Environmental Information Document

For

Post-Suspension Activities on the Nine Federal Undeveloped Units and Lease OCS-P 0409

Offshore Santa Barbara, Ventura, and San Luis Obispo Counties

Prepared for
U.S. Department of the Interior
Minerals Management Service
Pacific Outer Continental Shelf Region

Prepared by
Aspen Environmental Group

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ENVIRONMENTAL INFORMATION DOCUMENT
FOR
POST-SUSPENSION ACTIVITIES ON THE NINE FEDERAL UNDEVELOPED UNITS AND LEASE OCS-P 0409

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1.1 General Overview

This Environmental Information Document (EID) has been prepared by Aspen Environmental Group for the U.S. Department of the Interior, Minerals Management Service (MMS) to evaluate the possible environmental effects associated with the potential exploration and development of the nine undeveloped oil and gas units[1] and one non-unitized lease on the Pacific Outer Continental Shelf (OCS) located offshore southern California (Figure 1-1). The operators of the undeveloped leases have requested suspensions of operations or production[2] from the MMS. These undeveloped units and lease lie between 3 and 12 miles offshore Santa Barbara, Ventura, and southern San Luis Obispo Counties. Ten suspension requests have been made by five operators as presented in Table 1-1.

Table 1-1. Summary of Suspensions.

Operator	Units (leases inside the unit in parentheses)
Aera Energy LLC	Non-Unitized (Lease OCS-P 0409)
	Lion Rock Unit (Leases OCS-P 0396, 0397, 0402, 0403, 0408, 0414)
	Point Sal Unit (Leases OCS-P 0415, 0416, 0421, 0422)
	Purisima Point Unit (Leases OCS-P 0426, 0427, 0432, 0435)
	Santa Maria Unit[3] (Leases OCS-P 0420 , 0424, 0425, 0429, 0430, 0431, 0433, 0434)
Plains Exploration & Production Company	Bonito Unit[4] (Leases OCS-P 0443, 0445, 0446, 0449, 0450, 0499, 0500)
Arguello, Inc.	Rocky Point Unit (Leases OCS-P 0452, 0453)
Samedan Oil Corporation	Sword Unit (Leases OCS-P 0319, 0320, 0322, 0323A)
Samedan Oil Corporation	Gato Canyon Unit[3] (Leases OCS-P 0460, 0462, 0464)
Venoco, Inc.	Cavern Point Unit (Leases OCS-P 0210, 0527)

The potential environmental effects resulting from activities that may occur *during* the suspensions are evaluated in Environmental Assessments (EA's) that were published by the MMS in February 2005. This EID evaluates the potential *post*-suspension activities, presented as hypothetical scenarios in the period following the suspensions. When, and if, operators submit new or revised Exploration Plans (EP's) and/or Development and Production Plans (DPP's) to the MMS, the actual locations, sizes, and types of activities will be known. All EP's and DPP's will be subject to a thorough review under the National Environmental Policy Act (NEPA), MMS laws and regulations, the Coastal Zone Management Act (CZMA), other Federal and State laws, and they will be provided to affected agencies and the interested public for review. These operator's activities could potentially take place during the 2006–2030 time period and include (1) exploration and delineation drilling, (2) platform and pipeline construction, if necessary, (3) production activities, and (4) decommissioning of facilities. Activities may also include administrative efforts such as revisions to EP's and DPP's, technical analyses, and shallow hazards, archaeological, and biological surveys.

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1 A unit is defined as a number of leases grouped together to prevent waste, conserve natural resources of the OCS, or protect correlative rights, including Federal royalty interests.
2 A suspension is defined in 30 CFR §250.105 as "a granted or directed deferral of the requirement to produce (Suspension of Production [SOP]) or to conduct leaseholding operations (Suspension of Operations [SOO])."
3 By decision dated August 16, 1999, the MMS removed three leases in the Santa Maria Unit (OCS-P 0420, 0424, and 0429) and one in the Gato Canyon Unit (OCS-P 0462) and they expired. The lessees appealed the decision to the Interior Board of Land Appeals. For purposes of environmental analysis, they are included in the EID pending final outcome of the appeal.
4 Only the portion of Lease OCS-P 0450 that is in the Bonito Unit is being considered for a suspension. The remaining portion of the lease is within the Point Arguello Unit.

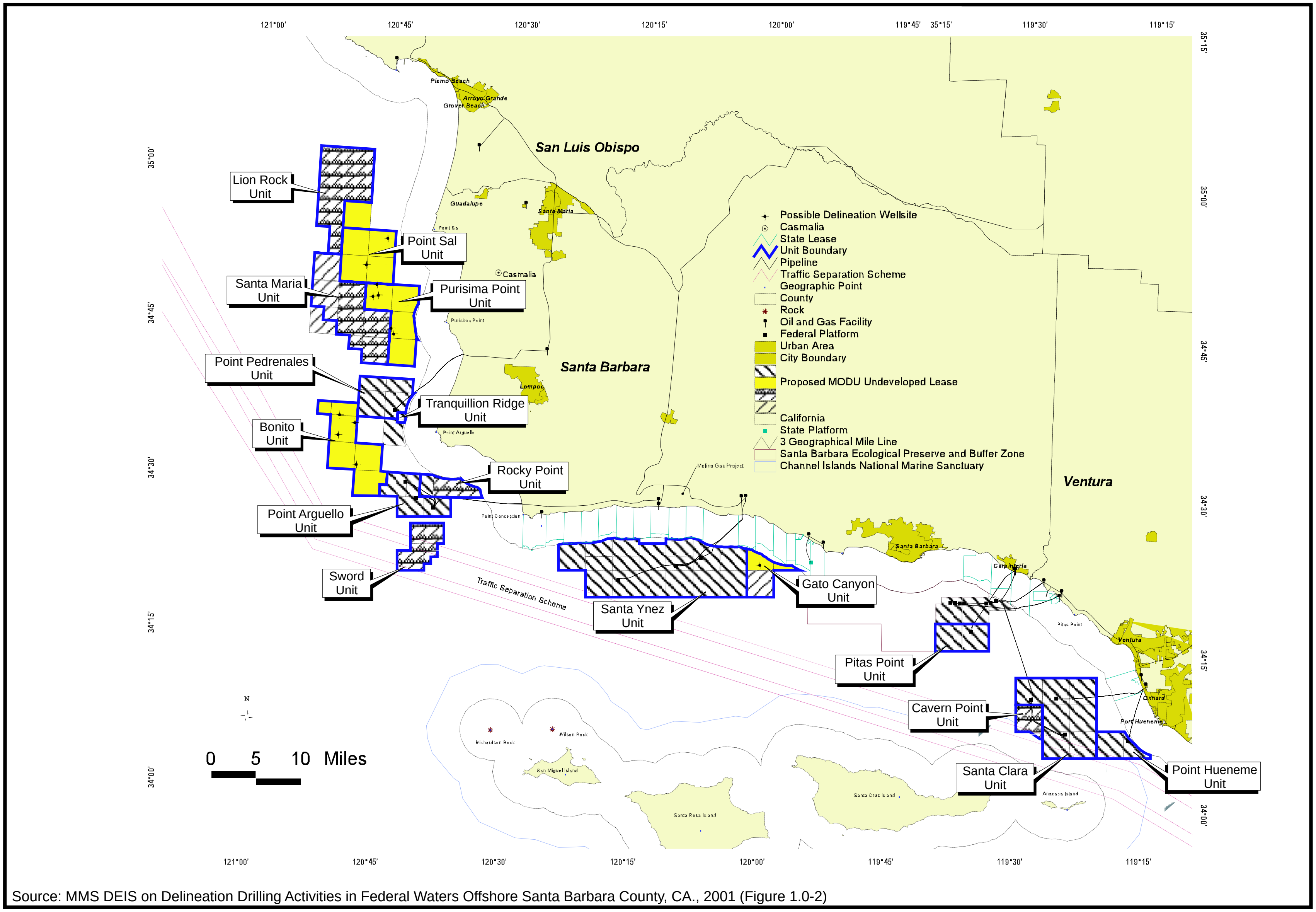


Figure 1-1. The undeveloped federal OCS oil and gas leases offshore Southern California: Point Sal Unit, Purisima Point Unit, Bonito Unit, Rocky Point Unit, Sword Unit, Gato Canyon Unit, and Cavern Point Unit. Individual lease OCS-P 0409 is located north and adjacent to the Point Sal Unit.

The environmental analysis contained in this EID includes potential effects on 14 resource/issue-specific topics. These include:

- Geology
- Climate and Meteorology
- Air Quality
- Physical Oceanography
- Water Quality
- Biological Resources
  - Rocky and Sandy Beach Habitat
  - Seafloor Resources
  - Kelp Beds
  - Marine and Coastal Birds
  - Marine Mammals
  - Threatened and Endangered Species
  - Estuarine and Wetland Habitats
  - Refuges, Preserves and Marine Sanctuaries
  - Onshore Biological Resources
- Cultural Resources
- Visual Resources
- Recreation
- Community Characteristics and Tourism
- Social and Economic Environment
  - Employment and Population
  - Housing
  - Infrastructure
  - Public Services and Finances
  - Non-Residential Land Use
- Commercial Fishing and Kelp Harvest
- Marine Recreational Fishing
- Military Operations
- Oil Spills, Risk, Movement and Response

Appendix G of this EID presents "Information Addressing Issues Raised by the California Coastal Commission in a Letter to MMS dated August 5, 1999." These issues and MMS's responses are summarized in the appendix. Additionally, the appendix cross-references applicable sections of this EID that relate to these issues.

This EID has been prepared to support the ten suspensions' Consistency Determinations (CD's) submitted by the MMS to the California Coastal Commission (CCC), pursuant to Section 307(c)(1) of the CZMA[5].

1.2 Reader's Guide to the EID

1.2.1 Technical Approach

This EID uses the MMS June 2001 Draft Environmental Impact Statement (DEIS) for proposed delineation drilling offshore Santa Barbara County as its foundation. The resource/issue-specific discussions in DEIS Chapter 4 ("Description of the Affected Environment") and DEIS Chapter 6 ("Cumulative Impact Analysis for the 36 Undeveloped Leases [2002 – 2030]") are employed in the same sequence for Sections 4 and 5, respectively, of the EID. Much of the resource/issue-specific content of the DEIS is germane to the EID and has not changed since its publication in 2001. The EID discussions, however, have been revised on a resource/issue-specific level to reflect the following:

- Resource/issue-specific "baseline" descriptions have been updated in the EID as needed to reflect current conditions;
- Impacts that may occur *during* the suspensions are addressed in the EA's (see Section 1.3.2) and are not addressed in the EID;
- The timeframe for the post-suspension impact assessment has been modified from the DEIS long-term period 2002 through 2030, to EID period 2006 through 2030;
- The cumulative projects addressed in this EID have been updated to reflect the current status of the operator's hypothetical exploration and development projects, and other anticipated projects in the study area; and,
- The analyses in this EID have been updated, as needed, to address the nine issues addressed by the CCC in its August 5, 1999 letter to MMS.

[5] A Federal agency may submit the information sufficient to support the consistency statement in any manner it chooses so long as the requirements of 15 CFR 930.39(a) are satisfied.

Updates to the "Affected Environment" in EID Section 4 were made by establishing that environmental and regulatory conditions that have or may have changed since 2001, and collecting and assessing the data needed to address these changes. Revisions, additions, and deletions to the DEIS text were subsequently revised to reflect current (2004 through 2005) conditions. The data and information sources used for these updates were reviewed and/or referenced, as appropriate, on a resource/issue-specific basis in EID Section 4 (Affected Environment).

Updates to the near- and long-term cumulative projects considered in Section 5 of this EID were made by researching the projects addressed in Chapters 5 and 6 of the DEIS to establish: (1) which projects listed in the DEIS had been completed or were otherwise no longer applicable for consideration; and (2) what new projects have been proposed within the study area since 2001 that could be anticipated and thus appropriate for consideration in this document. In addition, new information regarding Pacific OCS activities for both the near- and long-term projects was factored into the cumulative project listing based upon known projects and hypothetical exploration, development, and decommissioning plans communicated to the MMS by OCS operators. Revisions to the DEIS cumulative projects listing were subsequently made and the resource/issue-specific cumulative analyses of the DEIS were modified as warranted to reflect (1) the new cumulative project information, and (2) the newly established cumulative project timeframe of the EID (2006 through 2030), as opposed to the period of 2002 through 2030 presented in the DEIS. Each resource/issue-specific area is addressed in the EID by examining how the potential projects listed apply to the cumulative analysis.

In addition to these overall updates, the affected environment and impact analyses of the EID incorporate review and consideration of the August 5, 1999, scoping comments made by the (CCC) on the DEIS (Appendix G). Identified issues included potential effects on sea otter populations, potential effects on the Monterey Bay National Marine Sanctuary, changes in State and local air quality regulations, changes in water quality regulations, potential effects of drill muds and cuttings on hard bottom habitat, potential effects of undersea noise on marine mammals and other marine life, technological changes, changes in operators and their compliance with environmental protections required under current Federal, State and local regulations since submittal of the original Exploration Plans (EP's), and cumulative impacts of the exploration and development of the undeveloped leases.

1.2.2 Content of the EID

The content, scope and analysis are contingent upon several concepts that the reader should bear in mind during review. These include:

- The EID considers *post*-suspension activities. [Seven of the suspensions are strictly administrative in nature, and no physical activities will occur during the suspensions. The three other suspensions (for the Gato Canyon Unit [Samedan Oil Corp.] and Point Sal and Purisima Point Units [Aera Energy LLC]) are also administrative in nature; however, physical activities would occur during the suspensions. These physical activities are shallow hazards and biological surveys.]
- The study area for the EID was defined to allow analysis of the effects of a hypothetical exploration, development, and decommissioning scenario. The scenario encompasses the Pacific OCS undeveloped leases located offshore Santa Barbara, Ventura, and San Luis Obispo County. The factors that define the geographic scope include:
  - The placement of a hypothetical mobile offshore drilling unit (MODU);
  - The placement of hypothetical development platforms;
  - The placement of hypothetical subsea pipelines to transport oil and gas to existing or new onshore facilities; and
  - Potential oil spill effects.

- Section 5 of the EID presents a cumulative impact analysis for the period 2006 through 2030. In this cumulative analysis, the incremental effect of the hypothetical exploration, development, and decommissioning scenario for the undeveloped leases is added to the effects of past, present, and anticipated projects in the study area. The time period for these effects covers the time for exploration and production of hydrocarbon resources, and the decommissioning of the hypothetical platforms and existing platforms. These activities include oil and gas operations on developed leases plus other projects in the area. When, and if, operators submit new or revised EP's and/or DPP's to the MMS, the actual locations, sizes, and types of activities will be known. All EP's and DPP's will be subject to a thorough review under the National Environmental Policy Act (NEPA), MMS laws and regulations, the CZMA, other Federal and State laws, and they will be provided to affected agencies and the interested public for review.
- The potential effects of the activities that occur *during* the suspensions were assessed in the EA's. A summary is provided in Chapter of 1.4.2 of this EID.
- This EID is not an environmental review document pursuant to the requirements of either NEPA or the California Environmental Quality Act (CEQA).

The EID contains eight sections, each of which addresses a separate aspect of the post-suspension effects. To help the reader locate information of particular interest, a brief summary of the contents of each section of the EID is provided below.

- **Section 1. Introduction.** Section 1 provides an overview of the suspensions, the environmental resources and issue areas addressed in the EID, the scope of the EID's "baseline" and impact analyses, related environmental review documents and a summary of operator activities.
- **Section 2. Background and Purpose.** Section 2 provides an overview of the developed and undeveloped leases of the Pacific OCS, with emphasis placed upon leases offshore Santa Barbara, Ventura, and San Luis Obispo Counties, background regarding the history of the undeveloped leases, suspension history, and actions leading to review of these suspensions by the CCC.
- **Section 3. Regulatory and Administrative Framework.** Section 3 provides an overview of the Federal laws and regulations relating directly or indirectly to MMS's regulatory responsibilities.
- **Section 4. Affected Environment.** Section 4 presents existing ("baseline") conditions of the study area on a resource/issue-specific level.
- **Section 5. Environmental Consequences of Post-Suspension Activities.** Section 5 addresses the potential impacts of the post-suspension activities on a resource/issue-specific level in conjunction with the hypothetical exploration, development, production, and decommissioning activities of the undeveloped leases, anticipated activities associated with the developed leases, and other projects anticipated to occur in the study area between 2006 and 2030.
- **Section 6. Document Contributors and Reviewers.** Section 6 provides a listing of the persons involved in the preparation and review of this document.
- **Section 7. References.** Section 7 identifies all of the references used and cited in the EID.

In addition to these sections, the EID contains several technical appendices that were used, reviewed or developed during preparation of the document.

1.3 Related Environmental Review Documents

As the principal Federal agency responsible for oil and gas development in the Pacific OCS, the MMS must conduct its oversight and approval of such development in compliance with several Federal laws and their associated implementing regulations. The MMS is charged with ensuring compliance with NEPA prior to approving any proposed OCS activity that constitutes an "Action." In completing its NEPA review for a proposed action, the MMS may conduct categorical exclusion reviews or prepare either an EA or an EIS, depending on the breadth and magnitude of the proposed action's possible environmental effects.

1.3.1 Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, California - Draft Environmental Impact Statement

In June 2001, the MMS Pacific OCS Region published a DEIS addressing the potential environmental effects of proposed delineation drilling from a MODU in Federal waters offshore Santa Barbara County. The Proposed Action of the DEIS addressed the Point Sal Unit (Leases OCS-P 0415, 0416, 0421 and 0422), Purisima Point Unit (Leases OCS-P 0426, 0427, 0432, 0435), Bonito Unit (Leases OCS-P 0443, 0445, 0446, 0449, 0499, 0500) and Gato Canyon Unit (Leases OCS-P 0460 and 0464). The DEIS addressed potential impacts for the same resource/issue-areas listed above; potential cumulative impacts for these resources were addressed for the periods 2002 through 2006, and 2002 through 2030.

Subsequent to publication of the DEIS, on July 2, 2001, MMS directed suspensions on all of the undeveloped leases to provide time for the preparation of CD's and NEPA documentation, as directed by the District Court in California v. Norton. Also, as a result of the Court decision, MMS postponed work on the DEIS, including postponement of the DEIS public hearings and extension of the comment period.

1.3.2 Suspension Decisions Environmental Assessments

MMS has prepared six NEPA Environmental Assessments (EA's) addressing the potential impacts associated with the suspensions. The Draft EA's were made available for public and agency review on November 17, 2004, with the public review period ending on December 16, 2004. The EA's were finalized in February 2005. The EA's include:

- MMS Proposal to Grant Suspensions of Production for Aera Energy LLC's Lion Rock Unit, Point Sal Unit, Purisima Point Unit, Santa Maria Unit (Leases OCS-P 0396, 0397, 0402, 0403, 0408, 0414, 0415, 0416, 0420, 0421, 0422, 0424, 0425, 0426, 0427, 0429, 0430, 0431, 0432, 0433, 0434, 0435) and Lease OCS-P 0409
- MMS Proposal to Grant Suspension of Production for Plains Exploration & Production Company's Bonito Unit (Leases OCS-P 0433, 0445, 0446, 0449, 0450, 0499 and 0500)
- MMS Proposal to Grant Suspension of Production for Arguello Inc.'s Rocky Point Unit (Leases OCS-P 0452, 0453)
- MMS Proposal to Grant Suspension of Production for Samedan Oil Corporation's Sword Unit (Leases OCS-P 0319, 0320, 0322, 0323A)
- MMS Proposal to Grant Suspension of Production for Samedan Oil Corporation's Gato Canyon Unit (Leases OCS-P 0460, 0462 and 0464)
- MMS Proposal to Grant Suspension of Operations for Venoco, Inc.'s Cavern Point Unit (Leases OCS-P 0210, 0527).

The EA's address potential environmental effects associated with Air Quality, Protected Species of Marine Mammals and Sea Turtles, Fish Resources, Managed Species and Essential Fish Habitat, Commercial Fishing, Military Operations, Recreational Fishing and Diving and Environmental Justice during the suspensions. The EA's conclude that all potential impacts from activities occurring during the suspensions can be mitigated to an insignificant level. The MMS issued findings of no significant impact based on each of the EA's on February 11, 2005.

1.3.3 Other Environmental Documents

In addition to the above referenced environmental review documents prepared by the MMS for NEPA compliance, two other studies associated with Pacific OCS offshore development in the study area are especially relevant to this EID: the "California Offshore Oil and Gas Energy Resources Study"

(COOGER Study) and the Santa Barbara County "North County Siting Study." Summaries of these environmental documents are provided below.

- **COOGER Study.** The COOGER Study was designed by a joint government, industry, and public working group to address concerns about the potential demands on onshore infrastructure from expanded oil and gas development in both State and Federal waters. The Study assessed and compared a suite of potential Pacific OCS development scenarios for Santa Barbara, Ventura, and San Luis Obispo Counties over a 20-year timeframe (1995 though 2015). The Draft COOGER Study, published in January 1999, included an analysis of existing onshore conditions for land use, public infrastructure, biological resources, air quality, water supply and demand, cultural resources, and socioeconomics (MMS, 1999). The Final COOGER Study, published in January 2000, focused its constraints analysis for the potential development scenarios to industrial and public infrastructure demand within the study area (MMS, 2000).
- **North County Siting Study.** The County of Santa Barbara published its final North County Siting Study in October 2000. This Study focused on the Pacific OCS undeveloped leases offshore Santa Barbara County as they relate to potential onshore processing options. The Study included technical consideration of the oil and gas produced from these leases, the potential use of existing onshore processing facilities, and an evaluation of the environmental conditions and constraints (including adopted County policies) associated with the siting of a new onshore processing facility. The Study included assessment of public safety and hazardous materials, geology and hydrology, agricultural, biological, visual and cultural resources, land use, public services, noise, circulation and air quality for northern Santa Barbara County. The Study concluded that if a new onshore processing facility is necessary for development of the undeveloped leases, the "Casmalia East" and "Casmalia West" sites, located north of Vandenberg Air Force Base, would be strongly preferred (County of Santa Barbara, 2000).

1.4 Summary of Operator Activities

For the purpose of the EID, the effects of hypothetical post-suspension activities are considered (see section 5.2.3). Previous operator activities and activities during the suspensions are summarized below.

1.4.1 Previous Operator Activities

On July 2, 2001, MMS directed SOO's for the 9 units and 1 non-unitized lease, pursuant to the Court's decision in *California v. Norton*. Prior to the issuance of the 2001 Directed SOO's, MMS had approved suspension requests for the 9 units and 1 non-unitized lease, and some survey activities were conducted on the leases under the approved suspensions. Following are summaries of those activities:

- **Aera Energy LLC's Units and Non-Unitized Lease.** MMS approved SOP's for the Lion Rock, Point Sal, Santa Maria, and Purisima Point Units and non-unitized Lease OCS-P 0409 on November 12, 1999. Following SOP approval, Aera submitted a full digital copy of the 3-D seismic data to MMS on January 19, 2000, and submitted project descriptions for the units and non-unitized lease on February 29, 2000. A set of eight structure maps and eight sections were developed from a reinterpretation of the 3-D seismic survey and sent to MMS on April 28, 2000. Geohazards surveying operations were conducted during May and June 2001 on the Point Sal and Purisima Point Units. Aera submitted another plan for re-unitization on August 26, 2004; MMS is studying this request.
- **Nuevo Energy Company's (PXP's) Bonito Unit.** MMS approved Nuevo's SOP for the Bonito Unit on November 12, 1999. Following SOP approval, Nuevo submitted a project description on February 29, 2000, and submitted an Oil Spill Response Plan, Fisheries Plan, Marine Wildlife Contingency Plan, and a H2S Contingency Plan in July 2000. Nuevo geological and geophysical personnel met with the MMS to present their interpretation of the 1989 Chevron 3D seismic survey on January 29, 2000. Nuevo also submitted a plan to contract the Bonito Unit to remove unleased acreage from the unit boundaries, which was approved by MMS on October 25, 2000. Three months before issuance of the 2001 SOO, Nuevo provided the MMS with a shallow hazards survey Execution Plan. In 2004, Plains Exploration & Production Company acquired Nuevo Energy Company.

- **Samedan Oil Corporation's Sword and Gato Canyon Units.** SOP's for the Sword and Gato Canyon Units were approved on November 12, 1999. Following SOP approval, Conoco submitted a project description for the Sword Unit, and Samedan submitted a project description for the Gato Canyon Unit in February 2000. Samedan acquired the Sword Unit from Conoco on May 30, 2000, and proposed drilling of a new delineation well from Platform Hermosa and the abandonment of well #2 on Lease OCS-P 0320. In November 2000, Samedan submitted a draft project description for the abandonment of the well and a modified schedule of activities for the Sword Unit. In May and June 2001, some geohazards data were collected on the two units.
- **Venoco, Inc.'s Cavern Point Unit.** MMS approved the SOO for the Cavern Point Unit on November 12, 1999. Following SOO approval, Venoco submitted a project description on February 29, 2000 and submitted the following reports in June and July 2000: air quality and expected emissions data, information regarding consistency with the COOGER report, cumulative impact data, Marine Wildlife Contingency Plan, Fisheries Plan, and a Worst-Case Oil Spill Calculations. Venoco also submitted an EP, which was deemed submitted by MMS on June 4, 2001. Venoco withdrew the EP from review on July 3, 2001.
- **Arguello, Inc.'s Rocky Point Unit.** An SOP for the Rocky Point Unit was approved on November 12, 1999. Following SOP approval, Arguello submitted revisions to the Point Arguello DPP's in April 2001, which covered the development of the Rocky Point Unit with no new platforms or pipelines. In May of that year, Arguello submitted an application for a Final Development Plan (FDP) modification to the County of Santa Barbara. In addition, Arguello's consistency certification was forwarded by the MMS to the CCC. Following the Directed SOO, Arguello requested that the CCC suspend Federal consistency review for the proposed Rocky Point Unit revisions to the Point Arguello DPP's and submitted DPP and FDP revisions to develop only the eastern one-half (E/2) of Lease OCS-P 0451. In 2003, MMS contracted the Rocky Point Unit to remove the E/2 Lease OCS P-0451 from the unit. The CCC concurred with Arguello's consistency certification in August 2003. Necessary approvals were given by MMS and Santa Barbara County in August and September 2003, respectively. Arguello commenced production from the E/2 of the lease in October 2004.

1.4.2 Summary of Activities and Their Potential Impacts During the Suspensions

Following is a presentation of the abstracts taken from the MMS EA's for the suspension decisions.

- **Aera Energy LLC's (Lease OCS-P 0409; Lion Rock Unit—Leases OCS-P 0396, 0397, 0402, 0403, 0408, 0414; Purisima Point Unit—Leases OCS-P 0426, 0427, 0432, 0435; Point Sal Unit—Leases OCS-P 0415, 0416, 0421, 0422; and Santa Maria Unit—Leases OCS-P 0425, 0430, 0431, 0433, 0434)*:**

The MMS proposed action is to grant Suspensions of Production (SOP's) to Aera for 31 months for the Point Sal Unit and for 34 months for the Purisima Point, Lion Rock, and Santa Maria Units and Lease OCS-P 0409, located in the central Santa Maria Basin offshore northern Santa Barbara County and southern San Luis Obispo County. A suspension is defined in 30 CFR §250.105 as "a granted or directed deferral of the requirement to produce (SOP) or to conduct leaseholding operations [Suspension of Operations (SOO)]." Granting the suspensions would allow Aera time to conduct shallow hazards and biological surveys on the Point Sal and Purisima Point Units and to conduct administrative activities leading to the submittal of revised Exploration Plans to the MMS for subsequent technical and environmental review. MMS would approve, require modification, or disapprove the plans. Based on the implementation of both Aera's and MMS's mitigation measures identified in this Environmental Assessment, MMS concludes that all of the potential impacts identified for the surveys and for granting the suspensions are insignificant. Since there are no physical activities on the Lion Rock Unit and Santa Maria Unit or Lease OCS-P0409 as a result of granting the SOP's, there would be no environmental impacts for these two units and one non-unitized lease.

***** By decision dated August 16, 1999, the MMS removed three leases in the Santa Maria Unit (OCS-P 0420, 0424, and 0429) and they expired. The lessees appealed this decision to the Interior Board of Land

Appeals. For purposes of environmental analysis, they are included in this Environmental Assessment pending final outcome of the appeal.

- **Arguello Inc.'s Rocky Point Unit (Leases OCS-P 0452 and 0453):**

The MMS proposed action is to grant a Suspension of Production for Arguello, Inc.'s (Arguello) Rocky Point Unit for a period of 37 months. A suspension is defined in 30 CFR §250.105 as "a granted or directed deferral of the requirement to produce (Suspension of Production [SOP]) or to conduct leaseholding operations [Suspension of Operations [SOO])." Granting the suspension would allow Arguello 37 months to prepare revisions to the Platforms Hermosa and Hidalgo Development and Production Plans and submit them to MMS for subsequent technical and environmental review. MMS would approve, require modification, or disapprove the plans. All of these administrative activities would be completed by Arguello and/or their consultant(s) in an office setting and involve no physical activities on the unit itself. Since there are no impact-producing agents associated with Arguello's proposal, there would be no environmental impacts.

- **Plains Exploration and Production Company's Bonito Unit (Leases OCS-P 0443, 0445, 0446, 0449, 0450, 0499, and 0500)**:**

The MMS proposed action is to grant a Suspension of Production for Plains Exploration and Production Company's (PXP) Bonito Unit for a period of 18 months. A suspension is defined in 30 CFR §250.105 as "a granted or directed deferral of the requirement to produce (Suspension of Production [SOP]) or to conduct leaseholding operations (Suspension of Operations [SOO])." Granting the suspension would allow PXP 18 months to revise the Point Arguello Development and Production Plan (DPP) for Platform Hidalgo and submit it to MMS for subsequent technical and environmental review. MMS would approve, require modification, or disapprove the plans. All of these administrative activities would be completed by PXP and/or their consultant(s) in an office setting and involve no physical activities on the unit itself. Since there are no impact-producing agents associated with PXP's proposal, there would be no environmental impacts.

****** Only the portion of Lease OCS-P 0450 that is in the Bonito Unit is being considered for a suspension. The remaining portion of the lease is within the Point Arguello Unit.

- **Samedan Oil Corporation's Sword Unit (Leases OCS-P 0319, 0320, 0322, and 0323A):**

The MMS proposed action is to grant a Suspension of Production for Samedan Oil Corporation's (Samedan) Sword Unit for a period of 25 months. A suspension is defined in 30 CFR §250.105 as "a granted or directed deferral of the requirement to produce (Suspension of Production [SOP]) or to conduct leaseholding operations (Suspension of Operations [SOO])." Granting the suspension would allow Samedan 25 months to update and submit a revised Exploration Plan to MMS for subsequent technical and environmental review. MMS would approve, require modification, or disapprove the plan. All of these administrative activities would be completed by Samedan and/or their consultant(s) in an office setting and involve no physical activities on the unit itself. Since there are no impact-producing agents associated with Samedan's proposal, there would be no environmental impacts.

- **Samedan Oil Corporation's Gato Canyon Unit—Leases OCS-P 0460 and 0464***:**

The MMS proposed action is to grant a Suspension of Production (SOP) to Samedan Oil Corporation for 37 months for the Gato Canyon Unit, located in the western Santa Barbara Channel offshore Santa Barbara County. A suspension is defined in 30 CFR §250.105 as "a granted or directed deferral of the requirement to produce (SOP) or to conduct leaseholding operations (Suspension of Operations [SOO])." Granting the suspension would allow Samedan time to conduct a shallow hazards survey on the Gato Canyon Unit and to conduct administrative activities leading to the submittal of a revised Exploration Plan (EP) to the MMS for subsequent technical and environmental review. MMS would approve, require modification, or disapprove the plan. Based on the implementation of both Samedan's and MMS's mitigation measures identified in the Environmental Assessment, MMS concludes that all of the potential impacts identified for the survey and for granting the suspension are insignificant.

*******By decision dated August 16, 1999, the MMS removed one lease from the Gato Canyon Unit (OCS-P 0462) and it expired. The lessees appealed this decision to the Interior Board of Land Appeals. For purposes of environmental analysis, it is included in this Environmental Assessment pending final outcome of the appeal.

- **Venoco, Inc.'s Cavern Point Unit (Leases OCS-P 0210 and 0527):**

The MMS proposed action is to grant a Suspension of Operations for Venoco's Cavern Point Unit for a period of 13 months. A suspension is defined in 30 CFR §250.105 as "a granted or directed deferral of the requirement to produce (Suspension of Production [SOP]) or to conduct leaseholding operations (Suspension of Operations [SOO])." Granting the suspension would allow Venoco 13 months to update and resubmit their Exploration Plan (EP) and to complete the interpretation and analysis of seismic data from previous surveys, and submit this information to MMS for subsequent technical and environmental review. MMS would approve, require modification, or disapprove the plan. All of these administrative activities would be completed by Venoco and/or their consultant(s) in an office setting and involve no physical activities on the unit itself. Since there are no impact-producing agents associated with Venoco's proposal, there would be no environmental impacts.

2.1 Introduction

This section provides a regional overview of the Pacific OCS area.

2.2 Overview of Pacific OCS Region Offshore Santa Barbara, Ventura and San Luis Obispo Counties

The Pacific OCS Region of the MMS extends from the California-Mexico border to the Washington-Canada border. Historically, MMS has issued leases for natural gas and oil exploration off Washington, Oregon, and California. Currently, however, existing oil and gas leases are limited to offshore southern California.

There are 79 existing Federal OCS oil and gas leases offshore California and 4 expired leases that are under appeal[1]. Forty-three of these leases are developed (i.e., oil and/or gas is being produced from them). The remaining undeveloped leases lie between 3 and 12 miles offshore Santa Barbara, Ventura, and San Luis Obispo Counties. The undeveloped leases are grouped into nine units and one individual lease that is not unitized (Lease OCS-P 0409). Table 2.2-1 presents a summary of the undeveloped leases/units and Table 2.2-2 summarizes the developed leases/units.

Table 2.2-1. Summary of the Undeveloped Pacific OCS Oil and Gas Units and Leases.

Lease Number(s)	Unit	Operator
OCS-P 0409	N/A	Aera Energy LLC
OCS-P 0396, 0397, 0402, 0403, 0408, 0414	Lion Rock	Aera Energy LLC
OCS-P 0415, 0416, 0421, 0422	Point Sal	Aera Energy LLC
OCS-P 0426, 0427, 0432, 0435	Purisima Point	Aera Energy LLC
OCS-P 0420[1], 0424[1], 0425, 0429[1], 0430, 0431, 0433, 0434	Santa Maria	Aera Energy LLC
OCS-P 0443, 0445, 0446, 0449, 0450, 0499, 0500	Bonito[2]	Plains Exploration & Production Company
OCS-P 0452, 0453	Rocky Point	Arguello Inc.
OCS-P 0319, 0320, 0322, 0323A	Sword	Samedan Oil Corporation
OCS-P 0460, 0462[1], 0464	Gato Canyon	Samedan Oil Corporation
OCS-P 0210, 0527	Cavern Point	Venoco, Inc.

Nineteen platforms support production of the developed leases offshore Santa Barbara and Ventura Counties. No platforms are located offshore San Luis Obispo County. Table 2.2-3 provides a summary of these Pacific OCS platforms.

The 19 platforms included in Table 2.2-3 are supported by existing offshore and onshore oil and gas infrastructure, such as pipelines and processing and separation facilities. Onshore facilities supporting Pacific OCS oil and gas development in the study area include:

Ventura County

- Mandalay Onshore Separation Facility
- West Montalvo Operations
- Rincon Oil and Gas Processing Facility

1 By decision dated August 16, 1999, the MMS removed three leases in the Santa Maria Unit (OCS-P 0420, 0424, and 0429) and one in the Gato Canyon Unit (OCS-P 0462) and they expired. The lessees appealed the decision to the Interior Board of Land Appeals. For purposes of environmental analysis, they are included in the EID pending final outcome of the appeal.

2 Only the portion of Lease OCS-P 0450 that is in the Bonito Unit is being considered for a suspension. The remaining portion of the lease is within the Point Arguello Unit.

- La Conchita Oil and Gas Processing Facility

Santa Barbara County

- Carpinteria Onshore Gas Facility
- Carpinteria Oil and Gas Processing Terminal
- Las Flores Canyon Santa Ynez Unit Oil and Gas Processing Facility
- Las Flores Canyon Gas Processing Facility
- Gaviota Oil and Gas Processing Facility
- Lompoc Oil and Gas Processing Facility

Table 2.2-2. Summary of the Developed Pacific OCS Oil and Gas Units and Leases.

Lease Number(s)	Unit Name	Operator
OCS-P 0166	N/A	Pacific Offshore Operators, LLC
OCS-P 0180, 0181, 0182, 0183, 0187, 0188, 0189, 0190, 0191, 0192, 0193, 0194, 0195, 0326, 0329, 0461	Santa Ynez Unit	ExxonMobil Corporation
OCS-P 0202, 0203	Point Hueneme Unit	Plains Exploration & Production Company
OCS-P 0204, 0205, 0208, 0209, 0217	Santa Clara Unit	Venoco, Inc.
OCS-P 0215, 0216	Santa Clara Unit	Plains Exploration & Production Company
OCS-P 0234, 0346	Pitas Point Unit	Plains Exploration & Production Company
OCS-P 0240, 0241	N/A	Plains Exploration & Production Company
OCS-P 0296 OCS-P 0300, 0301, 0306	Beta Unit[3]	Plains Exploration & Production Company Aera Energy LLC
OCS-P 0315, 0316, 0450, 0451West 1/2[4]	Point Arguello Unit	Arguello, Inc.
OCS-P 0437, 0438, 0440, 0441[5]	Point Pedernales Unit	Plains Exploration & Production Company
OCS-P 0441[5], 0444	Tranquillon Ridge Unit	Plains Exploration & Production Company
OCS-P 0451 East 1/2[4]	N/A	Arguello, Inc.

Table 2.2-3. Summary of Existing Platforms Offshore Santa Barbara and Ventura Counties.

Platform	Operator	Nearest Onshore Point	Field (Unit)
Gail	Venoco, Inc.	Port Hueneme	Sockeye (Santa Clara Unit)
Grace	Venoco, Inc.	Mandalay	Santa Clara (Santa Clara Unit)
Gilda	Plains Exploration & Production Company	Mandalay	Santa Clara (Santa Clara Unit)
Gina	Plains Exploration & Production Company	Port Hueneme	Hueneme (Point Hueneme Unit)
Hermosa	Arguello, Inc.	Point Arguello	Point Arguello (Point Arguello Unit)
Harvest	Arguello, Inc.	Point Arguello	Point Arguello (Point Arguello Unit)
Hidalgo	Arguello, Inc.	Point Arguello	Point Arguello (Point Arguello Unit)
Habitat	Plains Exploration & Production Company	Carpinteria	Pitas Point (Pitas Point Unit)
Hillhouse	Plains Exploration & Production Company	Summerland	Dos Cuadras
A	Plains Exploration & Production Company	Summerland	Dos Cuadras
B	Plains Exploration & Production Company	Summerland	Dos Cuadras
C	Plains Exploration & Production Company	Summerland	Dos Cuadras
Henry	Plains Exploration & Production Company	Carpinteria	Carpinteria
Hogan	Pacific Operators Offshore LLC	Carpinteria	Carpinteria
Houchin	Pacific Operators Offshore LLC	Carpinteria	Carpinteria
Heritage	ExxonMobil	Gaviota	Sacate, Pescado (Santa Ynez Unit)
Harmony	ExxonMobil	Gaviota	Hondo (Santa Ynez Unit)
Hondo	ExxonMobil	Gaviota	Hondo (Santa Ynez Unit)
Irene	Plains Exploration & Production Company	Point Pedernales	Point Pedernales (Point Pedernales Unit) Tranquillon Ridge (Tranquillon Ridge Unit)

[3] The Beta Unit is located offshore Huntington Beach, Orange County, California and is not within the study area of this EID.
[4] The western ½ of Lease OCS-P 0451 is part of the Point Arguello Unit. The eastern ½ of Lease OCS-P 0451 is not unitized.
[5] Lease OCS-P 0441 is part of the Point Pedernales Unit and Tranquillon Ridge Unit.

In addition to Pacific OCS activities, the region includes oil and gas leases and production in California State waters (State tide and submerged lands). State leases fall under the management and administration of the California State Lands Commission (SLC). Currently, there are 32 leases in State waters, 17 of which were producing, 12 were non-producing, and 3 were undeveloped (California State Lands Commission, 2004). No State platforms are located offshore San Luis Obispo County and there are no corresponding onshore support facilities located in San Luis Obispo or northern Santa Barbara County. Platform Holly, located offshore Goleta (Santa Barbara County), and Rincon Island, located offshore Rincon Beach (Ventura County) are the only two offshore production facilities associated with State leases that are operational in the tri-county region. Platform Holly is supported onshore by the Ellwood Processing Oil and Gas Processing Facility, and Rincon Island is supported onshore by the Rincon Island and State Lease 145/410 Oil and Gas Processing Facility.

Offshore oil and gas production rates peaked in State waters in 1969 and in Federal waters in 1996 (MMS, 2001). Federal and State offshore oil and gas production rates for the years 1998 through 2002 are presented in Table 2.2-4.

Table 2.2-4 Offshore Oil and Gas Production Rates for 1998 through 2002.

Year	Oil Production Rates (bbl/day)		Gas Production Rates (Mcf/day)	
	Federal Waters	State Waters	Federal Waters*	State Waters*
1998	126,960	57,829	209,941	18,992
1999	107,618	49,692	219,709	17,808
2000	98,092	50,066	207,247	18,811
2001	90,897	46,500	194,443	18,693
2002	87,860	44,645	185,487	18,930

* Federal waters gas production is gross gas production. State waters gas production is net gas production.
Source: MMS, 2004d. Oil and Gas Production Rates. October, 2004.

2.3 Background

2.3.1 OCS Leasing in the Pacific OCS Region

The Federal OCS Lands Act, as amended (OCSLA) and Submerged Lands Act of 1953, as amended, stipulate that, in general, submerged lands beyond 3 miles of the coast are subject to the jurisdiction of the Federal Government. In accordance with the OCSLA, MMS is responsible for OCS oil and gas development planning, leasing, exploration and development permitting, and post-development (decommissioning) phase regulation of production platforms. MMS operating regulations are presented in Chapter 30 of the Code of Federal Regulations (CFR), Part 250.

Under the OCSLA, the Pacific OCS Region has conducted 12 lease sales. These lease sales occurred between 1961 and 1984, as follows:

- Phosphate Lease Sale, December 15, 1961
- Sale P-1, May 14, 1963
- Sale P-2, October 1, 1964
- Sale P-3, December 15, 1966
- Sale P-4, February 6, 1968
- Sale 35, December 11, 1975
- Sale 48, June 29, 1979
- Sale 53, May 28, 1981
- Sale 68, June 11, 1982
- Sale RS-2 (Reoffering Sale), August 5, 1982

- Sale 73, November 30, 1983
- Sale 80, October 17, 1984

Of these sales, nine included areas offshore Santa Barbara, Ventura, and San Luis Obispo Counties, including Sales P1, P3, P4, 48, 53, 68, RS-2, 73, and 80 (MMS, 2001).

In 1982, Congress began restricting new offshore leasing in select areas of the Pacific OCS through annual moratoria attached to the U.S. Department of the Interior's appropriations bills. In addition to these moratoria, in 1990 President George H.W. Bush directed that all areas protected by the moratoria be deferred for leasing until 1996 or 2000 depending on the area. In 1998, President Clinton issued a second directive that precludes any new leasing of the areas protected under moratorium until July 2012. Consequently, no new leasing has occurred in the Pacific OCS since Sale 80 (1984). The congressional moratoria and presidential deferrals do not, however, restrict the development of existing leases.

2.3.2 Suspension History

Each of the undeveloped leases had a primary lease term of 5 years. A suspension results in a deferral of the requirement to produce (Suspension of Production [SOP]) or to conduct leaseholding operations (Suspension of Operations [SOO]. The undeveloped leases offshore Santa Barbara, Ventura, and San Luis Obispo Counties were under directed suspension between 1993 and 1999 while the COOGER Study was being prepared. The COOGER Study assessed and compared a suite of potential Pacific OCS development scenarios for the Santa Barbara, Ventura, and San Luis Obispo County area over a 20-year timeframe (1995 though 2015).

In December 1998, near the end of the COOGER Study, MMS advised the lessees of the undeveloped leases to request suspensions or activate previously approved EP's or DPP's by May 15, 1999.

In November 1999, the MMS approved the requested suspensions and began preparation of a DEIS on proposed delineation drilling. The DEIS addressed the sequential drilling of four to five delineation wells from a MODU on four undeveloped units between 2002 and 2006. The purpose of the drilling was to enable the operators to plan for development and production. The DEIS was published for public and agency review in June 2001. The units covered in the DEIS included Point Sal (Leases OCS-P 0415, 0416, 0421 and 0422), Purisima Point (Leases OCS-P 0426, 0427, 0432, and 0435), Bonito (Leases OCS-P 0443, 0445, 0446, 0449, 0499 and 0500) and Gato Canyon (Leases OCS-P 0460 and 0464). Since the hypothetical development of the undeveloped leases was to occur between 2002 and 2030, the DEIS additionally evaluated long-term cumulative effects for the undeveloped leases during this 28-year period.

After the MMS granted the 1999 suspensions, the State of California filed suit against the Federal government, asserting that the suspensions should be subject to consistency review under CZMA. On June 20, 2001, the U.S. District Court of Northern California, Oakland (Court), ruled in favor of the State and directed MMS to set aside the suspension decisions, to provide Consistency Determinations to the CCC, and to provide a reasoned explanation for its reliance on the categorical exclusion under NEPA and the inapplicability of the extraordinary circumstances for the suspensions. The Court held that the suspensions were actions subject to coastal consistency review under CZMA Section 307 (c) (1) and 16 United States Code [USC] Section 1456 (c) (a) (*California v. Norton*). On July 2, 2001, the MMS set aside its 1999 suspension approvals while it responded to the court's ruling. In December 2002, the Ninth U.S. Circuit Court of Appeals upheld the 2001 Court ruling.

In February 2004, the Court ordered the MMS to propose a timetable for completing its analysis of the suspensions and its submittal of Consistency Determinations under CZMA. In April 2004, the operators of the undeveloped units and lease submitted revised suspension requests to the MMS, and in June 2004, the Court adopted MMS's proposed timeline, which included preparation of EA's pursuant to NEPA and

CD's pursuant to CZMA. The Draft EA's were made available for public review between November 17 and December 16, 2004, and were finalized in February 2005. The MMS issued findings of no significant impact based on each of the EA's on February 11, 2005. Additional information on the EA's is presented in Section 1.3.2 and 1.4.2 of the EID.

3.1 Introduction

Appendix H references those portions of Federal public laws, regulations, and MMS Lease Stipulations that are related directly or indirectly to the MMS's regulatory responsibilities for mineral leasing, exploration, and development and production activities on leases located on the submerged lands of the outer continental shelf (OCS). It also includes responsibilities and jurisdictions of other Federal agencies and departments that are involved in the regulatory process of oil and gas operations on the OCS. This is not intended to be a comprehensive summary of all laws associated with proposed exploration and development activities that might affect resources on the OCS or elsewhere. The brief descriptions are merely to acquaint the reader with the laws and are not meant as legal interpretations. For further information, the entire text of the laws should be reviewed. Appendix H is taken from Appendix 1.4 of the 2001 Draft Delineation Drilling EIS (MMS, 2001).

4.1 Introduction

This section describes the existing environment that could be affected by the hypothetical post-suspension activities. Additionally, this section describes past and present offshore oil and gas activities in the Pacific OCS Region. Each resource/issue-area description in this section includes a description of the existing environment, including a discussion of the impacts of past Pacific OCS activities on the resource/issue-area.

The study area covered in this EID is illustrated in Figure 4.1-1. Most of the impacts that could potentially result from the hypothetical post-suspension activities would be limited to the general geographic area of physical activities. The study area includes areas and resources potentially affected by the hypothetical development of all of the undeveloped units and lease on the Pacific OCS. The study area for this cumulative impact analysis of the undeveloped units and lease is addressed in Section 5 of this EID.

The impact analyses of the EID address the potential effects of the hypothetical post-suspension activities, including the cumulative impacts of past, present and potentially foreseeable actions through the hypothetical development of all of the undeveloped Federal units and lease for the period 2006 through 2030.

To properly describe the environment that could be impacted by the hypothetical development of all of the undeveloped units and lease, the geographical study area has been defined to include the environment that could be impacted from:

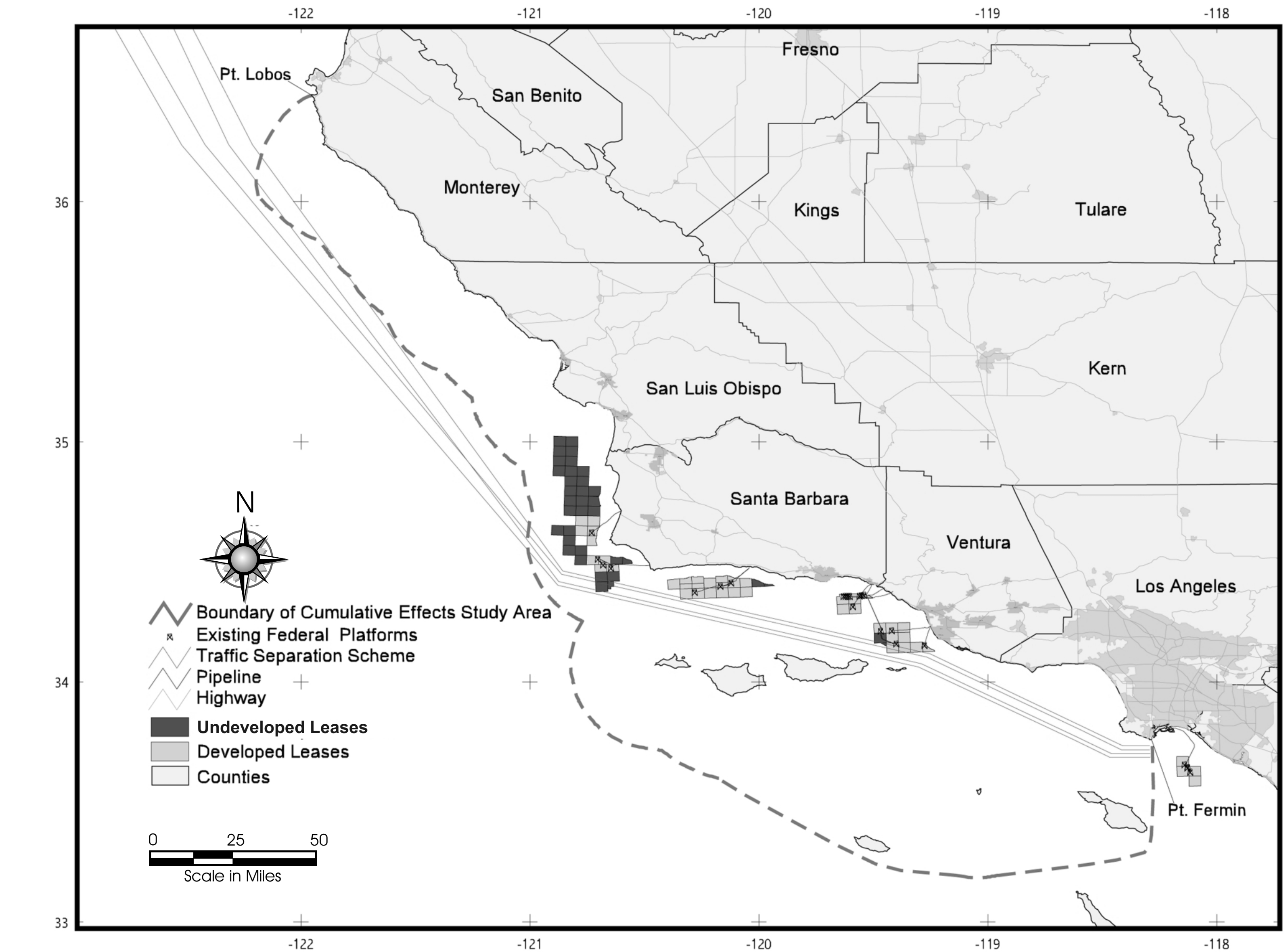
- Exploration and delineation drilling
- The hypothetical placement of development platforms
- The subsea pipelines to transport oil and gas to existing platforms and/or existing or new onshore facilities
- Potential oil spill effects over a greater area and longer timeframe than the extent of the undeveloped leases and post-suspension activities.

The expanded study area extends from Point Lobos in the north to Point Fermin in the south. It includes the Channel Islands, San Nicholas Island and Santa Catalina Island. It also includes the community of Casmalia — the assumed location of a hypothetical processing facility and related pipeline corridor (Figure 4.1-2).

4.1.1 Past and Present Offshore Oil and Gas Activities

Both past and existing natural and anthropogenic sources have strongly influenced the existing environment. The natural and anthropogenic sources that are found to have the largest effect on existing resources are discussed in this section and Section 5. Oil and gas development and production historically have been one of the larger industrial influences within Santa Barbara, Ventura and San Luis Obispo Counties.

The first offshore oil well was drilled from a pier in Summerland, Santa Barbara County, California, in 1897 (Lima, 1994 as cited in MMS, 2001). By the early 1950s, much of the Santa Barbara Channel had been explored, under various State and Federal laws. In 1953 the Federal Submerged Lands Act established State control over that portion of the submerged lands within State boundaries (to three miles offshore), and Federal jurisdiction over the submerged lands beyond the Sate boundary.



Source: MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 4.0-1)

Figure 4.1-1. The Study Area Boundary for the Cumulative Effects Analysis.

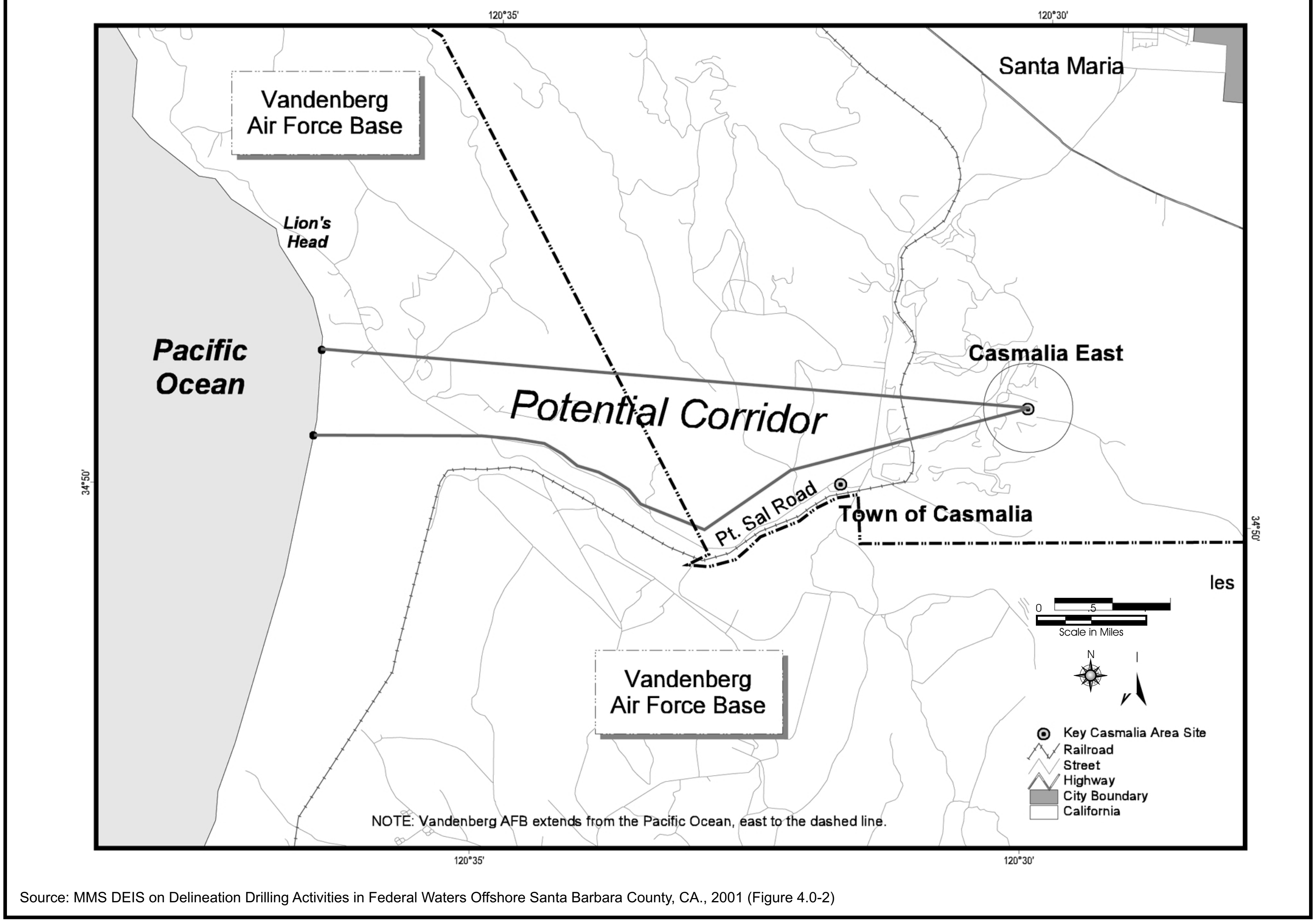
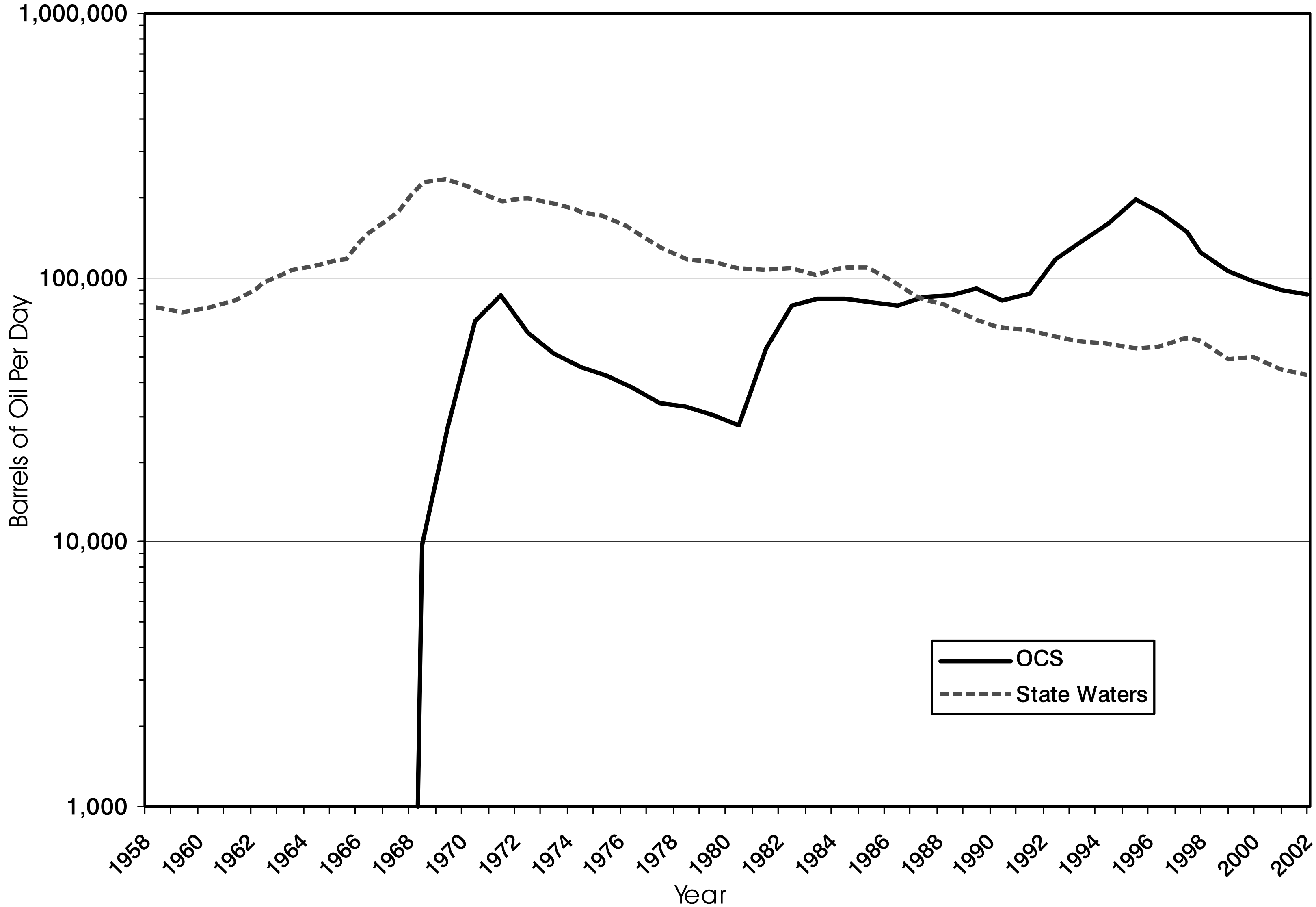


Figure 4.1-2. The Study Area for the Hypothetical Pipeline Landfall, Pipeline Route and Onshore Processing Facility.



Source: Revised from MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 4.0.1-1)

Figure 4.1-3. State and Federal Oil Production Offshore Southern California

There are currently 10 State and 23 Federal offshore oil and gas facilities from northern Santa Barbara County to Huntington Beach. Offshore oil production peaked in State waters in 1969 and in Federal waters in 1996. Figure 4.1-3 depicts annual State and Federal oil and gas production from offshore southern California. As of 2002, daily production from the 43 developed Pacific OCS leases offshore California was 87,860 barrels of oil and 185,487 million cubic feet of gas. This production is attributed to 13 fields. Remaining reserves for these fields was estimated to be 370 million barrels of oil and 1,205 billion cubic feet of gas (MMS, 2001). At January 2000 production rates, these reserves will last about 6 to 15 years for oil and 16 years for gas. Cumulative regional production as of January 2000 was 954 million barrels of oil and 1,104 billion cubic feet of gas (MMS, 2001).

There are 23 oil and gas platforms located on the Pacific OCS. The majority of the platforms (19) are located off the coast of Santa Barbara County and Ventura Counties. A total of 38 fields have been discovered in the California OCS, including 14 fields in the offshore Santa Maria Basin, 22 fields in the Santa Barbara Channel, and two fields in the offshore Los Angeles Basin.

To develop and produce offshore oil and gas, a complex and interrelated series of events are required. These operations or activities include: geophysical seismic surveys and geological sampling; drilling of exploration wells (including delineation drilling); installation of production facilities; development of oil and gas transportation systems; onshore processing facilities, pipe-line construction, support activities; and decommissioning activities. In addition, Alaska and foreign oil is imported by marine tankers to California. These activities have always had a potential to influence the environmental conditions within the study area. The following information on the recent past and present oil and gas activities is provided to foster understanding of the activities that may have influenced the existing environment.

4.1.1.1 Geological and Geophysical Surveys

Geological and geophysical (G&G) surveys are generally conducted prior to lease sales. The surveys often cover large areas. Table 4.1-1 provides the number of permits issued in the Pacific OCS Region for geological and geophysical surveys by fiscal year, 1960-1990. No G&G permits have been issued since 1990. Table 4.1-2 provides the number of G&G permits issued in the Santa Barbara Channel and Santa Maria Basin. These types of surveys are described below.

Geological Surveys. Geological surveys include bottom sampling, shallow coring, and drilling deep stratigraphic test wells. Bottom samples are obtained by dropping a weighted tube to the ocean floor and recovering it with an attached wire line. They can also be obtained from dredging. Shallow coring is performed by conventional rotary drilling equipment to obtain a near-surface sample of the rocks of the seabed. A deep stratigraphic test, as defined in 30 CFR 251.1, means drilling that involves the penetration into the sea bottom of more than 152 meters (500 feet). These wells are drilled primarily to gather geological information. Conversely, shallow test drilling, as defined in the same regulations, means drilling into the sea bottom to depths less than those specified in the definition of a deep stratigraphic test.

Geophysical Surveys. Geophysical surveys include two dimensional (2-D) and three dimensional (3-D) deep and shallow penetration surveys. Table 4.1-3 summarizes the 2-D and 3-D surveys conducted on the Pacific OCS by decade. On-lease surveys do not require a permit. Common Depth Point (CDP) seismic information is derived from a common location in the ocean sub-bottom where sound waves originating from various positions of the seismic (sound) source near the ocean surface are reflected back toward the surface. The 3-D information is used to delineate, in greater detail than that of traditional 2-D information, geologic structures that may be associated with the occurrence of natural gas and oil. Gravity surveys produce measurements of the gravitational field at a series of different locations over an area of interest.

Table 4.1-1. Number of Permits Issued for Geological and Geophysical Exploration in the Pacific OCS Region

Fiscal Year	Total Geological and Geophysical Permits	Geophysical Permits	Geological Permits	Permits for Deep Stratigraphic Tests	3-D Seismic Data Permits
1960–1968	153	132	21	0	0
1969	17	14	3	0	0
1970	6	5	1	0	0
1971	4	2	2	0	0
1972	4	4	0	0	0
1973	15	10	5	0	0
1974	36	29	7	0	0
1975	61	55	6	1	0
1976	32	30	2	0	0
1977	33	28	5	0	1
1978	38	30	8	1	0
1979	22	20	2	0	0
1980	31	27	4	0	0
1981	40	39	1	0	1
1982	62	60	2	0	5
1983	45	36	9	0	2
1984	56	42	14	0	8
1985	32	29	3	0	2
1986	20	19	1	0	5
1987	20	16	4	0	3
1988	33	25	8	0	2
1989	0	0	0	0	0
1990	4	3	1	0	0
Total	764	655	109	2	29

Source: MMS, 2001; Table A 10, OCS Report MMS 98 0027 and MMS Pacific OCS Records

Table 4.1-2. Santa Barbara Channel and Santa Maria Basin Geological and Geophysical Permits for the Pacific OCS*

Date	Geophysical Permits		Geologic Permits Issued	
	Number Issued	Miles Run	Sampling	Deep Stratigraphic Tests
1963	—	—	5	—
1964	2	0.02	1	—
1965	9	7,634	—	—
1966	16	9,607	1	—
1967	31	880	5	—
1968	12	10,187	1	—
1969	8	2,968	—	—
1970	4	2,750	—	—
1971	1	80	—	—
1972	3	120	—	—
1973	6	26,700	7	—
1974	23	58,401	—	—
1975	25	38,576	2	—
1976	21	23,551	2	—
1977	19	8,507	3	—

Date	Geophysical Permits		Geologic Permits Issued	
	Number Issued	Miles Run	Sampling	Deep Stratigraphic Tests
1978	23	15,309	5	—
1979	19	15,702	1	1
1980	22	33,702	—	—
1981	27	29,634	1	—
1982	28	25,614	1	—
1983	25	14,282	6	—
1984	28	16,180	8	—
1985	16	169	1	—
1986	15	12,960	—	—
1987	10	6,032	1	—
1988	9	5,118	3	—
1989	0	0	—	—
1990	1	230	1	—
Total	403	379	55	1

*All or a portion of the survey area was conducted in the Santa Barbara Channel or Santa Maria Basin Area.
Source: MMS, 2001

Table 4.1-3. Offshore Pacific OCS Region 2-D and 3-D Surveys by Decade

Survey Type	Decade				Total
	1960–1969	1970–1979	1980–1989	1990–1995	
2-D	186	147	188	3	524
3-D	0	2	30	1	33

Source: MMS, 2001

The objective in exploration work is to map density differences that may indicate different rock types. Gravity data usually are displayed as anomaly maps. Magnetic surveys measure the magnetic field or its component (such as the vertical component) at a series of different locations over an area of interest usually to locate concentrations of magnetic anomalies or to determine depth to basement.

4.1.1.2 Site Surveys for Pacific OCS Exploration, Development and Production

Site characterization surveys are conducted on-lease to detect seafloor and subsurface geologic and man-made hazards. Survey data is analyzed to ensure safety of exploration and production wells, and facilities and pipelines. High-resolution or acoustic-profiling surveys obtain information on the conditions existing at and near the surface of the seafloor. On-lease deep penetration seismic surveys have been conducted (Table 4.1-3 includes four 3-D surveys conducted on lease). Geological/geotechnical samples taken at the potential site of bottom-founded exploration and production platforms and within a proposed pipeline corridor are tested to categorize foundation-engineering conditions.

Underwater video/photography, hydrocarbon sniffer surveys, diver inspection, current velocity measurements, additional seafloor sampling and/or geologic age dating has been required to identify hazards, archaeological resources or sensitive habitats to ensure safety of personnel and equipment and protection (or avoidance) of archaeological resources, etc.

Platforms and pipelines installed in the Pacific OCS Region are periodically inspected in accordance with applicable regulations and regional Notices to Lessees and Operators. Inspections for platforms could include visual, cathodic protection, magnetic particle, or ultrasonic testing. Routine inspections on pipelines include visual (diver and/or remotely operated vehicle), side scan sonar (SSS), and high resolution internal surveys.

Exploration and Delineation Drilling. Exploration, as defined in 30 CFR 250.105, means the commercial search for oil, gas, or sulphur. For the purposes of this document, exploration drilling is synonymous with drilling delineation wells from a mobile offshore drilling unit (MODU). Exploration could also be drilled from an existing platform. Activities classified as exploration include but are not limited to: (1) G&G surveys using magnetic, gravity, seismic reflection, seismic refraction, gas sniffers, coring, or other systems to detect or imply the presence of oil, gas, or sulphur; and (2) any drilling conducted for the purpose of searching for commercial quantities of oil, gas, and sulphur, including the drilling of any additional well needed to delineate any reservoir to enable the lessee to decide whether to proceed with development and production. The drilling is usually conducted from MODUs such as a jackup, semi-submersible, or drillship. In the Pacific OCS Region there have been 326 exploration wells drilled (Table 4.1-4).

Table 4.1-4. Pacific OCS Region Exploration Wells from USDOI, MMS, Pacific Region, 1992

Lease Sale Name, Date and Area	Exploration Wells Drilled	Start Date of First and Last Well	
Sale P-1, May 14, 1963, Northern California	20	Sept. 20, 1963	Sept. 1, 1967
Sale P-2, Oct. 1, 1964, Oregon and Washington	12	April 24, 1965	July 11, 1967
Sale P-3, Dec. 15, 1966, Santa Barbara Channel	6	Feb. 18, 1967	May 10, 1967
Sale P-4, Feb. 6, 1968, Santa Barbara Channel	140	Feb. 18, 1968	June 25, 1989
Sale 35, Dec. 11, 1975, southern California	41	July 26, 1976	Aug. 25, 1981
Sale 48, June 29, 1979, southern California & Santa Barbara Channel	33	May 10, 1980	Sept. 1, 1988
Sale 53, May 28, 1981, Santa Maria Basin	55	March 21, 1982	June 15, 1986
Sale 68, June 11, 1982, southern California & Santa Barbara Channel	17	Nov. 20, 1983	Sept. 22, 1989
RS-2, Aug. 5, 1982, Santa Maria Basin	1	Aug. 16, 1986	Aug. 16, 1986
Sale 73, Nov. 30, 1983, Santa Maria Basin	0	—	—
Sale 80, Oct. 17, 1984, southern California & Santa Barbara Channel	1	Dec. 30, 1989	Dec. 30, 1989
Total	326*	(N/A)	(N/A)

Dash indicates no drilling.
* Does not include two Deep Stratigraphic Test Wells.
Source, MMS, 2001

The first State tidelands oil well was drilled in 1897 in Summerland, Santa Barbara County (Lima, 1994 as cited in MMS, 2001). Within 10 years, about 400 wells could be seen along the Summerland beach and just offshore. At that time, no State laws governed the extraction of oil and gas from State-owned lands and no revenues accrued to the State.

In 1921, the California Legislature authorized the issuance of prospecting permits and leases for oil and gas development of the State's tide and submerged lands by the Surveyor General, the predecessor of the California State Lands Commission. Exclusive jurisdiction over all oil and gas development on the State-owned property was given to the Commission by the Legislature in 1938.

The State now administers more than 100 sites on which oil companies have developed some 1,000 wells that take oil and gas from State lands. In addition, over 1,000 wells produce oil from granted tidelands in the city of Long Beach.

Development and Production. Development activities include the installation of jackets, topsides, pipelines, and drilling wells. Production activities include bringing the oil and gas to the surface, handling oil and gas on the platform, and sending the oil and gas to shore. Table 4.1-5 shows information on Federal and State of California platforms, pipelines and production. Table 4.1-6 shows information on platform construction timing, production support activities, and decommissioning timing.

Support Vessels. Vessels and helicopters provide transportation of necessary supplies and personnel to offshore. Table 4.1-6 provides present-day estimates of vessel and helicopter support levels for production. Records of vessel and helicopter traffic were not kept during the development phase. Table 4.1-7 provides examples of estimates of vessel and helicopter traffic for the construction phase. The estimates are from the EIS's prepared for the Development and Production Plans.

Vessels are work boats and crew boats. Work boats carry large items to the platforms and originate from Port Hueneme. Crew boats carry personnel and may carry small items. Crewboats originate from Port Hueneme, Ventura Harbor, Carpinteria Pier, or Elwood Pier.

Helicopters carry personnel and may carry small items. Helicopter services are typically based at public airports in Santa Barbara and Ventura Counties, although some onshore facilities, such as the Las Flores Canyon Oil and Gas Processing Facility, also have helicopter landing pads. Public airports used in support of offshore oil and gas activities include the Camarillo Airport, Santa Barbara Airport, Lompoc Airport, and Santa Maria Airport (Dames & Moore, 2000).

Based on Table 4.1-7 it is estimated that vessel and helicopter traffic during construction would include jacket and topsides installation, hookup and commissioning, and the initiation of drilling as follows: 1 to 6 supply boat trips/day; 1/day to 1/week crew boat trips; and, 2 to 7 helicopter trips/day.

Produced Water. A well produces an emulsion of oil and water with gas in solution. Each platform sends the emulsion to a tank for separation of the gas. The gas is used for fuel, sent to shore, or injected. The emulsion may be sent to shore for processing or some or all processing may occur on the platform.

Processing of the emulsion removes impurities such as water and results in oil of a quality to be accepted into a pipeline for transport to a refinery. Water removed at a platform can be injected and/or discharged overboard in accordance with the National Pollution Discharge Elimination System (NPDES) Permit. Water removed onshore can be injected onshore and/or sent to a platform offshore for injection or overboard discharge.

Table 4.1-8 shows discharges of produced water from 1988 through 2003 and is based on Discharge Monitoring Reports required by EPA as a condition of their NPDES Permit. There is little year-to-year consistency of discharges. There are a number of reasons for this inconsistency. For example, injection rates on offshore platforms vary, wells that produce high volumes of water may be uneconomic and may be shut-in or plugged, or a platform that pumps to another platform may cease or curtail processing emulsion. Additional information regarding produced water as it relates to past and present Pacific OCS oil and gas activities is found in Section 4.6.2 of this document.

Table 4.1-5. Existing Surface Structures, Pipelines, and Production in Federal Waters, Southern California

Platforms					Pipeline			Production				
										Peak Production[5]		Orig. Recoverable Reserves by Field: Oil (MMBBL)/ Gas (BEF)[6]
Structure (Platform)	Operator	Location of Nearest Landfall	Well slots[1]	Year Installed	Pipelines: Size, Number, Type	Year Installed	Onshore Facility or Pipeline Destination	Field	Date of First Production	Volume	Year	
Edith	PXP	Huntington Beach	72	1983	6" oil 6" gas	1983 1983	Elly Eva	Beta	01/21/84	Oil: 21,500 bbl/day Gas: 8,500 Mcf/day	1986 1986	106/ 33.8
Ellen	Aera	Huntington Beach	80	1980	N/A	N/A	N/A		01/13/81			
Elly[2]	Aera	Huntington Beach	Proc. Fac. [2]	1980	10" water 16" oil	1984 1980	Eureka Beta Pump St.		N/A			
Eureka	Aera	Huntington Beach	60	1984	12" oil 6 " gas	1984	Elly		3/17/85			
Gail	Venoco	Port Hueneme	36	1987	8" oil 8" gas 8" gas	1987	Grace	Sockeye	08/08/88	Oil: 9,900 bbl/day Gas: 28,500 Mcf/day	1990 1992	55.83/ 150.45
Grace	Venoco	Mandalay	48	1979	10" oil 12"/10" gas	1980	Carpinteria offshore	Santa Clara	07/25/80	Oil: 10,800 bbl/day Gas: 32,700 Mcf/day	1983 1983	47.76/ 80.13
Gilda	PXP	Mandalay	96	1981	12" oil/water 10" gas 6" water return	1981	Mandalay		12/19/81			
Gina	PXP	Port Hueneme	15	1980	10" oil/water 6" gas	1981	Mandalay	Hueneme	02/11/82	Oil: 4,600 bbl/day Gas: 38,200 Mcf/day	1983 1983	10.7 5.65
Habitat	PXP	Carpinteria	24	1981	12" gas	1983	Carpinteria	Pitas Point	12/15/83	Oil: 113 bbl/day Gas: 102,600 Mcf/day	1985 1985	0.21/ 239.22
Hillhouse	PXP	Summerland	60	1969	8" oil 8" gas 6" spare	1969	Platform A	Dos Cuadras	07/21/70	Oil: 80,900 bbl/day Gas: 48,700 Mcf/day	1970 1970	262/ 145.7
A	PXP	Summerland	57	1968	12" oil 12" gas 6" water	1968	B tie-in		03/3/69			

Platforms					Pipeline			Production				
										Peak Production[5]		
Structure (Platform)	Operator	Location of Nearest Landfall	Well slots[1]	Year Installed	Pipelines: Size, Number, Type	Year Installed	Onshore Facility or Pipeline Destination	Field	Date of First Production	Volume	Year	Orig. Recoverable Reserves by Field: Oil (MMBBL)/ Gas (BEF)[6]
B	PXP	Summerland	63	1968	12" oil 12" gas 6" water 6" water injection	1968 1968	Rincon Onshore Separation Facility Platform C		07/19/69			
C	PXP	Summerland	60	1977	6" oil 6" gas 6" water	1977	Platform B		08/01/77			
Henry	PXP	Carpinteria	24	1979	8" oil 8" water 6" gas	1979	Hillhouse	Carpinteria Offshore	05/15/80	Oil: 27,900 bbl/day Gas: 21,800 Mcf/day	1969 1969	69.6/ 58.0
Hogan	POO LLC	Carpinteria	66	1967	10" oil/water 12" gas 10" gas lift 4" water return	1967	La Conchita		06/10/68			
Houchin	POO LLC	Carpinteria	60	1968	10" oil/water 10" gas lift 12" gas 4" water return	1968	Hogan		04/28/69			
Heritage	Exxon Mobil	Gaviota	60	1989	20" oil/water 12" gas	1992 1998	Harmony	Pescado	12/18/93	Oil: 52,500 bbl/day Gas: 34,900 Mcf/day	1996 1996	126.79/ 222.32
								Sacate	09/26/99	Oil: 10,300 bbl/day Gas: 8,800 Mcf/day	2001 2001	71.3/ 207
Harmony	Exxon Mobil	Gaviota	60	1989	20" oil/water 12" water return 12" gas	1992 1992	Las Flores Hondo	Hondo	12/30/93	Oil: 41,500 bbl/day Gas: 70,400 Mcf/day	1984 1989	317.9/ 834.02
Hondo	Exxon Mobil	Gaviota	28	1976	14" oil/water 12" sour gas	1992 1983	Harmony Las Flores		04/02/81			

Platforms					Pipeline			Production				
										Peak Production[5]		Orig. Recoverable Reserves by Field: Oil (MMBBL)/ Gas (BEF)[6]
Structure (Platform)	Operator	Location of Nearest Landfall	Well slots[1]	Year Installed	Pipelines: Size, Number, Type	Year Installed	Onshore Facility or Pipeline Destination	Field	Date of First Production	Volume	Year	
Hermosa	Arguello, Inc.	Point Arguello	48	1985	24" oil/water 20" sour gas	1986	Gaviota	Point Arguello	06/09/91	Oil: 82,500 bbl/day Gas: 39,700 Mcf/day	1994 1994	208.00 143.84
Harvest	Arguello, Inc.	Point Arguello	50	1985	12" oil/water 8" sour gas	1986	Hermosa		06/03/91			
Hidalgo	Arguello, Inc.	Point Arguello	56	1986	16" oil/water 10" sour gas	1987	Hermosa		5/27/91			
Irene	PXP	Point Pedernales	72	1985	20" oil/water 8" gas 8" water return	1986	Lompoc Oil and Gas Plant	Point Pedernales and Tranquillon Ridge	04/13/87	Oil: 23,600 bbl/day Gas: 5,600 Mcf/day	1987 1989	77.3 25.5

[1] This is the number of well slots built into the platforms. Most platforms have fewer slots.
[2] Platform Elly is an offshore processing facility to process production from Platforms Ellen, Edith, and Eureka.
Source: MMS, 2001 with MMS updates as of November 2004.

Table 4.1-6. Existing Surface Structures Offshore Southern California, Construction Timing, Production Support Activities, and Decommissioning Timing.

Platforms			Construction	Production and Support Activities				Decommissioning
Structure[1]	Operator	Location	Year Installed	Field	Date of First Production	Helicopter Trip Frequency and Yearly Total[2]	Crew & Supply Boat Trip Frequency and Yearly Total[2]	Estimated Removal Date (Actual where indicated)[3]
FEDERAL WATERS (ALL PLATFORMS)								
Edith	PXP	Huntington Beach	1983	Beta	01/21/84	0	3/wk–156/yr	2010–2015
Ellen	Aera	Huntington Beach	1980		01/13/81	4/mo–48/yr	21/wk–1092/yr	2010–2015
Elly[3]	Aera	Huntington Beach	1980		N/A		3/wk–156/yr	2010–2015
Eureka	Aera	Huntington Beach	1984		3/17/85			2010–2015
Gail	Venoco	Port Hueneme	1987	Sockeye	08/08/88	0	17/wk–884/yr	2020–2025
Grace	Venoco	Mandalay	1979	Santa Clara	07/25/80	0	2/mo–24/yr	2020–2025
Gilda	PXP	Mandalay	1981		12/19/81	0	17/wk–884/yr	2020–2025
Gina	PXP	Port Hueneme	1980	Hueneme	02/11/82	0	1/wk–52/yr	2012–2017
Habitat	PXP	Carpinteria	1981	Pitas Point	12/15/83	0	25/wk–1300/yr	2012–2017
Hillhouse	PXP	Summerland	1969	Dos Cuadras	07/21/70			2012–2017
A	PXP	Summerland	1968		03/3/69			2012–2017
B	PXP	Summerland	1968		07/19/69			2012–2017
C	PXP	Summerland	1977		08/01/77			2012–2017
Henry	PXP	Carpinteria	1979	Carpinteria Offshore	05/15/80			2012–2017
Hogan	POO LLC	Carpinteria	1967		06/10/68	0	21/wk–1092/yr	2012–2017
Houchin	POO LLC	Carpinteria	1968		04/28/69			2020–2025
Heritage	ExxonMobil	Gaviota	1989	Pescado and Sacate	12/18/93 9/26/99	2/day–730/yr	25/wk–1300/yr	2020–2025
Harmony	ExxonMobil	Gaviota	1989	Hondo	12/30/93			2020–2025
Hondo	ExxonMobil	Gaviota	1976		04/02/81			2020–2025
Hermosa	Arguello, Inc.	Point Arguello	1985	Point Arguello	06/09/91	5/day -1825/yr	3/wk -156/yr (supply)	2015–2020
Harvest	Arguello, Inc.	Point Arguello	1985		06/03/91			2015–2020
Hidalgo	Arguello, Inc.	Point Arguello	1986		05/27/91			2015–2020
Irene	PXP	Point Pedernales	1985	Point Pedernales and Tranquillon Ridge	04/13/87			2015–2020 (w/o Tranquillon Ridge Development); 2025–2030 (with Tranquillon Ridge Development)

Platforms			Construction	Production and Support Activities				Decommissioning
Structure[1]	Operator	Location	Year Installed	Field	Date of First Production	Helicopter Trip Frequency and Yearly Total[2]	Crew & Supply Boat Trip Frequency and Yearly Total[2]	Estimated Removal Date (Actual where indicated)[3]
STATE WATERS [4]								
Emmy (P)	Aera	Huntington Beach	1963	Huntington Beach	1932	85/mo–1020/yr	15/mo–180/yr (work boat)	2010–2015
Eva (P)	PXP	Huntington Beach	1964				20/wk–1040/yr (crew)	2010–2015
Esther (P)	PXP	Seal Beach	1990	Belmont Offshore	1948		20/wk–1040/yr (crew)	2010–2015
Chaffee (I)	THUMS	Long Beach	1966	Wilmington	1939			Unknown
Freeman (I)	THUMS	Long Beach	1966					
White (I)	THUMS	Long Beach	1966					
Grissom (I)	THUMS	Long Beach	1966				182/wk–9464/yr (crew) 42/wk–2184/yr (barge)	
Rincon (I)	Greka	Rincon	1958	Rincon	1928	N/A	N/A	2005
Hope (P)	Chevron	Carpinteria	1965	Carpinteria	1966			Removed 1996
Heidi (P)	Chevron	Carpinteria	1965					Removed 1996
Hazel (P)	Chevron	Summerland	1958	Summerland	1958			Removed 1996
Hilda (P)	Chevron	Summerland	1960					Removed 1996
Holly (P)	Venoco	Goleta	1966	S. Ellwood	1967		25/wk (crew)	2015–2020
Helen (P)	Texaco	Gaviota		Curata	1961			Removed 1988
Herman (P)	Texaco	Point Conception		Conception	1961			Removed 1988

1 The type of structure is as follows: P – Platform, I – Artificial Island.
2 MMS Estimates as cited in MMS, 2001
3 Platform Elly is an offshore processing facility to process production from Platforms Ellen, Edit and Eureka.
4 For State facilities: Peak production refers to field. Peak gas production could not be obtained. The data sources in the CDOGGR publication PR06 *1998 Annual Report of State Oil and Gas Supervisor*, published in 1999 as cited in MMS, 2001.

Source: MMS, 2001 with MMS updates as of November 2004.

Table 4.1-7. Estimates of Vessel and Helicopter Traffic During Construction.

Platform	Crew Boats	Supply Boats	Helicopters
Gail: - Construction - Drilling	2/day 1/day	1/day 1/week	2/day 2/day
Habitat: - Construction - Drilling	1/day 3/day	3/week 3/week	— 3/week
Harvest - Construction - Hookup and Commissioning - Drilling	 1/day 1/day —	 4/week 4/week 3/week	 3/week 3/week 1.5/day
Hermosa and Hidalgo - Construction - Hookup and Commissioning - Drilling	 1/day 1/day —	 1/day 1/day 1/day	 2/week 10/week 2/day
Irene - Installation/Hookup - Drilling	 — —	 1 every 5 days 1 every 5 days	 4/day 7/day
Santa Ynez Unit Platforms - Installation - Hookup and Commissioning - Drilling	 n/a n/a 40/week	 n/a n/a 4-15/week	 n/a n/a 2/day

Source: MMS, 2001; N/A = Data not available

Decommissioning. Decommissioning is the process leading to the removal of a production platform. Current state-of-the-art technology (reverse installation using heavy lift vessels) will likely be used to remove shallow water platforms. It is assumed that platforms would be completely removed unless other options are available in California by the State. All wells are permanently plugged, severed below the seafloor, and surface casing retrieved to the platform. All piping and vessels, including retrieved casing, are flushed, drained, and the fluids injected or sent to shore. The components of topsides are removed and placed on barges. The jacket is severed from the seafloor, lifted to the surface, and placed on a barge. Large jackets may be cut off in smaller sections and placed on a barge. The barges transport removed equipment, topsides sections, and jacket to a port for scrapping.

One facility in Federal waters has been decommissioned: the Offshore Storage and Treatment (OS&T) vessel. Several facilities in State waters have been decommissioned (see Table 4.1-6). Table 4.1-6 also provides estimated times for the decommissioning of existing facilities in Federal and State waters.

Offshore Tankering Operations. Oil spills resulting from vessel collisions and other marine transportation–related accidents have the potential to cause significant impacts on the marine, coastal, and human environments, and contribute to cumulative environmental impacts. Marine transportation of Alaskan and foreign-import oil is an activity that occurs offshore California. Table 4.1-9 shows volume and number of oil tankers offshore California visiting Ports of San Francisco and of Los Angeles/Long Beach and El Segundo. In 2000, 877 oil tankers visited the ports of Los Angeles/Long Beach and El Segundo. Of these tankers, 192 were U.S. flagged and 685 were foreign flagged (MMS, 2001).

U.S. flagged oil tankers voluntarily stay 80 km (50 miles) off the California coastline, thus avoiding the Point Arguello platforms and the channel altogether. In total, about 90 percent of all crude oil tankers keep this distance. The small percentage of oil tankers that were not seaward of 80 kilometers (50 miles) tend to be vessels that traverse the waters without entering a port in California. These vessels stay more than 40 kilometers (25 miles) from the coast (MMS, 2001).

There is no tankering of oil and gas production from existing Pacific OCS oil and gas operations. All of the oil and gas produced on the Pacific OCS is transported to shore by pipeline.

Table 4.1-8. Produced water discharged by platform and by year in millions of gallons. Blank spaces are either no data or no discharge.

Year	Grace	Gail	Edith	Habitat	Harmony[1]	Ellen/ Elly	Gilda	Hogan[2]	Irene	Harvest	Hidalgo	Hermosa	A	B[3]	C	Hillhouse[4]	Gina	Total
1988	29.8	1.1					64.0	75.2	16.2				251.3	176.2			63.2	677.015
1989	24.2	5.3	10.0			1.1	178.4	71.2	21.1				332.3	225.5	257.6	31.3	185.4	1,343.37
1990	36.3	19.5	47.6	5.4		0.1	187.0	65.0	98.4				239.9	211.2	226.3	110.9		1,247.69
1991	25.9	13.6	6.9	7.8			132.6	76.4					255.4	140.6	51.9	84.4		795.451
1992	20.1	28.1	11.4	11.5			166.8	65.9					87.1	142.1	20.6	22.4		575.982
1993	4.1	49.8	11	12.6	28.2		185.4	76.0			7.2		243.1	87.8	23.3	131.3	1.2	860.96
1994		84.8	14.6	13.5	155.2		179.9	75.3		21.9	63.5	21.0	228.6	59.8	29.1	133.9	1.2	1,082.285
1995		52.9	14.1	14.3	217.8		85.7	71.0		129.6	106.8	157.6	214.7	98.3	32.0	121.0		1,315.86
1996		18.4	6.5	9.8	325.5		175.0	64.2		165.6	85.6	163.9	225.2	66.5	18.3	118.4	6.4	1,449.31
1997		21.5	11.6	11.4	315.7		145.9	77.8		161.7	69.3	172.7	214.9	81.0		120.7	8.6	1,412.796
1998		23.1	11.5	17.8	359.0		121.6	64.6		136.9	51.7	217.5	192.3	59.8		156.6	5.9	1,418.392
1999		22.0	9.4	14.5	517.7		59.1	70.8		49.8	39.0	182.3	198.7	95.7		140.1	55.3	1,454.52
2000		33.9	3.7	9.3	576.0		38.0	76.9		117.4	81.3	234.2	187.3	105.1		146.8	50.7	1,660.6
2001		39.9	13.7	11.4	546.2		54.4	83.7		215.8	91.8	284.1	145.8	108.9		125.1	32.0	1,752.8
2002		34.7	8.5	9.7	580.9		50.8	69.4		327.1	145.7	500.3	173.0	132.1		156.6	18.0	2,206.8
2003		25.0	14.7	10.6	636.0		62.9	67.0		418.6	68.5	681.8	172.7	143.1		148.2	27.0	2,476.1
Total	140.4	473.5	195.2	159.6	4,258.2	1.2	1,887.5	1,1150.5	135.7	1,744.4	810.4	2,615.4	3,362.4	1,933.6	659.2	1,747.8	454.8	21,729.9

[1] Discharges produced water from production from Platforms Harmony, Heritage, and Hondo.[2] Discharges produced water from production from Platforms Hogan and Houchin.[3] Discharges produced water from production from Platforms B and C.[4] Discharges produced water from production from Platforms Hillhouse and Henry.
Source: Operator collected data submitted to EPA in required Discharge Monitoring Reports

Table 4.1-9. Marine Tankering of Oil Offshore California

Oil Type and Location	Volume[1] (bbl)	Annual Tanker Trips[2]
Persistent Oils		
From Alaska	193,196,481	495
Other	38,473,754	349
Total	231,620,235	844
Non-Persistent Oils[3]		
From Alaska	931,085	8
Other	30,674,487	839
Total	31,605,572	847
TOTAL	263,225,807	1,691

[1] Tanker trips estimated from origin to destination oil volume and average tanker loads. Average tanker loads per trip estimated from Western States Petroleum Association study "Tanker and Barge Movements Along the California Coast – 1992" by DNA Association, Sacramento, CA, September 24, 1993.
[2] 390,000 barrels/trip used to estimate Alaska crude oil southbound trips. 110,000 bbl/trip used to estimate all other oil tanker movements.
[3] Non-persistent oil means petroleum-based oil, such as gasoline, diesel or jet fuel, which evaporates relatively quickly. Such oil, at the time of shipment, consists of hydrocarbon fractions of which: (A) at least 50 percent, by volume, distills at a temperature of 340 degrees C (645 degrees F); and (B) at least 95 percent, by volume, distills at a temperature of 370 degrees C (700 degrees F).

4.2 Geology

4.2.1 Geology and Petroleum Potential

The study area includes two distinctly different geologic regions off the California coast. The northern region is the offshore Santa Maria Basin. The southern region is the Santa Barbara–Ventura Basin. The submerged portion of the Santa Barbara–Ventura Basin is commonly referred to as the Santa Barbara Channel.

4.2.1.1 Regional Geology – Offshore Santa Maria Basin

The offshore Santa Maria Basin is approximately 100 miles (160 km) by 25 miles (40 km) in size and occupies an area of about 2,500 square miles (6,400 square km) (Mayerson, 1997; McCulloch, 1987, as cited in MMS, 2001). It is located west and north of the Point Arguello area, along the coastline of Santa Barbara and San Luis Obispo Counties. The basin trends north-northwest, as do most of its structural features (fault and fold trends). The offshore Santa Maria Basin is bounded on the east by the Hosgri and related fault zones, on the south by the "Amberjack High" (of Crain, et al., 1984, as cited in MMS, 2001), on the west by the Santa Lucia Bank, and on the north by the "San Martin Discontinuity" (of McCulloch, 1987, as cited in MMS, 2001). As a depositional center, the basin began to form in the late Oligocene to early Miocene (approximately 30 to 25 million years ago [mya]).

The stratigraphy of the offshore Santa Maria Basin is known from seafloor exposures, seismic methods, and boreholes drilled within the basin since 1964. The stratigraphic terminology used offshore has been adapted from the geologic literature which first described onshore exposures of the rock formations. The distribution and nature of basement rocks within the basin is not well known. Hoskins and Griffiths (1971, as cited in MMS, 2001) suggest that granitic rocks, similar to those seen in the onshore Santa Maria Basin area, may underlie portions of the offshore basin. Granitic rocks have not been identified in any of the offshore wells, however, granite-derived coarse clastic rocks of Cretaceous (?) to Eocene (?) age have been identified on the Santa Lucia Bank and other localities, suggesting a nearby granitic source. Metamorphic basement rocks of the Mesozoic (late Jurassic to early Cretaceous) Franciscan Formation have been identified in wells and outcroppings. Magnetic and gravity anomaly data, cited by McCulloch (1987, as cited in MMS, 2001), indicate a complex basement rock distribution within the basin.

The oldest sedimentary rocks within the Neogene offshore depocenter are the non-marine to shallow-marine sandstones, conglomerates and tuffs of the lower Miocene (?) Lospe Formation and Tranquillon Volcanics. Unconformably overlying the Lospe Formation are a succession of deep marine, fine-grained sedimentary formations that span in age from early Miocene to present. This succession includes the mudstones and dolostones of the lower Miocene Point Sal Formation; the siliceous shales, porcelanites, cherts and dolostones of the middle to upper Miocene Monterey Formation; the diatomaceous and siliceous mudstones of the upper Miocene to lower Pliocene Sisquoc Formation; and the siltstones, claystones, and sandstones of the Pliocene to Holocene Foxen and Careaga Formations (Mayerson, 1997; Crain, et al., 1984, as cited in MMS, 2001). The Neogene sedimentary section within the basin varies from approximately 10,000 feet thick in the depocenters to less than 1,000 feet thick over high standing, eroded basement blocks (Mayerson, 1997; McCulloch, 1987, as cited in MMS, 2001).

The bioclastic, organic-rich Monterey Formation, was identified in the early 1900s as a prolific source rock for petroleum generation. In the onshore fields of the Santa Maria basin it was noted that where the brittle cherts and shales of the Monterey were fractured, it was also an important reservoir (Prutzman, 1913, as cited in MMS, 2001).

The Santa Maria Basin formed as a result of rapid subsidence initiated in the late Oligocene to early Miocene. Atwater (1970, as cited in MMS, 2001) attributed the simultaneous formation of several offshore basins along the California continental margin to a late Oligocene encounter of an oceanic spreading center and subduction-related trench. Blake, et al. (1978, as cited in MMS, 2001) suggested that the encounter initiated strike-slip tectonism along the margin. Seismic records within the basin suggest that compressional tectonics, expressed in folds and thrust faults, became the dominant structural style by Pliocene times.

4.2.1.2 Regional Geology – Santa Barbara–Ventura Basin

The Santa Barbara–Ventura Basin is approximately 160 miles (260 km) by 40 (65 km) miles in size and occupies an area of about 6,400 square miles (17,000 square km). The west portion of the basin, commonly called the Santa Barbara Channel, is submerged and comprises an area of about 2,000 square miles (5,200 square km). The basin is located within the Transverse Ranges Province, so named because of the east-west trend of the basin's bounding mountain ranges. Those ranges include the Santa Ynez Mountains to the north, and the Santa Monica Mountains and Channel Islands to the south. The western extent of basin is less well defined and the "Amberjack High" (of Crain et al., 1984, as cited in MMS, 2001) is generally considered the boundary with the offshore Santa Maria Basin.

The stratigraphy of the Santa Barbara Channel area is known from coastal exposures, sea floor exposures, and numerous boreholes drilled offshore since the 1890s. The basin is probably underlain by a metamorphic or metasedimentary basement complex. Schists (similar to the Catalina Schist) and ophiolite-like rocks are noted in exposures on Santa Cruz Island and are reported in several boreholes (Vedder, 1987, as cited in MMS, 2001). Granitic rocks have been noted in the basin margins and granite-derived sediments within the basin suggest the possibility of granitic basement as well.

The oldest rocks drilled within the Channel area date to the Mesozoic. The Mesozoic and Paleogene-aged rocked within the basin were probably deposited in a forearc basin setting. This Cretaceous (?) to Oligocene sequence of rock formations suggest deposition within a basin adjacent to a paleosubduction zone. Rocks of this type are widely distributed throughout California and Baja California and are often referred to as the "Great Valley Sequence." A thorough review of basement strata and the Great Valley Sequence in the Santa Barbara Channel and adjacent areas is found in Vedder (1987, as cited in MMS, 2001).

At some point near the end of the Paleogene, approximately 38 to 35 mya, probably related to the regional structural event described by Atwater (1970, as cited in MMS, 2001), clockwise rotation of the forearc sequence began to form the Transverse Ranges Province. Kamerling and Luyendyk (1979, as cited in MMS, 2001) document up to 120 degrees of rotation based on paleomagnetic data. By 20 mya, the transform boundary between the North American and Pacific plates was the San Andreas Fault. The result of these regional stresses resulted in the formation of several small tectonic basins (including the Santa Maria, Santa Barbara–Ventura, and Los Angeles basins) with localized structural complexities.

The Neogene sedimentary record indicates a predominant marine depositional environment. Microfaunal evidence in the paleontological record suggests that deposition in the Santa Barbara–Ventura basin occurred in outer neritic to bathyal depths (S. Drewry, pers. comm., as cited in MMS, 2001). Basin subsidence continues in the depocenters today; however, in the past 5 million years, the rate of terrigenous sedimentation has filled the eastern portion of the basin, leaving only the Santa Barbara Channel area submerged. Major structural features in the basin, including the San Cayetano, Santa Susana, and Oakridge thrust faults, and the Ventura, Rincon, and Montalvo anticlines suggest crustal shortening within the basin. Sylvester and Brown (1988, as cited in MMS, 2001) indicate that several of these features may be geologically quite young (less than 1 million years old).

A regional unconformity of non-marine, transitional, and shallow marine rocks of the Sespe and Alegria formations marks the end of the Oligocene. During the Miocene, the sedimentary rocks record a sudden deepening of the basin, as indicated by the transition form the nearshore Vaqueros Sandstone to the deepwater Rincon and Monterey Formations. The Rincon Formation is composed of clay shales, mudstones, and siltstones. The Monterey Formation is composed of bioclastic siliceous and phosphatic shales, cherts, and calcareous and carbonaceous shales and marls. Early Miocene basin-edge marine fan facies are also noted in the record.

The Miocene to Pliocene transition is recorded in the coeval Sisquoc and Modelo Formations. The Sisquoc Formation is characterized by fine-grained, terrigenous-rich diatomaceous deposits. The Modelo Formation differs from the Sisquoc in that it contains occasional thick sandstone beds. Blake (1988, as cited in MMS, 2001) suggests that the increase in fine- and coarse-grained sediments in these deepwater formations is the result global sea level changes.

Pliocene sedimentation in the eastern portion of the basin is characterized by an influx of coarse-grained material in volumes overtaking the rate of subsidence and compaction. Paleobathymetric data clearly records the shoaling of the basin. The Repetto and Pico Formations are composed of turbidite-derived sands, siltstones, and shales. Generally, bed thickness and the sand-to-shale ratio of the formations increase up-section, while the depositional environment shallows. In the western portion of the basin, turbidite deposition is largely absent. Pliocene-aged sediments there are generally fine-grained and derived from nearby upland sources.

4.2.1.3 Petroleum Potential

The undeveloped leases in both the offshore Santa Maria Basin and the Santa Barbara Channel are in areas of proven petroleum potential. Natural oil, tar, and gas seepage in the nearshore and offshore areas were known to the Indian inhabitants of coastal southern California in prehistoric times (Heizer, 1943, as cited in MMS, 2001). Early European explorers also noted the occurrence of hydrocarbon seeps, particularly along the northern coastline of the Santa Barbara Channel (Wilkinson, 1971, as cited in MMS, 2001). Seepage oil was an important commodity to both the Indians and the early European settlers of the region. Fischer (1977, as cited in MMS, 2001) noted that most of the offshore seepage occurred in areas where the Monterey or Sisquoc formations are exposed at or near the seafloor, and where active faulting or growing folds were observed.

Active exploration for oil began in the Santa Barbara–Ventura Basin as early as the 1860s with the oil tunnels dug into the seeps of the Santa Paula area. The earliest offshore oil exploration occurred at Summerland in the 1890s, where the onshore field there was extended offshore by drilling on the beach and from piers (Galloway, 1997, as cited in MMS, 2001). Offshore oil exploration progressed in the Santa Barbara Channel area with several coastal oil field discoveries in the 1920s and 1930s. These included the Rincon, Ellwood, and Capitan oil fields. Initially, the offshore portions of these fields were developed by wells drilled from piers and by wells drilled directionally from onshore locations. The prototype for the modern oil platform, known as the “Steel Island,” was constructed on the offshore portion of the Rincon oil field in 1931 (Galloway, 1992, as cited in MMS, 2001).

Following World War II, the advances in petroleum exploration technology (such as the invention of mobile offshore drilling vessels and the development of computer processing techniques for seismic reflection data) led to further exploration, discovery, and production of the region’s hydrocarbon resources. In the late 1940s, 1950s, and 1960s several more nearshore and offshore oil and gas field discoveries were made. Most of these were in the Santa Barbara–Ventura basin, with the exception of the Guadalupe oil field near the mouth of the Santa Maria River.

On Pacific OCS lands (those lands in excess of three geographic miles seaward of the coast) oil exploration began in the 1950s with the drilling of coreholes and the mapping of the subsurface features through the use of early seismic reflection profiling techniques. The first Pacific OCS leasing in the area (Lease Sale P-1, 1963) included leases in the Santa Maria basin, which led to the drilling of one oil well in 1965, approximately 12 miles southwest of Oceano (Webster, 1983, as cited in MMS, 2001). Following a 1965 U.S. Supreme Court decision, settling the jurisdiction over the Santa Barbara Channel area, leasing, exploration, and development of the Federal lands in the Santa Barbara–Ventura basin proceeded. Since the 1960s, several large oil and gas fields have been discovered and developed in and around the study area.

4.2.2 Geologic Hazards

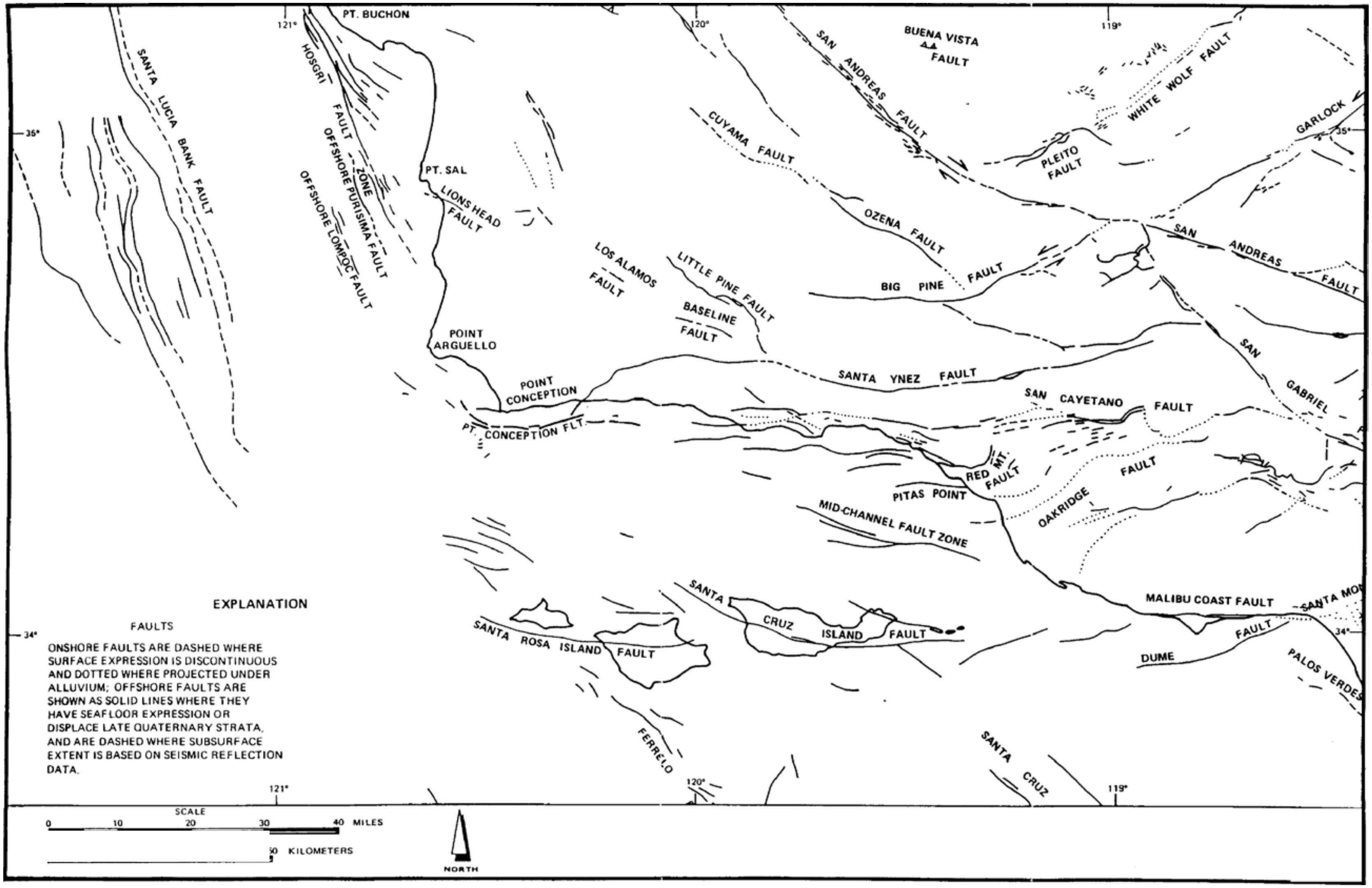
The principal geologic hazards in the region are (1) earthquakes, (2) tsunamis, (3) mass wasting, and (4) shallow gas. There exists no credible threat of local volcanic activity.

4.2.2.1 Historic Earthquakes

Southern California is located along a seismically active plate margin (Figure 4.2-1. “Late Quaternary Fault Map” and Figure 4.2-2. “Seismicity Map,” both modified after Jacobs Engineering Group, 1988, as cited in MMS, 2001). The major transform fault in the region is the San Andreas Fault. The last significant earthquake along the segment of the fault which borders the Santa Barbara and Ventura county areas happened in 1857, and is known as the “Fort Tejon” quake. Davis, et al. (1982, as cited in MMS, 2001) postulates an 8.3 magnitude earthquake in their planning scenario, modeled on the 1857 quake.

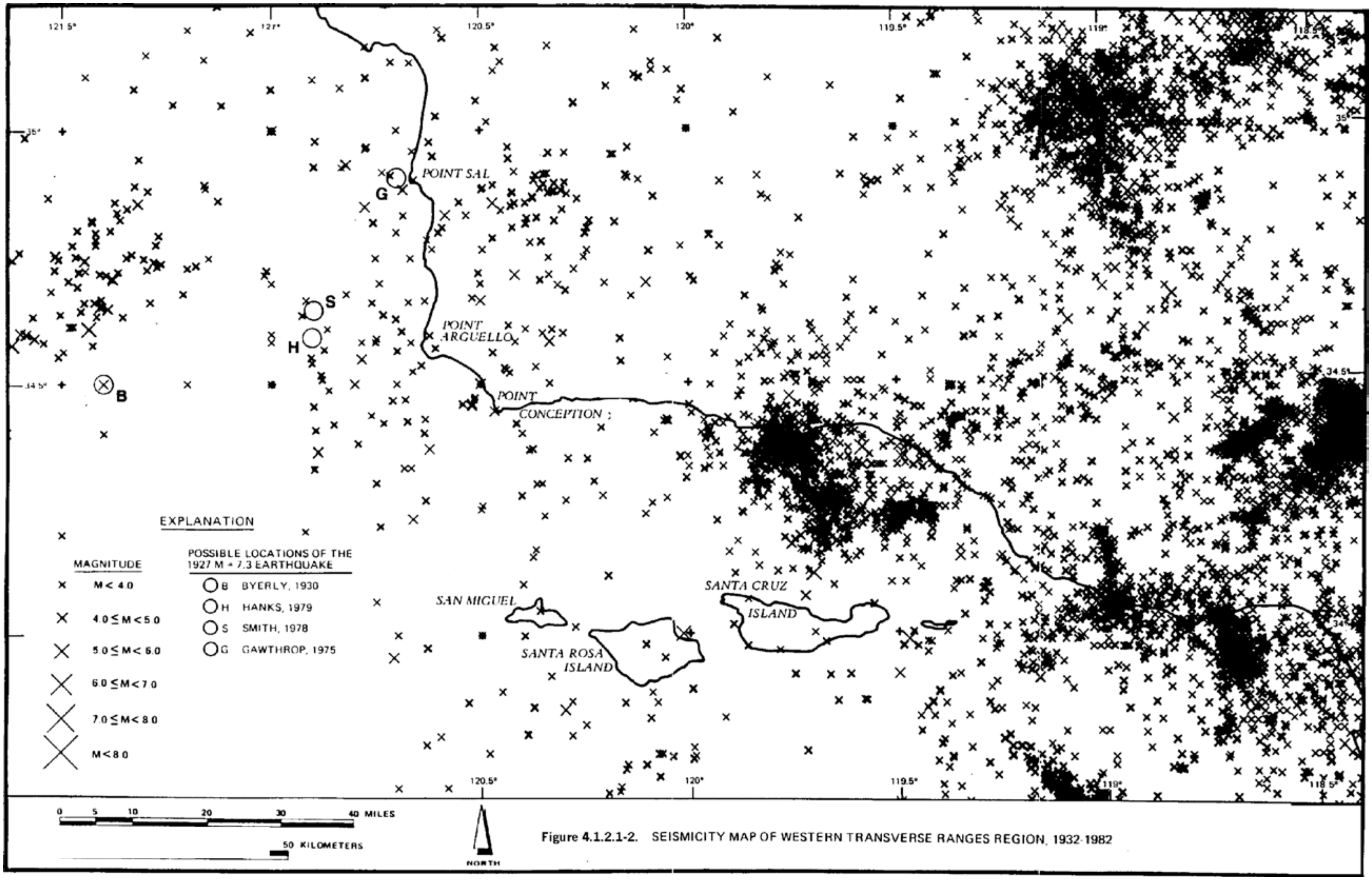
Several significant (Richter magnitude 6 or greater, or Modified Mercalli intensity scale VIII or greater) earthquakes have occurred in historic times near the study area. Earthquake magnitudes were first measured on instruments in 1903. However, prior to the 1930s and the advent of the widespread use of seismographs and the establishment of seismological networks, the epicentral locations of these significant earthquakes are conjectural. Following are summaries of significant earthquakes in or near the study area.

- On December 21, 1812, an earthquake centered in the Santa Barbara county area, possibly in the western Santa Barbara Channel, damaged or destroyed several of the old Spanish missions, including Mission La Purisima in Lompoc (destroyed), the Mission Santa Barbara (severely damaged), and the Mission Santa Inez (damaged). The 1812 earthquake occurred in an area that was sparsely populated. The main shock was preceded by about 15 minutes by a foreshock of considerable strength. The main shock was felt over a wide area of California. Damage from the quake would rate approximately level IX to X on the Mercalli scale. The approximate Richter magnitude would have been greater than 7. Mission Fathers report suspending a ball from a chain at the Santa Barbara Presidio and watching it move continuously for twenty-three days (George Pararas-Carayannis website). A series of aftershocks were recorded for at least three months following the main quake (Townley, 1939, as cited in MMS, 2001).



Source: MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 4.1.2.1-1)

Figure 4.2-1. Late Quaternary Fault Map Of Western Transverse Range Region



Source: MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 4.1.2.1-2)

Figure 4.2-2. Seismicity Map Of Western Transverse Ranges Region, 1932-1982.

There are no reports of ground rupture from the December 21 earthquake. This had led researchers to postulate that the quake occurred along an offshore fault, such as the North Channel Slope fault or the offshore southern branch of the Santa Ynez fault (Yerkes, 1980, 1981, as cited in MMS, 2001). The evidence for an offshore source is equivocal. Recent quakes in southern California demonstrate that even large seismic events do not necessarily produce significant surface rupture.

Interestingly, the December 21 temblor was the second large earthquake that month to rock southern California. On December 8, another earthquake, best remembered for damaging the Mission San Juan Capistrano, was noted in the Mission journals. The December 8 shock may have been epicentered in the Wrightwood area, on the San Andreas Fault (Townley, 1939; Jacoby, et al., 1988, as cited in MMS, 2001). It is unclear to seismologists if these earthquakes are in any way related. The December 21 earthquake purportedly spawned a minor tsunami in the Santa Barbara Channel, which will be discussed below.

- On January 9, 1857, a great quake, with a probable magnitude of over 8 on the Richter scale, was felt over a wide area of California, Mexico, and neighboring States. The surface rupture from this earthquake reached from the area near Parkfield, CA, to Cajon Pass, near San Bernardino – a distance of over 200 miles (300 km). This earthquake was preceded by two M=6 +/- foreshocks in the Parkfield area. Shaking during the main shock lasted up to three minutes. At Fort Tejon and other places along the rupture, the Mercalli intensity reached XII (highest level of destruction). In Santa Barbara, over 40 miles away from the San Andreas fault, strong shaking lasted over one minute, but the damage was negligible. California was still sparsely populated in 1857 and few deaths resulted from this quake.
- A swarm of earthquakes severely damaged the Los Alamos area of northern Santa Barbara County, from July 27 to July 31, 1902. The largest of the temblors, on July 31, registered an intensity of VIII on the Modified Mercalli scale. Older adobe and masonry buildings suffered more damage than wood-framed buildings. Noticeable aftershocks continued for several months (Townley, 1939, as cited in MMS, 2001)
- In the early morning hours of June 29, 1925, several small foreshocks rocked the Santa Barbara area. Most residents of that city were awakened at 6:44 a.m. by the M=6.8 main shock. The shaking lasted about 20 seconds. The epicenter of the quake was located in the Santa Barbara Channel, about 8 miles southwest of the city. This earthquake caused considerable damage in the old business district and accounted for several deaths. The failure of the Sheffield Dam near Santa Barbara is attributable to liquefaction of the underlying soils (Willis, 1925, as cited in MMS, 2001).
- On November 4, 1927, in the pre-dawn hours a very strong earthquake struck the offshore Santa Maria basin. This quake is alternatively known in the literature as the "Point Arguello" earthquake or the "Lompoc" earthquake. Both the magnitude and location of this earthquake are a source of controversy. The quake was witnessed both on shore and at sea (Townley, 1927; Byerly, 1930; Gawthrop, 1978; Hanks, 1979; Helmberger, et al., 1992; Satake and Somerville, 1992, as cited in MMS, 2001). Gawthrop (1978, as cited in MMS, 2001), analyzing the recorded aftershock sequence, concluded the main shock was located near the coast, possibly on the Hosgri Fault system. The recent re-analysis of the 1927 earthquake by Helmberger, et al. (1992, as cited in MMS, 2001), and the analysis of the related tsunami by Satake and Somerville (1992, as cited in MMS, 2001), suggest the earthquake occurred far from the coast, in deep water, on a thrust fault related to the southern portion of the Santa Lucia Bank fault zone.

  The earthquake occurred during the pre-dawn hours, at about 5:51 a.m. It was felt over a wide area of southern California. The captains of two vessels within 20 miles of the probable epicenter noted similar phenomena in their logs, including a shuddering sensation, as if the ship was running aground. They also noted a second seismic event 20 minutes later. Another ship's captain was startled to find the ocean surface littered with dead or stunned fish later that morning. These observations are attributable to "sea quake" — a shock wave propagated through the water column (Institute for Crustal Studies, UCSB, website, as cited in MMS, 2001).

  Coastal and inland towns, 20 to 30 miles from the epicenter, registered Mercalli intensity ratings as great as IX to X. Reports from ranches and small communities nearest the epicenter suggest shaking strong enough to throw objects into the air and to knock standing people from their feet. Landslides, sand boils, and local liquefaction gave evidence to the severity of this quake. This earthquake spawned a small tsunami (see below for further discussion).

- A moderate earthquake, registering about magnitude 6, struck the coastal communities of Santa Barbara, Carpinteria, and Summerland at 11:50 p.m. on June 30, 1941. The epicenter of the earthquake was located in the Santa Barbara Channel about 2 miles (3 km) south of Summerland (Ulrich, 1942, as cited in MMS, 2001). The slight damage from this quake, particularly in Santa Barbara (six miles from the epicenter), is a testament to revisions in the building codes following the 1925 Santa Barbara and 1933 Long Beach earthquakes.
- A very large earthquake struck the Kern County area at 4:52 a.m. on July 21, 1952. It registered at magnitude 7.7 and was located on the White Wolf thrust fault, near the San Andreas fault, about 60 miles (95 km) northeast of Santa Barbara. This quake was felt over a wide area, including northern California, Nevada, Arizona, and Mexico. The Modified Mercalli intensity rating for this earthquake was X to XI (Richter, 1958, as cited in MMS, 2001). Widespread damage was evident in communities near the epicenter, and minor damage was even noted in cities well removed from the maximum shaking.
- At 6:01 a.m. on the morning of February 9, 1971, a magnitude 6.6 earthquake struck in the eastern portion of the Santa Barbara–Ventura basin. This quake is known as the “San Fernando” or “Sylmar” earthquake, after the communities most seriously damaged. The earthquake occurred on a generally west-north-west to east-southeast trending, north-dipping thrust fault and ruptured to the surface (Jennings, 1994, as cited in MMS, 2001). The hypocenter of the earthquake is reported at a depth of over 5 miles (8.4 km) (SCEC website). The damage caused by this quake has been well reported and studied. Unusual phenomena were observed during this quake, including accelerometer readings greater than 1.0 (objects “thrown” into the air by forces greater than the downward force of gravity) (Bolt, 1971; K. Piper, pers. comm.; F. Langston, pers. comm., as cited in MMS, 2001).

  The 1971 earthquake occurred on the San Fernando fault. Although the fault had been recognized prior to the quake, it was not then considered important. Since that time, significant study has been made on the structural geology and seismic hazard potential in southern California (Petersen and Wesnousky, 1994, as cited in MMS, 2001). Subsequent studies have indicated that the recurrence interval for earthquakes on the San Fernando fault is about 200 years (SCEC website, as cited in MMS, 2001).
- On January 17, 1994, another destructive earthquake hit the onshore portion of the Santa Barbara–Ventura basin. The quake, known as the “Northridge” earthquake, registered at magnitude of 6.7, with a hypocentral depth of 12 miles (18.4 km). Like the 1971 quake, it was felt over a wide area of southern California. This temblor broke on a previously “unknown” blind thrust, probably related to the Oakridge fault system (in fact, the fault had been imaged on proprietary CDP reflection data years earlier, although its earthquake potential was not assessable).

  The 1994 quake was spatially related to the 1971 quake. Aftershock hypocentral data for the two earthquakes indicate that the “. . . Northridge aftershocks are cut-off by the San Fernando fault at depths of 5 to 8 km. The north-dipping San Fernando fault may have prevented the south-dipping Northridge rupture from reaching the surface” (SCEC website, as cited in MMS, 2001).The Oakridge trend is well defined west of the Northridge epicenter. It follows an arcuate trace across Ventura County and out into the Santa Barbara Channel. The recurrence interval on the Oakridge system has not yet been determined.
- On December 22, 2003 at 11 p.m., an earthquake with a magnitude of 6.5 occurred. The epicenter was about 11 km northeast of San Simeon. It was followed by a series of aftershocks, felt especially in the area of Cambria. This was the largest California earthquake since 1999. There were few strong motion measuring stations in the vicinity of the earthquake, but most severe shaking was recorded at Templeton (about 10 km from Paso Robles), and in San Luis Obispo (USGS, 2004; CISN, 2004).

4.2.2.2 Tsunamis

Tsunamis are potentially destructive ocean waves formerly called “tidal waves.” A more appropriate description may be “seismic sea waves,” because of their association with large earthquakes. It is generally believed that large-scale, underwater block movements, slumps, or slides are the mechanisms for generating these waves. Certainly unusual events such as volcanic island explosions and meteorite impacts are known to have occurred; however, the likelihood of such a wave affecting the southern California coastline is remote.

Tsunamis are usually apparent only at the coastline. Due to their long wavelength and low amplitude, they are rarely noted in deep water. However, in deepwater conditions they can travel at velocities of over 600 miles per hour (270 meters per second). As a tsunami approaches and strikes the coast, the wavelength becomes attenuated and the amplitude grows. The first sign of an impending tsunami is sometimes a sudden recession of the ocean away from the coast.

Most tsunamis are generated on the margins of the Pacific Ocean basin. Consequently, small, trans-Pacific tsunamis strike the California coastline with regularity. Large tsunamis striking the California coast are rare. Only three known tsunamis have been locally generated. The information below on specific tsunami accounts is from the National Weather Service website. The reader is directed there for greater detail.

- Associated with the December 21, 1812 earthquake, a tsunami was described at several places along the north and south shores of the Santa Barbara Channel. Over the years, the height, run up, and damage caused by this tsunami has been exaggerated and misinterpreted. Little or no physical evidence remains from the 1812 event. Contemporary accounts of the tsunami lack specific details. One 1856 account document a fur-trading vessel being carried inland by the waves at Gaviota Canyon on the Refugio Rancho upwards to 2,500 feet, before being taken back out to sea with the receding water. Similar accounts have ocean water running up into the plaza at Santa Barbara. These stories might suggest a maximum height of 50 feet for the 1812 tsunami. A secondhand story from a memoir of an elderly resident of Ventura relates that an old church, 15 feet above sea level, was damaged in 1812. More recent analysis discounts the 50-foot reports and suggests a 10- to 15-foot wave was more likely. Complicating the story of the November 21, 1812 tsunami is a report that a member of the Hawaiian royal family was killed by a tsunami on that date. Estimates of the Hawaiian tsunami run up are placed at 10 feet. If the California earthquake spawned this wave, then earlier accounts of large waves in the Santa Barbara Channel have more validity.
- A small earthquake, felt only in the Santa Barbara area in late May, 1854, may have been responsible for a "heavy swell" which washed into the town very soon afterward. The quake quite possibly triggered a nearby submarine slide, which in turn, generated the wave.
- On May 10, 1877, a destructive earthquake in northern Chile generated a tsunami that was monitored around the Pacific basin. At Gaviota, a series of three 12-foot waves were reported.
- On November 22, 1878, a probable tsunami unrelated to any recorded earthquake struck the north Santa Barbara County and San Luis Obispo County coastline. This wave was reported to have severely damaged the Point Sal wharf and the Avila wharf, and to have washed over the sand bar at Morro Bay. Given that no earthquakes are reported on that date anywhere around the Pacific basin, this wave may likely have been locally generated by a large-scale submarine landslide.
- On March 9, 1895, an unusual event in Cuyler's Harbor, at San Miguel Island, was responsible for the capsizing of a vessel anchored there. Apparently, a large portion of the bluffs on the west side of the harbor slumped in the ocean. The resultant wave rolled the vessel.
- The 1927 earthquake off Point Arguello (see above) generated a small tsunami that was witnessed by several coastal residents and recorded on tide meters. The tsunami caused damage to train tracks at the former community of Surf, near the mouth of the Santa Ynez River. The waves measured a maximum of 6 feet at Surf, and 4 feet at Pismo Beach.

  It is unclear if the 1927 tsunami was generated by the tectonic forces of the earthquake, or was a result of a submarine landslide associated with the quake. Two ships' captains, when interviewed about the "sea quake," indicated they had felt in their ships two distinct events about 20 minutes apart; the second even reported as being "more strongly felt." The first event was the main shock of the November 4 earthquake. Seismographs do not record a significant aftershock at the time of the second reported event. The captain of another vessel reported aftershocks at sea about 10:30 a.m. and noted large quantities of dead or stunned fish at the surface soon thereafter.

  It is clear from the record that the 5:51 a.m. earthquake disrupted the ocean surface of an otherwise "smooth" sea. The evidence suggests that the main shock triggered an underwater landslide offshore from Surf. The fish kill may be related to the initial shock wave of the quake, or to the turbidity and violent turbulence caused by the postulated submarine landslide. The area of the earthquake is also known for submarine oil and gas seeps, and it is possible that a slide may have triggered a toxic release of shallow methane gas. The lack of a significant aftershock recorded at 6:10 a.m. was initially attributed to a shallow focus event (Byerly, 1930, as cited in MMS, 2001). In fact, the 6:10 event could have been the progression of a submarine slide near the ship that had reported its position as 14 miles north of Point Arguello.

In retrospect, the November 4, 1927 tsunami was very similar in appearance and location to the November 22, 1878 tsunami. The 1927 event was recorded by instruments and several witnesses, and remains the best analogue for a locally derived tsunami with the study area. Satake and Somerville (1992, as cited in MMS, 2001) suggest that the tsunami was spawned near the epicentral site of Helmberger (1992, as cited in MMS, 2001).

- The deadly April 1, 1946 "Scotch Cap" tsunami became the textbook example for Pacific-wide tsunamis spawned by an Aleutian earthquake. This tsunami was recorded, by inference, at about 100 feet at the Scotch Cap Light station on Unimak Island. The progress of the tsunami was well recorded as it sped southward. Heavy damage was noted at other places in the Aleutian archipelago and in Hawaii. By the time the tsunami reached southern California it varied in height from 5 to 8 feet. At Point Arguello the tsunami was report as a "seven foot rise." It appears likely that the tsunami damage at Unimak Island was exacerbated by a large submarine landslide (Fryer, et al., 2000, as cited in MMS, 2001).
- The very large May 22, 1960 earthquake of the coast of Chile (the strongest earthquake ever measured on a seismometer M=8.6) generated a long period tsunami that was recorded in southern California. At Santa Barbara Harbor, the initial swell rose 8 feet above the expected tide and then dropped 9 feet in the course of ten minutes.
- The large March 28, 1964 "Good Friday" earthquake (M=8.4) in Alaska generated a series of seismic sea waves that were recorded around the Pacific basin. Substantial tsunami damage occurred in communities thousands of miles from the earthquake epicenter. At Morro Bay a ten-foot tide change occurred over a ten-minute interval. In Santa Barbara "five-foot surges on twenty-minute cycles" were noted.

Tsunamis, although not a common occurrence along the southern California coast, do pose a potential geologic hazard to coastal communities and facilities. Facilities located in offshore, deep-water areas (such as oil production platforms) are unlikely to be affected by tsunamis.

4.2.2.3 Mass Wasting

"Mass wasting" is a general term that describes the large-scale movement of rock or earth material down slope, by gravity, in either a sudden or slow process. Mass wasting can include soil or bedrock creep, rockfalls, landslides, flows and slumps, and avalanches. Submarine wasting processes are not well understood and are rarely witnessed. Prior to the 1960s, these processes were inferred to exist due to damage caused to submarine telephone and telegraph cables. Also, fishermen and divers reported changes in the ocean floor topography. These changes were sometimes associated with water discoloration and seismic activity.

More recently, the advent of side-scan sonar and multibeam technologies has allowed scientists to see modern submarine landforms. Greene, et al. (2000, as cited in MMS, 2001), have mapped large-scale slumps off the coast from Goleta. They conclude that failures such as these have the potential to generate local tsunamis. Scientists are not yet able to accurately assess the risks associated with submarine mass wasting. The ability of catastrophic slope failures to generate tsunamis, or tsunami-like waves, is recognized, as is a causal relationship with seismicity. However, identifying areas prone to this sort of failure, and determining the likelihood of such failure, is difficult.

4.2.2.4 Seepage and Shallow Gas

Seepage of oil, tar, or natural gas does not normally present a geologic hazard. Such seepage is evidence that thermally mature source rocks exist in the area. Seepage is also evidence of the migration of hydrocarbons from the source rock to the surface and is commonly associated with faulting (the fault acting as a conduit for the seepage). The seepage of hydrocarbons is usually attributed to the difference in density of oil and natural gas to the connate water that fills the pore spaces of rocks. The less dense hydrocarbons tend to “rise” through the rock column, through interconnected pores, along fractures, or by way of faults, until they are trapped in a sealed reservoir or emanate at the earth’s surface.

In the Santa Barbara Channel area, seepage has been associated with both fault trends and anticlinal trends (Fischer, 1978, as cited in MMS, 2001). Some of the most prolific areas of oil, tar, and natural gas seepage occur in the vicinity of Coal Oil Point, near Santa Barbara. Several studies have attempted to measure or estimate the volume of seepage in the Santa Barbara Channel area (Emery, 1960; Vernon and Slater, 1963; Vedder, et al., 1969; Allen, et al., 1970; Wilkinson, 1972; Fischer, 1978; Hornafius, et al., 1999; Quigley, et al., 1999, all as cited in MMS, 2001).

Fischer (1978, as cited in MMS, 2001) estimates that between 40 and 670 barrels of oil per day naturally seep into the Santa Barbara Channel. At one location, near Platform Holly, two submarine tents have been used since 1982 to trap gas and oil seepage emanating from the ocean floor. Since installation, the seep containment structures have captured in excess of 6 billion cubic feet of gas from an area of 20,000 square feet. There are no reliable estimates for the total amount of gas seeped into the Santa Barbara Channel, nor are there any reliable estimates for the volume of oil, tar, or gas seepage north of Point Arguello.

No active seeps of oil, tar, or natural gas have been identified on the specific leases included in the proposed action. However, geologic conditions favorable to the formation of hydrocarbon seeps (mature source rocks, faulting and folding of the strata, erosion of overburden, etc.), and the proximity of the study area to known seeps, suggest that natural seepage can not be entirely ruled out. Reports of oil sheens and floating tar balls in or near the study area may be attributable to several other sources other than local seepage.

Hornafius, et al. (1999, as cited in MMS, 2001) has suggested that the annual amount of hydrocarbon seepage in the Santa Barbara Channel has decreased over time and that the decrease is associated with sustained offshore oil and gas production. According to this model, local oil and gas seepage is due, in part, to hydrocarbons expelled under pressure from subterranean reservoirs. As compared to the density separation model, this model contemplates active reservoir recharge, piezometric connectivity, leaky reservoir seals, and ample conduits from the reservoir to the earth’s surface. As reservoir pressure is decreased through the production of oil and gas, the driving energy behind the abundant seepage is also decreased, and therefore the amount of oil and gas emanating at the surface decreases. The result of such a decrease in seepage could have profound impacts on the amount of natural tar on local beaches and of reactive hydrocarbons in the atmosphere.

The Hornafius, et al. (1999, as cited in MMS, 2001) model attempts to explain the apparent decrease in seepage volumes in the Santa Barbara Channel over the past 40 years. Data from the South Ellwood seep containment project collected since 1982 confirms the decrease at that location. Additional study needs to be conducted to determine whether this is a localized phenomenon, or whether this model describes a more widespread process. Shallow gas can present a geologic hazard. This type of accumulation is often imaged on high-resolution seismic data. Generally, shallow gas accumulations, especially those formed from the natural process of organic decay (biogenic methane), are contained in low pressure sand reservoirs or surficial sediments. However, thermogenic gas (gas produced by time, temperature, and organic maturation) has the potential to accumulate in “over-pressured” zones that present a drilling hazard. High pressure, shallow gas has been noted in several areas in the Santa Barbara–Ventura Basin. The giant Ventura Avenue field was discovered on the basis of shallow gas reservoirs. Hazards posed by high-pressure shallow gas have been mitigated in the drilling process by the use of casing and weighted drilling mud.

4.3 Climate and Meteorological Conditions

4.3.1 General Description

The area encompassed by the post-suspension activities is located in the Outer Continental Shelf (Pacific OCS), offshore of Santa Barbara County within the South Central Coast Air Basin. Santa Barbara County is considered to be a Mediterranean climate. It is characterized by partly cloudy, cool summers without significant precipitation and mostly clear, mild winters during which precipitation falls with seasonal storms. The climate is strongly influenced by a persistent high-pressure area which lies off the Pacific Coast referred to as the Pacific High. The combination of the Pacific High over the ocean to the west, thermal contrasts between land and the adjacent ocean, and topographic factors result in the mild temperatures experienced throughout the year.

The topography plays a factor in the wind flows observed in the county. The change in orientation of the eastward turn in the coastline at Point Conception and the mountains along the coast, results in a wind regime characterized by relatively light sea breezes in the afternoon and strong downslope winds at night. These terrain features can cause counterclockwise circulation (eddies) to form east of the Point and may often lead to highly variable winds along the southern coastal strip. The coastline mountain range causes a decrease in the occurrence of northwest winds in the channel as compared with Point Conception, which marks the change in the prevailing surface winds from northwesterly to southwesterly.

Transport of cool, humid marine air onshore by these northwest winds causes fog and low clouds near the coast, primarily during the night and early morning hours in the late spring and early summer. This fog also typically forms on the coast and inland valleys during the evening. Fog usually lifts and low clouds evaporate as land areas are warmed in the morning. Afternoon conditions are generally characterized by fair skies, cool temperatures, and a sea breeze. The Pacific High diverts extratropical storms to the north, and precipitation occurs infrequently when tropical moisture is transported into the region.

The Pacific High weakens and migrates southward during winter. During the winter season, three weather regimes generally prevail:

- Periods of low clouds/fog associated with dominance of the Pacific High;
- Periods of clear skies, cool nights, and warm days associated with continental flow; and
- Periods of variable cloudiness, shifting and gusty winds, and precipitation associated with extratropical storms.

An additional component in providing air flow up the channel from Los Angeles is the eddy low which is often present in the Southern California Bight. Under certain conditions this eddy, often referred to as the Catalina Eddy, will expand and/or shift northward producing a southeasterly gradient in the channel. This may result in a short duration sea breeze appearing for a short time during the afternoon. However, with a well developed eddy low, surface winds will remain from the southeast all day.

4.3.2 Wind Speed and Direction

The airflow around Santa Barbara County plays an important role in the movement of pollutants. In the northern portion of Santa Barbara County (considered north of the ridgeline of the Santa Ynez Mountains), the sea breeze is typically northwesterly throughout the year while the prevailing sea breeze in the southern portion are typically from the southwest. During summer months, these winds are stronger and persist later into the night. The sea breeze weakens during the evening hours as air adjacent to the surface cools, descending down the coastal mountains resulting in light land breezes (from land to sea). This land/sea breeze cycle combined with local topography greatly influence the direction and speed of the winds throughout the county. In addition, the alternation of the land-sea breeze cycle can sometimes produce a “sloshing” effect, where pollutants are swept offshore at night and subsequently carried back onshore during the day. This effect may be exacerbated during periods when wind speeds are low.

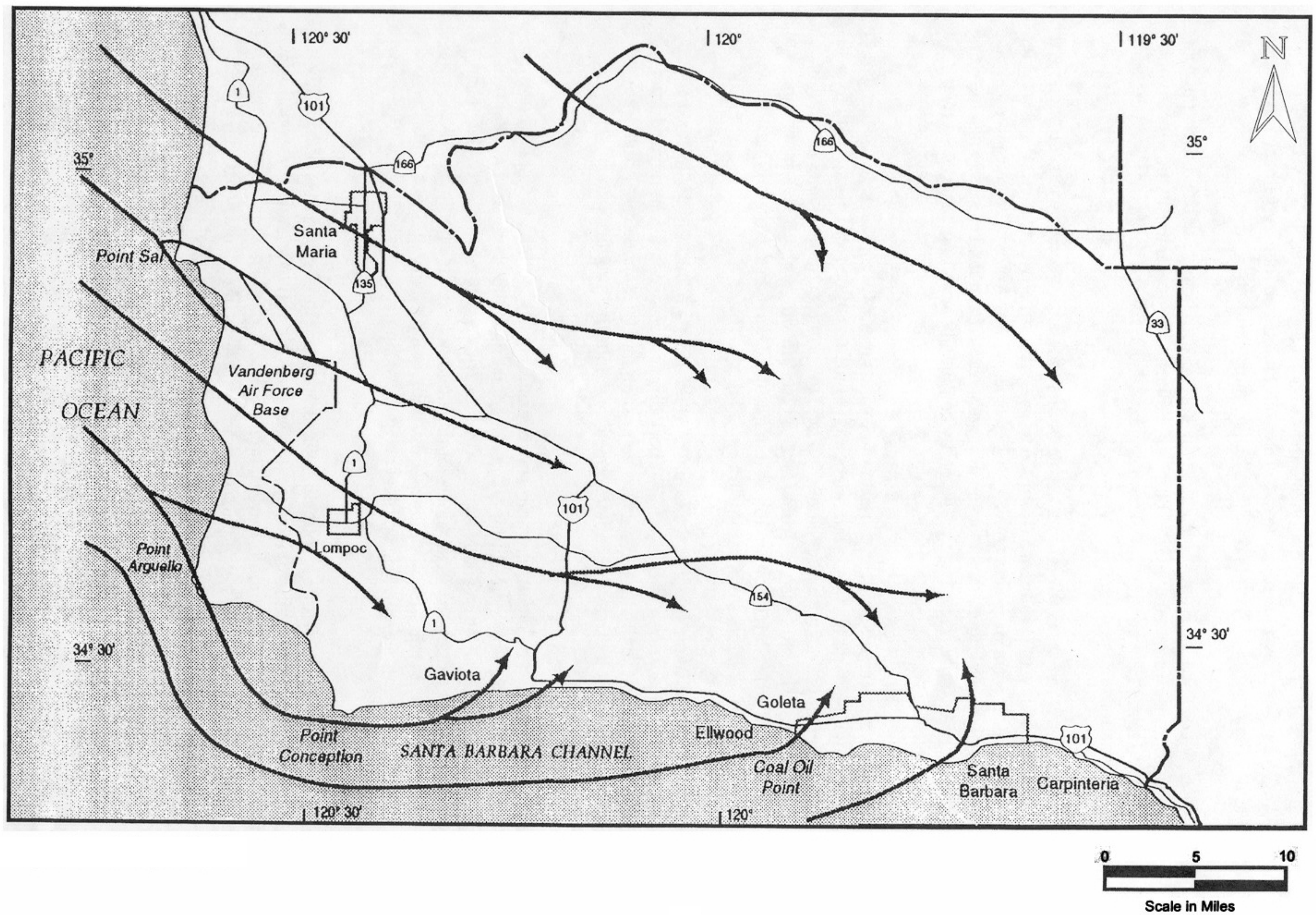
Data from all the meteorological stations within the area indicate a general northwesterly flow with higher wind speeds occurring offshore and at Point Conception and Point Arguello. The data in the channel generally show a greater westerly component than do winds at Point Arguello and north, because of the effects of the east-west oriented Santa Ynez Mountains. Wind data measured at Point Conception, Point Arguello and Vandenberg all show generally similar directional distributions. The data generally reflect conditions at the proposed exploration locations. However, the average speeds at Vandenberg are somewhat lower. Therefore, it is reasonable to expect a higher frequency of pollution events in the southern portion of the county where light winds are frequently observed, in relation to the North County where the prevailing winds are strong and persistent.

Figure 4.3-1 displays typical prevailing wind flows during the summer months for the region. The diagram shows that the generally northwesterly airflow associated with the Pacific High is significantly modified by interaction with the terrain. The flow becomes modified at particular times of the day due to temperature contrasts between the land and the ocean, resulting in the typical sea breeze experienced during summer days. The sea-breeze experienced in Santa Barbara County is common to all of California. These winds generally carry pollutants generated in the coastal areas to areas well inland. Typically, the air quality measured in the coastal areas of California is much better than that experienced inland.

Upper-level winds in the atmosphere are also important in the air quality of Santa Barbara County. These winds are routinely measured at Vandenberg Air Force Base once each morning and afternoon. The winds at 1,000 feet and 3,000 feet are generally from the north or northwest throughout the year. Occurrences of southerly and easterly winds are most frequent in winter, especially in the morning. Upper-level winds from the southeast are infrequent during the summer, though when they do occur, they are usually associated with periods of high ozone levels. As with the surface winds, upper-level winds can move pollutants that originate in other areas into the county.

During the fall and winter months, Santa Barbara County is occasionally subjected to Santa Ana winds. These are warm, dry, strong, and blustery winds blown from the high inland desert, through mountain valleys and eventually out to sea. Wind speeds associated with Santa Ana conditions are generally 15 to 20 mph, though speeds in excess of 60 mph have been registered. During these Santa Ana conditions, pollutants emitted in the Los Angeles region, Ventura and Santa Barbara Counties are moved out to sea. These pollutants can then be transported back onshore into Santa Barbara County (via the Santa Barbara Channel) in what is called a “post Santa Ana condition.”

“Sundowner” winds are a local condition inherent to the coastal strip below the Santa Ynez Mountains in Santa Barbara.” These winds are similar in effect to Santa Ana winds as the condition can produce high intensity, hot northerly winds down canyons and out to sea. While this condition can affect the local climate (usually for short periods of time), Sundowners are contrasted by the Santa Ana condition in that the winds are more localized and are caused by diurnal and land/sea temperature variations.



Source: MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 4.2-1)

Figure 4.3-1. Typical Prevailing Afternoon Summer Wind Flows

4.3.3 Stability and Mixing Height

Stability is an atmospheric trait that influences the mixing of air. In general, when the atmosphere becomes less stable, increased turbulence and mixing of the upper and lower atmosphere are prevalent. The mixing height is the height of the atmospheric layer measured from the ground upward in which convection and turbulence promote mixing. Good ventilation and dispersion result from a high mixing height, unstable conditions, and moderate to high wind speeds within the mixed layer.

Atmospheric stability is the primary factor that affects the concentrations of pollutants in the region. Atmospheric stability regulates the amount of mixing of air, both horizontally and vertically. An increased level of atmospheric stability that restricts mixing and low wind speeds is generally associated with higher pollutant concentrations. These conditions are typically related to temperature inversions that cap the pollutants that are emitted below. Inversions are characterized by a layer of warmer air above cooler air near the ground surface. In an inversion, the temperature of the air layer atypically increases with altitude acting like a cap on the cooler air mass below, preventing the dispersion of pollutants that are trapped in the lower air mass. Ozone concentrations are generally higher directly below the base of elevated inversions than they are at the ground surface. For this reason, elevated monitoring sites will occasionally record higher ozone concentrations than sites at lower elevations.

Atmospheric soundings at Vandenberg Air Force Base demonstrate that surface inversions (0 to 500 feet) are most frequent during the winter, and subsidence inversions (1,000 to 2,000 feet) are most frequent during the summer. Vertical dispersion of pollutants will generally be the most inhibited with a lower inversion base height and the greater the rate of temperature increase from the base to the top. The subsidence inversion is common during summer months along the California coast, and is one of the principle causes of air stagnation and poor air quality.

4.3.4 Temperature

The Mediterranean climate characteristics of Santa Barbara County result in mild temperatures occurring throughout the year, particularly adjacent to the coastal regions. Maximum summer temperatures average 70 degrees Fahrenheit near the coast and in the high 80s to low 90s inland. During winter, average minimum temperatures range from the 40s along the coast to the 30s inland. Temperatures within the coastal region are influenced by the marine dominance of the Pacific Ocean, while more inland areas of the county exhibit a more continental influence.

Santa Barbara and Santa Barbara Airport, on the south-facing coast between the ocean and the south slopes of the Santa Ynez Mountains, experience higher maximum temperatures, lower minimum temperatures, and more continental influence than those experienced at offshore Platforms and Islands dominated by marine influences (Table 4.3-1). At Santa Barbara, the highest mean maximum temperature (79°F) occurs in September, and the lowest mean minimum temperature (40°F) occurs in January. Temperatures at Santa Barbara Airport are slightly cooler. Cold air drainage off the mountain slopes contributes to the lower minimum temperature during the winter.

Table 4.3-1. Temperature and Precipitation Data for Selected Santa Barbara Locations

Location	Temperature (°F)		Precipitation (inches)
	Average Maximum	Average Minimum	Average Annual
Santa Barbara	71.2	50.1	17.0
Santa Barbara Airport	69.5	48.7	15.9
Lake Cachuma	76.9	45.3	18.7
Lompoc	69.9	46.8	14.0
Santa Maria	68.7	45.8	12.4

Source: Western Regional Climate Center, 2000 as cited in MMS, 2001

4.3.5 Precipitation

The climate of Santa Barbara is strongly influenced by a persistent high pressure area which lies off the Pacific Coast. As a result, sunny skies are common throughout most of the area. The majority of the annual precipitation amounts occur mostly from October to April, when the Pacific High pressure system has shifted south. Annual rainfall amounts range from about 10 to 18 inches along the coast, with more substantial amounts in the higher elevations. On occasion, tropical air masses produce rainfall during the summer. Cool, humid, marine air causes frequent fog and low clouds along the coast, generally during the night and morning hours in the late spring and early summer. The fog and low clouds can persist for several days at a time until broken up by a change in the weather pattern.

Average annual precipitation varies markedly over relatively short distances within the region, primarily because of topographic effects. Relatively high elevation stations (San Marcos Pass, Gibraltar) in the Santa Ynez Mountains receive an average of more than 25 inches of precipitation per year (Table 4.3-2). Santa Barbara receives slightly more precipitation (17.0 inches) than Santa Barbara Airport (15.9 inches).

Historical precipitation levels in the region may vary widely from year to year. At Santa Barbara, annual precipitation is 8.7 inches or less about once every 10 years; it can also be more than 28 inches one year in 10 (Western Regional Climate Center, 2000, as cited in MMS, 2001).

Table 4.3-2. El Niño 1997–1998 Precipitation Data for Santa Barbara County

Location	1997–1998 Rainfall (inches)	Normal Rainfall (inches)	Percent of Normal
Cuyama	21.50[1]	8.01	268
Gibraltar Dam	68.85[1]	25.37	271
Lake Cachuma	53.39[1]	18.73	285
Lompoc	37.25[1]	13.95	267
San Marcos Pass	73.87[2]	26.62	277
Santa Barbara	46.99[1]	16.98	277
Santa Maria	32.58[1]	12.36	264

Source: National Weather Service, 1998 as cited in MMS, 2001
[1] Seasonal record occurred during 1997-1998 El Niño
[2] Seasonal record of 78.48 inches occurred 1982-1983

4.3.6 Severe Weather

Thunderstorms in the study area are infrequent. Thunderstorms in the area are generally associated with active cold fronts or cold lows in winter or with the transport of tropical moisture into the region in late summer or early fall.

The winter of 1997-1998 was one of the most severe winters in local history as the effects of the El Niño were felt across southern California. Rainfall totals resulting from the El Niño for Santa Barbara County were 273% of normal rainfall for the county with many stations recording new seasonal records (National Weather Service, 1998 as cited in MMS, 2001). Table 4.3-2 depicts a precipitation summary for meteorological stations in Santa Barbara County as a result of the 1997-1998 El Niño severe storm cycle.

Rosenthal (1972, as cited in MMS, 2001) reported on occurrences of other types of severe weather in the region. He indicated that tornadoes are rare in California, with an estimated return period for a tornado striking the same location of 1 in 20,000 years for the Los Angeles area and about the same in other parts of the State. He also reported that water spouts, though infrequent, have been sighted over the Santa Barbara Channel.

Remnants of tropical storms formed off the West Coast of Central America have affected this region on more than one occasion. However, winds and precipitation associated with these storms have been only moderate (National Oceanic and Atmospheric Administration, 1976-1978, as cited in MMS, 2001).

4.4 Air Quality

4.4.1 Existing Air Quality

The Federal government has established ambient air quality standards to protect public health (primary standards) and, in addition, has established secondary standards to protect public welfare known as the National Ambient Air Quality Standards (NAAQS). National primary standards establish the levels of air quality necessary, with an adequate margin of safety to protect the public health. National secondary standards are the level of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

The State of California has established separate, more stringent ambient air quality standards to protect human health and welfare (CAAQS). California and National standards have been established for ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), suspended particulate matter 10 microns (PM_{10}), suspended particulate matter 2.5 microns ($PM_{2.5}$) and lead (Pb). These are commonly referred to as the criteria pollutants. In addition, California has standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility reducing particles.

National standards, other than O_3 and those based on annual averages or annual arithmetic means, are not to be exceeded more than once a year. The ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than one. Once the Federal 1-hour ozone standard is attained, it will be revoked and replaced by the 8-hour standard. California standards for O_3, CO, 1 hour SO_2, NO_2 and PM_{10} and visibility reducing particles are all values that are not to be exceeded. The 24-hour SO_2, sulfates, lead, hydrogen sulfide, and vinyl chloride are not to be equaled or exceeded. The current CAAQS and NAAQS are listed in Table 4.4-1.

Table 4.4-1. Ambient Air Standards

Pollutant	Averaging Time	California Standards	Federal Standards	
			Primary	Secondary
Ozone (O_3)	1 hour	0.09 ppm (180 µg/m^3)	0.12 ppm (235 µg/m^3)	Same as Primary Standard
	8 hour		0.08 ppm (157 µg/m^3)	
Carbon Monoxide (CO)	1 hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/ m^3)	
	8 hour	9.0 ppm (10 mg/m^3)	9 ppm (10 mg/ m^3)	
Nitrogen Dioxide (NO_2)	1 hour	0.25 ppm (470 µg/m^3)		Same as Primary Standard
	Annual Avg.		0.053 ppm (100 µg/m^3)	
Sulfur Dioxide (SO_2)	1 hour	0.25 ppm (655 µg/m^3)		
	3 hour			0.5 ppm (1300 µg/m^3)
	24 hour	0.04 ppm (104 µg/m^3)	0.14 ppm (365 µg/m^3)	
	Annual Avg.		0.030 ppm (80 µg/m^3)	
Lead	30 day avg.	1.5 µg/m^3		
	Calendar qtr.		1.5 µg/m^3	Same as Primary Standard
Particulate Matter (PM_{10})	24 hour avg.	50 µg/m^3	150 µg/m^3	Same as Primary Standard
	Annual Avg.	20 µg/m^3	50 µg/m^3	
Particulate Matter ($PM_{2.5}$)	24 hour		65 µg/m^3	Same as Primary Standard
	Annual Avg.	124 µg/m^3	15 µg/m^3	
Sulfates	24 hour	25 µg/m^3		
Hydrogen Sulfide	1 hour	0.03 ppm (42 µg/m^3)		
Vinyl Chloride	24 hour	0.010 ppm (26 µg/m^3)		
Visibility Reducing Particles	8-hour	Extinction coefficient of 0.23 per km; visibility 10 miles or more due to particles when relative humidity is < 70%		

Source: CARB 2004e.

Air quality is determined by measuring ambient concentrations at various monitoring sites within the county and comparing those concentrations to the health-based standards. The ambient air quality within the region depends upon the extent and orientation of emission sources, and the characteristics of the receptors as well as the time of exposure to a given pollutant. A summary of the attainment status of the South Central Coast Air Basin (SCCAB) is listed in Table 4.4-2.

Table 4.4-2. Attainment Status in the South Central Coast Air Basin

County	Pollutant	Attainment Status	
		Federal	State
Ventura Santa Barbara San Luis Obispo	Ozone – 1 hour	Severe-15 Nonattainment [a] Unclassifiable/Attainment [d] Unclassifiable/Attainment [d]	Severe Nonattainment Moderate Nonattainment Attainment
Ventura Santa Barbara San Luis Obispo	Ozone – 8 hour	Moderate Nonattainment [b] Unclassifiable/Attainment [d] Unclassifiable/Attainment [d]	N/A
All SCCAB Counties	CO	Unclassifiable/Attainment [d]	Attainment
All SCCAB Counties	NO_2	Unclassifiable/Attainment [d]	Attainment
All SCCAB Counties	SO_2	Unclassifiable/Attainment [d]	Attainment
All SCCAB Counties	PM_{10}	Unclassifiable/Attainment [d]	Nonattainment
Ventura Santa Barbara San Luis Obispo	$PM_{2.5}$	Unclassifiable [f] (Proposed) Unclassifiable [f] (Proposed) Attainment [f] (Proposed)	Nonattainment [e] Unclassified [e] Unclassified [e]
All SCCAB Counties	Lead	No Designation	Attainment

Source: CARB 2004a, USEPA 2004.
N/A – Not Applicable
Notes:

a. Severe-15 means that the area has 15 years from original designation date 1990 (i.e. until 2005) to meet attainment status.
b. Moderate means that the area has until Year 2010 to meet attainment status.
c. For the Federal attainment status, the SCAB is considered as a whole to be in nonattainment, whereas the State attainment status has been determined at a County level. Therefore, the Riverside area is considered to be in attainment of the State standard for CO, but in nonattainment of the Federal standard.
d. Unclassifiable/Attainment – The attainment status for the subject pollutant is classified as either attainment or unclassified.
e. State $PM_{2.5}$ attainment status was recommended in the 2003 Staff Report Attachment B - Proposed Amendments to the Area Designations available at: http://www.arb.ca.gov/desig/desig03/desig03.htm, and adopted into the California Code of Regulations (Title 17 Section 60210) by the Office of Administrative Law on June 7, 2004 and become operative on July 7, 2004 (CARB 2004b).
f. Proposed Federal $PM_{2.5}$ attainment status recommended by the California Air Resources Board on February 11, 2004. The USEPA plans to finalize $PM_{2.5}$ designations by December 15, 2004 (http://www.arb.ca.gov/desig/pm25desig/pm25desig.htm) (CARB 2004c).

4.4.2 Air Pollutants

Photochemical Pollutants. Ozone (O_3) is the principal compound of a group of secondary pollutants that are formed in the atmosphere through a series of complex photochemical reactions involving nitrogen oxides (NO_x) and reactive hydrocarbons (ROC). A secondary pollutant is not directly emitted into the atmosphere, but is formed as a result of photochemical reactions with primary pollutants. As these photochemical reactions may take several hours to occur, peak ozone levels are often found downwind of major source areas and have a more regional distribution. The 2003 ROC and NO_x estimated annual emission inventory in tons per day for Santa Barbara County is presented by category in Figures 4.4-1 and 4.4-2, respectively.

Figure 4.4-1. Reactive Hydrocarbon Inventory by Category

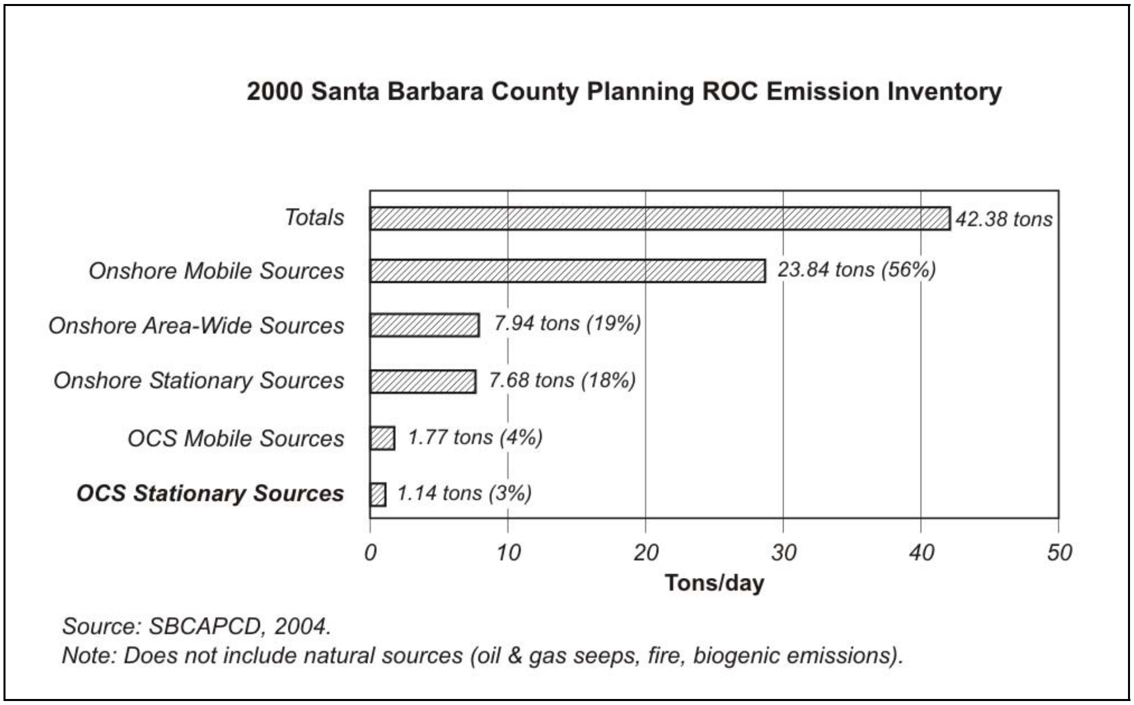
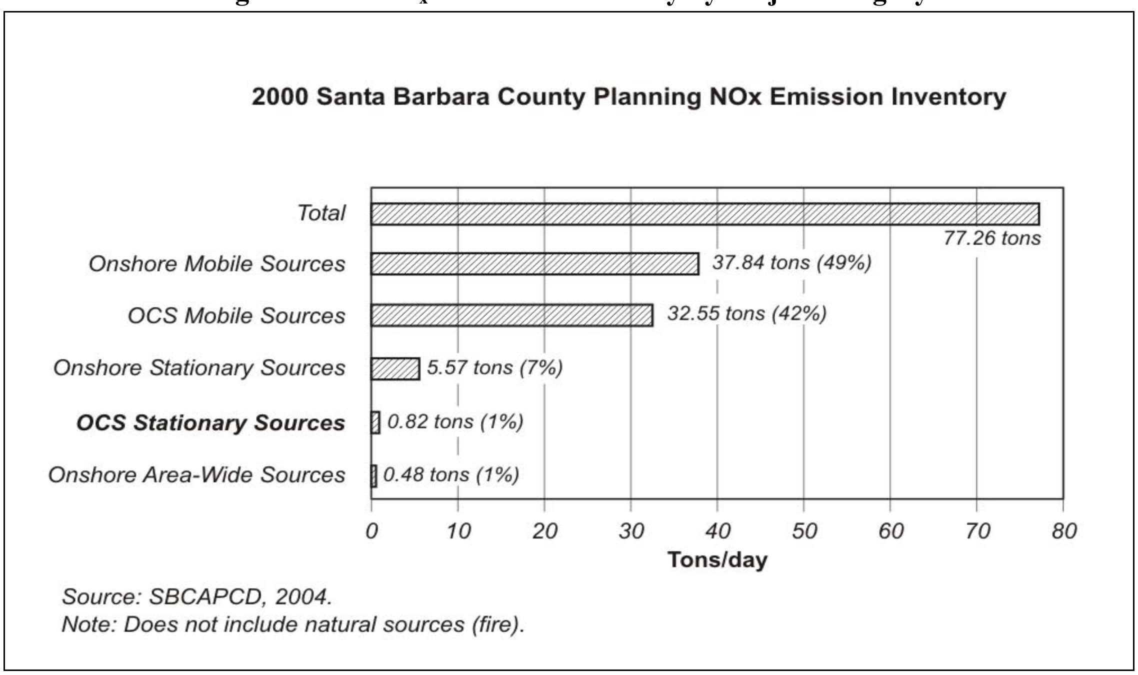


Figure 4.4-2. NO_x Emission Inventory by Major Category



Both the CAAQS and the NAAQS for ozone have been historically exceeded in the South Coast Air Basin, with currently both Santa Barbara and Ventura Counties designated as nonattainment for the State standards of Ventura County designated as nonattainment of the Federal standards. Due to aggressive emission control strategies and favorable meteorology, peak ozone concentrations have declined during the 1990s. Santa Barbara County was officially re-designated as attainment for the Federal 1-hour ozone standard in 2003. Ventura is presently classified as a “severe” non-attainment designation for the 1-hour

State and Federal ozone standards and moderate nonattainment designation for the 8-hour Federal standard.

Table 4.4-3 shows a summary of ozone monitoring concentrations for representative coastal or near coastal monitoring sites in Santa Barbara and Ventura Counties.

Table 4.4-3. Summary of Representative Ozone Monitoring Sites in SCCAB

Location	Period	2001			2002			2003		
		Maximum Conc.	Days Above Standard[a]		Maximum Conc.	Days Above Standard		Maximum Conc.	Days Above Standard	
			State	Fed.		State	Fed.		State	Fed.
Ventura – Emma Wood State Beach	1-hour	0.093	0	0	0.078	0	0	0.094	0	0
	8-hour	0.079	--	0	0.069	--	0	0.078	--	0
El Rio	1-hour	0.094	0	0	0.086	0	0	0.081	0	0
	8-hour	0.072	--	0	0.067	--	0	0.071	--	0
Carpinteria	1-hour	0.097	1	0	0.084	0	0	0.106	1	0
	8-hour	0.077	--	0	0.064	--	0	0.080	--	0
Santa Barbara – 700 East Canon Perdido	1-hour	ND	--	--	0.076	0	0	0.079	0	0
	8-hour	ND	--	--	0.061	--	0	0.070	--	0
Goleta	1-hour	0.082	0	0	0.070	0	0	0.097	1	0
	8-hour	0.066	--	0	0.060	--	0	0.071	--	0
Las Flores Canyon	1-hour	0.097	1	0	0.088	0	0	0.107	1	0
	8-hour	0.086	--	1	0.075	--	0	0.102	--	1
El Capitan Beach	1-hour	0.092	0	0	0.075	0	0	0.098	0	0
	8-hour	0.078	--	0	0.068	--	0	0.078	--	0
Santa Maria -Broadway	1-hour	0.064	0	0	0.065	0	0	0.065	0	0
	8-hour	0.058	--	0	0.059	--	0	0.060	--	0
Santa Rosa Island	1-hour	0.075	0	0	0.079	0	0	0.077	0	0
	8-hour	0.069	--	0	0.069	--	0	0.068	--	0

Source: CARB 2004d
ND = No Data

Inert Criteria Pollutants. State and Federal ambient air standards for the inert criteria air pollutants CO, NO_2, SO_2, PM_{10}, and lead, and State ambient air quality standards for sulfides and H_2S, are contained in Table 4.4-1. Elevated levels of these criteria pollutants are generally a localized phenomenon found in the vicinity of major pollutant sources. Therefore, elevated concentrations of these criteria pollutants are generally dependent upon the proximity of the ambient monitoring station to major pollutant sources.

Carbon monoxide (CO) is a gas formed primarily by the incomplete combustion of fuels. The primary source of CO emissions in the Santa Barbara area is motor vehicles. Santa Barbara County is considered to be in attainment of both the State and Federal CO standards. CO concentrations tend to be greater during the winter months due to limited dispersion and colder surface temperatures than during the summer months when increased mixing is more prevalent.

Nitrogen oxides (NO_x), primarily in the form of nitric oxide (NO), are formed during combustion processes, and rapidly form into nitrogen dioxide (NO_2) through oxidation. Nitrogen oxides are a primary precursor to the formation of ozone pollution. High nitrogen dioxide levels are generally measured in urbanized areas with heavy traffic. NO_2 emissions have been historically below both the State and Federal standards and there have been no exceedances of the 1-hour standard during the past 20 years.

Sulfur dioxide (SO_2) is primarily formed through combustion processes by stationary and mobile sources utilizing sulfur fuels. SO_2 concentrations have been historically low due to the lack of major sulfur dioxide sources in the region and all counties within the SCCAB are considered in attainment of the State and Federal standards.

Particulate matter, such as in the form of PM_{10} and $PM_{2.5}$ emissions, can be emitted directly or it can be formed many miles downwind from emission sources when various precursor pollutants interact in the atmosphere. Primary sources of particulate matter include man-made primary sources such as diesel exhaust and construction or road dust and natural sources such as wind-blown dust or sea salt and pollen. Gaseous pollutants like NO_x, SO_x, and ROC from combustion exhaust can form particulate matter in the form of nitrates (NO_3), sulfates (SO_4), and organic particles. These pollutants are known as secondary particulates, because they are not directly emitted but are formed through complex chemical reactions in the atmosphere. Particulate matter, particularly fine particles act as a respiratory irritant that may affect children and other individuals susceptible to respiratory problems. The entire SCCAB is considered to be in attainment of the Federal PM_{10} standards but is considered to be in nonattainment of the State PM_{10} standards. With the exception of Ventura County, which is considered to be in nonattainment of the State $PM_{2.5}$ standard, the entire SCCAB is considered to be in attainment with the State $PM_{2.5}$ standard and proposed to be in attainment of the Federal $PM_{2.5}$ standards.

Lead is a heavy metal whose particles in the atmosphere historically were primarily the result of emissions of motor vehicles due to leaded fuels. Lead emissions have been nominal since the phase out of leaded fuels and the entire SCCAB is in attainment of both State and Federal standards.

Sulfates are aerosols or particulates that can be emitted directly from industrial or natural sources, but are more predominately formed as a secondary pollutant in the atmosphere during cool humid conditions. Sulfates may act to aggravate respiratory diseases and are also a corrosive agent. The last exceedances of the State sulfate standard occurred in 1984 and the entire SCCAB is currently in attainment of the State sulfate standard.

Hydrogen sulfide (H_2S) is an odorless, toxic gas that can be detected by humans at very low concentrations. Higher concentrations can damage the nervous system and be fatal. H_2S is produced during the decay of organic material and is found naturally in petroleum. The entire SCCAB is currently in attainment of the State H_2S standard.

Toxic Air Contaminants. Toxic Air Contaminants (TACs) are air pollutants that are suspected or known to cause significant health hazards (i.e., cancer, genetic mutations, birth defects, or other serious illness). TACs are emitted from a variety of sources including industrial facilities (such as chrome plating shops), commercial facilities (such as drycleaners), and motor vehicles. The top three contributors of the potential cancer risk come primarily from motor vehicles (diesel PM, 1,3 butadiene, and benzene). Statewide, particulate matter from diesel-fueled engines (diesel PM) contributes more than half of the known risk from air toxics. Since 1990, the cancer risk from TACs has been reduced by 45 percent statewide even though there has been a significant growth in automobile use and industry (CARB, 2000). TAC emission reduction programs are in place for a number of TAC pollutants; including hexavalent chromium (from plating, paints, and cooling tower chemical use), dioxins (from incineration), perchloroethylene (from drycleaning and solvent use), and benzene (from gasoline refueling and use). Additionally, there are a number of programs active to reduce TAC emissions from both gasoline and diesel-fueled vehicles and stationary engines.

Greenhouse Gases. The primary greenhouse gases are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), ozone (O_3), water vapor (H_2O), and chlorofluorocarbons (CFCs). Greenhouse gases are largely transparent to solar radiation, but they do absorb long wave radiation emitted by the earth’s surface and reradiate a portion of the energy back down to earth. This process results in a net warming effect to the lower layers of the atmosphere. There is a growing concern regarding the potential effects of greenhouse gases on global climate; however, methodology is presently not available which will allow a determination of the project contribution to the probability, extent, or imminence of global climate change.

4.4.3 Regulatory Setting

The proposed exploration projects are primarily located adjacent to Santa Barbara County within the South Central Coast Air Basin. The Federal attainment status of Santa Barbara County is found in 40 CFR 81.305. Currently, Santa Barbara County is in attainment of all the National Ambient Air Quality Standards. Santa Barbara County is also considered non-attainment for both the California ozone and 24-hour PM_{10} air quality standards.

Section 328 of the 1990 Clean Air Act Amendments (CAAA) transfers authority for air quality on the Pacific OCS to the EPA. On September 4, 1992, the EPA Administrator promulgated requirements (40 CFR Part 55) to control air pollution from Pacific OCS sources to attain and maintain Federal and State air quality standards and to comply with CAAA provisions for the Prevention of Significant Deterioration. The promulgated regulations require Pacific OCS sources to comply with applicable onshore air quality rules in the corresponding onshore area (COA). EPA delegated authority to the SBCAPCD on November 5, 1993 to implement and enforce the requirements of 40 CFR Part 55. The full transfer of authority to SBCAPCD to regulate Pacific OCS air emissions pursuant to 40 CFR Part 55 transpired on September 4, 1994.

4.4.3.1 Federal and State Regulations

National, State, and regional agencies have established standards and regulations that affect the study area. The following National and State regulatory considerations apply to post-suspension phase activities:

- Federal Clean Air Act of 1970 directs the attainment and maintenance of National Ambient Air Quality Standards (NAAQS). The 1990 Amendments to this Act affect attainment and maintenance of NAAQS (Title I), motor vehicles and fuel reformulation (Title II), hazardous air pollutants (Title III), acid deposition (Title IV), facility operating permits (Title V), stratospheric ozone protection (Title VI), and enforcement (Title VII).
- The U.S. Environmental Protection Agency (EPA) implements the Federal Clean Air Act (CAA) and established the NAAQS for criteria pollutants.
- EPA instituted final rules for determining general conformity of Federal actions with State and Federal air quality implementation plans on November 30, 1993.
- California Air Resources Board (CARB) has established the California Ambient Air Quality Standard (CAAQS), which determine State attainment status for criteria pollutants.
- The California Clean Air Act (CCAA) went into effect on January 1, 1989 and was amended in 1992. The CCAA mandates achieving the health-based CAAQS at the earliest practicable date.
- Air Toxics "Hot Spots" Information and Assessment Act of 1987 (AB 2588) requires an inventory of air toxics emissions from individual facilities, an assessment of health risk, and a notification of potential significant health risk.
- The Calderon Bill (SB 1731) alters AB 2588. The bill sets forth changes in the following four areas: providing guidelines to identify a more realistic health risk, requiring high risk facilities to submit an air toxic emission reduction plan, holding air pollution control districts accountable for ensuring that the plans will achieve their objectives, and requiring high risk facilities to achieve their planned emissions reduction.
- The new Tanner Bill (AB 2728) amends the existing Tanner Bill (AB 1807) by setting forth provisions to implement the National program for hazardous air pollutants.

4.4.3.2 Local Regulations

The majority of the affected leases are within the jurisdiction of the Santa Barbara County Air Pollution Control District (SBCAPCD), including offshore sources delegated by USEPA, and the development of all of these 27 leases, with one exception, would require the use of onshore facilities located within Santa Barbara County. Therefore, this section provides a short history of the SBCAPCD air quality attainment plans and summary of the currently applicable SBCAPCD rules and regulations.

The SBCAPCD was the principal author of the 1991 Air Quality Attainment Plan, the 1993 Rate of Progress Plan (ROP), the 1994, 1998, and 2001 Clean Air Plans and the 2004 update to the Clean Air Plan. During this period the County came into attainment with all NAAQS. The 2001 plan sought redesignation for the county as an attainment area for the Federal 1-hour ozone standard and provides the Federal ozone maintenance plan, while the 2004 plan updates the 2001 plans for attainment of the State 1-hour ozone standard.

The SBCAPCD has 12 regulations, each of which includes a number of rules designed for the control of stationary sources of air pollution. The primary regulations affecting the post-suspension phase activities are contained in Regulation II, which establishes air permit requirements, and Regulation VIII, regarding the review of new or modified air pollution sources.

Regulation II (Permits). Regulation II establishes the County's permit system applicable to all stationary sources of air pollution. The construction and modification of sources of air contaminants are required to obtain (1) an Authority to Construct permit (ATC) prior to initiating construction or modification of a source; and (2) a Permit to Operate (PTO) prior to commencing operations. Regulation II codifies:

- Permits for activities that emit or affect air pollutants.
- Designates the permit and exemption criteria for air pollution sources.
- Describes the required permit application information.
- Establishes the standards for granting permits.

Rule 202, provides the general provisions and exemption criteria adopted by SBCAPCD to determine whether certain operations or activities are subject to a District Authority to Construct or Permit to Operate. Section F.6 of the Rule states, "A permit shall not be required for drilling equipment used in State waters or in the outer continental shelf provided the emissions from such equipment are less than 25 tons per stationary source of any affected pollutant during any consecutive 12 month period." Drilling equipment includes drill rig, workover rig and exploratory rig engines. Temporary engines that are ancillary to the drilling rig or workover operation (i.e., wireline unit engines, nitrogen skid unit engines, pump skid engines) are considered drilling equipment. Emissions from platform engines such as crane engines and well-kill pump engines are not included in the drilling equipment exemption.

Thus, the proposed delineation drilling projects would be subject to a 25 ton exemption threshold as denoted in Rule 202 and projects demonstrating drilling equipment emission potentials less than 25 tons shall have those emissions exempted from SBCAPCD permit requirements. Emission sources other than drilling equipment would be subject to the permit provisions contained in Regulation II.

Regulation VIII (New Source Review). Regulation VIII, commonly referred to as New Source Review (NSR) establishes criteria for new or modified source of air pollution in the County. The objective of Regulation VIII is to:

- Ensure that new or modified sources of air pollution prevent the degradation of air quality.
- Ensure that new or modified sources of air pollution do not interfere with the attainment and maintenance of air quality standards.

- Establish threshold levels of air emissions requiring Best Available Control Technology (BACT), emission offsets, and air quality impact analysis (AQIA).
- Specifies how increases in both non-attainment and attainment pollutants are permitted.

Table 4.4-4 provides a summation of SBCAPCD threshold requirements relating to the application of Best Available Control Technology (BACT), emission offsets and air quality impact analysis (AQIA).

Table 4.4-4. Santa Barbara County APCD BACT, AQIA, and Emission Offset Requirements

BACT Thresholds	• Nonattainment pollutants - 25 lbs/day (currently PM_{10}, NO_x and ROC). • Attainment pollutants – SO_x – 120 lbs/day, CO – 550 lbs/day • 10 tons for any Hazardous Air Pollutant (HAP) or 25 tons for all (HAPs) – Toxic Best Available Control Technology (T-BACT)
Offset Thresholds	• Nonattainment pollutants – PM_{10} – 80 lbs/day (15 tons/year), ozone precursors NO_x and ROC – 55 lbs/day (10 tons/year)
AQIA Thresholds	• Nonattainment pollutants - PM_{10} – 80 lbs/day, NO_x and ROC – 120 lbs/day • Attainment pollutants – SO_x – 120 lbs/day, CO – 550 lbs/day

Source: SBCAPCD 2004a
Note: Table lists thresholds that, when exceeded, triggers the specific requirement (i.e., BACT) and reflects current county attainment status.

The SBCAPCD has also adopted over fifty specific emission and emission source rules within Regulation III (Prohibitions). There are several general rules (such as opacity limitations, particulate matter concentration limit, and fuel specification rules) that apply to all sources of air pollution including any future Pacific OCS activities. Other Regulation III rules that would specifically apply to the Pacific OCS activity emissions and emission sources, including future oil and gas production, may include:

- Rule 310 – Odorous Organic Sulfides
- Rule 318 – Vacuum Producing Devices or Systems – Southern Zone
- Rule 325 – Crude Oil Production and Separation
- Rule 331 – Fugitive Emission Inspection and Maintenance
- Rule 344 – Petroleum Sumps, Pits and Well Cellars
- Rule 359 – Flares and Thermal Oxidizers.

4.4.4 Effects of Past Offshore Oil and Gas Activities

Regional air quality is affected by emissions from all direct and support activities for oil and gas operations occurring on the Pacific OCS. These emissions may result from oil and gas activities including exploratory drilling, construction, oil and gas development and production operations, and support craft activities. To date, a total of 23 offshore structures and 1 offshore storage and transfer facility have been installed on the Pacific OCS from 1968 through 1993. 16 structures have been emplaced offshore of Santa Barbara County, 4 offshore of Ventura County, and 4 structures offshore of Long Beach. Of the total of 16 structures offshore Santa Barbara County, the Offshore Storage and Treatment (OS&T) facility was removed in 1994 leaving 15 structures presently in place off the County.

A cooperative air quality study for the Santa Barbara Channel was conducted to assess the impacts of emissions from direct and indirect Pacific OCS activities on ozone concentrations on Santa Barbara and Ventura Counties. The Joint Interagency Modeling Study (JIMS) (SAI, 1986 as cited in MMS, 2001), was a cooperative study between MMS, Santa Barbara and Ventura APCDs, the EPA, and the California Air Resources Board (CARB). Three distinct meteorological scenarios that were highly conducive to ozone formation entailing site specific emissions data were utilized. The JIMS study established that the maximum onshore concentrations from existing Pacific OCS facilities were less than 1 part per hundred million for ozone. By comparison, the NAAQS for ozone is 12 parts per hundred million. In addition, the subsequent transfer of air regulatory authority to EPA and delegation to local APCDs has further minimized potential onshore air quality impacts from Pacific OCS related activities. Table 4.4-5 provides an estimate of Santa Barbara Channel emissions including the Pacific OCS operations that was determined by SAI for the JIMS study.

Table 4.4-5. Santa Barbara Channel Emissions from the 1980s (tons/day)

Pacific OCS Source	NO_x	ROC
Exploratory Drilling	0.27	0.01
Development Drilling	0.26	0.02
Production Operations	2.15	2.06
Tankering	0.42	0.35
Support Craft	2.47	0.27
Ships	26.95	0.96
Total	32.52	3.67

Source: Joint Interagency Modeling Study (JIMS) (SAI, 1986, as cited in MMS, 2001)

Drilling Operations. The emissions associated with both exploration and delineation drilling operations are primarily combustion related and the pollutant of concern with these operations is NO_x. The primary sources of emissions from exploration operations occur from the Drilling Vessels' main engines, cranes and flare. Additional support craft servicing the drilling operations are an additional source of NO_x emissions. Initial production well drilling emission sources are the turbines generating the power requirements, cranes and the flare. Drilling emissions are generally of short duration lasting on average between 80 and 120 days for a typical exploratory well.

Construction Operations. Construction operations generally result in the most emission intensive phase of offshore operations. As construction operations are particularly combustion intensive, the highest peak-hour emissions of offshore operations are usually associated with this phase. Due to the high peak-hour emissions over a relatively short duration of time, potential violations of hourly ambient air standards are of concern during this phase. The platform jacket installation is the largest source of construction related emissions associated with platform construction. Additional sources of platform construction emissions are hookup and platform commissioning, pipeline installation, and power cable installation. Support vessels are an additional source of NO_x emissions during construction operations.

Platform decommissioning operations are an additional source of construction emissions due to their short duration and combustion intensive nature. Decommissioning phases which could result in NO_x emissions are (1) pre-abandonment operations, (2) topside removal, (3) jacket removal, (4) debris removal, and (5) pipeline and power cable removal.

Production Operations. Production operations result in the majority of emissions associated with offshore operations over the lifetime of the platform. While day to day emissions are lower than drilling or construction operations, the total emissions are additive over the approximate 30 year life of the platform. The primary sources of NO_x emissions during oil and gas production are turbines, cranes, flares, and auxiliary generators. The primary ROC evaporative sources associated with construction are fugitive emissions from the multitude of valves, flanges and connectors as well as storage vessels.

Support vessels servicing platform operations are also a primary source of NO_x emissions. The bulk of support craft emissions are from the supply and crew boats main engines and auxiliary generators. Helicopters are an additional source of emissions.

4.5 Physical Oceanography

4.5.1 Introduction

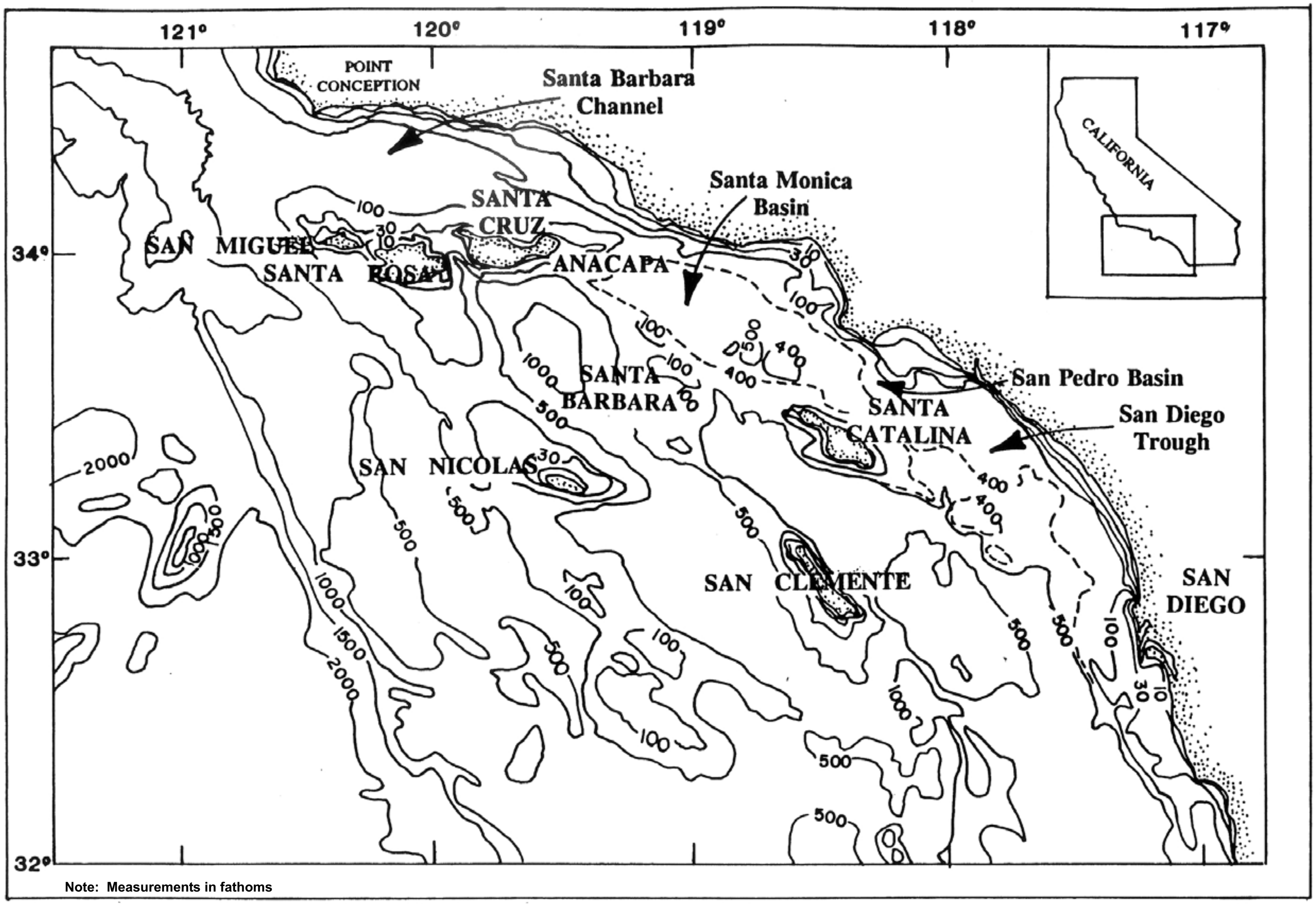
There has been a tremendous amount of physical oceanographic research done in the Southern California Bight over the last two decades. Extensive research was done concerning the deep circulation south of the Santa Barbara Channel in the 1980s and the surface circulation in the Santa Barbara Channel and the Santa Maria Basin in the 1990s and early 2000s. The latter research was conducted as part of the 1991 Cooperative Agreement between the MMS and the Scripps Institution of Oceanography, University of California, San Diego. This Cooperative Agreement was brought about in response to recommendations made by the National Research Council (NRC, 1989 and 1990, as cited in MMS, 2001), and by the findings of two scientific panels who met in the fall of 1990 in two separate workshops held in La Jolla, CA. These scientific panels met to discuss the numerical modeling and physical oceanographic research requirements necessary to obtain the information needed to effectively support Pacific OCS oil and gas decision-making in the Southern California Bight and offshore the southern central California coast. While this document will summarize the 1980s research in the Southern California Bight, emphasis will be placed on the surface circulation in the Santa Barbara Channel and Santa Maria Basin because of its direct pertinence to the objectives of the Environmental Information Document.

4.5.2 Southern California Bight Morphology

The Southern California Bight (Figure 4.5-1) is bounded to the north and east by the California coast, from Point Arguello to the U.S./Mexican international border. It is bounded offshore to the west by the Santa Rosa-Cortes ridge. Within the Bight are submarine valleys and mountains, the peaks of which form the various offshore islands. The ridges and troughs generally run northwest to southeast, with the exception of the Santa Barbara Channel, which runs east to west. The oceanic circulation in Southern California Bight owes its complexity principally to the Bight's composite bottom topography. Any water flow entering the 12 basins making up the Southern California Bight at depths below 250 meters must do so from the southeast along the San Diego Trough and into the Santa Monica–San Pedro basins. The Santa Monica–San Pedro basins act as a conduit for water flow into the rest of the Bight, opening up to the southeast at 737 meters, to the northwest into the Santa Barbara Basin at 250 meters, and to the west into the Santa Cruz Basin at 650 meters. Together, the Santa Monica–San Pedro Basins are 100 km long, 40 km wide, and 900 meters deep at the deepest point (Browne, 1994, as cited in MMS, 2001).

4.5.3 Oceanic Circulation in the Southern California Bight

The circulation patterns in the Southern California Bight were successfully approximated by a number of investigators in the 1960s and 1970s performing geostrophic (resultant movement from balance between forces caused by pressure gradients and the earth's rotation) calculations using temperature and salinity data obtained in the California Cooperative Oceanic Fisheries Investigations. These patterns were later verified by Barbara Hickey of the University of Washington (Hickey, 1992, as cited in MMS, 2001). It is her investigations of the currents in the Santa Monica and San Pedro basins from 1987 to 1990 that give us the detail of the poleward flow in the Southern California Bight, and also provide some surprising revelations for biologists concerning the overturning of bottom basin water.



Source: MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 4.4-1)

Figure 4.5-1. Southern California Bight Bathymetry.

The wind pattern along the west coast of the United States is typically strong, alternating in direction between from the northwest[1] and from the southeast in the northern part of the coast and becoming more polarized from the northwest in the southern region, especially off the California coast around Points Sal, Arguello, and Conception. This polarization of the winds from the northwest off the entire coast of California is most prominent during the late spring to early fall. These winds are called upwelling favorable winds because their consistent direction from the northwest moves surface waters offshore. This gives rise to upwelling of cold, nutrient-rich, bottom water at the coast that, in turn, moves this water mass offshore in a continual cycle. The Santa Ynez Mountains at the northern part of the Southern California Bight shield bight waters from this strong wind pattern, causing the winds inside the bight to be moderate and directed from the west to northwest throughout the year.

The sources of ocean water in the Southern California Bight (Figure 4.5-2) are (1) cold, low salinity, highly oxygenated sub-arctic water brought in by the California Current, and ultimately the California Counter-Current; (2) the moderate, saline, central north Pacific water advecting into the Bight from the west; and (3) the warm, highly saline, low oxygen content (Equatorial) water entering the bight from the south, principally by way of the California Undercurrent (at 300 meters depth). The distribution of these waters in the bight is such that the top 200 meters is typically low in salinity and high in oxygen content, which identifies this water mass as principally sub-arctic, even though the temperatures range between 9° and 18° C. The next 300 meters are consistently high in salinity and low in dissolved oxygen, identifying it as equatorial Pacific water. The temperature range for this water mass is 9° to 5° C (Jackson, 1986, as cited in MMS, 2001).

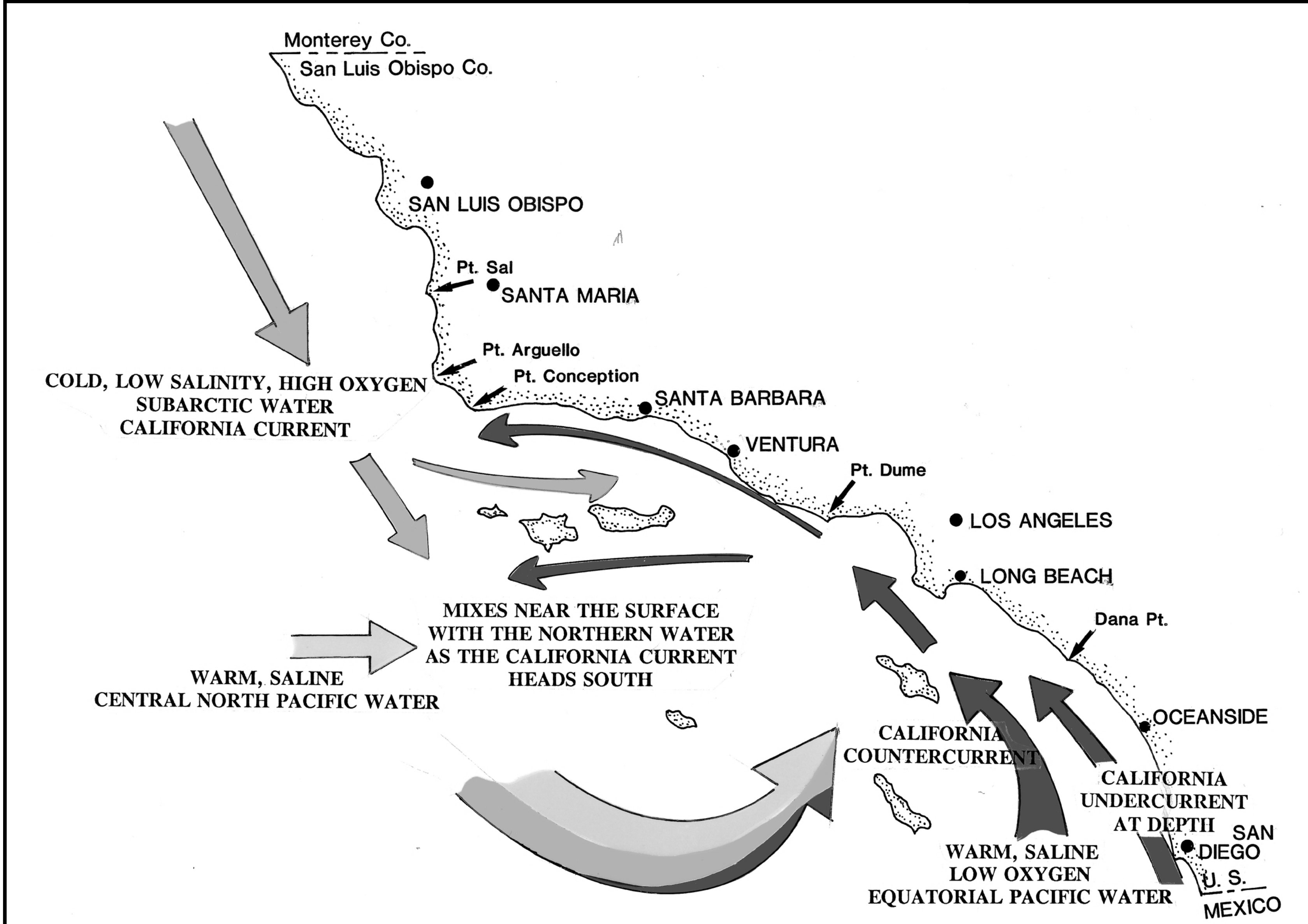
The circulation of the Southern California Bight is dominated by the Eastern Boundary Current of the North Pacific Gyre system, specifically the California Current, rather than by local wind forcing. The California Current carries subarctic water equatorward throughout the year, extends offshore a distance of about 400 km, and to a depth of 300 meters. The average speed of the California Current is approximately 0.25 m/s. Maximum speeds of the California Current are found at the surface with the strongest equatorward flow occurring during the spring and summer.

Nearer to the California coast, within 150 km, the surface current periodically reverses to the poleward direction, which, when it occurs is called the Inshore Countercurrent. The Inshore Countercurrent is strongest during the fall and winter, with its poleward flow reaching its maximum speeds (exceeding 0.04 m/s) typically within 50 km offshore of the coast.

In Figure 4.5-2, we see that the California Current, flowing in a southerly direction 200 to 500 km offshore Point Arguello, brings in cold, low-salinity, highly oxygenated water from the Subarctic region. The California Current continues in its southerly direction, mixing along the way with the warm, saline, north-central Pacific water coming in from the west. South of San Diego, part of the California Current spins eastward into the Southern California Bight and then poleward forming the California Counter-Current. It joins the poleward California Undercurrent, which is deeper and inshore of the California Counter-Current.

Below 200 meters depth, the poleward California Undercurrent exists throughout the year and is generally confined to within 100 km of the coast along the continental slope. The California Undercurrent originates in the eastern equatorial Pacific and brings these warm, saline, low dissolved oxygen waters poleward into the Southern California Bight. At either end of the Santa Barbara Channel, the California

[1] Wind directions are described as the direction *from* which the wind is blowing.



Source: MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 4.4-2)

Figure 4.5-2. Characteristic oceanic circulation in, and sources of water of, the Southern California Bight.

Undercurrent shows considerable seasonal variability. In winter and early spring, the California Undercurrent is its weakest with its maximum poleward core flow found below 200 meters depth. During this time the surface flow is typically equatorward. In late summer, fall, and early winter its poleward core flow increases in strength and ascends to shallower depths, at times reaching the surface where it becomes indistinguishable from the poleward Inshore Countercurrent.

Currents at the top 200 meters within the boundaries of the Santa Monica–San Pedro Basins are poleward year round (Hickey, 1992, as cited in MMS, 2001), with their speed ranging from 15 cm/sec to 20 cm/sec from late spring to winter and approximately 5 cm/sec from late winter to early spring. Coastally trapped waves traveling up the west coast of Mexico are thought to be a primary reason for surface current fluctuations in the Bight shelf region. The surface currents are driven geostrophically by these long period waves and not by local winds occurring in the Bight.

Previously, biologists have thought that benthic (sea bottom) sediments were depleting the oxygen content from the waters in the deep basins (700 to 900 meters depth). This may only be partially true, for they reasoned that this apparent consistent lack of oxygen was due to a very slow overturning of basin water (6 to 18 months). They were looking at water properties only and had no idea of the nature of the bottom currents in those basins. Hickey's measurements indicated that complete overturning in the basins occurred in only 1 to 3 months. The lack of oxygen content in the basins results from a good part of the basin waters coming from the California Undercurrent, bringing in highly saline, low-oxygenated, equatorial Pacific water.

During the fall, a relatively large water mass located between the depths of 300 and 600 meters and within the Santa Monica–San Pedro boundaries flows equatorward against the current direction of the rest of the water column.

Upon reaching the northern region of the Bight, the poleward flow typically bifurcates and enters both Santa Barbara and Santa Cruz Basins at their eastern sills. However, during strong, continuous, northwest winds (upwelling favorable) along the central California coast, the flow sometimes reverses and Channel water flows out of its eastern entrance. In this instance, the poleward moving current in the Bight is completely diverted to the west flowing along the southern coasts of the Channel Islands.

4.5.4 Santa Barbara Channel–Santa Maria Basin Surface Circulation

As cited in MMS, 2001, the description of the physical oceanography of the Santa Barbara Channel–Santa Maria Basin as it relates to the surface circulation in this area is a composite summary of Harms 1996, Hendershott and Winant 1996, Harms and Winant 1998, Dorman and Winant 1995, Winant and Dorman 1997, Dorman and Winant 2000, Dever 2000, Browne 1994, and Browne 2001. Heaviest emphasis in writing this description was placed on Harms 1996, Harms and Winant 1998, and Dever 2000.

4.5.4.1 Description of the Santa Barbara Channel and Recent Observational Field Arrays

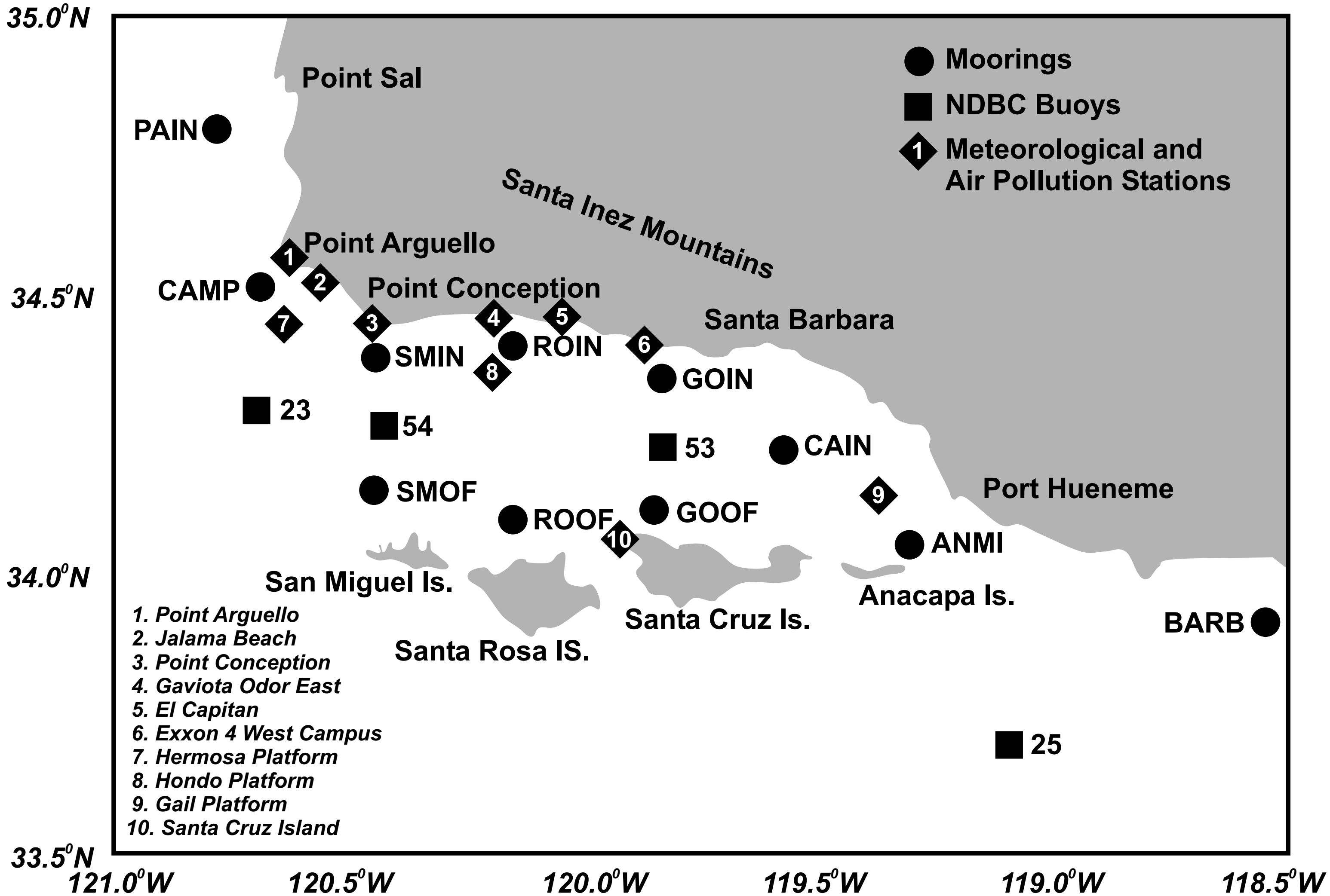
The Santa Barbara Channel basin (see Figure 4.5-1) is located at the northern edge of the Southern California Bight with an east to west orientation. It is bounded to the north by the California mainland, from Port Hueneme to Pt. Conception, and to the south by a string of four islands running from east to west: Anacapa, Santa Cruz, Santa Rosa, and San Miguel. The Channel is approximately 100 km long and 40 km wide with a maximum depth of 500 meters in its central basin. The shelf width on both sides ranges from 3 to 10 km, the sill depths at the eastern and western entrances are 220 meters and 430 meters respectively, and the island passages are approximately 40 meters deep.

The Minerals Management Service entered into a series of cooperative agreements with the Scripps Institution of Oceanography, University of California to conduct research regarding the oceanic circulation of the Santa Barbara Channel and the southern central California coastal area called the Santa Maria Basin. The Santa Barbara Channel–Santa Maria Basin Circulation Study (1991 to 2004) consisted of two consecutive major field programs: one focusing on the circulation in the Channel and one focusing on circulation in the Santa Maria Basin. The information provided below will reflect the analysis and peer-reviewed research coming out of the observations of the first field program. The data have been collected from the second field program and results should be available in 2005. Figure 4.5-3 shows the Santa Barbara Channel-Santa Maria Basin Circulation Study moored and meteorological instrument locations.

4.5.4.2 Large-Scale Forcing

The seasonal variation in the wind field in the Santa Barbara Channel-Santa Maria Basin region is determined by two large-scale atmospheric pressure patterns: the North Pacific anticyclone (high) and the thermal low located over the southwestern United States, resulting in persistent winds from the northwest. In the spring the North Pacific high strengthens and moves northward and the Southwestern U.S. Low intensifies. The resulting increase in the atmospheric pressure gradient results in persistently strong winds from the northwest off the central California coast, which separate from the coastline in the vicinity of Point Conception, leaving the winds in the Southern California Bight more weak and variable. In the summer the gradient between the two pressure systems reaches a maximum with the North Pacific high being displaced slightly further to the north, causing the winds off the central California coast to be directed more from the north. The gradients in the wind off Point Conception intensify (are stronger and occur over a shorter distance) in the summer. During the fall months, the North Pacific high gradually weakens and eventually moves south to its wintertime position. Fall wind fluctuations off Point Conception are comparable in magnitude to those in the summer but are typically of shorter duration. They last no longer than a few days and are interrupted by equal periods of calm. In the winter the most energetic atmospheric fluctuations along the south and central California coast result from propagating storm tracks. These storm systems pass over the Santa Barbara Channel in 2-4 days and are large in size compared to the size of the Channel.

Currents in the Channel are a superposition of large-scale flow (scales larger than the length of the Channel) and a cyclonic circulation characteristic to the Channel's interior. Surface pressure observations off Pt. Sal (PAIN) and in the Southern California Bight (BARB) and current observations at PAIN and at the eastern entrance to the Channel (ANMI) indicate close agreement between direct measurements and geostrophic calculations of the flow in these areas. The large-scale surface flow is equatorward in the spring due to strong equatorward wind stress. This increase in equatorward oceanic flow in the spring is accompanied by a decrease in the ocean's surface temperature and pressure. In late spring and early summer the equatorward wind stress off Pt. Conception increases to its seasonal maximum, but the current flow reverses to the poleward direction which is maintained throughout the summer, fall, and early winter. This flow reversal in the Southern California Bight, in the northern part of the Channel, and at times in the inner Santa Maria Basin is due to the setup and increase in the poleward alongshore pressure gradient. The setup of the alongshore pressure gradient is due to the markedly lower wind stress and the accompanying increase in the surface pressure (due to rising temperatures) in the Southern California Bight compared to waters offshore Pt. Conception. The



Source: MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 4.4-3)

Figure 4.5-3. Santa Barbara Channel Santa Maria Basin Circulation Study Moored and Meteorological Instrument Locations alongshore pressure gradient is fully established by early summer and remains strong until early fall, when it declines as both the equatorward wind stress off Pt. Conception and gradients in the wind stress field between Pt. Conception and the lower Southern California Bight weaken. The reversal of flow in the eastern Channel entrance from equatorward in the spring to poleward the rest of the year as well as the poleward flow in the northern Channel shelf appears to be related to the strengthening of the alongshore surface pressure gradient. Fluctuations (reversals) in these seasonal trends can last for periods up to a week.

The currents measured at SMOF in the southwestern corner of the Channel respond to the up-welling-favorable wind stress fluctuations year round, whereas the correlation between wind stress and the currents in the northern segment of the western Channel entrance (SMOF) lasts only during the late winter and spring. During the late winter and spring the flow is typically equatorward all along the western entrance in a manner consistent of other observations subject to upwelling. In late May and throughout the remainder of the year there is very little correlation of the currents in the northwestern corner of the channel and the windstress as measured at NDBC Buoy.

Along shelf currents in the northern Channel shelf are typically westbound and in opposition to (anti-correlated with) the currents on the southern shelf. The persistently year-round eastbound flow along the northern coastline of the islands is primarily due to wind stress, and except for late winter to early spring, is weaker than the westbound jet flowing on the northern shelf. The wind stress at GOOF is 1/2 to 1/3 that at NDBC 54 at the western Channel entrance. This cross-basin shear between along shelf currents sets up a cyclonic circulation in the western half of the Channel. It intensifies to its maximum in the summer and early fall, weakens in late fall and early winter, and is weakest (to near non-existence at times) in the winter and early spring. Measurements at SMIN-SMOF, ROIN-ROOF, and GOIN-GOOF indicate recurring anti-correlated fluctuations in the along shelf flow on the opposing shelves that last on the order of weeks during the summer and early fall, becoming shorter in duration as the cross basin shear decreases as the winter season approaches, to non-existence in the late winter and early spring.

4.5.4.3 Seasonal Variation of Monthly Means

Winds. Wind stress amplitudes decrease in magnitude from the western Santa Barbara Channel entrance toward the east all along the Channel. They are smallest along the northern Santa Barbara Channel coastline and its adjacent shelf and in the Southern California Bight due to sheltering from the coastal mountain range. The maximum wind stress occurs in the summer at the western Santa Barbara Channel entrance, south of Pt. Conception at NDBC Buoy 54. In the eastern Santa Barbara Channel and in the Southern California Bight, wind stress is strongest in the spring. Minimum monthly means occur everywhere in February. The slight displacement to the north of the North Pacific high during the summer months causes a tremendous difference in the wind stress gradient near Pt. Conception. They become stronger over a shorter distance. In spring the wind speeds are twice as strong at the western entrance than they are in the central Channel, whereas in the summer this difference is doubled (Dorman 2000, Harms and Winant 1998, Dorman and Winant 1995, as cited in MMS, 2001).

Currents. As stated above the currents in the Santa Barbara Channel are a superposition of cyclonic flow in its interior superimposed on the larger-scale flow (central California coast to the Southern California Bight). Monthly averaged currents on the southern Channel shelf are eastward year-round: they reach a maximum in the spring when the large-scale flow is equatorward, and a minimum in the late fall and winter when the large-scale flow is poleward. Currents on the northern shelf of the Channel are westward throughout the year with maximum westward velocities occurring during the summer and early fall. Currents on the southern and northern shelves at the western entrance behave differently than the rest of the Santa Barbara Channel due to wind stress. Just north of San Miguel the currents are directed southeast year-round rather than east like the rest of the southern Santa Barbara Channel in response to windstress at that location. In spring, just south of Pt. Conception on the northern Santa Barbara Channel shelf, the flow turns southwest to south in response to upwelling-favorable wind stress at that location. In the summer, and throughout the rest of the year, the mean flow at that location is westward in response to the alongshore pressure gradient set up along the coastal shelf. The flow at the eastern Santa Barbara Channel entrance is southeast out of the Santa Barbara Channel during the spring, and is northwest (poleward) the remainder of the year. Anticorrelated events between the Santa Barbara Channel shelves occur only when the flow at the eastern Santa Barbara Channel entrance is poleward into the Santa Barbara Channel.

Currents at depth in the western and eastern portions of the Santa Barbara Channel along its central axis were measured at NDBC Buoys 54 and 53 respectively at downward looking APCD bins between 24 meters and 328 meters. In the early spring, vertical profiles directed eastward at both locations are strongly sheered in the top 100 meters with maximum velocities at the surface. Minimum velocities occur at mid-depth. From late spring to winter similarities between the two profiles disappear. In the western central Santa Barbara Channel the maximum currents remain at the surface, but the vertical shear is sharply reduced. The major portion of the profile, including the surface currents, rotate clockwise towards the west as the year progresses. In the eastern central channel, the flow is stronger than in the west with its vertical profile directed westward with maximum currents at approximately 140 meters in late spring to early fall, shifting to the surface in mid to late fall. Unlike the flows at depth in the western and eastern central basin, the 100m flow at the Santa Barbara Channel eastern entrance does not change direction seasonally but remains poleward throughout the year.

Surface Water Temperature. The coldest temperatures are found along the central California coastline near Pt. Arguello in the spring due to the persistent upwelling of cold nutrient rich water to the surface caused by strong equatorward winds in that region. The warmest waters are found in the Southern California Bight in the summer due to the wind sheltering by the coastline mountain ranges and local solar heating cycles.

Inside the Santa Barbara Channel the temperatures typically increase from the southwest corner to the northeast. The temperature gradient between these two regions varies due to the seasonal variation of the balance between the two oceanic circulation forcing mechanisms: the upwelling favorable winds along the central California coastline and the poleward alongshore pressure gradient caused by temperature driven surface pressure increases in the Southern California Bight. In the spring when the upwelling favorable wind forcing is dominant, cold water is upwelled at Pts. Arguello and Conception and cold water spreads eastward into the Santa Barbara Channel with the coldest water appearing along the southern Santa Barbara Channel shelf. In the late spring and summer the alongshore pressure gradient builds up, the currents at the eastern Santa Barbara Channel entrance (ANMI) reverse to the poleward direction and warmer Southern California Bight water is introduced along the northern shelf of the Santa Barbara Channel continuing to Pt. Conception. Temperature gradients between the colder waters at the southwest region of the Santa Barbara Channel and the warmer waters in the Santa Barbara Channel’s northeast region are at a maximum during the summer (June to September). In mid-fall temperature gradients decrease as warmer Bight water replaces the cold waters offshore Pts. Conception and Arguello and the southern central California coast. Temperature gradients decrease further as Santa Barbara Channel surface water temperatures decline to their winter values.

Surface Pressure Field. Surface pressure (SSP) at various stations is directly related to bottom and baroclinic pressures, the latter of which is derived from temperature measurements (Harms and Winant; 1994, as cited in MMS, 2001). Minimum surface pressure occurs everywhere in April, while maximum surface pressures occur in the late summer and early fall. Surface pressure decreases to its minimum in the spring with the onset of equatorward wind stress. In late spring the surface pressure begins to steadily increase until fall despite the fact that the upwelling favorable winds continue to blow strong off Pt. Conception throughout the summer. Part of this increase is due to bottom pressure which increases uniformly to approximately the same values everywhere. Baroclinic pressure, on the other hand, is always at higher values in the Southern California Bight than offshore the central California coast and increases at a faster rate in the Southern California Bight than in the Santa Maria Basin. The increase in baroclinic pressure begins and reaches its annual maximum at the southernmost station, BARB, one month before the northernmost station, PAIN. It is these differences between these two regions in the rate and degree of increase in baroclinic pressure, which is temperature driven, that causes the poleward along-shore pressure gradient in the region. The maximum poleward surface pressure gradient occurs in August during a period of strong wind stress gradient between the western and eastern Santa Barbara Channel regions.

4.5.4.4 Balance Of Alongshore Wind Stress and Pressure Gradients in Effecting the Circulation

The alongshore momentum balance between up-welling-favorable wind stress and the alongshore pressure gradient at any particular location in the Santa Barbara Channel largely determines the surface currents at that location. The relative importance of these two major forcing mechanisms can be determined at any particular location in the Santa Barbara Channel by evaluating the momentum equation which balances the alongshelf acceleration term with the alongshelf pressure gradient term and the local wind stress term.

Analysis of time series of both forcing mechanisms indicate that upwelling-favorable wind stress and the alongshore pressure gradient:

- Oppose each other year-round going equatorward and poleward respectively,
- Are seasonal, and that they are both strongest in the summer and fall and weakest in winter,
- In summer and fall are dominated by fluctuations of time scales longer than 10 days,
- Are strongly anticorrelated with each other with the alongshore pressure gradient lagging the upwelling favorable wind stress by one day.

This last bullet strongly suggests that the alongshore pressure gradient is a response to this mesoscale upwelling favorable wind stress forcing. Observations strongly indicate that for both larger and smaller than Santa Barbara Channel length scales, spatial variation in the upwelling favorable wind stress is responsible for establishing the poleward alongshore pressure gradient.

The simple momentum balance equation above can be used to determine the degree of dominance of one forcing agent over another in eliciting alongshore flow in three major regions of the Santa Barbara Channel: the southern shelf, the northern shelf, and the eastern entrance.

The southern shelf of the Santa Barbara Channel is exposed to the upwelling favorable winds off the central California coast where the surface wind stress is 2 to 3 times smaller just north of Santa Cruz island (GOOF) than that at the western entrance (NDBC Buoy 54). This amount of wind stress however, is much greater than anywhere along the northern Santa Barbara Channel shelf. Not surprisingly, the acceleration term is strongly correlated with the wind stress term, and has negligible correlation with the opposing (to wind stress), but much smaller, alongshore pressure gradient term calculated for this area. Fluctuations of correlated wind stress and acceleration terms are on the order of days.

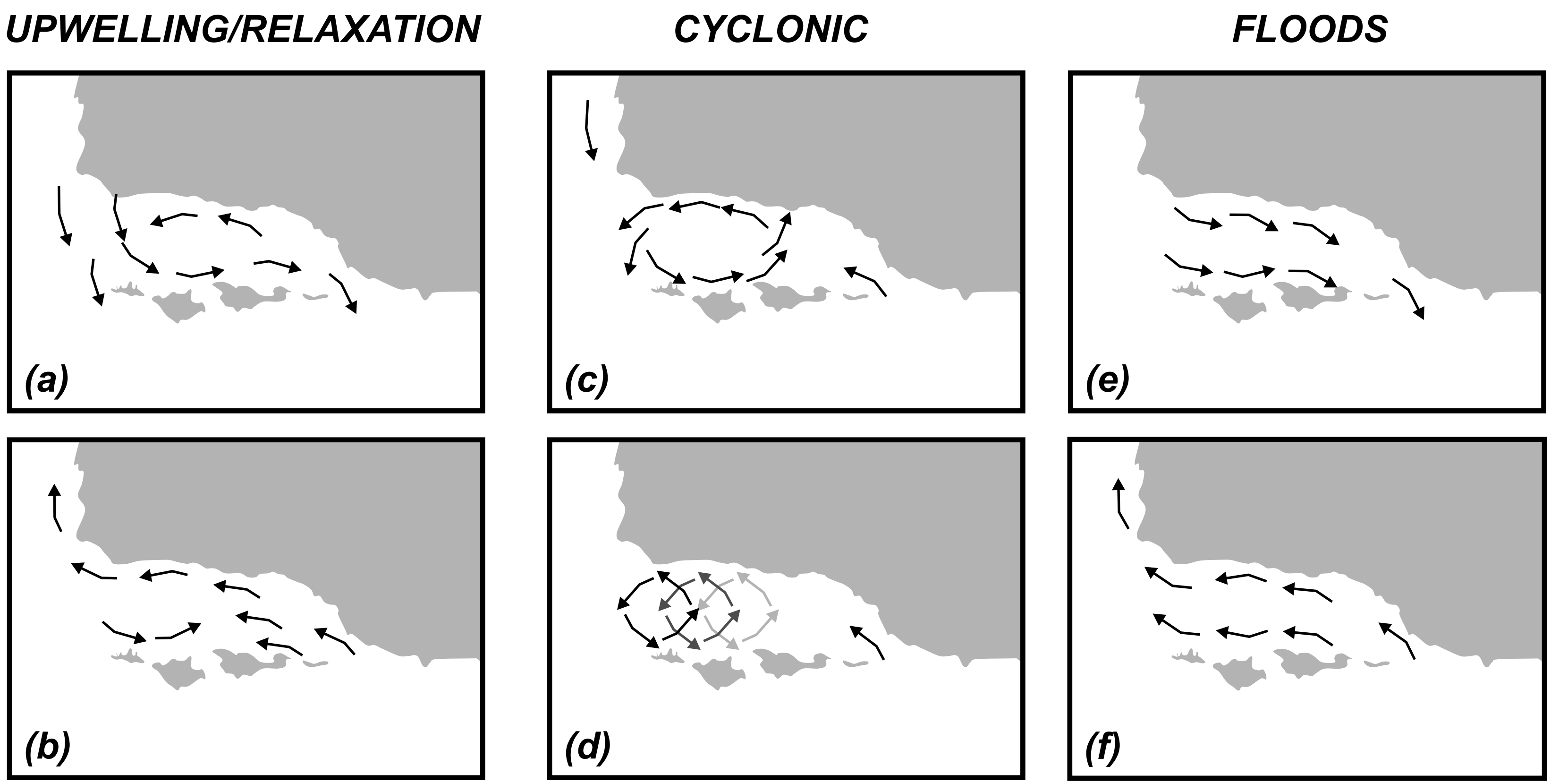
In the vicinity of GOIN on the northern shelf of the Santa Barbara Channel the wind stress is weak to negligible and the currents flow westward year round. The largest calculated term in the right hand side in the momentum equation is the alongshore pressure gradient which is characterized by low frequency fluctuations on the order of a month. The second largest calculated term is the local acceleration term, which is characterized by higher frequency fluctuations on the order of days. These two forcing terms are highly correlated with the respective low and high fluctuations in current flow at this location. There is no correlation between the surface stress (the smallest term in the equation) and the currents. Together the alongshore pressure gradient and acceleration terms exclusively predict the current flow at GOIN.

The current flow at the eastern Santa Barbara Channel entrance (ANMI) is polarized in the alongshelf direction. In the spring the current flow is equatorward out of the Santa Barbara Channel, and the rest of the year the flow is poleward into the Santa Barbara Channel. Superimposed on this seasonal pattern are fluctuations lasting on the order of days to weeks that are strong enough at times to reverse the flow. These higher frequency fluctuations occur many times throughout the year. The annual mean surface flow, however, is poleward into the Santa Barbara Channel.

The surface wind stress at the eastern entrance of the Santa Barbara Channel is weaker than it is at GOOF on the southern shelf, but stronger than what occurs on the northern shelf. All terms on the right hand side of the momentum equation are similar in magnitude. The surface stress and the alongshore pressure gradient are significantly anticorrelated when both exhibit low frequency fluctuations on the order of weeks to months. Surface stress also exhibits higher frequency fluctuations on the order of days as dose the local acceleration term. The correlation between calculated and observed currents at ANMI is strong when both the surface stress and the alongshore pressure gradient is taken into account. This suggests that, unlike the northern and southern Santa Barbara Channel shelves, both alongshore pressure gradient and wind stress play an important role in determining the flow at the eastern Santa Barbara Channel entrance. See Figure 4.5-3 for the location of the instruments discussed above.

4.5.4.5 Characteristic Synoptic Patterns of the Circulation

The different patterns of current flow in the Santa Barbara Channel-Santa Maria Basin are largely determined by the upwelling favorable wind stress (and its gradients) and the opposing alongshore surface pressure gradient. As cited in MMS, 2001, Hendershott and Winant, 1996, Harms 1996, and Harms and Winant 1998 through much collaborative effort, subjectively deduced six flow regimes characteristic of the Santa Barbara Channel-Santa Maria Basin area from inspecting synoptic displays of daily averages of near-surface current, wind, temperature, and pressure observations. The flow regimes are called Upwelling, Cyclonic, Relaxation, Propagating Cyclones, Flood East, and Flood West and are illustrated in Figure 4.5-4. These regimes were later objectively verified by subjecting the 5 and 45 meter current observations to empirical orthogonal function (EOF) analysis. Three (two) EOF modes described 50 percent (53 percent) of the 5-meter (45-meter) current fluctuations, which when combined with their respective mean current fields depict spatial current patterns similar to the six flow regimes determined by more subjective means. The EOF analyses of the 5 meters current observations also indicated that from late spring through the fall there is a repeating sequence of four flow states: Upwelling-Cyclonic-Relaxation-quiescent period that cycles approximately every 16 days. A brief summary of the six flow regimes is given below.



Source: MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 4.4-11)

Figure 4.5-4. Synoptic views of the circulation in the Santa Barbara Channel: (a) Upwelling, (b) Relaxation, (c) Cyclonic, (d) Propagating Cyclones, (e) Flood East, and (f) Flood West.

When the northwest upwelling-favorable winds are strong off the central California coast and the poleward alongshore pressure gradient is weak, the flow everywhere except possibly in the northeast corner of the Santa Barbara Channel is south to southeastward (including the flow at the eastern Santa Barbara Channel entrance). This flow regime is called Upwelling, and is characteristic of what we see in the early spring.

When the northwest upwelling-favorable winds are strong, but we now have a strong poleward alongshore pressure gradient established, we have poleward flow into the eastern entrance of the Santa Barbara Channel, strong westbound currents over the northern Santa Barbara Channel shelf, strong eastbound flow over the southern Santa Barbara Channel shelf. There is strong cross basin shear in this case and this flow condition is called Cyclonic. The Cyclonic flow regime is found to occur most frequently in the late spring through the summer.

When the poleward alongshore pressure gradient is still strong, but the upwelling favorable winds have significantly weakened (relaxed) we have strong poleward flow into the eastern Santa Barbara Channel entrance, strong westerly flow along the northern Santa Barbara Channel shelf, strong westerly flow at the northwest Santa Barbara Channel corner (SMIN), and poleward flow along the central California coast (usually as far offshore as PAIN). The flow along the southern Santa Barbara Channel shelf is weak, but continues to be eastward. The Relaxation flow regime occurs most prominently in the early fall to early winter.

There are times when the alongshore pressure gradient and the wind stress are acting in the same direction, or one of these forcing agents simply does not exist, and we get either a Flood East or Flood West where the flow everywhere in the Santa Barbara Channel flows in either one of these directions. These two flow regimes do not last very long, are not particularly strong flows, and typically occur in the winter.

During a time when the shear between the alongshelf flows on the northern and southern shelves is strong and we have:

- Significant anti-correlation between the currents at stations along the same longitudinal transect within the Santa Barbara Channel,
- The signal at current stations at both shelves lead their western neighbor by a lag time of 4 to 5 days, and
- The current fluctuations on the southern shelf lead current fluctuations on the northern shelf, we get smaller-than Santa Barbara Channel scale cyclones that originate in the eastern Santa Barbara Channel and propagate westward.

When this occurs we have what is known as a Propagating Cyclone flow regime. Table 4.5-1 summarizes these flow regimes along with a description of the relative strengths of their forcing agents.

4.5.4.6 AVHRR Satellite Imagery and Free Floating Surface Drifter Data

AVHRR satellite imagery and free floating surface drifter deployments give information about the synoptic surface currents, synoptic surface temperatures, and general movement of water masses for not only the Santa Barbara Channel-Santa Maria Basin area and the SCB, but the entire California coastal area. Daily AVHRR satellite images of the Santa Barbara Channel-Santa Maria Basin area and surrounding area can be found on the MMS/Scripps website: www-ccs.ucsd.edu/oilspill/. Black and white and color images depicting the meso-scale, and some finer scale, oceanographic processes occurring on a particular day of interest can be found. Water masses from different sources have different salinity and temperatures, and they leave their temperature signatures on the ocean surface.

Table 4.5-1 Relation between the current patterns and the forcing terms.

Current Pattern	Upwelling	Relaxation	Cyclonic	No Flow	Flood East	Flood West
Wind Stress	strong upwelling favorable	weak upwelling favorable	strong upwelling favorable	Weak upwelling favorable	strong upwelling favorable	Strong downwelling favorable
	strong gradients	weak gradients	strong gradients	weak gradients	weak gradients	
Surface Pressure	weak poleward alongshelf gradient	strong poleward alongshelf gradient	strong poleward alongshelf gradient	weak poleward alongshelf gradient	equatorward alongshelf gradient	weak gradients poleward alongshelf gradient
	onshore cross-shelf gradient	offshore cross-shelf gradient	*no cross-shelf gradient	no cross-shelf gradient	onshore cross-shelf gradient	offshore cross-shelf gradient

*Due to the absence of a pressure gauge in the center of the Santa Barbara Channel, the measurements do not resolve the cross-shelf distribution of the surface pressure when the Cyclonic flow regime prevails. During Cyclonic flow events we expect surface pressure to be low in the center of the Santa Barbara Channel and higher over the shelves.

Consequently, their location and general movement can be tracked by AVHRR satellite imagery. This information supplied a visual ground-truth to what other observations were indicating to Scripps scientists. “A typical image of the Santa Barbara Channel-Santa Maria Basin area includes upwelling of water along the southern central California coastline and the southwestern corner of the Santa Barbara Channel (deep blue), warmer water entering the eastern Santa Barbara Channel entrance and moving westward along the northern Santa Barbara Channel coast to Pt. Conception (yellow to deep orange), and a temperature gradient between these two water masses in the central portion of the Santa Barbara Channel (yellowish-green)” (Browne 2001, as cited in MMS, 2001).

Free-floating drifters designed to follow the top meter in the water column were constructed and deployed in support of the Santa Barbara Channel-Santa Maria Basin Circulation Study. Twenty-nine drifter deployments either from 12 or 24 locations in the Santa Barbara Channel and Santa Maria Basin were conducted from 1993 to 1999 in a manner that would allow a reasonable sampling over the four seasons. Three major flow regimes are easily defined by these drifter data: Upwelling, Convergent, and Relaxation. Dever (2000, as cited in MMS, 2001) renames the Cyclonic flow regime as “Convergent.” This was done because remnants of the western Santa Barbara Channel cyclone exist during many of the flows and the word “convergence” more aptly defines the resulting condition of an equally strong poleward alongshore pressure gradient and an upwelling-favorable wind stress existing simultaneously in the Santa Barbara Channel.

4.5.4.7 Applications of Santa Barbara Channel-Santa Maria Basin Oceanographic Research: Determining the Synoptic Flow State for the Santa Barbara Channel-Santa Maria Basin From Real-Time Data Presented on the MMS/Scripps Website

The Santa Barbara Channel-Santa Maria Basin Circulation study, with its comprehensive field program and rigorous analysis and modeling effort, adequately fulfills the research requirements necessary to allow a small array of moored instruments, strategically located, to effectively monitor the oceanographic conditions in the Santa Barbara Channel-Santa Maria Basin area in near real-time. Through a new cooperative agreement between the MMS and Scripps and an interagency agreement with NOAA, a monitoring array for the Santa Barbara Channel-Santa Maria Basin area was deployed in the fall of 1999 and will be in place until early 2005. It consists of four current and temperature observation moorings reporting surface currents in near real-time, three NDBC Buoy stations reporting near surface winds in near real-time, daily satellite imagery, and a cache of drifters ready for deployment to observe special oceanographic phenomena upon short notice of their occurrence. The near real-time observations can be found both in data stream and in graphical format at the MMS/Scripps website: www-ccs.ucsd.edu/oilspill/.

At any time, a trained user can determine the particular flow regime, and get a fair idea of its intensity, by looking at the near real-time wind and current data reported on the MMS/Scripps website. This information can be used for marine biological research as well as studying the physics of the ocean. It can also be used in time of crisis, such as an oil spill event, whether it be from a tanker in the area or from an offshore platform or pipeline. In the particular event of an oil spill, this information can be used to determine oil spill trajectory by subjective calculation or by inputting the near real-time current and wind data directly into an oil spill trajectory model. However we do this, there is certain information that a person attempting to predict oil spill trajectory in the Santa Barbara Channel-Santa Maria Basin area must know to be successful. They must know the fundamental causes and spatial variation of the Upwelling, Convergent, and Relaxation flow regimes that are characteristic to the Santa Maria Basin-Santa Barbara Channel area, and how to read the near real-time current and wind data to determine what particular flow regime is occurring at the advent of an oil spill crisis.

"When faced with an actual oil spill, or oil spill alert, the trained oceanographic forecaster will then use (1) the basic knowledge learned from the Santa Barbara Channel–Santa Maria Basin Circulation Study, (2) real-time oceanographic and meteorological data obtained from monitoring stations, (3) the latest satellite imagery of the area, (4) knowledge of drifter trajectory statistics, (5) results from the latest numerical circulation and oil-spill trajectory model runs, and (6) personal ability to synthesize the results of these analyses and background knowledge into accurate estimates of surface trajectories of water/ pollutant particles" (Browne 1994, as cited in MMS, 2001).

Three Primary Synoptic Flow Regimes Used In Real-Time Applications. Dr. Ed Dever of Scripps (Dever, 2000, as cited in MMS, 2001) describes these three flow regimes in a bit more detail than what was provided in the description of the characteristic synoptic flow regimes above. He also provides rules of thumb, based on strong statistics, on how to read the near real-time current and wind data provided on the MMS/Scripps website.

"The synoptic flow states described below are a compact way of describing certain commonly observed features of the large-scale circulation in the Santa Barbara Channel–Santa Maria Basin region. Though they are subjectively defined, statistical descriptions of the near-surface circulation demonstrate similar spatial structures.

These descriptions are intended to be used with information available from the MMS oil spill response page (http://www-ccs.ucsd.edu/oilspill/) maintained by the Center for Coastal Studies, Scripps Institution of Oceanography. Each synoptic flow state is described in terms of its diagnostic features in the observed surface currents off Purisima Pt., Pt. Conception, San Miguel Island, and the eastern entrance to the Santa Barbara Channel. Ancillary information such as regional winds and satellite sea surface temperature imagery are also described as a function of synoptic flow state.

It is important to remember the synoptic flow states are merely a conceptual model. They can be unambiguously identified about 60 percent of the time. Small-scale features, transitions between different synoptic states and uncommon patterns can make it difficult to identify the observed flow with a single synoptic state. Therefore, variations on the basic synoptic states will also be described.

Upwelling: The upwelling state gets its name from upwelling of cold (approximately 11° C) subsurface waters near Pt. Conception which often occur during it. The upwelling state occurs primarily in spring, though it has also been observed in other seasons. In terms of the conceptual models of the momentum balance, it occurs when strong (10 m/s or more) persistent (several days or more) upwelling favorable (equatorward, i.e., from the northwest) winds overwhelm any poleward along-shelf pressure gradient.

The most characteristic feature of the resulting flow field is southward flow at the western entrance to the Santa Barbara Channel which continues eastward from San Miguel to Santa Cruz and out the eastern

Santa Barbara Channel entrance. However, even during upwelling the flow can be weakly (10 cm/s) westward on the mainland coast of the Santa Barbara Channel. While there can be a cyclonic (counterclockwise) recirculation in the western channel during upwelling, the southern limb of the circulation is almost always stronger than the northern limb. Weaker velocities tend to occur in the eastern Santa Barbara Channel over the broad shelf between Port Hueneme and Santa Barbara and in the Santa Maria Basin within 5 km of the coast. Within the Santa Maria Basin the strongest (20 cm/s) velocities are observed over the 100-meter isobath between Purisima Pt. and Pt. Arguello. Very weak (<10 cm/s) velocities are often observed within 5 km of the shore in San Luis Obispo Bay and between Pt. Sal and Purisima Pt. During upwelling, velocity fluctuations (relative to the mean upwelling state) are strongest southwest of Pt. Conception. This may be an expression of the tendency for an upwelling jet to fluctuate in direction and speed during upwelling. The weakest fluctuations are found over the northeast Santa Barbara Channel shelf between Santa Barbara and Ventura as well as the above-mentioned nearshore regions (within 5 km) of the Santa Maria Basin.

Convergent: The convergent state gets its name from the convergence of southward flow west of Pt. Arguello with westward flow south of Pt. Conception. The convergent state occurs primarily in summer, though it has also been observed in other seasons. In terms of the conceptual models of the momentum balance, it tends to occur when upwelling favorable winds and a strong poleward along-shelf pressure gradient exist.

The most characteristic feature of the resulting flow field is a strong (with velocities often 40 cm/s or more — velocities of 70 cm/s are not unheard of) cyclonic recirculation in the western Santa Barbara Channel with about equal strength in the northern and southern limbs of the recirculation. While northwestward flow at the eastern entrance to the Santa Barbara Channel often occurs during the convergent state, northeastward flow across the eastern entrance to the Santa Barbara Channel can also occur. The convergent synoptic state averages are accompanied by southward flow in the Santa Maria Basin near the shore and off-shelf flow further away from the coast. The combination of westward flow at the northeast Santa Barbara Channel entrance and southward flow along the Santa Maria Basin coast is associated with convergence and offshore flow southwest of Pt. Conception. Relative to the upwelling state, stronger velocities are observed in the western Santa Barbara Channel and in most of the Santa Maria Basin. The highest velocity fluctuations are observed at the western entrance to the Santa Barbara Channel. The lowest velocity fluctuations are again found between Santa Barbara and Ventura and in San Luis Obispo Bay.

Relaxation: The relaxation state gets its name from the fact that it generally occurs when winds off Pt. Conception "relax" from their usual equatorward (from the northwest) direction. The relaxation state occurs primarily in fall and early winter. In terms of the conceptual models of the momentum balance, it occurs when poleward along-shelf pressure gradients overwhelm upwelling favorable or weak winds.

The most characteristic feature of the resulting flow field is a strong westward flow (50 cm/s or more) through the Santa Barbara Channel and into the Santa Maria Basin. Flow in the Santa Maria Basin is strongest along the mainland coast. Cyclonic recirculation in the western Santa Barbara Channel is often present, but with a northern limb strengthened with respect to the southern limb. Poleward flow continues out the western entrance to the Santa Barbara Channel into the Santa Maria Basin. Within the Santa Maria Basin the strongest poleward averages are found offshore of the 100-meter isobath where there is generally an offshore in addition to a poleward component of flow. Closer to shore in the Santa Maria Basin averages are weaker and in some nearshore locations, southward.

The highest velocity fluctuations occur west of Pt. Conception in the region where the westward flow from the Santa Barbara Channel is turning poleward into the Santa Maria Basin. There is a secondary maximum in the western Santa Barbara Channel where recirculating cyclonic flow rejoins the westward flow along the mainland coast. The lowest velocity fluctuations are again found between Santa Barbara and Ventura and in San Luis Obispo Bay" (Dever, 2000, as cited in MMS, 2001).

Real-Time Data Criteria Used To Determine Synoptic Flow State

A trained user can easily obtain surface current data from three to four moorings, winds from NDBC Buoy 46054 and others in the area, and at times AVHRR satellite imagery, which, when combined with the knowledge from the greater field program, will indicate which of the three major synoptic flow regime states is occurring that very hour (Browne 1994, as cited in MMS, 2001). The criteria that indicate which flow regime is actually occurring are summarized below by Dever 2000, as cited in MMS, 2001.

Upwelling Criteria

Surface Currents: Upwelling occurs when (subtidal) flow in the Santa Maria Basin (PAIN) is southward and flow at the eastern entrance to the Santa Barbara Channel (ANMI) is southeastward.

Winds: During upwelling, the wind field tends to show strong velocities (averaging above 8 m/s) from the northwest, south of Pt. Conception at NDBC 46054. Within the Santa Maria Basin winds are generally onshore and equatorward (from the northwest). Within the eastern Santa Barbara Channel winds can be relatively weak.

Satellite Imagery: When available, satellite sea surface temperature images often show cold water (11° to 12° C) between Pt. Arguello and Pt. Conception. Cooler water can be seen spreading southwards from Pt. Conception past San Miguel Island and eastwards from San Miguel towards the eastern entrance to the Santa Barbara Channel.

Convergence Criteria

Surface Currents: Convergence occurs when (subtidal) flow in the Santa Maria Basin is southward, flow at the eastern entrance to the Santa Barbara Channel is northwestward, and flow at Pt. Conception (SMIN) is westward.

Winds: In the convergent state, the wind field can resemble the upwelling wind field although this is not diagnostic in the sense that weak winds can sometimes accompany the convergent state. The average winds at NDBC 46054 during convergence are nearly equal to those observed in upwelling, above 7 m/s from the northwest.

Satellite Imagery: In the convergent state, satellite sea surface temperature images often show warm water (17° to 20° C) extending from the eastern Santa Barbara Channel north and westwards along the mainland coast. South of Pt. Conception, this warm water turns south and in exceptionally clear images a counterclockwise recirculation of warm water can often be discerned. Cold upwelled waters are still present between Pt. Conception and Pt. Arguello, often with tongues of cold water reaching westwards or southwestwards.

Relaxation Criteria

Surface Currents. Relaxation occurs when (subtidal) flow in the Santa Maria Basin is northward, flow at the eastern entrance to the Santa Barbara Channel is northwestward, and flow at Pt. Conception (SMIN) is westward.

Winds. Winds during a relaxation event tend to be weak equatorward (i.e., from the northwest) or poleward (from the southeast) at NDBC 46054 at the western entrance to the Santa Barbara Channel. The average winds at NDBC 46054 during relaxation are under 4 m/s (from the northwest).

Satellite Imagery. Satellite sea surface temperature images during relaxation will often show warm water (17° to 20° C) extending from Pt. Conception northwestwards into the Santa Maria Basin" (Dever, 2000, as cited in MMS, 2001).

Monthly, Seasonal, and Annual Frequency of Occurrence of Synoptic Flow Regimes

Studies indicate a seasonal preference of occurrence for the synoptic flow regimes: upwelling occurs primarily in Feb-June, convergence throughout the year (except April), and relaxation from September through January" (Dever, 2000, as cited in MMS, 2001). "By looking at the number of days of occurrence for each flow regime in each month, as is detailed in the last four columns of the table, we can determine the annual percentage of occurrence of each flow regime by dividing the annual totals of days for each flow regime by the total number of days of observations, 1804 days, which is approximately 5 years of data. From this relatively strong data set we see that the:

- Upwelling Synoptic Flow Regime occurs 35.0 percent of the year,
- Convergent Synoptic Flow Regime occurs 31.2 percent of the year,
- Relaxation Synoptic Flow Regime occurs 27.0 percent of the year, and
- Transitional or "other" flows occur 6.8 percent of the year.

Understanding the monthly, seasonal, and annual frequency of these flow regimes helps to read the real-time monitoring data from the MMS/Scripps website in proper context" (Browne, 2001, as cited in MMS, 2001).

4.5.5 Wave Climate of the Southern California Bight

As cited in MMS, 2001, discussion of the wave climate of the Southern California Bight is exclusively taken from Hickey 1993 and USDI, MMS 1991. Local wind driven waves and long period swell formed by distant tropical storms dominate the wave environment in the Southern California Bight. The Southern California Bight's offshore islands and ridges serve as a shelter for the coast from the effects of deep ocean gravity waves. Much of that energy is dissipated in island surf zones or reflected back offshore.

The restricted fetches within the Southern California Bight allow only the development of locally wind driven waves with relatively small amplitudes, short periods, and short wavelengths. Also, because the important winds are the sea breezes, the duration is normally less than 10 hours. It is only when gale winds blow from the west at 17 m/sec (38 mph) or more that high waves are formed in the local region and travel over the shelf. These are most common in the San Pedro Channel where waves as high as 7.6 meters (24.9 feet) have been encountered.

The sheltering effect of the Northern and Southern Channel Islands is dramatically illustrated in data collected at Begg Rock (located north of San Nicolas Island) and Sunset Beach (located just south of Palos Verdes) wave monitoring sites. Spectral amplitudes are an order of magnitude smaller at Sunset Beach than they are at Begg Rock.

The dominant swell period at Begg Rock varies from 14 to 18 seconds in winter to 5 to 10 seconds in summer. Long period swell can be generated from the north, west, or south, but most long period winter swell is generated by North Pacific storms. The summer wave spectra at Sunset Beach are dominated by 16- to 18-second period swell coming from the southern hemisphere. Begg Rock is sheltered from swell coming from the south.

Wave spectra during a major winter storm period are an order of magnitude greater than that of waves occurring during a typical winter period. Severe waves such as these are usually generated from storms that develop between Hawaii and the Pacific coast. The dominant wave period is about 16 seconds. The amplitudes of these waves are significantly reduced at the coast. Typically, waves impinging on the Southern California Bight coastline generate a net southeastward alongshore drift in the coastal surf zone. This alongshore drift is responsible for much of the sediment movement along the coast.

The coastal area between Point Conception and Ventura is the most protected from swell. Except at Pt. Conception itself, swell cannot reach the area without considerable reduction by the Channel Islands or extreme refraction over the mainland shelf. From Ventura to Pt. Hueneme, swell cannot reach the area without considerable reduction by the Channel Islands or extreme refraction over the mainland shelf. From Ventura to Pt. Hueneme, swell approaching from the west arrives unchanged and has sometimes caused substantial destruction along the shore. From Long Beach to Newport significant swells arrive from the west and south. From Newport to Oceanside, only swell from the south arrives unchanged. The coast near San Diego is the most exposed, especially to swell from the south, which arrives without significant modification. Following are wave types in the study area:

- **Swell from the north boundary of the Pacific High.** This occurs when the high elongates and migrates to the south, most commonly in winter. Because of lower wind velocities swell from this source is moderate.
- **Swell from Hawaiian lows.** The source of these swells is the low pressure centers developing in the expanse of the Pacific Ocean north of Hawaii. These develop most commonly in the spring and the height of this swell is normally moderate, usually less than 2.5 meters (8.2 feet).
- **Swell from storms in the Southern Hemisphere.** This swell is probably present about two-thirds of the time but is so low that is masked by swell from other areas. The effect is greatest in summer when storms in the Southern Hemisphere are most intense and follow tracks which are further to the north.
- **Swell from tropical hurricanes.** Very rarely, tropical storms which develop off the coast of Costa Rica may reach the waters off southern California and cause extensive damage. These storms usually dissipate long before that, but swell may arrive from the areas where the storms develop. It is estimated that heavy swell from this source may reach the southern California every four to five years, although more frequent occurrence is possible.
- **Waves and swell from local cold front passages.** These waves are characterized by their choppiness and are always accompanied by strong winds. Since the swells are generated in nearby surrounding areas, the sheltering effects of points, headlands, and islands is considerably reduced.
- **Tsunamis.** The highest water levels along the California coast are produced by tsunamis: long gravity waves which are generally produced by intense submarine earthquakes. Tsunamis occur very infrequently and the damage is usually not extensive to properly designed structures. Hazards from tsunamis include a variation in water level from 1.5 to about 4.5 meters (4.5 to 13.5 feet) and possible high current velocities in shallow or restricted waters" (USDI, 1991, as cited in MMS, 2001).
- **Tides.** The tides are mixed with a semi-diurnal constituent being more dominant than the diurnal constituent. The time between successive highs or lows vary between 10 and 14 hours. The barotropic tidal wave advances towards the southern California coastline from the southeast along the coastline reaching Pt. Conception ½ hour after it arrived at San Diego.

Both cross-shelf and along-shelf tidal current velocities within the Southern California Bight (including the Santa Barbara Channel) are on the order of 10 cm/sec. Cross-shelf tidal currents are predominantly baroclinic (depth and density dependent) whereas along-shelf tidal currents tend to be more barotropic (depth dependent only). Maximum velocities along the vertical profile of these currents tend to be at the surface and bottom boundary layers. Tidal currents are larger in the upper 100m over the shelf edges, slopes and open basins (15 to 20 cm/sec) than they are over the shelf. Tidal currents in the island passages of the Santa Barbara Channel tend to exhibit velocities four times greater, reaching 50 cm/sec during strong ebbs.

4.6 Water Quality

4.6.1 Regulatory Setting

In 1972, Congress passed the Federal Water Pollution Control Act, which was reauthorized in 1977, 1981, 1987, and 2000 as the Clean Water Act (Pew Oceans Commission (POC), 2001, as cited in MMS, 2001). The goal of the law was to eliminate pollution in the nation's waters by imposing uniform standards on all municipal and industrial wastewater sources based on the best available technology. Facilities discharging wastes at discernable, or point, sources, were required to obtain permits from the U.S. Environmental Protection Agency (EPA) in the form of National Pollutant Discharge Elimination System (NPDES) permits. Overall, the NPDES program has resulted in dramatic reductions in the amount of pollutants entering U.S. waters, including coastal waters (POC, 2001, as cited in MMS, 2001). The Southern California Bight (SCB), in particular, has seen great reductions in pollutants over the past 25 years, including 50 percent for suspended solids, 90 percent of combined trace metals, and more than 99 percent for chlorinated hydrocarbons. Measurements of sediments, fish and marine mammals all show decreasing contamination. This has occurred despite great increases in population and volumes of discharged wastewater (Schiff et al., 2000, as cited in MMS, 2001). This reduction as accomplished through source control, pretreatment of industrial wastes, reclamation and treatment plant upgrades.

In August, 1999, a California Coastal Commission letter to the MMS raised seven issues of concern. Among these was a question regarding changes in water quality regulations and anticipated further changes in these regulations. The following discussion addresses this concern.

While offshore oil and gas exploration and development do contribute to the pollution of the ocean, effluent parameters are limited according to the limitations of the appropriate NPDES permit issued by the EPA, Region 9[1]. On September 22, 2004, EPA Region 9 issued a new General permit for Offshore oil and gas facilities in the Pacific OCS Region. This new General permit became effective on December 1, 2004. The new General permit regulates 22 discharges. For produced water discharges, the new permit requires each permittee to sample its discharges for purposes of determining whether a reasonable potential exists to exceed the California Ocean Plan criteria (SWRCB, 2001) or EPA's Clean Water Act Section 304 (a) criteria. After EPA reviews the results of the study, EPA would modify the permit to include water quality based effluent limitations for those pollutants that have been shown to have reasonable potential to exceed either the California Ocean Plan or EPA's Section 304(a) criteria at the edge of the 100 meter mixing zone. The effluent limitations would be based on the more stringent of either water quality criteria.

A key aspect of the regulatory regime for water quality is compliance monitoring. In 1989, MMS, Pacific OCS Region and EPA Region 9 signed a Memorandum of Agreement (MOA) detailing the role each agency would play in conducting NPDES inspections and sampling at the offshore oil and gas platforms.

The centerpiece of the MOA is the workplan, created annually by EPA and MMS. The workplan gives the details of the inspection and sampling efforts and includes the number, location, and type of samples to be taken. Which platforms are to be sampled for the year is closely held since all inspections and sampling are unannounced. Violations of any permit limit can be treated in several ways by EPA. The most common is for EPA and the operator to determine the cause of the violation and to take steps to avoid future occurrences. Further actions by EPA, such as fines or other sanctions, would be determined at EPA's discretion depending on the specific aspects of the event.

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1 EPA's Region 9, with offices located in San Francisco, covers California, Nevada, Arizona, Hawaii, and the Trust Territories. See Region 9's website at: http://www.epa.gov/region09/ reg9bck.html. Also, for more information on EPA's nation-wide NPDES program see the website at: http://www.epa.gov/owm/npdes.htm#top.

The State of California developed a comprehensive water quality pollution control plan in 1972 called the California Ocean Plan (SWRCB, 2001). It is required that the plan undergo a triennial review. The plan was last issued in 2001, and the plan is currently undergoing review. The plan, which covers any facility that discharges into California State waters, up to 3 miles from shore contains several categories including Effluent Limitations, Water Quality Objectives, and Objectives for Protection of Human Health (Non-carcinogens and Carcinogens). Combined, these categories apply limits to 84 pollutants.

The U.S. Coast Guard (USCG) also regulates offshore oil and gas platforms in several ways, including when pollution events occur. For example, an oil sheen, a violation of USCG regulations, could result in an enforcement action. The USCG does regulate the spillage of oil in the Pacific OCS (and State waters), although it is not regulated under NPDES regulations or permits.

4.6.2 Regional Setting

This section describes the water quality in the study area and, in addition, includes a description of resources that could potentially be affected by oil spills resulting from the development of the undeveloped leases.

Water pollution has existed along the Pacific coast since urban centers and industrial complexes were built along the shores and rivers. Regulated pollution sources primarily include treated sewage outfalls and heated water outfalls from power plants (chlorine is sometimes used in these to reduce fouling). Nonregulated pollutant sources include storm drains, rivers, and other nonpoint source runoff sources. Pollutants from these sources have included chemicals, such as pesticides and manufacturing wastes, oil and rubber from vehicles, general trash and garbage and many other types of materials. In addition, agriculturally based materials from rural areas, including animal wastes, pesticides and herbicides and soil can be washed into nearby streams and rivers and the oceans.

The 1975-1978 BLM-sponsored baseline studies in the Southern California Bight (SCB) indicated that most of the metal and hydrocarbon loads of the four basins examined (Santa Barbara Channel, San Pedro, Santa Monica, and San Nicolas) were derived from industrial and municipal wastes, entering the marine environment through direct discharge, indirect runoff and atmospheric transport, all centering around the Los Angeles metropolitan area (BLM, 1979, as cited in MMS, 2001).

Lead was the only metal that reached the Santa Barbara Channel Basin in anything but natural amounts (BLM, 1979, as cited in MMS, 2001). Lead, apparently, is more susceptible to atmospheric transport, and was thus carried to the far reaches of the SCB from the sources (primarily industry and automobile gasoline exhaust). Age-dated box cores revealed that rates of lead deposition in the Santa Barbara Channel Basin are decreasing (as of 1978). This, despite the fact that this Basin has the greatest sedimentation rate of any of the four basins examined (San Pedro, Santa Monica and San Nicolas are the other three).

Analysis of hydrocarbons in the SCB showed significant increases over the last 50 years (as ascertained using age-dated box cores). In part, this increase was due to pulses of natural seepage, however, the majority was attributed to man-related combustion and sewage outfall sources. BLM (1979, as cited in MMS, 2001) noted that the degree of anthropogenic input to the Santa Barbara Channel Basin is relatively constant in recent years. Relative contributions from natural seepage were the highest for the Santa Barbara Channel Basin and least for the San Nicolas Basin, while combustion-derived sources were the most for the San Nicolas Basin, followed by the San Pedro and Santa Monica Basins and the least for the Santa Barbara Channel Basin.

Sources of pollution to the sea from offshore include shipping (for example, bilge and tank cleaning and treated sewage), recreational boating (such as oil, diesel, and general garbage) and oil and gas facilities, albeit under the limitations of NPDES permits (see regulatory setting discussion, above). Table 4.6-1 summarizes water quality studies in the study area.

Table 4.6-1. Relevant Studies Examining Water Quality in the Study Area*

Area of Study	Citation
Southern California	Anderson, J. W., D. J. Reish, R. B. Spies, M. E. Brady, and E. W. Segelhorst. 1993. Human Impacts on the Southern California Bight. Chapter 12, in, M.D. Dailey, D. J. Reish, and D. W. Anderson (eds.), Ecology of the Southern California Bight: A synthesis and interpretation.
Northern Santa Barbara County	Arthur D. Little (ADL). 1985. Union Oil Project/Exxon Project Shamrock and Central Santa Maria Area Study EIS/EIR (and appendices). Prepared for County of Santa Barbara, Minerals Management Service, California State Lands Commission, California Coastal Commission, and California Office of Offshore Development.
Santa Barbara County	ADL. 1984a. Point Arguello Field and Gaviota Processing Facility Area Study and Chevron/Texaco Development Plans EIR/EIS. Final Report. Prepared for: County of Santa Barbara, U.S. Minerals Management Service, California State Lands Commission, California Coastal Commission, California Secretary of Environmental Affairs.
Santa Barbara County	ADL. 1984b. Point Arguello Field and Gaviota Processing Facility Area Study and Chevron/Texaco Development Plans EIR/EIS. Appendix H. Marine Water Resources. Prepared for: County of Santa Barbara, U.S. Minerals Management Service, California State Lands Commission, California Coastal Commission, California Secretary of Environmental Affairs.
Southern California	Bureau of Land Management (BLM). 1979. Natural and Anthropogenic Fluxes of Chemicals into the Southern California Bight as Related to the Potential Impacts of Offshore Drilling. Southern California Baseline Study, Benthic, Year Two, Volume II, Report 24.0. Robert F. Shokes and Paul J. Mankiewicz (authors), Science Applications, Inc., La Jolla, California. BLM/DOI Contract No. AA550-CT6-40.
Southern California	BLM. 1978. 1975/1976 Southern California Baseline Study and Analysis. Vol. II, Integrated Summary Report. Robert F. Shokes and Richard A. Callahan (authors), Science Applications, Inc., La Jolla, California. BLM/DOI Contract No. 08550-CT5-52
Santa Barbara County –Santa Barbara Channel	Chambers Group, Inc. 1987a. Final Supplemental Environmental Impact Report for the Exxon Santa Ynez Unit Offshore Oil Development Proposal. Prepared for: California State Lands Commission.
Santa Barbara County –Santa Barbara Channel	Chambers Group, Inc. 1987b. Finalizing Addendum. Final Supplemental Environmental Impact Report of the Exxon Santa Ynez Unit Offshore Oil Development Proposal. Prepared for: California State Lands Commission
Southern California	Minerals Management Service. 1996. Outer Continental Shelf Offshore Oil and Gas Leasing Program: 1997–2002. Final Environmental Impact Statement. August 1996. 2 Vols.
General	National Research Council. 1983. Drilling Discharges in the Marine Environment
Santa Barbara County –Santa Barbara Channel	Science Applications, Inc. 1984. Final Environmental Impact Statement/Report. Technical Appendix 12: Marine Water Quality for the Santa Ynez Unit/Las Flores Canyon Development and Production Plan
Southern California	Southern California Coastal Water Research Project 1998 Southern California Bight 1994 Pilot Project
Southern California	Southern California Coastal Water Research Project 2003 Southern California Bight 1998 Regional Monitoring Program
Southern California	Valerie Raco-Rands. 1996. Characteristics of Effluents from Small Municipal Wastewater Treatment Facilities in 1995 (in SCCWRP, 1996)
Southern California	Valerie Raco-Rands. 1998. Characteristics of Effluents from Large Municipal Wastewater Treatment Facilities in 1996 (in SCCWRP, 1998)
General	James P. Ray and F. Rainer Engelhardt (eds.). 1992. Proceedings of the 1992 International Produced Water Symposium. February 4-7, 1992, San Diego, California.
Northern Santa Barbara County	URS Company. 1986. San Miguel Project and Northern Santa Maria Basin Area Study Final EIS/EIR (and appendices), Cities Service Oil and Gas Corporation and Celeron Pipeline Company of California. Prepared for San Luis Obispo County, Santa Barbara County, Minerals Management Service, California State Lands Commission, California Coastal Commission, and California Office of Offshore Development.

* All references are as cited in MMS, 2001.

Standard water quality parameters for the study area, including temperature, salinity, dissolved oxygen, pH, nutrient concentrations, turbidity, and organic material, have previously been described in Dames and Moore (1982), SAI (1984), Arthur D. Little (1984), and Chambers Group 1987 (a, b) (all as cited in MMS, 2001. These parameters and some basic characteristics are given in Table 4.6-2.

Table 4.6-2. Key Water Quality Parameters, Typical Units of Measure and Characteristics

Parameter (Units)	Characteristics
Temperature (°C)	Ocean surface temperatures minimums of 12-13 °C in April and maximums of 15-19 °C in July-October
Salinity (o/oo)	Typically 33.2-34.3 o/oo (parts per thousand)
Dissolved oxygen (DO) (mg/L or ml/L)	Maximum values of 5-6 ml/l at the surface, decreasing with depth; nearshore values at 200 m depth about 2 ml/l; at depths below 350 m, values as low as 1 ml/l; upwelling can brings oxygen-poor water to the nearshore surface waters, especially in May-July
pH (unitless)	pH values range from about 7.8 to 8.1. pH increases with increased CO_2 consumption, via photosynthetic activity, and with increasing salinity; pH decreases slightly with increasing depth and decreasing temperature.
Nutrients (µg-atoms/l)	Nutrients limiting primary production include nitrogen, phosphorus, and silicon (nitrogen more than phosphorus); micronutrients include iron (Fe), manganese (Mn), Zn, Cu, cobalt (Co), molybdenum (Mo), vanadium (V), vitamin B12, thiamin and biotin. Concentrations in the water column show depletion near the surface, increasing with depth.
Turbidity (mg/L)	Suspended sediment concentrations average near 1 mg/L, but can range from 0.93 to 1.5 mg/L in the nearshore, surface waters (BLM, 1978). Higher levels are found near the bottom sediments (mean of 0.4 mg/L and a range of 0.1 to 1.4 mg/L) while lower levels are found in the offshore regions (mean of 0.15 mg/L and a range of 0.07–0.32 mg/L). Periods of highest turbidity correspond to periods of highest upwelling, highest primary production and river runoff. Turbidity controls the depth of the euphotic zone, has applications for (absorbed) pollutant transport and is of aesthetic concern.
Organics materials (µg/l)	Naturally occurring organic materials include a wide variety of molecules ranging from hydrocarbons to biogenic-based substances. They may enter the marine environment via natural processes or from anthropogenic sources.

Water quality in the study area may be generally divided into two subregions:

- Point Lobos to the western entrance of the Santa Barbara Channel; and
- The northern Southern California Bight (SCB): Santa Barbara Channel to Point Fermin, including the offshore islands.

These subregions are loosely based on the level of activity that is occurring both onshore and offshore. For example, traveling from north to south, population, shipping traffic, nonpoint pollution sources, and on- and offshore oil and gas activities increase, while river runoff generally decreases. These factors result in a general increase in pollution. The Lion Rock, Point Sal, Purisima Point, Santa Maria, Sword, Rocky Point and Bonito Units can be considered to be in the first subregion, above, although the Bonito Unit, Rocky Point Unit and Sword Units, located west of Point Conception, can be considered to be in a transition zone from the Santa Maria Basin and to the Santa Barbara Channel proper. The Gato Canyon Unit is in the north-central Santa Barbara Channel thus, in the second subregion defined above. The Cavern Point Unit is offshore of Oxnard and also in the second subregion subunit.

Point Lobos to the Western Entrance of the Santa Barbara Channel

The California coast south of Point Lobos is, relative to southern California urban centers, sparsely inhabited with little industrial development and more agriculture and ranching (MMS, 1996, as cited in MMS, 2001). Only two Publicly Owned Treatment Works (POTWs), or sewage treatment plants, discharge directly into the Pacific Ocean in San Luis Obispo County (Table 4.6-3). Three others discharge into local rivers discharge into the ocean. All the dischargers are small, according to EPA criteria (less than 25 million gallons per day [mgd]).

Table 4.6-3. Dischargers in San Luis Obispo County, the Level of Treatment and Flow

Discharger	Receiving Water	Treatment Level	Flow (mgd)
City of Lompoc	Santa Ynez River	Secondary	3.72
San Luis Obispo	San Luis Obispo Creek	Tertiary	4.53
Pismo Beach	Pacific Ocean	Secondary	1.11
Avila Beach	San Luis Obispo Creek	Secondary	0.025
Tosco refinery	Pacific Ocean	Secondary	0.435

Source: Mike Higgins, Central Coast Regional Water Quality Control Board (pers. comm, 2001, as cited in MMS, 2001)

The Santa Maria River, on the border of Santa Barbara and San Luis Obispo Counties, and the Santa Ynez River, which flows into the ocean between Points Purisima and Arguello, are the major sources of pollution that could exist in the San Luis Obispo/northern Santa Barbara County area. Contaminants and nutrients in runoff from rivers are influenced by three factors (NRC, 2001, as cited in MMS, 2001):

- Land uses (for example, whether the primary use of the land is forested, agricultural, industrial or urban;
- Human activities that involve the application of fertilizers, pesticides and the generation of wastes;
- Natural phenomena and land-use decisions that affect water infiltration, groundwater movement, runoff, and transport in streams and rivers.

Pollutants that could be associated with these rivers are predominantly agriculturally based and may include dairy and ranching-related pollutants (for example, animal wastes) and pesticides. During winter, high runoff periods associated with storm and rain conditions followed by upwelling-favorable winds have driven these river plumes south past Point Conception and to the vicinity of San Miguel Island (Hickey and Kaschel, unpubl., as cited in MMS, 2001).

The paradox of these plumes is that the higher the flow, the greater the dilution. Additionally, the only time the plumes would reach to the vicinity of the outer continental shelf would be during times of high flow. Thus, pollutants carried by the plume would be well-diluted, but perhaps still detectable, in the offshore area.

For most of the central California coast, there are no oil and gas activities. Marine terminals at Morro Bay, Avila Beach and Gaviota have been removed. The most northern remaining marine terminal, and the only one in the Santa Barbara Channel is at Ellwood. The most northern offshore oil and gas facility is Platform Irene, located just northwest of Point Arguello. There may also be natural oil and gas seeps along the central California coast, but there is little information on these. The primary seepage zones are found at Point Conception and south (see below).

There is little information regarding the fate of pollutants that are discharged into this subregion, in part due to the overall lack of pollution. For this subregion, there is no evidence for such mechanisms as uptake and bioaccumulation of some anthropogenic-based materials such as mercury and certain pesticides, and DDT to occur.

Thus, due to the low population density, lack of major industries and intermittent high-flow river runoff, the Santa Maria Basin area and points north has good water quality.

Santa Barbara Channel to Point Fermin

Pollution in the Santa Barbara Channel and south, along the Malibu coastline, is probably greater than north of Point Conception, although no studies have been conducted to quantitatively ascertain this.

Nevertheless, increases in population and pollution sources would indicate that this statement is true qualitatively. Overall, there are 24 discrete sources of pollution from Point Conception to Point Fermin including six sew-age dischargers, two power plants, six industrial waste dischargers and 10 sources of runoff (Anderson et al., 1993, as cited in MMS, 2001). The largest fresh water inputs are the Santa Clara and Ventura Rivers and the Oxnard municipal wastewater treatment plant (MMS, 1996, as cited in MMS, 2001).

In general, water column particulates and benthic sediments in the southern California OCS reflect the chemistries of their source materials (BLM, 1978, as cited in MMS, 2001). Surface waters located in the inshore areas usually contain only fine-grained materials mixed with planktonic organisms while the near-bottom waters can hold a various assortment of materials in suspension from downslope transport processes (for example, turbidity flows). These inshore waters were found to have a preponderance of land-derived materials whose metal contents have been influenced by anthropogenic sources (BLM, 1978, as cited in MMS, 2001).

Indicators of Pollution

The Natural Resources Defense Council (NRDC) published its 14th Annual report entitled, "Testing the Waters 2004: A Guide to Water Quality at Vacation Beaches" in August of 2004 (NRDC, 2004). This report listed the number of nationwide beach closures and advisories due to pollution for 2004. For the previous reports, the data were collected by EPA as part of its BEACH (Beaches Environmental Assessment, Closure and Health) program and were based on responses from over 100 agencies to EPA's questionnaire. For the 2004 report, EPA replaced its BEACH survey with a new electronic reporting system.

In 2003, of the four southern California counties from San Luis Obispo to Los Angeles, Los Angeles County had the largest number of beach advisory/closings, 1459 days; followed by Ventura 720; Santa Barbara 360 and San Luis Obispo, 64. The closings were commonly posted due to high bacteria counts (fecal coliform). The majority of these closings were attributed to pollutants brought to the coast by storm runoff.

The Southern California Bight Pilot Project (SCBPP), a collaboration of 12 government organizations, conducted a 261-site comprehensive regional monitoring survey in 1994. The primary objective was to assess the spatial extent and magnitude of ecological disturbances on the mainland continental shelf of the SCB and to describe relative conditions among different regions of the Bight [Southern California Coastal Water Research Project (SCCWRP, 1998, as cited in MMS, 2001)].

The survey found water quality to be good throughout the SCB. Almost all of the surface waters were fully saturated with oxygen, and more than 99 percent of the SCB met California Ocean Plan water-quality objectives for dissolved oxygen and water clarity. Areas of reduced water clarity through the Bight were mostly located in shallow water and probably resulted from the natural resuspension of bottom sediments.

The Southern California Bight 1998 Regional Monitoring Program sampled a total of 415 sites in the Southern California Bight for sediment chemistry, sediment toxicity, demersal fishes and benthic fauna (SCCWRP, 2003). Approximately 86% of the Southern California Bight was found to have detectable levels of contamination arising from human activities. Sediment contamination was not equally distributed throughout the Bight. A disproportionate amount occurred within bay/harbor areas and in the vicinity of Publicly Owned Treatment Works discharge zones.

Trace metals, especially from anthropogenic sources, are of concern throughout the Southern California Bight. Table 4.6-4 shows some values collected during the 1976-1978 BLM-sponsored baseline studies.

Inner shelves and basins are those associated either with the mainland or islands as opposed to those located south of the Channel Islands towards and including Tanner and Cortez Banks.

Table 4.6-4. Selected Trace Metals Found in Sediments in the Southern California Bight

Metal	Average, Inner Shelves (ppm)	Average, Inner Basins (ppm)	Range, All Sampled Areas (ppm)
Barium	835	686	43–1899
Cadmium	0.57	0.93	0.2–5.5
Chromium	56	119	12–370
Lead	17	25	4.2–69
Zinc	54	101	12–227

Source: BLM, 1978, as cited in MMS, 2001.

Sources of Water Pollution

Publicly Owned Treatment Works. There are six POTWs that discharge treated effluent to the Channel (Table 4.6-5). They are all small dischargers (less than 25 million gallons/day) whose effluents are at a mixed primary/secondary level of treatment (SCCWRP, 2002). Although secondary treatment of municipal sewage removes at least 85 percent of the organic material and suspended solids in wastewater, only one-third of the nitrogen and phosphorus is eliminated (National Research Council (NRC), 1993; 2000, as cited in MMS, 2001). Generally, eutrofication, or the over-abundant presence of nutrients, is not generally a problem in the open-ocean, high energy environment that characterizes the coastline of the study area. However, there are advanced treatment technologies that can remove up to 97 and 99 percent of nitrogen and phosphorus, respectively. There are very few other point sources of pollution along the shorelines of the Channel with few industrially based outfalls. Several power plants spaced along the Santa Barbara, Ventura and northern Los Angeles County coastlines do discharge heated water, and some chlorine is used to prevent fouling of heat exchangers; however, effects from these effluents are limited spatially.

4.6-5. Publicly Owned Treatment Works that Discharge into the Southern California Bight (within the study area)

POTW Name	Location	Level of Treatment	Volume Discharging (mgd)
Goleta	Santa Barbara Channel	Primary/Secondary	4.7
Santa Barbara	Santa Barbara Channel	Secondary	6.0
Montecito	Santa Barbara Channel	Secondary	1.1
Summerland	Santa Barbara Channel	Tertiary	0.14
Carpinteria	Santa Barbara Channel	Secondary	1.5
Oxnard	Santa Barbara Channel	Secondary	21.0
Hyperion Treatment Plant	Los Angeles	Advanced Primary/ Secondary*	0/325
Joint Water Pollution Control Plant (Los Angeles County)	Los Angeles	Advanced Primary/ Secondary*	134/200
Terminal Island	Los Angeles	Secondary	15.9
Catalina Island (Avalon)	Los Angeles	Secondary	0.52
San Clemente Island	Los Angeles	Secondary	0.02

Source: SCCWWRP (2002)

Storm Drains. Storm-water runoff is the largest source of unregulated pollution to the waterways and coastal areas of the United States (CCC, 2000, as cited in MMS, 2001). Because runoff is an untreated pollution source, it has the potential to be a source of increased health risks to swimmers near storm drains, higher concentrations of metals in harbor and ocean sediments and increases in toxicity to aquatic life. However, storm drain-associated pollution would be confined to the near-coastal vicinity since, even during high runoff periods, the volume would not be enough to carry pollutants very far offshore.

The two major rivers, the Santa Clara and Ventura, are both in Ventura County and drain largely agricultural lands, although the urban areas of Ojai, Ventura, Oxnard/Port Hueneme and Camarillo contribute pollutants via storm drains and other nonpoint source runoff. Also, the plumes do cross the Channel and can reach as far as the Northern Channel Islands National Marine Sanctuary waters (Hickey and Kaschel, unpubl., as cited in MMS, 2001). However, as discussed above, most of this untreated runoff occurs only during the rainy season.

Natural Seeps. Natural oil and gas seeps contribute significant amounts of hydrocarbon to the marine environment. Most known seeps occur on the mainland shelf, although others have been reported around the Channel Islands and offshore banks and ridges (MMS, 1996, as cited in MMS, 2001). The four main seepage zones on the mainland shelf are at Point Conception, Coal Oil Point, Santa Barbara/Rincon in the Santa Barbara channel and in the Santa Monica Bay (Anderson et al., 1993, as cited in MMS, 2001). One of the world's largest natural oil and gas seeps lies offshore Goleta, just west of Santa Barbara. This seep was partially tented in the early 1980s by Arco, the owner at the time of the State leases on which the seeps exist. Estimates of the amount of oil an gas collected by the tents in the mid-1990s were 150 bbl of oil and 230 MMSCF of gas per day (MMS, 1996, as cited in MMS, 2001). These and other seeps, occurring in the SCB, contribute locally elevated hydrocarbons to the water column and can form substantial slicks on the sea surface.

The fate of pollutants discharged into the waters of this subregion can be many. For example, on-shore-based pollutants from POTWs, storm drains and other nonpoint sources can be taken-up by intertidal animals, such as mussels or other bivalves. However, mussels have been shown to be able to depurate their body burdens when exposed to clean water after an episode of pollution exposure (Neff, 1987; 1997, as cited in MMS, 2001). Mussels are harvested from some offshore platforms in the Santa Barbara Channel. These are collected by scraping from the platform legs and taken to fresh sea water for depuration and sold to local restaurants, as well as to overseas markets.

Overall, water quality in the Santa Barbara Channel area is relatively good. This is due to the lack of major point or nonpoint pollution sources such as major sewage outfalls, urban-associated storm drains, and major river outflow. Although river plumes do impinge on the Santa Barbara Channel during periods of high outflow, the pollution associated with this phenomenon becomes well-diluted as it spread across the Channel. Additionally, pollution indicators, such as beach closings, that show potential, coastally dependent pollution are somewhat contrasted with mussel watch data showing little land-based pollution problems.

High molecular weight petroleum aromatic hydrocarbons (PAHs) are one example of an anthropogenic-based pollutant. Offshore waters of the Southern California Bight receive this pollutant in the form of soot from various combustion sources. Soot-associated PAHs are delivered to the Bight primarily in aerial fallout, treated domestic waste discharges and urban runoff. Petroleum aromatic hydrocarbons associated with soot are tightly bound to the particles and are not readily bioavailable to marine organisms. These compounds are not accumulated efficiently from the food and are biodegraded rapidly in the tissues of most marine animals; therefore, they do not biomagnify in marine food webs and do not pose a potential hazard to fish that consume biofouling organisms from submerged platform structures.

Another example of a sink, in which pollutants may bioaccumulate or biomagnify, is Santa Monica Bay. Years of disposal of DDT, primarily via a sewage outfall, and other chlorinated hydrocarbons resulted in contamination of the sediments. Bottom-feeding fish, such as white croaker, became contaminated, resulting in public notices advising against eating these and other fish caught in the Santa Monica Bay area. Similarly, sewage sludge was discharged via an outfall in the same area. This discharge ceased in the mid-1980s but the problem remained in terms of contamination of fish and other organisms that inhabit the sea floor.

Effects on water quality from oil spills can range from a few days, to several weeks or months, depending on the size of the spill type of oil. Effects on the water column could occur in the top 10 to 20 meters (32 to 64 feet) of the water column, depending on sea state and the type of oil. Specifically, the effects could include turbidity, biological and chemical oxygen demand and release of hydrocarbons, such as BETX (benzene, ethylbenzene, toluene and xylene) and naphthalene. The slick would be affected by several factors including, wind and wave action, dissolution and volatilization losses. The dissolved components (BETX and others) make up about 20 to 50 percent of crude oils and would be subject to dispersion, dilution and volatilization, as well as to degradation via photolysis and microbial processes. The majority of these low molecular weight aromatic compounds will be lost to volatilization within 24 to 48 hours (Jordan and Payne, 1980, as cited in MMS, 2001). Clean-up actions would also contribute to the minimization of impacts to water quality. Recent information on marine oil [pollution can be found in *Oil in the Sea III* (NRC, 2003).

PAST AND PRESENT PACIFIC OCS OIL AND GAS ACTIVITIES

Pacific OCS oil and gas activities began off southern California in the late 1960s (Galloway, 1997, as cited in MMS, 2001). Section 2 provides information on current offshore infrastructure and levels and types of activities. Several reviews have been made of the possible cumulative impacts of these activities on physical, biological, and socioeconomic resources in the region (Van Horn et al., 1988; Bornholdt and Lear, 1995, 1997; MMS, 1996, as cited in MMS, 2001).

During the period of the 1950s and 1960s, regulation of discharges was less stringent that those of today. No records of what and how much was discharged exist from that period. In addition, six platforms and several piers, which support oil wells in the Santa Barbara Channel, in State waters have been decommissioned. Data from these platforms and piers is similarly nonexistent (pers. comm., Michael Higgins, Central Coast Water Resources Control Board, December, 2000, as cited in MMS, 2001). Of a total of 42 leases in State waters, there are currently 18 producing leases, including five offshore Ventura County and two offshore Santa Barbara County (California State Lands Commission (CSLC), 2000, as cited in MMS, 2001).

Each of the facilities that discharge effluents is regulated by NPDES permits issued by EPA. For facilities (including non-oil and gas) onshore and in State waters, the local Water Resources Control Board has been delegated by EPA to oversee compliance with NPDES permits.

Oil and gas activities in the Channel currently consist of 16 oil and gas platforms: 15 in Federal waters and one in State waters (for purposes of this discussion, the three oil and gas platforms west of Point Conception — Harvest, Hidalgo and Hermosa — are considered to be in the western Santa Barbara Channel). Only the facilities located in Federal waters discharge any effluents; no discharges are allowed from facilities located in State waters. While all platforms have the potential to discharge drilling muds and cuttings, only Exxon's Platform Heritage and Arguello, Inc.'s Hidalgo are conducting a drilling program at present, although both Exxon and Arguello, Inc. are using both water- and oil-based drilling muds for extended-reach wells from these platforms. Since oil-based muds cannot be discharged, the amount of water-based muds being discharged for these wells is probably less than for the other occasional wells that have been drilled at the other platforms during the past 6 to 8 years. Thirteen of the 16 platforms discharge produced water, while all the platforms discharge deck drainage, treated sewage, well completion and workover fluids, and other effluents. The five most common discharges, described in more detail below, contribute the most pollution and undergo the most treatment but may not comprise the most volume (this could come from noncontact cooling water or firewater overpressure, both of which are sea water with no treatment).

Drilling Fluids. Water-based drilling fluids (also known as drilling muds), which are the only type permitted for discharge, is a fresh or sea water slurry of clay (attapulgite or bentonite and sometimes others) or natural organic polymer, barium or iron sulfate, lignosulfonate, lignite and sodium hydroxide, plus several minor additives (NRC, 1983, as cited in MMS, 2001). Oil-based drilling fluids may contain up to 10 percent mineral oil, as well as water, and similar additives. Drilling muds are not treated. If they become contaminated with a material that exceeds oil and grease or toxicity limitations, they can be reinjected downhole or retained and shipped to shore for disposal.

There is no evidence that past routine discharges from offshore oil and gas facilities have no more than temporarily degraded the water quality. While they probably contributed to the overall pollutant load, these discharges have been shown to dilute to below detection fairly rapidly. For example Ayers et al. (1980a) found that suspended solids concentrations from discharged muds and cuttings reached background concentration at distances of 0.3 to 0.6 km (9,600 to 19,200 feet) while Ayers et al. (1980b) found that suspended solids and particular trace metals reached background levels in 0.5 to 1.0 km (16,000 to 32,000 feet). Houghton et al. (1980, as cited in MMS, 2001) found dilution rates of 10,000 to 1 with 100 meters (320 feet) of the discharge point. Ray and Meek (1980, as cited in MMS, 2001), in a study in the high energy environment of the Tanner Banks, offshore California, found that suspended solids and trace metals concentrations approached background levels at a distance of 0.2 km (6,400 feet) from the exploratory drilling rig. For all of these studies, once the discharge ceased, parameters for water quality returned to normal. In addition, Jenkins et al. (1988, as cited in MMS, 2001) found that barium levels resulting from drilling muds discharges from an exploratory well reached background within 1,500 meters (4,800 feet) and more recently, tracers of barium that was associated with drilling mud discharges from development wells offshore Point Conception, California, were detectable up to 6.8 km (21,760 feet) from the discharging platforms.

Produced Water. Produced water contains a suite of components, including metals and dissolved hydrocarbons that must be reduced as much as possible in the effluent before it is discharged into the sea. These components include, water-soluble organics such as light aromatics (benzene, toluene and xylene); a variety of other aromatic and aliphatic compounds; and metals such as barium (Ba), chromium (Cr), cadmium (Cd), copper (Cu), zinc (Zn), mercury (Hg), lead (Pb), silver (Ag), and nickel (Ni) (Unpubl. data, EPA, Region 9, as cited in MMS, 2001). Treatment of produced water is accomplished by various mechanical (such as heat, corrugated plates, and electrostatic) and chemical means. All facilities that discharge produced water have a sampling point installed in the pipe that discharges to the ocean where samples for chemical and toxicity analyses are collected. This is the point where both the operator and government inspectors can collect samples to ensure that the produce water stream is meeting the limits for the NPDES permit in effect at that facility (see above regulatory setting discussion).

MMS has compiled a table of produced water discharges from 1988 to present (Panzer, unpubl., as cited in MMS, 2001). The data are based on the Discharge Monitoring Reports (DMRs) that each operator's NPDES permit requires them to submit to the EPA. The spreadsheet also has data from compliance sampling conducted by EPA and MMS since 1990. Records of discharges prior to 1988 are spotty at best and, in most cases, include only a few records from a few platforms. The data since 1988 generally indicate that operators have met the terms of the permits (Panzer, 1999, as cited in MMS, 2001). Few exceedances have been reported or detected by compliance monitoring. Operators are required, by the terms of their permits, to report exceedences within 24 hours of the event. If this is not done, the operators are subject to penalties.

Produced water studies have shown dilutions of up to 1500 to 1, which is similar to that cited in models developed to calculate dilution for the purpose of determining compliance with NPDES permits (EPA, 2000a, as cited in MMS, 2001). Osenberg et al. (1992, as cited in MMS, 2001) studied a produced water outfall offshore Carpinteria, California. This outfall, located in shallow water [about 10 to 12 meters (32 to 40 feet water depth)] in an open-coast environment, was shutoff in 1986. In general the researchers found that outplanted mussel performance (as measured by shell growth) increased with distance from the outfall. However, the last two stations were 100 meters and 1,000 meters (320 and 3,200 feet, respectively) from the outfall. The researchers note that there was still some detectable affect in mussel performance at 1,000 meters (3,200 feet) however, due to the lack of a station between 100 and 1,000 meters, (320 to 3,200 feet) and their inability to detect the physical signal of produced water past 100 meters, they were unable to draw any firm conclusions. Similarly, there was no evidence on the competency of red abalone larvae settling past 500 meters (1,600 feet) from the outfall (Raimondi and Schmitt, 1992, as cited in MMS, 2001). The series of studies, cited above, resulted from a study site in shallow water. No studies on produced water discharges from Pacific OCS oil and gas facilities have been conducted in deeper water.

Treated Sewage. Sewage, treated with chlorine to kill fecal coliform bacteria, is discharged from all platforms. Generally, the sewage and the "gray" water from showers, sinks and the galley is co-mingled after the sewage is treated and both are discharged via the same outfall. Volumes discharged are calculated by assuming a factor of about 35 gallons per person per day aboard a platform or drilling vessel. Manning ranges from three to over 100 persons depending on the size of the facility and the amount of activity (for example, whether drilling is occurring).

Deck Drainage. Deck drains capture various fluids and other materials that are spilled or washed onto the decks of the platforms. All platforms have 4" (minimum required height) kick plates which prevent such spills from entering the sea. Deck drains are generally plumbed to a settling tank where oily liquids are skimmed off and the water treated with the produced water stream. On some facilities, deck drains are commingled with the produced oil and treated, discharged, and regulated with the produced water.

Well Treatment and Completion Fluids. These materials can be discharged when existing production wells need down-hole work, such as pump replacement or any of a variety of well production enhancement efforts. Any fluids emanating from these processes can be discharged provided they do not exceed oil and grease limits or cause a sheen or other visible pollution on the sea surface. Most often, operators combine any fluids from the wells with the produced water stream (pers. comm., David Panzer, MMS, as cited in MMS, 2001); the commingled stream then becomes subject to permit limitations for the produced water effluent.

The various other effluents that can come from facilities operating in the Pacific OCS are all subject to limitations but little treatment.

4.7 Biological Resources

This section includes discussion of the following resource areas: rocky and sandy beach habitats, seafloor resources, kelp beds, fish resources, marine and coastal birds, marine mammals, and threatened and endangered species. This section also covers estuarine and wetland habitats; refuges, preserves, and marine sanctuaries; and onshore biological resources.

4.7.1 Rocky and Sandy Beach Habitats

Rocky beach habitat in this section refers to the rocky tidepool habitat and its resident algal and invertebrate communities. Sandy beach habitat refers to the habitat and the communities found on the surface and inhabiting the sand. Birds, mammals and fishes present or visiting these habitats are discussed in those specific sections in the EID. The Coastal Act of 1976 regulates development in the coastal zone that includes sandy and rocky beach habitats. Sandy and rocky beach habitats are protected through local, State and Federal regulations and programs. County Local Coastal Plans provide specific protection for sensitive habitats in their County, limiting development activities that impact these areas. The California Department of Fish and Game manages marine resources in the intertidal zone, including commercial species such as abalone. The U.S. Fish and Wildlife Service is the Trustee for the resources under OPA 90 and would be responsible for evaluating potential impacts in the event of an oil spill, along with the California Department of Fish and Game. MMS protects rocky and sandy beaches from oil and gas activities through lease stipulations, regulations, inspection procedures and mitigation measures designed to prevent oil from reaching and impacting the shoreline, and to minimize beach impacts during pipeline installation.

Regional Setting

Approximately half of the shoreline from Point Conception north along the coastline of California is rocky, forming either broad benches or cliffs (Woodward and Clyde, 1982; Dugan et al., 1998, unpublished, as cited in MMS, 2001). Boulder and cobble beaches are patchily distributed within this same area (Dames and Moore, 1983; Woodward and Clyde, 1982, as cited in MMS, 2001). Within sandy beach areas between Point Conception and the Santa Ynez River, dune-backed and bluff-backed beaches are evenly represented (Dugan et al, 1998, unpublished, as cited in MMS, 2001). North of Point Conception, where strong and constant wave action prevails, sandy beaches are found in the lee of each point due to depositional patterns (NOAA, 1998, unpublished, as cited in MMS, 2001). Along the central coast, rocky shorelines form high cliffs and steep rocky benches. South of Point Conception, over three-fourths of the shoreline is sandy (Dugan et. al., 1998, unpublished, as cited in MMS, 2001). Wave exposure changes dramatically south of Point Conception with wave heights roughly half the size of those found to the north, primarily due to the protection afforded by the Channel Islands. Bluff-backed beaches are often ephemeral and lose their sand seasonally, exposing rocky platforms. Many beaches are associated with ephemeral creeks and rivers, which dry up in the summer (Dugan et al, 1998, unpublished, as cited in MMS, 2001). Water temperature in the Santa Barbara Channel is considerably warmer than water north of Point Conception due to the influence of southern currents. Rocky and sandy beaches in this area are heavily visited year-round, especially those proximate to the coastal cities in Santa Barbara and Ventura Counties.

The Channel Islands encompassed within the Channel Islands National Marine Sanctuary and Channel Islands National Park are noted for their nearly pristine marine environment and clear waters. The four northern Channel Islands have been comparatively less visited and impacted by humans than the adjacent mainland. The wide range of water temperatures, shoreline exposures and substrate types of the islands create a variety of different habitats (Chambers, 1991; BLM, 1978, as cited in MMS, 2001). Beaches on the outside or ocean facing side of the islands are subjected to strong wave action, whereas beaches along the Channel are calmer providing habitats for a wide range of species on each island. Most of the island shoreline is rocky. Rocky substrates on the islands create interesting arches, caves and offshore pinnacles rich with marine life. Santa Rosa and San Miguel islands have the largest expanses of sandy beaches of the four northern islands, though rocky beaches still predominate on both islands.

The Monterey Bay National Marine Sanctuary (MBNMS) contains among the most diverse and species-rich invertebrate fauna in the world (NOAA, 1992, as cited in MMS, 2001), with the widest array of invertebrate species occurring in the rocky intertidal habitat of the area. Characteristic species include periwinkles, isopods, barnacles, limpets, sea snails, crabs, chitons, mussels, sea stars, and anemones. Marine algae are also diverse and abundant, with over 450 species occurring in the area, including several endemic species.

Rocky Beach Habitat. Tidepool or rocky intertidal habitat on the mainland and islands has been the subject of numerous research efforts funded by the Minerals Management Service, the Channel Islands National Park, and other agencies and private organizations (Ambrose et al, 1994; Chambers, 1991; Littler, 1978; Woodward and Clyde, 1982; Raimondi et al., 1998, Richards, 1998, as cited in MMS, 2001). Ongoing monitoring of rocky intertidal resources in Santa Barbara County has been the joint venture of MMS, Santa Barbara County, and the University of California for the past 10 years, and ongoing monitoring of island resources has been maintained by the National Park Service since the mid-eighties. Resources such as mussels, abalone, barnacles, algae, limpets and surf grass are currently monitored at 61 locations along the Southern California Bight biannually organized through MARINe (Multi-Agency Rocky Intertidal Network). Additionally, rocky intertidal monitoring occurs throughout central and northern California at the Farallon Islands, MBNMS, and sites and as far north as Alaska through efforts funded by the Packard Institute (PISCO), the National Park Service, and the NOAA Marine Sanctuary program. The most significant change found through monitoring central and southern California in the past decade is the drastic decline of the black abalone (*Haliotis cracherodii*), once commonly found in large numbers (Murray and Littler, 1979; Ambrose et al, 1994, as cited in MMS, 2001). This decline is the result of a "withering foot syndrome", a fatal bacterial infection that causes the foot of the abalone to shrink. The spread of the disease is facilitated by warm water, explaining the accelerated spreading of the disease in the 1990s during El Niño conditions. The National Park Service first noted a sharp decline of this species on the northern Channel Islands in 1985. MMS-funded monitoring studies first found withered animals at Government Point in 1992 (Ambrose et. al, 1994, as cited in MMS, 2001). Tenera Environmental identified other withered animals at Diablo Canyon in the late 1980s. It is likely that the presence of the warm water outfall from the power plant contributed to the bacterial growth at that location. Since 1992, steady declines have crept up the coast from Government Point to Purisima Point (Ambrose et. al, 1994; Raimondi et. al, 1996; Raimondi et. al, 1999, as cited in MMS, 2001). The current population of abalone at the MMS-funded sites north of Point Conception is estimated at 5 to 10 percent of levels identified in 1991 (pers. comm., M. Wilson, U.C. Santa Cruz, 2000, as cited in MMS, 2001). The National Park Service estimates that population levels on the islands are less than 5 percent of their original level (pers. comm., D. Richards, NPS, 2001, as cited in MMS, 2001). Rogers-Bennett, et al., (2002a and b) report the results of the most recent surveys of black abalone and indicate that densities in the year 2000 more than 99 percent of their 1985 numbers at Pt. Arguello, San Miguel Island, and San Nicolas Island. Dramatic reductions in black abalone populations along the Santa Barbara County coastline from spring samplings in 1992 to fall samplings 2003 were reported by the MARINe surveys (MARINe, 2004). MARINe also reported that black abalone densities at sampling sites in San Luis Obispo County were relatively constant between fall 1997 and fall 2003 surveys.

Sandy Beach Habitat. Sandy beach habitat along the California coast has been characterized in several previous document (URS, 1987; ADL, 1985; ADL 1984; MMS; 1983, [as cited in MMS, 2001], see Table 4.7-1). Sandy intertidal beaches have also been recently characterized by MMS to better understand shorebird abundance in Santa Barbara County (Dugan et. al., 1998 unpublished, as cited in MMS, 2001) and Ventura County (Pierson and McCrary, 1999, as cited in MMS, 2001). In general, the common sand crab, (*Emerita analoga*) dominates the community along sand beaches north of Point Conception, with percent cover as high as 75 percent (pers. comm., J. Dugan, U.C. Santa Barbara, 2001, as cited in MMS, 2001). Beaches are characterized by the presence of common sand or mole crabs and spiny sand crabs (*Blepharipoda occidentalis*) in the intertidal zone, while flies, beach hoppers (*Megalorchestia* sp.) and isopods (*Alloniscus* spp;) frequent the wrack line (Ricketts et. al., 1985, as cited in MMS, 2001). Pismo clams (*Tivela stultorum*) are patchily distributed on intertidal beaches north of Point Conception (pers. comm., J. Dugan, U.C. Santa Barbara, 2001, as cited in MMS, 2001). Island beaches are inhabited by similar assemblages including sand crabs and beach hoppers (Chambers, 1991, as cited in MMS, 2001).

Table 4.7-1. Table of Studies Relevant to Sandy and Rocky Habitat

Author and Publication Date[1]	Description of Study
Raimondi, 1998	1997 Torch Oil Spill, an excerpt from Monitoring of Rocky Intertidal Resources along the Central and Southern California Mainland
Engle and Davis, 2000	Ecological Condition and Public Use of the Cabrillo National Monument Intertidal Zone 1990-1995
Engle and Davis, 2000	Baseline Surveys of Rocky Intertidal Ecological Resources at Point Loma, San Diego
Richards and Lerma, 2000	Rocky Intertidal Monitoring, Channel Islands National Park, 1998 Annual Report
Foster et al., 1988	Causes of Spatial and Temporal Patterns in Rocky Intertidal Communities in Central and Northern California
Ambrose et al., 1992	Shoreline Inventory of Resources in Santa Barbara County
Ambrose et al., 1995	Rocky Intertidal and Subtidal Resources, Mainland Santa Barbara County
Engle et al., 1997	Rocky Intertidal Resources in San Luis Obispo, Santa Barbara, and Orange Counties; 1997 Annual Report
Chambers Group, 2000	Santa Barbara County Shoreline Inventory
Rogers-Bennett, et al., 2002a and b	Abalone Status in California

[1]References are cited in MMS, 2001

Impacts of Past OCS Activities on Rocky and Sandy Beach Habitat

Impacting agents affecting rocky and sandy habitat from past OCS activities include installation of pipelines connecting offshore platforms with onshore processing facilities and two major oil spills — the Santa Barbara 1969 blowout and the Torch pipeline spill in 1997. The rocky and sandy beaches sustained low impacts due to the installation of the Point Arguello, Point Pedernales and Santa Ynez Unit pipelines (pers. comm., J. Storrer 2000, as cited in MMS, 2001) due to the mitigation measures taken to reduce construction impacts. The Point Arguello pipeline was a drilled crossing; mitigation designed to reduce potential impacts to dune habitat. Problems encountered during construction of the Point Arguello pipeline included engineering problems with the drilled crossing, removal of willow forests, and introduction of noxious weeds, but the construction did not result in dune impacts or impacts to resident snowy plovers (pers. comm., J. Storrer, 2000, as cited in MMS, 2001). However, during the drilling, part of the bluff collapsed due to over-saturation of the sediments. Older pipelines installed from 1963 to 1980 would have been expected to cause temporary impacts to beaches due to the localized nature of the impact. In general pipeline corridors have been chosen to mitigate impacts to dune resources and rocky intertidal resources. Impacts anticipated from pipeline construction in general are displacement, burial, and crushing of invertebrates in the trench corridor.

The Santa Barbara 1969 blowout most heavily impacted the sandy and rocky intertidal beaches on the mainland near Platform A, and at Anacapa and Santa Cruz Islands. Occurrence of oil was documented on Santa Barbara/Ventura County beaches for six months after the spill (Santa Barbara News Press, as cited in MMS, 2001). Sandy and intertidal beaches were studied shortly following the spill (Straughan, 1971, as cited in MMS, 2001) and again a few years after the spill (URS, 1974, as cited in MMS, 2001).

Dawson collected the primary data on rocky intertidal areas prior to the spill; Nicholson and Cimberg resampled Dawson's sites in areas where oil was recorded from the spill. Observable effects included impacts to the gooseneck barnacle *Pollicipes polymerus* at Carpinteria and East Cabrillo, smothering impacts of barnacles in the upper intertidal at East Cabrillo, and general declines in algal abundance in several areas, though these decline may have been influenced by other factors.

The surfgrass community, *Phyllospadix*, was also heavily hit at Santa Barbara Harbor (Foster, 1969, as cited in MMS, 2001). URS (1974, as cited in MMS, 2001) identified residual oil contamination of rocks in the cliff areas westward of the City of Santa Barbara in areas not cleaned following the blowout. Residual oil deposits were identified at Frenchy's Cove at Anacapa Island, on several rocky promontories well above the splash zone, and in an isolated cove at Point Bennet. No residual sediment contamination was found in coring operations in the Santa Barbara Harbor, but one core of the sand bar contained oil which indicates the possibility of "erratic buried deposits" in the sand bar (URS, 1974, as cited in MMS, 2001). It is expected that impacts to rocky and sandy beaches from the Santa Barbara blowout were patchy and ranged from low to moderate.

Reports disclosing the full impacts from the Torch Platform Irene pipeline spill in 1997 are not available. Generally, the spill most heavily impacted the sandy beach near Surf nearest the origin of the spill, with light sheen, tarballs and tar patties found at several other beaches. The rocky intertidal was less affected; one location was documented as oiled but other monitored rocky intertidal sites in the vicinity of the spill were not found to be significantly affected (Raimondi, 1999, as cited in MMS, 2001). The Platform Irene Trustee Council, 2004 report that the spill affected 17 miles of Santa Barbara County beaches. That report also indicates that Pismo clams and spiny sand crabs "likely suffered significant mortality from the spill." Rocky intertidal species including abalone and mussels were reported to have been "injured" by the spill with black abalone and mussel beds observed to be coated with along or near the shores of Vandenberg Air Force Base (USFWS, et al., 2004). Melissa Boggs (pers. comm. 2004). CDFG OSPR indicates that quantitative data on the spill effects on the inter- and subtidal habitats and biota are not yet available and are not expected to be released by CDFG until 2005.

4.7.2 Seafloor Resources

Seafloor resources covered in this section refer to the biological habitat and communities found on the ocean floor. These include communities that inhabit the ocean floor near the coastline and benthic communities found in the deep regions of the ocean. Kelp bed resources are discussed in Section 4.7.4. Biological resources living in tidally influenced areas along the shoreline are discussed in Section 4.7.1 above.

Regulatory Environment

The primary regulation affecting seafloor or benthic resources on OCS leases is the MMS Biological Lease Stipulation found in each lease agreement. This stipulation applies to exploratory and development operations on Federal leases. If MMS believes that rare, unique, or sensitive populations exist that may be affected by proposed operations, MMS invokes the provisions of the stipulation. In that case, operators must either conduct a biological survey over an identified area to document the biological resources, or move and/or mitigate their operations in such a way that potentially important resources would not be affected. Biological surveys are to be conducted in accordance with Notice to Lessees (NTL) No. 00-P04 codified November 1, 2000. The NTL describes the survey grid, data to be collected, and reporting requirements. The Biological Lease Stipulation has been invoked on all leases in the Bonito Unit, on OCS-P 0421 and OCS-P 0422 in the Point Sal Unit, on OCS-P 0426 in the Purisima Point Unit and on OCS-P 0460 in the Gato Canyon Unit.

MMS also formed the Hard Bottom Committee, a 14-member group of agencies, fishermen and industry. The Committee provides MMS with data, reviews biological survey plans and survey reports, and advises MMS on mitigation measures. The Committee has provided valuable input on the reliability of MMS data and provided confirmation of several identified hard bottom features from other data sources.

The National Oceanic Atmospheric Administration (NOAA) is the agency given authority through the Secretary of Commerce to oversee endangered species in the benthic environment. Historically, they have listed two species in the southern California area, a limpet (*Vema*) found at great depths, and a branching purple coral (*Allopora californica*). They are also the Trustees for benthic resources under Federal law during an oil spill. As a Trustee, NOAA is required to advise the U.S. Coast Guard during oil spill cleanup activities and to assess impacts to benthic resources as a part of the Natural Resource Damage Assessment (NRDA).

In 2001 the white abalone (*Haliotis sorenseni*) was listed as federally endangered (Rogers-Bennett, et al., 2002a and b). Cox (1960) states that *H. sorenseni* is found in water depths of from 15 to 150 feet but is most common between the 80 and 100 feet depths. One *H. sorensoni* was reported in 28 feet of water by de Wit (2002) during a survey of the nearshore rocky habitat near the ExxonMobil SYU pipeline corridor. D. Kushner (pers. comm., 2004) and other diver-biologists reported finding four white abalone during December 2004 surveys of the Channel Islands subtidal areas around Santa Cruz, Santa Rosa, San Nicolas, San Miguel, Santa Barbara, and Anacapa Islands. In general, the abundance of abalone was substantially lower than last year's numbers (D. Kushner, pers. comm., 2004).

Regional Setting

Hard or Rocky Substrate. Rocky features on the ocean floor, when compared with sandy bottom acreage, are uncommon offshore California (ADL, 1984; URS, 1987, both as cited in MMS, 2001). Several hundred small rocky platforms and submerged islands can be found in the nearshore coastline off California, with the incidence of nearshore rocky areas increasing as you move north of Point Conception. Several investigators have surveyed nearshore rocky habitats in Santa Barbara County adjacent to the leases where the delineation wells are proposed north and south of Point Conception (Ambrose et. al., 1995; MBC, 1980; Littler, 1977; Chambers, 1982, all as cited in MMS, 2001). Common species include cup corals and anemones. Refer to these references for species lists. In 2004, the MMS completed a comprehensive review of seafloor hard bottom features and associated epibiota that were located within two nautical miles of all POCS platforms and pipelines (Deysher, et al., 2004). Information on unit-specific hard bottom features that are provided in that report is used in characterizing the seafloor habitat in the following sections.

Shallow geohazard surveys conducted on OCS leases to identify potential drilling hazards can also be used to identify and locate rocky features. Several hard substrate features have been identified using these data. Since OCS leases are three miles offshore and the Continental Shelf drops off quickly offshore California, OCS features are in deep water. The deepest feature surveyed in the Basin on an OCS lease was in 1,700 feet of water. Rocky features, or natural reefs, are important biologically because they may support stable, long-lived, biologically diverse communities and because they provide a food source for fish and other organisms. The size of the feature is not as important as other factors in determining its importance biologically. Important resources are found on very large features such as the feature offshore Point Sal measuring seven miles at its widest point, on much smaller features such as the feature south of Platform Hidalgo measuring 34 acres, and on small isolated pinnacles and outcrops. Absolute relief of the feature is one of the most important factors in determining whether a given feature is likely to contain undisturbed, long-lived biological communities. Features with "low relief," ("low relief" is defined here as less than one meter of expressed biological relief), are typically subject to disturbance from river runoff and sediment deposition. These lower relief features, or lower relief portions of features, contain less diverse, shorter-lived communities due to the constant or periodic disturbance by sedimentation. They are characterized by sediment tolerant species such as cup corals (for example, *Caryophylla* sp. and *Paracyathus stearnsii*) and brachiopods. Species such as the anemone, *Metridium senile*, and the gorgonian, *Lophogorgia*, may also be present at low relief sites if bottom currents regularly expose the substrate. These latter species can tolerate burial by sediment once they have reached a certain height by allowing their respiratory organs to remain above the shifting sediment

Individually, lower relief habitat is characterized by a less rich biota than those on higher relief, less disturbed features or parts of features. Ecologically, however, low relief habitat is part of an important system of natural reefs. Communities associated with "high-relief" features, (defined as features or portions of features with greater than one meter of biological relief), are rare. Even within a given feature or group of identified rocky features, only a small portion of the habitat (<1 to 10 percent) is likely to contain sufficient relief and bottom characteristics to support the more sediment-sensitive species. Long-lived, highly diverse biological communities found on high-relief features are characterized by the presence of a variety of long-lived organisms such as sponges, corals, and feather stars. The three dominant phyla encountered on the features include *Cnidaria* (branching, cup, and encrusting corals and large anemones), *Echinodermata* (feather stars, brittle stars, basket stars, and sea urchins) and *Porifera* (vase, barrel, and shelf sponges) (Diener and Lissner, 1995, as cited in MMS, 2001). The presence of large vase sponges, such as *Aphrocallistes*, is a good indicator of high biological relief and strong bottom currents since its presence indicates a complete lack of disturbance by sediment cover over time. While the age of many slow growing species is difficult to visually estimate, biologists surveying high relief areas offshore in the Santa Maria Basin estimate large sponges to be at least 20 to 30 years old (Dames and Moore, 1982, as cited in MMS, 2001). In rare instances, such as on leases in the western Santa Barbara Channel near San Miguel Island, plate sponges estimated to be over 100 years old have been identified (Benech Biological Associates, 1984, as cited in MMS, 2001).

The endangered coral, *Stylaster californicus* (formerly *Allopora californica*), has been found in two locations only — on Tanner Cortes Bank and on reefs contiguous with the Channel Islands. Analysis of photographs taken during Phase II of the California Monitoring Program (CAMP) study yielded 286 separate hard bottom taxa (Diener and Lissner, 1995, as cited in MMS, 2001). In this study it was determined that water depth was the most significant factor in determining community structure, and relief of the feature was the next significant factor. The depth preference of the 50 most dominant taxa was evident; they were almost evenly split among three depth zones, with only14 of the taxa being found in roughly equal densities at each depth. As predicted from visual surveys, their data confirmed the relationship between water depth, relief and sediment flux. Most of the shallow water species preferred low-relief habitats where sediment flux was almost twice as high as on the deep reefs (Diener and Lissner, 1995, as cited in MMS, 2001).

Due to the high numbers of unidentified species and incomplete taxonomy for the benthic animals found in these surveys, MMS funded scientists to publish the taxonomy of all represented phyla. This 14-volume detailed color document entitled "Taxonomic Atlas of Benthic Fauna of the Santa Maria Basin and Western Santa Barbara Channel" provides the complete taxonomy for all phyla discovered during these surveys (Blake and Lissner, 1993, as cited in MMS, 2001).

Soft Substrate Resources. A total of 1,207 species of soft-substrate deep water benthic invertebrates were identified in the comprehensive reconnaissance survey of the Santa Maria Basin and western Santa Barbara Channel (SAIC, 1986). During the CAMP Phase II monitoring program, a total of 886 species were identified from 344 box cores representing 15 phyla (Blake and Lissner, 1993, as cited in MMS, 2001), (Hyland et al., 1990, as cited in MMS, 2001). Peracarid crustaceans (34 percent), polychaetes (31 percent), and molluscs (18 percent) dominate the fauna. Roughly 25 percent of these species were new to science. Analysis of community parameters such as species richness, diversity, and density indicated that the Santa Maria Basin supports a rich, highly productive, benthic invertebrate fauna (Blake, 1993, as cited in MMS, 2001). The highest number of species was found at nearshore stations, as was the highest species diversity and density. This decline in species richness with depth is in contrast to findings along the North Atlantic, where diversity increases with water depth. The significantly lower dissolved oxygen levels present in California slope waters as compared with the East Coast may explain this difference (Blake and Lissner, 1993, as cited in MMS, 2001). In their investigation of soft bottom assemblages in the Santa Maria Basin and western Santa Barbara Channel, SAIC (1985) found the most distinctive assemblage to be that occurring nearshore along the shelf in water depths less than 400 feet. This group was numerically dominated by one species of a brittle star (*Amphiodia urtica*), followed by two polychaete worms, *Spiophanes berkeleyorum* and *S. missionensis*.

Nearshore soft bottom benthos north of Point Conception in water depths less than 100 feet is typical of nearshore sand bottom communities throughout the Southern California Bight (ADL, 1984; Jones, 1969, as cited in MMS, 2001). This community is exposed to frequent or continuous wave action and disturbance. Surveys have been conducted of the pipeline corridors and onshore crossing inshore from the Point Arguello platforms north of Point Conception (Dames and Moore, 1983, as cited in MMS, 2001). Species lists from analyzed samples compare favorably with historical survey data from earlier investigators (Dames and Moore, 1983, as cited in MMS, 2001). Chambers (1982, as cited in MMS, 2001) sampled several transects in the Point Conception/ Point Arguello area where worms, *Nothria*, and clams, *Tellina*, dominate the community.

SITE SPECIFIC DESCRIPTIONS BY UNIT

It is anticipated that there will be little important variance among soft bottom communities in the Project Area. Site-specific surveys conducted for the platforms and pipelines for proposed Platform Julius, Platform Irene, and Platform Harmony, as well as the comprehensive biological sampling conducted as part of the regional California Monitoring Program, should be consulted for additional information and detailed species lists (McClelland Engineers, 1985; SAIC, 1985; SAIC, 1986; SAIC and MEC, 1995, Blake, J.A. and A.L. Lissner, 1993). Due to the differences between the types of rocky features in the Project Area and their habitat, the following additional discussion is provided for Units that could have seafloor habitat-disturbing activities. The following discussions and the listings in the unit-specific tables are based on data provided in the preceding citations and from other sources used in (Deysher, et al., 2004).

Point Sal Unit. Potential exposed rocky outcrop areas are mapped in two locations in the Point Sal Unit, one at the border between Lease OCS-P 0421 and P 0422, and the other on the northeast corner of OCS-P 0416. A review of existing shallow hazards data indicates that the features on the eastern border of OCS-P 0421 are likely outcrops, since they are associated with identified faults and contain sufficient relief to support hard bottom communities. Longline commercial fishing data also indicate that these features contain viable habitat. Based on a review of the shallow hazards data and commercial fishing data, potential features on the northeastern corner of OCS-P 0416 are not believed to contain viable hard bottom habitat. SAIC (1986) surveyed one rock area within Lease P-0421; information on that feature is provided in Table 4.7-2 below.

Table 4.7-2. Characteristics of Hard Bottom Feature in Lease P-0421

Transect Number	Lease Number	Water Depth (ft)	Description
17 A/B	P-0421	535-560	Rocky outcrop on slope overlain with silt, and exposed “hummocky” ridges characterized by *Metridium senile, Pandalus platyceros,* and *Opiacantha diplasia*.

Source: SAIC, 1986

Santa Maria Unit. Nekton (1981) found a mixture of rock and sediment in water depths of between 340 and 450+ feet during a survey of the seafloor in the southern portion of P-0431 and the southern portions of P-0425. SAIC (1986) reported observing several hard bottom features within the Santa Maria Unit. Table 4.7-3 lists the location and the type of substrate reported during the SAIC (1986) survey.

Table 4.7-3. List of Hard Bottom Features within the Santa Maria Unit

Transect Number	Lease Number	Water Depth (ft)	Description
13 A/B	P-0434	307-322	Low relief rocky rubble with light to moderate siltation characterized by *Paracyathus stearnsii, Stylasterias forreri,* and *Parastichopus californicus*
13 C/D	P-0434	295-335	Variety of mud flats, low relief silted rocks, and medium relief boulder piles. Rocks dominated by cup corals, *Mediaster aequalis, Lophogorgia* sp., *Ophiacantha diplasia*, and *Stylasterias forreri*. Rock piles with great diversity of fishes and *Metridium senile* on highest rocks.
16 A/B	P-0425 and 0430	305-410	Uniform cobble/boulder slope except for 2 small mud flat areas. Low relief rocks except for one 10-ft-high pinnacle. Dominants include *Opiacantha diplasia, Florometra serratissima, Mediaster aequalis, Actinostola* sp. A, cup corals, *Terebratulina* sp. A., *Halocynthia hilgendorfia igaboja*, juv. rockfish and starry rockfish.
20 A/B	P-0434	300-435	Rubble slope with *Florometra serratissima, Ophiacantha diplasia*, and brachiopods; vertical wall with *Corynactis californica, Eugorgia rubens*, and cup corals; plateau with *F. serratissima*, ophiuroids, and sponges.

Source: SAIC, 1986

Purisima Point Unit. One isolated feature has been mapped in the center of Lease OCS-P 0426. While the size of the feature is small, shallow hazards data indicates sufficient relief to support hard substrate communities and presence of habitat is corroborated by longline fishermen data (pers. comm., S. Timoschuk, 2001, as cited in MMS, 2001). SAIC (1986) also reports a feature within the same area in 250 to 300 feet of water that is characterized as an area of steep outcrops and ledges with intervening silt pockets and moderate siltation. Characteristic epibiota on this feature include anemones (*Metridium senile* and *Corynactis californica*), solitary corals (*Paracyathus stearnsii* and *Balanophyllia elegans*) and the echinoderm *Stylasterias forreri*.

Gato Canyon Unit. The northern half of lease OCS-P 0460 is identified hard bottom substrate. Confirmation as exposed hard bottom habitat seems likely given the commercial fishing records for the area.

Impacts of Past OCS Activities on Seafloor Resources

Over 300 exploration wells and nearly 900 development wells have been drilled on the OCS since 1963. Of these, roughly 130 were drilled after 1980, when more became known about the importance of hard substrate communities. The biological stipulation has been placed on each lease since Lease Sale No. 35 in 1977 and invoked on over 30 leases.

MMS has protected hard substrate communities through wellsite avoidance, anchor avoidance and, occasionally, through the barging or monitoring of muds and cuttings discharges, since the late 1970s. In the late 1970s and early 80s, the mitigation was focused on reducing direct impacts to resources from cuttings discharges and anchor placement. Operators were required to avoid drilling within 1,000 to 1,500 feet from features identified by the agency during the intense drilling phase in the early 1980s. These mitigation measures were also required prior to setting Platforms Hidalgo, Hermosa, and Harvest. Extensive mitigation was required for the construction of these pipelines and platforms because of their proximity to hard substrate features. Post-construction surveys were also required to ensure that impacts had been mitigated properly.

Table 4.7-4 lists studies of seafloor resources in the study area. Four of these are most relevant, and describe the impacts that have occurred on benthic resources from offshore oil and gas activities. The first is the California OCS Monitoring Program (CAMP), a ten-year monitoring study of the effect of discharges from drilling on Platforms Harvest, Hermosa, and Hidalgo on soft and hard substrate communities in the Point Arguello area. The second is a study of benthic communities following exploration operations on OCS leases (MEC Analytical Systems, Inc., 1995, as cited in MMS, 2001). The third is the post-construction survey of pipeline routes following the installation of Platforms Hermosa, Harvest and Hidalgo and their associated pipelines (Marine Research Specialists, 1993, as cited in MMS, 2001). The fourth study was conducted in the late 1970s during the drilling of an exploratory well near a shallow reef in the Tanner-Cortes Bank.

Table 4.7-4. Table of Studies Relevant to Seafloor Resources.

Author and Publication Date[1]	Description of Study
Ecomar, 1982	Biosurvey for exploration for a large feature on four leases 20 miles offshore Pt. Sal
Nekton, 1981	Biosurvey for exploration for a large feature on four leases off Purisima Point.
Dames and Moore, 1982	Biosurvey for exploration for scattered hard bottom on multiple leases in the Point Arguello area
Dames and Moore, 1982	Biosurvey for proposed platforms in the Santa Ynez Unit
Chambers, 1982	Biosurvey of State lease sale area at Point Arguello
Chambers, 1982	Biosurvey of construction through kelp beds in the Santa Ynez Unit in western Santa Barbara Channel
Dames and Moore, 1983	Biosurvey at the proposed Platform Hermosa site and along pipeline corridors to shore
Dames and Moore, 1983	Biosurvey of pipeline alternatives from Platform Hermosa to shore at Point Conception and Gaviota
Nekton, 1983	Biosurvey at the proposed Platform Harvest site and its pipelines
McClelland Engineers, 1984	Biosurvey at the proposed Platform Irene site and pipelines to shore
Dames and Moore, 1984	Biosurvey for the Project Shamrock platform site adjacent to Point Arguello (no platform was placed)
Engineering Sciences, 1984	Biosurvey at the proposed Platform Hidalgo/pipelines
McClelland Engineers, 1985	Biosurvey at the proposed Platform Julius site (no platform installed)
Benech Biological Associates, 1986	Biosurvey for exploration for a lease adjacent to Point Conception
Benech Biological Associates, 1986	Biosurvey for exploration for 2 leases in the western Santa Barbara Channel
McClelland Engineers, 1986	Biosurvey for proposed Platform Gail and pipelines
SAIC, 1986	Reconnaissance survey of the Santa Maria Basin and western Santa Barbara Channel including comprehensive sampling of soft and hard substrate communities
McClelland Engineers, 1987	Biosurvey for the proposed Platform Hacienda in Rocky Point Unit (no platform was placed)
Kinnetics Inc, 1989	Biosurvey for one lease in the eastern Santa Barbara Channel for exploration activities
Kinnetics, Inc. 1989	Biosurvey for four leases in the western Santa Barbara Channel for exploration
Blake, J.A and A.L. Lissner, 1993	Taxonomic Atlas of the Benthic Fauna of the Santa Maria Basin and western Santa Barbara Channel

[1]References are cited in MMS, 2001

Anchoring Impacts from Exploration. MEC Analytical Systems, Inc. evaluated the area of anchor impact from exploratory operations occurring between 1968 and 1989 (MEC Analytical Systems, 1995, as cited in MMS, 2001). Conclusions from this study found that in the case of anchoring activities from exploratory drilling, the actual area of impact was less than 0.5 percent of the identified exposed hard bottom habitat. Eight wellsites were selected out of 22 potential locations for study. The wellsite with the least anchor contact on hard bottom was drilled in 1989 on OCS-P 0512. Of the eight wellsites, which were all on leases with identified exposed hard substrate habitat, four wellsites had no scars on the hard bottom. Of the remaining four wellsites, 0.08 percent, 0.21 percent and 0.11 percent of the hard bottom substrate within the anchor was impacted for wellsites studies that were drilled after 1981, whereas, 0.46 percent was impacted for the wellsite drilled in 1968.

Anchor scope was defined as the area around the wellsite inclusive of circumference made by the eight anchors. The width of anchor scars ranged from 13.6 to 25.3 feet; the length from 221 to 1,650 feet. Depth of the scars was less than one meter. Conservatively, 10 percent of the exploration wells drilled in the California OCS were drilled on leases which contain potential hard substrate. Assuming that the study above is representative, it can be used to estimate area contacted by anchors. If one assumes that mitigation is totally successful half of the time as the study indicated, one would assume that 16 wells might have contacted hard bottom substrate. Based on impact areas from the study, the total area which might have been impacted from exploratory anchoring is, therefore, 0.06 mi^2, or less 0.7 percent of a lease in acreage for all wells drilled in the OCS to date.

Anchoring Impacts from Development Activities. Potential impacts from anchoring on hard bottom communities due to development activities can be determined by examining the Point Arguello Development project. The three Point Arguello platforms and pipelines are the development activities placed nearest hard substrate on the California OCS. Numerous scattered hard bottom features are found throughout these leases. Pipelines were carefully woven through an identified 200 foot-wide permitted pipeline corridor, but the diameter of the lines being laid required the lay barge to make three passes through the area to lay the lines, causing numerous anchoring events in areas of potential hard bottom.

Mitigation measures placed on their development as described in the Record of Decision for the EIS required Chevron and Texaco to avoid all rocky identified hard substrate features with their anchors and wellsite placements. They were also required to conduct post-installation surveys of any anchors contacting hard substrate. There were 1,085 anchoring events along the pipeline route to shore from Platform Hermosa. Of these events, six anchor scars were identified in post side-scan sonar mosaic data to have contacted hard substrate (Dunaway and Schroeder, 1989, as cited in MMS, 2001). It is estimated that roughly 2,000 anchoring events occurred during the installation of the three platforms and three inter-platform pipelines. In this area, 12 scars were observed to impact hard bottom habitat. Scar widths varied from 3.5 to 12 feet. Based on the post-installation survey (Hardin et al, 1993, as cited in MMS, 2001), less than 1 percent of the anchoring events contacted hard bottom features, causing impacts to habitat, due to the operator's avoidance practices. This is a very small amount of total potential acreage impacted. It is suspected based on the survey data that the anchors that contacted hard bottom did so because of navigational error in the geohazards data.

Anchors placed in soft bottom habitat do not impact the biota in the same way since the population is transient and recovers quickly. Anchor scars in soft bottom in relatively shallower water, or in coarser substrate, tend to be temporary and last six months to a year. Anchor scars on finer sediments have more longevity, but the species recolonize and return to pre-activity levels in a short amount of time. Residual impacts on the biota from anchoring activities in soft bottom habitat are unlikely.

Drilling Mud and Cutting Discharge Impacts. The other primary source of impact from OCS operation on benthic communities is from drilling mud and cutting discharges. Cuttings fall close to the wellsite or platform location, even in deep water, due to the weight of the material. In soft bottom habitat, cuttings discharges, particularly under platforms due to the mixing mixed with shell debris, could irreversibly change the community type from a finer grain to coarser grain associated community. It is likely that a different group of invertebrates than that inhabiting the original substrate would reestablish the cuttings pile following the drilling of a well or siting of a platform. This local impact could occur at each wellsite, with measurable changes occurring under existing platforms where sufficient volume of cuttings and shells has had the opportunity to accumulate. Additional information about the biological composition of shell mounds is being currently gathered in two MMS studies. A study of the biological, physical and chemical characteristics of shell mounds under four California state lease platforms (water depths 95 to

150 feet) was completed in 2001 (de Wit, 2001a). This study summarized previously collected data on the biota at these locations and augmented historical data with video of the habitat and biota and vibrocores at several locations within the shell mound material. That study found the shell mounds consisted of three relatively distinct “layers”: an upper layer of shell hash; an intermediate layer of drill cuttings and “muds;” and the underlying native sediment. Chemical and bioassay testing of the shell mound material suggested elevated concentrations of some heavy metals and hydrocarbons were present in the upper two layers and the sediments within one of the shell mounds resulted in moderate toxicity; the LD_{50} for a mysid shrimp was 48 percent sediment mixture (de Wit, 2001a).

The macroepibiota and fish communities associated with the shell mounds found prior to the removal of the platforms was more diverse and number of individuals was substantially higher than those observed at the same locations one to two years after the platforms had been removed. The surrounding sedimentary habitat supported a similar macroepibiota community prior to and following the removal of the platforms, but differed from the shell mound epibiota (de Wit, 2001a).

Cuttings could smother hard bottom species if hard bottom habitat was located close to the wellsite or platform. Since MMS has relocated wellsites away from features since 1981, wellsites after that time would not be expected to have identified impacts to hard substrate resources from cuttings discharges. It is possible that wells were drilled close enough to rocky substrate prior to 1981 to have caused impacts to these communities. They would have necessarily been in the Santa Barbara Channel since the first Santa Maria Basin lease sale was in 1981. Given the reasoning above for anchoring events, one might conservatively presume that 16 exploration wells were drilled near hard bottom features prior to 1981 and could have impacted them.

The Point Arguello platforms are located near hard bottom features and for this reason, discharges from these platforms were extensively monitored over a ten-year period as a part of the MMS California Monitoring Program (CaMP). This study provides an excellent review of the cumulative impacts over hard bottom areas since over 40 wells were drilled in a four-mile area adjacent to numerous natural reef features. The cumulative amount of muds measured would be more than the mud impacts experienced even during the most intensive exploratory drilling phases. Cumulative impacts from the drilling of Point Arguello wells resulted in no significant impacts that could be linked to the discharges. Refer to the Impacts to Seafloor Resources Section for additional discussion. Given the above information, it is expected that impacts from drilling past exploratory and development wells have been low to seafloor resources. Impacts included temporary increases in turbidity, alteration of habitat in localized areas, and crushing and smothering of resources in localized areas.

4.7.3 Kelp Beds

Kelp beds are an important and distinct community found nearshore in shallow waters. Kelp beds are important because they provide vertical water column habitat for many types of adult and juvenile fish, marine mammals such as the sea otter, and other marine animals. Kelp beds are located in the photic zone, that is, where the sunlight penetrates the water. Other subtidal resources on soft and hard bottom habitat are covered in the seafloor resources section.

The California Department of Fish and Game regulates activities in kelp beds, including the kelp harvesting, commercial fishing and boating activities that potentially impact these resources, since kelp beds are found in State waters. The National Park Service monitors, protects and restores kelp bed resources found within the Channel Islands National Park. The National Park Service works with NOAA to establish reserves within the park and sanctuary to encourage healthy kelp bed growth.

Regional Setting

Large kelp beds have been identified in waters up to 1 mile offshore in the area from Point Conception and Gaviota (ADL, 1984, as cited in MMS, 2001) and at San Miguel, Santa Rosa and Anacapa Islands. Historically, the kelp bed on the south side of San Miguel has extended out to a mile from the island (pers. comm., Lerma, 2001, as cited in MMS, 2001). Kelp, (primarily *Macrocystis pyrifera*) is more likely to survive in protected nearshore areas. On the mainland this would include areas such as the lee of the points north of Point Conception, and in the coves or bays south of the Point. Kelp usually attaches to rock outcrops or cobbles to stay in place, but in the Santa Barbara Channel, waters are so calm that kelp plants can become established in sandy subtidal regions, by attaching themselves to worm tubes (Chambers, 1991, as cited in MMS, 2001). Many species normally associated with rocky substrate are found in this habitat due to the unusual presence of kelp.

The size of the kelp beds is highly variable and dependent on environmental and anthropogenic factors. Kelp is very sensitive to changes in water temperature, dying back substantially during El Nino warm water events and reestablishing during cooler water periods. As natural predators, the red and purple sea urchin have a dramatic effect on determining the health of a given kelp forest. In many areas, purple urchins have become overabundant forcing out reestablishment of kelp. In the National Park Service's monitoring in 1999 they found 11 of their 16 sites were dominated by echinoderms. The purple urchin was dominant at all but two sites; sea cucumbers and the brittle star were also dominant at two sites occupied by purple urchins (Kelp Forest Inquirer, 2000, as cited in MMS, 2001). D. Kushner (pers. comm., 2004) indicated that December 2004 diving and ROV surveys found that urchins and brittle stars offshore Santa Barbara and Anacapa Islands had reduced the surface and subsurface kelp beds off of those two islands compared to the kelp beds offshore of Santa Cruz, Santa Rosa, San Nicolas, and San Miguel Islands.

Areas dominated by urchins are called "urchin barrens" due to the imbalance between urchins and kelp and other algae. During warm water years, both kelp and urchins die off, but the urchins fare better than the kelp. Urchins will forage large areas, move into the intertidal, and will forage a wide range of species if kelp is not available. Because urchins can survive the warm water periods, when the cooler water returns in urchin barrens, kelp cannot reestablish, even though water temperature is optimal for kelp.

Santa Barbara Island and non-reserve parts of Anacapa Island are urchin barrens and have not come back despite a recent influx of cool water. Ironically, commercial urchin fishing, since they specifically fish for red urchins, exacerbate the problem by reducing the competition between red and purple urchins and eliminating the natural urchin predators such as sheepshead. This is evidenced by the monitoring of kelp beds within and outside no-take reserves at Anacapa Island and that fact that the beds within the reserve retain healthy kelp communities (pers. comm., D. Lerma, 2001; J. Engle, 2001, as cited in MMS, 2001).

In response to cooler waters from 1998 through 2001, kelp is making a comeback on the southern and western shores of San Miguel Island, on the south side of Santa Rosa Island (pers. comm., D. Lerma, NPS 2001, as cited in MMS, 2001) and at several locations along the mainland. There is generally a lag effect between introduction of cooler waters bringing kelp recruits, and the increase in urchins, which also prefer cooler waters. While the kelp has recruited well to the south side of Santa Rosa in the past couple of years, increases in urchins were observed this year indicating the sites are in the process of becoming urchin barrens (pers. comm., D. Lerma, 2001, as cited in MMS, 2001). D. Kushner (pers. comm., 2004) suggested that based on his observations around the Northern Channel Islands throughout 2004, kelp recruitment had been good.

Impacts of Past Offshore OCS Oil and Gas Activities

The primary source of impact on kelp resources from OCS activities is from development construction activities in nearshore waters. The pipelines for the Santa Ynez Unit in the eastern Santa Barbara Channel and the Gaviota outfall line are examples of activities that affected kelp resources in nearshore waters. Impacts to the kelp bed were localized and temporary since kelp was able to reestablish following construction. Impacts were low.

4.7.4 Fish Resources

This section addresses general fish habitat and species; threatened and endangered fish are covered in Section 4.7.7.1.

Regional Setting

Marine fishes in the major habitats of the Santa Barbara Channel and Santa Maria Basin have been described in detail in previous studies and environmental document (e.g., ADL, 1984; MBC, 1986; CalCOFI, 1996; Dailey et al., 1993; Love et al., 1999; Horn and Allen, 1978; Miller and Lea, 1972, as cited in MMS, 2001; Love et al., 2003). At least 554 species of California marine fishes inhabit or visit California waters. The high species richness is probably due to the complex topography, convergence of several water masses, and changeable environmental conditions (Dailey et al., 1993, as cited in MMS, 2001). Point Conception is widely recognized as a faunal boundary with mostly cold-water species found to the north and warm-water species found to the south, though extensive migrations do occur as a result of fluctuating environmental conditions. In fact, warm and cool-water events in the Southern California Bight (SCB) affect fish recruitment and can alter the composition of some fish assemblages for years (Love et al., 1985, 1986, as cited in MMS, 2001). D. Kushner, (pers. comm., 2004) found relatively large numbers of small rockfish within the kelp bed survey areas off the Northern Channel Islands during his 2004 diver-biologist and ROV surveys.

The SCB is located in the transition area between Pacific subarctic, Pacific equatorial, and North Pacific central water masses, and the fish fauna contains representatives from each of these sources. Of the 554 species of California marine fishes, 481 species occur in the SCB (Horn, 1974, as cited in MMS, 2001). Spawning in marine fish species is variable, but can be generalized. The reproductive cycle of species with northern affinities, such as Pacific hake and olive rockfish, in the SCB generally peaks from winter to spring. The reproductive cycle of species with southern affinities like kelp bass and queenfish, will generally peak from spring to summer. Some fish species like splitnose rockfish and northern anchovy spawn throughout the year. Spawning periods can also be governed by lunar and diel cycles. Grunion, for example, spawn on the first few nights following each new and full moon of the spring and summer, and queenfish spawn from late afternoon to evening, especially during the first quarter of the moon.

Migrations are common among marine fishes and are usually related to feeding and reproduction. Dover sole migrate into deep water in winter to spawn and into shallow water in the summer to feed. Scorpionfish migrate offshore to spawning grounds from May through August. In the fall, Pacific hake migrate from feeding grounds off the Pacific Northwest to winter spawning grounds off southern California and Baja California. Other species, such as kelp bass and garibaldi move little during their lives. Thus life histories of the fishes of the SCB are very diverse.

Offshore Fish Regions

The fish offshore California occur in two main regions; the pelagic (open ocean) zone, and the benthic (bottom of the ocean) zone. Although these designations are useful, the regions overlap, and there are several zones within each of these regions. For example, the pelagic region is made up of three specific zones; epipelagic (from surface to depths of 655 feet), mesopelagic (depths between approximately 655 to 3,280 feet) and bathypelagic (depths greater than 3,280 feet). And the benthic zone includes soft-bottom habitat, hard-bottom habitat, low and high relief features all of which harbor specific species of fish.

Pelagic Fishes. The pelagic zone is the largest habitat in the SCB and the home of 40 percent of the species and 50 percent of the families of fish. The pelagic zone includes the water column covering the shelf and the upper 495 to 655 feet of water overlying the slope and deep basins. The fish from this zone represent a mix of permanent residents and periodic visitors. The important pelagic species of southern and central California include: northern anchovy, albacore tuna, jack mackerel, Pacific mackerel, Pacific bonito, Pacific sardines, Pacific whiting, Pacific herring, salmon, steelhead trout, swordfish, and thresher shark. The epipelagic zone is euphotic, and temperatures fluctuate diurnally and seasonally. Northern anchovy, Pacific sardine, jack mackerel, Pacific mackerel, and Pacific hake are residents of the epipelagic zone of the California Current system. From spring through fall, the epipelagic zone of the SCB is inhabited by Pacific saury, bluefin tuna, yellowtail, and many large, solitary predators that emigrate from tropical and oceanic areas (Dailey, 1993, as cited in MMS, 2001). Most of these species are widely distributed in the SCB, and it is unlikely that oil and gas operations will harm enough individuals, their prey, or habitat to significantly decrease population size. However, northern anchovy are of concern since their restricted distributions during parts of their life cycle make them vulnerable to impacts from oil and gas activities.

Northern anchovy is the most abundant epipelagic fish of the SCB. The central population of northern anchovy occurs in the SCB. Much of the population occurs inshore in the northern part of the bight during the fall. The fish move offshore and southeast with the onset of spawning in late winter. The northern and offshore limits of spawning are determined by cold, upwelled water advected from north of Point Conception into the SCB. The southern limit of spawning is determined by low phytoplankton pigment levels (Dailey, 1993, as cited in MMS, 2001). The largest schools occur within 25 miles of the coast over deep water, often over escarpments and submarine canyons. During daylight hours of summer and fall months, large compact schools may be found at depths of 360 to 600 feet. The schools rise to the surface at night and disperse. As the night passes, they tend to school more tightly until dawn, when they return to deeper waters. In spring, many small schools are found at the surface during the day while the fish tend to scatter over a wide area at night. From April to June, extremely large dense surface schools, containing up to several tons, form during daylight hours and disperse or move into deeper water at night. Anchovies reach reproductive maturity in 1 to 2 years and generally live 3 to 4 years. Anchovies are filter feeders and feed on various kinds of plankton.

Another species that is abundant in the epipelagic zone and is vulnerable to impacts is the market squid. Squid are not fish but are included in this section since they are managed under the Coastal Pelagics Fishery Management Plan (FMP) of the Pacific Fishery Management Council. Market squid ranges from British Columbia to central Baja California. Although during most of their life cycle squid are widely distributed offshore, squid congregate inshore in very large numbers during spawning. Spawning occurs in about January or February in southern California and about April in the Monterey Bay area. Monterey Bay and the northern Channel Islands are the most important spawning areas, but large spawning aggregations are known to occur along the entire coast from San Diego to Monterey. Squid live one to two years and die after one spawning season.

Less is known about the fish in the mesopelagic and bathypelagic zones. Typical mesopelagic species of the area include blacksmelt, northern lampfish, viperfish, and the lanternfish (Cross and Allen, 1993, as cited in MMS, 2001). Bathypelagic species of the area include dragonfish, hatchetfish, and bristlemouth (Cross and Allen, 1993, as cited in MMS, 2001).

Demersal Fishes. The benthic zone can be broken down into four habitat types: offshore, rocky shallow, sandy shallow and vertical relief. The offshore benthic environment is beyond the major direct impacts of tidal, wave, beach, and shoreline processes. It is usually sandy or muddy, but rocky outcroppings do occur. The species common to this zone are: flatfishes, lingcod, some rockfishes, cods, and sablefish.

The shallow, rocky bottom benthic environment includes tidepools, and subsurface rocky outcrops. Significant vertical relief is common. Rockfish, lingcod, sculpins, blennies, and eels are all typical residents. The shallow, sandy bottom benthic environment is affected by wave, tide, and shoreline processes and is constantly moving and changing. Common residents include skates, rays, smelts, surfperches, and flatfish. Vertical relief benthic areas, including kelp beds and manmade structures are reef-like with gradients oriented more vertically than horizontally. The habitat may reach from the sea floor to the sea surface. Fishes of both pelagic and benthic habitats are associated with these areas. Common species include kelp bass, senorita, blacksmith, rockfishes, and surfperches. Estuaries and wetlands, natural and artificial hardbottom features, kelp beds and harbors represent important habitat for demersal species.

Demersal fish distributions are generally based on depth or depth-related factors (Bence et al., 1992, Wakefield, 1992; Caillet et al., 1992, as cited in MMS, 2001). Depth distributions for common demersal fishes of the bight are summarized in Table 4.7-5.

Table 4.7-5. Depth Distribution of Demersal Fish Common to Central California.

Water Depth			
50 – 200m	**200 – 500m**	**500 – 1200m**	**1200 – 3200m**
Sand Dabs *Citharichthys sordidus*	Sablefish *Anoplopoma fimbria*	Thornyheads *Sebastolobus* spp.	Rattail *Coryphaenoides filifer*
English sole *Pleuronectes vetulus*	Pacific hake *Merluccius productus*	Pacific hake *Merluccius productus*	Thornyheads *Sebastolobus*spp.
Rex sole *Errex zachirus*	Slickhead *Alepocephalus tenebrosus*	Slickhead *Alepocephalus tenebrosus*	Finescale coddling *Antimora microlepis*
Rockfish *Sebastes* spp.	Eelpouts *Lycenchelys jordani*	Rattail *Coryphaenoides filifer*	Eelpouts *Lycenchelys jordani*
Pink surfperch *Zalembius rosaceus*	Rockfish *Sebastes* spp.		
Plainfin midshipman *Porichthys notatus*	Thornyheads *Sebastolobus*spp.		
White croaker *Genyonemus lineatus*			

As with the epipelagic fishes, the demersal species of concern are those with restricted distributions during a significant part of their life cycle. In the Santa Barbara Channel and Santa Maria Basin, demersal fishes are generally widely distributed and thus it is unlikely that oil and gas operations will harm enough individuals, their prey, or habitat to significantly decrease its population size. Recent studies, however, have reported significant declines with certain rockfish species (Love et al., 1998; Ralston, 1998, as cited in MMS, 2001). While specific species, areas, and reasons for the decline have been debated, there is little doubt that rockfish biomass and commercial harvests have decreased since the 1960s (Bloeser, 1999, as cited in MMS, 2001).

Eight species of west coast groundfish: widow rockfish, canary rockfish, yelloweye rockfish, darkblotched rockfish, bocaccio, Pacific ocean perch, lingcod, and cowcod are considered "overfished" by NOAA Fisheries (PFMC, 2004). As part of planning the recovery of several depleted rockfish species, NOAA Fisheries has instituted Rockfish Conservation Areas along the west coast of the United States (NOAA Fisheries, 2004a). In April 2004, NMFS reported the results of a status review of several species that had been previously listed as "candidate" for listing under the ESA (NOAA Fisheries, 2004d). The bocaccio was removed from the candidate list, but is considered a Species of Concern (Fed. Reg., Vol. 69 (73) pp. 19975-19979). In that publication, the NMFS also announced the removal of the brown, copper, and quillback rockfish from the candidate list. The cowcod was added to the species of concern list, however the NMFS has not yet completed a status review for that species. In addition, in October 2004 NOAA Fisheries has issued the Final Rule for the Groundfish Fisheries Management Plan that includes recovery plans for four depleted rockfish species: canary, yelloweye, bocaccio, and cowcod (NOAA Fisheries, 2004b).

Essential Fish Habitat

Under Section 305 (b)(2) of the Magnuson Fishery Conservation and Management Act (16 U.S.C. 1801 et seq) as amended by the Sustainable Fisheries Act on October 11, 1996, Federal agencies are required to consult with the Secretary of Commerce on any actions that may adversely affect Essential Fish Habitat (EFH). The Department of Commerce published an interim final rule (50 CFR Part 600) in the Federal Register (December 19, 1997, Volume 62, Number 244) that detailed the procedures under which Federal agencies would fulfill their consultation requirements. As set forth in the regulations, EFH Assessments must include: (1) a description of the proposed action; (2) an analysis of the effects, including cumulative effects, of the action on EFH, the managed species, and associated species by life history stage; (3) the Federal agency's views regarding the effects of the action on EFH; and (4) proposed mitigation if applicable. Section 600.920 (h) describes the consultation process the Minerals Management Service (MMS) is following.

The Pacific Fishery Management Council (PFMC) manages over 100 species of fish under three Fishery Management Plans: (1) Coastal Pelagics Fishery Management Plan; (2) Pacific Salmon Fishery Management Plan; (3) Pacific Groundfish Fishery Management Plan, and (4) Highly Migratory Species (Table 4.7-6). Nine of the species listed in Table 4.7-6 have zoogeographic ranges that do not include the project region. The marine environment offshore Point Conception is especially rich in fish species because this area constitutes a transition zone between southern warm, temperate, subtropical waters and northern cold-temperate waters. The area also provides a wide variety of habitats created by many banks, ridges, and deep-sea basins. Nearly all of the species managed by the council can be found within the project area during their life cycle. Therefore, this analysis will be broad in scope and will discuss the effects of the identified impacting sources on a wide range of fish prey and forage, fish habitats, and fish species. The EFH regulations also direct the Councils to consider a second, more limited designation for each species in addition to Essential Fish Habitat. Habitat Areas of Particular Concern (HAPC) are described in the regulations as subsets of EFH which are rare, particularly susceptible to human-induced degradation, especially ecologically important, or located in an environmentally stressed area.

Designated HAPC are not afforded any additional regulatory protection under the Act; however, federal projects with potential adverse impacts to HAPCs will be more carefully scrutinized during the consultation process. Currently, only Amendment 14 to the Pacific Coast Salmon Plan has addressed HAPC for chinook, coho, and pink salmon. It is generally accepted that salmon spawn and rear primarily in stream reaches with a slope less than 4-5 percent (Lunetta et al. 1997, as cited in MMS, 2001), while they migrate through much steeper stream reaches. Furthermore, recent research has indicated that fall-spawning anadromous salmonids are found primarily in plane bed, pool-riffle, and forced-pool riffle stream channels, which are channel types less than a four percent slope (Montgomery and Buffington 1997, Montgomery et al., In prep., as cited in MMS, 2001). Stream reaches greater than 4 percent slope are not frequently utilized by chinook, coho, or pink salmon for spawning and rearing, because of their high bed load transport rate, deep scour, and coarse substrate (Montgomery et al., In prep., as cited in MMS, 2001). Therefore, the protection and restoration of salmon habitat should focus on pool-riffle, plane bed, and forced-pool riffle channels. Furthermore, any activity adjacent to or upstream of activity that could influence the quality of these important reaches or channels should be evaluated. Although kelp was considered a possible HAPC for groundfish, none have, to date, been identified (NOAA Fisheries, 2004c). NMFS is also assessing the potential impacts of designating specific areas [the upper 30 percent of those areas where the habitat suitability probability (HSP) is greater than zero] around existing offshore oil and gas platforms as HAPC. That assessment includes the prohibition of all bottom-contact commercial fishing activities, including trawling, within the HAPC area.

Table 4.7-6. Species Managed by the Pacific Fishery Management Council.

Coastal Pelagics Fishery Management Plan		
Northern anchovy Pacific sardine	Pacific mackerel Jack mackerel	Market squid
Pacific Salmon Fishery Management Plan		
Chinook Salmon	Coho Salmon	Pink Salmon
Pacific Groundfish Fishery Management Plan		
Butter sole Curlfin sole Dover sole English sole Flathead sole* Pacific sanddab Petrale sole Rex sole Rock sole Sand sole Starry flounder Arrowtooth flounder Ratfish Finescale codling Pacific Rattail Leopard shark Soupfin shark Spiny dogfish Big skate California skate Longnose skate Pacific ocean perch shortbelly rockfish Widow rockfish Aurora rockfish Bank rockfish Black rockfish	Black-and-yellow rockfish Blackgill rockfish Blue rockfish Bocaccio Bronzespotted rockfish Brown rockfish Calico rockfish California scorpionfish Canary rockfish Chilipepper rockfish China rockfish Copper rockfish* (=Whitebelly rockfish that is found from Baja California to Crescent City) Cowcod rockfish Darkblotched rockfish Dusky rockfish* Flag rockfish Gopher rockfish Grass rockfish Green blotched rockfish Greenspotted rockfish Greenstriped rockfish Harlequin rockfish* Honeycomb rockfish Kelp rockfish Mexican rockfish Olive rockfish Pink rockfish Quillback rockfish*	Redbanded rockfish Redstriped rockfish Rosethorn rockfish Rosy rockfish Rougheye rockfish* Sharpchin rockfish Shortraker rockfish* Silvergrey rockfish Speckled rockfish Splitnose rockfish Squarespot rockfish Starry rockfish Stripetail rockfish Tiger rockfish* Treefish Vermilion rockfish Yelloweye rockfish Yellowmouth rockfish* Yellowtail rockfish Longspine thornyhead Shortspine thornyhead Cabezon Kelp greenling Lingcod Pacific cod Pacific whiting Sablefish
Highly Migratory Species Fishery Management Plan		
North Pacific albacore Yellowfin tuna Bigeye tuna Skipjack tuna Northern bluefin tuna Dorado (also known as dolphinfish and mahi-mahi)	Common thresher shark Pelagic thresher shark Bigeye thresher shark Shortfin mako shark Blue shark	Striped marlin Pacific swordfish
* Species not found within the Project Area (Miller & Lea, 1972, as cited in MMS, 2001)		

Other vulnerable habitats that are in need of protection and restoration are off-channel rearing areas (e.g., wetlands, oxbows, side channels, sloughs) and estuarine and other near-shore marine areas. Submarine canyons and other regions of pronounced upwelling are also thought to be particularly important during El Niño events (N. Bingham, Pacific Coast Federation of Fishermen's Associations, pers. comm., as cited in MMS, 2001) and may need additional consideration for protection. Because pink salmon enter freshwater primarily to spawn and juveniles spend little to no time in freshwater, adequate spawning habitat is critical to sustaining productive pink salmon populations. Therefore, it is important that pink salmon spawning areas and estuarine rearing areas receive adequate protection.

Impacts of Past and Present OCS Activities

OCS oil and gas activities began off southern California in the late 1960s (Galloway, 1997, as cited in MMS, 2001). Section 4.1 provides information on current offshore infrastructure and levels and types of activities. Several reviews have been made of the possible cumulative impacts of these activities on biological resources in the region (Van Horn et al., 1988; Bornholdt and Lear, 1995, 1997; MMS, 1996, as cited in MMS, 2001). Furthermore, several studies have examined the effects of OCS activities on fish resources of the study area (Imamura et al., 1993, as cited in MMS, 2001; Love et al., 1999, as cited in MMS, 2001; Love *et al.*, 2003).

Seismic Surveys. Since 1963, more than 400 geological and geophysical surveys, including both 2-D and 3-D seismic surveys, have been conducted in the Santa Barbara Channel and Santa Maria Basin, and many others have occurred in state waters. Most of these surveys occurred during the 1970s and 1980s; the most recent seismic survey offshore southern California was the Exxon 3-D seismic survey conducted in the western Santa Barbara Channel in 1995 (MMS, 1995, as cited in MMS, 2001). Several studies have examined the effects of seismic energy on various life stages of fish (e.g., Dalen and Knutsen, 1986; Falk and Lawrence, 1973; Greene, 1985; Holliday, et al., 1987; Kostyuchenko, 1973; Pearson, et al., 1987; Turnpenny and Nedwell, 1994, all as cited in MMS, 2001).

The studies indicate that direct damage to adult fishes is mainly to the swim bladder and at fairly close ranges to the air gun. Any direct mortality to adults, eggs, and larvae would only have occurred very close to the air gun arrays — within 5 to 20 feet of the source. Some short-term behavioral changes may have occurred, but would not have caused a significant impact to the fish resources of the survey area. Pelagic fishes, such as anchovies, mackerel, sharks, and barracuda, generally swim away from or would avoid the area during the seismic survey. Demersal fishes, such as rockfishes, flatfishes, and ling cod would either flatten to the bottom or leave the area during the survey. These behavioral changes would have been short-term and the fishes would have returned to the area once the survey was completed.

Oil Spills. One major OCS-related oil spill occurred in the study area in the Santa Barbara Channel in 1969. No effects on fish populations were noted by the California Department of Fish and Game (CDFG). A temporary reduction in fish catch after February 1969 was due more to the difficulties associated with fishing in oiled waters than to oil-related fish kills (Straughan, 1971, as cited in MMS, 2001). Ebeling et al. (1971, as cited in MMS, 2001) also found no noticeable effects on fish in the SBC after the spill. The NAS (1985, as cited in MMS, 2001) concluded that "a direct impact on fishery stocks has not been observed." Since 1971, when formal tracking of all OCS spills was initiated, 841 OCS-related oil spills have occurred in the Pacific Region (see Section 5.3). However, almost all of these (99 percent) have been very small (less than 50 bbl), although five ranged in size from 50 to 163 bbl. No impacts to marine fish resources have been reported from these spills.

Effluent Discharges. Effluent discharges are regulated by EPA under the General NPDES permit. The permitted discharges are based on water quality criteria determined outside the 328-foot (100-meter) radius mixing zone beyond each platform's discharge pipe. However, the discharge pipes are located directly beneath the platforms where up to 39 species federally managed in the Pacific Groundfish Fishery Management Plan have been documented. Several of the species are in decline due to various factors. Biotic surveys of California platforms indicate that many different species of fish and invertebrates can be found on the current platform structures (see for example Love *et al.,* 2003). MMS has funded research to determine whether platforms concentrate existing stocks, or provide new habitat, which may increase the numbers within a species. However, there is not any sound scientific evidence to support the idea that platforms enhance or reduce regional stocks of marine fish species. The primary reason for this conclusion is that the 27 platforms represent a tiny fraction of the available hard substrate in the SCB. Thus, for the majority of species any regional effects from lethal and sub-lethal impacts due to effluent discharges are likely to be very small and not even detectable empirically. However, because species differ greatly in life history, population dynamics, and geographic distribution, it is possible that effluent discharges could have a more substantial effect on some key species. These species of special concern could include several rockfish species whose low abundance has triggered severe restrictions on harvest and stock rebuilding plans. Bocaccio, for example, is estimated to have declined to about 1 percent of virgin biomass. Love *et al*. (2000, as cited in MMS, 2001) reported that Platform Gail had a density of adult Bocaccio an order of magnitude greater than the average density found on 61 natural reefs in appropriate depths. A more recent study (Love, et al., 2003) between 1995 and 2001, the fish populations associated with 18 oil and gas platforms and with over 80 shallow and deep-water natural rock reefs offshore southern and central California were assessed. Rockfish were found to be most abundant group of fish associated with the platform habitats (vertical and horizontal structures and shell mounds) and while generally higher fish densities were found at the platforms, species richness was found to be greater at the natural outcrops (Love, *et al*., 2003). That report also suggests that ". . . some platforms may be important to regional fish production."

4.7.5 Marine and Coastal Birds

The marine and coastal bird populations of the eastern Pacific Ocean off southern California are both diverse and complex, being composed of as many as 195 species (Baird, 1993, as cited in MMS, 2001). Most of these birds are afforded protection under the Migratory Bird Treaty Act of 1918. The Migratory Bird Treaty Act, which is enforced by the U.S. Fish and Wildlife Service, prohibits the take, possession, import, export, transport, selling, purchase, barter, or offering for sale, purchase or barter, any migratory bird, their eggs, parts, and nests, except as authorized under a valid permit (50 CFR 21.11). Threatened and endangered birds, which are protected under the Endangered Species Act, are discussed in Section 4.7.7.3.

The marine and coastal birds of the study area, which extends from the Point Sur in the north to the Palos Verde Peninsula in the south, has been described in detail in previous studies and environmental document (e.g., Sowls et al., 1980; Briggs et al., 1981; 1983; 1987; Hunt et al., 1981; A. D. Little, 1984; 1985; URS, 1986; Carter et al., 1992; Baird, 1993, as cited in MMS, 2001). Information on the at-sea distribution and abundance of seabirds is based largely on MMS-funded ship and aerial surveys conducted by researchers at the Center for Marine Studies, University of California, Santa Cruz. Surveys of seabirds in the Southern California Bight portion of the project area were conducted from 1975 to 1978 (Briggs et al., 1981, as cited in MMS, 2001), while surveys of the northern portion (north of Point Conception) of the project area were conducted from 1980 to 1983 (Briggs et al., 1983, as cited in MMS, 2001). Both of these studies are summarized in Briggs et al. (1987, as cited in MMS, 2001). The data from these studies have been computerized, standardized, and compiled in the Marine Mammal and Seabird Computer Database Analysis System (ECI, 1992, as cited in MMS, 2001). This computer database was used extensively in the following discussion of seabird distribution and abundance in the project area. Information on nesting seabirds is based on surveys conducted for MMS by the U.S. Fish and Wildlife Service. The first of these was conducted from 1979 to 1980 (Sowls et al., 1980, as cited in MMS, 2001), while the second and most recent was conducted from 1989 to 1991 (Carter et al., 1992, as cited in MMS, 2001). Information on shorebirds is from Garrett and Dunn (1981), Baird (1993), Lehman (1994), as cited in MMS, 2001, and McCrary and Pierson (2002), which was in preparation at the time of MMS, 2001.

Birds Sensitive to OCS Activities

Of the many different types of birds that occur in the project area, two groups are generally the most sensitive to the potential impacts of OCS development: seabirds (e.g., loons, grebes, shearwaters, sea ducks, and gulls) and shorebirds (e.g., sandpipers and plovers). Other types of birds, such as waterfowl and marshbirds (herons and egrets) may be vulnerable when they occupy coastal wetlands and estuaries. While some of these breed in the area, others may spend their non-breeding or "wintering" period there or may simply pass through during migration.

SEABIRDS

Seabirds, as compared to shorebirds, are probably the most sensitive to OCS activities and accidental oil spills, especially those that breed in the area. Seabirds can be divided into four major groups based on habitat use, behavior, and/or phylogenetic relationships: nearshore, pelagic, breeding species, and seasonal gulls. Each type is described below.

Nearshore Species. Nearshore species are those that generally occupy relatively shallow waters close to shore. While in central and southern California, these species spend almost their entire time on the water surface and are particularly vulnerable to oil spills. In the project area, the most common nearshore species are: loons (redthroated -*Gavia stellata*, common -*Gavia immer*, and Pacific -*Gavia pacifica*), western grebe (*Aechmophorus occidentalis*), and surf scoter (*Melanitta perspicillata*). In central and southern California, nearshore species occur in highest numbers during the winter months; relatively few remain during the summer. Based on information in the Marine Mammal and Seabird Computer Database Analysis System (ECI, 1992, as cited in MMS, 2001), the density of nearshore species in the project area averages about 5 birds/km^2 (1.9 birds/mile^2) (range = 0-240 birds/km^2; 0-92.7/mile^2). However, about 80 percent of these birds are usually found within 8 km (5 miles) of the mainland shore, and average densities can be much higher in this area. Although at least some of these birds are found along the entire coastline of both the mainland and Channel Islands, important concentrations occur off the City of Ventura (Ventura County) and between Point Sal and Purisima Point in northern Santa Barbara County in the general vicinity of the Point Sal and Purisima Point Units. Somewhat lower concentrations of nearshore species also occur in the Channel Islands National Marine Sanctuary, especially along the northern side of the Channel Islands.

Pelagic Species. Pelagic species are those that generally occupy deeper waters than nearshore species and may be found far from shore. These species spend much of their time on the water surface or diving into the water for food, and are very vulnerable to oil spills. In the project area, the most common offshore species are: shearwaters (sooty -*Puffinus griseus,* black-vented -*Puffinus opisthomelas*, and pink-footed -*Puffinus creatopus*), northern fulmar (*Fulmarus glacialis*), phalaropes (red -*Phalaropus fulicaria* and red-necked -*Phaloropus lobatus*), jaegers (pomarine -*Stercorarius pomarinus* and parasitic -*Stercorarius parasiticus*), and common murres (*Uria aalge*). Although the period of highest density varies from species to species, at least some individuals are present in the project area at any time. Based on information in the Marine Mammal and Seabird Computer Database Analysis System (ECI, 1992, as cited in MMS, 2001), the density of pelagic species in the project area averages about 21 birds/km^2 (8.1 birds/mile^2) (range = 0-2,232 birds/km^2; 0-861.8/mile^2). Although these species are generally widespread, important concentrations within the project area occur in the eastern Santa Barbara Channel; in the Channel Islands National Marine Sanctuary, especially the area between Santa Cruz and Santa Rosa Island; and along the coast, north of Point Arguello. This latter area of concentration includes the waters of the Point Sal and Purisima Point Units.

Breeding Species. Breeding species are those that nest on the Channel Islands, and along the mainland from Point Conception north; few, if any, seabirds nest on the mainland south of Point Conception (Carter et al., 1992, as cited in MMS, 2001). Most of the seabird nests in southern California occur within the

Channel Islands National Park, which affords a high level of protection to breeding seabirds. In the project area, the most common breeding species are: storm-petrels (leach's -*Oceanodroma leucorhoa,* ashy -*Oceanodroma homochroa*, and black -*Oceanodroma melania*), California brown pelican (*Pelecanus occidentalis*), cormorants (Brandt's -*Phalocrocorax penicillatus*, double-crested -*Phalocrocorax auritu*s, and pelagic -*Phalocrocorax pelagicus*), western gull (*Larus occidentalis*), and alcids (pigeon guillemot -*Cepphus columba*, Cassin's -*Ptychoramphus aleuticus* and rhinoceros auklet -*Cerorhinca monocerata*) (see Table 4.7-7 for a complete list of all breeding seabirds). Location, number of nests, and at-sea densities vary greatly from species to species (Table 4.7-7). Although breeding phenology also varies from species to species, one or more species is generally conducting some aspect of reproduction (nest building, egg laying, chick rearing, etc.) from April through August. In 1989-1991, the total breeding seabird population of the project area was estimated at over 100,000 birds or about 16 percent of the total for all of California (from Carter et al., 1992, as cited in MMS, 2001).

Table 4.7-7. Breeding Seabirds of Central and Southern California, 1989–1991.

Species	Location	Number of Birds	Mean At-Sea Density (km^2) (range)
Leach's Storm-petrel	San Miguel and Santa Barbara Island	318	0.04 (0–2.6)
Ashy Storm-petrel	San Miguel, Santa Cruz, and Santa Barbara Island	3,135	0.02 (0–4.8)
Black Storm-petrel	Santa Barbara Island	274	0.01 (0–0.6)
Brown Pelican	Anacapa and Santa Barbara Island	11,916	0.6 (0–35)
Double-crested Cormorant	San Miguel, Anacapa, and Santa Barbara Island	2,463	0.01 (0–0.7)
Brandt's Cormorant	Mainland; San Miguel, Santa Rosa, Santa Cruz, Anacapa, Santa Barbara, San Nicolas, and Santa Catalina Island	31,069	0.2 (0–5.5)
Pelagic Cormorant	Mainland; San Miguel, Santa Rosa, Santa Cruz, Anacapa, and Santa Barbara Island	3,322	0.04 (0–4.4)
Western Gull	Mainland; San Miguel, Santa Rosa, Santa Cruz, Anacapa, Santa Barbara, San Nicolas, and Santa Catalina Island	27,960	5.8 (0–625)
Least Tern	Mainland	2096-2198[1]	NA (NA)
Pigeon Guillemot	Mainland; San Miguel, Santa Rosa, Santa Cruz, Anacapa, and Santa Barbara Island	5,813	0.02 (0–1.2)
Xantus' Murrelet	San Miguel, Santa Cruz, and Santa Barbara Island	1,760	(0–1.1)
Cassin's Auklet	San Miguel, Santa Cruz, and Santa Barbara Island	12,566	0.5 (0–86)
Rhinoceros Auklet	San Miguel Island	19	0.2 (0–9.3)[2]
Tufted Puffin	San Miguel Island	10	0.01 (0–0.4)

Source: Carter et al, 1992, as cited in MMS, 2001
1 2003 nesting season (from Keane, 2004a)
2 Includes large population of wintering birds

The current pattern of breeding seabird abundance, species composition, and distribution in southern California is the result of many different factors, including human disturbance, habitat loss, climate changes, and major climate events (e.g., El Nino events). Ranching activities that occurred in the past on several of the Channel Islands resulted in the loss of nesting habitat, and some species (e.g., Cassin's auklets on Santa Barbara Island) may never fully recover (H. Carter, USGS, pers. comm., as cited in MMS, 2001). The introduction of domestic cats and rats to many of the offshore islands has resulted in the loss of eggs, nestlings, and adult birds. More recently, DDT use resulted in a major decline in brown pelican reproduction and possibly other species as well. Although the long-term effects on breeding populations are unknown, many thousands of seabirds were lost in the 1969 Santa Barbara Oil Spill. In recent years, although the reasons are not fully understood, several breeding seabirds have increased in abundance (pelagic cormorant and Brandt's cormorants, western gulls, pigeon guillemots), while others (Xantus' murrelet, Cassin's auklet) have declined (H. Carter, USGS, pers. comm., as cited in MMS, 2001). Although the effects of El Nino events on seabirds in southern California is not well understood, cormorants nesting in the Channel Islands may suffer higher adult mortality and lower reproductive success during El Nino periods probably as a result of a decrease in their food supply (H. Carter, pers. comm., as cited in MMS, 2001). One indication that the marine environment of southern California may have actually improved for at least some seabirds in recent years is that one species which may have never nested in southern California, the rhinoceros auklet, is now breeding there (Carter et al., 1992, as cited in MMS, 2001). Another species, the tufted puffin, which has not nested in southern California for many years, has now returned (Carter et al., 1992, as cited in MMS, 2001).

Seasonal Gulls. Many gulls and terns (excluding western gull and least tern which are covered under breeding species), although an important component of the central and southern California avifauna, do not readily fit into any of the above categories. Some are coastal in nature (e.g., ring-billed gull -*Larus delawarensis*), while others remain far offshore (e.g., arctic tern -*Sterna paradisaea*). The most common gulls and terns in the project area are: California (Larus californicus), ring-billed, Heerman's (*Larus heermanni*), and Bonaparte's gull (*Larus philadelphia*) and Forster's (*Sterna forsteri*), Caspian (*Sterna cassia)*, and elegant tern (*Sterna elegans*). Based on information in the Marine Mammal and Seabird Computer Database Analysis System (ECI, 1992, as cited in MMS, 2001), the density of seasonal gulls and terns in the project area averages about 7 birds/km^2 (2.7 birds/mile^2) (range = 0-361 birds/km^2; 0-139.4/mile^2). Important concentrations of gulls that do not breed in the project area occur along the mainland coast of the Santa Barbara Channel and in nearshore waters north of Point Arguello. The former area of concentration includes the waters of the Gato Canyon Unit.

SHOREBIRDS

Shorebirds are another important component of the avifauna of the project area. More than 40 shorebird species have been recorded in central and southern California (Garrett and Dunn, 1981, Lehman, 1994, as cited in MMS, 2001); however, many of these are extremely rare, and only about 24 species occur regularly in the area. Almost all shorebirds migrate to the project area from northern breeding sites; very few shorebirds breed in this area. Although the majority of shorebirds occupy coastal wetlands, including estuaries, lagoons, and salt and freshwater marshes, they also occupy other coastal habitats, including sandy beaches and rocky shores. Common shorebird species in the project area include: black-bellied plover (*Pluvialis squatarola*), willet (*Catoptrophorus semipalmatus*), whimbrel (*Numenius phaeopus*), marbled godwit (*Limosa fedoa*), black turnstone (*Arenaria melanocephala*), sanderling (*Calidris alba*), western sandpiper (*Calidris mauri*), least sandpiper (*Calidris minutilla)*, dunlin (*Calidris alpina*), and dowitchers (short-billed -*Limnodromus griseus*, and long-billed -*Limnodromus scolopaceus*). Breeding shorebirds are limited to black oystercatcher (*Haematopus bachmani)*, black-necked stilt (*Himantopus mexicanus*), American avocet (*Recurvirostra americana*), killdeer (*Charadrius melodus*), and the threatened western snowy plover, which nests and winters on sandy beaches (see Section 4.7.7.3 for more information on this species).

Because of their migratory nature and the fact that few breed in the project area, shorebirds are most abundant in this area from fall through spring; comparatively few shorebirds remain during the summer months. Shorebirds may begin the fall migration to their southern wintering grounds in August, and by October, most have moved to points south of Alaska. Wintering areas vary from species to species, with most species wintering from California southward (in some cases as far south as southern Chile).

Available habitat for shorebirds has been greatly reduced over the last several decades due to urban and recreational development projects, especially in California. Large percentages of California's coastal wetlands have disappeared, resulting in the loss of valuable habitat to several coastal birds that are dependent on wetlands. Within the project area, remaining shorebird use areas include: Mugu Lagoon, Santa Clara River mouth, Carpinteria Marsh, Goleta Slough, the Santa Ynez River mouth, and the Santa Maria River mouth. Shorebird densities are not available for these areas or others in southern California, but they are generally considered to be lower than heavily used areas, such as the San Francisco Bay. Although densities are not available, shorebirds occupying sandy beaches in nearby Ventura County averaged about 44 birds per linear kilometer of beach (McCrary and Pierson, 2002, as cited in MMS, 2001).

MARSHBIRDS AND WATERFOWL

These birds, which include herons, egrets, ducks, geese, and rails, occupy a variety of coastal and interior wetlands. Along the mainland coast of the project area, these birds occupy saltwater marshes including Morro Bay, Carpinteria Marsh, and Mugu Lagoon, as well as various river (e.g., Santa Ynez) and stream mouths. Although abundance information is generally not available for these birds, highest concentrations usually occur during the winter months; this is especially true for waterfowl.

As many as 25 species of marshbird have been recorded in the coastal region of central and southern California (Garrett and Dunn, 1981, as cited in MMS, 2001). Common marshbirds include: black-crowned night heron (*Nycticorax nycticorax*), green heron (*Butorides virescens*), cattle egret (*Bubulcus ibis*), snowy egret (*Egretta thula*), great egret (*Ardea alba*), great blue heron (*Ardea herodias*), Virginia rail (*Rallus limicola*), sora (*Porzana carolina*), and American coot (*Fulica americana)*.

As many as 40 species of waterfowl have been recorded in the coastal region of central and southern California (Garrett and Dunn, 1981, as cited in MMS, 2001). Common waterfowl in the project area include: Canada goose (*Branta canadensis*), green-winged teal (*Anas crecca*), American wigeon (*Anas americana*), northern pintail (*Anas acuta)*, northern shoveler (*Anas clypeata*), and cinnamon teal (*Anas cyanoptera)*

Effects of Past Offshore Oil and Gas Activities

Offshore oil and gas activities began off southern California in the late 1960s (Galloway, 1997, as cited in MMS, 2001). Several reviews have been made of the possible cumulative impacts of these activities on biological resources in the region (Van Horn et al., 1988; Bornholdt and Lear, 1995, 1997; MMS, 1996, as cited in MMS, 2001).

The impact sources related to offshore oil and gas activities that may have had long-term (e.g., months or years) effects on marine and coastal birds in the project area are oil spills, loss of offshore structures as roosting sites, and disturbance from helicopter flights. Other activities, including the noise and disturbance associated with exploration, platform and pipeline installation, and vessel traffic, would have had, at most, very short-term (e.g., hours or days), minor effects on birds in this area.

Direct contact of birds with oil can cause matting of plumage, resulting in reduced flying or swimming abilities; loss of buoyancy, which can lead to exhaustion and death from drowning; loss of insulation, which can lead to death from hypothermia; and increased physiological stresses and reproductive failures due to ingestion of oil (Nero and Associates, 1987; Clark, 1984; Hunt, 1985, as cited in MMS, 2001). The largest oil spill from offshore oil and gas activities in the project area was the 1969 Santa Barbara spill. Although the long-term effects of this spill on seabirds are unknown, many thousands of seabirds were lost (Straughn, 1971, as cited in MMS, 2001). Since 1971, when formal tracking of all OCS spills was initiated, 841 OCS-related oil spills have occurred in the Pacific Region. However, almost all of these (99 percent) have been very small (less than 50 bbl). No impacts to birds have been reported from these very small spills. In addition to these very small spills, five OCS-related spills equal to or larger than 50 bbl have also occurred in the Pacific Region since 1971. These spills ranged in size from 50-163 bbl. Four of these spills did not contact shore, and no impacts to birds were reported from them. One spill, the 163-bbl 1997 Torch pipeline spill off Point Pedernales, contacted the shoreline and resulted in bird mortality. This spill is estimated to have killed more than 700 birds (McCrary et al, 2003). Birds affected included brown pelicans, common murres, Brandt's cormorants and 18 other species.

Because offshore oil platforms provide roosting (and in some cases even nesting) habitat for seabirds, platform removal eliminates these roosting sites. Offshore structures provide seabirds protection from terrestrial predators and many kinds of human disturbance. In some cases, offshore structures may have considerable value to some seabird species. For example, an offshore pier on State Lease PRC-421 in the Ellwood Oilfield Complex in Santa Barbara County was used by between 12 and 160 California brown pelicans (Gillies, 2004). In addition, Brandt's cormorants nested on the structure.

Helicopter traffic can disturb birds. Probably the most sensitive birds are the nesting seabirds, especially those that nest on cliffs and offshore rocks. The few seabirds that nest along the mainland coast in the vicinity of OCS projects are the only ones that are likely to be exposed to OCS-related helicopter traffic, as air traffic over the Channel Islands National Marine Sanctuary and the Channel Islands National Park, where most of the breeding seabirds in southern California occur, is restricted to altitudes greater than 1,000 feet. Several international and numerous smaller airports occur along the southern California coast along with several military airports, and air traffic is a constant daily or even hourly occurrence. Birds have probably become habituated to air traffic at least to some extent in this area. It is possible, however, that increased air traffic over the past several decades has caused birds to abandon some nesting sites.

4.7.6 Marine Mammals

Three groups of marine mammals are found in central and southern California waters. The cetaceans consist of two groups: the mysticetes, or large baleen whales, which feed by filtering their food through long, fringed plates, and the odontocetes, or toothed whales, which include the sperm whales, dolphins, porpoises, and lesser-known species such as the beaked whales. The pinnipeds include the true seals and the eared seals, the sea lions and fur seals. Sea otters, the smallest of the marine mammals in southern California, belong to the mustelid family, which includes otters, weasels, badgers, and skunks.

The marine mammal population off California includes eight baleen whale species; more than 20 species of porpoises, dolphins, and other toothed whales; six species of pinnipeds; and the sea otter — at least 39 species have been identified from sightings or strandings. Some species are purely migrants that pass through central and southern California waters on their way to calving or feeding grounds elsewhere, some are seasonal visitors that remain for a few weeks or months, and others are resident for much or all of the year. At certain times of the year, hundreds of thousands of marine mammals may be present. Table 4.7-8 shows the seasonal abundance of common marine mammals in the project area.

The narrow continental shelf along the Pacific coast and the presence of the cold California current sweeping down from Alaska allow northern forms to reach nearshore waters as far south as Baja California. As a result, the waters of the Santa Maria Basin and Southern California Bight (SCB) encompass a region of overlap of warm and cool-water species; some reach the northern limits of their range here, others are at their southern limit (Bonnell and Dailey, 1993; Würsig, 1990, as cited in MMS, 2001). The SCB itself is a complex combination of islands, ridges, and basins that exhibit wide ranges in water temperature (see Section 4.5, Physical Oceanography).

Table 4.7-8. Seasonal Abundance of Common Marine Mammals in the Project Area.

Species	Month of Occurrence											
	J	F	M	A	M	J	J	A	S	O	N	D
California gray whale	Peak	Uniform	Peak	Uniform	Uniform							Peak
Fin whale					Uniform	Uniform	Uniform	Uniform	Uniform	Uniform		
Minke whale			Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform
Blue whale						Uniform	Uniform	Uniform	Uniform	Uniform		
Humpback whale					Uniform	Uniform			Uniform	Uniform	Uniform	Uniform
Common dolphin (both spp.)[2]	Seasonal	Seasonal	Seasonal	Seasonal	Seasonal	Seasonal	Uniform	Uniform	Uniform	Uniform	Uniform	Seasonal
Northern right-whale dolphin	Uniform	Uniform	Uniform	Uniform	Uniform							Uniform
Pacific white-sided dolphin[3]	Uniform	Uniform	Uniform	Seasonal	Seasonal	Seasonal	Seasonal	Seasonal	Seasonal	Uniform	Uniform	Uniform
Risso's dolphin	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform
Dall's porpoise[2]	Seasonal	Seasonal	Seasonal	Seasonal	Seasonal	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Seasonal
Bottlenose dolphin	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform
Short-finned pilot whale	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform
California sea lion	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform
Northern fur seal[4]	Uniform	Uniform	Uniform	Uniform	Seasonal	Seasonal	Seasonal	Seasonal	Seasonal	Seasonal	Seasonal	Uniform
Northern elephant seal[5]	Seasonal	Seasonal	Seasonal	Seasonal	Seasonal	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Seasonal
Pacific harbor seal	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform
Guadalupe fur seal[6]	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform
Northern (Steller) sea lion[6]	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform
Southern sea otter[7]	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform	Uniform

Relatively uniform distribution Peak distribution As seasonally described

1 Where seasonal differences occur, individual may also be found in the "off" season. Also, depending on the species, the numbers of abundant animals present in their "off" season may be greater than the numbers of less common animals in their "on" season.
2 Winter-spring distribution is mostly south of Pt. Conception.
3 Spring-summer distribution is mostly south of Pt. Conception.
4 Only a small percent occur over continental shelf (except near San Miguel rookery, May to November)
5 Common near land during winter breeding season and spring molting season.
6 Now very rare in area.
7 Only nearshore (diving limit 30 m). Only small numbers south of Pt. Conception.

Sources: Bonnell and Dailey, 1993; NOAA, 2000, as cited in MMS, 2001.

Most of the marine mammal species in central and southern California were heavily exploited prior to 1972 for oil, pelts, and other products, and some species are still recovering. Much of the historical information on marine mammal populations is based on accounts by whalers and sealers, and the original sizes of most populations are not well known (Bonnell and Dailey, 1993, as cited in MMS, 2001).

However, it is known that the populations of many marine mammals were much larger in the past. Recognition of this led to the passage of several laws regulating human activities where marine mammals might be adversely affected. In the United States, these include the Marine Mammal Protection Act of 1972, which prohibits the intentional taking, import, or export of any marine mammal without a permit, and the Endangered Species Act of 1973, which extends similar protection to species listed as threatened or endangered. The threatened or endangered marine mammal species found in southern California waters include six whales (blue, humpback, fin, sei, right, and sperm whales), two pinnipeds (Guadalupe fur seal and Steller sea lion), and the California sea otter. These species are discussed in Section 4.7.7, Threatened and Endangered Species.

In comparison with other areas, California marine mammals have been relatively well studied. Much of the information gathered during recent decades resulted from systematic aerial and vessel surveys sponsored by MMS's Environmental Studies Program (e.g., Bonnell et al., 1981, 1983; Bonnell and Dailey, 1993; Dohl et al., 1981, 1983, as cited in MMS, 2001). Pelagic data from these and more recent MMS studies in the area have been computerized, standardized, and compiled in the Marine Mammal and

Seabird Computer Database Analysis System (ECI, 1992, as cited in MMS, 2001). More recently, pelagic surveys of marine mammals and studies of pinniped populations on land in California have been conducted by NMFS and associated institutions (e.g., Barlow, 1995; Barlow et al., 1995, 1997; Barlow and Gerrodette, 1996; DeLong and Melin, 2000; Forney et al., 2000; Stewart and Yochem, 2000, as cited in MMS, 2001). Koski et al. (1998, as cited in MMS, 2001) provide a recent synthesis of much of the information generated by these studies for central and southern California waters. An ongoing study of marine mammals and seabirds off southern California, which is being conducted by the U.S. Geological Survey with MMS as a cooperating agency, is also beginning to yield information on marine mammals in the project area (McChesney et al., 2000; Orthmeyer et al., 2000, as cited in MMS, 2001; Caretta et al., 2004; and Angliss and Lodge, 2004). In addition, a number of MMS environmental document summarize existing data on marine mammals in the area (USGS, 1984; ADL, 1984, 1985; MMS, 1984, 1992, 1996; SAI, 1984; URS, 1986, as cited in MMS, 2001). Stock assessments of marine mammals that use central and southern California waters is available from NOAA Marine Fisheries Service (Carretta et al., 2004) and Alaska Fisheries Center (Angliss and Lodge, 2004). Information from these sources is incorporated by reference in this document and summarized below. The area described in this Section encompasses both the area potentially impacted by the Proposed Action and the larger area that potentially could be affected by oil spills resulting from the development of the undeveloped leases.

Whales

BALEEN WHALES

Three families of baleen whales, or mysticetes, occur in southern California waters: the gray whale, the right whale, and the rorquals. Rorquals (including the blue, fin, humpback, sei, Bryde's, and minke whales) have pleated throats that expand to take in water, which is then strained outward through the baleen. As noted, most of these species are listed as endangered and are described in Section 4.7.7.

Although individual species' patterns vary, baleen whales range widely in the North Pacific, migrating between coldwater summer feeding grounds in the north and winter calving grounds in the south (Bonnell and Dailey, 1993; Würsig, 1990, as cited in MMS, 2001). The mating season generally begins during the southbound migration and lasts through winter. Pregnancy lasts 11 to 12 months for most of the rorquals, and calves are usually weaned on the feeding grounds at 6 to 9 months of age (Bonnell and Dailey, 1993; Würsig, 1990, as cited in MMS, 2001). Females of most species calve every 2 to 3 years (Bonnell and Dailey, 1993; Würsig, 1990, as cited in MMS, 2001).

Most baleen whales feed fairly low on the food chain, eating a variety of swarming, shrimp-like invertebrates (mainly *euphausid* and copepod crustaceans) (Bonnell and Dailey, 1993; Würsig, 1990, as cited in MMS, 2001). Some species also take small schooling fishes and squid. Right whales and the larger rorquals, such as the blue whale, appear to feed mainly on large crustaceans, while the diets of smaller baleen whales tend to include more fish. Humpback whales, in particular, which feed cooperatively, prey on a number of fish species. The gray whale is an exception to this pattern, feeding mainly on bottom-dwelling amphipod crustaceans (Nerini, 1984, as cited in MMS, 2001).

Gray Whale. The gray whale (*Eschrichtius robustus*) population breeds and calves in lagoons along the west coast of Baja California and in the Gulf of California in the winter (Rice and Wolman, 1971, as cited in MMS, 2001). At the end of the January through March breeding season, the population begins an 8,000-km coastal migration to summer feeding grounds in the Bering and Chukchi seas, where they remain until late September or early October.

Migrating gray whales generally travel within 3 km of the shoreline over most of the route, unless crossing mouths of rivers and straits (Dohl et al., 1983; Braham, 1984a, as cited in MMS, 2001). Gray whales appear to avoid areas of high turbidity, particularly following periods of rapid run-off due to inland rainfall (Dohl et al., 1982, as cited in MMS, 2001). Headland-to-headland traverses often take gray whales 37 to 46 km off the coastline (Dohl et al., 1981, as cited in MMS, 2001). Off southern California, where gray whales often travel through the Channel Islands, offshore movements of up to 80 km have been observed (Jones and Swartz, 1987; Dohl et al., 1981; Bonnell and Daily, 1993, as cited in MMS, 2001). Gray whales generally are present off central and southern California from December through May.

The eastern North Pacific gray whale stock was estimated at approximately 23,109 animals in 1993/1994 (Small and DeMaster, 1995; Koski et al., 1998, as cited in MMS, 2001) and 26,635 in 1997/1998 (Angliss and Lodge, 2004).

Minke Whale. In the eastern North Pacific, minke whales (*Balaenoptera acutorostrata*) are a coastal species and are widely distributed on the continental shelf throughout the eastern North Pacific (Green et al., 1989, as cited in MMS, 2001). Minke whales are found year-round off California, and there may be a resident population with home ranges (Bonnell and Dailey, 1993; Koski et al., 1998, as cited in MMS, 2001). Southern California waters appear to be relatively central to the North Pacific distribution of minke whales (Bonnell and Dailey, 1993, as cited in MMS, 2001). The species' winter range includes the SCB, and a small portion of the population resides in the Bight throughout the summer, especially around the northern Channel Islands (ECI, 1992; Bonnell and Dailey, 1993, as cited in MMS, 2001). A recent estimate of the minke whale population for California-Washington waters is 1,015 animals (Carretta et al., 2004).

The cycle of abundance in the SCB shows small, but distinct peaks in June and November, suggesting that some whales probably migrate into and through the area in the spring and return in the fall. Bonnell and Dailey (1993, as cited in MMS, 2001) estimated the migrant population to range from about 30 to 70 animals in spring and fall and estimated a summer resident population in the Bight of 20 to 40 whales. Koski et al. (1998, as cited in MMS, 2001) estimated that about 180 minke whales are present throughout the year in the Point Mugu Sea Range (PMSR), which roughly encompasses the Santa Maria Basin and western half of the SCB out to about 200 km from shore.

The remaining unlisted species of baleen whale, Bryde's whale (*Balaenoptera edeni*), may be more tropical in distribution than other members of the genus *Balaenoptera* and is rarely seen in central or southern California waters (Bonnell and Daily, 1993; Koski et al., 1998, as cited in MMS, 2001).

TOOTHED WHALES

The toothed whales, or odontocetes, found in central and southern California waters include one large whale, the sperm whale, 12 to 16 species of dolphins, porpoises, and small whales, and at least 6 species of beaked whale. The sperm whale, an endangered species, is described in Section 4.7.7.

Reproduction seems to occur year-round in most odontocetes, with spring and fall peaks commonly observed in the North Pacific (Bonnell and Dailey, 1993; Würsig, 1990, as cited in MMS, 2001). Like the larger baleen whales, most medium-sized odontocetes have an 11- to 12-month pregnancy, although there is a general increase in duration with size, and larger species such as the killer whale have 15-month pregnancies (Würsig, 1990, as cited in MMS, 2001). These species generally have inter-calf intervals of greater than three years. Nursing generally lasts more than 1 year (Würsig, 1990, as cited in MMS, 2001).

Except for killer whales, which are the top predators in the ocean and feed on a wide variety of fishes, squid, pinnipeds, and cetaceans (including the largest baleen whales), odontocetes generally feed on schooling fishes and squid (Bonnell and Dailey, 1993, as cited in MMS, 2001). Major fish prey species include anchovy, whiting (hake), mackerel, lanternfish, saury, smelt, tomcod, herring, and rockfishes — a number of commercial species. Octopus and crustaceans are also eaten occasionally.

Common Dolphin. Common dolphins are found worldwide and are the most abundant cetaceans in California waters (Dohl et al., 1981, 1983; Bonnell and Dailey, 1993; Koski et al., 1998; Forney et al., 2000, as cited in MMS, 2001). They range from the equator to at least central California in eastern North Pacific. Common dolphins are gregarious and are frequently encountered in herds of 1,000 or more.

Two recognized species of common dolphin are found in central and southern California waters. The long-beaked common dolphin (*Delphinus capensis*) is commonly found within about 90 km (50 nm) of the coast from Baja north to about central California (Bonnell and Dailey, 1993; Forney et al., 2000, as cited in MMS, 2001). Its relative abundance changes both seasonally and interannually, with the highest densities observed during warm water events (Heyning and Perrin, 1994, as cited in MMS, 2001). A recent minimum population estimate for this species is about 43,360 animals (Carretta et al., 2004).

The more numerous short-beaked common dolphin (*D. delphis*) ranges from the coast to 550 km (300 nm) offshore. Short-beaked common dolphins have recently been sighted as far north as 42° N. latitude in the summer and fall (Forney and Barlow, 1998, as cited in MMS, 2001). A recent population estimate for the California-Washington population of this species is approximately 449,846 animals (Carretta et al., 2004).

Data from the MMS pelagic marine mammal database (ECI, 1992, as cited in MMS, 2001), which do not discriminate between the two species, indicate that common dolphins are found in highest annual densities in the southern and eastern SCB, and in moderate densities throughout the Santa Barbara Channel. Koski et al. (1998, as cited in MMS, 2001) estimated that common dolphin numbers in the PMSR drop from 220,000-240,000 in winter to about 150,000 by summer.

Dall's Porpoise. Dall's porpoises (*Phocoenoides dalli*) are probably the most abundant small cetacean in the North Pacific and are found in shelf, slope, and offshore waters throughout their range (Koski et al., 1998, as cited in MMS, 2001). In the eastern North Pacific, they range from the Bering Sea south to Baja California (Leatherwood et al., 1982, as cited in MMS, 2001). A recent abundance estimate for the California-Washington population of this species (including the inland Washington waters) is about 99,517 animals (Carretta et al., 2004).

Dall's porpoise are common off southern California in the winter and probably range south into Mexican waters during coldwater periods (Leatherwood et al., 1982; Bonnell and Dailey, 1993, as cited in MMS, 2001). Sighting patterns suggest north-south movement as oceanographic conditions change (Forney et al., 2000, as cited in MMS, 2001). Koski et al. (1998, as cited in MMS, 2001) estimated that about 9,500 Dall's porpoise (20 percent of the California population) are present in winter in the PMSR. Data for the project area from the MMS pelagic marine mammal database (ECI, 1992, as cited in MMS, 2001) indicate highest annual densities in shelf waters along the Big Sur coast, over the shelf and slope in the southern Santa Maria Basin, in the western Santa Barbara Channel, and offshore over deeper water.

Pacific White-Sided Dolphin. Pacific white-sided dolphins (*Lagenorhynchus obliquidens*) are found in temperate waters of the North Pacific and are widely distributed from Baja California to the Gulf of Alaska (Leatherwood et al., 1982, as cited in MMS, 2001). The California-Washington population was recently estimated at approximately 59,274 animals (Carretta et al., 2004).

Although there is conflicting information on seasonal shifts in numbers and distribution (Bonnell and Dailey, 1993; Koski et al., 1998, as cited in MMS, 2001), analyses of sighting patterns suggest that Pacific white-sided dolphins make north-south movements, occurring primarily off California in cold water months and moving northward to Oregon and Washington as waters warm in late spring in summer (Leatherwood et al., 1994; Forney et al., 2000, as cited in MMS, 2001). Koski et al. (1998, as cited in MMS, 2001) also estimated that *Lagenorhynchus* are most abundant in the PMSR from fall to spring, when 23,000-28,000 are present. Data for the project area from the MMS pelagic marine mammal database (ECI, 1992, as cited in MMS, 2001) indicate highest annual densities in waters over the shelf and slope, especially in the Santa Maria Basin. They occur in moderate densities in the Santa Barbara Channel and near the northern Channel Islands, but are less abundant in the eastern SCB.

Northern Right Whale Dolphin. Northern right whale dolphins (*Lissodelphis borealis*) are endemic to temperate waters of the North Pacific, where they range from about the Mexican border to British Columbia (Leatherwood and Walker, 1979; Leatherwood et al., 1982, as cited in MMS, 2001). They are primarily found over the shelf and slope in U.S. coastal waters and are known to make seasonal north-south movements (Forney et al., 2000, as cited in MMS, 2001). The California-Washington population of the species was recently estimated at about 20,362 animals (Carretta et al., 2004).

Off California, they are rarely sighted south of Point Conception in the summer; in winter, they are primarily distributed from central California south (Bonnell and Dailey, 1993; Koski et al., 1998, as cited in MMS, 2001). Koski et al. (1998, as cited in MMS, 2001) estimated that approximately 77,000-87,000 *Lissodelphis* are present in the inner half of the PMSR from winter through spring, with numbers dropping to about 4,000 by summer. Data for the project area from the MMS pelagic marine mammal database (ECI, 1992, as cited in MMS, 2001) show highest annual densities over the shelf north of Point Conception.

Risso's Dolphin. In the eastern North Pacific, Risso's dolphins (*Grampus griseus*) range from the equator to waters off British Columbia (Braham, 1983; Green et al., 1989, as cited in MMS, 2001). Sightings of Risso's dolphins traditionally have been tied to the slope, but sightings over the shelf have increased since 1971 (Leatherwood et al., 1984; Carretta et al., 1995, as cited in MMS, 2001). A recent estimate of the California-Washington population is about 16,066 animals (Carretta et al., 2004).

Risso's dolphins are present off central and southern California year-round (Dohl et al., 1981, 1983; Bonnell and Dailey, 1993, as cited in MMS, 2001). The Risso's dolphins found off California during the colder water months are thought to shift northward to Oregon and Washington in the late spring and summer, and there seems to be a gap between California animals and those sighted in the tropical Pacific and Gulf of California (Forney et al., 2000, as cited in MMS, 2001). Although Koski et al. (1998, as cited in MMS, 2001) reported that maximum numbers of Risso's dolphins are present in the PMSR in fall and winter, they provided numbers based on an earlier estimate for the west coast population, which has since been revised downward (Forney et al., 1995, 2000, as cited in MMS, 2001). Project-area data from the MMS pelagic marine mammal database (ECI, 1992, as cited in MMS, 2001) indicate that Risso's dolphins occur in highest densities along the shelf break.

Bottlenose Dolphin. Bottlenose dolphins (*Tursiops truncatus*) are probably more widely distributed than any other species of small cetacean in the tropical and temperate eastern North Pacific (Leatherwood et al., 1982, as cited in MMS, 2001). Off the American coastline, they range from equator north into central California (Leatherwood and Reeves, 1986; Bonnell and Dailey, 1993, as cited in MMS, 2001).

There are two California populations of bottlenose dolphins, coastal and offshore. Coastal bottlenose dolphins generally are found within a kilometer or two of shore, primarily from Point Conception south into Mexican waters. The coastal population appears to form small resident groups that range along the coastline, especially off Orange and San Diego counties (Weller and Defran, 1989, as cited in MMS, 2001). Since the 1982-1983 El Niño, coastal bottlenose dolphins have been sighted as far north as San Francisco (Bonnell and Dailey, 1993; Forney et al., 2000, as cited in MMS, 2001). Carretta et al. (2004) estimated the coastal population at about 206 animals.

Offshore bottlenose dolphins have been documented in offshore waters as far north as 41° N. latitude and may range into Oregon and Washington waters during warm water periods (Forney et al., 2000, as cited in MMS, 2001). Although no seasonality in their distribution is apparent from the sighting data (Forney and Barlow, 1998, as cited in MMS, 2001), the offshore population is believed to have a more-or-less continuous distribution off California (Mangels and Gerrodette, 1994, as cited in MMS, 2001). In the SCB, this population appears to be centered around Santa Catalina Island, with possible dispersion in the winter (Dohl et al., 1981, as cited in MMS, 2001). Project-area data from the MMS pelagic marine mammal database (ECI, 1992, as cited in MMS, 2001), which do not distinguish between the two forms, also show highest densities near Catalina and lower densities nearshore. The California-Washington offshore population is estimated at 5,065 animals (Carretta et al., 2004, as cited in MMS, 2001).

Killer Whale. Killer whales (*Orcinus orca*) are found over and near the continental slope from the Arctic south to the equator. They travel and feed in social groups known as pods, which may vary in number from a few to, occasionally, hundreds of animals (Bigg et al., 1987, as cited in MMS, 2001). In some areas, such as Puget Sound, killer whale populations are resident year-round; in others, they may make seasonal movements (Bigg et al., 1987, as cited in MMS, 2001). Off California, two stocks have been identified: an eastern North Pacific transient stock, and an eastern North Pacific offshore stock (Forney et al., 2000, as cited in MMS, 2001).

Movements of transient killer whales between Southeast Alaska and central California have been documented (Goley and Straley, 1994; Forney et al., 2000, as cited in MMS, 2001). These animals appear to belong to a ‘transboundary’ stock that includes whales from British Columbia waters (Forney et al., 2000, as cited in MMS, 2001). Off California, 121 ‘transients’ have been identified; the total estimate for this stock (based on the number of individually identified animals) is approximately 375 animals (Forney et al 2000, as cited in MMS, 2001).

Killer whales of the offshore stock have been identified off California, Oregon, and Southeast Alaska (Ford et al., 1994; Black et al., 1997; Dahlheim et al., 1997, as cited in MMS, 2001). These animals apparently do not mix with transient and resident stocks, but are most closely akin (genetically, morphologically, and behaviorally) to resident whales (Forney et al., 2000, as cited in MMS, 2001). The best available estimate of the offshore population component is 466 animals (Carretta et al., 2004).

Koski et al. (1998, as cited in MMS, 2001) estimated that about 360 killer whales of all stocks are present in the PMSR throughout the year. Data for the project area from the MMS pelagic marine mammal database (ECI, 1992, as cited in MMS, 2001) indicate that killer whales are seen west of San Miguel Island, over the shelf north of Point Conception, and in highest numbers in the Monterey Bay area.

Southern resident killer whales consist of three pods that reside primarily in Puget Sound (Washington State), the Strait of Juan de Fuca (between the United States and Canada), and the Strait of Georgia (British Columbia) during the spring, summer and fall. (Krahn et al., 2002). NMFS received a petition from the Center for Biological Diversity and co-petitioners on May 2, 2001, to list the Eastern North Pacific Southern Resident stock of killer whales as an "endangered" or "threatened" species under the Endangered Species Act (Carretta et al., 2004). NMFS established a Biological Review Team to determine the status of the stock. Based on the report of the Biological Review Team (Krahn et al., 2002), NMFS determined that southern resident killer whales are not a species under the Endangered Species Act and that a listing of "threatened" or "endangered" was not warranted. NMFS did classify the stock as "depleted" under the Marine Mammal Protection Act.

Southern resident killer whales recently have been sighted in central California where they are thought to be feeding on salmon (Krahn et al., 2002). K and L pods were observed together off Monterey Bay in January 2000 (Krahn et al., 2002). Members of L pod also were sighted in Monterey Bay on March 13, 2003 (Monterey Bay Whale Watch, 2003). These Monterey Bay sightings are as far south as southern resident killer whales have been seen.

Pilot Whale. The short-finned pilot whale (*Globicephala macrorhynchus*) is a relatively more southern, or warmwater species. Pilot whales were common off southern California until the early 1980s (Dohl et al., 1983, as cited in MMS, 2001), but disappeared from area waters following the 1982-83 El Niño (Bonnell and Dailey, 1993; Forney et al., 2000, as cited in MMS, 2001). Recently, pilot whales have begun reappearing in California waters, possibly in response to long-term changes in oceanographic conditions, but sightings are still rare (Forney et al., 2000, as cited in MMS, 2001). In 1993, there were six sightings of pilot whales off California; two of these were south of Point Conception (Mangels and Gerrodette, 1994; Koski et al., 1998, as cited in MMS, 2001). The most recent average abundance estimate for California through Washington waters is 304 (Carretta et al., 2004).

The remaining dozen or so species of odontocetes, including the beaked whales and several species of small whales and dolphins, tend to be pelagic or tropical species. These species are uncommon to rare in area waters, and some are known only from strandings. The beaked whales include Cuvier's beaked whale (*Ziphius cavirostris*), Baird's beaked whales (*Berardius bairdi*), and at least five species of the genus *Mesoplodon* (*M. carlhubbsi, M. ginkgodens, M. densirostris, M. hectori*, and *M. stejnegeri)*. Among the remaining species are the false killer whale (*Pseudorca crassidens*), pygmy and dwarf sperm whales (*Kogia breviceps* and *K. simus*), striped, spinner, and spotted dolphins (*Stenella coeruleoalba, S. longirostris*, and *S. attenuata*), and rough-toothed dolphin (*Steno bredanensis*).

Pinnipeds

Four species of pinnipeds (California sea lions, northern fur seals, northern elephant seals, and harbor seals) breed in southern California and are present year-round. The remaining two species, the eastern stock of the Steller (northern) sea lion and the Guadalupe fur seal, are listed as threatened and no longer breed in southern California (Bonnell and Dailey, 1993, as cited in MMS, 2001). These species are described in Section 4.7.7. Two of the Channel Islands, San Miguel and San Nicolas, are the largest pinniped rookeries on the west coast south of Alaska.

Pinnipeds come ashore at least once a year to breed and pup. Sea lions and fur seals are summer breeders. Males, which are much larger than females, generally haul out on the rookeries first and attempt to establish territories that will give them access to females. Pregnant females arrive, give birth, mate, and then begin making trips to sea to feed, returning regularly to the rookery to nurse their pups. Most births in California rookeries are in late June (Reeves et al., 1992). The length of the nursing period varies by species, from about 4 months in the northern fur seal to a year or more in the sea lions (Riedman, 1990, as cited in MMS, 2001).

True seals, or phocids, show different reproductive patterns (Riedman, 1990, as cited in MMS, 2001). Elephant seals are winter breeders (Le Boeuf, 1981, as cited in MMS, 2001). Females give birth between December and March (Reeves et al., 1992). As in the eared seals, males are much larger than females and compete for access to them. Females nurse their pups for about a month without feeding, then abandon them abruptly after mating. Pups spend about another month on the beach and then go to sea alone in the spring, as the upwelling season begins.

Less is known about harbor seal breeding (Bigg, 1981; Riedman, 1990, as cited in MMS, 2001). Pups are born in the spring and may enter the water with their mothers soon after birth. Their mothers continue to feed as they nurse. On the Channel Islands, harbor seal pups are born from late February to early April and nursed for 3 to 4 weeks (Stewart and Yochem, 1994, as cited in MMS, 2001).

Pinnipeds feed mainly on schooling fishes and squid (Bonnell and Dailey, 1993, as cited in MMS, 2001). All pinnipeds in California feed on some of the same prey — northern anchovies and market squid, for example, are important prey for many marine mammals and seabirds. However, the degree of overlap varies from species to species and season to season. Elephant seals spend relatively little time in nearshore waters and appear to feed mainly on deepwater squids. In contrast, the diet of a nearshore species such as the harbor seal includes greater quantities of bottom-dwelling fishes and octopus.

California Sea Lion. The California sea lion (*Zalophus californianus*) ranges from British Columbia to Mexico. They breed in the summer on islands from the Gulf of California in Mexico to the Channel Islands in southern California (Bonnell and Dailey, 1993, as cited in MMS, 2001). The current U.S. population size is estimated at 237,000 to 244,000 animals (Carretta et al., 2004). In the SCB, California sea lions currently breed on four islands: San Miguel, San Nicolas, Santa Barbara, and San Clemente. In the fall, following the breeding season, non-lactating females, juveniles, and subadult and adult males disperse northward from the Channel Islands rookeries to overwinter along the coasts of central and northern California, Oregon, Washington, and British Columbia; lactating females and pups remain in area waters (Stewart and Yochem, 2000, as cited in MMS, 2001). San Miguel and San Nicolas are the major rookeries and together account for more than 90 percent of all pup births (Bonnell and Dailey, 1993, as cited in MMS, 2001).

Off southern California, California sea lions are the most abundant pinnipeds on land and in waters over the continental shelf. Koski et al. (1998, as cited in MMS, 2001) estimated that about 72,000 California sea lions are present at sea in the PMSR during the summer, when numbers are lowest, and 130,000 to 160,000 at other times of the year. Project-area data from the MMS pelagic marine mammal database (ECI, 1992, as cited in MMS, 2001) demonstrate that California sea lions are widely distributed throughout the SCB and over the shelf north of Point Conception, with moderate densities as far north as Morro Bay. Highest densities throughout the year are recorded in the Santa Barbara Channel near the northern Channel Islands.

Northern Fur Seal. The northern fur seal (*Callorhinus ursinus*) ranges southward in the eastern North Pacific from the Bering Sea to California. Two stocks of northern fur seals are present seasonally in California waters: the eastern North Pacific stock, and the San Miguel Island stock (Bonnell and Dailey, 1993; Koski et al., 1998, as cited in MMS, 2001). The eastern Pacific stock of the species is now estimated to number a little more than a million animals, of which about 74 percent are associated with the Pribilof Islands rookeries in the eastern Bering Sea (Hill and DeMaster, 1999, as cited in MMS, 2001). In the fall following the breeding season, females and many juveniles leave the Bering Sea and migrate southward along the west coast as far as California.

Fur seals from the Bering Sea arrive offshore California in late November (Bonnell and Dailey, 1993, as cited in MMS, 2001). Some animals move southward into continental slope and shelf waters, with maximum numbers offshore of the slope between 34 to 42°N latitude during the months of February through April. Nearly 270,000 have been estimated to be present at this time (Antonelis and Perez, 1984, as cited in MMS, 2001). Most of these animals are gone by early June (Bonnell and Dailey, 1993; Koski et al., 1998, as cited in MMS, 2001). Project-area data from the MMS pelagic marine mammal database (ECI, 1992, as cited in MMS, 2001) reflect these seasonal movements, showing fur seals distributed offshore, over and beyond the slope, with highest densities from the Big Sur coast northward. Northern fur seals are rarely sighted within the SCB.

Northern fur seals established a breeding colony on San Miguel Island in the early 1960s (Peterson et al., 1968, as cited in MMS, 2001). Since that time, the colony has increased steadily, except for steep declines in 1983 and 1998 associated with El Niño events in 1982-1983 and 1997-1998 (DeLong and Antonelis, 1991; Forney et al., 2000, as cited in MMS, 2001). The most recent estimate of the San Miguel Island stock is approximately 7,784 fur seals (Carretta et al., 2004), which is down from the (pre-El Niño) 1997 estimate of 12,000 (DeLong and Melin, 2000, as cited in MMS, 2001) but up from the 2000 estimate of 4,500 (Forney et al, 2000, as cited in MMS, 2001) indicating recovery from the 1998 El Nino event. The San Miguel Island stock probably remains within the general vicinity of the rookery during most of the year — lactating females appear to forage primarily in upwelling areas near and west of Point Conception in summer (Antonelis et al., 1990; Stewart and Yochem, 2000, as cited in MMS, 2001), and most sightings in fall and winter have been recorded in offshore waters west of San Miguel Island (Bonnell et al., 1981, 1983; Koski et al, 1998, as cited in MMS, 2001).

Northern Elephant Seal. Northern elephant seals (*Mirounga angustirostris*) now breed along the coast from Baja California north to Point Reyes. Stewart et al. (1994, as cited in MMS, 2001) estimated the 1991 U.S./Mexican population at 127,000 animals. The California stock was estimated as 101,000 in 2001 (Carretta et al., 2004). San Miguel and San Nicolas islands are the major California rookery islands (85 percent of 1990 pup production); a few are also born on Santa Rosa, Santa Barbara, and San Clemente islands (Bonnell and Dailey, 1993, as cited in MMS, 2001).

Northern elephant seals typically haul out on land only to breed and molt and disperse widely at sea. They spend relatively little time in southern California waters, traveling from the rookeries and hauling areas to distant foraging areas in the North Pacific, Gulf of Alaska, and along the eastern Aleutian Islands (Stewart and DeLong, 1995; Stewart and Yochem, 2000, as cited in MMS, 2001). Data for the project area from the MMS pelagic marine mammal database (ECI, 1992, as cited in MMS, 2001) indicate that sightings of northern elephant seals at sea are scattered throughout the SCB and over the shelf and slope north of Point Conception.

Harbor Seal. Harbor seals (*Phoca vitulina*) range from Mexico to the Aleutians. The North Pacific population is centered in Alaska (Hoover, 1988), and about 27,720 harbor seals are found in California (Carretta et al., 2004). Peak harbor seal populations on land occur during the species' spring breeding and pupping season and early summer molt. Following the breeding and pupping season, harbor seals disperse along the coast and spend more time at sea throughout the fall and winter (Bonnell and Dailey, 1993, as cited in MMS, 2001). They haul out on all the Channel Islands and on beaches along the mainland shore, particularly from Ventura County northward (Hanan et al., 1992, as cited in MMS, 2001).

Harbor seals appear to forage relatively close to shore. Nearly three-quarters of all harbor seals seen at sea in the SCB have been within 10 km (5 nm) of land; greatest numbers have been seen in the fall (Bonnell et al., 1981; Bonnell and Dailey, 1993, as cited in MMS, 2001). At-sea distribution data for the project area from the MMS pelagic marine mammal database (ECI, 1992, as cited in MMS, 2001) indicate that harbor seals are found in highest densities in the Santa Barbara Channel in nearshore waters along the mainland and northern Channel Island shorelines; moderate densities are also observed in nearshore waters north of Point Conception, particularly in the Point Buchon area. Koski et al. (1998, as cited in MMS, 2001) estimated that 3,600-4,600 harbor seals inhabit the waters and coastal haul-out sites in the PMSR.

Impacts of Past and Present OCS Activities

OCS oil and gas activities began off southern California in the late 1960s (Galloway, 1997, as cited in MMS, 2001). Several reviews have been made of the possible cumulative impacts of these activities on biological resources in the region (Van Horn et al., 1988; Bornholdt and Lear, 1995, 1997; MMS, 1996, as cited in MMS, 2001).

Noise and disturbance associated with OCS activities in the Pacific Region have resulted in few documented impacts to marine mammals. Van Horn et al. (1988, as cited in MMS, 2001) concluded that seismic surveys and support vessel traffic had resulted in temporary, localized disturbances to some marine mammals, primarily gray whales. However, despite hypothesizing that increased vessel traffic off southern California might be causing greater numbers of gray whales to migrate farther offshore (Wolman and Rice, 1979; MBC Applied Environmental Services, 1989, as cited in MMS, 2001), the gray whale population has grown steadily during recent decades. Blue and humpback whales have also been appearing off southern California in increasing numbers in summer and fall (Calambokidis et al., 2003).

There is no evidence that increased vessel traffic (of which oil and gas support vessels are a very small part) has resulted in adverse impacts on marine mammal populations.

Based on experiences in southern California, the MMS believes that accidental collisions between cetaceans and support vessel traffic are unlikely events. Although large cetaceans have occasionally been struck by freighters or tankers, and sometimes by small recreational boats, no such incidents have been reported with crew or supply boats off California (MMS, unpubl. data, as cited in MMS, 2001).

Pinnipeds are nimble and considered very unlikely to be struck by vessels. However, the single documented instance of a collision between a marine mammal and a support vessel involved a pinniped — an adult male elephant seal struck and presumably killed by a supply vessel in the Santa Barbara Channel in June 1999.

The only OCS-related spill in the Pacific Region known to have contacted marine mammals was the 1969 Santa Barbara Channel spill. Although the entire northward migration of California gray whales passed through the Santa Barbara Channel while it was contaminated, Brownell (1971, as cited in MMS, 2001) found no evidence that any cetacean mortality had occurred due to the spill. Similarly, studies of elephant seals and California sea lions contacted by the 1969 spill reported no evidence of pinniped mortality from this event (Brownell and Le Boeuf, 1971; Le Boeuf, 1971, as cited in MMS, 2001). Since 1971, when formal tracking of all OCS spills was initiated, 841 OCS-related oil spills have occurred in the Pacific Region. However, almost all of these (99 percent) have been very small (less than 50 bbl), although five ranged in size from 50 to 163 bbl. No impacts to marine mammals have been reported from these spills. Although one OCS oil spill, the 1997 Torch spill off Point Pedernales, did contact the shoreline at the southern end of the sea otter range, no marine mammal mortality was reported (M.D. McCrary, MMS, pers. comm., as cited in MMS, 2001).

4.7.7 Threatened and Endangered Species

Section 7 of the Endangered Species Act of 1973 (ESA), as amended, requires that Federal agencies, in consultation with and the assistance of the Secretaries of Interior and Commerce, insure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or result in the destruction or adverse modification of the critical habitat of such species.

This section includes six sub-sections, covering threatened and endangered fish and marine invertebrates (Section 4.7.7.1), marine mammals (Section 4.7.7.2), birds (Section 4.7.7.3), sea turtles (Section 4.7.7.4), plant species (Section 4.7.7.5), amphibians (Section 4.7.7.6), and wildlife (Section 4.7.7.7).

4.7.7.1 Threatened and Endangered Fish and Marine Invertebrates

MARINE INVERTEBRATES

White Abalone (*Haliotis sorenseni*). In May 2001, the white abalone became the first marine invertebrate to receive Federal protection as an endangered species. The ESA regulates human activities where listed species might be adversely affected by prohibiting intentional take. The white abalone is a marine, rocky benthic, herbivorous, broadcast spawning gastropod. The shell is oval-shaped, very thin and deep. They can be up to 10 inches, but are usually 5-8 inches. This species usually dwells in deep waters from 80 to over 200 feet from Point Conception (southern California) southward to Baja California.

White abalone were reported to be more common along the mainland coast at the northern end of the range, while in the mid-portion of the California range it was more common on the islands (especially San Clemente and Santa Catalina Islands) (Cox, 1960; Leighton, 1972; NMFS, 2002). This species has occurred in shallower depths near its northern most limit (Hobday and Tegner, 2000 [cited in MMS, 2003]). Specifically, localized mainland areas in the Coal Oil Point region west of Santa Barbara have supported white abalone in water depths less than 60 feet (Greg Sanders, pers. comm., 2002; Pete Haaker, pers. comm. 2002 [cited in MMS, 2003]). Speculation concerning reasons for its presence in shallow water include a localized decrease in competition with red abalone and/or a localized decrease in predation from sea otters without a concomitant increase in harvest (as reported in Hobday and Tegner, 2000). During a 2001 diver survey of the nearshore seafloor habitats around the ExxonMobil Santa Ynez Unit, de Wit (2001b [also cited in MMS, 2003]) reported one abalone that was assumed to be *H. sorenseni*, on the armor rock that overlaid the existing SYU powercables and pipelines in 22 feet of water. During a similar survey of a larger area centered on the armor rock corridor, an abalone that was confirmed to be *H. sorenseni* was recorded in 25 feet of water approximately 300 feet east of the armor rock (de Wit, 2002 [as cited in MMS, 2003]). Recently completed diver and ROV surveys of the Channel Islands resulted in four white abalone being recorded by the National Park Service (D. Kushner, pers. comm., 2004).

THREATENED AND ENDANGERED FISH

Of the marine fishes occurring in the SBC and SMB, two (tidewater goby and the Southern California Evolutionarily Significant Unit (ESU) of west coast steelhead) are listed as endangered under the Endangered Species Act. The biology of these species in the project area is discussed in detail in the biological evaluation prepared for the Endangered Species Act Section 7 consultation on the Rocky Point Unit development project (MMS, 2000a, as cited in MMS, 2001).

The steelhead, *Oncorhynchus mykiss*, are migratory anadromous rainbow trout. The Southern ESU steelhead inhabits streams and rivers from the Santa Maria River south to Malibu Creek, California (Behnke 1992, Burgner et al., 1992, as cited in MMS, 2001). The critical habitat for steelhead includes all river reaches and estuarine areas accessible to listed steelhead in coastal river basins from the Santa Maria Basin to Malibu Creek. In the Point Arguello area, this would include the Santa Ynez River, San Antonio Creek, and the Santa Maria River, and perhaps Jalama and Cañada Honda Creeks. Only winter steelhead occur along the south-central coast. Winter steelhead enter their home streams from November to April to spawn. Juveniles migrate to sea usually in spring. Steelhead can migrate extensively at sea.

The tidewater goby, *Eucyclogobius newberryi*, is found in shallow coastal lagoons, stream mouths and shallow areas of bays in low salinity waters. The northern population of tidewater goby is found along coastal areas from Del Norte County south to Los Angeles County. Since 1994, the northern population of tidewater gobies has rebounded sharply. This population of gobies are quite resilient and have a great ability to disperse and re-colonize areas from which they were previously eliminated (FWS News Release, June 24, 1999, as cited in MMS, 2001). Early summer 1999, the U.S. Fish and Wildlife Service proposed to delist that population, while maintaining the endangered designation for the southern population. The entire population is still listed as endangered (USFWS, 2004).

Two other fish could potentially be affected by onshore activities, the unarmored threespine stickleback and the Santa Ana sucker. The current range of the unarmored threespine Stickleback (*Gasterosteus aculeatus williamsoni*) is not within the project area. The Santa Ana Sucker (*Catostomus santaanae*) was listed as threatened under the Endangered Species Act on April 12, 2000 and was not included on the original species list from FWS. The Santa Clara River and estuary system supports a population of Santa Ana suckers, but this population is presumed to be introduced and outside the species' native range. Therefore, FWS is not proposing to designate this population as threatened pursuant to the Act (J. Fishman, FWS, pers. comm., as cited in MMS, 2001).

4.7.7.2 Threatened and Endangered Marine Mammals

General information on the biology of marine mammals in the project area is presented in Section 4.7.6, Marine Mammals. More detailed information on the biology of the species of federally listed marine mammals in the project area is provided in the Biological Evaluation prepared for the Section 7 consultation on the proposed Rocky Point Unit development project (MMS, 2000, as cited in MMS, 2001).

Blue Whale. The blue whale (*Balaenoptera musculus*) was listed as a Federal endangered species in 1970 (35 FR 8495). No critical habitat has been identified for this species. The main reason for listing was a severe worldwide population decline due to intensive commercial whaling.

Blue whales are distributed worldwide in circumpolar and temperate waters and inhabit both coastal and pelagic environments (Leatherwood et al., 1982; Reeves et al., 1998a, as cited in MMS, 2001). Like most baleen whales, they migrate between warmer waters used for breeding and calving in winter and high-latitude feeding grounds where food is plentiful in the summer. In the eastern North Pacific, blue whales are found from the Gulf of Alaska south to at least Costa Rica (Reeves et al., 1998a; Mate et al., 1999, as cited in MMS, 2001). Rice (1992, as cited in MMS, 2001) concluded that the California population is separate from that in the Gulf of Alaska and the eastern Aleutians, and this view is supported by other recent work (Barlow, 1995; Calambokidis and Steiger, 1995; Calambokidis et al., 1995, as cited in MMS, 2001).

Off California, blue whales are first observed in Monterey Bay, around the Channel Islands, and in the Gulf of the Farallones in May-June and are present on the continental shelf in these areas from August to November (Calambokidis et al., 1990; Calambokidis, 1995; Larkman and Veit, 1998; Mate et al., 1999, as cited in MMS, 2001). Based on sighting data collected off southern California from 1992 through 1999 (Cascadia Research, unpubl. data, as cited in MMS, 2001), blue whales tend to aggregate in the Santa Barbara Channel along the shelf break (seaward of the 200-m line). Sighting frequencies were highest west of San Miguel Island and along the north sides of San Miguel, Santa Rosa, and the western half of Santa Cruz Island.

No reliable population estimate exists for blue whales in the North Pacific, except for the population that summers off California (Reeves et al., 1998a, as cited in MMS, 2001). More than 700 individual blue whales had been photo-identified in California and Mexican coastal waters through 1993 (Calambokidis, 1995, as cited in MMS, 2001); the most recent estimate for this stock is approximately 1,480 blue whales (Carretta et al., 2004). Although the population appears to be growing, the observed increase in blue whale abundance off California during the past two decades is considered to have been too large to be explained by population growth alone and may be due to a shift in distribution (Barlow et al., 1997; Reeves et al. 1998a, as cited in MMS, 2001). Carretta et al (2004) suggest that the observed increase of blue whales in California coastal waters may be the result of an increased use of California as a feeding area.

Fin Whale. The fin whale (*Balaenoptera physalus*) was listed as a Federal endangered species in 1970 (35 FR 8495). No critical habitat has been identified for this species. The main reason for listing was a severe worldwide population decline due to intensive commercial whaling.

Fin whales are distributed worldwide. NMFS recognizes three stocks in U.S. Pacific waters: Alaska; California, Oregon, and Washington; and Hawaii (Mizroch et al., 1984a; Barlow et al., 1997; Hill et al., 1997; Reeves et al., 1998b, as cited in MMS, 2001). According to Rice (1974, as cited in MMS, 2001), the summer distribution of fin whales includes immediate offshore waters throughout the North Pacific, from central Baja to Japan and north to the Chukchi Sea. Numbers in these areas peak in late May-early July. In recent years, fin whales have occurred year-round off central and southern California, with peak numbers in summer and fall (Dohl et al., 1981, 1983; Barlow, 1995; Forney et al., 1995, as cited in MMS, 2001). In the Southern California Bight, summer distribution is generally offshore and south of the northern Channel Island chain, particularly over the Santa Rosa-San Nicolas Ridge (Leatherwood et al., 1987; Bonnell and Dailey, 1993, as cited in MMS, 2001). Since fin whale abundance decreases in winter/spring off California (Dohl et al., 1981, 1983; Forney et al., 1995, as cited in MMS, 2001) and Oregon (Green et al., 1992, as cited in MMS, 2001), the distribution of this stock probably extends outside these waters seasonally.

Recent estimates for the North Pacific fin whale population range between 7,890 and 20,000 animals (Ohsumi and Wada, 1974; Rice, 1974; Wada, 1976; Allen, 1980, as cited in MMS, 2001), with approximately 60 percent occurring in the eastern half of the North Pacific (Ohsumi and Wada, 1974, as cited in MMS, 2001). Current estimates place the California-Washington population at about 3,279 animals (Carretta et al., 2004). There is some evidence that recent increases in fin whale abundance have occurred in California waters (Barlow, 1994; Barlow and Gerodette, 1996, as cited in MMS, 2001), but these have not been significant (Carretta et al., 2004).

Sei Whale. The sei whale (*Balaenoptera borealis*) was listed as a Federal endangered species in 1970 (35 FR 8495). No critical habitat has been identified for this species. The main reason for listing was severe worldwide population decline due to intensive commercial whaling.

Sei whales are distributed worldwide and are primarily a pelagic, temperate-water species (Leatherwood et al., 1982; Barlow et al., 1997; Reeves et al., 1998b, as cited in MMS, 2001). There are believed to be three stocks in the North Pacific (Mizroch et al., 1984b, as cited in MMS, 2001). In the eastern North Pacific, sei whales migrate northward from wintering grounds in temperate and subtropical waters to feeding grounds that extend from west of the California Channel Islands as far north as the Gulf of Alaska and the Aleutians in the summer (Leatherwood et al., 1982; Mizroch et al., 1984b, as cited in MMS, 2001). Evidence from tag recoveries indicates movement between central California and Vancouver Island (Rice, 1977; Reeves et al., 1998b, as cited in MMS, 2001). Unlike fin whales, sei whales seldom enter the Bering Sea (Leatherwood et al., 1982, as cited in MMS, 2001). The winter range stretches from about 18°30'N latitude off Baja California to near 35°30'N off the central California coast (Leatherwood et al., 1982, as cited in MMS, 2001), but may be centered between 20°N and 23°N (Mizroch et al., 1984b, as cited in MMS, 2001). Some individuals apparently approach the equator (Leatherwood et al., 1982, as cited in MMS, 2001).

Sei whales are now rare in California waters (Dohl et al., 1981, 1983; Bonnell and Dailey, 1993; Mangels and Gerodette, 1994; Barlow, 1995; Forney et al., 1995; Barlow et al., 199, as cited in MMS, 20017). Although there is no estimate for the sei whale population off California, the population in these waters is believed to be very low, in the tens to several hundreds (Reeves et al., 1998b, as cited in MMS, 2001). A recent estimate for California, Oregon, and Washington waters based on 1996 and 2001 shipboard surveys is 56 whales (Carretta et al., 2004). There are no data on trends in sei whale abundance in the eastern North Pacific. Although the population in the North Pacific is expected to have grown since given protected status in 1976, continued unauthorized take and incidental ship strikes and gillnet mortality make this uncertain (Carretta et al., 2004).

Humpback Whale. The humpback whale (*Megaptera novaeangliae*) was listed as a Federal endangered species in 1970 (35 FR 8495). No critical habitat has been identified for this species. The main reason for listing was a severe worldwide population decline due to intensive commercial whaling.

Humpbacks are distributed worldwide and undertake extensive migrations in parts of their range (Leatherwood et al., 1982; NMFS, 1991a, as cited in MMS, 2001). They aggregate from late spring through fall to feed in productive waters of temperate and high latitudes and migrate in winter months to lower latitudes for breeding and calving, which often occur near tropical islands and in shallow coastal waters. In the eastern North Pacific, humpbacks range from arctic waters south to central California in the summer. On their feeding grounds, humpbacks are found primarily on the continental shelf near shallow banks and inshore marine waters (Rice, 1974; Wolman, 1986, as cited in MMS, 2001). Humpback whales winter in three areas: waters off Mexico (Rice, 1974, as cited in MMS, 2001); Hawaii (Baker et al., 1986, as cited in MMS, 2001); and the Marianas, Bonin, and Ryukyu Islands and Taiwan (Nishiwaki, 1959, as cited in MMS, 2001). Whales from all three wintering grounds apparently intermingle during the summer months in Alaskan waters (Baker et al., 1986, as cited in MMS, 2001).

Based on photo-identification work, Calambokidis et al. (1996, as cited in MMS, 2001) concluded that humpback whales off California, Oregon, and Washington form a single, intermixing population, with very little interchange with areas farther north. Whales from this population feed off California through summer and fall (Dohl et al., 1983; Calambokidis et al., 1996, as cited in MMS, 2001). Based on sighting data collected off southern California from 1992 through 1999 (Cascadia Research, unpubl. data, as cited in MMS, 2001), humpback whales occur throughout the western two-thirds of the Santa Barbara Channel and, to a lesser extent, in the Santa Maria Basin. As was the case for blue whales, there appears to be a tendency for humpbacks to concentrate along the shelfbreak north of the Channel Islands.

The total humpback population in the North Pacific is now believed to number more than 6,000 animals (Carretta et al., 2004). The most recent minimum population estimate for the California/Mexico stock is 681 animals (Carretta et al., 2004), and there are indications that this population increased during the 1980s and 1990s (Barlow, 1994; Barlow and Gerodette, 1996; Barlow et al., 1997, as cited in MMS, 2001), but declined between 1998 and 1999 (Carretta et al., 2004). The most recent mark recapture information suggests that growth may have resumed (Carretta et al., 2004).

Northern Right Whale. The northern right whale (*Eubalaena glacialis*) was listed as a Federal endangered species in 1970 (35 FR 8495). No critical habitat in the Pacific has been identified for this species. The main reason for listing was a severe worldwide population decline due to intensive commercial whaling.

Right whales apparently migrate from high-latitude feeding grounds toward more temperate waters in the fall and winter. The location of calving grounds is unknown; summer feeding grounds may generally stretch across the North Pacific from about 50° to 63°N (Omura, 1958; Omura et al., 1969, as cited in MMS, 2001). In the northeastern Pacific, the major northern right whale whaling ground was the “Kodiak Ground,” which encompassed essentially the Gulf of Alaska and was a major summer feeding ground for the species (Leatherwood et al., 1982, as cited in MMS, 2001). Waters off the eastern Aleutian Islands and in the southern Bering Sea were apparently also important areas of concentration (Braham and Rice, 1984; NMFS, 1991b, as cited in MMS, 2001). Catches of right whales on the summer feeding grounds were widespread on the continental margin, generally away from shore (Townsend, 1935; Brueggeman et al., 1985, as cited in MMS, 2001).

The scarcity of sightings along the west coast of North America suggests that right whales migrate to summer grounds from the western or central North Pacific or well offshore in the eastern North Pacific (Braham and Rice, 1984, as cited in MMS, 2001), although the location of seasonal migration routes is unknown (Scarff, 1986, as cited in MMS, 2001). Reeves and Brownell (1982, as cited in MMS, 2001) concluded that the usual wintering ground of northern right whales extended from northern California to Washington, although sightings have been recorded as far south as 23°N off Baja California and near the Hawaiian Islands (Scarff, 1986; NMFS, 1991b; Gendron et al., 1999, as cited in MMS, 2001). However, Scarff (1986, as cited in MMS, 2001) reviewed the literature and whaling records and concluded that right whales overwinter in the western or mid-North Pacific. Since 1955, only five sightings of right whales have been recorded in waters off southern California; all these sightings were of individuals and were recorded between February and May (Scarff, 1991; Carretta et al., 1994, as cited in MMS, 2001).

Northern right whales are the rarest of the endangered cetaceans. In the North Pacific, the population is currently believed to number 100-200 animals (Braham, 1984b; NMFS, 1991b, as cited in MMS, 2001).

Sperm Whale. The sperm whale (*Physeter macrocephalus*) was listed as a Federal endangered species in 1970 (35 FR 8495). No recovery plan has been prepared for this species. The main reason for listing was a severe worldwide population decline due to intensive commercial whaling.

The largest of the toothed whales, sperm whales are found predominantly in temperate to tropical waters in both hemispheres (Gosho et al., 1984, as cited in MMS, 2001). In the North Pacific, females and juveniles generally remain south of about 45°N latitude year-round, while adult males range northward as far as the Bering Sea in the summer (Best, 1979; Gosho et al., 1984, as cited in MMS, 2001). During the winter, most of the population is distributed south of 40°N (Gosho et al., 1984, as cited in MMS, 2001). Off California, sperm whales are present in offshore waters year-round, with peak abundance from April to mid-June and again from late August through November as they pass by during migration (Dohl et al., 1981, 1983; Gosho et al., 1984; Barlow et al., 1997, as cited in MMS, 2001).

Sperm whales are primarily a pelagic species and are generally found in waters with depths of greater than 1,000 m (Watkins, 1977, as cited in MMS, 2001), although their distribution does suggest a preference for continental shelf margins and seamounts, areas of upwelling and high productivity (Leatherwood and Reeves, 1986, as cited in MMS, 2001). The majority of sightings by Dohl et al. (1983, as cited in MMS, 2001) in their three-year study off central and northern California were in waters deeper than 1,800 m, but near the continental shelf edge.

The current world population of sperm whales has been estimated at 1,950,000 animals (Brownell et al., 1989, as cited in MMS, 2001). Using acoustic methods, Barlow and Taylor (1998, as cited in MMS, 2001) estimated 39,200 sperm whales in a 7.8 million-km^2 study area encompassing waters between the U.S. west coast and Hawaii. The sperm whale population off California has been estimated between about 900 and 1,200 animals (Forney et al., 1995, 2000; Barlow and Gerrodette, 1996, as cited in MMS, 2001) and appears to be relatively stable (Barlow et al., 1997, as cited in MMS, 2001). The most recent abundance estimate for California through Washington is 1,233 whales (Carretta et al., 2004). Although the population in the eastern North Pacific is expected to have grown since large-scale pelagic whaling stopped in 1980, the possible effects of large unreported catches are unknown and the ongoing incidental ship strikes and gillnet mortality make this uncertain (Carretta et al., 2004).

Steller Sea Lion. The Steller, or northern sea lion (*Eumetopias jubatus*), was listed as a Federal threatened species in 1990 (55 FR 50006). Critical habitat identified for this species includes the major California rookeries. The main reason for listing was a severe decline in the Steller sea lion population, particularly in the Alaskan portions of its range, for reasons that were not clearly understood.

The species' range extends along the North American coast from the Bering Strait in Alaska to southern California. Steller sea lions breed during the summer on rookery islands from the Pribilof Islands, Alaska, south to Año Nuevo Island in central California (Green et al., 1989, as cited in MMS, 2001). Two stocks are now recognized in U.S. waters: an eastern stock, including animals east of Cape Suckling, Alaska (144°W longitude); and a western stock, including animals at and west of Cape Suckling (Loughlin, 1997; Ferraro et al., 2000, as cited in MMS, 2001). Because of continuing population decline, the western stock was reclassified as endangered in 1997; the eastern stock (which includes animals in the project area) remains classified as threatened.

Following the breeding season, adult males in California and Oregon move northward into Washington, British Columbia, and Alaska; by the end of October, no adult males are found along the Oregon Coast (Bartholomew and Boolootian, 1960; Gentry, 1970; Mate, 1975; 1981, as cited in MMS, 2001). Female and immature Steller sea lions may not disperse as widely following the breeding season (Green et al., 1989, as cited in MMS, 2001).

Steller sea lions are presently uncommon in southern California waters (Bonnell and Dailey, 1993, as cited in MMS, 2001). A few adult or subadult males occasionally may occupy territories on relict rookeries at the west end of San Miguel Island and adjacent rocks in the summer months, but the last reported pups on San Miguel Island were seen in the summer of 1980 (Bonnell and Dailey, 1993; DeLong and Melin, 2000, as cited in MMS, 2001). North of Point Conception, a few animals have been sighted in recent years on offshore rocks at Point Sal, at Diablo Canyon near Point Buchon, and at Point Piedras Blancas (Bonnell et al., 1983, as cited in MMS, 2001). Off California, Steller sea lion sightings at sea have been concentrated in shallow waters over the shelf and upper slope (<400 m) and within 50 km from land (Bonnell et al., 1983, as cited in MMS, 2001).

Although total numbers in Oregon and California have been relatively stable in recent decades, at about 4,000 and 2,000, respectively (Hill and DeMaster, 1999, as cited in MMS, 2001), Steller sea lion distribution appears to have shifted northward (Hill et al., 1997, as cited in MMS, 2001). Año Nuevo Island is now the southernmost Steller sea lion rookery in the species' range and the largest in California, although it too is decreasing in size (Bonnell et al., 1983; Ferraro et al., 2000, as cited in MMS, 2001). Between 1990 and 1993, pup counts at Año Nuevo dropped from about 310 to 230 (Westlake et al., 1997, as cited in MMS, 2001). Smaller rookeries also exist at Cape Mendocino, the Farallon Islands, and the Point St. George Reef (Bonnell et al., 1983, as cited in MMS, 2001). In 2000, the combined count of adult and juvenile Steller sea lions at rookeries on Año Nuevo and Farallon Islands was 349 (Angliss and Lodge, 2004).

Guadalupe Fur Seal. The Guadalupe fur seal (*Arctocephalus townsendi*) was listed as a Federal threatened species in 1985 (50 FR 51252). No recovery plan has been prepared for this species. The main reason for listing was the reduction of the population to near extinction by commercial sealing in the nineteenth century.

The Guadalupe fur seal is the only representative of the genus *Arctocephalus* in the Northern Hemisphere (Repenning et al., 1971, as cited in MMS, 2001). Historically, the Guadalupe fur seal apparently ranged northward from Islas Revillagigedo off the coast of Mexico to at least Point Conception (Repenning et al., 1971; Fleischer, 1978; Walker and Craig, 1979, as cited in MMS, 2001). At present, the species breeds primarily on Isla de Guadalupe off the coast of Baja California, Mexico. In 1997, a second rookery was discovered at Isla Benito del Este, Baja California (Carretta et al., 2004). Individual animals appear regularly in the California Channel Islands (Stewart et al., 1987; Bonnell and Dailey, 1993, as cited in MMS, 2001), and a single pup was born on San Miguel Island in 1997 (DeLong and Melin, 2000, as cited in MMS, 2001).

Little is known about the distribution of Guadalupe fur seals at sea (Gallo, 1994, as cited in MMS, 2001), but recent strandings have been reported from as far north on the California coast as Sonoma County (Antonelis and Fiscus, 1980; Hanni et al., 1997, as cited in MMS, 2001).

The Guadalupe fur seal population is still small, but is growing; Gallo (1994, as cited in MMS, 2001) calculated the growth rate between 1955 and 1993 to have been 13.7 percent per year and estimated the 1993 population at approximately 7,400 animals.

Southern Sea Otter. The southern sea otter (*Enhydra lutris nereis*) was listed as a Federal threatened species in 1977 (42 FR 2968). No critical habitat has been identified. The main reasons for listing the southern sea otter (1) its small size and limited distribution, and (2) the threat of oil spills, pollution, and competition with humans.

Before commercial hunting began in the late 18th century, sea otters inhabited coastal waters of the North Pacific in an almost continuous band stretching from central Baja California, Mexico, across the Aleutians to the northern islands of Japan (Kenyon, 1969, as cited in MMS, 2001). By 1911, when sea otters were afforded protection under the North Pacific Fur Seal Convention, only 13 isolated colonies remained throughout the species' range; most of these eventually became extinct (Kenyon, 1969; Estes, 1980, as cited in MMS, 2001).

From that low point, the species began slowly to recover. Several surviving Alaskan populations began reoccupying former habitats from Prince William Sound southwest across the Aleutian Islands (Kenyon, 1969, as cited in MMS, 2001). Beginning in 1965, efforts were made to recolonize former habitats by translocating Alaskan otters to areas in southeast Alaska, the Pribilof Islands, British Columbia, Washington, and Oregon (Jameson et al., 1982; Riedman, 1987, as cited in MMS, 2001).

Since early part of this century, the California sea otter population has expanded much farther southward than northward from its initial location near Point Sur. Sea otters now range in nearshore waters from near Año Nuevo Island south to approximately Point Conception (Riedman, 1987; FWS, 2000, as cited in MMS, 2001). Northward expansion had more or less stopped at Año Nuevo by the mid-1990's (FWS, 2000, as cited in MMS, 2001). In the late 1990's, however, 20 otters were sighted between Point Año Nuevo and a point 30 miles north (CDFG, 1998, as cited in MMS, 2001). In the spring 2004 survey, 171 independent otters and 32 pups were counted north of Pigeon Point (USGS, 2004). By 1995, sea otters were relatively common as far south as Point Arguello and were routinely sighted near Point Conception (FWS, 2000; Pierson et al., unpubl. data, as cited in MMS, 2001). Some of these animals are thought to have come from the San Nicolas Island translocation population (FWS, 2000, as cited in MMS, 2001).

In spring 1998, about 100 sea otters were sighted south of Point Conception (FWS, 2000, as cited in MMS, 2001). By mid-summer, most of these otters had presumably returned to waters north of the point. However, by January 1999, more than 150 animals were again counted south of Conception (FWS, 2000, as cited in MMS, 2001). As late as May 1999, tens of otters were still present along the Santa Barbara Channel shoreline as far east as Goleta Point (USGS, unpubl. data, as cited in MMS, 2001). In the spring 2004 survey, 8 sea otters were counted southeast of Point Conception (USGS, 2004).

Sea otters typically inhabit shallow nearshore waters with rocky or sandy bottoms supporting large populations of benthic invertebrates (Riedman, 1987, as cited in MMS, 2001). In California, otters generally live in waters less than 18 m deep and less than 2 km offshore (Riedman, 1987, as cited in MMS, 2001). However, there are a number of recent observations of otters a considerable distance from shore (S. Shimek, the Otter Project, pers. comm., 2004). These include observations by oil rig operators of otters feeding on mussels and other shellfish attached to offshore oil platforms, observations by Channel Islands National Park Service naturalists of otters three miles from shore, and reports of rafts of large numbers of sea otters in the center of Monterey Bay.

The remnant California population began recovering from a low of about 50 animals around 1914 (Bryant, 1915; Riedman, 1987, as cited in MMS, 2001). The California sea otter population grew steadily at a rate of about 5 percent per year until the mid-1970s, when it was estimated to contain nearly 1,800 animals (Riedman, 1987; Riedman and Estes, 1990, as cited in MMS, 2001). The population then began declining, due to increased mortality from entanglement in set nets (Wendell et al., 1985, as cited in MMS, 2001), reaching an estimated low of fewer than 1,400 animals in 1984. A series of restrictions on nearshore net fisheries culminated in 1991, when the State of California closed waters less than 30 fathoms deep to fishing with nets. Soon thereafter, sea otter numbers began increasing; the peak spring count of 2,377 was recorded in 1995 (FWS, 2000, as cited in MMS, 2001). However, following that survey the number of otters seen during the annual spring surveys declined steadily until 1999, when 2,090 sea otters were counted, representing a 12-percent decrease over the preceding four years (FWS, 2000, as cited in MMS, 2001). Numbers increased again in May 2000, when 2,317 sea otters were counted, an almost 11-percent increase over the previous year (FWS, unpubl. data, as cited in MMS, 2001). Following 6.7-percent and 1-percent decreases in 2001 and 2002 respectively, the southern sea otter population increased by 17.1-percent in 2003 and 12.8-percent in 2004 (USGS, 2004). In 2004, the total spring count for the southern sea otter was 2,825 animals (USGS, 2004).

Between August 1987 and July 1990, the U.S. Fish and Wildlife Service translocated 139 sea otters from the central California range to San Nicolas Island (FWS, 2000, as cited in MMS, 2001). Of these, 36 are known to have returned to the parent population range, 10 were captured in the management zone and returned to the parent range, 15 are known to have died, and the fate of the remaining animals is unknown. The number of otters at San Nichols Island has only slowly increased since 1993. As of the end of 2002, the otter population at San Nicholas Island numbered only 29 animals (FWS 2003, as cited in MMS, 2001). The presumed causes for the low population on San Nicholas Island include poor recruitment (failure of pups to reach maturity), immigration, and mortality (FWS, 1995, 2000, as cited in MMS, 2001). Of the 50 sea otter pups known to have been born at San Nicolas Island as of December 1998, 6 died, 13 weaned successfully (but subsequently disappeared), and the fate of the remaining 31 is unknown (FWS, 2000, as cited in MMS, 2001).

4.7.7.3 Threatened and Endangered Birds

The following discussion provides a brief description of the threatened and endangered birds that both occur in the project area and that may be affected by project-related activities. More detailed information on the biology of the species of federally listed birds in the project area is provided in the Biological Evaluation prepared for the Section 7 consultation on the proposed Rocky Point Unit development project (MMS, 2000, as cited in MMS, 2001).

California Brown Pelican. The California brown pelican (*Pelecanus occidentalis*) was listed as endangered on October 13, 1970 (35 FR 8320). To date, no critical habitat has been designated for this species. A recovery plan for this species was finalized in 1983 (FWS, 1983, as cited in MMS, 2001). The main reason for listing this species was low reproductivity due to pesticides and food scarcity.

The range of the California subspecies of the brown pelican extends from British Columbia to the coast of southwest Mexico, but the species' current breeding range is much more restricted. Most pelicans nest on islands in the Gulf of California (Baja California) and on the Tres Marias Islands off mainland Mexico near the city of Nayarit (FWS, 1983, as cited in MMS, 2001). In the U.S., pelicans historically nested in several locations including Anacapa Island, Santa Barbara Island, Prince Island, Scorpion Rock, and even as far north as Point Lobos near Monterey. However, they currently nest only on Anacapa and Santa Barbara Islands in the Southern California Bight. Although a few pairs nested on Scorpion Rock during the 1970's, this site is unlikely to be used in the future due to high levels of human activity in the area (P. Martin, NPS pers. comm., as cited in MMS, 2001). Listing of the California brown pelican was based primarily on serious declines observed in the Southern California Bight population of this subspecies. Other populations of brown pelicans (those nesting in the Gulf of California and along the west coast of southern Baja California and mainland Mexico) have not suffered colony-wide reproductive failures to the degree that the southern California population has, although human disturbance has been an increasing source of concern in these areas (FWS, 1983, as cited in MMS, 2001).

The breeding season for brown pelicans off California is generally from March through early August, although breeding may begin as early as January in some years (FWS, 1983, as cited in MMS, 2001). Pelicans generally do not breed until they are three to five years old. They mainly lay clutches of three eggs, with incubation estimated to last for about 30 days; young birds are able to fly by about 9 weeks of age.

After the breeding season, pelicans begin to disperse along the Pacific coast to as far north as British Columbia and as far south as the southwestern coast of Mexico (FWS, 1983, as cited in MMS, 2001). Since the breeding season for pelicans nesting in Mexico may begin and end earlier than for those in California, large numbers of pelicans may begin moving northward into the Southern California Bight as early as May. Pelicans usually begin appearing north of Point Conception by July, with numbers increasing through September and October. Pelicans begin to disappear from the northern portions of their range in November. From December through March, when pelicans are nesting to the south, fewer than 500 remain north of Point Conception (Briggs et al., 1987, as cited in MMS, 2001).

Most of the pelicans seen foraging off the coast of California have been within 20 km (11 nm) of the coast; however, a few individuals have been recorded over waters deeper than 3,000 m (1,640 fm) and at distances of 88 km (48 nm) off the coast of central California (Briggs et al., 1987, as cited in MMS, 2001). The preferred nesting habitat is on offshore islands, although some individuals nest in mangroves along the Mexican coast. The northern anchovy (*Engraulis mordax*) is the primary prey species of the brown pelican (FWS, 1983, as cited in MMS, 2001). Estimates of the portion of the pelican's diet consisting of anchovies range as high as 90–95 percent (FWS, 1981). Other prey species include Pacific sardine (*Sardinops sagax*) and Pacific mackerel (*Scomber japonicus*) (Thelander and Crabtree, 1994, as cited in MMS, 2001).

Because brown pelicans have wettable plumage, as is typical for many other members of the order Pelecaniformes, they must have terrestrial roost sites for drying their plumage after feeding or swimming, and for resting and preening. Roost sites, therefore, are considered essential habitat for this species. Roosting habitat includes offshore rocks and islands, river mouths with sand bars, breakwaters, pilings, jetties, and estuaries (FWS, 1983, as cited in MMS, 2001). Pelicans usually return to specific coastal roosts each day (usually by late afternoon, but sometimes not until several hours after sunset) and do not normally remain at sea overnight. Night roosts are usually in regions with high oceanic productivity and isolated from predation pressure and human disturbance. Pelicans may also periodically return to land during the day to rest, but requirements for daytime roosts are less restrictive, and these roosts are more numerous and usually much smaller than night roosts (Briggs et al., 1983; Jacques and Anderson, 1987, as cited in MMS, 2001).

Based on Jaques and Anderson's research (1987, as cited in MMS, 2001), pelican roosts are widespread and abundant in the project area. Important pelican roost areas include the area between Morro Bay and Point Sal (especially the Pismo Beach and Diablo Canyon areas and the Santa Maria River mouth), where offshore rocks, estuaries, and beaches are used primarily. Very few offshore rocks exist to the south, and along the southern coast primary roost sites include breakwaters, jetties, and other man-made structures. One of the most important roosting areas along the southern coast, which is somewhat outside the primary area of concern for this analysis, is the breakwater at the Long Beach Harbor. Other, less regularly used roost sites include Point Mugu Lagoon, the Santa Clara River mouth, and the Marina del Rey breakwater. Pelicans also use offshore oil platforms for roosting (McCrary, pers. obs., as cited in MMS, 2001). The greatest number of pelicans, however, uses the Channel Islands (especially Santa Cruz Island) and the many offshore rocks in that area for roosting.

Based mainly on the work of Gress, the number of nests on Anacapa between 1981 and 1992, ranged from 628 in 1984 to 6,326 in 1987 (nesting attempts and productivity data are summarized in Ingram and Carter, 1997, as cited in MMS, 2001). In 1991, Carter et al. (1992, as cited in MMS, 2001) working jointly with Gress (1992, as cited in MMS, 2001) estimated the number of breeding pairs on West Anacapa Island at 5,340. The number of nests has continued to be highly variable throughout the 1990's. In 1998 there were only about 2,500 nesting attempts on West Anacapa (F. Gress, UC Davis, pers. comm., as cited in MMS, 2001), while in 1999 there were about 5,300 nesting attempts. At least some of the variation observed in the 1990's has been due to El Niño effects. Although the number of nesting attempts continues at a relatively high level, low fledging success remains a concern (F. Gress, UC Davis, pers. comm., as cited in MMS, 2001).

Prior to the 1980's, nesting pelicans used Santa Barbara Island only sporadically. However, beginning in 1985, when there were 1,046 nests on the island, pelicans have nested every year (nesting attempts and productivity data are summarized in Ingram and Carter, 1997, as cited in MMS, 2001). From 1985 to 1992, the number of nesting attempts has ranged from 1,441 in 1986 to 157 in 1988. Recent counts of nesting attempts on Santa Barbara Island include 450 in 1998 and 750 in 1999 (F. Gress, pers. comm., as cited in MMS, 2001).

Another historically important Southern California Bight colony is located in the Mexican Islas Los Coronados, located about 27 km (17 mi) south of San Diego. From the late 1880's until 1920, about 500-1,000 pairs nested on mainly the north island (FWS, 1983, as cited in MMS, 2001). Peak abundance probably occurred in the 1930's when somewhat more than 5,000 pelicans nested on the islands. The colony declined throughout the 1950's and 1960's to as few as 300 pairs by about 1970. In 1993, the last time the colony was surveyed, there were about 600 pairs on the islands (F. Gress, pers. comm., as cited in MMS, 2001).

California Least Tern. The California least tern (*Sterna antillarum browni*) was listed as endangered on October 13, 1970 (35 FR 16047). A recovery plan for the species was published in 1980 (FWS, 1980b, as cited in MMS, 2001), but critical habitat has not been designated. The main reasons for listing this species were loss of habitat, human disturbance, and predation.

The breeding range of the California least tern, which the population occupies from about April to September each year, extends from San Francisco Bay south to northern Baja California, Mexico. The winter range of the California least tern is somewhat unknown, but probably extends from the Pacific coast of southern Mexico south to Central America, and possibly South America.

During the last 20-25 years, about 50 sites in California have been occupied by nesting least terns at some time (Fancher, 1992; Caffrey, 1995, as cited in MMS, 2001). These range from Pittsburg in northern California to the Tijuana River mouth at the south end of the State. However, the number of sites actually used fluctuates from year to year, as potential nesting areas become available naturally or through site preparation efforts, or unavailable due to natural or human disturbance and/or predation. Fewer sites have been used in recent years; for example, only 40 sites were used in 2003 (Keane, 2004a). Furthermore, the number of nesting pairs is concentrated at only a few locations. In 2003, 8 of the 40 sites used that year accounted for 60 percent of the breeding pairs (Keane, 2004a). These eight sites were Alameda Point, Ormond Beach East, Venice Beach, L.A. Harbor-Pier 400, Huntington Beach, Santa Margarita River/North Beach South, Batiquitos Lagoon - W-2, and NAB Ocean.

Least terns usually begin arriving in southern California in April. Early arrival dates include April 8, 1978 for San Diego (Garrett and Dunn, 1981, as cited in MMS, 2001) and April 27, 1976 for Santa Barbara (Lehman, 1994, as cited in MMS, 2001). Nesting colonies are usually located on open expanses of sand, dirt, or dried mud, typically in areas with sparse or no vegetation. Colonies are also usually in close proximity to a lagoon or estuary where they obtain most of the small fish they consume, although they may also forage up to 3 to 5 km (2 to 3 miles) offshore. Least terns are fairly faithful to breeding sites and return year after year regardless of past nesting success. Nests consist of a shallow scrape in the sand, sometimes surrounded by shell fragments. Eggs (usually two per clutch) are laid from mid-May to early August. Incubation takes 20 to 28 days, and young fledge in about 20 days (FWS, 1980b, as cited in MMS, 2001). Least terns breed after their second year, and first-time breeders are more likely to nest later in the breeding season (Massey and Atwood, 1981, as cited in MMS, 2001). For a detailed account of least tern reproductive biology, see Thompson et al. (1997, as cited in MMS, 2001).

The southward migration of least terns may begin as early as August and few, if any, terns remain in California after late September (Garrett and Dunn, 1981, as cited in MMS, 2001). The migration route and winter distribution of these birds are mostly unknown, although they probably winter along the Pacific coast of southern Mexico and Central America.

In 1970, when California least terns were listed as endangered by the Federal government and California, their population in California was estimated at 600 breeding pairs. Population growth rates have increased, especially since the mid-1980s, when active management for least terns was initiated. Management of California least tern colonies has included intensive monitoring of nesting colonies, site preparation to reduce vegetative cover, protection of sites by means of reduced access to humans, and predator management. Although the increase in the breeding population has not been consistent from year to year (there were only about 2,598 pairs in 1995 vs. 2,792 in 1994; Caffrey 1995, 1997, as cited in MMS, 2001), long-term trends have shown steady population growth. Recent population estimates range from 3,330-3,392 pairs in 1996 (Caffrey, 1998, as cited in MMS, 2001) to 6,688-6,901 pairs in 2003 (Keane, 2004a).

In the project area from 1994 to 2003, as many as 12 sites have been used for nesting by least terns, depending to some degree on how some sites have been lumped or split in different years (Caffrey, 1995, 1997, 1998, as cited in MMS, 2001; Keane, 1998, 2000, 2004a). However, only 7-9 of these sites were used in any one year (9 sites were used in 2003), again depending on how they were tabulated. The general locations of these sites are: Pismo Dunes, Guadalupe Dunes, Mussel Rock Dunes, Vandenberg Air Force Base (Beach 2 and Purisima Point), Santa Clara River mouth, Ormond Beach (3 sites), Point Mugu, and Venice Beach. The number of pairs at most of these locations is generally low (<50). However, Venice Beach is one of the largest colonies in California, with 348 pairs in 2003 (Keane, 2004a). Also, Ormond Beach East at Point Mugu had 346-380 pairs in 2003 (Keane, 2004a).

Bald Eagle. In 1978 (43 FR 6233), the bald eagle (*Haliaeetus leucocephalus*) was listed as endangered throughout the lower 48 states except Washington, Oregon, Minnesota, Wisconsin, and Michigan, where it was listed as threatened. A recovery plan for the Pacific recovery region was approved in 1986 (FWS, 1986, as cited in MMS, 2001). The bald eagle was reclassified in 1995 from endangered to threatened as a result of the significant increase in numbers of nesting pairs, increased productivity, and expanded distribution (60 FR 36000). Critical habitat has not been designated for this species. The main reasons for listing this species were the harmful effects of pesticides, especially DDT, and habitat loss. The bald eagle was proposed for delisting in 1999 (50 FR 36453), but the decision was delayed until the U.S. Fish and Wildlife Service determines how it will manage the species once it is taken off the list (Rutledge 2004).

Historically, the bald eagle was found throughout the Channel Islands (Grinnell and Miller, 1944, as cited in MMS, 2001). Historic nesting sites along the mainland coast include the Goleta and Carpinteria areas of Santa Barbara County, La Jolla Canyon near Point Mugu in Ventura County, and Zuma Canyon west of Malibu in Los Angeles County (Garrett and Dunn, 1981, as cited in MMS, 2001). The bald eagle disappeared as a breeding bird from the Channel Islands in the late 1950’s (Garrett and Dunn, 1981, as cited in MMS, 2001). However, bald eagles have now been reintroduced to Santa Catalina Island. Currently, the Santa Catalina Island population consists of four nesting pairs and one group of three nesting birds (P. Sharpe, pers. comm., 2005); there are also three mature and two immature eagles on the island. Although the eagles are actively nesting on the island, they still suffer from the effects DDT, which remains in the waters off the island (Garcelon, 1994b; Sharpe and Garcelon, 1999, as cited in MMS, 2001).

Bald eagles also occur at Lake Cachuma in Santa Barbara County. Several birds winter there, and eagles have nested there since the late 1980’s (Lehman, 1994, as cited in MMS, 2001). A few transients may also occur along the mainland coast and the Channel Islands during migration. However, these birds usually do not remain in the area for more than a few days (P. Bloom, pers. comm., as cited in MMS, 2001).

Western Snowy Plover. The coastal population of the western snowy plover (*Charadrius alexandrinus nivosus*) was listed as threatened in the Federal Register on March 5, 1993 (58 FR 12864). A recovery plan for the species has not been completed. Designation of critical habitat was published in the Federal Register on December 7, 1999 (64 FR 68507), as shown in Table 4.7-9. The main reasons for listing this population are loss of habitat and disturbance.

Table 4.7-9. Western Snowy Plover Critical Habitat in the Project Area (64 FR 68507)

Site No.	Name	County	USGS Quad Map	Plover Use
CA-8	**Point Sur**	**Monterey**	**Point Sur**	**Nesting**
CA-9	**Arroyo Hondo Creek Beach**	**San Luis Obispo**	**Burro Mt Piedras Blancas**	**Winter**
CA-10	**Arroyo Laguna Creek Beach**	**San Luis Obispo**	**San Simeon**	**Nesting Winter**
CA-11	**Morro Bay Beaches**	**San Luis Obispo**		
Unit 1	Toro Creek Beach	San Luis Obispo	Morro Bay North	Nesting Winter
Unit 2	Atascadero Beach	San Luis Obispo	Morro Bay North/South	Nesting Winter
Unit 3	Morro Bay Beach	San Luis Obispo	Morro Bay South	Nesting Winter
CA-12	**Pismo Beach/Nipomo Dunes**	**San Luis Obispo**	**Oceano Point Sal**	**Nesting Winter**
CA-13	**Point Sal to Point Conception**	**Santa Barbara**		
Unit 1	Vandenberg Air Force Base	Santa Barbara	Casmalia	Nesting Winter
Unit 2	Santa Ynez River Mouth/Ocean Beach	Santa Barbara	Surf	Nesting Winter
Unit 3	Jalama Beach	Santa Barbara	Tranquillon Mt/Lompoc Hills/Point Conception	Winter
CA-14	**Coast Beaches**	**Santa Barbara**		
Unit 1	Devereaux Beach	Santa Barbara	Dos Pueblos Canyon Goleta	Nesting Winter
Unit 2	Point Castillo/Santa Barbara Harbor Beach	Santa Barbara	Santa Barbara	Winter
Unit 3	Carpinteria Beach	Santa Barbara	Carpinteria	Winter
CA-15	**Oxnard Lowlands**			
Unit 1	San Buenaventura Beach	Ventura	Ventura	Winter
Unit 2	Mandalay Bay/Santa Clara River Mouth	Ventura	Oxnard	Nesting Winter
Unit 3	Ormond Beach Point Mugu	Ventura	Oxnard	Nesting Winter
Unit 4	Mugu Lagoon Beach	Ventura	Point Mugu	Nesting Winter
CA-16	**San Nicolas Island Beaches**	**Ventura**	**San Nicolas Island**	**Nesting Winter**
CA-17	**Malibu Lagoon**	**Los Angeles**	**Malibu Beach**	**Winter**

Western snowy plovers are found in several western states including Washington, Oregon, California, Nevada, Utah, and Arizona as well as Baja California and mainland Mexico. However the range of the threatened Pacific coast population is much more limited. This population is defined as those individuals that nest adjacent to tidal waters, and includes all nesting birds on the mainland coast, peninsulas, offshore islands, adjacent bays, estuaries, and coastal rivers (58 FR 12864). The breeding range of the threatened population extends along the Pacific coast of North America from southern Washington to southern Baja California, Mexico. The winter range is somewhat broader and may extend to Central America (Page et al., 1995, as cited in MMS, 2001); most plovers winter from California south, however. The threatened coastal population consists of both resident and migratory birds. Some birds winter in the breeding areas, while others migrate north or south to wintering areas (Page et al., 1986; Warriner et al., 1986, as cited in MMS, 2001). The majority of birds winter south of Bodega Bay, California (Page et al., 1986, as cited in MMS, 2001).

The nesting habitat of the coastal population is mainly dune-backed beaches, barrier beaches, salt flats, and salt evaporation ponds (Page and Stenzel, 1981; Palacios and Alfaro, 1994, as cited in MMS, 2001). Habitat of wintering birds includes beaches where nesting is not known to occur.

In coastal California, plovers historically nested at 53 locations prior to 1970 (Page and Stenzel, 1981, as cited in MMS, 2001). Since that time, 33 of these sites are no longer used by nesting plovers. Declines in the number of nesting sites have also occurred in Oregon and Washington (see 35 FR 16047). Of the 20 currently used California nesting areas, 8 support 78 percent of the California breeding population. These are: San Francisco Bay, Monterey Bay, Morro Bay, the Callendar-Mussel Rock Dunes area, the Point Sal to Point Conception area, the Oxnard Lowland, Santa Rosa Island, and San Nicolas Island. Most of these areas and many others have been designated as critical habitat for the western snowy plover (64 FR 68507). Designated critical habitat in the project area is shown in Table 4.7.-9.

Snowy plovers breed in loose colonies where colony size can range up to 150 pairs. Site fidelity is high, and they often nest in the exact same location as the previous year (Warriner et al., 1986, as cited in MMS, 2001). The breeding season for western snowy plovers extends from early March to late September, with birds at more southerly locations beginning to nest earlier in the season than birds at more northerly locations (64 FR 68507). Nest initiation and egg laying occur from mid-March through mid-July (Wilson, 1980; Warriner et al., 1986, as cited in MMS, 2001). Coastal plovers lay usually three eggs (range = 2 to 6, Page et al. 1995) in a shallow depression in the sand.

Snowy plovers forage for invertebrates across sandy beaches from the swash zone to the macrophyte wrack line of the dry upper beach. They also forage in dry sandy areas above the high tide, on salt flats, and along the edges of salt marshes and salt ponds (58 FR 12864). The coastal diet consists of molluscs, worms, crabs, sandhoppers, and insects (Soothill and Soothill, 1982; Page et al., 1995, as cited in MMS, 2001).

Although historical data are not available from the period before 1981 when the first surveys were conducted, in that year the breeding population was estimated at 1,565 birds (Page and Stenzel, 1981, as cited in MMS, 2001). However, based on the number of historical nesting sites that are no longer occupied, the number of plovers nesting along the coast was most likely much higher. The breeding population continued to decline after the 1981 surveys, and the number of breeding birds was estimated at 1,386 in 1989 (Page et al., 1991, as cited in MMS, 2001), 1,180 in 1991, and 967 in 1995 (G. Page, Point Reyes Bird Observatory, Stinson Beach, California, unpublished data, as cited in MMS, 2001). The 2000 breeding season snowy plover count in California was 976 birds (Keane, pers. comm., 2004b). Based on Christmas Bird Counts from 1962 to 1984, the number of wintering birds has also declined, at least in southern California (Page et al, 1986, as cited in MMS, 2001).

The decline in the breeding population has been even more dramatic in recent years. On Vandenberg AFB in northern Santa Barbara County, the decline has been so severe that a beach closure has been put into effect beginning in spring 2000 for all but about two miles of beach. In 1997, the breeding population on the base was estimated at 240 birds, but counts in 1999 found only 78. In 2000, 106 snowy plovers bred on Vandenberg Air Force Base (Keane, pers. com., 2004b). A decline also occurred on Santa Rosa Island in the Channel Islands National Park; 72 snowy plovers were counted on the island during the 1998 breeding season, but only 41 the following year (P. Martin, CINPS, pers. comm., as cited in MMS, 2001). In 2000, only 17 adult snowy plovers were counted on Santa Rosa Island (Keane, pers. com. 2004b).

Light-footed Clapper Rail. The light-footed clapper rail (*Rallus longirostris levipes*) was listed as endangered on October 13, 1970 (35 FR 8320). A recovery plan was approved in 1979 (FWS, 1979, as cited in MMS, 2001). Critical habitat has not been designated for this subspecies. Habitat loss was the main reason for listing this species.

The current and historic range of the light-footed clapper rail extends from Bahia de San Quintin, Baja California, Mexico to Santa Barbara County, California where they are restricted to coastal salt marshes. Although, historically, most of the salt marshes in this region were probably occupied by rails, no more than 24 marshes have been occupied since about 1980 (Zembal and Hoffman, 1999, as cited in MMS, 2001). Only a portion of these 24 marshes is used each year. For example, from 1997 to 1999, 16, 17, and 14 marshes were occupied, respectively (Zembal and Hoffman, 1999, as cited in MMS, 2001). In 2004, 16 southern California wetlands were occupied by clapper rails (R. Zembal, pers. comm., 2004). The vast majority (more than 95 percent) of the remaining rails are in Orange and San Diego counties. In the project area, there are presently only two marshes occupied by rails, Carpinteria Marsh in Santa Barbara County and Mugu Lagoon in Ventura County. The next closest location for rails is the Seal Beach National Wildlife Refuge in Orange County.

The light-footed clapper rail is normally found in estuarine habitats, particularly salt marshes with well-developed tidal channels. Dense growths of cordgrass (*Spartina foliosa*) and pickleweed (*Salicornia sp.*) are conspicuous components of rail habitat, and nests are located most frequently in cordgrass. In a radio-telemetry study conducted in Newport Back Bay, radio-tagged rails spent about 90 percent of their time in cordgrass, in the lower marsh (Zembal et al., 1989, as cited in MMS, 2001). At low tides they also hunted along creek banks. When water covered the lower marsh, radio-tagged rails foraged on higher ground in sparser vegetation.

Clapper rails construct loose nests of plant stems, either directly on the ground when in pickleweed or somewhat elevated when in cordgrass (FWS, 1979, as cited in MMS, 2001). Although nests are usually located in the higher portions of the marsh, they are buoyant and will float up with the tide. Eggs are laid from mid-March to the end of June, but most are laid from early April to early May. Clutch size ranges from 3-11, with clutches of 5-9 most common. The incubation period is about 23 days, and young can swim soon after hatching.

Based on the first statewide survey, the California population was estimated at about 500 birds (Wilbur, 1974, as cited in MMS, 2001), although this estimate is believed to be somewhat high (FWS, 1979, as cited in MMS, 2001). Since 1980, the California population has ranged from a low of 284 birds in 1985 to a high of 700 in 2004 (Zembal and Hoffman, 2004). The number of marshes occupied has also varied from a low of 8 in 1989 to a high of 19 in 1984. The population in 1999 was estimated at 466, distributed among 14 marshes (Zembal and Hoffman, 1999, as cited in MMS, 2001). In 2004, the California population was 700 breeding birds in 16 marshes (R. Zembal, pers. comm. 2004). Although surveys have not been conducted in Baja California for several years, the Baja population is thought to consist of at least 400-500 pairs (R. Zembal, pers. comm., as cited in MMS, 2001).

In the project area, two marshes are currently occupied by clapper rails, Carpinteria Marsh and Mugu Lagoon (Zembal and Hoffman, 1999, as cited in MMS, 2001). Although as many as 26 pairs have been known to occur at Carpinteria Marsh, the rail population of the marsh declined sharply in 1985, and no rails were found during annual surveys from 1989 to about 1994. Since about 1995, there have been 2-5 nesting pairs, along with a few apparently unmated birds at the marsh (Zembal and Hoffman, 1999, as cited in MMS, 2001). Surveys of Carpinteria Marsh conducted in 1999 found two pairs and one unmated female (R. Zembal, pers. comm., as cited in MMS, 2001). Carpinteria Marsh had only advertising singles in 2003 and 2004 (R.Zembal, pers. comm. 2004). From 1984 to 2001, Mugu Lagoon had been consistently occupied by 3-6 nesting pairs and a few unpaired birds but the population began to increase in 2002 (Zembal and Hoffman, 2004). Mugu Lagoon had an all-time high population of 19 pairs in 2004 (R. Zembal, pers. comm., 2004).

4.7.7.4 Threatened and Endangered Sea Turtles

Sea turtles typically inhabit tropical and subtropical seas and are uncommon in eastern North Pacific waters north of Mexico. Historically, four species of sea turtles have been recorded in the eastern North Pacific: the leatherback sea turtle (*Dermochelys coriacea*), the green sea turtle (*Chelonia mydas*), the Pacific (or olive) ridley sea turtle (*Lepidochelys olivacea*), and the loggerhead sea turtle (*Caretta caretta*) (Caldwell, 1962; Marquez, 1969; Hubbs, 1977, as cited in MMS, 2001). Sea turtle populations have been greatly reduced by overharvesting and, to a lesser extent, coastal development of nesting beaches in developed countries (Ross, 1982, as cited in MMS, 2001).

In the eastern Pacific, most sea turtles probably nest on the Pacific coasts of Mexico and Central America. Sea turtles reach sexual maturity at about 4 to 9 years, depending on the species (Mager, 1984, as cited in MMS, 2001). They breed at sea, and the females instinctively return to their natal beaches to lay eggs (although leatherbacks are not such strict remigrators). The nesting season varies with species (Mager, 1984, as cited in MMS, 2001). Females typically nest four to seven times during the nesting season (again depending upon the species) with clutch sizes of 80 to 150 eggs. About 2 months after being laid in the sand, eggs hatch, and the young instinctively make for the sea. Once at sea the males very rarely, if ever, return to land (Mager, 1984, as cited in MMS, 2001).

Leatherback Sea Turtle. Leatherback sea turtles, the largest of the sea turtles, occur in the Atlantic, Indian, and Pacific Oceans (Mager, 1984, as cited in MMS, 2001). The species was listed as endangered in 1970 (35 FR 8495). Leatherbacks commonly range farther north than other sea turtles, probably because of their ability to maintain warmer body temperatures over longer time periods (Frair et al., 1972, as cited in MMS, 2001), and they have been sighted in the eastern north Pacific as far north as Alaska (Mager, 1984, as cited in MMS, 2001). Leatherback sea turtles in the eastern Pacific are probably part of the western Mexico, Central America, and northern Peru breeding population (Mager, 1984, as cited in MMS, 2001). Pritchard (1971, as cited in MMS, 2001) estimated that there were at least 8,000 nesting females in the eastern Pacific; on the basis of additional information, he later estimated a total world population of 115,000 mature females (Pritchard, 1982, as cited in MMS, 2001).

Leatherbacks are the most common sea turtle in U.S. waters north of Mexico (Dohl et al., 1983; Green et al., 1989; NMFS and FWS, 1998a, as cited in MMS, 2001). On aerial surveys of Washington and Oregon waters conducted in 1989 and 1990, Green et al. (1992, as cited in MMS, 2001) recorded 16 sightings of leatherbacks (no other sea turtles were seen); all sightings were made between June and September, when sea surface temperatures were highest, in waters over the slope and shelf. Most (83 percent) of the sea turtles sighted off northern and central California by Dohl et al. (1983, as cited in MMS, 2001) during their 3-year survey were leatherbacks, and nearly 90 percent of these sightings were made during the summer and fall. Sightings were widely distributed from 10 to 185 km offshore, and most were recorded in waters over the continental slope. It has been surmised that an eastern Pacific migratory corridor probably exists along the U.S. west coast and Mexico; the timing of these sightings may indicate adult leatherbacks moving southward for winter breeding in Mexico (NMFS and FWS, 1998a, as cited in MMS, 2001).

Female leatherbacks apparently migrate between foraging and breeding grounds at 2 to 3-year intervals (NMFS and FWS, 1998a, as cited in MMS, 2001). In Mexico, where roughly one-half of the world population of females nests, the nesting season extends from November to February, although some females arrive as early as August (NMFS and FWS, 1998a, as cited in MMS, 2001).

Although considered omnivorous (feeding on sea urchins, crustaceans, fish, and floating seaweed), leatherbacks feed principally on soft foods such as cnidarians (*medusae, siphonophores*) and tunicates (*salps, pyrosomas)* (Mager, 1984; NMFS and FWS, 1998a, as cited in MMS, 2001). There are reports of surface feeding on jellyfish off the U.S. west coast (Eisenberg and Frazier, 1983, as cited in MMS, 2001). Leatherbacks also may forage nocturnally at depth on *siphonophores* and *salps* in the deep scattering layer (Eckert et al., 1989; NMFS and FWS, 1998a, as cited in MMS, 2001).

Green Sea Turtle. Green sea turtles are distributed worldwide in waters that remain above 20°C during the coldest month. The species was listed in 1978 (43 FR 32808); green turtles in the Pacific are listed as threatened, except for Mexican breeding populations, which are listed as endangered. No reliable population estimates are available for the green sea turtle in the Pacific (Mager, 1984, as cited in MMS, 2001). Prior to commercial exploitation, green turtles were abundant in the eastern Pacific from Baja California south to Peru and west to the Galapagos Islands (NMFS and FWS, 1998b, as cited in MMS, 2001). Off the Pacific coast, sightings have been recorded as far north as British Columbia, although most have been reported from northern Baja California and southern California (Mager, 1984; NMFS and FWS, 1998b, as cited in MMS, 2001). Green turtles have stranded in northern California and on the Washington and Oregon coasts in recent decades (Smith and Houck, 1984; Green et al., 1992, as cited in MMS, 2001).

Green sea turtles were once common in San Diego Bay, but now appear limited to a single channel in the southern part of the bay (Hubbs, 1977, as cited in MMS, 2001), where they seem to be year-round residents (NMFS and FWS, 1998b, as cited in MMS, 2001). Regular sightings of small juveniles suggest that turtles are continuing to migrate into the bay (NMFS and FWS, 1998b, as cited in MMS, 2001).

At present, the main nesting sites for eastern Pacific green turtles are located along the Pacific coast of Mexico (State of Michoacán) and in the Galapagos Islands (Mager, 1984; NMFS and FWS, 1998b, as cited in MMS, 2001). There are also smaller nesting grounds along the Central American Pacific coastline (NMFS and FWS, 1998b, as cited in MMS, 2001).

Green sea turtles are primarily herbivorous, feeding on sea grasses and algae, although they may feed on a variety of marine animals in some areas (Mager, 1984; NMFS and FWS, 1998b, as cited in MMS, 2001). Identified animal food items include molluscs, crustaceans, bryozoans, sponges, jellyfish, polychaetes, echinoderms, fish and fish eggs (NMFS and FWS, 1998b, as cited in MMS, 2001).

Pacific Ridley Sea Turtle. Pacific, or olive, ridley sea turtles are the smallest of the sea turtles (Mager, 1984, as cited in MMS, 2001). Olive ridleys occur worldwide in tropical to warm temperate waters and are considered to be the most abundant sea turtle in the world (NMFS and FWS, 1998c, as cited in MMS, 2001). The species was listed in 1978 (43 FR 32808); Pacific ridleys on the Pacific coast of Mexico are listed as endangered, all other populations as threatened. In the eastern North Pacific, the species' main foraging areas extend between Colombia and Mexico. Major nesting beaches are, as with many other eastern Pacific sea turtles, on the Pacific coasts of Mexico and Costa Rica, although a few may nest as far north as Baja California (Mager, 1984; NMFS and FWS, 1998c, as cited in MMS, 2001). Currently, as many as 200,000 females are estimated to nest in Mexico each year (Márquez, 1990; NMFS and FWS, 1998c, as cited in MMS, 2001).

These sea turtles are infrequent visitors to waters north of Mexico. According to Green et al. (1992, as cited in MMS, 2001), Pacific ridleys have stranded on the Washington and Oregon coasts during the past decade, and strandings have also been recorded from northern California (Houck and Joseph, 1958; Smith and Houck, 1984). Hubbs (1977, as cited in MMS, 2001) observed a pair of Pacific ridleys mating in the water off La Jolla, San Diego County, California, in August 1973.

In the eastern Pacific, ridleys nest throughout the year, with peaks occurring from September through December (NMFS and FWS, 1998c, as cited in MMS, 2001).

They are considered omnivorous, feeding on a variety of benthic and some pelagic items (NMFS and FWS, 1998c, as cited in MMS, 2001). Identified prey include fish, crabs, shrimp, snails, oysters, sea urchins, jellyfish, salps, fish eggs, and vegetation (Ernst and Barbour, 1972; NMFS and FWS, 1998c, as cited in MMS, 2001). Pacific ridleys may also scavenge (NMFS and FWS, 1998c, as cited in MMS, 2001).

Loggerhead Sea Turtle. Loggerhead sea turtles inhabit subtropical to temperate waters worldwide, and are generally found in waters over the continental shelf (Carr, 1952; Mager, 1984, as cited in MMS, 2001). The species was listed as threatened in 1978 (43 FR 32808). In the Pacific, loggerheads nest only in the western region, primarily at and near Japan and Australia (NMFS and FWS, 1998d, as cited in MMS, 2001). There are no reliable population estimates for the loggerhead sea turtle in the Pacific (Mager, 1984, as cited in MMS, 2001).

Stebbins (1966, as cited in MMS, 2001) listed southern California as the northern limit of the loggerhead range. In recent years, most sightings of this species have been reported from southern California and Baja California waters, generally during the summer (Guess, 1982; NMFS and FWS, 1998d, as cited in MMS, 2001). Although Smith and Houck (1984, as cited in MMS, 2001) reported no sightings of this species for northern California, Green et al. (1992, as cited in MMS, 2001) state that this species has stranded on the Washington and Oregon coasts during the past two decades.

Loggerhead sea turtles are omnivorous, feeding on a variety of benthic prey including shellfish, crabs, barnacles, oysters, jellyfish, squid, sea urchins, and occasionally on fish, algae, and seaweed (Carr, 1952; Mager, 1984; NMFS and FWS, 1998d, as cited in MMS, 2001).

On December 16, 2003, NOAA Fisheries issued a final rule to protect loggerhead sea turtles that follow warmer El Nino currents and risk becoming entangled in drift gillnet fishing operations (50CFRPart 223). The regulation prohibits drift gillnet fishing in United States waters off southern California east of 120^{o}W longitude (Point Conception to the Mexican border), for the months of June, July, and August during an El Nino year that raises sea surface temperatures off southern California.

4.7.7.5 Threatened and Endangered Plant Species

Salt Marsh Bird's-Beak (*Cordylanthus maritimus* ssp.*maritimus*). The salt marsh bird's beak (*Cordylanthus maritimus* ssp.*maritimus*), an annual semiparasitic herb in the figwort family (*Scrophulariaceae*), was listed as endangered on September 28, 1978 (43 FR 44812). A recovery plan for this species was approved in 1984 (FWS, 1984b, as cited in MMS, 2001). Critical habitat has not been designated. The main reason for listing this species was habitat loss. This plant is generally restricted to coastal salt marshes. Although there has been some confusion in the past over the range of this subspecies and the similar Point Reyes bird's-beak (*Cordylanthus maritimus* spp. *palustris*), this plant occurs in salt marshes from Carpinteria Marsh in Santa Barbara County south to San Diego County and Northern Baja California, Mexico. Herbarium records indicate that it was found in at least 10 marshes in California (FWS, 1984b, as cited in MMS, 2001), and in as many as 5 in Baja. The current distribution of this species includes Carpinteria Marsh, the Ventura County Game Preserve, Ormond Beach, Mugu Lagoon, Anaheim Bay, Upper Newport Bay, Sweetwater Marsh, and the Tijuana River estuary (FWS, 1984b, as cited in MMS, 2001).

The primary habitat for this plant is the upper salt marsh that is inundated by tides on a regular basis, but above areas that receive daily salt flooding. Plants may also occur behind barrier dunes, on dunes, mounds, and occasionally in areas with no tidal influence. The plant forms root associations with other plant species such as salt grass (*Distichlis spicata*), pickleweed (*Salicornia* sp.), and cattail (*Typha latifolia*), which may be especially important for plants growing on drier sites (FWS, 1984b, as cited in MMS, 2001). Population data are not available for most of the salt marsh bird's-beak sites.

California Sea-Blite (*Suaeda californica*). The California sea-blite (*Suaeda californica*), a succulent-leaved perennial plant of the goosefoot family (*Chenopodiaceae*), was listed as endangered on December 15, 1994 (59 FR 64623). A recovery plan is not available for this species, and critical habitat has not been designated. The main reason for listing this species was habitat loss. Some confusion has occurred over the historical range of this plant. Munz (1959, as cited in MMS, 2001) described the range as extending from San Francisco Bay south to southern Baja California, Mexico. However, Ferren and Whitmore (1983, as cited in MMS, 2001) separated the plant into two species. The plant they separated out, *Suaeda esteroa*, occurs from Santa Barbara County south to Baja. The historical range of the California sea-blite, therefore, includes the San Francisco Bay area and Morro Bay. The only existing population of this species is along the perimeter of Morro Bay. The distribution of California sea-blite around Morro Bay was mapped in the early 1990s (see 59 FR 64623). On the east side of the bay, colonies occur adjacent to the communities of Morro Bay, Baywood Park, and Cuesta-by-the-Sea, although it apparently is absent from the more interior portion of the marshlands created by Chorro Creek runoff. On the west side of the bay, it is found along most of the spit, excepting the northern flank adjacent to the mouth of the bay. California sea-blite is restricted to the coastal marsh habitat of Morro Bay, where it occurs in a very narrow band in the upper intertidal zone. Sea-blite occurs in association with other marsh plants including pickleweed, saltgrass, spiny rush, jaumea, frankenia, and the federally endangered salt marsh birds-beak (59 FR 64623). The sea-blite's colonial habits make it difficult to estimate the population. One estimate places the number of individuals at no more than 500 (see 59 FR 64623).

4.7.7.6 Threatened and Endangered Amphibians

California Red-Legged Frog (*Rana aurora draytonii*) (Threatened**)**. The California red-legged frog (*Rana aurora draytonii*) was listed as threatened on May 23, 1996 (61 FR 25813). A final recovery plan for the species was released on September 12, 2002 (67 FR 57830). A final rule designating critical habitat for the California red-legged frog was signed on March 1, 2001, and published in the Federal Register on March 13, 2001 (66 FR 14626). On June 8, 2001, a lawsuit was filed in the U.S. District Court for the District of Columbia challenging the Service's designation of critical habitat for the California red legged frog. On November 6, 2002, the court entered a consent decree remanding the designation to the Service to conduct an economic analysis. The consent decree vacated the critical habitat designation for the California red-legged frog with the exception of Units 5 and 31, units not known to be occupied by the frog, and ordered the Service to promulgate a proposed revised designation by March 2004, and a final revised rule by November 2005.

The California red-legged frog has been extirpated from 70 percent of its former range and is threatened in its remaining range by a wide variety of human impacts, including urban encroachment, construction of reservoirs and water diversions, introduction of exotic predators and competitors, livestock grazing, and habitat fragmentation. The historical range of the California red-legged frog extended coastally from the vicinity of Point Reyes National Seashore, Marin County, and inland from the vicinity of Redding, Shasta County, southward to northwestern Baja California, Mexico (Jennings and Hayes, 1985; Hayes and Krempels, 1986, as cited in MMS, 2001). The central coast recovery unit from San Mateo and Santa Clara Counties south to Ventura and Los Angeles Counties is one of five units considered essential to the survival of the species.

The diet of California red-legged frogs is highly variable. Hayes and Tennant (1985, as cited in MMS, 2001) found invertebrates to be the most common food items of adult frogs. Vertebrates, such as Pacific tree frogs (*Hyla regilla*) and California mice (*Peromyscus californicus*), represented over half of the prey mass eaten by larger frogs (Hayes and Tennant, 1985, as cited in MMS, 2001). Hayes and Tennant (1985, as cited in MMS, 2001) found juvenile frogs to be active diurnally and nocturnally, whereas adult frogs were largely nocturnal. Feeding activity likely occurs along the shoreline and on the surface of the water (Hayes and Tennant, 1985, as cited in MMS, 2001).

California red-legged frogs are known to occur in 243 streams or drainages in 22 counties, primarily in the central coastal region of California. Monterey (32), San Luis Obispo (36), and Santa Barbara (36) Counties support the greatest number of currently occupied drainages.

4.7.7.7 Threatened and Endangered Wildlife

Three sensitive wildlife species are found in the onshore region:

- **Morro Bay Kangaroo Rat** (*Dipodomys Ingens*). No onshore facilities are proposed within the range of this species, and its current habitat would not be subject to either direct or indirect effects from the proposed projects (R. Gamps, California Polytechnic State University, San Luis Obispo, pers. comm., as cited in MMS, 2001).
- **Island Night Lizard** (*Xantusia riversiana*). This species is an island endemic; its habitat would not be subject to either direct or indirect effects from the proposed projects (P. Martin, NPS, pers. comm., as cited in MMS, 2001).
- **Morro Shoulderband Snail** (*Helminthoglypta walkeriana*). The Morro shoulderband snail was listed as endangered on January 17, 1995. It is found in the Los Osos area near Morro Bay, usually within or near coastal dune scrub vegetation. Its current habitat would not be subject to either direct or indirect effects from the proposed projects (R. Sloan, Morro Group, Inc., pers. comm., as cited in MMS, 2001).

4.7.7.8 Impacts of Past Offshore Oil and Gas Activities

Offshore oil and gas activities began off southern California in the 1800's (Lima, 1994, as cited in MMS, 2001). Section 5.2 provides information on current offshore infrastructure and levels and types of activities. Several reviews have been made of the possible cumulative impacts of these activities on biological resources in the region (Van Horn et al., 1988; Bornholdt and Lear, 1995, 1997; MMS, 1996, As cited in MMS, 2001).

Impacts of past oil and gas activities on threatened and endangered fish are addressed in Section 4.7.4 above.

THREATENED AND ENDANGERED MARINE MAMMALS

Noise and disturbance associated with offshore oil and gas activities in southern California have resulted in few documented impacts to marine mammals. Van Horn et al. (1988, as cited in MMS, 2001) concluded that seismic surveys and support vessel traffic had resulted in temporary, localized disturbances to some marine mammals, primarily gray whales. However, despite hypothesizing that increased vessel traffic off southern California might be causing greater numbers of gray whales to migrate farther offshore (Wolman and Rice, 1979; MBC Applied Environmental Services, 1989, as cited in MMS, 2001), the gray whale population has grown steadily during recent decades. Blue and humpback whales have also been appearing off southern California in increasing numbers in summer and fall. There is no evidence that increased vessel traffic (of which oil and gas support vessels are a very small part) has resulted in adverse impacts on endangered cetacean populations.

Based on experiences in southern California, the MMS believes that accidental collisions between endangered whales and support vessel traffic are unlikely events. Although large cetaceans have occasionally been struck by freighters or tankers, and sometimes by small recreational boats, no such incidents have been reported with crew or supply boats off California (MMS, unpubl. Data, as cited in MMS, 2001).

The same is true for southern sea otters.

Pinnipeds are nimble and considered unlikely to be struck by vessels. However, the single documented instance of a collision between a marine mammal and a support vessel involved a pinniped— an adult male elephant seal struck and presumably killed by a supply vessel in the Santa Barbara Channel in June 1999.

The only oil spill from offshore oil and gas activities in southern California known to have contacted marine mammals was the 1969 Santa Barbara Channel spill. Although the entire northward migration of California gray whales passed through the Santa Barbara Channel while it was contaminated, Brownell

(1971, as cited in MMS, 2001) found no evidence that any cetacean mortality had occurred due to the spill. Similarly, studies of elephant seals and California sea lions contacted by the 1969 spill reported no evidence of pinniped mortality from this event (Brownell and Le Boeuf, 1971; Le Boeuf, 1971). Since 1971, when formal tracking of all OCS spills was initiated, 841 OCS-related oil spills have occurred in the Pacific Region (see Section 5.3.1). However, almost all of these (99 percent) have been very small (less than 50 bbl), although five ranged in size from 50 to 163 bbl. No impacts to marine mammals have been reported from these spills. Although one OCS oil spill, the 1997 Torch spill off Point Pedernales, did contact the shoreline at the southern end of the sea otter range, no otters are known to have been contacted by oil (M.D. McCrary, MMS, pers. comm., as cited in MMS, 2001).

To date, no significant impacts on threatened and endangered marine mammal populations from OCS oil and gas activities have been identified.

THREATENED AND ENDANGERED BIRDS

The impact sources related to offshore oil and gas activities that may have had long-term (e.g., months or years) effects on threatened and endangered birds in the project area are oil spills and helicopter flights. Other activities, including noise and disturbance associated with exploration, platform and pipeline installation, and vessel traffic, would have had, at most, very short-term (e.g., hours or days), minor effects on threatened and endangered birds in this area.

The largest OCS-related oil spill in the Pacific Region was the 1969 Santa Barbara spill, which resulted in the loss of thousands of birds of many different species, including brown pelicans (Straughn, 1971, as cited in MMS, 2001). As discussed above for marine mammals, all other oil spills in southern California were either very small (less than 50 bbl) or had no reported impact on birds except for the 163-bbl 1997 Torch pipeline spill off Point Pedernales. The Torch spill contacted the shoreline and resulted in bird mortality. The Torch spill is estimated to have killed more than 700 birds including endangered brown pelicans (McCrary et al., 2003). Federal threatened western snowy plovers also were harmed by the spill (USFWS et al., 2004).

The level of OCS-related helicopter traffic in the Pacific Region is described in Section 5.1. Helicopter traffic can cause disturbances to birds, especially in largely unpopulated areas (e.g., Alaska). Several international and numerous smaller airports occur along the southern California coast along with several military airports, and air traffic is a constant daily or even hourly occurrence, and birds have probably become habituated to air traffic at least to some extent in this area. Probably birds are most sensitive to the effects of helicopter traffic when they are nesting. Brown pelicans nest on Anacapa and Santa Barbara Islands, which are part of the Channel Islands National Marine Sanctuary and the Channel Islands National Park, where air traffic is restricted to altitudes greater than 1,000 feet.

4.7.8 Estuarine and Wetland Habitats

Estuaries are bodies of water ranging in size from streams to large bays that communicate with the sea through relatively narrow openings. The openings of many estuaries are closed to the sea for certain periods of time. Most estuaries are characterized by strong salinity gradients, ranging from very low salinity at the head to high salinity at the mouth. Wetlands are the saturated lowland areas associated with the estuary, such as a swamp or mudflat. This section will focus on estuarine and wetland habitats; for specific discussions of the plants, animals or fish and endangered species residing in these habitats, please refer to the appropriate sections in this chapter.

Estuaries and wetlands in the Southern California Bight have been severely impacted through physical alteration by commercial and residential development, upland practices in the watersheds increasing sediment load, and discharges of pollutants into the watersheds through agricultural practices and surface runoff. Consequently, there are numerous local, state, and federal regulations protecting remaining wetland areas. Policies of the Coastal Act on 1976 and the local Land Use Plans specifically afford wetland and estuarine habitat protection through limitations placed on dredging, excavation and construction activities (A. D. Little, 1984, as cited in MMS, 2001). The Regional Water Quality Control Board and local water quality agencies require permits for projects that could discharge into a watershed. Additionally, a variety of biological agencies such as the U.S. Fish and Wildlife Service and California Department of Fish and Game protect specific species found in wetlands that are listed under Federal or State provisions as candidate, threatened, or endangered species.

MMS protects this habitat through lease stipulations, regulations, and inspection procedures designed to prevent oil from reaching and impacting important estuarine habitat due to oil spill prevention measures and field response.

Regional Setting

Estuarine habitats contain a greater diversity of both plant and animal life forms, per unit surface area, than any other habitat in the marine environment. Estuarine habitats are highly productive because they constitute an area where freshwater, marine and terrestrial habitats meet and intermingle. Estuarine habitats often serve as spawning and nursery grounds for marine fish and invertebrates. Although the size and relative importance varies, estuaries are found along most of the Pacific Coast.

In general, the estuaries off California are smaller than along the East Coast and the estuaries in southern California are the most heavily disturbed along California. The largest of the relatively unaltered bays is Morro Bay. Morro Bay contains an extensive salt marsh, tidal mudflats, and a rich assemblage of estuarine and terrestrial animals. Eel grass beds are extensive providing specialized habitat for plants, invertebrates and important bird species, such as the black brant (MMS, 1996, as cited in MMS, 2001). In 1994, the Governor named Morro Bay as California's first State Estuary. The designation recognized the importance of "preserving and enhancing Morro Bay and its watershed as one of the state's rare natural treasures." In 1995, Morro Bay was designated one of only 28 National Estuaries. Congress established the National Estuary Program as part of the Clean Water Act to restore and protect these important coastal resources (Morro Bay National Marine Estuary Program, 2004). For a complete discussion of birds, fishes and endangered plants refer to the appropriate sections in this document.

Important estuarine habitats in Santa Barbara County include the Santa Ynez River, Goleta Slough and Carpinteria Marsh. Resources found are described in detail in Santa Barbara County's inventory of coastal wetland resources (Ambrose, 1995, as cited in MMS, 2001).

The Santa Ynez River and Carpinteria Marsh have limited tidal flushing because they become closed off at the mouth by natural sand berms seasonally. The Santa Ynez River and the Goleta Slough contain by far the largest areas of salt marsh in the Santa Barbara County area. They also contain large mud flats and channels. On average, 40 percent of the plant species identified were non-native (Ambrose, 1995, as cited in MMS, 2001). Invertebrates were lacking at all wetland sites except those with regular tidal flushing. Ambrose (1995, as cited in MMS, 2001) found that higher numbers of birds were associated with wetlands that have larger flooded areas. Their surveys also found that Goleta Slough contained the highest diversity of fish.

Tidewater gobies (*Eucyclogobicus newberryi*) were sampled in a large percentage of the identified creeks, the highest number at Santa Ynez River (Ambrose, 1995, as cited in MMS, 2001). The streams in Santa Barbara County are perennial or intermittent. Streams that had, at some time, a connection to the ocean and are subject to tidal inundation are more likely to be impacted by an accidental oil spill. In Santa Barbara County, 24 streams were identified which could have inward flow at certain times of the year (Ambrose, 1995, as cited in MMS, 2001); roughly a third of the streams, therefore, are more susceptible to oiling. For example, of the 26 streambeds from Gaviota to Point Conception, 10 have perennial flow (A. D. Little, 1984, as cited in MMS, 2001).

One of the largest remaining wetlands in southern California is Mugu Lagoon in Ventura County. It has a permanently open mouth that assures good water quality but also makes it more vulnerable to an oil spill. Important habitats include open water, mudflats, tidal creeks and a very extensive salt marsh. The salt marsh is the most extensive in southern California and supports many endangered and sensitive species including salt marsh bird's beak, clapper rail, Belding's savannah sparrow, least tern, snowy plover and brown pelican (pers. comm., R. Ambrose, U.C.L.A., 2001, as cited in MMS, 2001) Mugu Lagoon is also an important stop on the Pacific flyway, serving many thousands of migrating shorebirds each year. While serving a diverse biological community, Mugu Lagoon and its watershed contends with a variety of disturbances from onshore activities. Ongoing Navy activities including noise and emissions from air traffic, urban and rural runoff, and input from six sewage treatment plants provide ongoing sources of contamination and disturbance. Agricultural runoff into the watershed is another source of ongoing disturbance.

Descriptions of the various community types found in estuaries and wetlands such as tidal flats, eel grass beds, salt marsh, open water, and rocky bottoms are found in a variety of document including previous Lease Sale EIS's, and development EIS's, as well as documents listed in Table 4.7-10.

Table 4.7-10. References for Wetland and Estuarine Habitats*

Author and Publication Date	Description of Study
Ambrose, 1995	Biological inventory of wetlands in Santa Barbara County.
Coastal Conservancy; SCCWRP (2002 and 2003)	Website detailing database of information about wetlands through the Southern California Wetlands Recovery project. www.coastalconservancy.ca.gov/sccwrp/index
Zedler, 1982	Characterization of wetlands from southern Santa Barbara county to the Mexican border.

* References are cited from MMS, 2001.

Impacts of Past Offshore Oil and Gas Activities

The two activities from oil and gas activities that would impact wetland or estuarine habitats are nearshore/onshore pipeline construction and an oil spill accident. Pipelines have been constructed in several locations that border on estuarine areas. These include the Point Pedernales pipeline near the Santa Ynez River, the Point Arguello pipeline which transects several streambeds, the All American pipeline which crosses streambeds along southern Santa Barbara County and several pipelines connecting older facilities to the Carpinteria Plant near the Carpinteria Marsh.

The Point Pedernales pipeline to shore connecting Platform Irene to its onshore facility in Lompoc was installed north of Santa Ynez River. Mitigation measures placed on the project by the County of Santa Barbara and the U.S. Fish and Wildlife service, in particular, were intended to mitigate impacts to the wetland from increased sedimentation and habitat removal. In conversation with the county's environmental inspector, it appears that very few, if any, impacts occurred in the wetland due to the pipeline's location north of the river (pers. comm., J. Storrer, 2000, as cited in MMS, 2001). Residual impacts from the pipeline installation relate to terrestrial vegetation recovery and not impacts to the wetland resources. UNOCAL satisfied all of its County permit conditions related to the shoreline resources, including the dune area. The two remaining issues are terrestrial: the replanting of a large number of oak trees and the realignment of a road (pers. comm., J. Storrer, 2000, as cited in MMS, 2001). Periodic pipeline block valves, required by the U.S. Fish and Wildlife Service to minimize the size of a spill into the river should a break occur, were installed and are inspected regularly.

The Point Arguello pipeline from Platform Hermosa to the onshore facility at Gaviota crossed ten miles of onshore land containing 27 intermittent creeks and streams. As is the case with the Point Pedernales pipelines, residual impacts include primarily terrestrial revegetation issues rather than wetland resource problems. Construction did not result in significant increases in sediment load or other losses to the streambed/wetland habitats themselves (pers. comm., J. Storrer, 2000, as cited in MMS, 2001) The only offshore OCS spills that have hit the shoreline were the 1969 blowout and the Platform Irene pipeline spill in 1997. There is no indication that oil from the 1969 blowout reached wetland habitat. This is surprising since the Carpinteria Marsh is close to other heavily oiled beaches, near the origin of the spill, and virtually unprotected by today's standards (Santa Barbara News Press, Straughan, 1971, URS, 1974, as cited in MMS, 2001). It seems probable that ongoing rain during the first several days of the spill caused the rivers to have outward flow, thereby preventing inward flow of oil. In the case of the 1997 spill, although the Santa Ynez River mouth was within a short distance of the spill origin, it was not damaged. A small quantity of oil passed over the natural berm at the Santa Ynez River due to unusually high tides, however, no measurable impacts to wetland habitat or resources were identified (pers. comm., K. Wilson, CDFG/OSPR 2001, as cited in MMS, 2001).

In conclusion, overall impacts to wetland and estuarine habitats from oil and gas construction activities to date have been low. Temporary increases in sedimentation in intermittent streams may have occurred during pipeline construction activities, and short-duration loss of access to areas by resident birds during construction activities may also have occurred at the Santa Ynez River. Oil spills from OCS activities have not occurred that have affected wetland habitat to date.

4.7.9 Refuges, Preserves and Marine Sanctuaries

Refuges, preserves, and marine sanctuaries are areas that are legally defined and regulated by the State or Federal government, with the primary intent of protecting marine resources for their inherent biological or ecological value (for more detailed information on these areas, see A. D. Little, 1985 and McArdle, 1997, as cited in MMS, 2001). For information on the biological resources protected within these areas, refer to the individual resource sections in Chapter 4. Additional areas, which are considered by many to be unique or of significant biological importance, but not legally defined as such, may also be discussed in the appropriate resource section. Other areas that have been designated for public use and preserved principally for their recreational and/or aesthetic values are described in Section 4.9.

State Protected Areas

Marine protected areas (MPAs) within the study area that are legally defined and controlled by the State of California include reserves, ecological reserves, Areas of Special Biological Significance (ASBS), and University of California Natural Reserves. The purpose in assigning marine preserve or ecological reserve status to certain coastal areas is to further protect (beyond existing regulations) the State's tidepool and shallow subtidal resources from the abuse and waste of recreational and commercial harvesting. This is achieved by prohibiting the general (unpermitted) collection of animals and plants within the designated boundaries of preserves to 1,000 feet beyond the low tidemark. Ecological reserves extend this level of protection to include rare or endangered wildlife and aquatic organisms, as well as specialized habitat types, both terrestrial and aquatic. Thus, entire ecosystems are maintained in a natural condition for the benefit of both the general public and scientific communities. Currently, the preserves and ecological reserves that occur within the study area are listed below (see Table 4.7-11 and Figure 4.7-1).

Areas of Special Biological Significance. Areas of Special Biological Significance (ASBS) contain biological communities that, because of their intrinsic value or fragility, deserve special protection through the preservation and maintenance of natural water quality conditions. The purpose of ASBS designation is to eliminate the risk of damage to valuable intertidal and shallow subtidal habitats and their marine life occupants by prohibiting the discharge of wastes into, or within the vicinity of, these special biological communities.

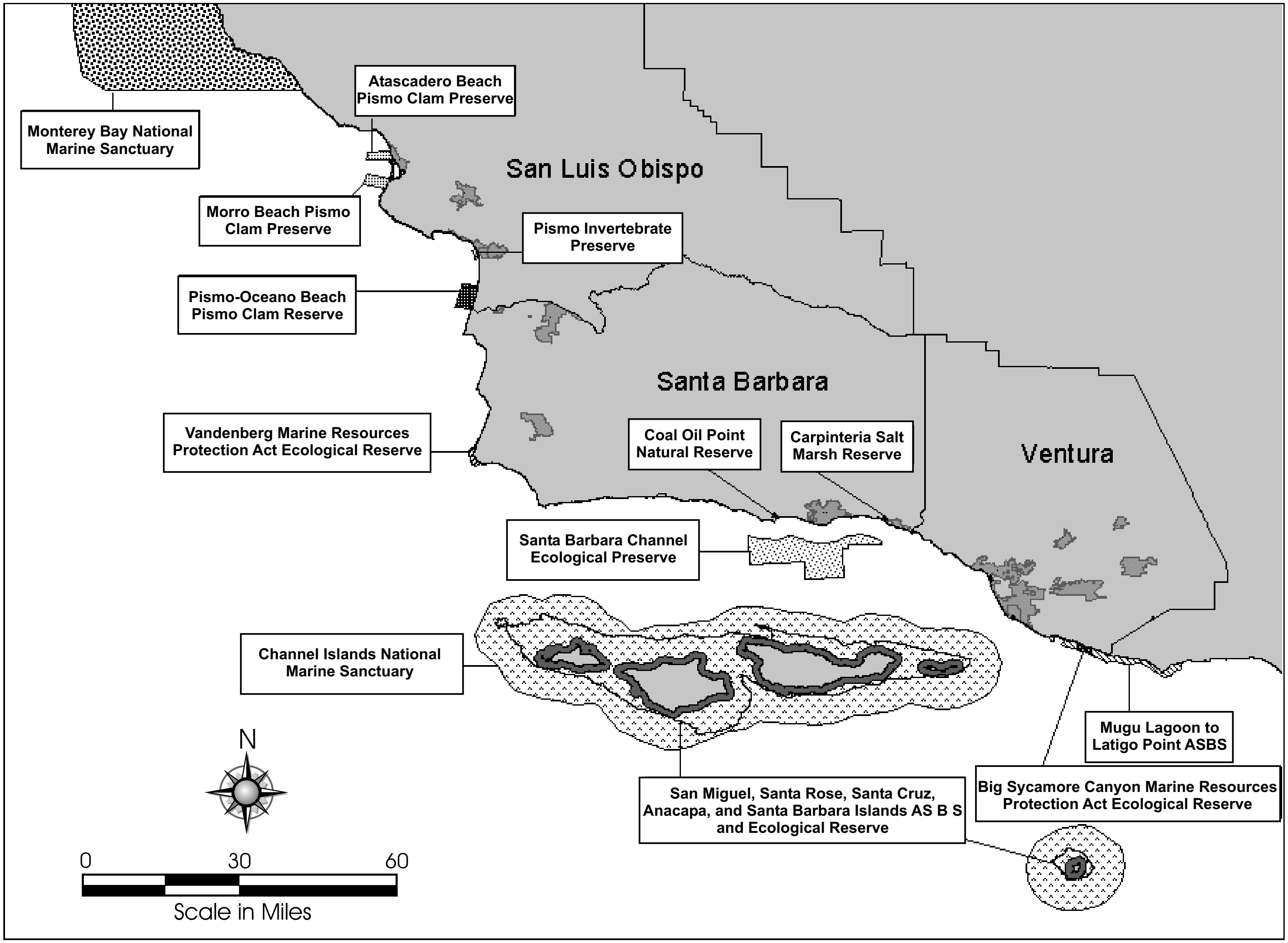
Areas of Special Biological Significance were designated by the State Water Resources Control Board in 1974 and 1975, and are monitored periodically through a joint interagency agreement with the California Department of Fish and Game. Many ASBS's overlap geographically with established marine life refuges and reserves. Of the 34 total ASBS's in the State, five occur within the study area.

Table 4.7-11. State and Federal Areas of Defined Biological Significance in the Project Area

Designation	Ownership/Administration
Abalone Cove Ecological Reserve	State
Anacapa Island State Marine Conservation Area[2]	State
Anacapa Island State Marine Reserve[2] San Miguel Island Ecological Reserve	State
Atascadero Beach Pismo Clam Preserve	State
Big Creek Marine Resources Protection Act Ecological Reserve	State
Big Sycamore Canyon Marine Resources Protection Act Ecological Reserve	State
Carpinteria Salt Marsh Reserve	Univ. of Calif.
Carrington Point (Santa Rosa Island) State Marine Reserve	State
Channel Islands National Marine Sanctuary	Federal
Channel Islands National Park	Federal
Coal Oil Point Natural Reserve	Univ. of Calif.
Gull Island (Santa Cruz Island) State Marine Reserve	State
Harris Point State Marine Reserve[2] Santa Barbara Island Ecological Reserve	State
Judith Rock State Marine Reserve[2]	State
Julia Pfeiffer Burns Underwater Park ASBS	State
Monterey Bay National Marine Sanctuary	Federal
Morro Beach Pismo Clam Preserve	State
Mugu Lagoon to Latigo Point ASBS	State
Ocean Area Surrounding the Mouth of Salmon Creek ASBS	State
Painted Cave (Santa Cruz Island) State Marine Conservation Area	State
Pismo Invertebrate Preserve	State
Pismo-Oceano Beach Pismo Clam Preserve	State
Richardson Rock State Marine Reserve[2]	State
San Miguel, Santa Rosa, and Santa Cruz Islands ASBS[1]	State
Santa Barbara and Anacapa Island ASBS	State
Santa Barbara Channel Ecological Preserve	Federal
Santa Barbara Island State Marine Reserve[2] Anacapa Island Ecological Reserve	State
Santa Cruz Island Reserve	Univ. of Calif.
Scorpion (Santa Cruz Island) State Marine Reserve	State
Skunk Point (Santa Rosa Island) State Marine Reserve	State
South Point (Santa Rosa Island) State Marine Reserve	State
Vandenberg Marine Resources Protection Act Ecological Reserve	State

1 Area of Special Biological Significance

2 The Anacapa, Santa Barbara, and San Miguel Islands Ecological Reserves were repealed and are superseded by the Channel Islands MPAs, which took effect on April 9, 2003. Work is currently underway to extend the MPAs into Federal waters.



Source: MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 4.6.9-1)

Figure 4.7-1. Location of Refuge, Preserves, and Marine Sanctuaries in the Study Area

University of California Natural Reserves. The Natural Reserve System (NRS) was created by the Regents of the University of California in 1965. Each reserve has been established to support the University of California's research and teaching mission and, where appropriate, public service programs. To date, 33 NRS reserves have been established, three of which occur along the coast within the project area (see Table 4.7-10 and Figure 4.7-1).

PROPOSED CHANGES TO STATE PROTECTED AREAS

The 1999 Marine Life Protection Act (MLPA) requires that the State design and manage an improved network of marine protected areas to protect marine life and habitats, marine ecosystems, and marine natural heritage. The MLPA states that "marine life reserves" (defined as no-take areas) are essential elements of an MPA system because they "protect habitat and ecosystems, conserve biological diversity, provide a sanctuary for fish and other sea life, enhance recreational and educational opportunities, provide a reference point against which scientists can measure changes elsewhere in the marine environment, and may help rebuild depleted fisheries".

The purpose of the MLPA is to enhance the existing system of MPAs existing in California waters through the adoption of a Marine Life Protection Program and a comprehensive master plan. Through the MLPA, an integrated network of MPAs will be established, with standardization of nomenclature, regulations, and management. This Statewide marine reserve is to be designed, created, and managed according to sound science in order to protect the diversity and abundance of marine life and the integrity of marine ecosystems.

Six goals for the MLPA are established in Section 2853(b) of the California Fish and Game Code:

- To protect the natural diversity and abundance of marine life, and the structure, function, and integrity of marine ecosystems.
- To help sustain, conserve, and protect marine life populations, including those of economic value, and rebuild those that are depleted.
- To improve recreational, educational, and study opportunities provided by marine ecosystems that are subject to minimal human disturbance, and to manage these uses in a manner consistent with protecting biodiversity.
- To protect marine natural heritage, including protection of representative and unique marine life habitats in California waters for their intrinsic value.
- To ensure that California's MPAs have clearly defined objectives, effective management measures, and adequate enforcement, and are based on sound scientific guidelines.
- To ensure that the state's MPAs are designed and managed, to the extent possible, as a network.

To achieve these goals, the California Marine Life Protection Act Initiative (MPLA Initiative) was formed in August 2004. The MPLA Initiative is a cooperative effort funded by a public-private partnership, guided by the advice of scientists, resource managers, experts, stakeholders and interested members of the public. The objectives of the Initiative include the preparation of a Master Plan Framework for proposed adoption by the Fish and Game Commission in August 2005. The Master Plan Framework will include an action plan to design and implement MPAs in phases by region between the years 2006 and 2011.

MPAs include marine reserves, marine parks and marine conservation areas. Historically, nomenclature and regulations have not been standard among the State's marine reserves. The California Resources Agency has proposed recommendations for a simplified classification system for all state MMAs and MPAs, including state marine reserves, state marine parks, and state marine conservation areas.

The following six classifications for designating managed areas in the marine and estuarine environments were established in Public Resources Code, Section 36700. These became effective January 1, 2002 and replace the 18 classifications which were previously used to categorize state MMAs. The regulatory process to officially change the names of existing MPAs is expected to be completed in December 2004.

State Marine Reserve. A State marine reserve is a non-terrestrial marine or estuarine area that is designated so the managing agency may achieve one or more of the following:

- Protect or restore rare, threatened or endangered native plants, animals or habitats in marine areas;
- Protect or restore outstanding, representative or imperiled marine species, communities, habitats and ecosystems;
- Protect or restore diverse marine gene pools; or
- Contribute to the understanding and management of marine resources and ecosystems by providing the opportunity for scientific research in outstanding, representative or imperiled marine habitats or ecosystems.
- Restrictions [36710(a) PRC]: it is unlawful to injure, damage, take or possess any living, geological or cultural marine resource, except under a permit or specific authorization from the managing agency for research, restoration or monitoring purposes. While, to the extent feasible, the area shall be open to the public for managed enjoyment and study, the area shall be maintained to the extent practicable in an undisturbed and unpolluted state. Therefore, access and use (such as walking, swimming, boating and diving) may be restricted to protect marine resources.
- Allowable uses [36710(a) PRC]: research, restoration and monitoring may be permitted by the managing agency. Educational activities and other forms of non-consumptive human use may be permitted by the designating entity or managing agency in a manner consistent with the protection of all marine resources.

State Marine Park. A "state marine park," is a non-terrestrial marine or estuarine area that is designated so the managing agency may provide opportunities for spiritual, scientific, educational, and recreational opportunities, as well as one or more of the following:

- Protect or restore outstanding, representative or imperiled marine species, communities, habitats and ecosystems;
- Contribute to the understanding and management of marine resources and ecosystems by providing the opportunity for scientific research in outstanding, representative or imperiled marine habitats or ecosystems;
- Preserve cultural objects of historical, archaeological and scientific interest in marine areas; or
- Preserve outstanding or unique geological features.
- Restrictions [36710(b) PRC]: it is unlawful to injure, damage, take or possess any living or nonliving marine resources for commercial exploitation purposes. Any human use that would compromise protection of the species of interest, natural community or habitat, or geological, cultural or recreational features, may be restricted by the designating entity or managing agency.
- Allowable uses [36710(b) PRC]: all other uses are allowed, including scientific collection with a permit, research, monitoring and public recreation (including recreational harvest, unless otherwise restricted). Public use, enjoyment and education are encouraged, in a manner consistent with protecting resource values.

State Marine Conservation Area. A "state marine conservation area" is a non-terrestrial marine or estuarine area that is designated so the managing agency may achieve one or more of the following:

- Protect or restore rare, threatened or endangered native plants, animals or habitats in marine areas;
- Protect or restore outstanding, representative or imperiled marine species, communities, habitats and ecosystems;
- Protect or restore diverse marine gene pools;
- Contribute to the understanding and management of marine resources and ecosystems by providing the opportunity for scientific research in outstanding, representative or imperiled marine habitats or ecosystems;

- Preserve outstanding or unique geological features; or
- Provide for sustainable living marine resource harvest.
- Restrictions [36710(c) PRC]: it is unlawful to injure, damage, take or posses any specified living, geological or cultural marine resources for certain commercial, recreational, or a combination of commercial and recreational purposes. In general, any commercial and/or recreational uses that would compromise protection of the species of interest, natural community, habitat or geological features may be restricted by the designating entity or managing agency.
- Allowable uses [36710(c) PRC]: research, education and recreational activities, and certain commercial and recreational harvest of marine resources may be permitted.

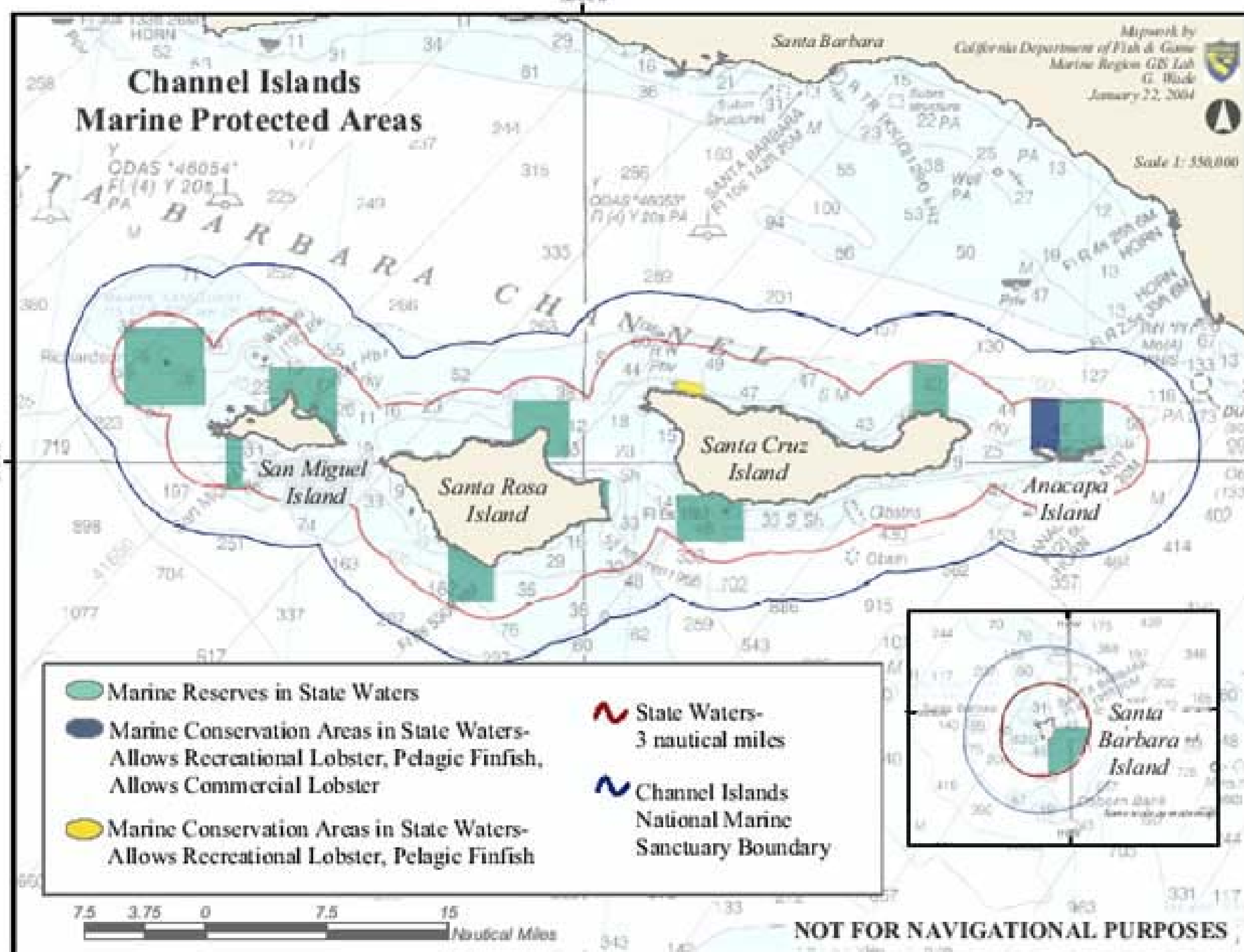
State Water Quality Protection Area. A "state water quality protection area," is a non-terrestrial marine or estuarine area designated so the managing agency may protect marine species, biological communities, or unique or significant resources from an undesirable alteration in natural water quality. Section 36710(f) of the PRC prohibits or limits by special conditions point source waste and thermal discharges. Nonpoint source pollution is controlled to the extent practicable.

CHANNEL ISLANDS MPAS

The Office of Administrative Law approved the Channel Islands MPA regulatory action and filed it with the Secretary of State on March 10, 2003. The regulations took effect on April 9, 2003. In doing so, the California Fish and Game Commission formally created the largest network of marine reserves off the West Coast. The MPAs set aside 132 square nautical miles (175 square miles) within the Channel Islands National Marine Sanctuary into 12 separate MPAs where fishing is not allowed. See Figure 4.7-2 for a map of the new State MPAs surrounding the Channel Islands (CDFG, 2002b).

The plan for the MPAs was first proposed in 1998 by a group of sportsfishermen. In response, the Department of Fish and Game and the Sanctuary launched a stakeholder process (known as the Marine Reserves Working Group) that developed a range of approaches to address the problem and included representatives from fishing groups, kelp harvesters, academia, environmental groups, and State and Federal government. More than 9,000 public comments were received; the majority supported a reserve network in the Channel Islands (CDFG, 2002b).

Figure 4.7-2. Map of Channel Islands Marine Protected Areas (CDFG, 2004a)



The creation of the marine reserves establishes "safe zones" to reverse the drop over the past decade in the populations of several marine species, such as red snapper, angel sharks, and abalone that were once plentiful off the California coast. The marine reserves extend around portions of State waters surrounding the five islands that form the Channel Islands National Marine Sanctuary: Anacapa, Santa Cruz, San Miguel, Santa Rosa and Santa Barbara Islands. The new system of MPAs consists of the following (CDFG, 2002a and 2004b):

- Ten State Marine Reserves (see Table 4.7-10) where it is unlawful to damage, take, or possess any living, geological, or cultural marine resource, except under a permit or specific authorization by the Commission for research, restoration, or monitoring purposes;
- Painted Cave State Marine Conservation Area where only the recreational take of spiny lobster (Panulirus interruptus) and pelagic finfish is allowed;
- Anacapa State Marine Conservation Area where only the recreational take of spiny lobster (Panulirus interruptus) and pelagic finfish is allowed and commercial take of lobster is allowed on the north side of West Anacapa Island; and
- The existing regulations for ecological reserves at Anacapa, Santa Barbara, and San Miguel Islands should be repealed to avoid duplication of the new regulations.

The no-take areas represent approximately 132 square nautical miles, or approximately 19 percent of the State waters within the Sanctuary. The limited-take areas represent an addition 10 square nautical miles of area (CDFG, 2004c). The next phase of this project would expand the network of reserves into Federal waters lying beyond the three-mile boundary of State water that encircle each island. The full system of marine reserves would cover 322 nautical miles (426 square miles) and once adopted by the Federal government would make the largest network of marine reserves in the continental United States (CDFG, 2002b).

Federally Protected Areas

Two national marine sanctuaries occur within or near the general project area, the Channel Islands National Marine Sanctuary and Monterey Bay National Marine Sanctuary. Title III of the Marine Protection, Research and Sanctuaries Act of 1972 as amended, authorizes the Secretary of Commerce, with Presidential approval, to designate discrete marine areas of special national significance as national marine sanctuaries. The program is administered by NOAA through its Marine and Estuarine Management Division (MEMD). The objectives of the program are to: (1) preserve and protect valuable marine resources, (2) promote scientific research, (3) enhance public awareness, and 4) facilitate, to the extent compatible with the primary goal of resource protection, multiple use (including oil and gas activities) of these marine areas. Soon after designation and after consultation with other Federal and State agencies, "necessary and reasonable" regulations for activities which are permitted within the sanctuary are issued.

CHANNEL ISLANDS NATIONAL MARINE SANCTUARY

Located along the south side of the Santa Barbara Channel, the Channel Islands National Marine Sanctuary (CINMS) was created in 1980 to preserve the area's unique and strategically situated ecosystems (intertidal, subtidal, benthic, and pelagic), to encourage scientific research, and to enhance public awareness of sanctuary resources. Areas of upwelling within waters of the CINMS explain the high levels of productivity found there. This in turn supports an exceptionally rich and diverse biota on the bottom (including an area of purple coral, *Allopora californica*) and within the water column. The CINMS contains extensive kelp beds, fish, and shellfish highly valued by commercial and sport fishermen, and an unusual combination of several cold water/warm water transition zone species. The management plan for the CINMS is currently undergoing a review. During this review process, changes to the sanctuary boundaries are being considered which, if approved, would expand the sanctuary.

The wide range of water temperatures, shoreline exposures and substrate types of the islands creates a variety of different habitats. Common intertidal habitat types within the Sanctuary include rock shelves, boulder beaches, sandy beaches, and tidepools (CINMS, 2001, as cited in MMS, 2001). Most of the islands' shoreline is rocky. Santa Rosa and San Miguel islands have the largest expanses of sandy beaches of the four northern islands, although rocky beaches still predominate on both islands. Beaches on the outside or ocean facing side of the islands are subjected to strong wave action, whereas beaches along the Channel are calmer, providing habitats for a wide range of species on each island.

In the rocky intertidal, common species include mussels, barnacles, periwinkles, limpets, chitons, sea stars, anemones, shore crabs, and brown, red, and green algae (CINMS, 2001, as cited in MMS, 2001). Island sandy beaches are characterized by the presence of common and spiny sand crabs in the intertidal zone, while flies, beach hoppers and isopods frequent the wrack line (Ricketts et al., 1985, as cited in MMS, 2001).

Within the CINMS, kelp forest rocky-bottom and shallow sandy-bottom communities are the predominant nearshore subtidal habitats (CINMS, 2001, as cited in MMS, 2001). Giant kelp occurs in shallow water throughout the Sanctuary, with densest formations along protected island shores. The kelp beds provide habitat for a variety of invertebrates, including sponge, kelp crab, spiny lobster, octopus and squid, sea stars, and sea urchins. Common kelp forest fish include garibaldi, opal eye, kelp bass, sheepshead, sea perch, and rockfish. In sandy habitat, common invertebrate species include sea pansies, polychaetes, and sand dollars; fish include several species of rays, sand dabs, and turbot.

Four species of pinnipeds breed on islands within the CINMS (Bonnell and Dailey, 1993; DeLong and Melin, 2000; Stewart and Yochem, 2000, as cited in MMS, 2001). California sea lions, the most abundant pinnipeds in southern California, breed principally on San Miguel Island and, in substantially lower numbers, on Santa Barbara Island. Northern elephant seals also breed in large numbers on San Miguel Island and in relatively small numbers at Santa Rosa and Santa Barbara Islands. Harbor seals haul out and breed on all the islands in the CINMS. In the CINMS, northern fur seals breed only at San Miguel Island (at Point Bennett and nearby Castle Rock).

Two additional pinniped species, the Steller sea lion and Guadalupe fur seal, are occasional visitors to San Miguel Island (Bonnell and Dailey, 1993; DeLong and Melin, 2000; Stewart and Yochem, 2000, as cited in MMS, 2001). Both these species are listed as threatened under the Federal Endangered Species Act (ESA).

At least 27 species of cetaceans have been sighted in CINMS waters (CINMS, 2001, as cited in MMS, 2001). Of these, about a dozen species occur regularly. The CINMS lies along the gray whale migratory pathway, and gray whales with calves have been observed in nearshore kelp beds along the islands. Federally endangered blue and humpback whales are also present in Sanctuary waters during summer months.

More than 60 species of marine birds may use CINMS waters to varying degrees, as nesting and foraging habitat, wintering, and/or migratory or staging areas (CINMS, 2001, as cited in MMS, 2001). Twelve species of seabirds are known to breed on islands in the CINMS, with greatest numbers on San Miguel, Anacapa, and Santa Barbara Islands (Carter et al., 1992, as cited in MMS, 2001). Santa Barbara Island has the largest Xantus' murrelet nesting colony and the only established black storm-petrel nesting colony in the U.S. Anacapa Island is the only permanent U.S. breeding site for the endangered brown pelican.

The CINMS overlaps or encompasses the boundaries of several other Federal- and State-protected areas. The terrestrial resources of the five northernmost Channel Islands (San Miguel, Santa Rosa, Santa Cruz, Anacapa, and Santa Barbara) are protected by the Channel Islands National Park, which was created in 1980. The Park also encompasses the marine environment within one mile of shore, where it overlaps the Sanctuary. This region was also designated as a Biosphere Reserve in 1976.

The Sanctuary also encompasses State-controlled MPAs discussed above and shown in Figure 4.7-2. With the establishment of marine reserves and conservation areas, additional protection has been afforded several areas within the CINMS. Restrictions within these areas focus on commercial and recreational fishing, but also include prohibition of the removal of archeological and cultural artifacts.

MONTEREY BAY NATIONAL MARINE SANCTUARY

Located to the north of the project area, the Monterey Bay National Marine Sanctuary (MBNMS) was created in 1992. The MBNMS, which extends from Point Reyes-Farallon Island National Marine Sanctuary south to Cambria, San Luis Obispo County, was established for the purpose of: bolstering the existing regulatory resource protection regime, establishing a coordinated research program, developing a broad-based education and interpretive program, and providing a comprehensive management framework to protect the area's resources. The exceptionally rich and abundant floral and faunal communities that occur within the MBNMS include a variety of intertidal and subtidal habitats; a high diversity of marine mammals, including several endangered and threatened species such as the endemic and threatened California sea otter; and a large array of bird species.

The invertebrate fauna of the Monterey Bay area is among the most diverse and species-rich in the world (NOAA, 1992, as cited in MMS, 2001), with the widest array of invertebrate species occurring in the rocky intertidal habitat of the area. Characteristic species include periwinkles, isopods, barnacles, limpets, sea snails, crabs, chitons, mussels, sea stars, and anemones. Marine algae are also diverse and abundant, with over 450 species occurring in the area, including several endemics.

The diverse and abundant fish fauna in the Monterey Bay area is another important resource. Approximately 345 species of fish are found within the sanctuary (NOAA, 1992, as cited in MMS, 2001). The various fish resource habitats within the sanctuary include: canyon and deep bottom; rocky intertidal (tidepools); subtidal (kelp); estuaries, sloughs and sandy intertidal; nearshore sublittoral (soft bottom); epipelagic; and meso- and bathypelagic.

Ninety-four seabird species are known to occur in the Monterey Bay region, of which about thirty species predominate in their preferred seasons and habitats (Briggs and Chu, 1987, as cited in MMS, 2001). Thirteen species are resident breeders or former breeders within the region. Common breeding species include Brandt's cormorants, western gulls, pigeon guillemots, and common murres (Dohl et al., 1983, as cited in MMS, 2001).

In all, 21 cetacean species, 6 pinniped species, and the southern sea otter are known to occur in the Sanctuary (Bonnell et al., 1983; Dohl et al., 1983; MBNMS, 2001, as cited in MMS, 2001). Within and near the Bay itself, the predominant odontocete species include Pacific white-sided dolphins, Risso's dolphins, northern right whale dolphins, Dall's porpoises, harbor porpoises, and bottlenose dolphins. Seasonally, the most common baleen whales in this area are gray whales, and the endangered blue and humpback whales. Sperm whales, also an endangered species, are relatively common in offshore waters.

SANTA BARBARA CHANNEL ECOLOGICAL PRESERVE

Another federally-protected area, the Santa Barbara Channel Ecological Preserve, was established in March 1969 by Public Land Order 4587 and consists of what was previously known as the Federal

Ecological Preserve and Buffer Zone. The Federal Ecological Preserve alone is composed often whole and partial blocks, while eight additional blocks (whole and partial) adjacent to the Preserve are designated as a Buffer Zone. All blocks are subject to valid existing rights, but have been withdrawn from all forms of disposition (including mineral leasing) and are reserved for scientific, recreational, or other uses similar to these.

4.7.10 Onshore Biological Resources

This section provides a brief overview of the terrestrial biology of northern Santa Barbara County, where future onshore activities may occur as a result of the post-suspension activities. The study area for this analysis extends from the Santa Barbara County line at the Santa Maria River in the north to the Santa Ynez River and Point Arguello in the south and inland to the Cities of Santa Maria and Lompoc. More detailed information on this area or similar nearby areas is provided in the Point Pedernales Project Environmental Impact Report/Statement (A. D. Little, 1985, as cited in MMS, 2001), the San Miguel Project Environmental Impact Report/Statement (URS, 1986, as cited in MMS, 2001), the Vandenberg Air Force Base Integrated Natural Resources Management Plan (Tetra Tech, 1996, as cited in MMS, 2001), and the Draft North County Siting Study (County of Santa Barbara, 2000, as cited in MMS, 2001).

Although this discussion concentrates on natural communities, the onshore project area actually consists of a complex patchwork of native (wetlands, oak woodlands, etc.) and man-made (urban areas, agricultural land, etc.) habitats, which support a diverse assemblage of plants and animals (for a description of the agricultural and other man-made areas, see A. D. Little, 1985 and County Santa Barbara, 2000, as cited in MMS, 2001). The area varies from coastal beaches, dunes, and wetlands to river valleys and coastal mountains. Two important rivers, the Santa Maria and Santa Ynez Rivers, flow through the area. San Antonio Creek is another important drainage. The location of Point Conception at the south end of this area, which is a major biogeographical feature marking the northern and southern range limits for many plants and animals, further adds to the complexity of the area. About 1,400 plant species are native to Santa Barbara County (Smith, 1998, as cited in MMS, 2001), about 40 of which are endemic to the project area or nearby surrounding areas (A. D. Little, 1985, as cited in MMS, 2001).

Plant Communities and Habitats

The terrestrial vegetation within the project area generally fall into seven major plant communities, which are described below.

Wetlands. Freshwater wetlands that occur in the project area include freshwater upstream marshes and sloughs, vernal pools, seeps and marshy areas. For information on coastal wetlands including estuaries and saltwater marshes, see Section 4.7.8. Freshwater marshes in the area are typically dominated by herbaceous species including cattails, tules, and rushes associated with springs and seeps, ponds, dune swales, and slow-moving streams. Wetlands, although easily disturbed, are an ecologically important component of the project area in that they support a large number of plant and animal species and playa major role in erosion control, water quality, and water storage.

Coastal Strand. Within the project area, this habitat is found on foredunes and beaches above the high tide line. It is especially well represented along the north coast of Santa Barbara County and into southern San Luis Obispo County, from Point Conception to Pismo Beach. Most plants that grow here are low, succulent perennials with spreading stems that form large mats or trail over the dune surface and deep root systems that extend far down into the well-drained sand. Plant cover reduces sand movement and imparts a degree of stability to this changeable environment. The ocean-facing slopes of the foredunes are dominated by purple sand-verbena, a southern species, or yellow sand-verbena, a northern species. Sea rocket, an annual most common on low beach hummocks, beachbur, beach primrose and beach morning-glory are also common in coastal strand. These plants are sensitive to crushing by people and off-road vehicles (ORVs). Disturbance of these communities has resulted in the displacement of native species by exotics such as ice plant and beach grass.

Grassland. Grasslands, which are predominantly composed of introduced annual grasses, herbs, and forbs, cover much of the lower elevation foothills and terraces of the project area. They also occur adjacent to stands of scrub and woodland, forming edge habitat where species diversity is greatly enhanced. Native bunch grasses, which dominated these grasslands before the advent of grazing by non-native herbivores, are now restricted to remnant patches.

Coastal Sage Scrub. Coastal sage scrub is a diverse habitat that occurs from steep, dry slopes near the coast to the interior foothills, where it is frequently in association with grasslands, chaparral, and oak woodland. Dense vegetative cover and an abundance of available food, combine to make coastal sage scrub an important habitat for reptiles, birds, and mammals. Coastal sage scrub is dominated by low to medium sized shrubs with soft, gray or dull green leaves. These shrubs are aromatic, woody or woody at the base only, shallow-rooted and may have facultatively drought-deciduous leaves. Common species include California sagebrush, various sages, coyote brush, and goldenbush.

Chaparral. Chaparral is the predominant vegetation type in much of southern California and covers large areas of rocky mountain slopes in Santa Barbara County. Most commonly, chaparral is found on steep slopes with little soil development. It is abundant on sandstone rock types but also occurs on diatomaceous shale, stabilized sand dunes and other soil types. The dominant plants are fire-adapted woody shrubs, many with restricted distributions. The leaves of chaparral plants have thick waxy surfaces that prevent moisture loss during the dry summer months. Common in the project area and vicinity are various manzanitas, ceanothus species, bush poppy, mountain mahogany, yerba santa, toyon, holly-leaf cherry, scrub oaks, and others. Burton Mesa chaparral, a form characteristic of sandy Burton Mesa and the nearby Purisima Hills, is noteworthy for the high rate of endemism in its flora; more than 20 plant species found in this community have restricted geographic distributions, including rare plants such as shagbark manzanita, seaside bird's-beak, black-flowered figwort, and Hoover's Bentgrass.

Oak Woodland. Oak woodlands, which are an important component of the project area, usually occur in canyons, riparian areas, and north facing slopes where they are often associated with riparian woodlands, coastal sage scrub, and chaparral. Coast live oak and valley oak are the dominant species in this habitat. Oak woodlands may be further characterized as having more closely spaced trees with a relatively unbroken canopy (woodland), or where trees are more widely spaced and the canopy is more open (savannah). In closed canopy areas, the understory is usually dominated by poison oak, hummingbird sage and elderberry. Where the canopy is more open, the understory is typically composed of annual grasses and wildflowers. Oak woodlands in the area tend to support a diverse resident and migratory vertebrate fauna. Due to the more moist characteristics of oak woodlands compared to coastal sage and chaparral, amphibians are relatively common.

Riparian Woodland. This habitat, which is dominated by dense growths of tall deciduous trees and shrubs, varies from narrow bands in stream canyons to extensive floodplain groves. Characteristic vegetation of this habitat includes: various willow species, black cottonwood, western sycamore, and box elder. Riparian woodlands are one of the most sensitive plant communities found in the project area due to: (1) their limited occurrence in the region; (2) the diversity and abundance of wildlife supported by this community; (3) the number of sensitive species known to use it; and 4) the degree of loss and degradation due to human activities. Riparian woodlands are critical to wildlife because they provide a number of essential ecological services including water sources, microhabitats for cover, nesting, and feeding, food, and corridors for wildlife movement and dispersal wildlife.

Biologically Important Areas

Within the project area, Santa Barbara County has identified several biologically important and environmentally sensitive features (County of Santa Barbara, 2000). These include: Guadalupe Dunes, Santa Maria and Santa Ynez River mouths, Betteravia (Guadalupe) Lakes, Point Sal, San Antonio Creek, and Burton Mesa. These features are of particular importance because of their rarity, biological diversity, and/or vulnerability to disturbance. For descriptions of these areas, refer to the Draft North County Siting Study (County of Santa Barbara, 2000, as cited in MMS, 2001).

Onshore Plants and Wildlife

According to the California Natural Diversity Database (CNDDB), approximately 57 non-listed sensitive species also have the potential to occur in mainland Santa Barbara County. These species occur in a variety of habitat types, but several are known from coastal areas.

To a large extent, the distribution an abundance of wildlife is determined by the availability and condition of their preferred habitat, although the same species can frequently be found in more than one habitat. Thus, the topographic complexity and large diversity of habitats found in the project area support diverse and abundant wildlife population. The fact that the project area is located at a major biogeographic transition zone also contributes to the diversity of wildlife Excluding saltwater marshes and estuaries, riparian woodlands support the greatest number of species in the project area (A. D. Little, 1985, as cited in MMS, 2001), followed by oak Woodlands. Birds are the most abundant vertebrate wildlife in every plant community; followed by mammals and reptiles. The number of amphibian species in the area is relatively limited, although the number of individuals can be high. For a comprehensive list and discussion of wildlife the vicinity of the project area, see A. D. Little (1985, as cited in MMS, 2001) and URS (1986, as cited in MMS, 2001).

Over 400 birds have been recorded in Santa Barbara County (Lehman, 1994, as cited in MMS, 2001), only a portion of which occur in the project area. Common breeding birds include: red-tailed hawk, American kestrel, California quail, barn owl, Anna's hummingbird, acorn woodpecker cliff swallow, scrub jay, American crow, bushtit, house wren, wrentit, California towhee, song sparrow, and brewer's blackbird.

Over 60 species of mammals (excluding marine mammals) have been recorded as occurring in San Barbara County. Common mammals in the project area include: California ground squirrel, Botta's pocket gopher, deer mouse, dusky-footed woodrat, western harvest mouse, California vole, desert cottontail, raccoon, striped skunk, gray fox, coyote, bobcat, and mule deer

More than 30 species of reptiles have been report for Santa Barbara County. Common reptiles in the project area include: western pond turtle, western fen lizard, side-blotched lizard, gopher snake, western rattlesnake, and striped racer.

4.8 Cultural Resources

4.8.1 Regulatory Overview

Cultural resources include any prehistoric or historic sites, buildings, districts, structures, traditional use areas, or objects considered to be important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. Cultural resources encompass three categories: archaeological resources (both historic and prehistoric), architectural resources, and traditional cultural resources (U.S. Navy, 2000, as cited in MMS, 2001).

Archaeological resources are any material remains (sites) of human life or activities that are at least 50 years of age and that are of archaeological interest. Material remains include physical evidence of human habitation, occupation, use or activity including the site, location, or context in which such evidence is situated. Items of archaeological interest may provide scientific or humanistic understanding of past human behavior, cultural adaptation, and related topics through the application of scientific or scholarly techniques. These resources can be identified and evaluated for significance according to each site's cultural importance, integrity, and ability to yield information (MMS, 1998, as cited in MMS, 2001).

Prehistoric archaeological sites consist of various forms of evidence of human activities that spanned time from approximately 13,000 years ago until the time of European contact in 1542. (The dividing line between prehistoric and historic is not precise given the 257-year lapse between initial contact and European settlement of California.) Prehistoric artifacts include utilitarian and non-utilitarian objects, such as flaked and ground stone tools as well as bone and shellfish objects. Occasionally, remnants of basketry or cordage, remains of living spaces, fire hearth, bedrock milling stations, mortuary remains, or rock art exist as parts of prehistoric sites. These sites may manifest themselves as a scatter of surface material or be a subsurface or midden deposit. Often sites include surface and subsurface components. In addition, sites may be submerged and include intact sites buried beneath the seabed, isolated artifacts deposited on the seafloor from erosion of an upland site, or remnants of aboriginal watercraft.

Historic archaeological sites can be subsurface remains that contain buried foundations or other structures such as pier footings, depositional sites such as refuse dumps, and other locations. The sites may include surface remains of walkways, roads, or structural remnants. Submerged historic sites include shipwrecks, cargo spills, historic anchorages and wharves, and aircraft.

Architectural Resources are standing buildings, dams, canals, bridges and other structures of historic or aesthetic significance. Architectural resources must be more than 50 years old to be considered for protection under existing cultural laws.

Traditional Cultural Resources are those associated with cultural practices and beliefs of a living community that are rooted in history and are important in maintaining the continuing cultural identity of the community. Traditional cultural resources may include archaeological sites; location of historic events; sacred areas; sources of raw materials used to produce tools and sacred objects; and traditional hunting or gathering places. The community may consider these resources essential for the persistence of their traditional culture.

Laws and regulations governing cultural resources include the following:

- The Minerals Management Service, under various Federal laws and regulations, ensures that regulated Outer Continental Shelf (OCS) activities do not adversely affect significant archaeological resources.
- National Historic Preservation Act of 1966, as amended, (16 USC 470, P.L. 95-515) under Section 106, requires Federal agencies to identify historic properties their actions could affect, determine whether or not there could

be a harmful or adverse affect, and if so, to try to avoid or reduce the effect. The section also requires consultation with State historic preservation officers and tribal historic preservation officers.

- Archaeological and Historic Preservation Act of 1974 (16 USC 469-469c, PL93-291) requires Federal agencies to notify the Secretary of the Interior when they find that any Federally permitted activity or program may cause irreparable loss or destruction of significant scientific, prehistoric, historical, or archaeological data.

4.8.2 Studies in the Area

Table 4.8-1 lists some of the numerous studies that address onshore and offshore archaeological resources in the area.

Table 4.8-1. Archaeology Studies in the Area

Area of the Study	Title	Citation[1]
Pt. Mugu Sea Range	Shipwreck Study, Pt. Mugu Sea Range Environmental Impact Statement	U.S. Navy. Department of the Navy, Naval Air Warfare Center Weapons Division. April 1998
Santa Barbara Channel	Channel Islands National Park and Channel Islands National Marine Sanctuary, Submerged Cultural Resource Assessment	CINPS. Don Morris and James Lima, 1996
Morro Bay to Canadian Border	OCS Study MMS 90-0087 through 90-0092 California, Oregon, and Washington Archaeological Resource Study	MMS. 1990. Espy, Houston and Associates.
Morro Bay to Mexican Border	OCS Study MMS 87-0025. Archeological Resource Study	MMS. 1987. P.S. Associates.
Pt. Conception to Mexican Border	Archaeology Literature Survey and Sensitivity Zone Mapping of the Southern California Bight Area. Volume I, Technical Report	BLM, 1978. Science Applications Incorporated.

[1] Citations are as referenced in MMS, 2001.

4.8.3 Regional Setting

In addition to the studies cited above, previous environmental impact statements and reports have described the region's offshore and onshore, prehistoric and historic, archaeological resources of the in great detail. These reports, whose geographic scope for archaeological resources overlap, include the northern Santa Maria Basin (URS, 1986, as cited in MMS, 2001), the central Santa Maria Basin (A. D. Little, 1985, as cited in MMS, 2001), the southern Santa Maria Basin (A. D. Little, 1986, as cited in MMS, 2001) and the western Santa Barbara Channel (U.S. Geological Survey, 1974; Science Application Inc., 1984; SLC, 1992, as cited in MMS, 2001).

Prehistoric Settlement

Archaeological evidence from the Channel Islands indicates that prehistoric populations may have settled in the area and traversed coastal areas by water as early as 13,000 years ago (Johnson et al., 1999, as cited in MMS, 2001). Table 4.8-2 summarizes the sea level fluctuation and the result on the coastline during the period of human habitation. Although sea levels were much lower than today, by perhaps 46 to 20 meters, the Channel Islands separated by the mainland by a minimum of five miles (MMS, 1987; U.S. Navy, 1998, as cited in MMS, 2001). The presence of archaeological sites dating to the late Pleistocene/Early Holocene era, approximately 12,000 to 8,000 Before Present (BP), suggests that maritime travel occurred between the mainland and the islands (U.S. Navy, 1998, as cited in MMS, 2001) and that aboriginal populations may have exploited littoral and nearshore resources (SLC, 1992, as cited in MMS, 2001). A well-developed maritime economy may have been in place by 5,500 BP with favored settlement locations consisting of embayments, lagoons, and estuaries (MMS, 1990, as cited in MMS, 2001).

Table 4.8-2. Sea Level Fluctuation from Present to 14,500 Years Before Present (B.P.)

Years B.P.	Water Depth (meters below present sea level)	Sea Level Changes	Result
3,500 to present	0	Very slow rise	Present still stand
8,500 to 3,500	18 to 0	Slow rise	Erosion
8,500	18	Still stand	18 m shoreline
10,000 to 8,500	20 to 18	Still stand	Cut platform
11,000 to 10,000	46 to 20	Rapid rise	Erosion
11,000	46	Still stand	46 m shoreline
12,000 to 11,000	24 to 46	Rapid fall	Exposure
14,500 to 12,000	60 to 24	Rapid Rise	Erosion

Submerged prehistoric sites consist of remains deposited during the period of lowered sea level. Rising sea levels and the associated high-energy wave environment are supposed to have inundated and destroyed many sites. However, certain landforms which would have been attractive to human habitation and offered protection to archaeological resources during inundation include submerged river valleys, embayments, and island complexes. In addition, archaeological resources may be deposited offshore by the continuing erosion of coastal landforms (MMS, 1987, 1990; SLC, 1992, as cited in MMS, 2001).

Chumash groups occupied the coast from present-day Morro Bay in San Luis Obispo County to Malibu. Gabrieleno groups occupied the coastline from present-day Malibu to Mission Viejo. The Chumash exhibited a unique maritime subsistence adaptation, although the marine resources appear to have been less important to Chumash groups north of Point Conception (MMS, 1990, as cited in MMS, 2001). The Gabrieleno groups, while developing a maritime technology, were not as well oriented to this type of resource procurement as the Chumash (BLM, 1978, as cited in MMS, 2001). The plank canoes of the Chumash, tomols, and of the Gabrieleno, *te'aat,* allowed the development of trade between offshore island and the mainland villages. The plank canoes and the activities they fostered played an important role in the region's economy and social development (U.S. Navy, 1998, as cited in MMS, 2001). Foundering at sea or in the nearshore and overturning of these watercraft in the surf zone were common. Wrecks of tomols may have occurred in the study area, but it is unlikely that the remains of such craft would be preserved in the offshore environment. The more likely areas for preservation of such craft would be within shoreline caves and under talus slopes of cliff-faced beaches (SLC, 1992, as cited in MMS, 2001).

Historic Settlement

The first European exploration of the Santa Barbara Channel and the central California coast north of Point Conception occurred in 1542 from vessels under the command of Juan Rodriguez Cabrillo. During the exploration, Cabrillo died and, according to some sources, is buried on one of the offshore islands. For the next 267 years, until permanent Spanish colonization started in 1769, the area was largely ignored except for an occasional voyage of exploration and discovery. Vessels of commerce, the Manila galleons, sailed down the California coast enroute to Acapulco from Asia. Some of the galleons were lost along the California coast and reports of a galleon lost in the Channel Islands cannot be completely dismissed (Morris and Lima, 1996, as cited in MMS, 2001). During the Spanish colonial period, voyages of the Manila galleons continued, as did vessels engaged in coastwise trading and international commerce, exploration, and other pursuits, including smuggling. The Mexican period in California (1822 to 1846) saw little change in the character of coastal shipping over that which occurred during the Spanish period. During the American period (1846 to present) coastwise shipping increased. Prior to completion of the Southern Pacific railroad, coastal communities, most lacking natural harbors, constructed piers as a means of accessing maritime trade for shipment of agricultural products. A thriving lumber trade between ports in the Pacific Northwest and the coastal communities developed and continued into the 1920s. In the 20th century, as coastwise trade decreased it was replaced by trans-Pacific trade, commercial fishing, military, petroleum exploration and development, and leisure as sources of widespread maritime activity. The area contains the remains of vessels that came to grief while engaged in each of these activities.

Shipwrecks tend to be concentrated around sites that focus maritime traffic, such as ports, commercial piers and shipping lanes, hazards to navigation, such as islands, headlands, and prominent points, and in areas of variable weather and sea conditions. These factors have been integrated into a series of shipwreck location prediction maps for the Pacific coast of the United States (MMS, 1987 and 1990, as cited in MMS, 2001). Several of these factors combine to explain the concentration of shipwrecks between Point Conception and Point Arguello (a so-called Graveyard of the Pacific) and the western end of San Miguel Island. The balance of shipwreck sites not attributable to the above mentioned factors appear to be randomly distributed (BLM, 1978; MMS, 1987; SLC, 1992, as cited in MMS, 2001). Other historical resource sites include aircraft ditched at sea and the remains of maritime infrastructure, such as wharves and piers.

4.8.4 Description of the Study Area for Cultural Resources

This section describes two areas. The first area is the area within which the post-suspension activities would occur. The second is the area that could be affected by an oil spill, approximately Point Sur in Monterey County to Point Fermin in Los Angeles County.

Area of Post-Suspension Activities

The area potentially affected by the post-suspension activities related to the undeveloped leases includes the segments of the nearshore and coastal area of Santa Barbara County, from Point Sal to Point Arguello and the area around El Capitan State Beach. As summarized above, the studies in the area have noted the presence of a variety of prehistoric and historic resources and the potential for discovery of additional, significant sites. For example, of the hundreds of vessels reported lost in the area of the Channel Islands, only a small percentage have been located and even fewer have been documented. These yet-to-be-discovered vessels represent every activity associated with the islands (Morris and Lima, 1996, as cited in MMS, 2001). As remote-sensing technology improves and systematic surveys are conducted, more sites are discovered. Similarly, the number of documented onshore prehistoric sites increases with the systematic surveying and documentation.

The 77-acre promontory comprising Point Sal, managed by the Bureau of Land Management, is sensitive for archaeological resources with Native American use in the area ranging from approximately 200 to 5,000 years. The area is managed by BLM as an Area of Critical Environmental Concern. There is no public access to BLM-managed land at Point Sal (BLM, 2001, as cited in MMS, 2001).

The following properties in the area are listed on the National Register of Historic Places database for Santa Barbara: Point Conception Light House Station, Space Launch Complex 10 on Vandenberg AFB, and the SS Yankee Blade, a vessel wrecked near Point Arguello (MMS, 2001).

A review of California Native American Heritage Commission records for the area of the undeveloped leases reveals no listed Native American sacred sites in the onshore portion of the study area. However, the absence of specific site information in the sacred lands records does not indicate the absence of traditional cultural resources in the study area (Rob Wood, 2001, pers. comm., as cited in MMS, 2001). There are numerous traditional resource sites associated with the Chumash on VAFB. In addition, there is a specifically identified property in the vicinity of Point Conception, referred to by some in the Chumash culture as the Western Gate because of its role in Chumash beliefs about death and the afterlife (USAF, 1998, as cited in MMS, 2001).

Known onshore prehistoric sites in the study area appear to cluster around stream drainages. Additional sites inland along the drainages are likely. There is a likelihood of prehistoric site deposits between the current shoreline and the shoreline of 8500 BP. Artifacts deposited by erosion of onshore sites, with the exception of large stone artifacts, would be short-lived. This shoreline is approximated by the 18-meter isobath (approximately 2.5 kilometers from the present shoreline between Point Sal and Point Arguello and 0.5 kilometers near El Capitan. Beyond this depth, areas of potential bay, estuarine, and lagoon deposits exist offshore between Point Sal and Point Arguello and in the area of El Capitan should be considered highly sensitive archaeologically (MMS, 1987, as cited in MMS, 2001).

The archaeological site data summarized in Table 4.8-3 reveals that the potential corridor of the pipeline landfall to the processing plant for the hypothetical development in the northern Santa Maria Basin contains several prehistoric and historic sites. The description of the site does not indicate archaeological significance or importance. The data suggests a variety of sites in the area of the Shuman Creek drainage that would need to be evaluated in determining the pipeline route.

Shipwrecks. A number of vessels have been lost in the area between Pt. Sal, Purisima Point, and Point Arguello, primarily at nearshore locations. Table 4.8-4 lists these vessels. The area around Point Sal to three nautical miles seaward is considered a medium sensitivity zone for shipwrecks. As shown on Figures 4.8-1 and 4.8-2, the area from Purisima Point to Point Arguello is considered a high sensitivity zone immediately offshore. A medium sensitivity zone, which extends less than three nautical miles offshore, borders the high-sensitivity zone. As indicated by Table 4.8-4, few vessels have been lost in the El Capitan area. In the vicinity of El Capitan, a high sensitivity zone for shipwrecks extends from the shore to approximately 2.5 nautical miles, bordered by a medium sensitivity zone, which extends beyond three nautical miles.

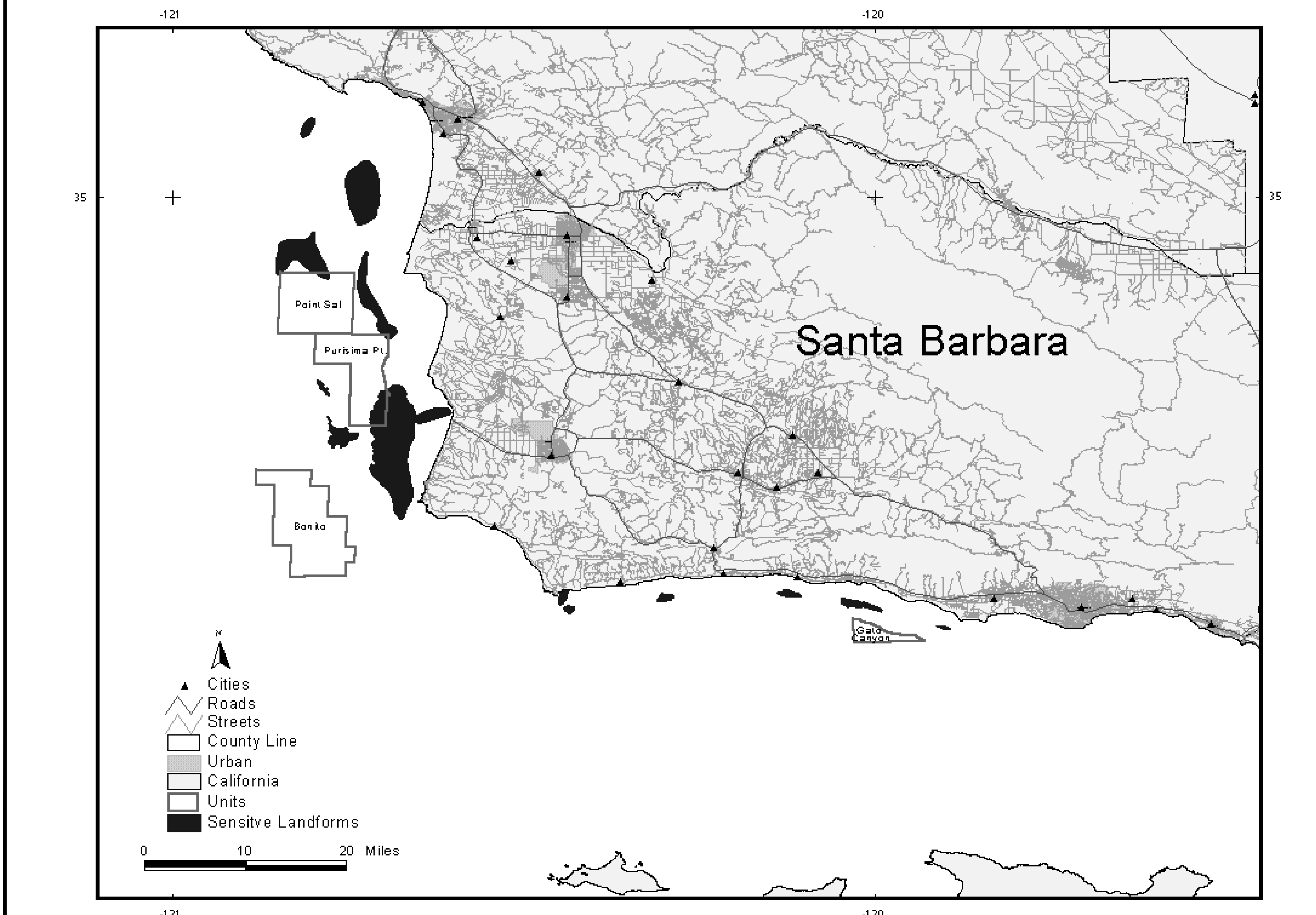
Data on prehistoric and historic resource sites in the study area comes from a number of sources. Archaeological resource surveys have been completed on portions of several units. The records of several agencies, MMS, the U.S. Navy’s Point Mugu Sea Range and SPAWAR Systems Command, the California State Lands Commission, and the Central Coast Information Center at the University of California, Santa Barbara were consulted to determine if vessels had been reported as lost in the area of the leases or if sites on the leases had been documented. Predictive zones, areas evaluated for indications of landforms of interest and for their potential to contain historic resource sites, were examined (SAI, 1978; MMS, 1987; MMS, 1990; U.S. Navy, 1998, as cited in MMS, 2001). For shipwrecks, an area’s potential was evaluated based on several factors. Differences in methodology between studies account for the different designations for the same area.

Table 4.8-3. Onshore Archaeological Sites in the Area of Shuman Canyon, Santa Barbara County, California

SBa Site Number	Function	Burial (Y/N)	SBa Site Number	Function	Burial (Y/N)
512	Campsite	Y	2175	Quarry site	N
722	Hunting site	N	2193	Temp. site	N
723	Campsite/quarry site	N	2319	Temp. site	N
724	Temp. site (quarry)	N	2320	Temp. site	N
725	Temp. site (quarry)	N	2368-H	Unclassified	N
726	Unclassified	N	2476-H	Unclassified	N
727	Unclassified	N	2479	Campsite	N
728	Unclassified	N	2568	Unclassified	N
729	Unclassified	N	2688	Temp. site (quarry)	N
730	Unclassified	N	2715-H	Historic trash scatter	N
731	Temp. site	N	3013	Campsite	N
732	Quarry site	N	3014	Temp. site (hunting)	N
733	Temp. site (lithic scatter)	N	3018	Temp. site (hunting)	N
734	Campsite/burial site	Y	3026	Temp. site	N
735	Unclassified	N	3027	Temp. site (hunting)	N
939	Temp. site (camping)	N	3028	Temp. site	N
940	Campsite	N	3029	Temp. site	N
941	Campsite	N	3030	Campsite	N
942	Campsite (seasonal)	N	3033	Temp. site	N
962	Temp. site (camping)	N	3034	Temp. site	N
963	Temp. site (camping)	N	3035	Temp. site (hunting)	N
965	Temp. site (shellfisher camp)	N	3036	Temp. site	N
966	Unclassified	N	3040	Temp. site (hunting)	N
967	Temp. site (camping)	N	3296	Quarry site	N
968	Temp. site (camping)	N	3297	Hunting site	N
969	Temp. site (shellfisher camp)	N	3298	Hunting site	N
991	Temp. site (hunting)	N	3386	Historic trash scatter	N
992	Temp. site	N	3390	Temp. site (hunting)	N
1001	Temp. site (hunting)	N	3393	Temp. site (hunting)	N
1002	Temp. site	N	3424	Temp. site	N
1728	Temp. site (lithic scatter)	N	3426	Temp. site (lithic scatter)	N
1997	Temp. site (hunting)	N	3503	Temp. site (lithic scatter)	N
2174	Quarry site	N			

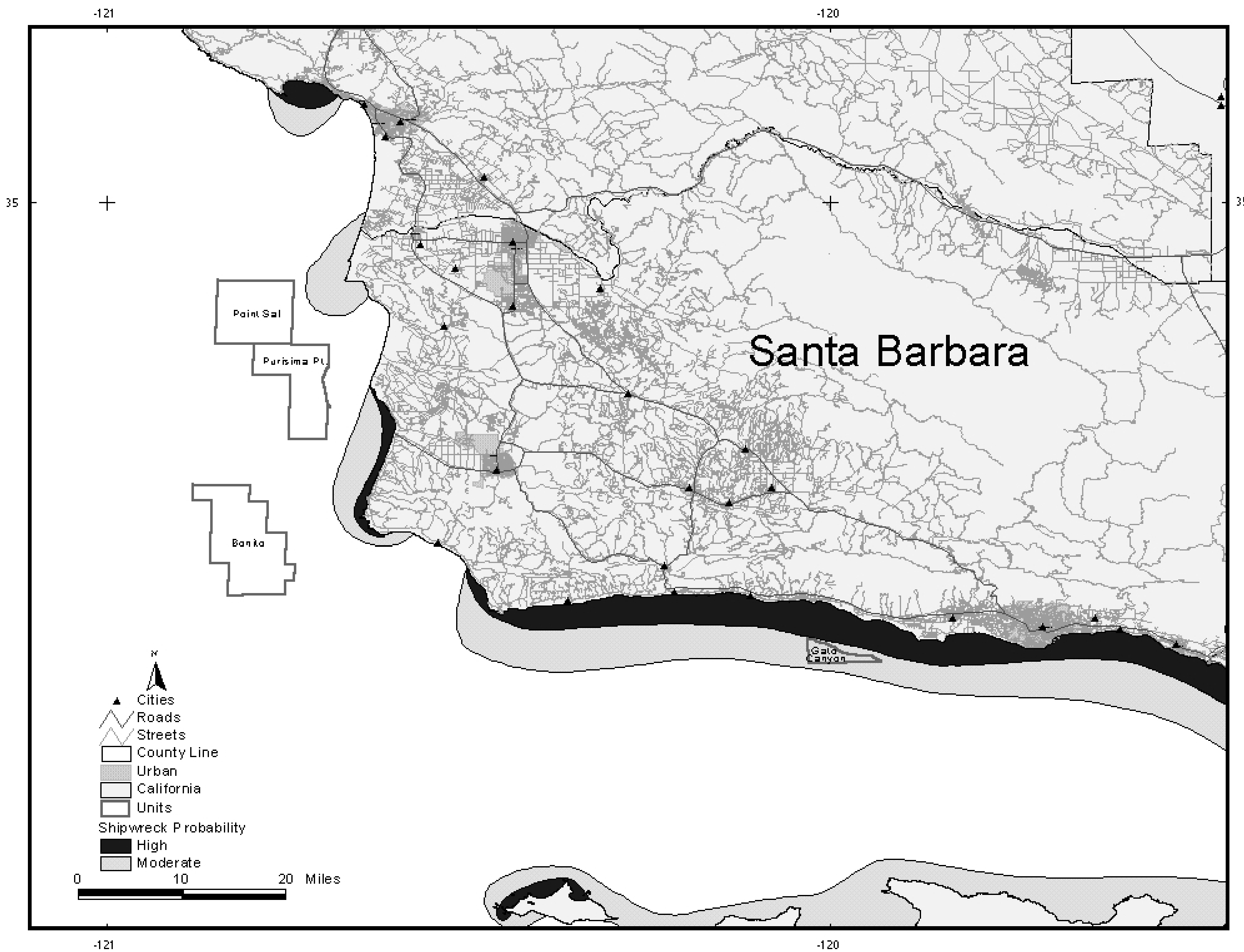
Table 4.8-4. Vessels lost between Point Sal and Point Arguello, California

Ship	Place Lost	Date Lost	Cause
Harvard	Point Arguello	1931	Stranded
JJ Loggie	Point Arguello	1912	Stranded
Lone Eagle	Point Arguello	1940	Collision
Los Angeles	Point Arguello	1942	Foundered
Nippon Maru	Point Arguello	1933	Stranded
Santa Rosa	Point Arguello	1911	Stranded
Sibyl Marston	Point Arguello	1909	Stranded
Ellin	Point Arguello	1963	Foundered
Suomi	Point Arguello	1955	Collision
Yankee Blade	Point Arguello	1854	Stranded
DD261 Delphy	Point Arguello	1923	Stranded
DD296 Chauncey	Point Arguello	1923	Stranded
DD297 Fuller	Point Arguello	1923	Stranded
DD309 Woodbury	Point Arguello	1923	Stranded
DD310 S.P. Lee	Point Arguello	1923	Stranded
DD311 Nicholas	Point Arguello	1923	Stranded
DD312 Young	Point Arguello	1923	Stranded
Evylyn H	Point Arguello	1976	Burned
Isis Point	Arguello	1964	Foundered
Margaret B	Point Arguello	1955	Foundered
Miracle	Point Arguello	1974	Stranded
Presephone	Point Arguello	1970	Stranded
Tiki Gem	Point Arguello	1976	Stranded
Welcome	Point Arguello	1932	Stranded
Yankee Mariner	Point Arguello	1949	Burned
Edith	Point Pedernales	1849	Stranded
Annie Lysle	Point Sal	1875	Stranded
Crovate	Point Sal	1923	Stranded
Jan Lin	Point Sal	1974	Stranded
Leucadia	Point Sal	1952	Stranded
Little Dipper	Point Sal	1954	Stranded
Marlin VIII	Point Sal	1959	Stranded
Narhel	Point Sal	1949	Stranded
Norma J	Point Sal	1953	Stranded
Putty Ann	Point Sal	1984	Stranded
Sea Me	Point Sal	1975	Foundered
Hopestill	Purisima Point	1949	Stranded
Scotia	Purisima Point	1914	Stranded
WCF Co. No. 2	Santa Maria River	1920	Stranded
Robert Sudden	Surf	1905	Stranded
El Commodore	Surf	1946	Stranded
Brant	El Capitan	1960	Burned



Source: MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 4.7.3-1)

Figure 4.8-1. Sensitive Lands for Submerged Prehistoric Sites.



Source: MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 4.7.3-2)

Figure 4.8-2. Shipwreck Sensitivity Zones.

Table 4.8-5 summarizes archaeology information for four offshore units.

Table 4.8-5. Summary of Archaeology Information by Unit

	Gato Canyon Unit OCS-P-0460, 0462, and 0464	**Bonito Unit** OCS-P-0443, 0445, 0446, 0449, 0450, 0499, and 500	**Purisima Point** Unit OCS-P-0426, 0427, 0432, and 0436	**Pt. Sal Unit** OCS-P-0415, 0416, 0421, and 0422
Cultural Resource Survey and Report	None. Archaeological Survey and Report must be completed prior to exploration.	None. Analysis of geophysical survey data reveals no indication of sites. Archae-ological Survey and Report must be completed prior to delineation on OCS-P 0500.	Yes on OCS-P-0432, revealed indication of sites. Additional analysis ordered.	Yes on OCS-P-0416, revealed indication of sites. Additional analysis ordered.
Landforms with Possible Prehistoric Sites	No. Leases seaward of 16,500-year-old shoreline.	No. Leases seaward of 18,000-year-old shoreline.	No. Leases seaward of 16,500-year-old shoreline	Eastern portion of 0432 seaward of 16,500-year-old shoreline. Southeast portion of 0432 may contain lagoon, estuary or embayment landform.
Vessel Lost List–MMS	MV Brant. Oil explora-tion vessel. Sank two miles north of lease boundary in State waters.	No vessel listed. Possible sites off lease detected by surveys.	No vessel listed.	No vessel listed
Vessel Lost List–Pt. Mugu Sea Range	No information.	No vessel listed.	No vessel listed.	No vessel listed.
Vessel Lost List–State Lands Commission	No information.	No vessel listed.	No vessel listed.	No vessel listed.
Vessel Lost List–U.S. Navy SPAWAR Systems Command	No information.	No vessel listed.	No vessel listed.	No vessel listed.
Central Coast Information Center at UCSB	No information.	No vessel listed.	No vessel listed.	No vessel listed.
Fisherman's Contingency Fund claims from unknown causes	Loss on OCS-P-0462 and 0464.	Loss on southeast corner of OCS-P-0500.	None	None
Predictive Zone—MMS	Moderate	Low	Low	Low
Predictive Zone—Pt. Mugu Sea Range	Moderate	Low	Moderate	Moderate

Fisherman's Contingency Fund claims for gear loss due to unknown sources were plotted for each unit. Gear loss may be indicative of a shipwreck site.

The MMS Regional Director has required operators to conduct an archaeological resource survey and report on the Gato Canyon, Purisima Point, and Point Sal Units prior to the submittal of new or revised exploration plans. These surveys and reports, which must comply with the Region's Notice to Lessees 9805 which may be viewed on the world wide web at:http://www.mms.gov/omm/pacific/offshore/ntls/ntl98-p05.htm.

The area that could be affected by an oil spill consists of the intertidal area approximately from Point Sur in Monterey County to Point Vicente in Los Angeles County.

As noted above, the northern extent of the Chumash appears to have been the Morro Bay area. Along the coast, the Salinan people inhabited the area from Piedras Blancas to Big Creek. Most villages are found along interior river drainages, although some habitation sites were found along the coast. Evidence suggests that Salinan villages were located above the fog line while temporary camps used by travelers are found along the coast. The area north of Big Creek into the Carmel Valley was inhabited by the Esselen people, whose settlement patterns remain poorly known. Generally, large coastal village sites are absent in this area, where only temporary camps are found (MMS, 1990, as cited in MMS, 2001).

This pattern is somewhat different south of Point Conception where large coastal village sites on the mainland and the islands around drainages persisted until the beginning of the Historic period. Temporary camps are also prevalent along the coastline and inland along the drainages. Remnants of these sites remain in great abundance in the lesser-developed areas of the Southern California Bight. They are threatened by coastal erosion and cliff retreat that continues to be a serious problem in this area.

Generally in the central California, there appears to have been very little use of coastal areas prior to 5,500 BP. Between about 5,500 and 1,000 years BP, there occurred a profusion of sites along the central coast, with a strong focus on maritime resources in the early part of this period. Almost all settlement sites in Monterey County from this period occur in the immediate area of the coastline. After this period, evidence suggests abandonment of coastal sites for larger village sites inland. Coastal sites during this time tend to be task specific sites for gathering and processing shellfish and or small, temporary camps. Many of the sites in central California represent habitation sites. Habitation sites are found in protected areas of high resource yield such as embayments, lagoons, lower drainages or areas slightly inland. Shellfish processing stations or camps may be found in the more exposed areas of the coastline. Sites are found at or near the mouths of virtually every substantial drainage from Morro Bay to Monterey, which appears to reflect a genuine preference for such points along the coast. Many shoreline sites are actively eroding (MMS, 1990, as cited in MMS, 2001).

The MMS shipwreck database indicates that 81 “historic wrecks” those occurring before 1946 occurred along the entire Monterey county coastline (3.3 wrecks per mile of coastline), with the earliest reported wreck in 1831, with the time span of the first ten wrecks taking 44 years. San Luis Obispo county has 21 wrecks (0.3 wrecks per mile of coastline), with the earliest wreck in 1852, with the time span of the first 10 wrecks taking 64 years.

4.8.5 Effects of Past Offshore Oil and Gas Activities on Cultural Resources

Regulations require that the Minerals Management Service (MMS), under various Federal laws and regulations, ensure that regulated Outer Continental Shelf (OCS) activities do not adversely affect significant archaeological resources. Since 1973, the Region has required the lessees to conduct lease-specific archaeological surveys and report the survey’s results as a means to determine what actions, if any, are necessary to protect the resource. The archaeological survey identifies potential prehistoric and historic sites. The archaeological report presents the analysis and evaluation of the survey data. The report serves as the basis for determining if potential archaeological resources exist and what actions are necessary to protect the potential resources. If a potential resource is detected, it must be avoided or the site documented and data recovered prior to conducting activities that may affect the site. Given the expense of documenting sites in water depths encountered on the Pacific OCS, avoidance has been the preferred mitigation method.

Approximately 36 archaeological surveys have been conducted in the Pacific Region. All operators avoided the potential resources identified in the surveys (MMS, 1995, as cited in MMS, 2001). Other measures are undertaken during construction to protect previously undetected resources. For example, pipeline emplacement between Platform Heritage and Harmony, pre-installation remotely operated vehicle survey of the pipeline route and real-time monitoring of the touchdown point by the ROV during the pipeline emplacement ensured any resource not detected by previous surveys would be discovered. Regulations require the cessation of operations in the area of such a discovery until direction can be provided on how to protect the resource (MMS, 1997, as cited in MMS, 2001). In this project, no resources were detected.

4.8.6 Native American Concerns

Previous consultation with Native American respondents documented in environmental impact statements highlighted the following concerns:

- Participation in identification, documentation, and data recovery programs at archaeological sites.
- Protection of ancestral sites by avoidance, especially mortuary sites, human burials in residential areas, and other sacred sites.
- Protection of plant and animal communities, and other resource areas;
- Participation in determination of the importance of sites.

Although local Native Americans consider all resources significant, they have identified certain types of resources as more important than other types. For example, a burial generates greater concern than isolated artifacts, just as an ethnohistoric village site is considered more sensitive than a scatter of lithic flakes.

The following environmental impact statements, whose geographic scopes for archaeological resources overlap, include the northern Santa Maria Basin (URS, 1986, as cited in MMS, 2001); the central Santa Maria Basin (A. D. Little, 1985, as cited in MMS, 2001); the southern Santa Maria Basin (A. D. Little, 1986, as cited in MMS, 2001) and the western Santa Barbara Channel (U.S. Geological Survey, 1974; Science Application Inc., 1984, as cited in MMS, 2001).

Additional concerns regarding monitoring of offshore energy related construction activity were revealed in a number of Santa Barbara County Energy Division assessments of condition effectiveness (SBC 1991, 1992, 1993, as cited in MMS, 2001). These concerns include:

- Sites were not avoided or construction occurred when Native American and archaeological monitors were not present. Part of the problem with site avoidance was unfamiliarity with permit conditions by all parties and to a misunderstanding of the kinds of activities that required monitoring.
- Modern sacred sites, that is, those currently used by Chumash, should be shown proper respect and avoided.
- Need for life-of-the project monitoring. For example, if a buried pipeline is reopened, monitoring may be needed because of potential archaeological sites in staging areas, parking areas, and access roads.
- Responsibilities for protecting burials or reburials and other sites in the event of an oil spill.
- Establish clear and informal lines between the project operator, project archaeologists, Native Americans, and responsible government agencies.
- Include Native American representatives in the initial survey to determine presence of sites (phase 1 investigation) and decisions associated with avoiding sites. Information they could provide include knowledge about local sensitivities, familiarity with local cultural resources, and identity of religious areas, such as areas used for reburials.
- Include Native American representatives in the characterization of site (phase 2 investigation) and discussions regarding mitigation plans on all discoveries.
- Plans and agreements should address issues regarding Native American monitors including the need to ensure adequate numbers of monitors, transportation of monitors to and from construction sites, definitions of "disturbance," and criteria on which to determine the need for monitoring. These issues are particularly important since mitigation (data recovery) often took place as the pipeline was constructed.

- Resolution of conflicts between scientific archaeology value of a resource and the value to Native Americans.
- Native American participation in determining the ownership and curation of artifacts recovered during construction.

Concerns have also been expressed about the effect development may have on traditional cultural properties, such as “the Western Gate” at Point Conception, which have engendered a high level of controversy (Craig et al., 1978; Haley and Wilcoxon, 1996, 1997, 1999; Khus-Zuarte, 1998, as cited in MMS, 2001). Evidence suggests that this “gate” or portal was one of several that are important in Chumash spiritual beliefs. Traditionally, each gate appears to have a strong association with Chumash people within a particular region. Concern has also been expressed about the present-day view of the continuing significance of this and other sites. Disagreement exists over the boundaries of the traditional cultural property. One definition limits the location to the immediate vicinity of Point Conception, present site of the U.S. Coast Guard Point Conception Lighthouse Station. A broader definition encompasses the mainland coast within view of Point Conception. The Point Conception Lighthouse Station is listed on the National Register of Historic Places because of its significance as a maritime aid to navigation, not as a traditional cultural property.

Concern has also been expressed regarding the effects of degradation of the environment and the availability of plants used in traditional cultural practices, such as those materials used in the construction of Chumash watercraft (Cordero, 2000, as cited in MMS, 2001).

4.9 Visual Resources

This section outlines the visual character of the study area. Visual resources are considered an important feature of the scenic coastal portions of Ventura, Santa Barbara, and San Luis Obispo Counties.

4.9.1 Regulatory Setting

Visual resource protection is the subject of a variety of Federal, State, and local policies adopted as part of applicable land use management plans. This section summarizes the provisions of these laws and plans.

The California Coastal Act of 1976 was adopted after State voters approved the Coastal Conservation Act [Proposition 20] in 1972 (see Section 3, Regulatory Framework, for a complete discussion of the California Coastal Act and Coastal Zone Management Act). A key factor that led to the passage of this landmark legislation was the visible deterioration of the coastal environment because of development pressures of a growing population. The Act's visual resource preservation provisions, contained in Section 30251, protect the scenic and visual qualities of coastal areas as a resource of public importance. Permitted development must be sited and designed to protect views to and along the ocean and scenic coastal areas and, where feasible, to restore and enhance visual quality in visually degraded areas. New development in highly scenic areas must be subordinate to the character of its setting.

As required by the California Coastal Act, Santa Barbara County developed the Santa Barbara County Coastal Plan in 1982 (amended through 1999) and the Coastal Zoning Ordinance (CZO) in 1982. As a result, the County now has jurisdiction over development in the coastal zone, which generally stretches the length of the coast with a width of approximately 3,000 feet. In citing the importance of coastline visual resources, the County's Local Coastal Plan, which implements the Coastal Act, states, in part:

> The scenic resources of Santa Barbara's coastal zone are of incalculable value to the economic and social well-being of Santa Barbara County. The beauty of the Santa Barbara coastline is world-renowned; it is the basis of the County's strong tourist and retirement economies and is a source of continuing pleasure for the local populace. The visual resources of the coastal zone include its beaches, sand dunes, coastal bluffs, headlands, wetlands, estuaries, islands, hillsides and canyons, upland terraces and plains, and its rivers and streams. These resources are vulnerable to degradation through improper location and scale of building development, blockage of coastal views, alteration of natural landforms by poor cutting, grading and filling practices, and by poor design or placement of roadside signs and utility lines. The primary concern of the coastal Act is to protect views to these scenic resources from public areas such as highways, roads, beaches, parks, coastal trails and accessways, and vista points.

The County's Comprehensive Plan Open Space Element includes scenic highway corridors, parks and recreation areas, and views of coastal bluffs as significant visual resources (Santa Barbara County, 1995, as cited in MMS, 2001).

The National Marine Sanctuary Program (NMSP) of the National Oceanic and Atmospheric Association (NOAA) established a network of marine reserves and conservation areas within the Channel Islands National Marine Sanctuary (CINMS) to maintain the natural biological communities and to protect, restore, and enhance natural habitats, populations, and ecological processes. This action complemented the State of California's recent establishment of Marine Protected Areas (MPAs), which are a network of marine reserves and protected areas within the State waters of the CINMS. The Office of Administrative Law approved the Channel Islands Marine Protected Area (MPA) effective April 9, 2003. General Regulations governing MPAs state:

> *The areas specified … have been declared by the commission to be Marine Protected Areas. Public use of Marine Protected Areas shall be compatible with the primary purposes of such areas, and subject to the following applicable general rules and regulations… Nothing in this section expressly or implicitly precludes, restricts or requires modification of current or future uses of the waters identified as Marine Protected Areas or the lands or waters adjacent to these designated areas by the Department of Defense, its allies or agents.*
> (http://www.dfg.ca.gov/mrd/channel_islands/regs.html)

As of 2004, Santa Barbara County has awarded 224 grants for a total of approximately $15 million from its Coastal Resource Enhancement Fund (CREF). The County established CREF in 1987 to help mitigate significant impacts of offshore oil and gas development to coastal aesthetics, coastal recreation, coastal tourism, and environmentally sensitive coastal resources. In effect, the County awards grants from CREF to enhance these specific coastal resources. The following summarizes CREF expenditures (1988-2004):

- Half of these mitigation funds have been used to acquire coastal properties or conservation easements. For example, CREF helped purchase key bluff-top properties, such as the Carpinteria Bluffs, the Douglas property in the City of Santa Barbara, Santa Barbara Shores in Ellwood, and Point Sal near Guadalupe. It also helped to acquire properties that protect environmentally sensitive coastal habitats, such as Burton Mesa chaparral near Lompoc, Monarch butterfly foraging habitat in Ellwood, and the Carpinteria Salt Marsh.
- Approximately 40 percent of CREF have been devoted to developing or improving coastal parks and other coastal-related facilities such as the Cabrillo Aquarium near Lompoc, the Dunes Center in Guadalupe, and the Watershed Resource Center at Arroyo Burro Beach.
- Approximately 6 percent of CREF monies fall under Planning & Research, which mainly includes preparing master plans for coastal properties.
- A small portion of CREF has funded educational projects. Typically a small CREF grant of less than $25,000, this type of project can have a big impact. Santa Barbara Museum of Natural History's Los Marineros curriculum, Dunes Center's many exhibits, and La Purisima Audubon Society's Snowy Plover video educate students and adults about the fragile marine environment and the ways to protect it.

4.9.2 Visual Resources Studies in the Area

Table 4.9-1 lists some of the numerous studies that address onshore and offshore aesthetic resources in the area.

Table 4.9-1. Visual Resource Studies

Area of the Study	Title	Citation
California	Inventory and Evaluation of California Coastal Recreation and Aesthetic Resources	BLM, 1981. POCS Technical Paper No. 81-5. Granville Corporation, 1981.
California	Impacts of Outer Continental Shelf (OCS) on Recreation and Tourism.	MMS, 1987. OCS Study 87-0064 through 87-0068. Dornbusch and Associates. 1987
Point Conception and Point Arguello	Point Arguello Field and Gaviota Processing Facility Area Study and Chevron/Texaco Development Plan EIS. Technical Appendix L: Aesthetic Environment. Part 2 Visual Resources	MMS. 1984
California	California Coastal Resource Guide	California Coastal Commission. 1987
California	California Coastal Access Guide, 5th ed.	California Coastal Commission, 1997

4.9.3 Regional Setting

The regional setting for this analysis includes the offshore and onshore areas proximate to the undeveloped leases. Each separate area is described below.

4.9.3.1 Northern Santa Maria Basin

Aera operates leases within the Point Sal, Purisima Point, Lion Rock, and Santa Maria Units, and Lease OCS-P 0409. Long, straight sandy strand, offshore rocks, and rocky beaches characterize the coastline in the area most proximate to these units. Sand dune headlands and coastal terraces are the principal landforms. The dunes are part of the least disturbed of the remaining dune systems in California. Oil development in the Guadalupe Dunes, north of the Santa Maria River, is currently undergoing abandonment (MMS, 1998, as cited in MMS, 2001). The dunes from the Santa Maria southward toward Point Sal are part of the Nature Conservancy's Nipomo Dunes Preserve (CCC, 1997, as cited in MMS, 2001). Military structures, including missile-firing installations, are sited at Vandenberg Air Force Base, south of Point Sal. The dunes described above, the Point Sal headlands, and the Casmalia Hills support a varied wildlife population, while the rocky shoreline at Mussel Point and Point Sal provide habitat for marine mammals.

The most important aesthetic resources in this area include the scenic hillsides and shoreline of Point Sal, the rocky water's edge at Mussel Point and Point Sal, and the Guadalupe dunes (BLM, 1981, as cited in MMS, 2001). The Point Sal area displays a varied geology with excellent exposures of unique features (CCC, 1987, as cited in MMS, 2001). The area's overall aesthetic rating ranged from medium high to high (BLM, 1981, as cited in MMS, 2001). Platform Irene in the Point Pedernales Unit may be seen from this area when visibility allows.

The rocky shoreline at Purisima Point provides habitat for marine mammals. The Point itself has been identified as one of the most important aesthetic resources in the area, although military structures at Vandenberg AFB dot the landscape in this area (BLM, 1981, as cited in MMS, 2001). Public access is limited in the area by Vandenberg AFB (CCC, 1987; 1997, as cited in MMS, 2001). South of Purisima Point to the Santa Ynez River features low coastal terraces, low sand dunes and a flat sandy strand (BLM, 1981, as cited in MMS, 2001). Ocean Beach County Park, the only public access in the area, also features wetlands and a stream corridor (CCC, 1997, as cited in MMS, 2001). The area's overall aesthetic rating was judged to be medium high (BLM, 1981, as cited in MMS, 2001). Platform Irene in the Point Pedernales Unit may be seen from this area when visibility allows. The coastal route of the Southern Pacific Railroad traverses the area along the coast starting south of Purisima Point. This route affords rail passengers spectacular coastal views.

4.9.3.2 Bonito Unit

Plains Exploration and Production operates leases within the Bonito Unit. Long, straight sandy strand, offshore rocks, and rocky beaches characterize the coastline in the area proximate to this unit. Point Pedernales is a marine mammal haul-out site and a seabird nesting area. Low coastal terraces with rolling, relatively barren foothills extend from south of Point Pedernales to Jalama. Drainage swales meander out of the foothills and cut through the terraces to a rocky shoreline exposed to the north of Rocky Point but slightly more sheltered to the south. The water's edge between Point Pedernales and Rocky Point is described as "exceedingly dramatic" with offshore rocks, rocky intertidal areas, small rocky and sand pocket beaches accenting wave cut terraces (BLM, 1981, as cited in MMS, 2001). Point Arguello light enhances the picturesque nature of this area (BLM, 1981, as cited in MMS, 2001). Jalama Beach County Park provides the only public access to this area and features wetlands, bluffs, coastal foothills and a sandy beach (CCC; 1987, 1997, as cited in MMS, 2001). The area's overall aesthetic rating was judged to be medium high (BLM, 1981, as cited in MMS, 2001). Platforms in the Point Arguello Unit may be seen from this area when visibility allows. The coastal route of the Southern Pacific Railroad traverses the area along the coast. This route affords rail passengers spectacular coastal views.

4.9.3.3 Sword Unit

Samedan operates leases within the Sword Unit. Long, straight sandy strand, offshore rocks, and rocky beaches characterize the coastline in the area proximate to this unit. The water's edge between Point Pedernales and Rocky Point is described as "exceedingly dramatic" with offshore rocks, rocky intertidal areas, small rocky and sand pocket beaches accenting wave cut terraces (BLM, 1981, as cited in MMS, 2001). Point Arguello light enhances the picturesque nature of this area (BLM, 1981, as cited in MMS, 2001). Jalama Beach County Park provides the only public access to this area and features wetlands, bluffs, coastal foothills and a sandy beach (CCC; 1987, 1997, as cited in MMS, 2001). The area's overall aesthetic rating is judged to be medium high. Platforms in the Point Arguello Unit may be seen from this area when visibility allows.

4.9.3.4 Rocky Point Unit

Arguello operates leases within the Rocky Point Unit. Long, straight sandy strand, offshore rocks, and rocky beaches characterize the coastline in the area proximate to this unit. The water's edge between Point Pedernales and Rocky Point is described as "exceedingly dramatic" with offshore rocks, rocky intertidal areas, small rocky and sand pocket beaches accenting wave cut terraces (BLM, 1981, as cited in MMS, 2001). Point Arguello light enhances the picturesque nature of this area (BLM, 1981, as cited in MMS, 2001). Jalama Beach County Park provides the only public access to this area and features wetlands, bluffs, coastal foothills and a sandy beach (CCC; 1987, 1997, as cited in MMS, 2001). The area's overall aesthetic rating is judged to be medium high. Platforms in the Point Arguello Unit may be seen from this area when visibility allows.

4.9.3.5 Cavern Point Unit

Venoco operates leases within the Cavern Point Unit. This unit is located offshore of the area including the Cities of Ventura (San Buenaventura), Oxnard, and Port Hueneme. This area of the coast is fairly urbanized. Sandy beaches, popular surfing breaks, riparian canyons, State parks, occasional riparian areas at stream outfalls to the ocean, and ocean views of the Channel Islands characterize the less developed northwestern portion of this area. The more developed portion includes artificial modifications including the presence of commercial centers, hotels, golf courses, generating stations, and residential areas. This area also includes the Channel Islands Harbor, part of the Channel Islands National Park.

4.9.3.6 Gato Canyon Unit

Samedan operates leases within the Gato Canyon Unit. A moderately rolling high coastal terrace, sandy beaches and coves, and steep, stream cut canyons leading to the crest of the Santa Ynez mountain range characterize the coastline in the area proximate to the Unit. Sandy beaches, popular surfing breaks, riparian canyons, State parks, occasional riparian areas at stream outfalls to the ocean, and ocean views of the Channel Islands are among the most important aesthetic features of this area (BLM, 1981, as cited in MMS, 2001). The area also includes artificial modifications including the presence of offshore platforms and onshore oil and gas infrastructure, commercial centers, a major resort hotel, golf courses, and residential areas of Goleta extending from the urban growth boundary eastward to the Coal Oil Point Reserve. The area is traversed by the main south to north transportation corridor, U.S. Highway 101 and the Southern Pacific Rail Road. This segment of US 101 is eligible for designation as a California scenic highway, but the designation has not been made (http://www.caltrans.ca.gov/hq/LandArch/scenic/cahisys.htm). However, the County has, in all areas where there are views from Highway 101 to the ocean, established a View Corridor Overlay designation in its coastal zoning ordinance and local coastal plan. The County Board of Architectural Review reviews all development in this area to ensure that visual resources are protected.

4.9.4 Effects of Past Offshore Oil and Gas Activities

Since its advent in the late 1890s, offshore oil and gas activities have engendered concern over the aesthetic appearance of the offshore and onshore support facilities. In fact, prior to the 1969 oil spill, community resistance to offshore oil and gas was primarily driven by aesthetics (Lima, 1994, as cited in MMS, 2001). The cumulative effects of past offshore oil and gas activities in the area are attributable to development in State submerged lands and the Pacific OCS.

The platforms are the most visible portion of the Pacific OCS activities, since they are essentially permanent structures during their producing lives. A total of 23 oil and gas platforms and approximately 200 miles of associated pipelines have been installed off the coast of southern California. Nineteen of the Pacific OCS platforms are located offshore Ventura County and Santa Barbara County. There is also one State Tidelands platform (Platform Holly) located offshore Santa Barbara County and one artificial island (Rincon Island) located offshore Ventura County.

Since the 1980s, operators of the Santa Ynez Unit, the Point Arguello Unit, and the Point Pedernales Unit have made payments to the Coastal Resources Enhancement Fund (CREF), which provides enhancement projects that would compensate for residual impacts to coastal resources that are not otherwise mitigated. Santa Barbara County Findings of Approval for past offshore oil and gas projects in Santa Barbara County have found adverse project and cumulative impacts to recreation, tourism, and aesthetics from construction and operation of proposed projects. To mitigate general, diffused, project-specific, and cumulative impacts in these and other areas, Santa Barbara County created the CREF. CREF receives annual payments over the life of the project to be used for projects that enhance coastal recreation, aesthetic, tourism, or other environmentally sensitive resources (SBC, 1993, as cited in MMS, 2001).

A 1993 analysis of the program for the Santa Ynez Unit suggested that while the mitigation is effective, CREF expenditures tended to be more heavily weighted towards recreation, despite oil development impacts being as great or greater on environmentally sensitive resources, aesthetics, and tourism. In other words, while payments were sufficient to mitigate cumulative impacts, allocation of the Fund by the County may have caused an imbalance in mitigation across categories. The report noted that aesthetic impacts in areas that had not previously experienced offshore development would be more pronounced than areas that already had development (SBC, 1993, as cited in MMS, 2001).

4.10 Recreation

Recreation makes up an important component of the regional economy and, in part, defines the quality of life and the sense of place for residents of and visitors to the study area (MMS, 1996; MMS, 1998; MMS, 2000, as cited in MMS, 2001). Recreation activities may be classified as ocean-dependent or ocean-enhanced. Ocean-dependent activities are those where direct access to the water is necessary for the activity to take place. These endeavors include surfing, swimming, diving, fishing, sailing, beach combing, and beach games. Ocean-enhanced activities include cycling, hiking, running, sunning, nature appreciation, and camping (California Department of Parks and Recreation, 1980, as cited in MMS, 2001). Recreational enjoyment is strongly affected by the aesthetics of the location; visual resources are addressed in Sections 4.9 and 5.9.

4.10.1 Regulatory Setting

The California Coastal Act of 1976 was adopted after State voters approved the Coastal Conservation Act, Proposition 20, in 1972. A key factor that led to the passage of this landmark legislation was the restriction of coastal access and recreation opportunities. Table 4.10-1 summarizes the key Coastal Act recreation policies.

Table 4.10-1. California Coastal Act Recreation Policies

Coastal Act Section	Policy
30211	Development shall not interfere with the public's right to access to the sea where acquired through use of or legislative authorization, including but not limited to the use of dry sand and rocky coastal beaches to the first line of terrestrial vegetation.
30213	Low cost visitor and recreation facilities shall be protected, encouraged, and where feasible, provided. Development providing public recreational opportunities are preferred.
30220	Coastal areas suited for water-oriented recreational activities that cannot readily be provided at inland water areas shall be protected for such uses.
30221	Ocean front land suitable for recreational use shall be protected for recreational use and development unless present and foreseeable future demand for public or commercial recreational activities that could be accommodated on the property is already adequately provided in the area.
30234	Facilities serving the commercial fishing and recreational boating industries shall be protected and, where feasible, upgraded.
30240 (b)	Development in areas adjacent to…parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those recreation areas.

4.10.2 Studies in the Area

Table 4.10-2 lists some of the numerous studies that address onshore and offshore recreation resources in the area.

Table 4.10-2. Recreation Studies

Area of the Study	Title	Citation
California	Impacts of Outer Continental Shelf (OCS) on Recreation and Tourism.	MMS, 1987. OCS Study 87-0064 through 87-0068. Dornbusch and Associates. 1987
California	California Coastal Resource Guide	California Coastal Commission. 1987
California	California Coastal Access Guide, 5th ed.	California Coastal Commission, 1997
Santa Barbara and Ventura County	Santa Barbara and Ventura Counties Shoreline, California. Final Reconnaissance Report	U.S. Army Corps of Engineers, 1997
Santa Barbara County	Santa Barbara County: Two Paths	MMS. 1996. OCS Study MMS 96-0036, Molotch, et. al.
Santa Barbara County	Petroleum Extraction Industry in Santa Barbara County, California. An Industrial History	MMS. 1998. OCS Study MMS 98-0048, Nevarez, et. al.

4.10.3 Regional Setting

4.10.3.1 Coastal Access

Many factors affect recreational resources including supply, demand, site quality and accessibility, and site closures and restrictions, as well as diversification and expansion of activities (Pollock, 1997, as cited in MMS, 2001). Communities recognize recreation opportunities, especially coastal-dependent and coastal-enhanced recreation, as a defining characteristic of the community for both resident and visitor (King, 1997; MMS, 1996a, b, and c; MMS, 2000, as cited in MMS, 2001). Population growth is a robust predictor of recreational demand (Science Applications Inc, 1984, as cited in MMS, 2001). For example, by 2040, population is estimated to grow 145 percent for San Luis Obispo County, 110 percent for Santa Barbara County, and 90 percent for Ventura County, implying a commensurate growth in demand for recreational opportunities. Furthermore, changing consumer preferences affect recreational resources. For example, in San Luis Obispo, recent years have seen an increase in tourism and shoreline recreation and increasing popularity of boating, hiking, mountain biking and other forms of coastal recreation (CCC, 2001, as cited in MMS, 2001).

Coastal access points for recreation along the coast from Point Sur in Monterey County to Point Fermin in Los Angeles County tend to be fairly concentrated. Generally, four to ten formally identified access points cluster in 5 to 7 mile segments, with the higher concentrations in shorter segments in highly developed areas. Access ranges from high use recreational beaches offering a range of amenities and activities to stairways to pocket beaches. In less-developed areas, formally identified access is fairly isolated. These units tend to be State and county parks that feature a mix of day and overnight uses and provide the only recreational access in the area (California, 1997, as cited in MMS, 2001).

One reason for the concentration of access is a result of how public access is gained. For example, a recent California Coastal Commission report notes that in San Luis Obispo County, public access often occurs in clusters in urban areas because access is secured as mitigation from development projects. However, distribution of access is important and large expanses of rural areas may offer little vertical or lateral access. Furthermore, the goal of providing public access may sometimes conflict with and be subordinate to coastal resource protection. Finally, the report examines how access requirements, including upland support facilities such as signage and parking facilities, are important elements for fostering and addressing changing demands for access (CCC, 2001, as cited in MMS, 2001).

Besides changes in access, the mixture of activities changes as one moves north to south through the area. North of Point Conception, in-water recreation tends to require a wetsuit and is limited to activities such as surfing, scuba and skin diving, and snorkeling. However, coastal-enhanced activities abound, such as wildlife viewing and scenic enjoyment, which require the isolated dramatic sweep of the coastline and habitat of the area. South of Point Conception, water-contact activities become more numerous, with greater levels of participation.

4.10.3.1 Regional Setting for the Proposal

Recreation sites in the area may be accessed through a variety of points managed by the National Park Service (National Parks; e.g., Channel Islands National Park); the California Department of Parks and Recreation (State Parks); County Departments of Parks and Recreation (County Parks); and local municipalities. Table 4.10-3 lists the access points and the primary recreation activity that takes place at each site.

Table 4.10-3 Public Coastal Recreational Facilities

Recreational Facility	Entrance or Parking Fee	Parking	Restrooms	Lifeguard	Campground	Showers	Firepits	Path to Beach	Bike Path	Hiking Trail	Facilities for Disabled	Boating Facilities	Equestrian Trail	1999 Advisory/Warning Days Posted with Advisory	Concessions	Ocean Dependent Activities	Ocean Enhanced Activities
Nipomo Dunes Preserve		X	X							X	X		X			X	X
Point Sal State Beach		X						X								X	X
VAFB Fishing Access		X						X								X	X
Ocean Beach County Park		X	X				X	X			X					X	X
VAFB Beach Access		X														X	X
Jalama Beach County Park	X	X	X		X		X		X	X	X				X	X	X
Gaviota State Park	X	X	X	X	X	X	X			X	X	X			X	X	X
Refugio State Beach	X	X	X	X	X	X	X			X	X				X	X	X
Bike Path and Beach Ramp								X	X	X	X					X	X
El Capitan State Beach	X	X	X	X	X	X	X		X	X	X				X	X	X
Haskell's Beach Access		X				X										X	X
Sandpiper Golf Course																	X
Santa Barbara Shores County Park		X							X	X			X				X
Coal Oil Point Reserve		X						X		X							X
Isla Vista County Park		X						X			X						X
Window to the Sea Park		X															X
Isla Vista Beach		X														X	X

Table 4.10-4 lists public beaches throughout the tri-county area and their respective beach closures and advisories since 2000. The information in Table 4.10-4 for 2003 and 2004 does not accurately reflect the California beach advisories for Santa Barbara and San Luis Obispo Counties because this information is not yet available. California is actively working to meet EPA's data reporting requirements, however, at this time, the swimming season data is only available in summary format (EPA BEACON, 2004). Ventura County data have been added to supplement the BEACON data (Ventura County, 2004).

Table 4.10-4. Beach Closings and Advisories

Public Beach	Closings and Advisories				
	2000	2001[1]	2002[1]	2003[1]	2004[1]
San Luis Obispo County					
Avila Beach	1	5	1	0	0
Cayucos	2	3	1	0	0
Moonstone Beach	1	1	0	0	0
Morro Bay City Beach	1	3	1	0	0
Olde Port Beach	0	1	0	0	0
Pismo State Beach	0	2	2	0	0
Pismo State Beach, Oceano	0	0	0	0	0
Shell Beach	1	0	0	0	0
Santa Barbara County					
Arroyo Burro Beach	15	10	12	0	0
Arroyo Quemada Beach	15	9	12	0	0
Butterfly Beach	6	6	4	0	0
Carpinteria City Beach	5	5	5	0	0
Carpinteria State Beach	0	7	4	0	0
East Beach at Mission Creek	9	11	11	0	0
East Beach at Sycamore Creek	8	6	9	0	0
El Capitan State Beach	6	5	4	0	0
Gaviota State Beach	13	9	3	0	0
Goleta Beach	8	12	5	1	0
Guadalupe Dunes	2	4	5	0	0
Hammond's Beach	9	8	6	0	0
Haskells	0	3	3	0	0
Hope Ranch Beach	9	8	1	1	0
Jalama Beach	12	8	3	0	0
Leadbetter Beach	7	14	4	0	0
Ocean Beach	3	2	0	0	0
Refugio State Beach	10	7	9	1	0
Rincon Beach	9	4	1	0	0
Sands Beach at Coal Oil Point	4	5	2	0	0
Surf Beach	0	2	2	0	0
Ventura County[2]					
Channel Islands Harbor Beach Park	1	16	20	24	14
County Line Beach	3	4	1	2	1
Deer Creek Beach	3	2	3	3	0
Emma Wood State Beach	2	5	2	1	2
Faria County Park	3	3	0	2	0
Hobie Beach	1	13	8	7	4
Hobson County Park	1	5	0	2	1
Hollywood Beach – La Crescenta St.	1	6	1	2	0
Hollywood Beach – Los Robles St.	0	0	1	2	2
La Conchita Beach	0	2	0	0	0
Mandalay County Park – 5th St.	4	0	1	2	0
Mandalay County Park – Channel Way	0	0	1	2	0
Mandalay County Park – Outrigger Way	0	11	1	2	0
Mandos Cove Beach	2	3	0	0	1
Marina Park Beach	4	3	4	3	2
McGrath St. Beach – North of Gonzales Rd.	0	10	2	3	3
McGrath St. Beach – McGrath Lake	0	0	1	3	3
McGrath State Beach – Gonzales Rd.	8	0	2	3	2
Mussel Shoals Beach	0	2	1	0	2
Oil Piers Beach	3	2	2	0	1
Ormond Beach – Arnold Rd.	12	0	0	0	0
Ormond Beach – Industrial Drain	0	0	3	4	1
Ormond Beach – J St.	0	11	0	3	1

Public Beach	Closings and Advisories				
	2000	2001[1]	2002[1]	2003[1]	2004[1]
Oxnard Shores Beach – Amalfi Way	4	3	2	2	0
Oxnard State Beach – Falkirk Ave.	5	6	1	2	0
Oxnard State Beach – Starfish Dr.	0	0	1	2	0
Peninsula Beach/Harbor Cove	10	6	5	4	4
Point Mugu State Beach	3	3	2	4	3
Port Hueneme Beach Park	3	2	1	1	1
Promenade Park – California St.	8	26	3	4	2
Promenade Park – Figueroa St.	0	0	2	8	2
Promenade Park – Oak St.	0	0	2	5	3
Promenade Park – Redwood Apts.	0	0	2	3	3
Rincon Beach	17	29	18	7	6
Rincon Parkway – North	0	0	0	1	0
San Buenaventura St. Beach – San Jon Rd.	0	0	4	3	9
San Buenaventura St. Bch. – Weymouth Ln.	0	24	5	3	1
San Buenaventura St. Bch. – Dover Ln.	14	0	2	3	2
San Buenaventura St. Bch. – Kalorama St.	0	0	3	5	1
Seaside Wilderness Park	0	3	0	1	0
Silverstrand Beach – San Nicolas Ave.	6	10	1	3	0
Silverstrand Beach – Santa Paula Ave.	0	0	2	2	2
Silverstrand Beach – Sawtelle Ave.	0	0	2	4	2
Solimar Beach	5	7	1	4	2
South Jetty Beach	2	3	2	2	2
Staircase State Beach	1	1	1	2	0
Surfer's Knoll Beach	0	3	6	5	2
Surfer's Point	7	8	2	5	3
Sycamore Cove State Beach	0	2	3	2	0
Thornhill Broome State Beach	0	2	1	1	1
TOTAL	**289**	**396**	**238**	**158**	**91**

Source: EPA BEACON, 2004 and Ventura County, 2004.
[1] It should be noted that the decrease in closings at all beaches corresponds to multiple regulatory and funding changes in 2000-2001.
[2] Beach closings for Ventura County in 2004 only includes data through November 30, 2004.

Many California communities have beach areas that extend inland for a short distance from the water's edge. Within these beach areas, economic activity is predominantly related to water-oriented recreation and this is where most of a community's water-oriented recreation is concentrated. Beyond the beach area, water-oriented recreation and tourism is more diffused and less distinguishable from other recreation. These beach areas also encompass adjoining residential areas. These areas would include Morro Bay, Avila, Shell Beach, Pismo Beach, Santa Barbara, Carpinteria, Ventura, Oxnard, Santa Monica, Venice, Manhattan Beach, Hermosa Beach, and Redondo Beach. A small craft harbor or municipal recreational pier anchors or focuses activities in these areas.

Santa Barbara's beach area extends from Leadbetter Beach through the harbor to East Beach, a distance of approximately 2.5 miles and extends inland a few city blocks to the area of the Southern Pacific Railroad tracks. An oceanfront thoroughfare, Cabrillo Boulevard, with its sidewalk and beachpath, connects the two beaches. Most of the area's ocean-oriented activity takes place in this area. Hotels and restaurants in the area highlight their proximity to the ocean. Most retail businesses in this area service ocean-oriented activity. However, even if such establishments are outside the beach area, such as a dive shop, surf shop, or kayak rental establishment, this area provides the put-in point. Moreover, this area exemplifies the quality-of-life aspects prized by residents and visitors.

Santa Barbara Harbor is primarily a small-craft port with limited cargo handling capability. Marina facilities include boat slips, fuel docks, a fish hoist and ice machine, marine specialty shops and businesses, restaurants, the maritime museum, sport fishing and dive boat charters, convenience stores, a yacht club, and boat rentals. It also hosts the Coast Guard cutter for the area. The harbor's West Beach area features sand volleyball courts. The breakwater, itself a tourist and recreation attraction, forms a calm water area adjacent to West Beach that is ideally suited for youth sailing instruction and activities from April through October.

Stearns Wharf, which bounds the harbor area on the east, is a public fishing pier and the city's most important ocean-oriented tourism and recreation attraction with several restaurants, shops, and marine education facilities. Stearns Wharf, as the mid-point between Leadbetter and East Beach and at the foot of the city's main thoroughfare, State Street, focuses the ocean-oriented activities in Santa Barbara. Palm Park offers a mile of beach frontage, picnic areas, a cultural center, and grass areas with soccer fields and other recreation amenities. The park is the site of the weekend open-air art show. East Beach hosts a recreational center and public bathhouse and features sand volleyball courts. The city maintains several public parking lots throughout the area.

County or city parks outside of these beach areas provide other coastal access for a wide range of activities. These range from camping and day use facilities in isolated areas to day use parks offering a wide variety of amenities to parking areas with coastal access.

The California Department of Parks and Recreation maintains many units throughout the study area. These units tend to be placed away from municipal areas and often offer improved campsites, day use, and other amenities.

Water-Oriented Recreation

Table 4.10-5 indicates the level of water-oriented recreational activity that occurs at Channel Islands National Park and the overlying Channel Islands National Marine Sanctuary. Access to the five-island park is generally from the small craft harbors at Santa Barbara, Ventura, or Channel Islands (Oxnard). Table 4.10-6 indicates on-island activity. The peak season for island visitation occurs March through October with the greatest use occurring May through June. Coastal units in the Santa Monica Mountains National Recreation area are maintained by State or local agencies.

Table 4.10-5. Water Oriented Recreation Activity in the Channel Islands National Marine Sanctuary, 1999.

Activity	Ventura County (person-days)	Santa Barbara County (person-days)	Los Angeles County (person-days)	Location of Highest Distribution of the Activity
Whale Watching	17,718	8,266	Not reported	Anacapa West Santa Cruz Santa Rosa passage
Sailing	3,731	Not reported	284	East Santa Cruz
Kayaking/sightseeing	65	1,168	Not reported	Santa Cruz West Santa Rosa West San Miguel
Charter boat diving	17,429	7,669	611	Anacapa East Santa Cruz
Private boat diving	42,155	4,513	581	Anacapa
Charter boat fishing	148,638	8,758	1,374	Anacapa East Santa Cruz
Private boat fishing	199,073	12,672	2,270	All five islands

Source: Unpublished data, National Oceanic and Atmospheric Administration

Table 4.10-6. Day Use Visitors and Overnight Campers to Channel Islands National Park, January to December 2000

Month	Anacapa		Santa Barbara		Santa Cruz		Santa Rosa		San Miguel	
	Day Use	Camp	Day Use	Camp	Day Use	Camp	Day Use	Camp	Day Use	Camp
Jan	293	19	9	0	2345	169	1170	18	0	0
Feb	325	0	0	0	126	41	0	0	43	0
Mar	1783	5	6	0	1287	317	104	71	0	0
Apr	1655	43	160	45	1738	551	311	205	0	0
May	2269	104	125	60	1946	711	401	268	87	0
Jun	2360	146	210	144	1826	504	484	283	225	106
Jul	3060	165	320	94	2685	1200	433	273	145	36
Aug	2165	224	247	50	3225	1547	430	292	222	59
Sep	1158	159	18	0	2282	957	334	170	136	18
Oct	688	55	6	0	1245	527	159	149	79	0
Nov	422	36	3	0	671	267	22	16	3	0
Dec	306	6	7	0	462	167	25	19	9	0

Source: Unpublished data, Channel Islands National Park, Ventura California

4.10.4 Effects of Past Offshore Oil and Gas Activities

The 1929 development of the State tideland and submerged lands portion of the Ellwood Oil Field from more than a dozen piers initiated offshore oil and gas development in the study area. Today, the Ellwood pier is the last of the structures that dotted the area eastward to Coal Oil Point (Lima, 1994, as cited in MMS, 2001). Sandpiper Golf Course and the Santa Barbara Shores County Park occupy the original site of the Ellwood Field. Beach users in the area still must be careful of metal footings and other structures left in place when the piers were abandoned and removed. Offshore of Haskell's beach, debris fields from past development attracts local scuba divers.

Offshore oil and gas production from platform Holly in the State's South Ellwood field started in 1966. The Bacara Resort is adjacent to the onshore processing plant for Platform Holly. Occasional leaks from oil pipelines of State offshore leases have resulted in beach and coastal cleanup in the area. Development of the Santa Ynez Unit on the Pacific OCS started in 1976. Las Flores Canyon between El Capitan State Beach and Refugio State Beach contains the onshore processing facilities for the Santa Ynez Unit. Storage tanks and shut-in onshore processing facilities for the Point Arguello field are sited near Gaviota State Park. Other onshore and offshore oil and gas infrastructure has been abandoned and removed over the years.

Santa Barbara County Findings of Approval for past offshore oil and gas projects have identified adverse project and cumulative impacts to recreation, tourism, and aesthetics from construction and operation of these projects. To mitigate general, diffused, project-specific, and cumulative impacts in these and other areas, Santa Barbara County created a Coastal Resources Enhancement Fund, which receives annual payments over the life of the project to be used for projects that enhance coastal recreation, aesthetic, tourism, or other environmentally sensitive resources (SBC, 1993, as cited in MMS, 2001). Specifically, projects make payments to a CREF, which provides enhancement projects that would compensate for residual impacts to coastal resources not otherwise mitigated during project development. While mitigation is often effective, CREF expenditures tend to be more heavily weighted towards recreation, despite oil development impacts being as great or greater on environmentally sensitive resources, aesthetics, and tourism. In other words, while payments were sufficient to mitigate cumulative impacts, allocation of the Fund by the County may have caused an imbalance in mitigation across categories.

4.11 Community Characteristics and Tourism Resources

Tourism is not a standard category in which economic data are collected. Tourism activities generally affect several service sectors through expenditures such as lodging, dining, and special activities. Tourism also generates transportation activity and increases in retail sales. In all these areas there is local demand as well as tourist demand. The California Department of Tourism defines tourism as any non-routine visit to an area. This definition encompasses business and personal travel in addition to the leisure travel most typically associated with tourism. In the absence of a discrete measure of tourism activity, a number of indicators may be utilized to estimate the activity. This section examines the aggregate economic activity. The recreation section (Section 4.10) examines specific activities, amenities, and infrastructure the serve both tourism and recreation.

Researchers have developed the extract/intact ratio as an indicator of an area's reliance on extractive industries (petroleum development, mining, sand and gravel) compared to those activities that rely on intact industries such as eating, drinking, and lodging establishments and museums. The industries that make up the intact sector serve as a proxy for tourism (MMS, 1996 and 1998, as cited in MMS, 2001). To the extent that tourism depends on amenities a community has to offer, the ratio will function as an indicator of the importance of community attributes to an area.

The county comprises the appropriate unit for an analysis of the affected environment for coastal community concerns and tourism as opposed to individual Pacific OCS production leases grouped as units. This county-wide approach is consistent with previous social development and petroleum extraction industry (MMS, 1996 and 1998, as cited in MMS, 2001).

4.11.1 Studies in the Area

Table 4.11-1 lists some of the numerous studies that address onshore and offshore tourism in the area.

Table 4.11-1. Tourism Studies

Area of the Study	Title	Citation[1]
California	Impacts of Outer Continental Shelf (OCS) on Recreation and Tourism.	MMS, 1987. OCS Study 87-0064 through 87-0068. Dornbusch and Associates. 1987
Santa Barbara County	Economic Outlook 2000. Santa Barbara County.	UCSB Economic Forecast Project. 1999.
Ventura County	Economic Outlook 2000 Ventura County	UCSB Economic Forecast Project. 2000
San Luis Obispo County	Economic Outlook 2000 San Luis Obispo County	UCSB Economic Forecast Project
Santa Barbara County	Santa Barbara County: Two Paths	MMS. 1996. OCS Study MMS 96-0036 Molotch, et. al.
Santa Barbara County	Petroleum Extraction Industry in Santa Barbara County, California. An Industrial History	MMS. 1998. OCS Study MMS 98-0048, Nevarez, et. al.
Ventura County	Ventura County: Oil, Fruit, Commune, and Commute.	MMS. 1996. OCS Study MMS 96-0035.
Ventura County	Petroleum Extraction Industry in Ventura County, California. An Industrial History	MMS. 1998. OCS Study MMS 98-0047
San Luis Obispo County	San Luis Obispo County: A Major Switching	MMS. 1996. OCS Study MMS 96-0037
San Luis Obispo County	Petroleum Extraction Industry in Ventura County, California. An Industrial History	MMS. 1998. OCS Study MMS 98-0048
California	Impacts of Outer Continental Shelf (OCS) on Recreation and Tourism.	MMS, 1987. OCS Study 87-0064 through 87-0068. Dornbusch and Associates. 1987
Santa Barbara County	Economic Outlook 2000. Santa Barbara County.	UCSB Economic Forecast Project. 1999.
Ventura County	Economic Outlook 2000 Ventura County	UCSB Economic Forecast Project. 2000

Area of the Study	Title	Citation[1]
San Luis Obispo County	Economic Outlook 2000 San Luis Obispo County	UCSB Economic Forecast Project
Santa Barbara County	Santa Barbara County: Two Paths	MMS. 1996. OCS Study MMS 96-0036 Molotch, et. al.
Santa Barbara County	Petroleum Extraction Industry in Santa Barbara County, California. An Industrial History	MMS. 1998. OCS Study MMS 98-0048, Nevarez, et. al.
Ventura County	Ventura County: Oil, Fruit, Commune, and Commute.	MMS. 1996. OCS Study MMS 96-0035.
Ventura County	Petroleum Extraction Industry in Ventura County, California. An Industrial History	MMS. 1998. OCS Study MMS 98-0047
San Luis Obispo County	San Luis Obispo County: A Major Switching	MMS. 1996. OCS Study MMS 96-0037
San Luis Obispo County	Petroleum Extraction Industry in Ventura County, California. An Industrial History	MMS. 1998. OCS Study MMS 98-0048

[1] Citations are as referenced in MMS, 2001.

4.11.2 Regional Setting

The regional setting primarily consists of the coastal portions of Ventura, Santa Barbara, and San Luis Obispo Counties.

4.11.2.1 Ventura County

The UCSB Economic Forecast Project (2000, as cited in MMS, 2001) quantifies the importance of tourism to Ventura County. The report notes that cities and unincorporated areas in the western portion (Ojai, Camarillo and coastal communities) and eastern portion of the county (Thousand Oaks) experienced healthy growth in hotel and motel room sales, attributable to rising occupancy rates and higher prices rather than increased room inventory. Tourism accounted for approximately 8.8 percent of the County's employment, with approximately one percent employed in the lodging sector. Starting early in the County's history and until very recently, the petroleum industry and agriculture have been the major industries. Many cities in the coastal portion of the county, such as Ventura, Oxnard, and the inland cities of Fillmore and Santa Paula, developed around these two activities. The petroleum extraction industry was integral to the social, cultural, and economic development of the area. The County has largely been amenable to both onshore and offshore development. The County was a production and service center for the regional petroleum industry, a role that moderated in the 1980s and has since begun to decline. However, it remains an important but not dominant sector of the local economy (MMS, 1996a and 1998a, as cited in MMS, 2001).

For much of the period of 1970 to 1995, the extract/intact ratio, using aggregate income for Ventura County, hovered around 80 percent before slipping to approximately 40 percent in the period from 1985 to 1995. This trend illustrates the importance of extractive industries to the county's economy for much of this period, as well as the rising importance of the tourism economy with the decline in the petroleum industry.

Long-term patterns of economic and community development resulted in beachfront areas being developed for uses other than outdoor recreation and tourism. In the city of Ventura, while beach area recreation and tourism is quite high during the summer, year-round tourism remains sparse. The City is actively engaged in trying to draw tourist and residents alike to its beach area and incorporate the beach area into the adjacent and recently redeveloped downtown area (MMS, 1996a, as cited in MMS, 2001).

4.11.2.2 Santa Barbara County

The UCSB Economic Forecast Project (1999, as cited in MMS, 2001) quantifies the importance of tourism to Santa Barbara County and the county's southern (coastal) area. Table 4.11-2 summarizes these statistics, which indicate that tourism and lodging is a valuable sector of the County's economy. In 1999, the expenditures in the County for lodging rose 9.6 percent and are expected to grow annually between 1 and 2 percent per year for the next decade.

Table 4.11-2. Selected Indicators of Santa Barbara County Tourism (1999[1])

Total visitor expenditure (County)	Approximately $360 million
Overnight visitor expenditures	$273.1 million
Daily visitor expenditures	$ 79.2 million
Hotel occupancy rate (south coast)	78.5 percent
Total visitors per day (south coast)	20,837
Percentage of County workforce employed in tourism and lodging segments	12.5 percent

[1] As cited in MMS, 2001.

For purposes of analysis and description, the County can be subdivided into the coastal area of the County, which borders the Santa Barbara Channel, and the inland North County, separated from the Pacific Ocean by Vandenberg Air Force Base. Petroleum extraction took place with and contributed to social and cultural orientations in the county. In areas of the county dependent on tourism and other intact qualities, such as the South Coast, the need to control oil development has been paramount, as has the desire to control development generally. Residents have allowed oil (and gas) activities on both land and offshore, but have made efforts to limit the precise locations and conditions of its development (MMS, 1996b, as cited in MMS, 2001). The North County has been the center of agriculture, petroleum extraction, and has been more receptive to development in general. The differences between the two portions of the County reflect two different traditions about how development should take place, how economies should be constructed, and how communities should be built (MMS, 1996b and 1998b, as cited in MMS, 2001).

For much of the period of 1970 to 1995, the extract/intact ratio, using aggregate income for Santa Barbara County's South Coast area, increased from just under 20 percent in 1970 to a high of 33 percent in 1980, returning to just over 20 percent in 1995. This trend illustrates the importance of tourism-related industries to that of the extractive industries to the county's economy.

Molotch and other researchers (MMS, 1998, as cited in MMS, 2001) note that tourism represents a traditional specialization of the Santa Barbara economy. Tourism does not readily diffuse to other locations that do not have aesthetic and recreational amenities already in place. As such, it constitutes a competitive economic asset for those localities where it is strong, such as Santa Barbara. A common local concern is that tourism and offshore energy are contradictory industries, where growth of one potentially forecloses growth in another. The researchers find that the county's economy has consistently remained more dependent on tourism, which employs greater numbers (albeit at lower wages) and produces greater income wealth than does onshore and offshore petroleum extraction. However, the study does not conclude that the two sectors are mutually exclusive, essentially incompatible, or that one forecloses the other.

Tourism and hospitality have a long association with Santa Barbara, both as an important economic activity and as a symbol of the area (MMS, 1996b, as cited in MMS, 2001). As noted above, allocation of the value to tourism from the various standard categories of economic activity presents methodological problems. Arguably, while few tourism activities are coastal-dependent (that is, cannot occur without access to the coast), the majority are coastal-enhanced, for it is the coastal orientation of the city that greatly contributes to the sense of place and the general ambiance so highly prized by visitors to the area (MMS, 1996b, as cited in MMS, 2001).

4.11.2.3 San Luis Obispo County

The UCSB Economic Forecast Project (1999, as cited in MMS, 2001) quantifies the importance of tourism to San Luis Obispo County and the county's southern (coastal) area. Table 4.11-3 summarizes these statistics, which indicate that tourism and lodging is a valuable sector the County's economy. Vacancy rates are lower in San Luis Obispo than neighboring Santa Barbara or Monterey County. While tourism is most strongly associated with coastal communities and San Luis Obispo city, the activity is becoming more important for many communities in the county (MMS, 1996c, as cited in MMS, 2001).

Table 4.11-3. Selected Indicators of San Luis Obispo County Tourism (1999[1])

Total visitor expenditures (County)	Approximately $431 million
Overnight visitor expenditures	$372.7 million
Daily visitor expenditures	$ 58.4 million
Hotel occupancy rate (County)	64.7 percent
Total visitors per day (County)	15,222
Percentage of County workforce employed in tourism and lodging segments	14.6 percent

1 As cited in MMS, 2001.

Early petroleum extraction activity in San Luis Obispo County took form as a transportation center with development of pipeline and shipping infrastructure. Agriculture was another important activity (MMS, 1996c, as cited in MMS, 2001). However, over time the County, and especially its principal city, shifted toward becoming a significant center of higher education. The County then developed without integrating oil extraction into the local economy, especially when compared to Ventura and Santa Barbara Counties. Petroleum transportation has been a small industrial presence in San Luis Obispo County and oil and gas extraction has been limited.

For much of the period of 1970 to 1995, the extract/intact ratio, using aggregate income for San Luis Obispo County, fluctuated from 10 to 20 percent before slipping to approximately less than five percent from 1985 to 1995. This trend illustrates the overwhelming importance of the tourism sector to the county's economy for much of this period.

San Luis Obispo coastal cities (Cambria, Cayucos, and Morro Bay in the north; Pismo Beach in the south) contemporarily developed as retirement communities and tourist towns with an opposition to industrialization of the coast. San Luis Obispo County has not experienced offshore energy development from State or Federal leases (a small portion of the onshore Guadalupe Field extends offshore). Strident local opposition to offshore development, often expressed as concern over the activity's perceived consequences on quality of life and sense of place, has evolved throughout the County with the trend less prevalent in the northern inland section (MMS, 1996c and 1998c, as cited in MMS, 2001).

4.11.3 Effects of Past Offshore Oil and Gas Activities

Researchers have searched for a negative link between onshore tourism and offshore oil and gas activities. If tourists select destinations based on visual characteristics of the destination to the exclusion of other characteristics such as cost, type of recreation available, other amenities, and the ambiance of the destination, then it is possible that the presence of offshore platforms would reduce the amount of tourism.

Studies relating to this issue include MMS (1987, as cited in MMS, 2001). While various surveys and other efforts were used to identify the often-negative feelings about the presence of offshore oil and gas activity, little quantitative evidence exists regarding whether or not the presence of offshore oil and gas activities lead to a decline in tourism.

Santa Barbara County's 1993 assessment of the effectiveness of mitigation measures for Santa Ynez Unit included an examination of the project-specific and cumulative effects on environmentally sensitive resources, tourism, recreation, and aesthetics. Specifically, projects make payments to a CREF, which provides enhancement projects that would compensate for residual impacts to coastal resources that are not otherwise mitigated. The analysis suggests that while the mitigation is effective, CREF expenditures tended to be more heavily weighted towards recreation, despite oil development impacts being as great or greater on environmentally sensitive resources, aesthetics, and tourism. In other words, while payments were sufficient to mitigate cumulative impacts, allocation of the Fund by the County may have caused an imbalance in mitigation across categories.

Use of hotel and campgrounds by construction workers employed to build onshore processing plants has been identified as a potential impact to tourism. However, a study of socioeconomic impacts of offshore development indicated that use of hotels and campgrounds alleviates demand for and is a viable alternative to more conventional permanent housing (MMS, 2000, as cited in MMS, 2001).

4.12 Social and Economic Environment

This section presents information on the social and economic environment of the study area, which is composed of Ventura, Santa Barbara, and San Luis Obispo Counties, California. This information includes employment and population, housing, infrastructure, and public services and finance. The socio-economic effects of past oil and gas activities, both onshore and offshore, have been well documented in a series of MMS studies (MMS, 1996a, b, and c, 1998a, b, and c, 2000, as cited in MMS, 2001).

Starting early in Ventura County's history and until very recently, the major industries have been the petroleum industry and agriculture. Many cities in the coastal and western portion of the county such as the Cities of Ventura and Oxnard and the inland cities of Fillmore and Santa Paula developed around these two activities. The petroleum extraction industry was integral to the social, cultural, and economic development of the area. The County has largely been amenable to both onshore and offshore development. The County was a production and service center for the regional petroleum industry, a role that moderated in the 1980s and has since begun to decline. However, the petroleum industry remains important but is no longer dominant due to industry decline and economic diversification (MMS, 1996a, 1998a, as cited in MMS, 2001). Historically, property taxes generated by the value of petroleum deposits and onshore oil and gas infrastructure have been an important source of property tax revenues.

For purposes of analysis and description, Santa Barbara County can be divided into the coastal area of the County, which borders the Santa Barbara Channel, and the inland North County, separated from the Pacific Ocean by Vandenberg Air Force Base. Opposition to and reliance on, respectively, petroleum extraction contributed to current social and cultural orientations within the county. In the coastal area of the County, the need to control oil development has been paramount, as has the desire to control development generally. Residents have allowed oil and gas activities on land and offshore, but made efforts to limit the precise locations and conditions of development (MMS, 1996b, as cited in MMS, 2001). The North County has been the center of agriculture and petroleum extraction, and has been more receptive to development in general. The differences between the two portions of the County reflect two different traditions about the appropriate speed and content of development, economies, and communities (MMS, 1996b, 1998b, as cited in MMS, 2001). Historically, property taxes generated by the value of petroleum deposits and onshore oil and gas infrastructure have been an important source of property tax revenues.

Early petroleum extraction activity in San Luis Obispo County took form as a transportation center with development of pipeline and shipping infrastructure. Agriculture was another important economic activity (MMS, 1996c, as cited in MMS, 2001). However, over time the County, and especially its principal city (San Luis Obispo), shifted toward becoming a significant center of higher education. The County then developed without integrating oil extraction into the local economy, especially compared to Ventura and Santa Barbara Counties.

In the 1980s, a number of offshore development projects and other large onshore non-petroleum development projects had the potential to affect the social and economic conditions in the three counties. Permit conditions imposed by the Counties, especially Santa Barbara, successfully ameliorated the range of socioeconomic impacts from offshore development projects (SBC, 1993, as cited in MMS, 2001).

Santa Barbara and Ventura Counties undertook a socioeconomic monitoring and mitigation program for offshore development projects. The program identified annual public facility and services impacts, caused primarily by the in-migration of project workers to the area, and estimated the mitigation payments for these impacts to counties, cities, school districts, and special service districts. The program mitigated impacts to several communities for public services (such as public safety), water supply and sewage treatment, schools, and housing. For the period of 1986 to 1994, governments in Santa Barbara and

Ventura County received total mitigation payments of $7.4 million and $3.4 million, respectively (San Luis Obispo County declined participation) (MMS, 2000-0019, as cited in MMS, 2001).

In addition to the direct effect of mitigation payments, permit fees, and property taxes, the oil and gas industry contributes to the social and economic environment of the study area through higher wages, local purchases, and philanthropic giving. Typically the average worker in the oil and gas industry worker in the study area earns more than the average similarly skilled worker. Average wages for selected industries in the study area are shown in Table 4.12-1.

Table 4.12-1. Average Wages for Selected Industries in the Study Area (2004)

	San Luis Obispo County		Santa Barbara County		Ventura County		Tri-County Area	
	No. of Workers	Average Annual Salary	No. of Workers	Average Annual Salary	No. of Workers	Average Annual Salary	No. of Workers	Average Annual Salary
Construction & extraction	6,070	$39,590	7,950	$41,406	14,710	$39,634	28,730	$40,210
Farming, fishing, and forestry	1,560	$18,383	8,160	$18,646	6,910	$18,444	16,630	$18,491
Production	5,300	$29,846	7,880	$29,748	22,260	$27,267	35,440	$28,954
Transportation	4,930	$27,875	7,580	$25,482	18,320	$25,633	30,830	$26,330
Sales and related occupations	10,910	$29,242	19,250	$30,131	32,020	$35,750	62,180	$31,708
Food preparation and serving – related occupations	11,270	$18,185	16,510	$19,509	24,540	$18,077	52,320	$18,590
Tour guides and escorts	N/A	N/A	70	$30,318	N/A	N/A	70	$30,318
Total	40,040	$27,187	67,400	27,891	118,760	$27,468	226,200	$27,800

Source: EED, 2004.

The generally higher wages earned by oil and gas industry workers (represented here by the Construction and Extraction category) are likely to result in higher sales and property taxes for their local communities.

The UCSB Economic Forecast Project estimated the economic contribution of the oil and gas industry from direct, indirect, and induced sources to exceed $1 billion in both total expenditures and total output. Total income was estimated to be in excess of $727 million. The offshore oil and gas industry contributes to the total economic effect, as described in "The Economic Contribution of the Oil & Gas Industry in the Tri-Counties."

Local philanthropy in the study area has generally been disproportionate to the number of employees in the study area. In 1996 the oil and gas industry accounted for between two and five percent of contributions received in the United Way branches of Camarillo, Santa Barbara, Santa Maria, and San Luis Obispo (MMS, 1998a, as cited in MMS, 2001). The percentage of these contributions is in contrast to a total employment in the oil and gas industry of less than one-quarter of one percent in the study area.

While philanthropic contributions have not been spread evenly through out the study area, the effect of these activities has been to enhance the social and economic environment of the communities receiving the gifts. A somewhat more comprehensive look at charitable giving by the oil industry can be found in the MMS series of studies done on the Petroleum Extraction Industry (MMS, 1998a, b, and c, as cited in MMS, 2001).

Table 4.12-2 lists social and economic studies that characterize the area.

Table 4.12-2. Social and Economic Studies in the Study Area

Area of the Study	Title	Citation[1]
Ventura, Santa Barbara, and San Luis Obispo Counties	The Economic Contribution of the Oil & Gas Industry in the Tri-Counties	UCSB Economic Forecast Project, 1997.
Ventura, Santa Barbara, and San Luis Obispo Counties	Final California Offshore Oil and Gas Energy Resources Study (COOGER)	MMS, 1999. OCS Study 99-0043 Dames and Moore
Santa Barbara County	Economic Outlook 2000. Santa Barbara County.	UCSB Economic Forecast Project, 2000.
Ventura County	Economic Outlook 2000 Ventura County	UCSB Economic Forecast Project, 2000
San Luis Obispo County	Economic Outlook 2000 San Luis Obispo County	UCSB Economic Forecast Project, 1999
Santa Barbara County	Santa Barbara County: Two Paths	MMS. 1996b. OCS Study MMS 96-0036 Molotch, et. al.
Santa Barbara County	Petroleum Extraction Industry in Santa Barbara County, California. An Industrial History	MMS. 1998b. OCS Study MMS 98-0048, Nevarez, et. al.
Ventura County	Ventura County: Oil, Fruit, Commune, and Commute	MMS. 1996a. OCS Study MMS 96-0035.
Ventura County	Petroleum Extraction Industry in Ventura County, California. An Industrial History	MMS. 1998a. OCS Study MMS 98-0047
San Luis Obispo County	San Luis Obispo County: A Major Switching	MMS. 1996c. OCS Study MMS 96-0037
San Luis Obispo County	Petroleum Extraction Industry in Ventura County, California. An Industrial History	MMS. 1998c. OCS Study MMS 98-0048
San Luis Obispo County	The Costs of Oil and Gas Development Off the Coast of San Luis Obispo County	Environmental Center of San Luis Obispo County and the San Luis Obispo Chamber of Commerce, 1998
Ventura and Santa Barbara Counties	Monitoring and Mitigating Socioeconomic Impacts of Offshore Related Oil and Gas Development: 1985-1995, A Case Study	MMS 2000. OCS Study MMS 2000-0019

[1] Citations are referenced in MMS, 2001.

A major indirect result of offshore oil and gas development is the Land and Water Conservation Fund. The Land and Water Conservation Fund has been a source for the acquisition of recreational lands in the study area. While the level of development offshore of a specific coastal segment is not directly related to the Land and Water Conservation Fund, if Pacific OCS development ends, no funds would be available to fund the Land and Water Conservation Fund. Disbursements to California from Pacific OCS funds from 1968 to 1996 have totaled more than $1.7 billion. California's allocation of Federal funding for Fiscal Year 2004 was $7,832,545 (LWCF, 2004). Previously, California disbursed $6,959,589 for 2003-04 (LWCF, 2004).

Funding has been provided to projects involving the following: Los Padres National Forest, California Condors, Santa Monica Mountain National Recreation Area, Channel Islands National Park, Montana De Oro State Park, and Pismo State Beach. More information on the Land and Water Conservation Fund can be found at the MMS website.

4.12.1 Employment and Population

Employment

Table 4.12-3 shows employment by economic sector in each County for the year 2000.

Table 4.12-3. 2000 Employment by Sector

	San Luis Obispo		Santa Barbara		Ventura		Tri-County Area	
	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total	Number	Percent of Total
Agriculture, forestry, fishing and hunting, and mining	4,134	0.4%	12,094	1.2%	14,265	1.5%	30,493	3.1%
Construction	8,642	0.9%	10,773	1.1%	21,946	2.2%	41,361	4.2%
Manufacturing	7,772	0.8%	17,482	1.8%	48,154	4.9%	73,408	7.5%
Wholesale trade	2,721	0.3%	5,912	0.6%	13,811	1.4%	22,444	2.3%
Retail trade	13,561	1.4%	20,347	2.1%	38,539	3.9%	72,447	7.4%
Transportation and warehousing	2,771	0.3%	4,299	0.4%	9,061	0.9%	16,131	1.6%
Utilities	2,204	0.2%	915	0.1%	2,324	0.2%	5,443	0.6%
Information	2,907	0.3%	5,347	0.5%	14,639	1.5%	22,893	2.3%
Finance, insurance, real estate and rental and leasing:	5,545	0.6%	9,755	1.0%	28,328	2.9%	43,628	4.5%
Finance and insurance	3,079	0.3%	5,836	0.6%	20,921	2.1%	29,836	3.0%
Real estate and rental and leasing	2,466	0.3%	3,919	0.4%	7,407	0.8%	13,792	1.4%
Professional, scientific, management, administrative, and waste management services	10,336	1.1%	19,514	2.0%	38,476	3.9%	68,326	7.0%
Professional, scientific, and technical services	6,407	0.7%	11,828	1.2%	23,651	2.4%	41,886	4.3%
Management of companies and enterprises	7	0.0%	133	0.0%	143	0.0%	283	0.0%
Administrative and support and waste management services	3,922	0.4%	7,553	0.8%	14,682	1.5%	26,157	2.7%
Arts, entertainment, and recreation	2,353	0.2%	4,031	0.4%	6,171	0.6%	12,555	1.3%
Accommodation and food services	10,147	1.0%	14,378	1.5%	17,498	1.8%	42,023	4.3%
Other services (except public administration)	5,883	0.6%	9,823	1.0%	16,377	1.7%	32,083	3.3%
Public administration	6,770	0.7%	7,647	0.8%	18,929	1.9%	33,346	3.4%
Total employment	171,082	17.5%	284,101	29.0%	524,281	53.5%	979,464	100.0%

Source: Census, 2000.

The largest employment sectors in the three counties are manufacturing, retail trade, and professional, scientific, management, administrative, and waste management services.

Direct employment in offshore oil and gas is estimated at 1,028 jobs in the three counties. Total employment that is attributable to Federal offshore oil and gas in the three counties is estimated to be 2,670.

Population

Since the 1990 U.S. Census, the three county study area has increased its population by 143,439, or 11 percent. Table 4.12-4 shows the population for each county in 1990 and 2000 as well as the rate of change from 1990 to 2000.

Table 4.12-4. Population

County and Major Incorporated Cities	1990 Population	2000 Population	Total Population Change 1990–2000	Percent Change 1990–2000
San Luis Obispo County	217,162	246,681	29,519	14%
Arroyo Grande	14,378	15,851	1,473	10%
Atascadero	23,138	26,411	3,273	14%
Grover Beach	11,656	13,067	1,411	12%
San Luis Obispo	41,958	44,174	2,216	5%
Rest of County	126,032	147,178	21,146	17%
Santa Barbara County	369,608	399,347	29,739	8%
Carpinteria	13,747	14,194	447	3%
Goleta*	N/A	55,204	N/A	N/A
Lompoc	37,649	41,103	3,454	9%
Santa Barbara	85,571	92,325	6,754	8%
Santa Maria	61,284	77,423	16,139	26%
Rest of County	171,357	119,098	(52,259)	-30%**
Ventura County	669,016	753,197	84,181	13%
Camarillo	52,303	57,077	4,774	9%
Fillmore	11,992	13,643	1,651	14%
Moorpark	25,494	31,415	5,921	23%
Oxnard	142,216	170,358	28,142	20%
Port Hueneme	20,319	21,845	1,526	8%
Santa Paula	25,062	28,598	3,536	14%
Simi Valley	100,217	111,351	11,134	11%
Thousand Oaks	104,352	117,005	12,653	12%
Ventura	92,575	100,916	8,341	9%
Rest of County	94,486	100,989	6,503	7%
Total Study Area	1,255,786	1,399,225	143,439	11%
State of California	29,760,021	33,871,648	4,111,627	14%

Source: Census, 2000. Census, 1990, as cited in MMS, 2001.
*Incorporated between 1990 and 2000 censuses.
**Includes loss of area now incorporated as the City of Goleta.

The fastest growing city in the three-county study area was Santa Maria (26 percent) which only slightly outpaced Moorpark (23 percent).

4.12.2 Housing

Despite increasing housing stock, the study area has a decreasing vacancy rate, implying a tightening housing market, as demonstrated in Table 4.12-5.

Table 4.12-5. Housing Stock and Vacancy Rates

County	Housing Units 1990	Vacant 1990	Vacancy Rate 1990	Housing Units 2000	Vacant 2000	Vacancy Rate 2000	Change in Housing Units	Change in Vacancy	Change in Vacancy
San Luis Obispo	90,200	9919	11%	102,275	9,536	9%	12,075	-383	-3%
Santa Barbara	138,149	8347	6%	142,901	6,279	4%	4,752	-2,068	-44%
Ventura	228,478	11180	5%	251,712	8,478	3%	23,234	-2,702	-12%
Total Study Area	456,827	29,446	6%	496,888	24,293	5%	40,061	-5,153	-13%

Source: Census, 2000 and Census 1990, as cited in MMS, 2001.

This tightening housing market results in higher median housing prices in the study area than the California or national averages. San Luis Obispo rose relative to the State median housing price and is now 110 percent of the State median housing price. Table 4.12-6 shows the median housing prices for the study area, as compared with State and national figures.

Table 4.12-6. Median Housing Price

Jurisdiction	1990	2000	Percent Change	Percent of California (2000)	Percent of National (2000)
San Luis Obispo	$ 213,200	$ 218,600	3%	110%	196%
Santa Barbara	$ 249,200	$ 264,100	6%	133%	236%
Ventura	$ 243,500	$ 238,800	-2%	120%	214%
California	$ 194,300	$ 198,900	2%	100%	178%
United States	$ 78,500	$ 111,800	42%	56%	100%

Source: Census, 2000.Census 1990, as cited in MMS, 2001

A lack of affordable housing is a problem in each county within the study area and is expected to continue because population growth is anticipated to be faster than the growth in new housing. The quest for affordable housing has resulted in long commutes into southern Santa Barbara County from Orcutt and other parts of the Santa Maria Valley and Ventura County. Santa Barbara County housing prices show a strong bi-modal structure as median housing prices in the Santa Maria Valley are 30 percent of the median price in the south coast of Santa Barbara (The UCSB Economic Forecast Project 1999, 2000, as cited in MMS, 2001).

4.12.3 Infrastructure

Infrastructure supporting offshore oil and gas production in the study area is generally of two types: infrastructure that exists to directly support offshore oil and gas production and infrastructure that supports offshore oil and gas production because the infrastructure exists. Direct support infrastructure includes dedicated onshore processing facilities and pipelines and some port or pier space. With the exception of some port and/or piers, facilities solely dedicated to the use of Federal offshore oil and gas production are unlikely to be used to support the post-suspension activities. Table 4.12-7 identifies onshore facilities that provide direct support to the Federal offshore oil and gas industry. A more comprehensive discussion about onshore support facilities can be found in the COOGER Report (MMS, 1999, as cited in MMS, 2001).

Table 4.12-7. Study Region Oil and Gas Processing Facilities

Facility Name	Platform	Field / Unit
Carpinteria Onshore Gas Terminal	Habitat	Pitas Point
Gaviota Oil & Gas Processing Facility	Hermosa Harvest Hidalgo	Point Arguello Point Arguello Point Arguello
La Conchita Oil & Gas Processing Facility	Hogan Houchin	Carpinteria Carpinteria
Las Flores Canyon SYU Oil & Gas Processing Facility & Las Flores Canyon Gas Processing Facility	Hondo Harmony Heritage	Hondo/Santa Ynez Unit Hondo/Santa Ynez Unit Pescado/Santa Ynez Unit
Lompoc Oil & Gas Processing Facility	Irene	Point Pedernales Unit
Mandalay Onshore Separation Facility	Gina Gilda	Hueneme Offshore Santa Clara
Rincon Oil & Gas Processing Facility	Henry Hillhouse A B C	Carpinteria Dos Cuadras Dos Cuadras Dos Cuadras Dos Cuadras

Source: MMS, 1999, as cited in MMS, 2001

Typically roads and highways, ports and harbors, and the broad sweep of public and private infrastructure such as utilities, schools, and police are infrastructure or services that support offshore oil and gas development and production because they exist. Table 4.12-8 identifies highways used to support Federal offshore oil and gas activity.

Table 4.12-8. Highways Supporting Offshore Activity

Highway	From/To	General Description	Primary Use by the Offshore Oil & Gas Industry(1)
Highway 1	From Ventura to La Conchita in Ventura County	2 lane undivided	Service to Rincon area facilities by vacuum trucks, oil transport trucks, drilling/workover rigs, cranes and other heavy "maintenance" vehicles.
Highway 1	From Highway 101 to Lompoc in Santa Barbara County	2 lane undivided	Service to Lompoc Oil & Gas Processing Facility by vacuum trucks, cranes and other heavy "maintenance" vehicles.
Highway 1	From Highway 166 in Guadalupe in Santa Barbara County to Grover City in San Luis Obispo County	2 lane undivided	Service to the Santa Maria Refinery by vacuum trucks, product distribution trucks (e.g., sulfur, petroleum coke, oil and gas products), cranes, and other heavy "maintenance" vehicles.
Highway 101	From eastern boundary of Study Region northwest to Rincon Island area	Six lane divided freeway with on/off ramps	Service to Rincon area facilities by vacuum trucks, cranes and other heavy "maintenance" vehicles. This is also a primary route for NGL and other product transport trucks.
Highway 101	From Rincon Island area northwest to east edge of Santa Barbara	Four lane divided highway; non-freeway from Rincon Island area to Ventura-Santa Barbara County Line, freeway from county line to Santa Barbara	Service to La Conchita facility by vacuum trucks, cranes and other heavy "maintenance" vehicles. This is also a primary route for NGL and other product transport trucks.
Highway 101	From east edge of Santa Barbara northwest to Fairview offramp in Goleta	Six lane divided freeway with on/off ramps	Service to Ellwood area facilities by vacuum trucks, cranes and other heavy "maintenance" vehicles based in Ventura County. This is also a primary route for NGL and other product transport trucks.

Highway	From/To	General Description	Primary Use by the Offshore Oil & Gas Industry[1]
Highway 101	From Fairview offramp in Goleta northwest and north to Atascadero in San Luis Obispo County	Four lane divided freeway with on/off ramps	Service to all facilities in western Santa Barbara and San Luis Obispo Counties by vacuum trucks, cranes and other heavy "maintenance" vehicles. This is also a primary route for NGL and other product transport trucks.
Highway 126	From Highway 101 in Ventura to Santa Paula in Ventura County	4 lane divided freeway	Service to eastern Ventura County facilities (e.g., Santa Paula and Torrey Pump Stations) by vacuum trucks, cranes and other heavy "maintenance" vehicles and used by companies based in eastern Ventura County. This is also a possible route for NGL and other product transport trucks.
Highway 126	From Santa Paula to Fillmore	4 lane undivided with center turn lane	Service to eastern Ventura County facilities (e.g., Santa Paula and Torrey Pump Stations) by vacuum trucks, cranes and other heavy "maintenance" vehicles and used by companies based in eastern Ventura County. This is also a possible route for NGL and other product transport trucks.
Highway 135	Between Highway 101 and Highway 1	2 lane undivided	Service to Lompoc Oil & Gas Processing Facility by vacuum trucks, cranes and other heavy "maintenance" vehicles.
Highway 135	From junction with Highway 1 to Clark Avenue in Orcutt	4 lane divided	Service to Lompoc Oil & Gas Processing Facility by vacuum trucks, cranes and other heavy "maintenance" vehicles.
Highway 166	From Highway 1 in Guadalupe to Highway 101 in Santa Maria in Santa Barbara County	4 lane divided w/island 2 lane undivided	Service to the Santa Maria Refinery and Santa Maria Asphalt Refinery by vacuum trucks, product distribution trucks (e.g., sulfur, petroleum coke, asphalt, oil and gas products), cranes, and other heavy "maintenance" vehicles.
Highway 166	From Highway 101 in Santa Maria to Santa Barbara/Kern County Line	2 lane undivided	Service to northern Santa Barbara and San Luis Obispo Counties by companies located in Kern County. This is also a primary route for transporting products from the Study Region to markets in Kern County and other areas.

Source MMS, 1999, as cited in MMS, 2001

Table 4.12-9 lists streets and roads used to support Federal offshore oil and gas activity.

Table 4.12-9. Roads and Streets Supporting Offshore Activity

Road/Street	From/To	General Description	Primary Use by the Offshore Oil & Gas Industry
Ventura County			
Victoria	From Highway 101 south to Channel Islands Blvd.	4 lane divided with median, center turn lane or turn islands (varies)	Primary service route for Port Hueneme to/from Highway 101 North (Santa Barbara). Typical use is by all types of vehicles used to transport supplies, equipment and other materials to/from the Port where they are transferred to/from vessels serving the offshore platforms.
Channel Islands Blvd.	From Victoria east to Ventura Road	4 lane divided (by drainage ditch) and with center turn islands	
Ventura Road	From Channel Islands south to Hueneme Road	4 lane divided with center turn islands	
Hueneme Road	From Ventura Road into the Port of Hueneme (main entrance)	4 lane undivided narrowing to 2 lane undivided	

Road/Street	From/To	General Description	Primary Use by the Offshore Oil & Gas Industry
Las Posas	From Highway 101 south to Hueneme Road a. from Highway 101 to Pleasant Valley Road b. from Pleasant Valley Road to Hueneme Road	a. 4 lane undivided b. 2 lane undivided	Primary service route for Port Hueneme to/from Highway 101 South (Los Angeles). Typical use is by all types of vehicles used to transport supplies, equipment and other materials to/from the Port where they are transferred to/from vessels serving the offshore platforms.
Hueneme Road	From Las Posas west into the Port of Hueneme a. from Las Posas west to Saviers b. from Saviers west to Ventura Road c. from Ventura Road west into Port Hueneme	a. 2 lane undivided b. 4 lane with turn islands c. narrows from 4 to 2 lanes undivided	
Harbor Boulevard	At Seward Exit from 101 south to Wooley Road	4 lane undivided w/center turn lane 4 lane with center island 2 lane undivided	Service to Mandalay, Ventura Pump Station, and West Montalvo facilities by vacuum trucks, oil transport trucks, drilling/workover rigs, cranes, and other heavy "maintenance" vehicles.
Santa Barbara County			
Bailard Road	From Highway 101 south to Carpinteria Avenue	2 lane undivided	Service to Carpinteria facilities by vacuum trucks, cranes and other heavy "maintenance" vehicles. Also used by the Clean Seas Cooperative vehicles to access their main storage yard adjacent to the Carpinteria facilities.
Carpinteria Avenue	From Bailard Road west to Dump Road (private)	2 lane undivided	
Storke Road	From Highway 101 south to El Colegio Road (UCSB) in Goleta	4 lane undivided	Service to Ellwood Oil & Gas Processing Facility and Ellwood Marine Terminal by vacuum trucks, cranes, and other heavy "maintenance" vehicles.
Hollister Avenue	From Highway 101 east to Storke Road in Goleta	2 lane undivided 4 lane with center turn lane 4 lane divided by islands	
Purisima Road	From Highway 246 to Highway 1 near Lompoc	2 lane undivided	Service to Lompoc Oil & Gas Processing facility by vacuum trucks, cranes and other heavy "maintenance" vehicles.
Harris Grade Road	From Highway 1 to Highway 135 north of Lompoc	2 lane undivided	
Clark Avenue	From Highway 135 to Highway 101 in Orcutt	4 lane with center turn lane	
Betteravia Road	From Highway 101 in Santa Maria west to Santa Maria Asphalt Refinery	4 lane divided with island 2 lane undivided	Service to Santa Maria Asphalt Refinery by vacuum trucks, oil transport trucks, cranes and other heavy "maintenance" vehicles.
San Luis Obispo County			
Tefft Street	From Highway 101 in Nipomo west to Pomeroy Road	2 lane undivided	Service to the Santa Maria Refinery by vacuum trucks, product distribution trucks (e.g., sulfur, petroleum coke, oil and gas products), cranes, and other heavy "maintenance" vehicles.
Pomeroy Road	From Tefft Street northwest to Willow Road	2 lane undivided	
Willow Road	From Pomeroy Road west to Highway 1	2 lane undivided	

Source: MMS, 1999, as cited in MMS, 2001

In addition to the transport of products, offshore oil activities place demands on public transportation infrastructure associated with the transportation of materials, supplies, and solid wastes associated with offshore exploration, development drilling, and routine operations of offshore and onshore facilities. Employment associated with these activities also generates commuter traffic on public roadways. Table 4.12-10 shows annual average traffic volumes for all vehicular traffic and for trucks only on selected highways in the study area.

Table 4.12-10. Annual Average Traffic Summary for Regional Highways

Hwy	County	Description	All Traffic - Back			All Traffic - Ahead			Truck AADT - Ahead		
			Peak Hour	Peak Month	AADT	Peak Hour	Peak Month	AADT	All Trucks	5+ Axle	Year V/E
1	VEN	Seacliff, Mobil Oil Pier Road	140	850	570	---	---	---	58	4	82V
101	VEN	Camarillo Springs Road/Truck Scales	10,200	138,000	128,000	10,200	137,000	128,000	6,642	2,575	02V
101	VEN	Jct. Rte 126 East	7,400	96,000	92,00	9,900	133,000	120,000	6,490	1,257	02E
101	SD	Carpinteria-Casitas Pass Road	8,400	90,000	76,000	8,500	92,000	77,000	5,329	2,515	98E
101	SD	Las Positas (225)	12,200	146,000	141,000	12,000	141,000	136,000	5,794	2,746	00E
101	SD	Jct. Rte 217 South (UCSB)	11,600	126,000	119,000	7,900	87,000	81,000	6,642	3,467	96E
101	SD	Storke Road	5,400	67,000	62,000	4,150	42,500	40,000	3,920	2,313	96E
101	SD	Jct. Rte 246 (Buellton)	2,300	24,100	21,500	2,200	23,500	21,000	3,014	1,775	97E
101	SD	Jct. Rte 135 (Los Alamos)	2,800	30,000	26,000	2,650	28,500	24,500	3,360	1,851	97E
101	SD	Betteravia Road (Santa Maria)	3,600	42,500	40,000	4,950	66,000	59,000	4,484	2,412	97E
101	SLO	Jct. Rte 166 East	6,300	71,000	61,000	4,700	62,000	53,000	3,996	2,066	97E
101	SLO	Jct. Rte 227 N.-Grand (Arroyo Grande)	5,800	56,000	48,000	6,100	58,000	49,000	4,312	2,234	97E
126	VEN	Victoria (Ventura)	4,450	48,000	44,500	4,500	49,000	45,500	3,204	1,342	92V
135	SB	Jct. Rte 101 (Los Alamos)	---	---	---	390	5,100	4,400	242	98	98E
166	SLO	Suey Road	270	2,900	2,500	270	2,500	2,100	583	330	00E
246	SB	Jct. Rte 101 (Buellton)	1,500	19,500	17,000	1,500	19,800	18,000	697	164	97E

Source: Caltrans, 2004a and 2004b.

Notes: All highway intersections or interchanges have a “back” leg (south or west of intersection) and an “ahead” leg (north of east of intersection). “All traffic” counts were collected in 2003. Truck traffic counts presented in this table are for the back leg of the stated intersections. The column entitled "Year V/E" means year verified (V) or estimated (E). It represents the year the truck percentages were verified (counted continuously or quarterly) or estimated.

A more comprehensive discussion of the use of highways and roads to support oil and gas activity can be found in the COOGER Report (MMS, 1999, as cited in MMS, 2001). Offshore oil and gas development contributes approximately 900 weekly vehicle trips to the total demand on roads in the study area.

Crude oil produced in the study area is typically processed at local onshore facilities. Current onshore processing facilities prepare crude oil for shipment to major refining centers and produce natural gas for delivery to local consumers via existing utilities. Natural gas liquids and liquefied petroleum gases are also produced and are either blended with crude oil for transport or delivered to local markets via truck. Some of the processing facilities also produce sulfur, which is transported to market by truck. In addition, the Santa Maria Refinery refines some offshore oil and produces asphalt, petroleum coke, and sulfur, which are transported to market by truck and rail. The volume of oil that may be processed at each onshore facility may be affected by the characteristics of the incoming crude oil feedstock, which alter the proportion of different products produced. Other characteristics, such as the amount of water in the incoming crude oil, presence of contaminants (sand, heavy metals, etc.), or chemical characteristics of the crude oil may affect the capacity of a specific facility with respect to a specific oil production source. Table 4.12-11 shows pipelines supporting Federal offshore oil and gas development.

Table 4.12-11. Existing California Crude Pipelines

Operator Line Name(type [1])	Pipeline Diameter inches	Origin	Destination	Capacity (MBD[2])	Crude Source
APLC, Line 63 (c)	16	Bakersfield	Los Angeles	115	SJV/OCS[4]
Tosco (p)	12 - 16	Bakersfield	San Francisco	72	SJV/OCS
Tosco (p)	10 - 12	Santa Maria P/S	Suey Junction	120	OCS/Local/SJV
AAPLP (c)	30	Gaviota	Bakersfield	300	OCS/SJV
Tosco (p*)	12	Torrey P/S	Los Angeles	20/40	Local/OCS
APLC(c)	16	Los Angeles	McCamy (TX)	45/75	OCS/ANS[7]
Tosco (p)	12	Sisquoc P/S	Santa Maria P/S	50.4	OCS
Venoco (p*)	10	Carpinteria	Rincon 268,000 Tk.	42	OCS
POOI (p)	4	La Conchita	Rincon 268,000 Tk.	>0.6	OCS
Tosco (p*)	6-8	Mandalay	Ventura P/S	20	OCS
Torch(p)	6	Rincon Fac.	Rincon 268,000 Tk.	8.5	OCS
Venoco, M-143 p*)	22	Rincon 268,000 Tk.	Ventura P/S	72	OCS/Local
Pacific Pipeline(c)	20	Bakersfield	Los Angeles	130	SJV/OCS
Tosco (p*)	8 & 8	Avila P/S	San Francisco	57.6	OCS/Local
AAPLP (c)	24	Las Flores	AAPLP Main Line	150	OCS
Tosco (p*)	8	Ventura P/S	Fillmore P/S	24	OCS/Local
Tosco (p*)	10 - 128	Suey Junction	Summit P/S	8424	OCS/Local Local/SJV
Tosco (p*)	8	Orcutt P/S	Suey Junction	50.4	OCS/Local
Tosco (p*)	12	Lompoc O&G Proc. Facility	Orcutt P/S	96	OCS
Tosco (p*)	108	Summit P/S Santa Maria Refinery	Santa Maria Refinery Summit P/S	7241	OCS/Local/SJV Idle
Tosco (p*)	8 - 12	Santa Maria Refinery	North of Avila P/S	36	OCS/Local & Product

Notes: 1. Type: (c) = common carrier; (p) = proprietary; (p*) = proprietary pipeline that transports oil from multiple companies under an operating agreement; 2. MBD thousand barrels per day; 3. SJV: San Joaquin Valley; 4. OCS: Outer Continental Shelf (offshore in Federal waters); 5. Local: From onshore fields near the pipeline's origin (Ventura and Santa Barbara Counties); 6. P/S: Pump Station; 7. ANS: Alaska North Slope; 8. SW: Offshore Leases in State Waters

Source: MMS, 1999, as cited in MMS, 2001.

4.12.4 Public Services and Finance

Public Services

Federal offshore oil and gas development directly and indirectly uses a wide range of public and private services. Direct services can be found in the form of utilities such as water and electricity. Indirect services include services used by employees and their families, suppliers, and others affected by Federal offshore oil and gas operations.

Public Finance

Local government revenues are limited both by tax assessment restrictions and limitations on tax collections and disbursements. Because of the limitations on tax collections many local governments rely on applicant fees to offset otherwise non-recoverable costs. While property taxes remain the largest source of revenue for schools, revenues from these taxes are now transferred to the State, which then returns funds to the appropriate jurisdiction. Some special districts and cities are not eligible to receive a share of property tax revenues and rely on sales taxes and user fees. Offshore oil and gas development generates direct revenue for local governments through property taxes, intergovernmental transfers, and direct payments (mitigation fees). Of these revenues, only property taxes are predictably linked to specific offshore development projects. The revenues associated with intergovernmental transfers are influenced by several factors beyond the level of local offshore development and are not clearly correlated to the level of local development. The percentage of total direct revenue resulting from Federal offshore oil and gas development in the three counties range from almost nonexistent in San Luis Obispo to approximately three percent of the revenue generated by Santa Barbara County. Table 4.12-12 shows the major property tax payers in each County. A discussion of the revenue effects of offshore oil and gas development in the three-county study area can be found in the COOGER Study (MMS, 1999, as cited in MMS, 2001).

Table 4.12-12.
Top Property Tax Payers, 1995-1996

Property Owner	Tax Contribution ($000)
Ventura County	
Southern California Edison	7,960
Amgen, Inc	5,427
GTE	4,806
Proctor-Gamble Paper Products	2,747
CalResources, LLC	2,051
Pacific Bell	1,768
Rockwell International Corporation	1,660
Santa Barbara County	
Exxon Corporation	5,490
Chevron Gaviota Gas Plant	2,258
GTE California	2,093
Southern California Gas Company	1,618
Raytheon Company	1,444
Pacific Offshore Pipeline Company	1,198
Southern California Edison	1,018
San Luis Obispo County	
Pacific Gas and Electric	37,194
Union Oil/Union Chemical/UNOCAP	2,439
Pacific Bell	1,622
Southern California Gas	551
ATT Communications	340

Source: Unpublished Data. Minerals Management Service, as cited in MMS, 2001

4.12.5 Non-Residential Land Use

In addition to housing and the land uses supporting offshore oil and gas development, the three counties have maintained a significant percentage of land devoted to agriculture. Over the past three decades, development pressures have resulted in increased demand for conversion of agricultural lands to other uses (see above Housing discussion). In addition to the pressure to convert agriculture lands to urban uses, additional pressure has been brought by the conversion from non-irrigated crops to irrigated crops, such as wine grapes. The call for preserving agricultural lands and open space in the three counties has resulted in a class of land use protections collectively referred to as SOAR (Save Open Space and Agriculture Resources). Table 4.12-13 shows agriculture land uses and total land area for each county. In addition to agriculture, a large part of each of County is devoted to public ownership and use. Major examples of public land use in the counties are the Los Padres National Forest, Santa Monica Mountain National Recreation Area, and Montana de Oro State Park. Military uses include Point Mugu Naval Weapons Station and Vandenberg Air Force Base.

Non-residential land uses also include coastal-dependent uses, such as shipping facilities, boatyards, and water-dependent recreation, such as fishing or swimming.

Table 4.12-13. Agricultural Land Use

	San Luis Obispo	Santa Barbara	Ventura	California	Study Area as Percent of California
Number of farms	1,916	1,451	2,214	74,126	7.53%
Irrigated	925	1,062	1,959	55,920	7.06%
Non-irrigated	991	389	255	18,206	8.98%
Total farm land in acres	1,301,889	817,068	346,279	27,698,779	8.9%
Average farm size in acres	679	563	156	374	N/A
Farm land as percent of total land	61.56%	46.62%	29.31%	27.75%	5.06%

Source: Census of Agriculture, 1997, as cited in MMS, 2001

4.13 Commercial Fishing and Kelp Harvest

4.13.1 Regional Setting

Commercial fishing occurs at various locations off the coast of southern and central California. The nearshore waters along the coast from Los Angeles to Monterey counties and the waters just off the Channel Islands contain giant kelp beds that provide habitats for numerous species of commercially important fish and shellfish species. The majority of fish are caught within these areas. In 1999, about 64 commercial fish and shellfish species were fished using up to 15 gear types. Fishery seasons are established and regulated by the California Department of Fish and Game (CDFG).

Figure 4.13-1 shows the distribution of fish blocks in the Study Area, which are used to organize information on commercial fish catch. Fish blocks are 9-by-11-mile rectangles, or approximately 100 square miles of ocean area.

CDFG reports the total number of pounds of commercial fish species landed in California and the value of those landings annually for six reporting areas along the coast. The reporting areas are Eureka, San Francisco, Monterey, Santa Barbara, Los Angeles, and San Diego. The study area is located in the Santa Barbara reporting area and includes the ports of Santa Barbara, Morro Bay, Ventura, Oxnard, Port Hueneme, Avila, Oceano, and San Simeon. Landings and values in the Santa Barbara reporting area for the years 1988-2003 are provided in Table 4.13-1. Approximately 70 percent of the landings in the Santa Barbara reporting area are from Santa Barbara, Ventura, Oxnard, and Port Hueneme harbors. Many fishers in the study area do not fish for just one species, or use only one gear-type. Most switch fisheries during any given year depending on market demand, prices, harvest regulations, weather conditions, and fish availability. The following section describes commercial fishing use of the study area.

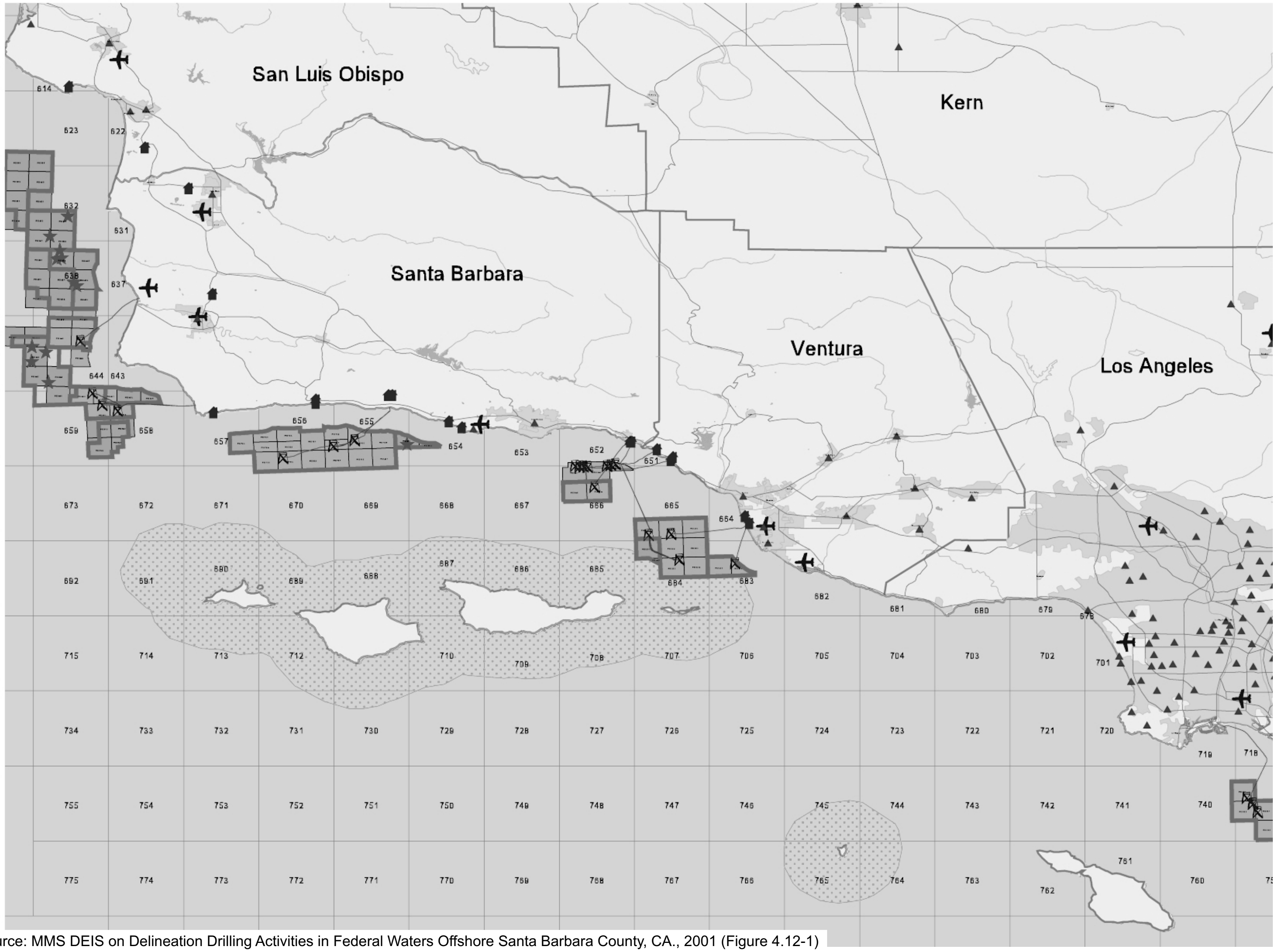
Table 4.13-1.
Poundage and Value of Landings,
Santa Barbara Reporting Area, 1988–2003

Year	Pounds Landed	$ Value
1988	75,645,800	25,875,000
1989	88,799,000	28,529,900
1990	65,500,300	30,360,000
1991	73,112,800	33,274,700
1992	42,090,700	32,212,000
1993	81,821,200	27,142,100
1994	91,129,000	42,194,800
1995	134,084,000	46,068,300
1996	158,265,000	53,606,800
1997	128,672,000	35,951,200
1998	27,181,400	21,000,900
1999	163,232,289	39,495,463
2000	171,435,803	27,469,210
2001	110,053,403	17,826,842
2002	62,188,852	17,281,875
2003	60,369,837	22,909,597

4.13.2 Fishing Methods

Nets

Fishing by net is a long-standing practice in the Southern California Bight, and includes trawling, set and drift gillnet, purse seine, lampara net, and dipnet gear. During the 1940s, nets were pulled mechanically, instead of by hand. Net reels were introduced in the 1950s, mechanically driven at first, then hydraulically powered. In the 1950s and early 1960s came other advances, which, along with increased effort from newcomers and fishermen returning home from war, helped usher in technological advances in net fisheries. It also began a latent descent into other issue areas, such as stressed stocks, competition with sportsmen, and marine mammal interactions. With developments like the "balloon trawl," which altered a drag net's design to lift it off the bottom and increase the size of its mouth, otter trawlers began catching more rockfish, which school just above the seafloor, not on the sea floor like halibut or sole.



Source: MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 4.12-1)

Figure 4.13-1. Southern California Commercial Fishing Blocks

Santa Barbara trawl fishermen pushed rockfish landings (principally, Bocaccio and chilipepper rockfish) beyond four million pounds in 1960, second only in weight to mackerel and far ahead of market fish like halibut (206,000 pounds), seabass (367,000 pounds), and barracuda (305,000 pounds).

By the mid-1960s, hydraulics had replaced many mechanical net-hauling devices and nylon nets replaced cotton, hemp, and linen. Fishing methods changed, too, and airplanes began assisting the fleet by spotting potential catch such as sardines and seabass. Meanwhile, "circle gillnetting" for barracuda and seabass was supplementing set nets and drift nets used to take these species. A cross between gillnetting and round hauling, circle netting involved setting a gillnet in a circle without fully closing its ends, as one would with a purse seine. With a school of barracuda or seabass encircled, the crew would scare fish into the webbing, by shouting, banging on pots and pans, throwing firecrackers or driving the boat inside the deployed net.

Purse Seining

Presently, this fleet is based primarily in ports to the south of Santa Barbara; mainly Ventura Harbor and San Pedro. The species fished are primarily pelagic, such as anchovy, mackerel, and bonito. A major squid fishery has also developed in the past several years. Because purse seiners follow schools of these pelagic fish, it is difficult to predict where the fleet will be at a given time. Though the season is open all year, the Department of Fish and Game sets catch quotas. When these are filled, the fishery is over for that year unless an extended quota is subsequently issued. The vessels, in the 35 to 70 feet size range, are distinguishable by the extra pursing skiff usually carried astern, and the tall boom and winch for pursing and hauling in the seine.

When a school of fish is spotted, the vessel maneuvers into position near the school and launches the skiff, which drags the seine around the school of fish and back to the mother vessel. The purse line of the seine is rapidly winched in to close the bottom of the net, and the entire net is then brought in with a power block and winch. A successful set and haul usually takes from 30 to 90 minutes, depending on the size of the fish school, weather, and other factors. During the pursing process, the purse seine vessel is not maneuverable, and can be considered dead in the water. Purse seiners from Monterey to San Pedro have fished the Santa Barbara Channel for sardines, mackerel and anchovies for decades. Sardine harvests, which from the late 1940s to the early 1980s were essentially absent from Monterey, but available in modest, fluctuating amounts in southern California, were bolstered by considerable anchovy landings during the period, especially in the 1950s, 1960s and early 1970s.

When sardines were unavailable, roundhaulers, including Santa Barbara-based lampara boats and purse seiners, turned to anchovies. At the time, buyers sent trucks to Santa Barbara to retrieve the catch, helping the port's yearly anchovy landings rise as high as 50 million pounds in 1975. [Cmt 120: awaiting call back from CDFG] In the early 1980s, reduction fisheries declined amid political pressure and production of alternate animal-food sources, and sardine fishing staged a major, prolonged comeback that ultimately saw statewide quotas increase steadily to 132,000 tons in 1999. Purse seine activity in the Santa Barbara Channel and along the coast returned commensurately, as boats eschewed anchovies in favor of sardines, mackerel, and squid. For decades, fishermen have plied the Santa Barbara coast and the Channel Islands for squid, supplying everything from the fresh-fish markets to markets for canned product in Europe and Thailand. Traditionally, the squid were taken at night with dip nets, after being lured to the surface with lights. In the late 1980s, however, dramatic changes molded the fishery into its modern form.

Small "scoop boats" gave way to large purse seiners that worked with dedicated "light-boats" to harvest the catch. Squid prices typically range from $300 to $500 per ton, and some boats can haul 60 tons per night. The fishery, which typically begins in fall and ends in late spring, helped fuel a statewide record of 110,000 tons in the 1996-1997 season, when demand among Chinese consumers increased several-fold over a short period of time. Since then, however, a moratorium on new permits, a warmwater El Niño event, and shifting markets have presented challenges for the fishery, which currently includes 200-plus purse seiners and about 70 light-boats.

Because purse seiners follow schools of pelagic fish, it is difficult to predict how large or where the fleet will be at a given time. When working an area, the purse seine fleet is made up of a group of vessels. While searching, the vessels often move on erratic courses, trying to spot schools visually or on sonar. The bonito and mackerel fisheries are often aided by spotter planes. The season for coastal pelagics (i.e., squid, anchovy, mackerel, etc.) is generally open all year; however the CDFG sets catch quotas. When quotas are filled, the fishery is over for that year unless an extended quota is subsequently issued.

Gill Nets

Two types of gillnets are in common use in the Santa Barbara Channel and SMB, and they are very distinct in the way they are fished. The first type is the set gillnet which is set in place with anchors on the seafloor and left unattended fish for a period of 24 hours or so. The second is the drift gillnet, which is a floating net with a lighted buoy at one end, attached to the fishing vessel at the other end. Set gillnets. Since 1994, set gillnets have been banned for use within State waters, except in certain areas where deepwater rockfish nets are now being set. The species sought by these nets are halibut, seabass, angel shark, other sharks, rockfish, queenfish and kingfish.

Additional restrictions on rockfish set netting were established in 2003 with the establishment of Groundfish Conservation Areas (GCAs) (NMFS website). Within the GCAs are Rockfish Conservation Areas (RCAs) that preclude set nets and other commercial rockfish gear. The 2004 regulations prohibit trawling or the use of set nets for rockfish from the 3-mile limit to a depth of approximately 150 fm (900 feet) from 36^{o} 00' N (just south of Lopez Point) to the U.S.-Mexico border. Restrictions of trawling and other gear types are reviewed each year by NOAA Fisheries (National Marine Fisheries Service).

Commonly, gillnet buoys have flags marking the ends, for ease of visibility. Set nets range in length from a hundred yards to a half mile or so in length, depending on how many "gangs" or pieces of net webbing are hung together between anchor lines. The net is set during day or night and is usually retrieved within 24 hours. Fish are taken from the net as it is pulled aboard, or worked over the deck and redeployed in place, depending on whether the net is to be relocated or not. The decision to relocate gear is based on the catch rate of the net at the current location. Nets may be arranged so the net material itself is close to the surface, at midwater, or near the bottom. The inshore set-net fishery went through dramatic changes during the 1980s. Most important was the introduction of monofilament gill nets early in the decade. Nearly disposable in nature, they were much lighter and easier to handle than nylon nets and they performed just as well, if not better, catching plenty of fish but fewer sticks and less kelp. If hung with a lot of slack, they even made single-wall net fishing for halibut feasible, eliminating the need for three-walled trammel nets, which were difficult to build, use, and mend.

Beginning in 1988, two successive legislative campaigns were undertaken to ban nearshore nets from Point Arguello to the Mexican border. Proposition 132 included a ban on gill nets in a Marine Resource Protection Zone extending from Point Arguello to the Mexican border within 3 miles of shore, and around the Channel Islands within 1 mile of shore (or shallower than 70 fathoms (420 feet), whichever is closer to land). It passed on November 5, 1990. Following final implementation of Proposition 132 in 1994, statewide halibut landings dropped to 533,000 pounds, about half the historic average. Halibut trawlers had moderate success, especially near Santa Barbara. White seabass landings declined from 100,000 pounds in 1993 to 79,000 pounds in 1994.

Drift Gillnets

Drift gillnets are not left unattended, and most often, one end of the drift net is attached to the fishing vessel. The drift net fishery operates in a much different area of the Santa Barbara Channel and Santa Maria Basin regions than the set net fishery does. Fish species sought in this fishery are swordfish, and thresher shark, but some incidental catch of other pelagic species like opah is also now common since a strong market is developing for such species. Drift gillnets are much longer than set gillnets, and may be as long as a mile or mile and a half.

This is significant from a gear interaction viewpoint because drift gillnet vessels may have restricted ability to maneuver with nets deployed. Drift gillnetting usually occurs at night and during the darker phases of the moon. The end of the net not attached to the vessel usually has a radar reflector/lighted buoy attached to it. Normally, the vessel would be at the leeward end of the drifting net equipment.

The drift gillnet can be fished anywhere from right at the surface to 30 or 40 feet below the surface. Drift nets have been used mostly to catch thresher shark and swordfish. With good fishing and strong markets, Santa Barbara landings of thresher shark rose from 36,000 pounds in 1977 to a high of 687,000 pounds in 1983. Meanwhile, as drift netters scoured new areas for sharks, including the Channel Islands, they also began fishing for broadbill swordfish.

Until the late 1970s, broadbill swordfish had been taken only by harpoon. But discovery that this profitable fish could be taken in shark drift nets forced a gear revolution, with mesh sizes increasing to 18 to 20 inches in order to catch swordfish. Slowly, the drift net fleet began to bifurcate. Smaller boats stayed inshore, targeting sharks and the occasional swordfish. Larger boats, meanwhile, ventured further offshore, up to 150 miles out, and as far north as Oregon, searching for swordfish. Many swordfish fishermen built new boats, exchanging wooden vessels for aluminum or steel ones better suited to offshore conditions. As a measure of the drift netters' success, California swordfish landings rose to a record 2.8 million pounds in 1989. As the shark and swordfish gillnet fisheries developed and expanded, several regulations, including area closures and seasons, were implemented to conserve targeted stocks and protect marine mammals, including migrating gray whales.

In 1997, fishermen began deploying sonic pingers on their nets, devices that emit signals through the water that deter whales from the gear. The vessels used in both the set gillnet and drift gillnet fisheries vary in size and shape, but may be classified into two categories: (1) smaller (28 to 40 feet), faster craft similar to the crab and lobster craft of the region, and (2) larger (40 to 60 feet), more traditional fishing hulls. However, the gillnet boat is readily distinguishable from other vessels of similar design and size by the presence of a large (4 to 10 feet) reel on which the gillnet is spooled when not in use. The reel may be mounted on a fore deck or aft deck.

Trawl

The trawl fishery is a mobile fishery in which a trawl net is towed behind the fishing vessel at slow speed, either in midwater, or more commonly along the bottom. The species most commonly sought by trawlers are ridgeback shrimp, spot prawns, rockfish, various species of sole, and sea cucumbers. Seasonally, the trawlers are allowed to drag in shallower State waters for halibut, and incidental catch of shark and some other fish is allowed.

Most of the vessels are large for commercial fishing vessels of this area, ranging from 40 to 80 feet in length. These vessels are readily identifiable when the net is not deployed because of the net "otter boards" which are usually hung near the stern of the vessel, and the single boom and winch for net retrieval usually mounted forward on the open stern deck. Some draggers use a Gulf-style double net rig (twin trawlers) which is towed from the ends of two heavy outrigger poles readily visible extending laterally 20 to 30 feet from the beam of the boat. Trawlers navigate slowly along a depth contour through the dragging grounds for several hours. The net is then hauled on deck with a hydraulic winch and boom. The fish are emptied from the cod end of the net, sorted, and the process is repeated. Depending on the species sought and the season, trawlers of the Santa Barbara Channel drag anywhere from the 50- to 150-fathom depth contour along the coastline, along the Channel Islands, and along topographic features of the seafloor in midchannel. In the Santa Maria Basin, draggers may work out to 400 fathoms in their search for various species of sole.

Trawlers with nets deployed are not readily maneuverable for several reasons. First, the net is the bottom, and can be up to a mile behind the vessel, depending on water depth. Second, the trawlers often work along the top edges of steep dropoff slopes. If the trawler is forced to turn in to deeper water, the net would have to be picked up and reset, causing lost fishing time. Similarly, rocky outcrops, wrecks, or other debris are located randomly with respect to the trawl grounds. These features are hazards to the trawler because of their potential to snag and hang up the net. Through trial and error, trawlers become aware of most of the snags to avoid in favored grounds. Knowledge of these snags also limits the potential maneuverability of the trawler when towing a net(s). Turning into such a snag may mean loss or damage to the net(s), and potential hazard to the vessel itself if the hang is significant and/or weather/sea conditions are unfavorable. Since turning into such obstructions would be hazardous, most trawlers would have to stop towing and pull their gear in rather than turn.

During the late 1970s and early 1980s, at the same time prawn trawling and shark/swordfish drift netting were developing, some Santa Barbara draggers began a quest that would ultimately establish a steady, local fishery for sea cucumbers. The fishery began when Asian buyers courted Santa Barbara fishermen in 1978, asking about the availability of this pickle-shaped echinoderm, found in waters about 30 fathoms deep. The sea cucumber fishery steadily grew until yearly landings in Santa Barbara began averaging more than 100,000 pounds, with trawlers earning $50 per pound (draggers harvest a giant red sea cucumber, while divers harvest the somewhat more lucrative warty sea cucumber). Trawl prices can vary, however, based on whether cucumbers are dry or full of water—a function of handling or even time of year.

The commercial trawl fishery has and continues to undergo extensive changes in the areas utilized and target species (C. Fusaro, pers. comm., 2001, as cited in MMS, 2001). Except for the area between Point Conception and Point Mugu, designated the “California Halibut Trawl Grounds,” no commercial trawling is allowed inshore of the State 3-Mile Limit. The inshore halibut trawl season is closed between March 15 and June 15 each year. Revisions to the commercial trawling regulations, the establishment of cowcod conservation areas, and seasonal adjustments to landings of certain rockfish are ongoing through the Pacific Fisheries Management Council and change throughout the year as landings are recorded (C. Fusaro, pers. comm., 2004). Current commercial trawling restrictions within the study area, excluding exempted areas for halibut and sea cucumber trawling, include the rockfish conservation area between the shoreline and 150 fathoms (900 feet) from offshore Monterey Bay to the U.S./Mexico Border (NOAA Fisheries, 2004a).

Hook and Line

As with other gear types, the design of hook-and-line equipment has evolved only modestly from prehistoric times, although technological advances have caused dramatic changes in the manner in which lines are constructed, deployed, and hauled. Still, the modern age remains dominated by a few basic styles of hook-and-line fishing.

Vertical Longline

Also called “buoy lines” or “Portuguese lines,” this gear is deployed vertically. It typically consists of a gangion to which hooks are attached at various locations, either directly or on short leaders, or “tippets.” A weight is secured to the bottom of the gangion, often with a lighter piece of material, called a breakaway, so if the gear becomes snagged, the weight would detach before the entire gangion breaks. A buoy tied at the top of the line keeps it vertical in the water column. The number of hooks deployed on vertical longline gear is usually limited by water depth and how high a certain species or school of fish will “climb.” Rarely are more than 200 hooks deployed on a vertical longline. Most often, hook and line fishermen use their fathometers to seek out relatively deep water rocky outcrops having “stacks” of fish showing over them. The buoyed vertical longline is baited and placed in the water upcurrent of the stack of fish and drifts through the fish. The lines are then retrieved, any fish hooked are removed, the hooks rebaited, and the process is repeated. Vertical longlines are typically used to take rockfish, and are set on pinnacles, reefs, rocks, rubble, hard bottom, canyon edges or seamounts where they congregate.

Traditional Longline

Unlike vertical longlines, traditional longlines are deployed horizontally, usually near the seafloor. Longlines are designed to cover much more territory than vertical lines, and may contain hundreds or even thousands of hooks. Rockfish are also taken on traditional longlines, especially in areas characterized less by distinct reefs than by broad stretches of suitable, hard-bottom habitat. Traditional longlines typically feature a mainline (“groundline,” in the case of bottom gear), to which hooks are attached at various intervals. Sometimes the groundline is set just above the seafloor and has small floats attached to keep it from snagging. These floats may be alternated with small lead weights to keep the gear close to the bottom without snagging. Longlines set from tubs are called tub gear. Longlines can also be set from mechanical reels or spools, depending on the size and nature of the operation. Anchors are set at either end of bottom longlines to keep the gear from moving or tangling. The term “set line” is often applied to shorter longlines that contain fewer hooks, usually about 50 hooks. Several set lines might be deployed in a given area and moved around during the day. Like traditional longlines, these lines are often laid close to the ocean floor.

Historically, the vertical and traditional longline fisheries of the Santa Barbara Channel and Santa Maria Basin primarily targets several species of rockfish, such as the red (vermilion), Bocaccio, chili, and several others; incidental catch includes rocky reef associated fish such as lingcod and cabezon. The fishery, up until recently, has had no seasonal restrictions, but is most active during the fall and winter months. In 2001, the rockfish fishery was closed to recreational and commercial harvest during January and February in southern and central California. This fishery as it exists in the Santa Maria Basin and Santa Barbara Channel is a “fallback” fishery for some of the fishermen who enter it, since many of these fishermen also fish in other fisheries during other times of the year. As such, a variety of vessel types and sizes are involved in the fishery, ranging in size from weekend skiffs with rod and reel to larger commercial vessels from other fleet types, using buoyed, vertical longline techniques.

Rockfish have been commercially fished since the mid-1800s, and for over a century regional fishermen working from boats ranging in size from 26 to 60 feet have targeted rockfish with hook and line, often earning higher prices for their catch than those offered for trawl-caught species because they are handled individually, not taken in large numbers in a towed net. Most of the fish have been taken from depths of 50 to 100 fathoms. Before the 1960s, rockfish prices averaged 3 to 4 cents per pound, depending on market conditions and the species being sold. Brokered through or processed at plants ranging from Larco Fish Company to Castagnola Seafoods, Eureka Fisheries and Seafood Specialties, prices rose, hitting 25 cents per pound for reds and 17 cents per pound for fillet fish in the 1960s, and 35 cents per pound for reds by the 1970s. Twenty years later, reds earned $1.50 per pound, as fishermen sought to make the most of limited availability and increasingly low quotas. By the early 1970s, the number of hook-and line rockfish fishermen working local waters was increasing. A core fleet of 25 boats was fishing at the Channel Islands and along the coast, doubling in winter when fishermen sought "fill in" fisheries between salmon, seabass, swordfish, or lobster seasons. This pattern changed little since the fishery's early days, even though the rock cod fleet was growing. Since 1938, nearly half the year's total rockfish landings for the Santa Barbara area have been taken between December and February.

In the early and mid-1980s, offshore oil development dealt the fleet a serious blow. Rockfish fishermen were affected by seismic surveys (which scatter rockfish) and siting or construction of drill rigs and platforms, barges, and pipelines. Conflicts were aggravated by the fact that rockfish congregate over rocks or hard bottom in the same depths and locales that harbor oil reserves. As a result, fishermen were often precluded from working. Unlike trawlers, crabbers, or gill netters, however, the hook-and-line fishermen had few other places to go, since hard-bottom rockfish spots are small and often separated by many miles (Kronman, 1995, as cited in MMS, 2001). By 1987, the number of hook-and-line rockfish fishermen was shrinking because of the perceived long-term effects of seismic blasting, reduced fish availability due to overfishing and poor regional recruitment, and market competition from trawl-caught rockfish from California to Canada. Trawler catches were reaching regional markets only a day or two after harvest, or being sent to the market as frozen fillets when opportunity for profit peaked.

Despite substantial blackgill landings, which in Channel Islands Harbor alone rose from 10,000 pounds in 1991 to 95,000 pounds in 1994 and a port record 115,000 pounds in 1996 (reflecting the regionwide trend), breaking into a market that had dealt primarily with other rockfish species for decades was difficult. Prices lingered at 40 to 60 cents per pound until fishermen advertised in Asian newspapers and began selling blackgill rockfish at Los Angeles-area outlets. This effort increased the price to 75 cents per pound, which then made it profitable to fish for blackgills instead of competing for dwindling supplies of vermilion rockfish.

Quotas shrank in the late 1990s to levels that rendered both longlining and vertical lines temporarily obsolete for catching rockfish, although longlines continued to be used for deepwater species such as sablefish, which are not members of the rockfish family. Also known as black cod, sablefish limits remained at levels reasonable enough (1,050 pounds per week) to warrant some effort. Rockfish quotas, however, fell to 500 pounds per month in 1999 and are expected to drop further in the future, as Federal fisheries managers endeavor to rebuild depleted groundfish stocks, especially bocaccio, lingcod, cow cod, canary rockfish, and Pacific Ocean perch. The rockfish fishery was closed for the first time from January to February 2001.

In the mid-1980s, demand among Asian consumers for live finfish stimulated growth of nearshore fisheries for cabezon, sheephead, grass rockfish, sculpin, gopher rockfish and other species found at depths of 5 to 60 feet. As the fishery grew, landings escalated from 52,000 pounds in 1989 to 988,000 pounds in 1995, with the number of live-fish fishermen statewide rising from 70 to nearly 700 during the same period. The gear soon gained the attention of State regulators, who expressed concern for the health of nearshore fish stocks. Ultimately, legislation was passed that targeted coastal fisheries, limiting each line to a maximum of 15 hooks, with no more than 150 hooks permitted on a single boat.

An opportunity for shallow-water longlining at the islands emerged following implementation of Proposition 132 in 1994. By eliminating gill nets within 1 mile of any island, the initiative created a "harvest vacuum" for other commercial gear types. Seizing the opportunity, a few fishermen began longlining near the islands for white seabass, and also were catching sheephead, halibut, rockfish, and other shallow-water species (including those destined for the "live" market).

Trolling

In trolling, lines are pulled through the water from the stern of a boat that is underway. This method is primarily employed to catch salmon, although it is also used to catch species like albacore, California halibut, and occasionally bonito. Salmon trolling gear consists of up to six stainless steel (wire) mainlines unwound from electrically powered, hydraulically powered, or hand-cranked gurdies (spools). The wires are suspended from outrigger poles on either side of a boat (occasionally including two sets of poles, one amidships and one on the bow), which help spread out the gear. Monofilament leaders with attached hooks (either lures of baited hooks) are clipped to the mainline, often at three-fathom intervals, although the placement of hooks can vary depending on geographic location, water temperature, water color, or depth. For example, in shallow water where fish are concentrated in a cold thermocline on the bottom, only three hooks or "spreads" might be employed. In deeper water, where fish are dispersed throughout the water column, 7 to 10 spreads might be used. Each wire line, with its series of leaders, is held in place by a large, round weight called a cannonball.

Ranging from 10 to 60 pounds, the cannonballs help keep the gear somewhat vertical as the boat trolls the leaders through the water, dragging bait such as herring, anchovies, or sardines, or lures such as hootchies, plugs or spoons, behind it. Trollers sometimes also clip a float onto the line at the surface ("float bag"), to help regulate the gear's depth and spacing relative to the other lines. As the troll lines are hauled, a leader with a fish on it is unclipped from the mainline as it nears the surface. The fish is then pulled carefully to the boat, where it is netted or gaffed aboard. Trolling for albacore employs a similar design, although the lines are fished solely on the surface.

Trolling is done primarily in the Santa Maria Basin, and to a lesser extent in the Santa Barbara Channel, depending on where the fish are from year to year. A troller is most often a relatively small vessel (from 20 to 40 feet long). Trolling gear can trail the vessel by 100 to 300 feet. Trollers work in highly variable areas, since this fleet targets highly migratory and widely ranging fish. As in the hook and line fishery, trollers are often in another fishery, and enter the troll fishery in the off-season of their principal fishery. Peaks in salmon fishing have occurred in Santa Barbara (one in the mid-1980s, one in the mid-1990s) that were notable enough to lure fishermen from Crescent City, swelling the local fleet for a period of days or even weeks. In 1995, the year a Saturday fishermen's market opened at Santa Barbara Harbor, local trollers delivered 138,000 pounds of chinook worth $251,000, most of it in a period of just two months.

On Saturday mornings throughout May and early June, boats and customers crowded the City Pier, with salmon selling for $3.30 per pound. The Saturday market was not only good for fishermen due to the high direct-sale price paid for salmon, it gave them an alternative to traditional markets, where prices had fallen from $2.50 to $3.00 per pound in the 1970s to $1.25 per pound in the 1990s because of competition from farm-raised fish, primarily from Chile and British Columbia. Salmon fishermen are careful where they troll. Otherwise, they risk losing expensive, 50-pound leads, leaders, lures and even an outrigger pole if they snag badly. If a troller sees an obstruction looming on his fathometer, such as a rock or a sunken boat or oilfield debris, he might slow down to try and ease over it, or speed up to raise the gear above it. Using modified salmon-trolling gear, often without outrigger poles and often with rods and reels instead of gurdies, a few Santa Barbara fishermen fish for halibut with hooks when the fish are plentiful, especially during spring. Although they enjoy periodic success, only the best, most knowledgeable, and most persistent fishermen appear able to profit from hook-and-lining halibut, a species that has traditionally been taken in cotton or nylon trammel nets or monofilament gill nets.

Trap Fisheries

Crab Fishery. Two different groups of crabs are trapped in the south/central California region. The largest crab fishery is for what is commonly called "rock crab." Three types of rock crab are found along the Santa Barbara coast and at the Channel Islands: red rock crab *(Cancer productus)*, brown rock crab

(Cancer antennarius), and yellow rock crab *(Cancer anthonyi)*. The red rock crab is caught primarily around or on submerged rocky outcrop areas. The other types are caught in areas of low relief sand or sandy mud bottom. The fishery is active all year, and many of the fishermen who fish crab gear also fish lobster gear in lobster season (October to March). Traps are basically wire, plastic coated wire, or plastic mesh boxes 2 to 4 feet square, which are weighted to stay in place on the seafloor.

Braided polypropylene rope (usually 3/8" diameter) is used to deploy and retrieve traps, which are set in nearshore waters from shore to 40 or 50 fathoms deep. Crab traps are baited and deployed in fishing grounds and commonly left to soak 3 days. The crab fishing vessel pulls alongside the trap buoy, and grapples the buoy on deck, feeds the line through a pinch puller winch, and raises the trap from the seafloor. The crabs are taken from the pot, it is rebaited, and redeployed.

It is difficult to predict the location of any particular sting of gear at a given time. Most full-time crab fishermen have at least 50 to 70 traps, and many have upwards of several hundred traps arranged in "strings" of from 5 to 25 individual traps set along depth contours. If traps are fishing well, they left where they are. However, if they are not producing, they will be moved to try a new location. This occurs on an unpredictable time schedule dictated by crab population movements. Also, crab vessels are small, ranging from 20 to 40 feet. Therefore, traps are deployed over several trips, since only 10 to 30 traps can be carried safely on one trip. Relocating gear is also done in increments.

Beginning in the 1980s, regulators required a 3¼" diameter escape ring to avoid undersized crabs, although some fishermen voluntarily used a larger ring, to protect stocks and weed out small crabs not popular in the market. The legal minimum size was set, and remains at, 4.25" carapace width. Typically, crabbers set their gear deeper than lobster traps, and usually over sand bottom. The Santa Barbara fishery began at the shallower depths, then worked deeper with time. In addition, with the appearance of shellfish-eating sea otters in the late 1990s, Santa Barbara trappers moved their gear to depths of 200 feet to avoid them.

The second crab fishery is a southern extension of a larger, northern California to Alaska fishery for Dungeness crab. Both the trap and buoy systems are somewhat different for this fishery, and is highly variable in the area depending on signs of stock early in the season. The fishery extends from northern California south through the Santa Maria Basin to Point Arguello in some years. Dungeness crab vessels tend to be larger (25 to 75 feet) than those fishing rock crab south of Point Conception. Most of the crab, rock or Dungeness, are marketed locally to fresh fish wholesalers, markets, or restaurants.

Since the early 1980s, markets have not only strengthened, but tanking systems at oceanfront eateries have improved, allowing more crabs to be kept alive longer in larger systems and reducing "dead loss" to 1 percent. Also, self-contained tank systems that do not depend on circulating seawater make the crabs more accessible to inland restaurateurs, especially in the ethnic communities of Los Angeles, where the product is most popular. The fishery is considered easy to master. However, as pressure on the resource has grown (annual Santa Barbara landings in the 1990s averaged 500,000 pounds, split among 15 or so trappers), fishermen have begun fishing the outer islands of Santa Rosa and San Miguel. For the period 2001 through 2003, Santa Barbara Harbor crab landings averaged 796,000 pounds. The market remains highly competitive. If a particular crab fisherman cannot assure his market of a steady supply, he is not likely to continue to be able to sell to that market, since the market can seek product from other more steady producers of crab. Therefore, minimizing interactions with crab fishermen and their gear minimizes the potential for altering an individual's position in this highly competitive market.

Spiny lobster. The California spiny lobster *(Panulirus interruptus)*, a mainstay of the trapping industry, is found from the intertidal zone to depths of 240 feet from Monterey to Mexico. California spiny lobsters live amid rocky coastal habitats throughout the Southern California Bight, including the Channel Islands. They spend daylight hours in holes, crevices and under ledges, then crawl out at night to scavenge or hunt food, or to migrate, moving progressively from shallow water to deeper water from fall to winter and their yearly breeding cycle begins.

The lobster fishery is similar to the crab fishery. The traps are of similar size, the marking buoys are similar, and they are set for similar sized vessels. In fact, most crab fishermen also fish lobster, changing over some of their crab gear for lobster gear, or adding strings of lobster gear to their deployed crab gear in nearshore waters. One of the main differences between crab and lobster fishing is that lobster fishing is confined to a specific season: fall through winter. Opening day of lobster season is the first Wednesday in October, and the season closes on the first Wednesday after the 15th of March. Another difference is lobster gear is deployed not only in strings along depth contours, but also grouped in clusters, which fringe rocky outcrops on the seafloor. Lobster gear is fished in exactly the same manner as crab gear.

At the beginning of the season, most traps are set in shallow water, hugging the shoreline. As the season progresses, the gear is likely to be found further and further from shore, as fishermen follow the movements of the lobster population offshore into deeper water throughout the season. Toward the end of the season (March), it would not be unusual to find most of the gear in the 20 to 40 fathoms range.

To contend with an expanding fishery that by the mid-1970s included over 200 trappers deploying over 20,000 pots in southern California, regulators, beginning in 1976, required that traps include an escape port through which small, sublegal lobsters (less than 3.25 inches carapace length) could freely exit the gear. Measuring 2.375 by 11.5 inches, the escape panel ensured longevity for a fishery whose target catch had dropped in average size to about 1.25 to 1.5 pounds per lobster. However, this is exactly the size preferred by markets, since its tail is plate size. The escape ports appear to have stabilized the fishery, landings from which had slipped to less than 100,000 pounds per year beginning in 1968, then rebounded to more than 100,000 pounds in the 1978-1979 season — a level below which they have not dropped since. In the 1997-1998 season, in fact, area landings of 210,000 pounds were the highest since 1954-1955. Along with the escape ports, State regulators also began requiring the use of “destruct clips” in the 1970s. These clips, made of weaker metal than the trap wire, are attached to the trap in strategic spots and corrode rapidly if a trap is lost or left unattended. Ultimately, the entire lid of the pot falls off, freeing any trapped lobsters and preventing the cage from trapping any more.

Beginning in the early 1980s, a dramatic change in markets had an equally dramatic effect on the fishery. Overseas buyers, particularly in Asia, began purchasing live lobsters at prices never before seen by local trappers. When the price exceeded $5 per pound, local restaurants, unable to compete, stopped buying. Asian economies were booming, with an ascending interest in California lobsters. Boats and gear were changing, too, to meet the demands of shipping live lobsters overseas by air. Some fishermen bought east coast lobster boats that were fast, roomy, and required no waiting time to build. Others customized their boats to include self-bailing live wells, which replaced hosefed rubber barrels to keep lobsters healthy. With increasing demand came a rapid rise in participation.

The number of permits issued by the California Department of Fish and Game climbed from 213 in 1980 to 440 in 1984. And while some trappers fished more and more pots, others believed reducing their string was more cost-efficient. They could make more money with fewer traps, they reasoned, by saving fuel and not risking gear loss in ocean storms or swells.

By the early 1990s, lobster prices hit an astounding $7 per pound, and competition increased from countries such as Mexico, Australia, and Costa Rica. Meanwhile, landings in the Santa Barbara area stayed at a steady 150,000 pounds per year. Finally, however, at the urging of the California Lobster and Trap Fishermen’s Association, the California Department of Fish and Game put a moratorium on new entrants into the fishery in 1995, then closed it to new entrants the following year. Fishermen said they were concerned not only about overcapitalization of the lobster fishery, but entry into the fishery from fishermen closed out of other fisheries that implemented similar limited entry schemes. Ultimately, prices flattened too, as Asian economies (and their taste for expensive lobsters) weakened.

In fact, Santa Barbara-area fishermen who were able to set top prices for their 210,000-pound catch during the 1997-1998 season saw prices and landings in 1998-1999 drop to levels of half what they were the previous year.

Diving

Commercial divers in the Santa Barbara Channel primarily seek sea urchins, although a small dive fishery has recently developed for sea cucumbers. Divers usually work rocky reef areas in water no deeper than 20 fathoms, since the two primary species sought are distributed in that depth range. Historically, the coast was dived extensively for abalone and urchins, but the primary dive grounds for urchins are now the Channel Islands. Commercial dive boats are usually small, fast vessels from 22 to 32 feet in length. Normal operations can be either anchored or “live-boat.” One to several divers may be in the water. A “tender” or deck hand operates the vessel and diver air compressor, and tends the divers air hose and game bags. Typically, the diver will work a “bed” of urchins until his bottom time is exhausted or the bed is fished of all legal size urchins.

Five of the eight species of abalone found in California have been harvested commercially by diving along the Santa Barbara Coast and the Channel Islands. The Santa Barbara–based California Abalone Association (CAA) was formed in 1972 to represent the State’s abalone divers. CAA offered them a vehicle for providing input into the management of those abalone stocks, which are also consumed by sea otters. CAA also formed at a unique, if not coincidental time, the same year as passage of the Federal MMPA. Among other things, the MMPA transferred sea otter management from the State to the USFWS. CAA has also negotiated several regulations, including a limited-entry permit system for abalone (1977), and development of an assessment tax for enhancement projects (1991). A Director’s Abalone Advisory Committee (DAAC), including divers, biologists, and Sea Grant representatives, oversaw the $12.5-per-pound assessment tax fund and recommended enhancement projects to CDFG. Limited entry was widely credited with helping stabilize southern California’s red abalone fishery. With design help from industry, the program allowed for the transfer of permits, thus maintaining their value as a business investment. To enter the fishery, however, a newcomer had to buy two diver’s permits. This was considered a good means of reducing the overall number of abalone divers, which declined to 100 before the fishery was terminated in 1997.

By 1974, Santa Barbara was the capital of the State’s abalone fleet, generating two-thirds of its annual harvest and generating $791,000 for the local fleet, making it the single most valuable species at that port. By the late-1970s, as many as 70 divers worked out of Santa Barbara, although by then some were also diving for sea urchins. While annual Santa Barbara-area landings of red and black abalone were both at 400,000 to 500,000 pounds apiece during the late 1970s, more black abalone were landed in 1980. More black than red abalone was landed for the next 5 years, until disease began to affect populations of the shallow-water black abalone. While some fishermen continued collecting the higher-priced red abalone, others preferred the more easily captured black abalone.

Around 1986, the black abalone population began dying in great numbers from a natural but disturbing mortality that became known as “withering foot syndrome.” Mysteriously, the animals would shrink in their shells, grow weak, and even fall off the rocks. They died by the tens of thousands. Caused by a bacterial pathogen whose exact source has never been identified, withering foot syndrome wiped out most of the black abalone population at the Channel Islands, with only isolated populations surviving there and on the coast. Santa Barbara landings of black abalone decreased rapidly, from 227,000 pounds in 1987 to 22,000 pounds in 1991 and just 1,600 pounds in 1993. Meanwhile, Santa Barbara landings of red abalone remained strong at more than 300,000 pounds per year. However, with virgin stocks thinned and the abalone harder to find, a good day was five dozen abalone per diver, not 30 dozen. However, they were worth $170 per dozen in 1989 and $420 per dozen by 1994, as the market shifted from pounded steaks to live abalone shipped to Asia.

About 30 abalone divers fished out of Santa Barbara during the early 1990s. Despite bag limits, size limits, area closures and seasons, the combination of disease, pollution, politics, sea otters, and sport and commercial pressure led first to the banning of black abalone harvests in July 1993, then to the banning of commercial takes of pink, green, and white abalone in March 1996. In 1997 the California Fish and Game Commission placed a moratorium on the commercial take of red abalone, a move extended by legislation for a five-year period, until a management plan for rebuilding abalone stocks can be completed. If no plan is forwarded by the California Department of Fish and Game, the ban could be extended another 5 years. The law also created a $12 abalone stamp that sport divers must purchase before taking abalone from the northern California coast, where recreational harvests (by “breath-hold diving” also known as “free-diving”) remain legal. Revenue from the stamps is projected to generate up to $1.2 million for an Abalone Preservation and Restoration Fund. As of 2004, the commercial abalone fishery remains closed.

Sea urchins are also harvested commercially by divers. While continued harvests, plus regulated size limits and seasons, steadily decreased statewide urchin landings from the 1988 record to 32 million pounds in 1992 and just 18 million pounds in 1997, rising prices compensated for reduction. In the early 1990s sea urchins were $1 per pound, with increases around winter holidays, when Japanese demand increases. At times, Santa Barbara divers earned over $2 per pound for their catch; this price dropped when Asian economies suffered a downturn in the mid-1990s. Ironically, high prices also reflected the quality of roe, which, to a degree, got better as urchin beds thinned and competition for food among remaining animals declined.

Meanwhile, harvesting big loads was getting more difficult, despite the fact that only 300-plus divers held permits as of 1998. Divers were working deeper and many employed electric, underwater scooters to survey areas before anchoring the boat and committing to a given spot. In the mid- and late 1990s, two events occurred that drove prices down to 1980 levels: the Asian economic crisis and two El Niño events that affected the quality of roe. In 1999, however, a cold-water La Niña event began benefiting urchin stocks by stimulating kelp growth, thus increasing the amount and quality of roe. The change helped move prices back close to $1 per pound.

Harpooning

Swordfish and shark are taken by harpoon. By the early 1970s, Santa Barbara harpooners were taking 15 to 30 percent of the coastal catch. Just as the swordfish fishery reached its peak, with 150 harpooners from Santa Barbara to San Diego averaging 400,000 pounds per year (with single boats landing up to 200 fish per season), concerns were raised over mercury contamination. In 1971, no swordfish with mercury levels above 0.5 parts per million were allowed on the market. Samples from all landed fish had to be tested at special laboratories (at $10 per test), and fishermen went to great lengths to avoid the process or have their fish test “clean.” Concerns over mercury faded over 2 years, but a political controversy began when some fishermen, often more affluent ones, began using airplanes to spot swordfish. By 1974, some 20 spotter planes were hunting swordfish, raising catch rates and concern in the fishery.

In 1974 the California Fish and Game Commission outlawed the planes, but in 1976, when the measure was to take effect, it passed a regulation limiting their use to scouting only, requiring that they not work within 5 miles of a harpoon boat. In 1984, the commission again allowed planes to locate individual fish, after the harpoon fishery faded in light of a burgeoning gillnet fishery for swordfish. As the fishery’s efficiency increased, so did participation and landings; the latter hit a record high of 7,000 fish in 1978. Top boats had over 300 fish for the season. Following the 1978 record high, the number of swordfish harpoon permits issued by the California Department of Fish and Game soared to a record 1,200, up from just 397 permits in 1974. Unfortunately, the fish were less plentiful for several years following 1978, and landings dropped commensurately. As overall swordfish production rose (hitting a record 5.1 million pounds in 1985), prices fell, making harpooning less profitable for those who had not converted. Fish that in 1978 fetched $3.50 per pound earned $2.50 per pound a decade later. Ultimately, Santa Barbara's harpoon fleet began shrinking. By the early 1990s, only a few boats remained in this fishery, and usually only when a lot of "finners" appear to be available at Santa Cruz Island.

4.13.3 Commercial Fisheries in the Areas of Post-Suspension Activities

Santa Maria Basin

Aera is the operator for Point Sal, Purisima Point, Lion Rock, and Santa Maria Units and Lease OCS-P 0409, located in the central Santa Maria Basin offshore northern Santa Barbara County. Aera would perform the surveys and pipelines and new platforms would be placed within two California Department of Fish and Game (CDFG) Fish Blocks, specifically 632 and 638 (Jana Robertson, pers. comm., 2004). Blocks 632 and 638 are each "10-minute squares," encompassing 214 km^2 (82 mi^2) for a total area of 428 km^2 (164 mi^2). Historically the area has been fished using several gear types targeting multiple species: (1) purse seine for coastal pelagics such as sardine, northern anchovy, mackerel, and market squid; (2) trawl for Pacific ocean shrimp, sole, flounder, and halibut; (3) hook and line/longline for rockfish and other rocky outcrop fish; (4) trap for crab and lobster; (5) drift/set gillnet for shark and swordfish; and, (6) troll for albacore and salmon (Fusaro et al., 1986, as cited in MMS, 2001; Craig Fusaro, pers. comm., 2004). Commercial fishing occurs within the survey area on a seasonal, quota, and trip limit basis and in response to market forces throughout the year.

Gato Unit

Samedan is the operator for the three leases (P-0460, 0462 [expired], and 0464) that comprise the Gato Unit. The unit is located within two California Department of Fish and Game (CDFG) Fish Blocks, specifically 654 and 655 (Jana Robertson, pers. comm., 2004). Blocks 654 and 655 are each "10-minute squares," encompassing 214 km^2 (82 mi^2) for a total area of 428 km^2 (164 mi^2). Historically the area has been fished using several gear types targeting multiple species: (1) purse seine for coastal pelagics such as sardine, northern anchovy, mackerel, and market squid; (2) trawl for Pacific ocean shrimp, sole, flounder, and halibut; (3) hook and line/longline for rockfish and other rocky outcrop fish; (4) trap for crab and lobster; (5) drift/set gillnet for shark and swordfish; and, (6) troll for albacore and salmon (Fusaro et al., 1986, as cited in MMS, 2001; Craig Fusaro, pers. comm., 2004). Commercial fishing occurs within the survey area on a seasonal, quota, and trip limit basis and in response to market forces throughout the year.

Cavern Point Unit

Venoco operates the Cavern Point Unit. The unit is located within one California Department of Fish and Game (CDFG) Fish Block (684) (Jana Robertson, pers. comm., 2004). Block 684 is a "10-minute square," encompassing 214 km2 (82 mi^2). Historically the area has been fished using several gear types targeting multiple species: (1) purse seine for coastal pelagics such as northern anchovy and market squid; (2) trawl for spot prawns, and halibut; (3) hook and line/longline for rockfish and other rocky outcrop fish; (4) trap for crab and lobster; (5) drift/set gillnet for halibut and white seabass. Catch records indicate that commercial diving for urchins and sea cucumbers occurs within this block, however due to the depth, diving operations are not possible within the unit area. (CDF&G unpublished Fish Block data, 1999-2003). Commercial fishing occurs within the area on a seasonal, quota, and trip limit basis and in response to market forces throughout the year.

Bonito Unit

Plains Exploration and Production operates the Bonito Unit. The unit is located within two California Department of Fish and Game (CDFG) Fish Blocks, specifically 644 and 659 (Jana Robertson, pers. comm., 2004). Blocks 644 and 659 are each “10-minute squares,” encompassing 214 km2 (82 mi^2) for a total area of 428 km^2 (164 mi^2). Over the most recent five years, the area has not been heavily fished, probably due to the distance from major fishing ports and the undesirable weather conditions that characterize the area offshore Points Conception and Arguello. Commercial gear types targeting multiple species: (1) trawl for ridgeback shrimp, sole, flounder, and halibut; (2) hook and line/longline for rockfish and other rocky outcrop fish; (3) trap for crab and live fish; and (5) set gillnet for rockfish (CDF&G unpublished Fish Block data, 1999-2003). Commercial fishing occurs within the survey area on a seasonal, quota, and trip limit basis and in response to market forces throughout the year.

Sword Unit

Samedan operates the Sword Unit. This unit is located within one California Department of Fish and Game (CDFG) Fish Block (658) (Jana Robertson, pers. comm., 2004). Block 658 is "10-minute squares,” encompassing 214 km^2 (82 mi^2). Similar to the other fish blocks in the Pt. Conception/Arguello area, this area is not fished as routinely as areas within the Santa Barbara Channel or closer to major fishing ports. Historically the area has been fished using several gear types targeting multiple species: (1) purse seine for market squid; (2) trawl for ridgeback shrimp and halibut; (3) hook and line/longline for rockfish and other rocky outcrop fish; and (4) trap for crab (CDF&G unpublished Fish Block data, 1999-2003). Commercial fishing occurs within the survey area on a seasonal, quota, and trip limit basis and in response to market forces throughout the year.

Rocky Point Unit

Arguello operates the Rocky Point Unit. This unit is located within the same California Department of Fish and Game (CDFG) Fish Block as the Sword Unit (658) (Jana Robertson, pers. comm., 2004). The paragraph above describes the recent commercial fishing activities within this area.

4.13.4 Impacts of Past and Present Pacific OCS Activities on Commercial Fishing

Pacific OCS oil and gas activities began off southern California in the late 1960s (Galloway, 1997, as cited in MMS, 2001). Several reviews have been made of the possible cumulative impacts of these activities on commercial fishing in the region (Van Horn et al., 1988; Bornholdt and Lear, 1995, 1997; MMS, 1996). Furthermore, several studies have examined the effects of Pacific OCS activities on commercial fishing of the study area (Richards, 1991; Fusaro, 1991; Centaur, 1985, as cited in MMS, 2001).

The MMS requires Pacific OCS operators to conduct activities without interfering with fishing activities. However, fishermen have experienced adverse impacts due to past and present Pacific OCS activities in the Pacific Region. This includes space use conflicts, Pacific OCS-associated seafloor debris, and reduced catch due to seismic surveys. The oil industry has achieved peaceful co-existence with the fishing industry during the past 15 years by funding mitigation programs, providing fishing gear, paying fishermen to avoid operations, and avoiding major spills as oil production increased from 80,000 barrels/day to 220,000 barrels/day between 1985 and 1995 (Kronman, 1995, as cited in MMS, 2001). The programs, however, have failed to prevent loss of access to fishing grounds. It will be decades before the current facilities on the Pacific OCS are removed and fishermen can access these areas again. Pipelines, in all likelihood, would be abandoned in place and would continue to pose an obstruction to trawl fishermen after all platforms offshore California have been decommissioned.

Relations between oil companies and commercial fishermen have improved, but this is partly attributed to a lack of new development on the Pacific OCS since the mid-1980s. The lack of development stems from the fact that no offshore leases have been offered for sale in the Santa Barbara Channel or Santa Maria Basin. Thus, there has only been one high energy seismic survey (Exxon, 1995, as cited in MMS, 2001), no exploratory drilling from mobile rigs, and no new platforms on the Pacific OCS for the past 10 years. Since 2001, ExxonMobil has replaced a defective power cable from shore to its platforms in the Santa Ynez Unit, and emergency repairs of the pipelines associated with Platform Irene (Santa Maria Basin) have been completed with no substantial impacts to commercial fishing operations. Within the State waters, the Unocal Cojo Marine Terminal has been removed and plans for removal of the remnant ARCO Ellwood Pier (aka Bird Island) and the shell mounds under the 4H platforms are being finalized by the State and Santa Barbara County.

Any future development on Federal leases could test the effectiveness of mitigation and communication programs such as the Joint Committee and Liaison Office, Santa Barbara County's Fisheries Enhancement Fund and Local Fishermen's Contingency Fund, and the Local Marine Fisheries Impact Program. In conclusion, fishermen have experienced moderate impacts from past and present oil and gas activities on the Pacific OCS. However, the mitigation programs have effectively minimized these impacts to low, or insignificant, for the commercial fishing industry as a whole.

4.13.5 Mariculture and Kelp Harvest

Mariculture is the practice of culturing, growing, and harvesting marine species in a controlled setting. California has approximately 400 registered aquaculturists who raise products within intensive systems (enclosed, or on land) (Resources Agency of California, 1997, as cited in MMS, 2001). Until 2004, Ecomar was using several the Pacific OCS oil and gas structures in the Study Area to raise mussels and other invertebrates. The bulk of the statewide mussel production (85 percent) comes from offshore oil production platforms, while 91 percent of abalone production, valued at close to $2 million (in 1992), takes place in the Study Area and Morro Bay (Resources Agency of California, 1997, as cited in MMS, 2001).

There are at least nine different mariculture leases scattered within State waters along the coast of the Santa Barbara Channel. These commercial operations grow kelp, mussels, oysters, abalone, and/or a number of other species. These leases are easily identified by a fixed marker buoy, or several fixed, permanent buoys or rafts which locate the lease for the operator and permitting authority. Likewise, there are fixed buoys in place for various research institutions throughout the west coast, gathering information on the oceanography or ecology of the Santa Barbara Channel. Kelp harvesting occurs in the Study Area near Point Conception, San Miguel Island, Santa Rosa Island, and near Point Mugu (Resources Agency of California, 1997, as cited in MMS, 2001).

Summary of Impacts of Past and Present Pacific OCS Activities

The Pacific OCS leases and oil and gas platforms lie beyond the three mile State boundary. It is unlikely that effluents from Pacific OCS platforms have affected mariculture or kelp beds of the study area which generally lie within State waters. One mariculture venture is actually harvesting mussels from offshore platforms.

4.14 Marine Recreational Fishing and Diving

4.14.1 Regional Setting

Recreational fishing involves hook-and-line fishing from piers and docks, jetties and breakwaters, beaches and banks, private or rental boats, and commercial passenger fishing vessels. Recreational fishing also includes activities such as dive, spear and net fishing. Recreational fisheries in southern California access both nearshore and offshore areas, targeting both bottom fish and mid-water fish species. Boats can either drift with the currents, anchor, or live-boat to remain on the specific spot. The majority of recreational fishing is done by "jigging" baited hooks or lures. Several hooks or lures often occur on a single weighted line.

For pelagic species such as salmon, trolling methods are also used. The top five recreational landings in California between 1993 and 1998 are Pacific mackerel, kelp bass, barred sand bass, white croaker, and Pacific bonito. A commercial passenger fishing vessel (CPFV) is a boat, which is operated by a hired skipper, and on which anglers pay a fee to board and fish. The term CPFV encompasses the terms charter boat (which usually refers to a boat carrying a prearranged, or closed, group of anglers) and party boat (which usually refers to a boat carrying a non-prearranged group). CPFVs in the Santa Barbara Channel and central California typically have capacities of six to 50 anglers. Fishing trips normally are for one-half day or a full day; overnight trips are unusual. Private boat fishing encompasses all hook and line sport fishing activity from boats other than CPFVs. These vessels are typically 16 to 26 feet long, privately owned, trailered, and launched from ramps for single-day trips. Table 4.14-1 shows the number and type of recreational fishing trips in the period from 1993 to 1998.

Table 4.14-1. Number of Marine Recreational Fishing Trips in Southern California, 1993–1998

Year	Total	Private/Rental Boat	Charter/Party Boat	Shore
1993	4,037,548	1,625,306	1,174,125	1,238,118
1994	4,748,031	1,931,685	1,200,634	1,615,712
1995	4,300,264	1,700,620	1,128,652	1,470,991
1996	3,768,537	1,478,258	889,256	1,401,024
1997	3,232,417	1,274,901	788,071	1,169,445
1998	2,972,828	1,325,482	673,813	973,533
Percent Change 1993–1998	–26.4	–18.4	–42.6	–21.4

Source: National Marine Fisheries Service, Marine Recreational Fisheries Statistics Survey (MRFSS) http://www.st.nmfs.gov/st1, as cited in MMS, 2001

For the period 1999 through 2002 (the latest available data), the total number of recreational fishing trips has generally increased each year. Private and rental boat trips have shown a continuous increase in number of trips in southern California over that four-year period (see Table 4.14-2).

Table 4.14-2. Private and Rental Boat Trips

Type of Trip	1999	2000	2001	2002
Party/Charter	616,976	1,014,567	994,353	1,155,814
Private/Rental	1,018,601	1,721,416	1,742,369	1,830,687
Beach/Bank	222,007	342,523	342,523	618,364
Total, All trips	1,857,654	3,078,506	3,193,712	3,604,865

Almost all recreational diving is done with Self Contained Underwater Breathing Apparatus (SCUBA) from charter vessels and can be a year-round activity, but is mostly concentrated in the warmer months of the summer through fall. Beach diving in Ventura and Santa Barbara counties is uncommon. The charter vessel fleet for SCUBA diving consists of six specialized charter vessels based in local harbors; three in Santa Barbara and 3 in Ventura. All of these vessels make near-daily trips from July through October with vessels from Santa Barbara each carrying 46 divers and vessels from Ventura each carrying 30 to 40 passengers. The SCUBA diving is done for consumptive reasons for both fish and shellfish and non-consumptive reasons such as underwater photography and enjoyment. The SCUBA divers target a wide variety of finfish with spearguns and take lobster and crabs by hand.

A small number of private vessels for SCUBA diving from Santa Barbara, Ventura, and/or Oxnard each carrying 2 to 4 persons may visit coastal reefs and kelp beds on an irregular basis. When the weather is good, private vessels usually head for the Channel Islands National Marine Sanctuary (CINMS). Private SCUBA diving takes place often on the weekends during the summer months. The SCUBA diving for research purposes occurs monthly, weather permitting, at coastal reefs and kelp beds within the Santa Barbara Channel and/or at CINMS usually on the same day. Usually SCUBA divers remain fairly close (within 300 feet) to the dive boat.

Recreational fishing is a year-round activity concentrated during late spring through fall involving a number of gear types using three different modes of fishing: shore, private/rental, and charter/party boats. The most prevalent gear type for recreational fishing is the rod and reel. Hoop nets, spears, shovels, and hands are also used. Hoopnetters generally target crabs, lobsters, or shrimp. Shovels, rakes, and hands are used to harvest a number of clam species and California grunion. The Commercial Passenger Fishing Vessels/Fleets (CPFV) consists of two facilities each for Santa Barbara, Ventura, and Oxnard, and one for Port Hueneme. Each facility may operate a tackle/bait shop and a fleet of up to 10 vessels and each vessel may carry from 20 to 99 passengers per trip.

The following synopsis of recreational fishing in southern California is based on information as summarized by Leet et al. (2001) and NOAA Fisheries (2004c). The private/rental boat mode continues to dominate the recreational fishery followed by charter/party and shore modes. Those recreational anglers that fish by charter/party boat have a higher success rate. In 2002, about 2.5 million marine recreational fishers took over 9.3 million trips and caught a total of 42 million fish. About 70 percent of these trips were made in California. In southern California nearly 50 percent of the recreational catch is thought to be taken from private/rental boats with another 20 to 23 percent taken from CPFVs and 25 to 27 percent taken from shore. The private/rental boat catch from State waters accounts for the largest proportion of the total number of fish caught with about 51 percent of the recreational catch coming from within State waters which are three miles or less from shore.

4.15 Military Operations

4.15.1 Description of Military Operations

The surface and subsurface waters and surrounding airspace above the coastal waters of southern and central California are used intensively for military-related operations. The U.S. Navy and U.S. Air Force conduct military operations throughout the Point Mugu Sea Range. The Naval Air Warfare Center Weapons Division (NAWCWDPNS) at Point Mugu conducts extensive operations in the Sea Range, as does the Vandenberg Air Force Base. The majority of NAWCWDPNS operations are conducted in the portion of the Sea Range that lies west and south of the Channel Islands and San Nicolas Island. Vandenberg Air Force Base also uses the Sea Range, particularly Military Warning Area W-532, for military operations (see Figure 4.15-1). Most of the Santa Barbara Channel lies outside the Sea Range. Consequently, the number and scope of military operations conducted in the Channel are limited relative to other portions of the Sea Range. Although the NAWCWDPNS is fully operational, there have been studies considering the base for the Base Realignment and Closure (BRAC) list. However, these rumors have occurred sporadically for over a decade, and NAWCWDPNS is expected to remain active for the foreseeable future (including both cumulative timeframes discussed in this document).

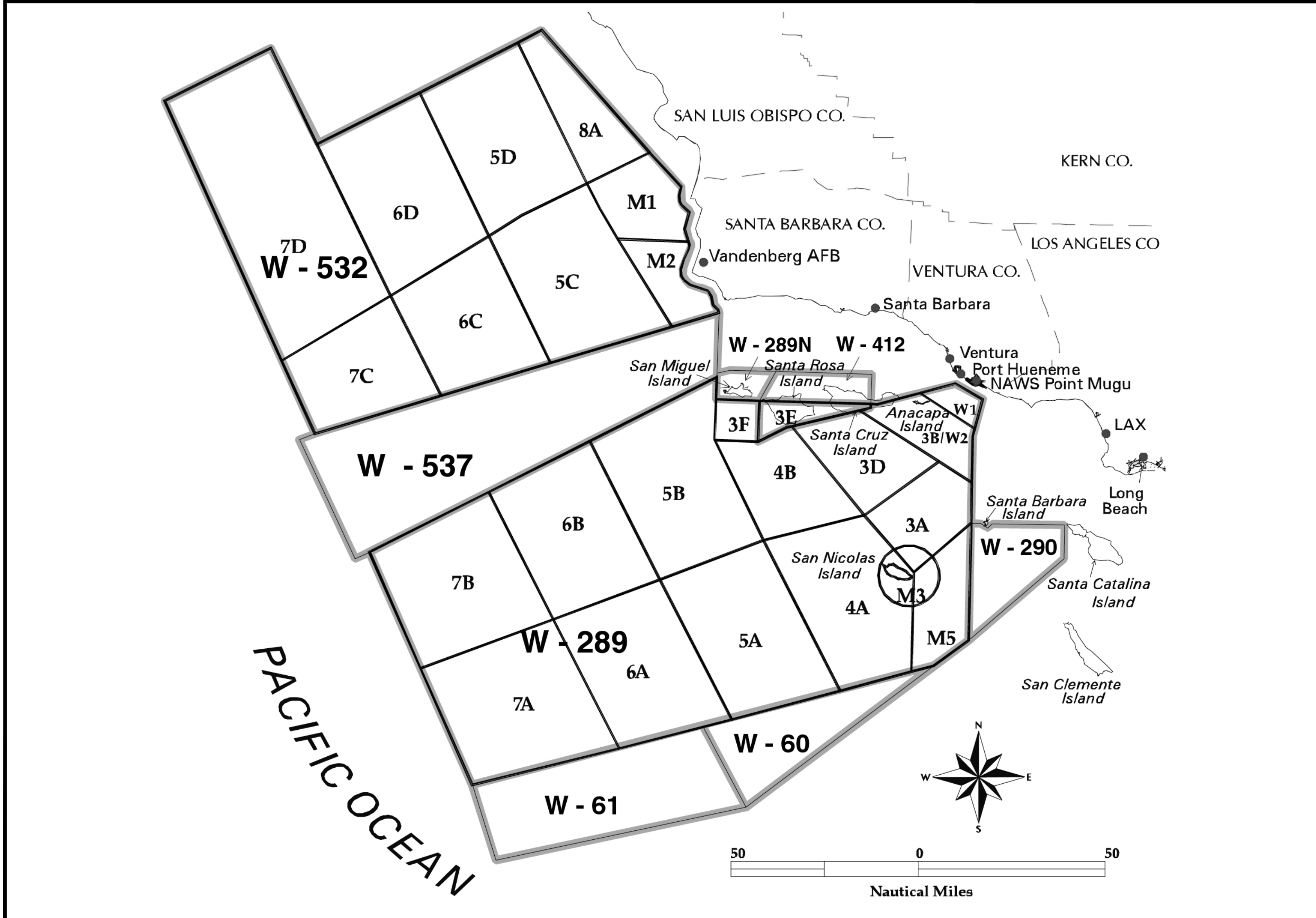
Other military uses of the coastal waters near the offshore actions include a military dumping site and a submarine transit lane. OCS Lease-P 0315, which is located in the Point Arguello Unit about 16 km (10 miles) west of Point Conception, is about 64 km (40 nm) east of military dumping area Charlie. Charlie was established in 1959 to handle explosives, toxic chemicals, munitions, and radioactive wastes. Dumping activities at this site were discontinued in 1971. Submarine Transit Lane Sierra Venus is located 42 km (26 nm) to the west of the OCS Lease-P0315.

4.15.2 Department of the Navy

Point Mugu Sea Range. The NAWCWDPNS Point Mugu Sea Range is a 93,240 km^2 (36,000 mi^2) area of ocean and controlled airspace, roughly 322 km (200 nm) long (north to south) and extending west into the Pacific Ocean from its nearest point at the mainland coast (5 km [3 nm] at Ventura County) out to approximately 290 km (180 nm) offshore (see Figure 4.15-1). The Sea Range includes San Nicolas Island and portions of the northern Channel Islands. The Navy primarily uses the Sea Range to test guided missiles and other weapons systems. The Navy has been conducting activities on the Sea Range for over 50 years.

The Point Mugu Sea Range currently supports five general categories of tests to evaluate sea, land, and air weapons systems:

- Air-to-air tests,
- Air-to-surface tests,
- Surface-to-air tests,
- Surface-to-surface tests, and
- Subsurface-to-surface tests.



Source: MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 4.14-1)

Figure 4.15-1. Point Mugu Sea Range

The Sea Range also supports three general categories of training including:

- Fleet training exercises (FLEETEXs),
- Small-scale amphibious warfare training, and
- Special warfare training.

In addition to the current test and training operations conducted on the Sea Range, NAWCWDPNS Point Mugu proposes to accommodate Theater Missile Defense (TMD) test and training activities and an increase in the current level of both FLEETEXs and special warfare training. The Navy is planning to modernize facilities at Point Mugu and San Nicolas Island to increase the Sea Range's capability to support existing and future operations.

The Navy prepared a Final Environmental Impact Statement/Overseas Environmental Impact Statement (EIS/OEIS) in July 2000 for the Point Mugu Sea Range that compared baseline military activities with the proposal to expand military operations (U.S. Navy, 2002). Table 4.15-1 shows the baseline level of military activity and the increased levels that would result from the proposed military action. The Final EIS/OEIS determined there would be no significant environmental impacts associated with the proposed military activities and that no significant cumulative impacts would occur from military operations and other non-military activities, including offshore oil and gas operations. Alex Stone, Sea Range Environmental Coordinator for the U.S. Navy, verifies that there are no additional sea range activities that could interfere with or be affected by the proposed action(s) (Alex Stone, 2004, pers. comm.). On February 14, 2001, the California Coastal Commission (CCC) concurred with the Navy's consistency determination that the proposed activities were fully consistent, to the maximum extent practicable, with the enforceable policies of the California Coastal Management Program (CCC, 2001, as cited in MMS, 2001).

Table 4.15-1. Baseline Military Plus Proposed Sea Range Activities (annual)

Category	Aircraft Sorties	Ships and Boats	Missiles Fired and Ordinance Deployed	Target Launched
Operations baseline	3,934	799	351	300
Proposed new activity				
Theater Missile Defense	89		20	17
Additional FLEETEX	57	18	34	33
Additional Special Warfare	4	32	0	0
Total new activity	**150**	**161**	**54**	**50**
Total	**4,084**	**960**	**405**	

Naval Facilities Engineering Service Center. The Naval Engineering Service Center (NFESC) is located in Port Hueneme, California. The NFESC conducts various military activities in the action area. The activities are described in a programmatic NEPA document prepared by NFESC in 1994 (U.S. Navy, 1994, as cited in MMS, 2001). The activities include:

- Mechanical load testing of cranes, A-frames and other equipment onboard vessels and piers,
- Deployment and testing of fiber optic cables,
- Oceanographic surveys,
- Geotechnical surveys to determine sediment and geologic conditions,
- Testing of ship and equipment moorings,
- Remotely Operated Vehicle (ROV) surveys,
- Sinking and re-floating of equipment, and

- Diving operations to test tools and equipment.

The activities are conducted in the Santa Barbara Channel and the Point Mugu Sea Range. The programmatic document concluded the activities had no significant impact on the navigable waters of the United States, the coastal zone, any endangered or threatened species or their critical habitat, and would not interfere with the regulations set forth by other local, State, or Federal agencies.

Naval Surface Warfare Engineering Facility. The Surface Warfare Engineering Facility (SWEF) is located at the Naval Construction Battalion Center in Port Hueneme, California. The SWEF is a component of the Port Hueneme Division Naval Surface Warfare Center. During testing, the SWEF functions like a ship on land. It is used for testing shipboard systems to accomplish the following objectives:

- Investigate engineering solutions for existing systems,
- Provide training for military and civilian personnel, and
- Evaluate self-defense systems without requiring installation aboard ships or equipping a laboratory at sea.

Aircraft used by SWEF to test radar detection and tracking capabilities fly from, to, and/or through the Sea Range and use its range operations and air controllers to assist in detecting aircraft. NAWCWDPNS Point Mugu schedules and controls all aircraft operations.

The Navy published an Environmental Assessment (EA) and issued a Finding of No Significant Impact (FONSI) on June 22, 2000, which addressed current operations and proposed implementation of the Virtual Test Capability at SWEF (U.S. Navy, 2000, as cited in MMS, 2001).

Naval Construction Battalion Center. The Naval Construction Battalion Center (CBC) is located in Port Hueneme, California. The CBC is tasked with the construction, maintenance, repair, and inspection of ocean facilities including waterfront structures, submarine cables, pipelines, and tracking ranges. CBC operations are conducted in all oceans. The CBC, which was officially established in 1942, has been conducting operations for over 60 years.

4.15.3 Department of the Air Force

Vandenberg Air Force Base. The Vandenberg Air Force Base (VAFB) occupies approximately 39,822 ha (98,400 acres) on the south-central coast of California, about 80 km (50 miles) northwest of Santa Barbara (see Figure 4.15-1). As headquarters for the 30th Space Wing, the Air Force's primary missions at VAFB are to launch and track satellites in space and to test and evaluate strategic intercontinental ballistic missile (ICBM) systems. There are also several tenant users of the base, the primary being the National Aeronautic and Space Administration (NASA) Space Shuttle Program. Commercial space launches are also conducted on the base.

The VAFB's military history dates back to 1941, when it served as an Army training facility. With the advent of the missile age in the 1950s, a large portion of the base was transferred to the Air Force as a missile launch and training base. The first missile launched from VAFB in 1958. Through February of 2000, 1,790 orbital and ballistic missiles had been launched from the base.

The following description of operations at VAFB was excerpted from the Final EIS/OEIS for the Point Mugu Sea Range, and other NEPA document prepared for selected military activities. While much of this discussion originated in the Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County Draft EIS (2001, as cited in MMS, 2001), Walter Schobel, Chief of Airspace and Offshore Management at VAFB confirms that the Air Force's use of offshore areas in the vicinity of the proposed action has not changed since publication of the Draft EIS in June of 2001 (Tatiana's personal communication). He also noted that the existing lease stipulations (see below) and Memorandum of

Understanding between the military and Department of the Interior have been effective in limiting the impacts of oil exploration on military operations and vice versa.

30th Space Wing Operations. The 30th Space Wing conducts west-coast space and missile launch operations using a variety of launch vehicles, including the Minuteman III, Peacekeeper, Titan II, and Titan IV. To achieve a polar launch (i.e., a polar orbit), a southerly launch trajectory is required. To achieve an equatorial launch, a western launch is required. Since these missiles affect the scheduling of other operations on the Sea Range, NAWCWDPNS Point Mugu provides tracking support, back-up command destruct capabilities, and scheduling support for all west-bound launches.

Airspace overlying the Sea Range includes both Warning Areas and Restricted Areas. There are eight Warning Areas that comprise the majority of airspace over the Sea Range: W-289, W-289N, W-290, W-412, W-532, W-537, W-60, and W-61 (see Figure 4.15-1). Warning Areas are designated airspace for military activities that are in international airspace but are open to all aircraft. The Warning Areas are active on an intermittent basis and activated by NAWCWDPNS Point Mugu in coordination with the Federal Aviation Administration (FAA). Restricted Areas are airspace over U.S. land and territorial waters the military uses to exclude non-authorized aircraft and to contain hazardous military activities. The Restricted Areas on the Sea Range are over San Nicolas Island, the Point Mugu airfield, and nearshore waters adjacent to the airfield.

The NAWCWDPNS Point Mugu and VAFB have developed a comprehensive safety program to ensure that aircraft and vessels are kept clear of safety hazard zones and potential impact areas. The program includes detailed agency coordination and public notification procedures that include Notices to Airmen and Mariners.

The safety program has contributed to an impressive safety record for military operations in the Point Mugu Sea Range. During the 50-year operational history of the Navy in the Sea Range, there have been no accidents involving non-participants (U.S. Navy, 2002).

Proposed Evolved Expendable Launch Vehicle Program. Currently, VAFB launches a variety of launch vehicles from a number of launch sites. The U.S. Air Force (USAF) is considering participation in the continued development and deployment of Evolved Expendable Launch Vehicle (EELV) systems to replace current Atlas IIA, Delta II, Titan II, and Titan IVB launch systems. An EIS has been prepared to address this proposal (USAF, 1998, as cited in MMS, 2001). The EIS concluded that the proposed action would not represent a noticeable change from current and past VAFB activities. The proposed EELV launches would be conducted at the same azimuth altitudes as are typical of VAFB operations.

Commercial Space Launch Program. In addition to military and other government launches, VAFB also launches commercial space vehicles. The number of commercial launches generally ranges from four to ten per year.

F-22 Low-Level Supersonic Over-Water Testing. The USAF is also planning to test the F-22's ability to perform low-level flight maneuvers at supersonic speeds and to determine what, if any, maintenance concerns result from testing in an ocean environment. The proposed action is to conduct up to an average of 24 low-level supersonic sorties per year over open ocean areas within the Point Mugu Sea Range and in adjacent airspace off the coast of California. Flight tests would involve use of one F-22 aircraft, an F-15 or F-16 as a chase aircraft, and tanker aircraft for aerial refueling. The USAF prepared an EA to address potential impacts of the proposed action (USAF, 2000, as cited in MMS, 2001). The USAF issued a FONSI on February 2, 2000, stating that noise from these activities would not have significant impacts on marine mammals or other animals because noise levels would be within the range of those produced by existing aircraft using the Point Mugu Sea Range. The FONSI also stated that cumulative impacts of this action on the Sea Range would not be significant because the F-22 over-flights would not result in a perceptible increase in noise levels on the range.

4.15.4 Impacts of Past and Present Pacific OCS Activities

Military operations have been conducted in the Point Mugu Sea Range for more than 50 years. During the 50-year operational history of the military in the Sea Range, there have been no accidents involving oil and gas related operations or other parties (U.S. Navy, 2002).

Oil and gas exploration and development activities on the Pacific OCS began in the late 1960s (Galloway, 1997, as cited in MMS, 2001). Currently, 23 oil and gas platforms are located on the Pacific OCS. The platforms were constructed between 1967 and 1989. Four of the platforms (Harvest, Hermosa, Hidalgo, and Irene) are located in the Santa Maria Basin and within Military Warning Area W-532. The four Santa Maria Basin platforms were installed in 1985 and 1986. Offshore oil and gas activities that could have a cumulative impact on military operations include geological and geophysical surveys, exploration drilling, platform construction, development and production, decommissioning, and oil spills. To reduce potential conflicts between oil and gas and military operations, military stipulations have been attached to all of the leases. The stipulations control vessel and aircraft traffic in designated areas, include hold harmless conditions and requirements, and reserve the right of the U.S. Government to suspend offshore operations temporarily for national security reasons. To further reduce potential hazards to offshore personnel, the MMS Pacific OCS Region has required offshore operators conducting operations in Military Warning Areas to develop Evacuation and Sheltering Plans for each offshore facility, including platforms, semi-submersibles, jack-ups, and ships. No military operations have been delayed, disrupted, or cancelled due to offshore oil and gas activity. In addition, there have been no accidents (vessel/aircraft collisions, deaths, or serious injuries) involving oil and gas activities and military operations on the Sea Range since the initiation of exploration and development activities in the Santa Maria Basin more than 30 years ago.

In summary, the military and the oil and gas industry have been sharing use of the Sea Range for more than 30 years. Military and oil and gas operations have been able to successfully coexist due in large part to the effective policies and procedures that have been developed to minimize the potential for space use conflicts.

5.1 Introduction

This section provides an analysis of hypothetical post-suspension activities during the period 2006 through 2030. The analysis in this section 5 focuses on hypothetical exploration and development scenarios that may occur following the expiration of the suspensions. The activities described in this chapter and possible environmental consequences therefrom do not derive from the requested suspensions, but result instead from hypothetical post-suspension exploration and development scenarios that remain independent from the suspensions. The entire analysis at this time necessarily remains somewhat speculative because, at the pre-suspension stage, the level of exploration and development that will actually be proposed remains uncertain. Nonetheless, the agency has used its best judgment relying on current information in developing a hypothetical exploration and development scenario involving all of the undeveloped leases, from which environmental consequences have been projected. It should be emphasized that this hypothetical scenario does not represent a proposed agency action at this time and may or may not occur upon the expiration of the suspensions. Any actual exploration and development proposals would be analyzed with greater accuracy in the future in connection with specific industry applications to conduct exploration and development activities.

This chapter builds on the description of the affected environment provided in Section 4. The structure of the analysis of the environmental consequences of the post-suspension activities describes the impact-producing factors (IPFs), and defines the criteria employed for high, moderate, low, and negligible impacts for each resource category. The impacts are analyzed for all the projects combined with and without development of the undeveloped Units and Lease OCS-P 0409, followed by those potential impacts associated with each separate Unit or Lease, if that level of analysis is appropriate or relevant for the issue area. Each resource/issue-specific analysis includes in its conclusions a table summarizing the impacts associated with development of each of the undeveloped Units and Lease OCS-P 0409 under the hypothetical scenario. As indicated above, it is possible that not all of the resources will be fully developed. Under such circumstances certain impacts would be proportionally diminished.

Section 5.2 describes the activities that could occur during the post-suspension period under the hypothetical exploration and development scenario. The effects of the post-suspension activities from such a scenario and related cumulative activities are considered and discussed by resource/ issue area in Sections 5.3 to 5.15.

5.2 Potentially Foreseeable Post-Suspension Investigation, Exploration and Development Activities

The basis for the cumulative effects analyses considers the aggregate of all the effects of all activities and the contribution of the post-suspension investigation, exploration and development activities. The effects of the other activities in the study area (past, present, and within the foreseeable future) are evaluated, and the likely effects of the post-suspension activities are overlaid to provide a clear understanding of the contribution of the post-suspension activities to the whole.

Identified off- and on-shore potentially foreseeable activities in the study area include on-going Pacific OCS and State Tidelands oil and gas development operations, on- and off-shore modifications and/or reconfigurations to some of these operations, decommissioning, onshore remediation and restoration efforts, fiber optic/telecommunications projects, Liquefied Natural Gas (LNG) projects, desalination projects, crude oil tankering, commercial fishing and mariculture activities, expansion of the Channel Islands National Marine Sanctuary boundary, existing and planned military operations, and onshore residential and commercial development. Activities associated with these projects may affect on- or off-shore resources, and sometimes both, depending on their location, construction requirements, and long-term operation. Potentially foreseeable activities identified for the study area are presented in Appendix I of this document.

This section identifies additional impact producing factors (IPFs) that are associated with the potential development of the undeveloped leases and any potential future development activity of leases. Developing, producing, and transporting hydrocarbon resources that could be developed require a complex and interrelated series of operations.

5.2.1 Impact Producing Factors of the Post-Suspension Phase

Table 5.2-1 shows the magnitudes of the IPFs that are projected to occur in the various offshore/onshore areas from the potential development of the undeveloped leases in the study area under a hypothetical development scenario. These quantities are expressed as the total amount generated during the post-suspension period, defined as 2006 through 2030.

Table 5.2-1. Summary of Activities Projected for Existing and Future Pacific OCS and State Leases (2006 through 2030).

Activity	Future Activity on Currently Producing OCS Leases/Facilities	Future Activity on Existing State Facilities	Hypothetical Activity on Undeveloped Leases	Total
Wells drilled	83	0	225	300
Platforms installed	0	0	4	4
Miles of pipelines installed	0	0	112	112
Platforms removed	23	9	4	36
Crew and supply boat trips	122,416	105,542	13,000	240,958
Helicopter trips	50,264	13,260	31,275	94,799

The projects assessed in this section include Federal Pacific OCS oil and gas projects, State Tidelands oil and gas projects, and other energy and non-energy activities. All of the projects described are located in the vicinity offshore Santa Barbara County, Ventura County, San Luis Obispo and Los Angeles County. It should be noted that information on many of these projects is limited because they are in the preliminary stages of development. Appendix I presents a listing of cumulative projects identified and factored into the cumulative analysis for this section.

The list below presents the types of projects and activities considered for this cumulative impacts analysis:

- Geological and geophysical surveys
- Shallow hazards surveys
- Subsurface investigation and testing
- Exploration and delineation drilling
- Development and production activities (includes the installation of jackets, topsides, pipelines, and drilling. Production activities include bringing the oil and gas to the surface, handling of oil and gas on the platform and sending the oil and gas to shore)
- Vessel and helicopter support activities
- Produced water handling
- Site characterization surveys for OCS development
- Extended reach drilling
- Platform and pipeline installation and abandonment
- Oil spills
- Crude oil tankering
- Fiber optic data transmission cable installation
- State tidelands projects
- Spill remediation
- Point and nonpoint source discharges
- Commercial fishing activities
- Military operations and commercial space launches

Activities that could occur on currently developed or undeveloped leases are described below (Section 5.2.2).

5.2.2 Anticipated Future Activities on Existing Leases

Section 4 describes past and present offshore oil and gas activities in State and Federal waters. Production on existing State and Federal offshore facilities peaked in approximately 1969 and 1995, respectively, and it is assumed that production will continue to decline. Appendix I provides a listing of anticipated oil and gas activities on existing leases in both State and Federal waters. The following is a brief summary of the anticipated future oil and gas activities that were considered in this cumulative analysis.

Ongoing Operations

Additional production from new wells would slow the decline of production and is expected to occur over the life of the existing facilities. No new production wells are expected on State Platforms with the exception of Platform Holly. Discharge volumes are expected to be at or below the levels identified in Table 4.1-8. Helicopter and vessel support is assumed to be at or below the levels identified in Table 4.1-7.

Operational impacts associated with the development and production of oil and gas resources from these existing facilities have been fully analyzed, mitigated and permitted by applicable Federal, State, and local authorities.

The risk of an oil spill from the existing Pacific OCS facilities has previously been individually and cumulatively analyzed and reviewed. Oil spill response planning as required by MMS has been implemented and is currently in place. Oil spill prevention and response efforts offshore California are coordinated between the MMS and the California Office of Spill Prevention and Response (OSPR). Among other measures, this coordination provides for the sharing of technical expertise in pollution prevention, response equipment inspections, spill exercises, and other related areas of offshore operations and safety.

There are no scheduled or anticipated oil and gas lease sales scheduled or anticipated in Federal or State waters. Therefore, with no new leasing, once the development of the undeveloped leases occurs, no additional new production platforms would be installed.

Periodic Inspections

All platforms and pipelines installed in the Pacific OCS Region are inspected periodically in accordance with applicable regulations and regional Notice to Lessees and Operators. Inspections for platforms include, but are not limited to, drilling equipment, safety systems, pollution prevention equipment, production equipment, workover and completion equipment, visual, cathodic protection, magnetic particle, or ultrasonic testing.

Routine inspections of pipelines include visual (diver and/or remotely operated vehicle), side scan sonar (SSS), and high resolution internal surveys. Pipeline SSS surveys must be conducted at least once every six years.

Future Well Drilling

Section 4 of this EID provides past and present offshore oil and gas activities in State and Federal waters. As referenced above, Table 5.2-2 shows the number of wells expected to drilled by field from existing Pacific OCS platforms.

Table 5.2-2. Federal Offshore Oil and Gas Wells Expected to be Drilled from Existing Platforms into Currently Producing Fields.

<table>
<tr><th>Platform</th><th>Operator</th><th>Location of Nearest Landfall</th><th>Field</th><th>Anticipated Number of Wells Drilled through 2030</th></tr>
<tr><td>Gail</td><td>Venoco</td><td>Port Hueneme</td><td>Sockeye</td><td>13</td></tr>
<tr><td>Grace</td><td>Venoco</td><td rowspan="2">Mandalay</td><td rowspan="2">Santa Clara</td><td>5 to 8</td></tr>
<tr><td>Gilda</td><td>PXP</td><td>5</td></tr>
<tr><td>Gina</td><td>PXP</td><td>Port Hueneme</td><td>Hueneme</td><td>2</td></tr>
<tr><td>Hermosa</td><td rowspan="3">Arguello, Inc.</td><td rowspan="3">Point Arguello</td><td rowspan="2">Point Arguello</td><td rowspan="2">5</td></tr>
<tr><td>Harvest</td></tr>
<tr><td>Hidalgo</td><td>Rocky Point*</td><td>6</td></tr>
<tr><td>Habitat</td><td>PXP</td><td>Carpinteria</td><td>Pitas Point</td><td>4</td></tr>
<tr><td>Hillhouse</td><td rowspan="4">PXP</td><td rowspan="4">Summerland</td><td rowspan="4">Dos Cuadras</td><td rowspan="4">10</td></tr>
<tr><td>A</td></tr>
<tr><td>B</td></tr>
<tr><td>C</td></tr>
<tr><td>Henry</td><td>PXP</td><td>Carpinteria</td><td>Offshore Carpinteria</td><td>2</td></tr>
<tr><td>Hogan</td><td rowspan="2">POOLLC</td><td rowspan="2">Carpinteria</td><td rowspan="2">Offshore Carpinteria</td><td rowspan="2">10</td></tr>
<tr><td>Houchin</td></tr>
<tr><td>Heritage</td><td rowspan="4">ExxonMobil</td><td rowspan="4">Gaviota</td><td>Sacate</td><td>6</td></tr>
<tr><td>Heritage</td><td>Pescado</td><td>0</td></tr>
<tr><td>Harmony</td><td rowspan="2">Hondo</td><td rowspan="2">10</td></tr>
<tr><td>Hondo</td></tr>
<tr><td>Irene</td><td>PXP</td><td>Point Pedernales</td><td>Point Pedernales</td><td>2</td></tr>
</table>

Decommissioning

Over the next 24 years (2006–2030) all existing oil and gas platforms in Federal and State waters are expected to be removed as outlined in Table 5.2-3.

Table 5.2-3. Platform Decommissioning Scenarios.

Platforms	Time Period	Project Duration/ Scheduling	Vessel Spread*	Disposal Site
South Coast (Los Angeles/Orange County)				
4 Pacific OCS Platforms: Eureka, Ellen, Elly, Edith 3 State Tidelands Platforms: Emmy, Eva, Esther	Decommissioning could occur between 2010 and 2015	230 days	Vessel Spread B	Long Beach, CA
Eastern Santa Barbara Channel (Ventura and Santa Barbara Counties)				
9 Pacific OCS Platforms: Hogan, Houchin, A, B, C, Gina, Gilda, Henry, Hillhouse	Decommissioning could occur between 2010 and 2015	200 days	Vessel Spread A	Long Beach, CA
Santa Barbara Channel and Southern Santa Maria Basin (Santa Barbara County)				
7 Pacific OCS Platforms: Gail, Grace, Hermosa, Harvest, Hidalgo, Irene, Habitat 1 State Tidelands Platform: Holly	Decommissioning could occur between 2020 and 2025 (Platform Habitat is projected to be decommissioned between 2012 and 2017, and Platform Irene could be decommissioned between 2015 and 2020 without the Tranquillon Ridge Project and between 2025 and 2030 with the Tranquillon Ridge Project).	400 days	Vessel Spread B	Portland, OR
Western Santa Barbara Channel (Santa Barbara County)				
3 Pacific OCS Platforms: Hondo, Harmony, Heritage	Decommissioning could occur between 2020 and 2025	270 days	Vessel Spread C	Portland, OR
Northern/Southern Santa Maria Basin and Gato Canyon (Santa Barbara County)				
4 Pacific OCS Platforms (to be constructed)	Decommissioning could occur between 2040 and 2050	250 days	Vessel Spread B	Portland, OR

* Vessel Spread scenarios as are follows:
Vessel Spread A: For platforms in water depths between 50 and 100 feet. One (1) heavy lift vessel (HLV) (400 ton lift capability); one (1) anchor handling tug; one (1) support vessel; three (3) cargo barges; two (2) tug boats; and, support craft (crew boats, supply boats and helicopter).
Vessel Spread B: For platforms in water depths between 200 and 700 feet. One (1) heavy lift vessel (HLV) (400 ton lift capability); one (1) anchor handling tug; one (1) support vessel; six (6) cargo barges; four (4) tug boats; and, support craft (crew boats, supply boats and helicopter).
Vessel Spread C: For platforms in water depths at 700 feet or more. One (1) heavy lift vessel (HLV) (400 ton lift capability); one (1) anchor handling tug; one (1) support vessel; ten (10) cargo barges; ten (10) tug boats; and, support craft (crew boats, supply boats and helicopter [use at current levels]).
Source: MMS, 2001

Some decommissioning has already occurred. For example, the Offshore Storage and Treatment Vessel and Single Anchor Leg Mooring was removed from the Santa Ynez Unit in Federal waters in 1994 and Platforms Hazel, Heidi, Hilda, and Hope were removed from State waters in 1996.

For the purposes of the cumulative analysis, the following assumptions were made:

- Platforms would be decommissioned in groups of three to nine based on age, size, geographic location, and heavy lift vessel (HLV) lifting capability.
- Platform decommissioning projects would be phased and occur in the following chronological sequence: (1) South Coast; (2) Eastern Santa Barbara Channel; (3) Western Santa Barbara Channel and Southern Santa Maria Basin; (4) Western Santa Barbara Channel; (5) Southern Santa Maria Basin; and (6) Northern/Southern Santa Maria Basin and Gato Canyon (see Table 5.2-3).
- HLV's spreads would be mobilized from the Gulf of Mexico, North Sea, or Asia. No more than one HLV would be operating at a time. Decommissioning of platforms would be phased to minimize environmental impacts. Associated onshore processing facilities would be decommissioned immediately after the offshore component of the project has been completed.

Crude Oil Tankering

Oil spills resulting from vessel collisions and other marine transportation-related accidents have the potential to cause significant impacts on the marine, coastal, and human environments, and contribute to cumulative environmental impacts. Marine transportation of Alaskan and foreign-import oil occurs offshore California. In 2000, 877 oil tankers visited the ports of Los Angeles/Long Beach and El Segundo. Of these tankers, 192 were United States flagged oil tankers and 685 were foreign flagged oil tankers (MMS, 2001).

Since 1989, California refineries have received about half of Alaska's total production. If this trend remains unchanged, supply volumes from Alaska to California would decline by 61 percent from current levels over an estimated 20-year period. Although it is possible that Alaska production could increase with the opening of new areas for development, no decisions have yet been made. In 1998, the foreign component of California's oil supply represented 16 percent of total supply – triple the amount in 1992 (MMS, 2001).

California refineries receive about half of their total oil supplies by marine tankers. As California petroleum product demand increases and in-State crude oil supplies decline, marine tanker deliveries will increase. Based on the CEC estimates, the rate of import growth varies between two to three percent per year, while the total demand increases at one percent per year.

The CEC (CEC, 1999 as cited in MMS, 2001) estimates that import of 168 to 257 million more barrels per year are expected by 2017 based on a very gradual decline in California in-state supply. The volume of 168 million barrels translates into the equivalent of about 220 more oil tanker deliveries to California ports per year in 2017, based on the use of medium class size tankers (about 120,000 dead weight tons). The 257 million barrel estimate means 337 more tanker deliveries per year, about one per day.

5.2.3 Post-Suspension Activities on the Undeveloped Leases

After the suspension period, the undeveloped leases could have a limited amount of exploration activities, and possibly resource development. The following sections describe possible site characterization activities, as well as the hypothetical development scenario upon which the impact analysis (beginning in Section 5.3) is based.

5.2.3.1 Site Characterization Surveys and Exploration and Delineation Drilling for OCS Development

A Development and Production Plan (DPP) for a platform must include a complete site investigation program. The site investigation program generally consists of three major phases (30 CFR 250.909):

- Shallow hazard survey to obtain data to analyze seafloor and subsurface geologic and manmade hazards
- Geological survey to obtain data of a regional nature concerning the site
- Subsurface investigation and testing to obtain geotechnical data.

Shallow Hazard Surveys: A high-resolution or acoustic-profiling survey is required to obtain information on the conditions existing at and near the surface of the seafloor. A survey is required for proposed production platform sites and proposed pipeline routes. The Pacific OCS Region issues guidance in regional Notices to Lessees and Operators for survey strategies capable of detecting and evaluating hazardous conditions that may be in the vicinity of the proposed development site(s).

Shallow hazard surveys are high-resolution site surveys that are conducted to investigate the shallow subsurface for geohazards and soil conditions in relatively small areas. The geotechnical information collected during a shallow hazard survey is commonly used at the exploratory stage for initial site evaluation for drilling rig emplacement. Shallow hazard surveys are typically conducted by survey vessels that measure 37 to 47 m (121 to 154 ft) in length. A typical operation consists of a ship towing an air gun about 25 m (82 ft) behind the ship and a 600-meter (1,969-foot) streamer cable with a tail buoy. The ship travels at 3.0 to 3.5 knots (5.6 to 6.5 kilometers/hour), and the air gun is fired every 7 to 8 seconds. Geotechnical information is typically collected from the sea floor to a depth of 300 to 450 m (980 to 1,475 ft).

Geological Surveys. Background geological data is required to provide regional information that can affect the design and siting of a platform or route of a pipeline.

Subsurface Investigation and Testing. A detailed geotechnical evaluation for the platform's foundation is required. For pile supported platforms, such as those likely to be installed in the Pacific OCS Region, at least one borehole will be required with depth equal to the anticipated length of the pile plus a zone of influence. The regulations of 30 CFR 250.909 provide specific requirements for subsurface investigations and testing for platform installations.

In addition, the operator would be required to perform sufficient geological/geotechnical sampling and testing of foundation soils within the proposed pipeline corridor to thoroughly categorize foundation engineering conditions.

The MMS would review the results of the site investigation program prior to approving a proposed platform site or pipeline route. Based on the review, the operator may be required to verify hazards, archaeological resources, hard bottom resources, or sensitive habitats to ensure safety of personnel and equipment and protection or avoidance of archaeological resources, etc. This may require the use of equipment and techniques such as underwater video/photography, hydrocarbon sniffer surveys, diver inspection, current velocity measurements, additional seafloor sampling, and/or geologic age dating.

Delineation Drilling. Drilling of three delineation wells on the undeveloped leases from 2006-2009 would be required in order to define the extent of fields and to determine exact siting of platforms. Appendix K of this document provides a description of anticipated delineation drilling activities.

5.2.3.2 Hypothetical Development Scenario for Undeveloped Leases

This hypothetical scenario was originally developed for the purposes of the cumulative analysis addressed in the MMS's 2001 Draft EIS. This scenario has been modified since publication of the Draft EIS based on additional information provided to the MMS by the lessees of the undeveloped leases. The scenario is based on:

- Project Descriptions (PD's) provided by Unit Operators (Aera, Plains, Venoco, and Samedan) indicating: (1) where a production platform might be located; and (2) production destinations.
- Operator submitted Rocky Point PD and DPP's for Platforms Hermosa, Harvest, and Hidalgo.
- MMS resource estimates.
- Based on the above resource estimates, MMS estimates of platforms, pipelines, power cables, onshore facilities characteristics, and other information.
- MMS requirements for site investigation prior to installation of platforms and pipelines.
- MMS requirements for periodic inspections after installation of platforms and pipelines.

Resources from leases that are planned to be produced from existing platforms include:

- Rocky Point Unit, leases OCS-P 0452, 0453, Platforms Harvest, Hermosa, and Hidalgo.
- Sword Unit, leases OCS-P 0319, 0320, 0322, and 0323A, Platform Hermosa.
- Cavern Point Unit, leases OCS-P 0210 and 0527, Platform Gail.
- Bonito Unit, leases OCS-P 0443, 0445, 0446, 0449, 0450, 0499, 0500, Platforms Hidalgo

Resources from leases that are planned to be produced from four new Pacific OCS platforms include:

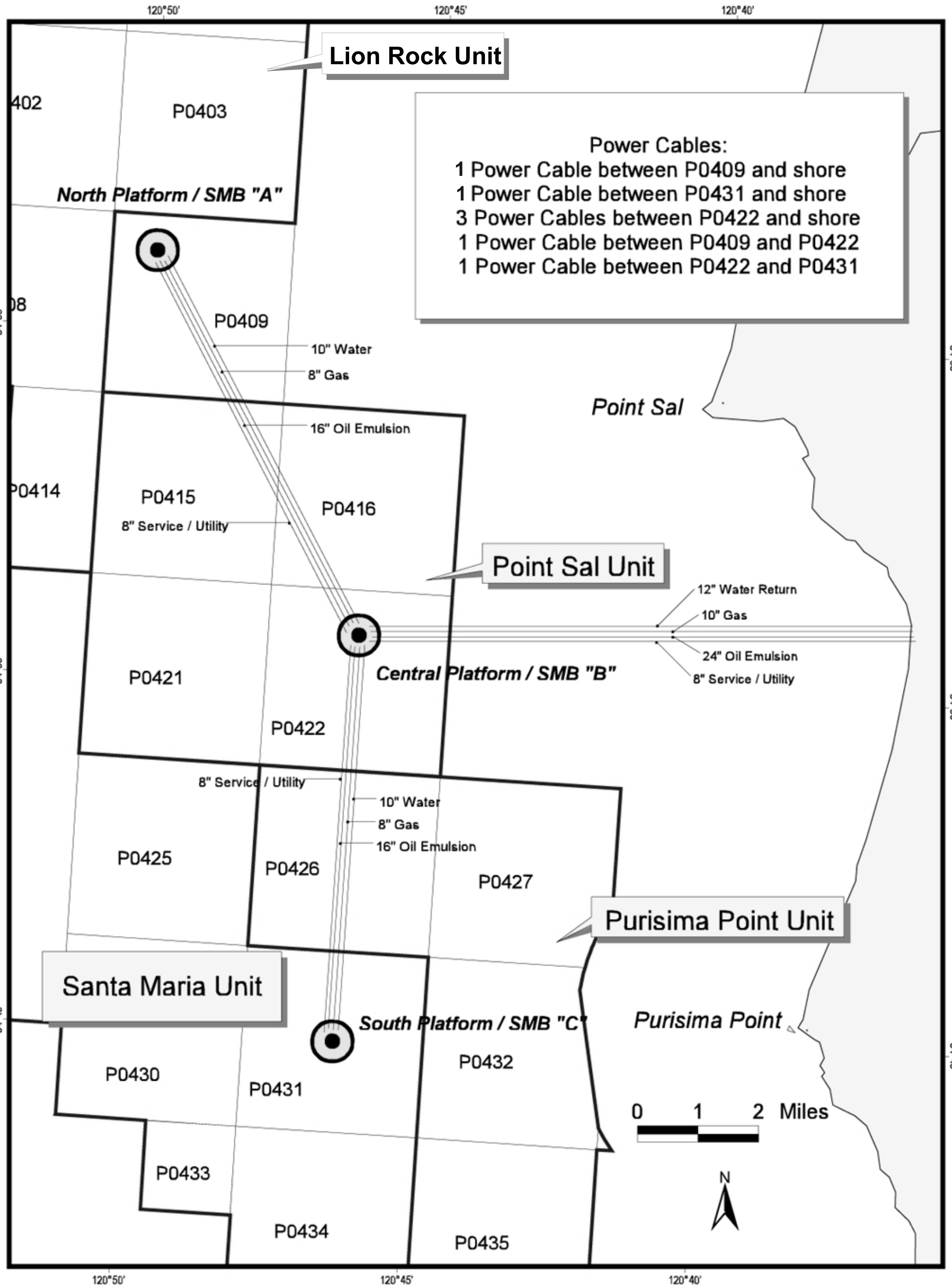
- Lease OCS-P 0409.
- Lion Rock Unit, leases OCS-P 0396, 0397, 0402, 0403, 0408, and 0414.
- Point Sal Unit, leases OCS-P 0415, 0416, 0421, and 0422.
- Purisima Point Unit, leases OCS-P 0426, 0427, 0432, and 0435.
- Santa Maria Unit, leases OCS-P 0425, 0430, 0431, 0433, and 0434.
- Gato Canyon Unit, leases OCS-P 0460 and 0464.

The operators estimate that four new platforms would be needed to develop the remaining undeveloped leases. Three platforms would develop the northern offshore Santa Maria Basin area (Figure 5.2-1) and one would develop the Gato Canyon Unit (Figure 5.2-2). Tables 5.2-4 and 5.2-5 provide scenario estimates of: (1) reserves, platforms, pipelines, power cables, and production; (2) dates and length of time for installation; (3) dates for production and decommissioning; (4) pipeline destination; and (5) support activities.

The undeveloped Santa Maria Basin Units and the Gato Canyon Unit could be produced with a minimum number of platforms due to advances in extended reach drilling technology. It is assumed in this scenario that all new platforms would be conventional fixed facilities similar to existing Pacific OCS facilities, and that development activities, processing, and other operations both offshore and onshore would be very similar to the existing facilities and operations. These platforms are assumed to have a number of curved conductors to reach remote targets using extended reach drilling technology. It is also assumed that gas and oil production would be sour, with limited offshore processing. All jackets would likely be fabricated overseas and require 12 to 14 months for fabrication and three months to loadout and transport to the installation location. Topside modules would most likely be fabricated in the Gulf of Mexico. Table 5.2-6 provides estimates of the number of days required for the phases of construction for each platform. Crew and supply boat operations would originate from Port Hueneme or the Carpinteria pier. Helicopter operations would originate from either the Santa Maria or the Santa Barbara airports.

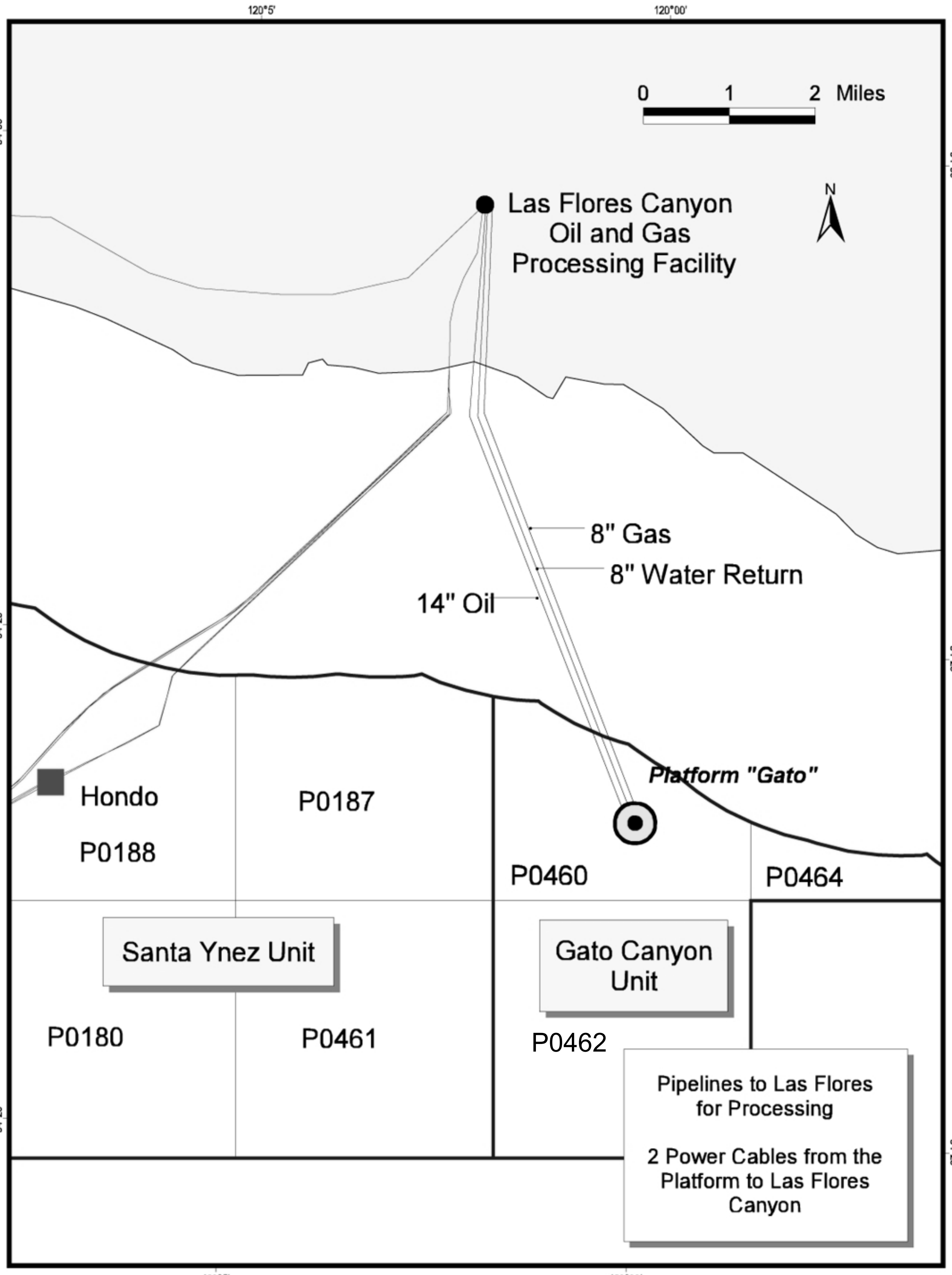
Peak production for new facilities may be lower than that attained by existing platforms in the Pacific Region. The new platforms would utilize extended reach wells, which, based on industry's current experience, take longer to drill. This situation causes the peak production to occur later in the life of the field, and stretches the peak out so that the actual peak production is lower.

With proper planning, the four potential platforms could be installed in a sequential order over a two- to three-year period using a single derrick barge (also called a Heavy Lift Vessel or Crane Vessel) rather than four separate derrick barges if the platforms were installed independently. A derrick barge with a 2,999-metric-ton (3,000-ton) capacity should be adequate to install all the platforms in the scenario described below. The timing of the operation, including first production for each facility, would require a coordinated effort for this to be possible. Using the information from the operators' PDs and development and production activity timelines, a coordinated effort of sharing a derrick barge appears possible. It is assumed all of the four new platforms would be electrified due to Santa Barbara Air Pollution Control District requirements. It is also assumed pipelines would be installed using a pipeline lay barge and the power cables would be installed using a power cable lay vessel. It should be possible for the pipelines and power cables to be installed in a sequential manner, sharing the pipeline and power cable lay vessels.



Source: MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 6.1.3-1)

Figure 5.2-1. Potential platform, pipeline, and power cable locations, northern Santa Maria Basin units.



Source: MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 6.1.3-2)

Figure 5.2-2. Potential platform, pipeline, and power cable locations, Gato Canyon Unit.

Table 5.2-4. Surface Structures, Pipelines and Power Cables, and Production Offshore Southern California, Hypothetical Development Scenarios for the Undeveloped Leases.

Platforms					Pipelines and Power Cables			Production				
										Peak Production: Oil and Gas		
Platform	Operator	Nearest Onshore Location or Nearest Landfall	Well Slots Production Wells Service Wells	Year Installed/ Commis-sioned	Size, Type, and Number	Year Installed/ Commis-sioned	Onshore Facility (pipeline destination)	Field	Date of First Production	Volume (bbl/day) (MCF/day)	Year	Reserves Expected to be Developed, by Field: Oil (MMbbl), Gas (Bcf)
OSMB A Northern	Aera	Pt. Sal and Purisima Pt.	60 45 6	2011	16" oil/water 8" gas 10" water return 8" service 2 power cables	2012–2013	To SMB Central B	Lion Rock, Pt. Sal	2013	35,000 10,500	2020	115 47
OSMB B Central			60 49 6	2010	24" oil/water 10" gas 12" water return 8" service 3 power cables		Casmalia	Pt. Sal and Purisim a Pt.	2012	32,000 6,400	2020	118 24
OSMB C Southern			60 46 6	2011	16" oil/water 8" gas 10" water return 8" service 2 power cables		To SMB Central	Santa Maria and Purisim a Pt.	2013	25,000 5,000	2020	90 18
Bonito (uses existing platform)	PXP	Pt. Arguello	N/A 7 2 N/A	Existing Platforms Hidalgo	See Table 4.1-5	See Table 4.1-5	Lompoc and/or Gaviota	Bonito and Electra	2009	11,000 5,500	2012	22 11
Rocky Point (uses existing platforms)	Arguello, Inc.	Pt. Arguello	N/A 12 0	Existing Platforms Hermosa and Hidalgo	See Table 4.1-5	See Table 4.1-5	Gaviota	Rocky Point*	2008	18,500 5,550*	2013	39 11.7*

Platforms					Pipelines and Power Cables			Production				
										Peak Production: Oil and Gas		
Platform	**Operator**	**Nearest Onshore Location or Nearest Landfall**	**Well Slots Production Wells Service Wells**	**Year Installed/ Commis-sioned**	**Size, Type, and Number**	**Year Installed/ Commis-sioned**	**Onshore Facility (pipeline destination)**	**Field**	**Date of First Production**	**Volume (bbl/day) (MCF/day)**	**Year**	**Reserves Expected to be Developed, by Field: Oil (MMbbl), Gas (Bcf)**
Sword (uses existing platform)	Samedan	Pt. Arguello	N/A 10 1	Existing Platform Hermosa	See Table 4.1-5	See Table 4.1-5	Gaviota	Sword	2007	12,500 3,125	2012	29 7.3
Gato Canyon		Naples Beach	28 20 4	2012	14" oil/water 8" gas 8" water return 2 power cables	2012	Las Flores Canyon	Gato Canyon	2012	22,500 13,500	2017	77 46
Cavern Point (uses existing platform)	Venoco	Anacapa Island	N/A 10 1	Existing Platform Gail	See Table 4.1-5	See Table 4.1-5	Carpinteria via Platform Grace	Cavern Point	2007	9,600 8,640	2010	22 20

* The Rocky Point field is already on production via wells drilled from existing platforms (Pt. Arguello) into the eastern half of Lease OCS-P0451. The reserve numbers and peak production (vol./day) reflect the entire field's development potential.

Assumption: 7/05 is the estimated date for the beginning of the suspensions.

Table 5.2-5. Surface Structures Offshore Southern California, Construction Timing, Production Support Activities, and Decommissioning Timing, Development Scenarios for the Undeveloped Leases.

Platforms			Construction	Production and Support Activities				Decommissioning
Platform Water Depth	Operator	Nearest Onshore Location or Nearest Landfall	Year to be Installed/ Commissioned	Field	Date of First Production	Helicopter Trips, Yearly Total	Crew and Supply Boat Trips, Yearly Total	Estimated Removal Date
SMB North 450 ft.	Aera	Pt. Sal and Purisima Pt.	2013	Lion Rock and Point Sal	2013	1,095	156	2027–2030
SMB Central 300 ft.			2012	Pt. Sal and Purisima Pt.	2012			
SMB South 700 ft.			2013	Santa Maria and Purisima Pt.	2013			
Bonito (existing Platform Hidalgo)	PXP	Pt. Arguello	Existing Platform Hidalgo	Bonito and Electra	2007	Existing rates for Arguello Platforms	Existing rates for Arguello Platforms	2015–2020
Rocky Point (existing Platforms Hermosa, Harvest, and Hidalgo)	Arguello	Pt. Arguello	Existing Platforms Hermosa, and Hidalgo	Rocky Point	2008	Existing rates for Arguello Platforms	Existing rates for Arguello Platforms	2015–2020
Sword (existing Platform Hermosa)	Samedan	Pt. Arguello	Existing Platform Hermosa	Sword	2007	Existing rates for Arguello Platforms	Existing rates for Arguello Platforms	2015–2020
Gato Canyon 560 ft.	Samedan	Naples Beach	2012	Gato Canyon	2012	156	364	2026–2030
Cavern Point (existing Platform Gail)	Venoco	Anacapa Island	Existing Platform Gail	Cavern Point	2007	Existing rates for Platform Gail	Existing rates for Platform Gail	2020–2025

Table 5.2-6. Estimates of the Number of Days Required for the Phases of Construction, Development Scenarios for the Undeveloped Leases

<table>
<tr><th>Platform</th><th>Launch Jacket</th><th>Drive Piles/ Set Topsides</th><th>Install Pipelines</th><th>Install Power Cables</th><th>Commissioning</th></tr>
<tr><td>Gato</td><td>1</td><td>153</td><td>93</td><td>63</td><td>214</td></tr>
<tr><td>SMB B</td><td>1</td><td>93</td><td rowspan="3">276</td><td rowspan="3">123</td><td>456</td></tr>
<tr><td>SMB A</td><td>1</td><td>121</td><td>335</td></tr>
<tr><td>SMB C</td><td>1</td><td>92</td><td>243</td></tr>
</table>

Development Scenarios by Area/Unit

Santa Maria Basin Development. Three platforms would be located in the northern offshore Santa Maria Basin (OSMB) area and would be used to recover reserves in the Lion Rock Unit, Purisima Point Unit, Point Sal Unit, Santa Maria Unit, and Lease OCS-P 0409 (see Figure 5.2-1). Platform names are used as follows:

- OSMB A is the northern offshore Santa Maria Basin platform located on Lease OCS-P 0409.
- OSMB B is the central offshore Santa Maria Basin platform located on Lease OCS-P 0422.
- OSMB C is the southern offshore Santa Maria Basin platform located on Lease OCS-P 0431.

OSMB A. Reservoirs from 6.44 km (4 mi) horizontally away could be reached from this platform using current drilling technology. The production from this platform would go by pipelines to OSMB B.

OSMB B. Reservoirs from 4.83 km (3 mi) to 6.44 km (4 mi) horizontally away could be reached from this platform using current drilling technology. The production from OSMB A and OSMB C would come by pipelines to this central platform and then to shore.

OSMB C. Reservoirs from 4.83 km (3 mi) to 6.44 km (4 mi) horizontally away could be reached from this platform using current drilling technology. The production from this platform would go by pipelines to OSMB B.

For the purposes of the hypothetical development scenario, the oil emulsion and gas would go to shore in separate pipelines for processing. The processing of the production would be mainly accomplished at the onshore facility. Because of the nature of the crude oil and its high viscosity, pipeline transport of the oil emulsion is predicated on having water content of at least 50 percent in the pipeline (known as "wet-flow" transport). We estimate that a 61 cm (24 inch oil emulsion and a 25 cm (10 inch) gas pipeline to the onshore processing facility will be adequate for this purpose.

The OSMB crude is highly viscous, API gravity 5-15 by industry standards, and requires special consideration to optimize transportation and refining. The optimum product of the OSMB crude has not been determined; refining options continue to be studied and evaluated. At this time, it cannot be definitively said which transportation method(s), such as pipelines, rail, truck, or a combination of all three, would be used to move the OSMB crude from the processing facility. As stated in the COOGER study, rail and truck transportation may be required due to viscosity and delivery limitations of pipelines (Dames & Moore, 2000).

The oil emulsion and gas would be sent to a processing facility located in the Casmalia area, similar to the Lompoc Oil and Gas Processing facility, where the oil and gas would be processed for further distribution through local pipelines. There is also the potential for a co-located asphalt facility. All oil would be sold. Some of the gas may be used offshore as fuel on the platforms for production operations. Gas may also be (1) re-injected at one or more of the OSMB platforms, (2) used at a co-located onshore co-generation facility and returned to the platforms as electrical power, or (3) sold to the gas utility. A combined processing, asphalt, and co-generation facility would be roughly twice the size of the Lompoc Oil and Gas Processing facility. Pipelines from the hypothetical processing facility would probably tie into the All American Pipeline system at an existing pump station.

The three platforms are assumed to be electrified with three power cables from shore to the central platform (OSMB B), one power cable each from shore to the OSMB A and OSMB C, and one power cable each between OSMB B and OSMB A, and OSMB B and OSMB C.

The pipelines from OSMB B would come onshore through a sandy shoreline associated with the Point. Sal and Lion Rock area south of an area covered by surface outcrops of the Monterey formation and north of the mouth of Shuman Creek. The pipeline would be placed in a half-mile-wide corridor from landfall to the Casmalia East site. The northern boundary runs due east to the Casmalia site. The southern boundary of the corridor runs along Pt. Sal Road and maintains a separation from the town of Casmalia, hillsides prone to landslides, and Shuman Creek.

The Santa Barbara County "North County Siting Study" (County of Santa Barbara, 2000) identifies constraints to the siting of new oil and gas processing facilities. The study identifies a number of potential sites and identifies two sites as a preferred location; Casmalia East or West. For purposes of this analysis, the Casmalia East site was chosen as the location of the onshore oil and gas processing facility.

Produced water would be treated at the oil and gas processing facility and then transported offshore by a 30 cm (12 inch) water return line to the OSMB B platform for offshore disposal or down-hole injection. There would also be 25.4 cm (10 inch) produced water pipelines between the platforms. Included are 20.3 cm (8 inch) service/utility pipelines between the platforms and between the OSMB B platform and shore for additional operational flexibility due to the nature of the heavy oil. A 40-by-0.8-kilometer (25-by-0.5-mi) corridor (four pipelines for a total of 161 km [100 mi]) that would be needed to complete the offshore portion of the OSMB project (Figure 5.2-1).

Bonito Unit Development. Development of the Bonito Unit would be undertaken from facilities associated with the Point Arguello Unit; oil and gas would be produced via extended reach drilling from Platform Hidalgo, passed through Platform Hermosa, and then sent to the Gaviota facility as described for development of the Rocky Point Unit, below.

Rocky Point Unit Development. The Rocky Point Unit includes Leases OCS-P 0452 and 0453 in the southern offshore Santa Maria Basin. Twelve development wells would be drilled from Platforms Hermosa and Hidalgo. The wells would be extended-reach wells with horizontal displacements of 4.6 to 6.4 km (2.5 to 3.5 mi). Drilling each well would require three to four months. The Rocky Point field is already on production via wells drilled from existing platforms (Pt. Arguello) into the eastern half of Lease OCS-P0451. The number of wells, reserve numbers, and peak production (vol./day) (Table 5.2-4) reflect the entire field's development potential.

Oil would be dehydrated and stabilized on the platforms, then sent to the Gaviota facility via the PAPCO pipeline. At Gaviota, the oil would be metered and heated, stored temporarily in the Gaviota Terminal Company storage tanks, then transported via the All-American Pipeline to various refining destinations.

Rocky Point gas would be sweetened on the platforms and (1) sent via pipeline for sale onshore, (2) used to generate electricity and heat for platform operations, (3) sent to shore to fuel the Gaviota co-generation units, or (4) injected into the Point Arguello Field, the Rocky Point Field, or both.

Sword Unit Development. The Sword Unit includes Leases OCS-P 0319, 0320, 0323, and 0323A. Samedan Oil Corporation is the unit operator. A portion of Lease OCS-P 0323 has been relinquished and the remaining lease was redesignated 0323A to reflect the change. Eleven development wells, 10 oil wells and 1 service well, would be drilled from Platform Hermosa, located on Lease OCS-P 0316. The wells would be extended-reach wells with horizontal displacements of 6.4 to 8.3 km (3.5 to 4.5 mi). Drilling each well would require three to four months.

Oil would be dehydrated and stabilized on the platforms, then sent to the Gaviota facility via the PAPCO pipeline. At Gaviota, the oil would be metered and heated, stored temporarily in the Gaviota Terminal Company storage tanks, then transported via the All-American Pipeline to various refining destinations.

Sword gas would be sweetened on Platform Hermosa and (1) sent via pipeline for sale onshore, (2) used to generate electricity and heat for platform operations, (3) sent to shore to fuel the Gaviota co-generation units, or (4) injected into the Point Arguello Field.

Gato Canyon Unit Development. Samedan Oil Corporation is the operator of the Gato Canyon Unit. One platform located on Lease OCS-P 0460 (Gato Canyon Unit) would be used to develop the Gato Canyon Unit area. Reservoirs up to 4.8 km (3 miles) horizontally away could be reached from this platform using current drilling technology. The production would be sent to shore via 3 new pipelines. A 35.5 cm (14 inch) oil pipeline, a 5.5 cm (8 inch) gas pipeline, and a 5.5 cm (8 inch) water return pipeline would be adequate. The three pipelines would be placed in an 8.8-by-0.8-kilometer (5.5-by-0.5-mi) corridor.

The oil and gas would be sent to the ExxonMobil operated facilities at Las Flores Canyon via new pipelines. The gas sent to shore would be sour. The pipelines would run from the platform, traversing State Lease PRC 2991.1 to landfall, through the existing Exxon SYU pipeline crossings and corridor. Production from the platform would be processed at Las Flores Canyon using existing capacity and the oil shipped in the All American Pipeline. The gas would be processed at the Exxon Gas Plant using existing capacity and sold to The Gas Company. The produced water would be treated at the existing water treatment plant at Las Flores Canyon, transported offshore by pipeline, and disposed of at the Gato Canyon Unit platform. The platform is assumed to be electrified; two power cables would connect the platform to the existing co-generation facility located in Las Flores Canyon.

Cavern Point Unit Development. The Cavern Point Unit includes Leases OCS-P 0210 and 0527 north of Santa Rosa Island in the Santa Barbara Channel. Eleven development wells, ten oil wells and one service well, would be drilled from Platform Gail. The development wells would be extended-reach wells with horizontal displacements of 6.4 to 8.3 km (3.5 to 4.5 mi). Drilling each well would require three to four months. The service well would be drilled into the Sockeye Field and would not be an extended reach well.

The oil and gas would be sent to the Carpinteria onshore processing facility via Platform Grace using existing pipelines. The oil and gas would be processed using existing capacity. Produced water would be injected or disposed overboard at Platform Gail.

Pipeline and Power Cable Installation

This analysis assumes that the pipelines between platforms and platforms to the landfalls (Gato Canyon Unit and northern OSMB) are accomplished with a pipeline lay barge with one pass per pipeline. The number of passes with the lay barge is dependent on the number of pipelines between the inter-connecting platforms and the platform to shore pipelines. The number of pipelines between the platforms is three for Gato Canyon Unit to shore and four for OSMB development, both between the platforms and between OSMB B and shore. Installation of power cables would be completed by reeling the power cable off a power cable vessel into the same corridors as the pipelines. The power cables are connected to the platforms by pulling them through J-tubes at the platform.

5.3 Oil Spills, Risk, Movement, and Response

The purpose of this section is to provide the reader with an estimate for the potential risk of an oil spill from post-suspension phase activities. In addition, this section addresses movement of spilled oil on water, the sources of petroleum hydrocarbons to the sea, how oil changes when it is spilled on water, responses to oil spills, and how various organizations respond to oil spills and the tools they have available in the “response toolbox.”

5.3.1 Oil Sources, Behavior, and Spill Response

5.3.1.1 Sources of Oil

Sources of oil that could enter the marine environment include are defined in the National Research Council’s report, Oil in the Sea III, 2003 (MMS, 2001). That report identifies 19 sources of oil in the sea, divided into four major categories:

- Natural seeps (responsible for nearly half of estimated oil in the sea)
- Extraction of petroleum (platforms, atmospheric deposition, produced waters)
- Transportation of petroleum (pipeline spills, spills [from tank vessels], operational discharges (cargo oil), coastal facility spills, and atmospheric deposition [tanker VOC])
- Consumption of petroleum (land-based [river and runoff], recreational vessel discharge, spills (commercial vessels ≥100 GT), operational discharges (vessels ≥100 GT), operational discharges (vessels <100 GT), atmospheric deposition, and aircraft dumping.

Municipal and industrial wastes and urban runoff also contribute oil to the marine environment, likely in amounts much greater than those contributed by any other single source. The estimated amount of dissolved oil discharged into the OCS each year is a total of 85 tonnes (1 tonne = 1,000 kg). For comparison, the contribution of each of the following in the region is much greater than the OCS component: rivers and streams (nearly 124,000 tonnes), natural seeps (17,000 tonnes), and sewage discharges (20,000 tonnes) (Panzer and Wagner, 2004).

See Draft EIS, Appendix 5.2, Section 5.2.2 for further detail on these sources of hydrocarbons. For the purposes of this discussion, we will only examine the potential for oil spills from the sources listed above.

Oil and Gas Exploration Activities

Exploration activities include the mobilization and operations on the drilling vessel as well as support vessel operations. The two general potential sources for spills during exploration activities, include spills during drilling operations due to loss of well control and spills from other exploratory sources including those related to support vessels.

Technological innovations today have greatly lessened the risk from exploration drilling, including:

- Increased knowledge of geology and potential reservoirs from such methods as 3-D seismic surveys and improved data processing;
- Better ability to monitor wells using a plethora of downhole data while drilling is occurring; and
- Intensive training and drills by facility workers, resulting in a readiness and an instant responsiveness to unexpected events.

Spills During Drilling Due to Loss of Well Control. A total of 57 OCS Loss of Well Control incidents have occurred nationwide from 1992 through 2003. Of these, only 8 resulted in oil reaching water. The largest release was 350 bbl, which resulted from a hurricane that damaged the production platform, removing part of the wellhead. The total pollution from the 8 events was 650 bbl (as well as 806 bbl of synthetic drilling mud which occurred during deep-water drilling in the Gulf of Mexico when a riser accidentally disconnected). Thirty-four of the 57 events occurred during drilling, and 16 occurred during exploration operations. Three events occurred in the Pacific OCS Region, two as a result of workover operations and one during drilling operations. During one of these, in November 2000, approximately 1 gallon of oil was spilled (see the website: http://www.mms.gov/incidents/ blowouts.htm and Draft EIS Appendix 5.3 for additional information).

Spills from other exploratory sources including those related to support vessels. When only exploration activities are accessed in the MMS Pacific Region database, of 239 exploratory wells drilled from 1970 to present (all from MODUs), a total of 78 hydrocarbon spills occurred, spilling about 50 bbl of hydrocarbons. Most of the exploration drilling occurred during the 1980s; the last Pacific Region exploratory well was drilled in 1989.

Oil and Gas Development and Production Activities

In the Pacific OCS Region from 1970 through 2003, a total of 1,038 spill events resulted in 844 bbl of oil spilled from all sources related to development and production activities, while about 1.05 billion bbl of oil was produced. The largest spill from a Pacific Region facility since 1970 was 163 bbl from a pipeline from Platform Irene in 1997. As noted earlier, the 1969 event resulted in 80,900 bbl of oil spilled.

There are four potential phases in development and production activities during which spills could occur:

- Platform installation;
- Development drilling;
- Production and pipelines; and
- Decommissioning.

The MMS oil spill database does not contain information that allows differentiation between these phases and the frequency of spills and the type of hydrocarbon spilled. Therefore, the following discussion will address only generic possibilities and scenarios, rather than statistics.

Platform Installation. Spills of diesel, lube oil and hydraulic oil are the most common types of spills to occur during platform installation and construction activities since no wells would have been drilled at that time. These types of spills can occur during all phases (including exploration) of offshore oil and gas activities. Transfer of diesel fuel between the supply vessel and the derrick barge can result in small spills during the transfer process. Lube and hydraulic oils are stored in drums or cans. To our knowledge, no drums of these types have been dropped into the sea that resulted in the spillage of oil. However, lines and hoses have broken resulting in small spills of lube and hydraulic oils into the sea.

Development Drilling. During development drilling, the possibility of crude oil spills arises, only when oil is found. Loss of well control can and has happened. Of the 881 spills events that have occurred from 1970 to the late-1980's, when drilling activities was high in the Pacific Region, 1 in 25 events occurred during drilling or while equipment was in a well during other operations.

Most platforms have diesel fuel onboard even if they are powered from shore by electrical cable. The diesel is used for powering some cranes and for backup generators, especially for running fire water pumps in case of emergencies. Diesel is commonly stored in tanks in the pedestals that support the superstructure of the cranes. The use of hydraulic and lube oils continues in this phase since various pumps, compressors and other machinery require one or both of these.

Production and Pipelines. Hydrocarbon spills may occur during production of oil and gas and while the oil and gas is treated and pumped through pipelines to shore (all oil and gas is piped to shore in the Pacific OCS Region). By far, the most spills occur during this phase, as this phase lasts the longest, over 30 years in some cases. The largest spills that occurred on a facility during this phase were two-17 bbl spills. Otherwise, the 1997 Platform Irene pipeline spill of 163 bbl has been the largest in this phase (and largest overall since 1969).

Produced water discharges also contribute oil into the sea. This effluent is regulated under the National Pollutant Discharge Elimination System (NPDES) regulations under the Environmental Protection Agency purview. The effluent is treated prior to discharge by various means. The most common treatment system used involves a combination of heat, chemicals (for example, emulsion breakers) and the use of mechanical forces (such as corrugated plates, bubbling air, etc.). Under normal operating and treatment circumstances, no slick will form on the ocean surface as from an oil spill. However, NPDES permits allow some dissolved components of oil to remain in the effluent; the current permit allows up to 29 ppm (monthly average) but no more than 42 ppm per day, so some oil is discharged into the sea from this effluent. See Section 4.6 for more detailed information on oil and grease in produced water discharges.

Decommissioning. The potential for oil spill from decommissioning activities is similar to those from platform installation. Since platform operations will cease, there is no chance for spills from oil wells. Thus, the greatest chance of spills from this phase would be due to the attendant vessels, including the derrick barge and the supply vessels.

Tankers, Barges and Other Shipping

Vessels that carry hydrocarbons, either as cargo or as fuel or both, ply the waters of the Study. The history of spills in the west coast from vessels is brief (USCG, 2000, as cited in MMS, 2001). Since the early 1970s, six vessels have spilled various types of oil, totaling about 9,000 bbl, within the study area (see Draft EIS Appendix 5.3 for additional detail).

Natural Seeps

At least 50 oil seepage areas exist between Point Arguello and Huntington Beach with at least 38 in the Santa Barbara Channel. Altogether, it is estimated that 40 to 670 bbl of oil per day seep into the sea in the Santa Barbara Channel with the most concentrated occurring near Coal Oil Point where about 25 to 400 bbl/day seep out (Hornafius, et al., 1999; Quigley, et al., 1999, as cited in MMS, 2001). Seepage areas are also known to exist from Point Arguello to Monterey.

Onshore Sources

Sources of oil that could enter rivers and, perhaps, the sea, include municipal and industrial waste and urban runoff, refineries, oil and gas production facilities, oil and gas processing facilities, and pipelines.

One refinery is located near the Santa Maria River in San Luis Obispo County while several others are located near the Los Angeles Harbor and sea shore near Los Angeles International Airport. To our knowledge, no spills from those refineries have entered either rivers or the sea.

Two separate, but related, production spills have occurred on the San Luis Obispo County coast. They are the Guadeloupe Dunes diluent spill and the Avila Beach oil spill. They are both under ground spills formed by both the diluent (diluent is a light hydrocarbon used to thin oil in formations to ease the pumping of the oil to the surface) and the oil seeping and contacting ground water, where it was transported further from the original spill site. The diluent spill was first noticed when hydrocarbons appeared in the surf zone. The source of the “spill” was traced to underground pools of diluent which had settled atop of ground water, then seeped downhill to the ocean. The Coast Guard, with Unocal and the State, developed a response to the situation, which is ongoing. Further searches revealed many such pools scattered about the oil field. The Avila Beach spill is another that is under ground. It was the result of long-term seepage of oil from tanks on the slopes above the town of Avila Beach. Again, Unocal was the responsible party and has undertaken the entire cost of the clean up action.

Oil and gas processing facilities are located mostly near the shore and some are located in canyons that also contain small seasonal streams. In some cases, much effort has been expended to prevent any spilled oil from reaching the sea where there is a potential for oil to spill into a small stream and hence into the sea.

Processing facilities range in oil-handling capability from large (for example, Exxon/Mobil's Los Flores Canyon), to medium (Plains' Mandalay Beach) to small (Pacific Offshore Operators' Rincon plant). All of these examples take wet oil from offshore, separate the water and dewater the gas, send the treated water back offshore for disposal, and ship the oil and gas into the local pipeline infrastructure. All are located on or near the shore, or in a canyon (in the Las Flores Canyon case). No oil spills from these facilities have been known to reach the sea or any nearby local stream which runs to the sea.

Pipelines are the primary way that oil is shipped both from offshore to onshore and from one place to another onshore. Since pipelines that run along the shore often cross small streams and some major rivers, the potential for a breakage and subsequent leakage into the stream or river exists. Examples are the 1997 Northridge earthquake which caused an ARCO pipeline to break in six places; a Unocal pipeline running from a tank farm in Avila Beach which broke and spilled oil which ran down a cliff into the shallow tidal waters; a Berry Petroleum pipeline break with oil flowing into a nearby agricultural drainage pond near McGrath State Beach.

5.3.1.2 Behavior and Weathering Processes: How Oil Changes When Spilled at Sea

When oil is spilled at sea it will normally break up and be dissipated and dispersed into the marine environment over time. This dissipation is a result of a number of chemical and physical processes and are collectively known as weathering. Some of the processes, like dispersion of the oil into the water, cause part of the oil to leave the sea surface, while others, like evaporation or the formation of water in oil emulsions, cause the oil that remains on the surface to become more persistent. The time dissipation takes depends on a series of factors, including the amount and type of oil spilled, the weather conditions and whether the oil stays at sea or is washed ashore. Physical properties such as the density, viscosity and pour point of the oil also affect the speed and the resulting form of the oil during these weathering processes.

There are eight main processes that cause oil to weather (ITOPF, 2001 as cited in MMS, 2001). They are: spreading, evaporation, dispersion, emulsion, dissolution, oxidation, sedimentation/sinking, and biodegradation. The processes of spreading, evaporation, dispersion, emulsification and dissolution are most important during the early stages of a spill whilst oxidation, sedimentation and biodegradation are more important later on and determine the ultimate fate of the oil (ITOPF, 2001; Fingas, 2000, as cited in MMS, 2001).

Tar Balls and Mats. Heavy oil residues, or tar balls, often remain after all the short-term weathering processes have occurred. These residues are normally made up of the least volatile components of the oil (MMS, 1996 as cited in MMS, 2001). Tarballs, which are often found on shorelines, and have a solid outer crust surrounding a softer, less weathered interior, are a typical example of this process. The process forms an outer protective coating of heavy compounds that results in the increased persistence of the oil as a whole (ITOPF, 2001 as cited in MMS, 2001). The oil may come from spills, but may also arise from natural seeps or from deliberate (but illegal) operational releases from ships during bilge-cleaning operations (Fingas, 2000 as cited in MMS, 2001). For additional information on sources of oil and weathering processes, see NRC (1985, as cited in MMS, 2001 and 2003).

5.3.1.3 Oil Spill Response

This very broad topic is summarized here and expanded in Draft EIS[1] Appendix 5.3. A typical response potentially involves many Federal, State, and local agencies, as well as the spiller of the oil (known as the Responsible Party, or RP) and various oil spill clean-up entities in the form of cooperatives and contractors. The volume of the oil normally determines the identity and number of entities involved in the response. As discussed above, this EID examines three different oil spill scenarios. They are:

- 50 to 1,000 bbl spill with a most-likely volume of 200 bbl or less;
- 2,000 bbl, assumed to occur from a pipeline; and
- A 22,800 bbl tanker spill.

The agencies that would always be involved in an oil spill response are the U.S. Coast Guard and the State of California's Office of Oil Spill Prevention and Response (OSPR, contained, administratively, within the Department of Fish and Game). The Coast Guard, the State, and the RP all constitute the Unified Command (UC), where all information and all decisions are made regarding spill response strategy and day-to-day planning. MMS's responsibilities are summarized below and given in more detail in Draft EIS[1] Appendix 5.3.

Other agencies and private organizations that might participate in a response (depending on size and location) could include the local county's Office of Emergency Services, Fire Department, Harbor Patrol, Department of Transportation's Office of Pipeline Safety, U.S. Park Service, Federal Emergency Management Agency, U.S. Fish and Wildlife Service, California Department of Fish and Game, and various contractors that would provide personnel, equipment, food and housing services, disposal of oily debris and hazardous materials, and other services.

Spill Response Plans

Planning for an oil spill response is essential to insure an effective, efficient and organized response. Oil spill response planning is conducted at four distinct levels: the National, Regional, Area, and the Facility/Vessel. The first three levels of response planning are conducted by government agencies charged with protecting the environment under the National Response System. The Area level of response planning includes input from both State and local government, as well as industry and other interested parties, while the facility response planning is conducted by the owner or operator of the oil and gas facility from which a spill could impact navigable waters (see Draft EIS Appendix 5.3 for additional detail on these levels of oil spill response planning).

A good example of a recently written OSRP was prepared by Padre and Associates (2001) (see MMS, 2001). This plan covers oil spill response in the eastern Santa Barbara Channel and Santa Maria Basin area. The plan was written in accordance with MMS regulation found at 30 CFR 254. The main text of the plan describes the typical response organization and actions to be taken by an oil and gas operator. Appendix A discusses the spill response equipment available in this area and its maintenance and inspection. Appendix C describes a worst case discharge scenario for this area, where the discharged oil may occur, the resources at risk and the response for this spill. Appendices D and E are plans for the use of dispersants and in-situ burning, respectively. These spill response technologies could be used if their used demonstrated that a net environmental benefit would result. This section also includes the approval

[1] Draft Delineation EIS, MMS 1999, referenced only as a source of information herein.

process for use of these technologies and procedures for their use. Appendix F discusses the spill response training and drills offshore personnel will undergo to prepare for a spill response.

Operator Response. Any operator's strategy for dealing with oil spills is to prevent their occurrence. Well-engineered facilities, good housekeeping practices, adequate equipment maintenance and adherence to proper operational procedures are diligently employed to reduce the likelihood of an oil spill to the lowest possible level. In the unlikely event that an oil spill occurs, response operations would be initiated immediately. Throughout all response operations, the highest priority would be placed upon personnel safety, in addition, environmental resource considerations would be taken into account in the selection of response techniques and equipment and in the conduct of response operations. The initial response to a spill at a site of delineation activities will be from onsite equipment stationed on dedicated spill response vessels at the drill site. Additional response resources for spills beyond the capabilities of the onsite equipment will be provided by the oil spill cooperative.

Notifications. Upon the spillage of oil, the operator's first concern is always the safety of the personnel at the site. Next, the RP begins to discern the cause of the spill and attempts to abate (shut off) the source. MMS personnel, when notified, would assist in this endeavor. While these initial actions are occurring, notifications to the U.S. Coast Guard's National Response Center and the State of California's Office of Emergency Services are made, along with several other agencies, including the State Lands Commission, the Coast Guard at Long Beach and Santa Barbara, OSPR and the Oiled Wildlife Care Network. Several other agencies would be notified, when time and if circumstances warrant (see Draft EIS Appendix 5.3). If the spill is from a platform or pipeline under MMS's jurisdiction, MMS would be included in the initial notification as noted above, and be on-scene as rapidly as possible. If the spill were from a tanker as described in the scenario above, the notifications would be substantially be the same, except for MMS and other agencies with no direct jurisdiction.

The second type of entity to be commonly notified would be the local oil spill cooperative. For the Santa Barbara Channel and Santa Maria Basin that would be Clean Seas, and for offshore Los Angeles, Clean Coastal Waters. These two co-ops have response equipment and contractors (including a fishing vessel-based organization, the Fisherman Oilspill Response Team). Other co-op type organizations that could contribute personnel and equipment include the Coast Guard's Pacific Strike Team, the oil industry's Marine Spill Response Corporation, and the National Response Corporation, another major independent contractor.

Equipment and Personnel Deployment. Once oil is in the water from either a platform or pipeline, equipment is deployed either directly from the spilling facility, or a co-op, or both. On-scene oversight is usually provided by a local co-op representative who, with the use of helicopter overflights, properly positions booms and vessels to most efficiently attack the thickest part of the oil slick.

Beach debris removal, wildlife capture and rehabilitation, and public concerns all are concerns the UC must address for any spill. A spill from a tanker, in addition to being very large, as compared to one from a platform or pipeline, would generally entail the mobilization of nearly all the resources discussed above and, potentially, others from other States and even countries. The Exxon Valdez spill was just such an event, and equipment from all over the world was eventually mobilized to Prince William Sound, Alaska.

Day-To-Day Spill Response. The emergency phase of a spill lasts until the major assets are in-place and working. The UC is formed and four sub-units are set-up: Finance, Logistics, Operations, and Planning. The general philosophy is to initially overreact to any incident, so depending on the size of the spill, more or less equipment and personnel would be added or released from the spill scene. Night-time and foggy operations can continue, but often on a more limited basis.

As a spill response continues, various auxiliary issued must be addressed. These include disposal of oily debris, recycling, disposal at sea of water separated from recovered oil, contaminated debris, sorbent use/reuse, petroleum-contaminated soil recycling and reuse, temporary storage, treatment of oily wastes, characterization of recovered material, transportation, hazardous waste, and nonhazardous wastes. All of these topics have their individual considerations that must be accounted for in any oil spill response. Additional information is given in Draft EIS Appendix 5.3

Equipment

Operators in the Pacific Region are required to keep sufficient equipment on or near the platform to enable them to initiate immediate containment activities. For a secondary level response, equipment at the platform is supplemented by equipment kept onshore and operated by oil spill cooperatives formed by the lessees and operators. For example, Clean Seas has pre-staged equipment located at Morro Bay, Avila Bay, Santa Barbara Harbor, the Carpinteria Yard, in the Ventura/Port Hueneme area, and at Point Mugu Navy Base. Various types of response equipment are stored at these locations. The three major cooperatives also have at least six dedicated ocean-going vessels with containment and recovery equipment for oil spill response.

If the Federal On-Site Coordinator (OSC) so requests, the Navy and the USCG can provide additional oil spill response equipment and personnel located at Stockton and at Hamilton Air Force Base in northern California. The Marine Spill Response Corporation (MSRC) is the primary industry supported spill response center for the California coast, with its west coast headquarters in Concord. Clean Coastal Waters Inc., the Southern California industry funded cooperative, merged with MSRC effective July 1, 2004. The merger with Clean Coastal Waters follows the previous merger with Clean Bay in Northern California effective January 1, 2004. MSRC now offers access to the resources of MSRC, Clean Bay and Clean Coastal Waters operating under MSRC's California Region (MSRC, 2004). MSRC also operates two dedicated Oil Spill Response Vessels OSRV's in the San Francisco Bay and four in the southern California.

Draft EIS Appendix 5.3 for details on the sources, amounts, and types of mechanical equipment available for oil spills within the study area.

MMS Responsibilities

MMS’s primary responsibilities, by law, are abatement of the initial spill and investigation of the cause. However, MMS believes that prevention of oil spills is much preferable to cleaning up spilled oil. This prevention strategy includes a regulatory scheme that requires the use of the best available and safest technologies at any facility, training standards for the operator’s personnel and a rigorous inspection program. This strategy ensures that industry operates well-engineered facilities, with good housekeeping practices, adequate equipment maintenance, and adherence to proper operational procedures to reduce the likelihood of an oil spill. For additional information on MMS’s responsibilities, see Draft EIS Appendix 5.3.

To ensure that a facility is prepared in the unlikely event that oil is spilled, the MMS has a comprehensive oil spill response exercise program in place. The program tests a facility operator’s response, as well as their knowledge and understanding of their individual OSRP. For planning purposes, the MMS adheres to the requirements of the USCG’s National Preparedness for Response Exercises Program. Facility operators must exercise their entire response plan at least once every 3 years (triennial exercise). To satisfy the triennial exercise requirement an owner or operator must conduct the following aspects of their response capability:

- Annual spill management tabletop exercise;

- Annual deployment exercise of spill response equipment staged at onshore locations;
- Annual notification exercise; and
- Semiannual deployment exercise of any response equipment which the owner or operator must maintain at the facility of dedicated vessels (MMS-initiated or actual spill responses can be used for credit for one of these exercises).

Alternative Response Technologies – Offshore

Dispersants. Dispersants are a class of spill-treating agents that, when applied to oil on water, form the oil into droplets which are driven into the top layer of water column (Fingas, 2001, as cited in MMS, 2001). Surface active agents (surfactants) are the key components of a chemical dispersant. These compounds contain both a water compatible and an oil compatible group. Because of this molecular structure, the surfactant locates at the oil-water interface, reduces the interfacial tension, and enabling the oil slick to break up into small oil droplets. Once the droplets are dispersed into the water column, they are subjected to natural processes such as spreading by currents and biodegradation (National Research Council (NRC), 1989; SL Ross, 2000, as cited in MMS, 2001) A number of papers have been written explaining how dispersants work (Fingas, 1988 and Fingas et al., 1997; 1995; 1993, as cited in MMS, 2001) and summarized in American Petroleum Institute (1999; 1997). Draft EIS Appendix 5.3 contains more information on the NRC (1989, as cited in MMS, 2001) study which asked two questions:

- Do dispersants do any good? (that is, are they effective?); and
- Do dispersants do any harm (that is, are they toxic?).

Effectiveness. “Dispersant effectiveness” is defined as a measure of how effective the application of dispersant might be on a targeted part of a slick. It is not to be confused with dispersant “operational efficiency” which relates to operational factors such as having sufficient stockpiles of chemicals, application platforms, and fast response capabilities. Also, “dispersant effectiveness” means the effectiveness of the dispersant under field conditions, rather than laboratory conditions. Unfortunately, there is little quantitative information on the effectiveness of dispersants when used in the field. This is because (1) there have been only a handful of open-ocean trials; and (2) there are no acceptable surface-sampling or remote sensing methods available for measuring the overall thickness or volume of a spill on the sea surface, and no acceptable methods for determining total volume of dispersed oil in the water column. Most quantitative information comes from a number of laboratory tests, which are poor simulators of dispersant-use in the field. The five most popular laboratory tests today (Swirling Flask, Labofina, IFP, MNS and Exdet; see Nordvik et al., 1993, as cited in MMS, 2001) have different designs and produce different results for identical dispersant/oil combinations. Although the results from any laboratory test can be useful in providing relative values of dispersant effectiveness between dispersant/oil combinations, they should not be trusted to predict absolute dispersant effectiveness values in the field.

A critical factor in the strategy of dispersant application is that the viscosity of the oil increases rapidly with weathering, which is a function of evaporation and emulsification (see Draft EIS Appendix 5.3 for additional information). When an oil is highly viscous the applied chemical may simply “roll off” the oil or does not penetrate and mix with the mass of oil. Because more viscous oil is more difficult to disperse, response within a few hours is generally essential to high effectiveness.

Two other critical factors to consider when applying dispersants are the type of oil and sea energies available. Both of these factors, in turn, affect how much dispersant is needed for any specific application. For example, assuming the same amount of dispersant is used in both low and high sea energy conditions, diesel and light crude oils will be dispersed at rates greater than 50 percent under any conditions. Medium crude oils, those that would disperse only under ideal conditions, need a greater amount of sea energy in order to show any significant dispersibility. Heavy oils, such as Intermediate Fuel Oil and Bunker C, do not disperse at a rate of greater than 10 percent under any circumstances (Fingas, 2001, as cited in MMS, 2001).

A study conducted by McAuliffe, et al. (1981) (see MMS, 2001) offshore southern California gives some "rules of thumb" regarding dispersant effectiveness. While some of these may appear to be obvious conclusions, they are nevertheless, important considerations when deciding how to attack an oil spill:

- Chemical dispersion is more effective than natural dispersion in relatively calm seas;
- Dispersant treatment by air is superior, in most cases, to dispersant treatment by boat;
- Weathered oil is not dispersed as effectively as fresh oil; and
- A dispersant that performed poorly in the laboratory also performed poorly in the field.

Toxicity. The toxicity of dispersants is the other issue of concern. The wreck of the Torrey Canyon, offshore England in 1967, was the first occasion where dispersants, or dispersant-like substances were used to address oil spills. Unfortunately, the materials used in that event were extremely toxic and affected the shoreline organisms and habitats more severely than did the oil alone. That experience gave the concept of using dispersants a somewhat undeserved reputation since the substances used during the Torrey Canyon incident were of the first generation toxic-type (NRC, 1989, as cited in MMS, 2001). Other early dispersants exhibited toxicities in the 5 to 50 mg/l LC50 range. Since then, the formulation of dispersants has evolved into carefully controlled combinations of lower-toxicity solvents with surfactants with LC50s ranging from 200 to 500 mg/l (Fingas, 2001, as cited in MMS, 2001).

Once an oil slick is dispersed, then what? In most places, oil slicks are subjected to surface currents, winds, and waves. If the oil is all or partially removed from the water surface, these factors that directly affect the movement and weathering of the oil, become detached from any changes in the characteristics of the oil. Subsurface currents then predominate. If the dispersed droplets are small enough they will have little buoyancy and will be carried away and diluted by normal ocean current and movement. One of the inputs to a decision regarding tradeoffs (discussed below) is where the oil might go if subsurface currents become the predominant influence on the plume of dispersed oil.

As with other Alternative Response Technologies (for example, in-situ burning) the decision to apply dispersants is a balancing of tradeoffs. Since dispersants are never 100 percent effective, any responder would have to ask if the process of apply dispersants is worth the costs (both environmental and economic) of attacking the spill by only mechanical means. A succinct summary of biological tradeoffs is from NRC (1989) (see MMS, 2001):

- In open waters, organisms on the surface will be less affected by dispersed oil than by an oil slick;
- Organisms in the water column, particularly the upper layers, could experience greater exposure to oil components if the oil was dispersed;
- In shallow water habitats with poor circulation, benthic organisms could be more immediately exposed to dispersed oil;
- Although some immediate biological effects of dispersed oil may be greater than for untreated oil, long-term effects on most habitats, such as mangroves, are less and the habitat recovers more quickly if the oil is dispersed before it reaches that area;
- Studies have shown that dispersed oil does not adhere as much as untreated oil to some organisms or habitats; and
- The application of dispersants after oil contacts some habitats, such as salt marshes, rocky shorelines, and sand and mud flats, is generally not effective and could do more harm than good.

A comprehensive discussion on the logistics of dispersant planning and application is beyond the scope of this discussion. However, some key factors that members of the Unified Command must consider in their decision-making process are:

- Availability of dispersant product;
- Characteristics of platforms (payload, pump rate, speed);
- Spill conditions (e.g., type of spill, behavior of the oil, distance offshore);
- Ability to identify thick oil areas and position spray equipment accordingly;
- Availability of effectiveness monitoring; and
- Weather and daylight hours.

In-Situ Burning. While mechanical removal is the preferred method, it is recognized that in-situ burning can be a viable option in conjunction with, or in lieu of, mechanical or other types of recovery. In-situ burning has been demonstrated to be a very useful response tool in open water conditions when used in conjunction with a fire resistant boom. In-situ burning greatly reduces the need for recovery, storage, transportation, and disposal of a large percentage of the spilled oil. Numerous burn tests have been done in the lab, in test tanks, and in the field (including one during the second day of the Exxon Valdez spill cleanup operation), which demonstrate the feasibility and effectiveness of this technique.

Currently, California does not permit the burning of oil within the State or on State waters. In-situ burning may be considered in waters beyond three miles of the shore, which are under Federal jurisdiction. The Federal OSC would need to obtain approval from the U.S. Environmental Protection Agency (EPA) representative to the Regional Response Team. In all cases, the State of California will be notified of the use of in-situ burning.

Preliminary laboratory testing has been conducted on the crude oil currently being produced from the Santa Barbara Channel and Santa Maria Basin Areas. The results of these tests indicate that the crude oil has a low percentage of volatile components that would cause difficulty to ignite the oil. Therefore, in-situ burning of discharged oil may not be an appropriate mitigation measure. Information on the equipment needed and the procedures that would be followed in preparation for in-situ burning are contained in Draft EIS Appendix 5.3 (MMS, 2001).

Other issues that must be included in any discussion on in-situ burning are efficiency and environmental effects. Burning efficiency is calculated as the difference between the percentage of residue left and the initial amount of oil and is largely a function of oil thickness within the fireproof boom. During the Exxon Valdez spill, a test burn using the 3M fire resistant boom was conducted 2 days following the spill. In this test, an estimated 357 to 714 bbl of North Slope crude oil were burned in approximately 75 minutes with an estimated efficiency of 98 percent. The volume elimination rate for this test using a single 500-foot boom was estimated to be between eight to 16 bbl per minute (Allen, 1990, as cited in MMS, 2001).

The primary objective of oil spill abatement and cleanup is to reduce the effect of spilled oil on the environment. The use of in-situ burning may be considered when the preferred techniques are judged to be inadequate and the environmental benefit of in-situ burning outweighs its adverse effects. Some critics of in-situ burning have raised questions about the effects of air pollution resulting from the process. Tests conducted by MMS, Environment Canada, and the American Petroleum Institute, to better quantify air quality data related to in-situ burn processes indicated that burn products reach safe levels within several kilometers of the burn site and that the eventual concentrations of particulates and associated pollutants are several orders of magnitude below acutely toxic levels. Additional research is needed to fully document these hazards and to develop methods to minimize these hazards.

On August 12, 1993, MMS, USCG, Canadian Coast Guard, and Environment Canada also co-sponsored a large-scale in-situ test burn off the coast of Newfoundland, Canada. Environment Canada published a preliminary report that included the following findings:

- Burning at sea is feasible and practical.
- The fireproof boom stood up throughout the tests, but more work is necessary for it to last longer. Sea motion combined with heat appears to have reduced the life of the boom (48 hours in test tanks). Total burn during the tests lasted 4 hours.
- Some observations from the burns did not correspond to previous test tank data. First, several effects, such as the rapid sea burns noted in test tanks, did not occur at sea. Second, burn rate calculations must more accurately account for the effects of wind. Even a small amount of wind (8 to 11 km/hr during the second burn) drove the oil far into the apex of the boom and thereby reduced the burning rate to about two-thirds of previous calculations.
- Burning outside of the fire-resistant boom occurred on about three occasions as a result of too much oil in the boom, but did not result in sheening. Either some form of containment occurred naturally, or the overflow was very viscous.

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Shoreline cleaning agents, bioremediation and no action are other options for oil spill responders. Each of these involves tradeoffs, has its own strengths and weaknesses, and has its particular role during the response to an oil spill. Draft EIS Appendix 5.3 contains additional detail on these tools.

5.3.2 Historical OCS Spill Data

A major environmental concern associated with offshore oil and gas activities is the potential for oil spills and the resulting effects on biological resources. The largest oil spill in the Pacific OCS Region occurred in 1969, when control was lost on a well on Platform A off Santa Barbara spilled an estimated 80,000 bbl into the Channel (Van Horn et al., 1988, as cited in MMS, 2001). A number of preventive measures have been initiated since that time, including stringent regulations covering OCS operational and environmental safety, a rigorous MMS inspection program in the Pacific Region, continuous evaluation and improvement in OCS facilities' oil spill response, and the development of a highly organized oil spill response structure (Bornholdt and Lear, 1997, as cited in MMS, 2001). No spill of this magnitude has occurred anywhere on the U.S. OCS since 1969, and these measures make a recurrence a highly unlikely event.

Table 5.3-1 lists the hydrocarbon spills that occurred in the Pacific OCS Region from OCS oil and gas activities from 1969 through 2003. During that period, 1,039 oil spills were recorded. The total volume of oil spilled in the Pacific OCS Region is dominated by the Santa Barbara spill. Since 1969, these spills have ranged in size from less than 1 to 163 bbl, for a total of approximately 844 barrels (bbl) For comparison, natural oil seeps at Coal Oil Point in the Santa Barbara Channel are estimated to discharge approximately 100 to 170 bbl of oil per day (Hornafius et al., 1999, as cited in MMS, 2001).

In the course of normal day-to-day platform operations, occasional accidental discharges of hydrocarbons may occur. Such accidents are typically limited to discharges of quantities of less than 1 bbl of crude oil. As shown in Table 5.3-1, 1,032 spills of less than 50 bbl (99 percent of the total) occurred on the Pacific OCS between 1975 and 2003, resulting in approximately 331 bbl of oil being discharged into the ocean. Due to the infrequency and small volumes of these accidental discharges, spills of less than 50 bbl are not considered to be a significant impact-producing agent for the majority of marine and coastal resources discussed in this document.

Table 5.3-1. Crude, Diesel, or Other Hydrocarbon Spills Recorded in the Pacific OCS Region for OCS Oil and Gas Activities, 1969–2003 (volumes in barrels)

Year	Less than or Equal to 1 bbl		Greater than 1 bbl, less than 50 bbl		Equal to or Greater than 50 bbl		Total	
	No.	Volume	No.	Volume	No.	Volume	No.	Volume
1969	0		0		2	80,900.0	2	80,900.0
1970	0		0		0		0	
1971	0		0		0		0	
1972	0		0		0		0	
1973	0		0		0		0	
1974	0		0		0		0	
1975	1	0.1	0		0		1	0.1
1976	3	1.1	1	2.0	0		4	3.1
1977	11	2.2	1	4.0	0		12	6.2
1978	4	1.2	0		0		4	1.2
1979	5	1.7	1	2.0	0		6	3.7
1980	11	4.9	2	7.0	0		13	11.9
1981	21	6.0	10	75.0	0		31	81.0
1982	24	3.2	1	3.0	0		25	6.2
1983	56	7.7	3	6.0	0		59	13.7
1984	65	4.7	3	36.0	0		68	40.7
1985	55	9.3	3	9.0	0		58	18.3
1986	39	5.5	3	12.0	0		42	17.5
1987	67	7.5	2	11.0	0		69	18.5
1988	47	3.7	1	2.0	0		48	5.7
1989	69	4.1	3	8.0	0		72	12.1
1990	43	3.6	0		1	100.0	44	103.6
1991	51	5.8	1	10.0	1	50.0	53	65.8
1992	39	1.2	0		0		39	1.2
1993	32	0.7	0		0		32	0.7
1994	18	0.4	2	33.0	1	50.0	21	83.4
1995	25	0.9	1	1.4	0		26	2.3
1996	39	0.9	1	5.0	1	150.0	41	155.9
1997	20	2.5	0		1	163.0	21	165.5
1998	29	1.0	0		0		29	1.0
1999	26	1.2	1	10.0	0		26	11.2
2000	36	0.9	0		0		36	0.9
2001	48	1.7	0		0		48	1.7
2002	55	1.3	1	9.0	0		56	10.3
2003	56	1.3	0		0		56	1.3
Totals	991	85.6	41	245.4	7	81,413.0	1,039	81,744.0*

*The 163 bbl spill in 1997 occurred in State waters.

Larger oil spills may occur from well loss of well control (if wells are free flowing), pipeline breaks, operational errors, or vessel-platform collisions. Only 5 of the 46 total spills (since 1969) of greater than 1 bbl measured 50 bbl or more in volume (Table 5.3-1); the largest of these was the 163 bbl Platform Irene pipeline spill in September 1997.

5.3.3 Estimated Spill Risk of Delineation Drilling

Proposed delineation drilling during post-suspension phase activities involves minimal risks of an oil spill. Oil spills during exploration or delineation drilling of wells from mobile drilling platforms are very rare events according to the MMS and U.S. Coast Guard data base. Wells drilled during the exploration and delineation phases of oil and gas activity tend to be drilled and plugged quickly with little exposure to the large volume of oil or gas processed through the well bores during production. In addition, special precautions are taken to stop the drilling at regular intervals to monitor well pressures at each production zone. The exploration and delineation well is plugged according to MMS regulations immediately after the well has been drilled and tested. The probability of one or more spills from delineation drilling has been calculated to be less than 0.05 percent (the lowest value calculated by MMS spill data). Therefore the risk of a spill is considered to be minimal and poses almost no risk to the marine environment. Spills during delineation drilling for these proposed projects are not considered further in the spill risk assessment.

5.3.4 Estimated Spill Risk from Potential Development Scenario

MMS has estimated the mean number of oil spills and probability of one or more spills for two spill size ranges — 50 to 999 bbl and greater than or equal to 1,000 bbl — that could occur as a result of potential cumulative actions in the region of the proposal (Tables 5.3-2 and 5.3-3). Based on a larger spill data set for the OCS (MMS, unpubl. data, as cited in MMS, 2001) and cumulative oil production figures, these estimated mean number of spills and the probability of one or more spills were calculated using the method of Anderson et al. (2000). In addition, Table 5.3-4 lists the estimated risks of spills 50 to 999 bbl and greater than or equal to 1,000 bbl for individual units and fields. Oil spill estimates are based on the estimated production of oil over the life of the proposed projects, with subsea pipeline transport of hydrocarbons to shore.

Table 5.3-2. Spill Risks, 50–999 Barrels.

	Estimated Mean Number of Spills: 50–999 bbls.**	Probability of One or More Spills (%)
Delineation Drilling Scenario (3 Delineation Wells) (2006-2009)	None	Less than 0.05
Cumulative w/o Hypothetical Scenario (2006-2009)		
• Existing Federal Oil and Gas Development	0.97	62.1
• Existing State Oil and Gas Development	0.25	23.2
• Hypothetical Federal (Rocky Pt, Cavern Pt., Sword) Oil and Gas Development	0.12	11.4
• Hypothetical State (Tranquillon Ridge) Oil and Gas Development	0.08	7.7
Total Risk (Less Tankering)	1.42	75.9
• Alaskan and Foreign Tankering (Crude Oil)	NA*	99
Cumulative w/o Undeveloped Leases (2006-2009)		
• Existing Federal Oil and Gas Development	2.96	94.9
• Existing State Oil and Gas Development	0.49	38.8
• Hypothetical State (Tranquillon Ridge) Oil and Gas Development	1.55	78.8
Total Risk (Less Tankering)	5.0	99
• Alaskan and Foreign Tankering (Crude Oil)*	NA	99
Hypothetical Development Scenario		
• Most Likely Case (0.558 bbl)	4.35	98.8
• High Case (0.660 bbl)	5.115	99

* Spills of less than 1,000 bbl not recorded in the database.
** Based on spill rate of 7.75 spills of 50 to 999 bbl per billion barrels handled (Anderson et al., 2000).

The mean size of an oil spill from Alaskan and foreign tankers is statistically larger than the mean spill size from a platform or pipeline. In the discussion of spill sizes below, the largest spill size analyzed (22,800 bbl) is from a hypothetical tanker spill and is based on the mean tanker spill size in the database.

Table 5.3-3. Spill Risks, Greater than 1,000 Barrels.*

	Estimated Mean Number of Spills: > 1,000 bbl.**	Probability of One or More Spills (%)
Delineation Drilling Scenario (3 Delineation Wells) (2006-2009)	None	Less than 0.05
Cumulative w/o Hypothetical Scenario		
• Existing Federal Oil and Gas Development	0.173	15.9
• Existing State Oil and Gas Development	0.044	4.4
• Hypothetical Federal (Rocky Pt, Cavern Pt., Sword) Oil and Gas Development	0.021	2.1
• Hypothetical State (Tranquillon Ridge) Oil and Gas Development	0.014	1.4
Total Risk (Less Tankering)	0.252	23.3
• Alaskan and Foreign Tankering (Crude Oil)	0.99	63.9
Cumulative w/o Undeveloped Units and Lease (2006-2009)		
• Existing Federal Oil and Gas Development	0.53	41.2
• Existing State Oil and Gas Development	0.087	8.4
• Hypothetical State (Tranquillon Ridge) Oil and Gas Development	0.276	24.2
Total Risk (less Tankering)	0.893	59.1
• Alaskan and Foreign Tankering (Crude Oil)	5.742	99
Hypothetical Development Scenario		
• Most Likely Case (0.558 bbl)	0.774	53.9
• High Case (0.660 bbl)	0.911	59.8

* Spills of less than 10,000 bbl or greater are a subset of spills of 1,000 bbl or greater.
** Based on spill rate of 1.38 spills greater than 1,000 bbl per billion barrels handled (Anderson et al., 2000).

5.3.4.1 Estimated Most Likely Spill Size

An effort also was made to estimate the most likely size of a spill under the hypothetical scenario that all of the undeveloped leases are developed. The MMS's U.S. Oil Spill Database (C. Anderson, unpubl. data as cited in MMS, 2001) includes Pacific and Gulf of Mexico OCS spills of greater than 1.5 bbl recorded between 1971 and 1999. The database contains platform and pipeline spills, but no barge or tanker spills. Of the 2,125 total spills in the database, 106 are in the range of 50 to 999 bbl. The mean volume of these spills is 158.6 bbl, and 75 percent (79) are of less than 200 bbl. More than 95 percent (101) are of less than 500 bbl. Given these data and the experience in the Pacific Region over the last 30 years and nationally over the past 15 years, it seems reasonable to assume that such a spill would probably be less than 200 bbl, and almost certainly less than 500 bbl in volume.

The most likely maximum size of a major oil spill from potential future development — the maximum most probable discharge — 2,000 bbl, is based on the volumes of oil in various pipelines and vessels (i.e., tanks and other containers on platforms) as described in the U.S. Coast Guard Area Contingency Plans for oil spill response (e.g., USCG, 1999) (see MMS, 2001). This is the maximum volume of oil calculated to be spilled from a break in the longest Point Arguello Unit pipeline, the Hermosa to shore pipeline (A. D. Little, 2001 as cited in MMS, 2001).

In addition to possible spills from oil and gas platforms and pipelines, spills can originate from Alaskan and foreign tankers and other shipping activities in the area. It is obvious from the estimated mean number of spills and the probability of one or more spills given in the tables above, that the greatest risk of an oil spill in the area comes form these tanker and shipping vessels. The mean (average) spill size derived from the U.S. Coast Guard database for accidents in U.S. Waters is 22,800 bbl for the period 1985–1999 and the median spill size is 5,600 bbl.

This analysis provides potential environmental effects of three sizes of spills based on the discussion above: 200 bbl, 2,000 bbl, and 22,800 bbl. These spill sizes correspond to the most likely spill size from the hypothetical and cumulative oil and gas activities; the maximum reasonably foreseeable spill size from the hypothetical and cumulative oil and gas activities; and the mean spill size for a tanker spill.

Table 5.3-4.
The Probability of an Oil Spill Contacting the Coastline for Various Spill Sizes and Length of Coastline Contacted

Spill Size (bbl)	Probability of Contacting a Length of Coastline (%)	Length of Coastline Contacted (km)
200	95	1.04
	75	2.45
	50	4.43
	25	8.01
	5	18.9
2000	95	2.84
	75	6.76
	50	12.3
	25	22.4
	5	52.5
22,800	95	8.87
	75	20.89
	50	37.84
	25	68.4
	5	161.4

The level of impacts from spills will depend on many factors, including the type, rate, and volume of oil spilled and the weather and oceanographic conditions at the time of the spill. These parameters would determine the quantity of oil that is dispersed into the water column; the degree of weathering, evaporation, and dispersion of the oil before it contacts a shoreline; the actual amount, concentration, and composition of the oil at the time of shoreline or habitat contact; and a measure of the toxicity of the oil. The estimate of the maximum reasonably foreseeable volume of an oil spill (2,000 bbl; see paragraph above) from oil and gas operations used in this analysis suggests that oil is unlikely to remain in the water (beyond dispersed, weathered tar balls) in appreciable amounts for more than ten days. Therefore, a ten-day oil-spill trajectory analysis was used to establish the primary geographic boundaries of this analysis. In addition, primary environmental impacts are based on an oil spill reaching a resource within ten days after the spill.

5.3.4.2 Estimate of Length of Affected Coastline

Estimating the length of coastline that may be affected by an oil spill is necessary to determine potential impacts by oil spills on resources considered in the EID. The following discussion provides information on the empirical methods used to determine this. Using the multiple regression equations developed by Glenn Ford (Ford, 1985; Ford and Bonnell, 1987, as cited in MMS, 2001), an attempt was made to estimate the length of coastline that might be contacted by spill sizes indicated in the section above.

The equation used is:

$$\log(\text{COAST}) = -0.8357 + 0.4525 \log(\text{VOL}) + 0.0128 (\text{LAT}) + ZS$$

where:

COAST is the length of coastline contacted in kilometers,
VOL is the spill volume in barrels,
LAT is the spill latitude and
Z is a correction factor applied to S the standard deviation of the residual variation.

This version of the equation explained 64.8 percent of the total variance. Inclusion of additional variables for wave height (WAVE), wind speed (WIND), or sea surface temperature (TEMP) did not significantly improve the fit of the equation. Ford (1985, as cited in MMS, 2001) felt that the variable LAT obtained at least some of its predictive power from its high intercorrelation with the WAVE, WIND, and TEMP variables. It should be noted that this model does not account for weathering, cleanup efforts, or any other complicating factors.

Example:

If VOL = 2,000 bbl and LAT = 34.5 (the approximate latitude of Point Conception), then:

$\log(COAST) = -0.8357 + 0.4525 \log(2{,}000) + 0.0128\ (34.5) = 1.09$

Hence, COAST = 12.3 kilometers. This represents the median length of coastline that spills of this volume would be expected to contact.

Using the same methodology, the maximum number of kilometers of coastline affected was estimated for three spill sizes and five levels of probability (Table 5.3-4):

Thus, for the 200 bbl spill, only 5 percent of the spills would be expected to contact more than about 18 km (11.2 miles) of shoreline, 25 percent more than 8 km (5 miles), and so on.

The estimates above for the length of shoreline that may be affected by a hypothetical oil spill are based on a statistical analysis (multiple linear regression of spill size, length of shore oiled, and various environmental factors) of historical spills. These estimates are used by EID analysts in conjunction with the results of the oil spill trajectory analyses (Section 5.3.4 below) and the probability of spills of three size categories to discuss the potential impacts to marine resources. In the case of the largest spill category, 22,800 bbl mean spill size from tankering, the length of coast-line and probability of shore contact may be overestimated. This is because oil tankers have voluntarily agreed to transit the coast at a minimum distance of 80.6 km (50 miles) for the past few years. Therefore, a spill from a tanker would most likely begin at a point distant from land. This is not reflected well in the existing data base of oil spills (thus biasing the shoreline length analyses) and probability of shoreline contact (because the oil spill trajectory analyses do not take into account oil weathering or other processes which act to reduce the amount of oil with time.)

5.3.5 Conditional Oil Spill Risk Analysis

The probabilities presented in this analysis are in the conditional context that assumes an oil spill has occurred for the cumulative impact analysis. For this analysis, we assume a 200 bbl oil spill to be the most likely case, and a 2,000 bbl spill to be the maximum most probable discharge. We then address the issue of resources impacted if either of these scenarios occurs. The three analyses described below provide estimates of oil spill trajectory and potential landfall. They include MMS's Oil Spill Risk Assessment (OSRA) model calculation, an analysis of 306 free-floating surface drifter trajectories deployed by the Scripps Institution of Oceanography (Scripps), and the National Oceanic and Atmospheric Administration's (NOAA) "General NOAA Oil Modeling Environment" (GNOME) oil spill model. These three analyses indicate a similar area of possible oil contact to the south. When the winds are relaxed for an extended period of time, the drifter data shows that oil can be transported north along the coast. Use of these three analyses is a conservative approach to identifying the possible area of oil contact for the Pacific OCS Region. The summary of results of this composite analysis is presented in this section. A more detailed presentation of the three separate analyses can be found in Draft EIS Appendix 5.2, Conditional Oil Spill Risk Analysis.

The MMS OSRA model analysis calculates numerous trajectories from pre-designated launch points by combining observed wind data with seasonally averaged ocean current fields and applying a local wind effect to estimate the movement of oil over the surface layer of the water. The seasonally averaged current fields were provided by Scripps Institution of Oceanography (Scripps) and are based on several years of current meter and free-floating drifter data. Shore-line segments are partitioned into their USGS Quad maps, and probabilities of oil spill landfall for each shoreline segment are calculated. Offshore boxes giving probabilities of oil spill intrusion into their defined region are presented as part of a more comprehensive regional OSRA model analysis contained in OCS Report MMS2000-057. Oil spill size or weathering (evaporated or dispersed) are not modeled in the OSRA analysis to allow for a maximum estimate of spill travel times and extent.

The free-floating surface drifters were designed to follow the surface current (top 1 meter of the water column) and not to track or mimic an oil spill. However, the drifter analysis provides good information on surface currents, which is one of the major components determining spill movement, by describing statistics on actual trajectories of free-floating surface drifters. When the winds are relaxed, or in areas where local winds do not dominate, drifter trajectories could mimic the movement of an oil spill. For example, the drifter trajectories indicate that when the winds are relaxed, oil could be transported north along the coast. A description of the surface drifters and their deployment strategy is found along with a more detailed presentation of comprehensive drifter analysis in Draft EIS Appendix 5.2, Conditional Oil Spill Risk Analysis, Appendix Subsection 5.2.3, Surface Drifter and GNOME Model Data and Analysis. The drifter analyses consists of analyses done specifically for the Lion Rock and Santa Ynez Units, and drifter analyses previously written for the Rocky Point and Cavern Point projects that apply well to the Point Arguello and Santa Clara Units, and Platform Hillhouse located in the northeastern Santa Barbara Channel. These latter drifter analyses are entitled: “Surface Drifter Analysis for the Rocky Point Unit Project Oil Spill Risk Assessment” and “Surface Drifter Analysis for the Cavern Point Unit Project Oil Spill Risk Assessment.” The drifter analyses completed for the Lion Rock and Santa Ynez Units were done for each of the three flow regimes characteristic of the Santa Barbara Channel-Santa Maria Basin (SBC-SMB) area. The free-floating drifter launch points are illustrated in Appendix J, Figure J-1. The drifter analyses previously written for the Rocky Point and Cavern Point projects were done according to seasonal months coinciding with those of the MMS OSRA model analysis performed for those same projects.

The GNOME analysis was run according to the environmental forcing and criteria for winds and currents described in Section 4.5, Physical Oceanography. Calculations were performed for 200 and 2,000 bbl spills at each of the nine launch points listed in Table 5.3-5. Over 180 GNOME model runs were conducted. As is the case for part of the drifter analysis, GNOME model results were generated for the three major flow regimes described in Section 4.5: Relaxation, Convergent, and Upwelling. Scripps provided synoptic current fields for the GNOME model that were derived by averaging surface current observations by dominant flow regime rather than over time, such as the seasonal averages. This means that the GNOME model output for each run gives trajectory results specific to one of the three characteristic flow regimes that occur in the SBC-SMB area. The synoptic current fields for these three flow regimes were based on five years of concurrent moored current data and free-floating drifter trajectories. Synoptic current fields, used by the GNOME model, for the relaxation, convergent, and upwelling current flow regimes are illustrated in EID Appendix J (Figures J-2 through J-4, respectively). Further description of these flow regimes can be found in Section 4.5. Results of GNOME model runs are given in terms of estimated barrels of oil beached, location of beaching, barrels floating, barrels weathered (evaporated or dispersed), or barrels moving out of the model domain. Runs scenarios are conducted for 200 and 2,000 bbl spills over 3 and 5 days. For these more detailed results, see Draft EIS Appendix 5.2, Conditional Oil Spill Risk Analysis.

Table 5.3-5. Comparison of Seasonal Months with the Frequency and Relative Dominance of the Three Characteristic Flow Regimes per Calendar Month

OSRA Season	Calendar Month	Dominant Flow Regime	Days of Continuous Current Data	Upwelling (%)	Convergent (%)	Relaxation (%)	Other (%)
Winter	December	Relaxation	146.5	9.22	34.30	49.32	7.17
Winter	January	Relaxation	155.0	30.16	26.13	37.42	6.29
Winter	February	Upwelling	141.0	51.77	26.06	19.15	3.01
Spring	March	Upwelling	154.5	53.07	33.98	2.43	10.52
Spring	April	Upwelling	150.0	86.00	8.83	2.67	2.50
Spring	May	Upwelling	155.0	47.74	32.10	14.68	5.50
Summer	June	Upwelling	150.0	44.67	32.83	17.33	5.17
Summer	July	Relaxation	155.0	22.42	32.10	32.90	12.58
Summer	August	Convergent	155.0	28.87	35.32	27.58	8,23
Fall	September	Relaxation	152.0	20.07	36.35	37.99	5.59
Fall	October	Convergent	155.0	19.03	41.94	32.74	6.29
Fall	November	Relaxation	135.0	5.37	33.52	53.15	7.96

Source: MMS, 2001

The OSRA model calculations, the GNOME model results, and the drifter data provide important insights concerning potential areas affected by an oil spill occurring in the area of proposed activity. The MMS OSRA model gives us seasonal results over a large domain covering the entire affected area. The GNOME model provides oil spill trajectory results based on current flow regimes strongly characteristic of the area. One of these flow regimes is very likely to be occurring during an actual spill event. So the GNOME model gives us trajectories based on calculations using mean wind and current fields established from analyzing six years of data, but over a smaller model domain. The drifter analysis is based on actual field observations and provides information on surface current variability to be considered with the computer-generated results calculated for the SBC-SMB area by the GNOME and OSRA models. Where the local winds do not dominate, the drifter data like the two models, provide reasonably good estimates of the locations of oil spill contacts over the entire affected area. This composite of the three analyses present a more complete picture of what may results from an oil spill event occurring in the area of proposed activity where the current and wind regimes are very complex.

5.3.6 Summary Discussion

As stated above, there is only a remote probability that an oil spill of 200 bbl or greater will occur for the delineation well projects included in the hypothetical development and production scenario. For the cumulative impact analysis, the geographical limits of the potentially affected area are defined by the farthest locations on the California coastline that could be contacted by oil within 10 days of a spill event occurring in the area of proposed developed activities. The drifter analysis indicates that during an extended period of relaxed winds, the extreme northern boundary of the potentially affected area is Pt. Lobos on the central California coast. The drifters also indicate that during this same wind condition, the northern limits of the area where contact with a spill is “most likely” is Ragged Point, which is further south on the central California coast. Both the drifter and OSRA model analyses indicate that both the extreme and “most likely” southern boundaries of the potentially affected area coincide at Santa Catalina Island in the Southern California Bight, and Palos Verdes on the Southern California mainland.

The analysis indicates that spilled oil from activity as far away as the eastern-most Unit in the SBC, the Santa Clara Unit, may contact the shoreline as far north as Point San Luis on the central California coast. The central California coast is found most likely to be contacted by oil from a spill occurring during a relaxation flow regime. The relaxation flow regime occurs 27 percent of the time during a year (Section 4.5, Physical Oceanography).

The composite analysis indicates that oil from a spill occurring anywhere in the SBC may contact either the SBC mainland, the Channel Islands, or both. The Channel Islands have the highest probability of contact, according to both models and the drifter data, with San Miguel and Santa Rosa Islands being the most likely islands contacted by spilled oil. The area between Goleta Point and Gaviota seems to be the most likely area along the SBC mainland to experience contact with spilled oil. Oil spill contact with SBC shorelines is most likely during a convergent or upwelling flow regime. These flow regimes occur 31 and 35 percent of the time respectively during the year. This is because there is strong re-circulation within the SBC associated with these two flow regimes. During a convergent flow regime, a spill in the northern area of the SBC tends to affect the western-most Islands: San Miguel and Santa Rosa a little more than the others. During an upwelling flow regime, a spill in the same area will tend to affect the easternmost islands: Santa Cruz and Anacapa a little more than their western neighbors. Purisima Point to Point Arguello on the central California coast and San Miguel and Santa Rosa Islands in the SBC are the most likely areas of shoreline contact with oil spilled in the Lions Rock Unit during an upwelling event.

Spills occurring in the eastern portion of the SBC (in the Santa Clara Unit) will likely move south and southeast out of the SBC by way of the eastern SBC entrance, and into the area offshore of the Santa Monica Bay-Redondo Beach coastlines in the Southern California Bight. The composite analysis indicates that at times Santa Catalina Island, and to a lesser extent San Nicolas Island, may be contacted by a spill occurring in the SBC. This is largely during the spring when the upwelling flow regime occurs most prominently. Additionally, the composite analysis indicates that a spill in the SBC could affect the southern California shoreline as far south as Palos Verdes. The probability that spilled oil will continue south of Santa Catalina Island within a 10-day time frame is remote.

5.4 Air Quality

5.4.1 Significance Criteria

The following significance criteria levels were used in the impact analysis for air quality to determine whether the post-suspension activity emissions could result in air quality impacts.

- **High.** Activities may cause or substantially contribute to a violation of Federal or State ambient air quality standards, and exceed threshold emission levels that have been determined to result in significant impacts to air quality. Impacts deemed to be high are considered to be significant.
- **Moderate.** Activities do not result in any violations of Federal or State ambient air standards, but do exceed threshold emission levels that have been determined to result in significant impacts to air quality. Impacts deemed to be moderate are considered significant, but are mitigable to an insignificant level.
- **Low.** Activities do not result in any violations of Federal or State ambient air standards, and do not exceed threshold emission levels that have been determined to result in significant impacts to air quality. Impacts deemed to be low are considered to be insignificant.

Assuming a hypothetical development and production of the undeveloped leases, the impact-producing activities associated with the post-suspension period could include well drilling and new development on the undeveloped leases, with the associated construction and production support activities. Short-term impacts could result from the well drilling, platform construction, pipeline construction, and power cable construction emission sources. Long-term impacts could result from the oil production and support activities (i.e., crew and supply boats) associated with developing the undeveloped leases.

Emissions resulting from the potential development of the undeveloped leases would have a potential to increase concentrations of air pollutants onshore. The primary regulated pollutants of concern in Santa Barbara County are oxides of nitrogen (NO_x) and reactive organic compounds (ROC). Both NO_x and ROC are considered precursors to ozone (O_3) formation, for which Santa Barbara County is presently in nonattainment. The major pollutant of concern associated with the development construction projects is NO_x due to the use of diesel fueled propulsion and construction/drilling equipment, while for production both NO_x and ROC emissions are pollutants of concern.

5.4.2 Impacts of a Post-Suspension Hypothetical Development Scenario

Air emissions expected from a hypothetical development and production scenario of the undeveloped leases following the expiration of the proposed suspensions would come from a variety of sources including well drilling, platform construction, pipeline construction, power cable construction, oil production, support activities (i.e., crew and supply boats), and potential oil spills. The full transfer of authority to SBCAPCD to regulate Pacific OCS air emissions pursuant to 40 CFR Part 55 transpired on September 4, 1994. Therefore, air quality permits from SBCAPCD would be required for any new platforms constructed as part of the future development, and could also include well drilling conducted at existing platforms assuming the emissions from the drilling equipment are greater than 25 tons per year (APCD Rule 202 F.6 - Drill Rig Engine Exemption). Therefore, the MODU delineation well drilling may require air quality permits if the annual emissions are greater then 25 tons/year.

Table 5.4-1 provides a summation of SBCAPCD threshold requirements as provided in Regulation VIII: New Source Review, relating to the application of Best Available Control Technology (BACT), air quality impact analysis (AQIA), and emission offsets.

Table 5.4-1. Santa Barbara County APCD BACT, AQIA, and Emission Offset Requirements

BACT Thresholds	• Nonattainment pollutants - 25 lbs/day (currently PM10, NOx and ROC). • Attainment pollutants – SOx – 120 lbs/day, CO – 550 lbs/day • 10 tons for any Hazardous Air Pollutant (HAP) or 25 tons for all (HAPs) – Toxic Best Available Control Technology (T-BACT)
Offset Thresholds	• Nonattainment pollutants – PM10 – 80 lbs/day (15 tons/year), ozone precursors NO_x and ROC – 55 lbs/day (10 tons/year)
AQIA Thresholds	• Nonattainment pollutants - PM10 – 80 lbs/day, NO_x and ROC – 120 lbs/day • Attainment pollutants – SO_x – 120 lbs/day, CO – 550 lbs/day

Source: SBCAPCD, 2004a
Note: Table lists thresholds that, when exceeded, triggers the specific requirement (i.e., BACT) and reflects current county attainment status.

5.4.2.1 Cumulative Impacts without Activities on the Undeveloped Leases on Air Quality

Major sources of cumulative air quality impacts include emissions from on-going oil and gas activities in Federal and State waters, offshore shipping and tankering operations, and other proposed onshore and offshore projects. Table 5.4-2 lists the 2000 and forecast 2020 Pacific OCS, Non-Pacific OCS, and total Santa Barbara annual planning emission inventory.

Table 5.4-2. Santa Barbara County 2000 Pacific OCS and Non-Pacific OCS Emissions Estimate (tons/day)

Source	2000		2020	
	ROC	NO_x	ROC	NO_x
Onshore Mobile Sources	23.84	37.84	8.03	13.69
Onshore Stationary Sources	7.68	5.57	8.25	6.74
Onshore Area-Wide Sources	7.94	0.48	10.16	1.23
Pacific OCS Mobile Sources	1.77	32.55	2.22	64.77
Pacific OCS Stationary Sources	1.14	0.82	1.14	0.82
Total	42.38	77.26	29.80	87.25

Source: SBCAPCD 2004.
Note: The planning inventories do not include natural emissions sources (oil and gas seeps, fires, biogenic emissions)

This table shows that the SBCAPCD currently forecasts a reduction in the overall ROC emissions by 2020, but shows the overall NO_x emissions to increase during that period due to an increase in Pacific OCS emissions. The major source of the forecast increase in Pacific OCS NO_x emissions is the near doubling of NO_x emissions from shipping and tankering.

On-going Oil and Gas Activities

There are presently a total of 19 Pacific OCS platforms located in the South Central Coast Air Basin with 15 platforms located in the Pacific OCS offshore of Santa Barbara County and 4 platforms in Federal waters offshore of Ventura County. In addition, Platform Holly is located in State waters off southern Santa Barbara County. The existing platforms are within the jurisdiction of the adjacent onshore air agencies and all have current Permits to Operate. The emission sources from those facilities have been controlled and fully offset and are in full compliance with applicable Air District Rules and Regulations.

The emissions from ongoing oil and gas activities include several emission sources that occur from oil production activities. These include power generation, flares, piping component leaks and other direct oil production related emission sources; well drilling/redrilling at the existing platforms; and crew ship and helicopter trips to and from the platforms. Additionally, there are approved Pacific OCS exploration well/well abandonment and development projects that are approved (See Table 5.2-1) that are likely to occur between 2006 and 2030.

It is anticipated that all existing platforms would be decommissioned by 2030. Decommissioning would include a short-term emission peak when the actual physical decommissioning activities take place. The production emissions associated with the existing platforms would decrease as production decreases, as may emissions from associated onshore storage and refining facilities.

The 2000 annual emission inventory for the Pacific OCS contained in the 2004 Santa Barbara Clean Air Plan (SBCAPCD, 2004b) estimates that fuel combustion and petroleum production NO_x emissions from Pacific OCS oil and gas production facilities contribute less than 3 percent of the total Pacific OCS NO_x emissions with this fraction forecast to decrease to less than 2 percent by 2020. Oil and gas fuel combustion and petroleum production activities contributed just over 35 percent of the Pacific OCS ROC emissions with this fraction forecast to decrease to 31 percent by 2020.

The 2004 Santa Barbara Clean Air Plan assumes that emission contributions from ongoing oil and gas activities in the Pacific OCS remain essentially constant through 2020.

Marine Shipping and Tankering

Emissions from marine vessels traversing the Santa Barbara Channel are not regulated by Federal, State or local air authorities and may affect onshore air quality. Approximately 80 percent of the vessels calling on the Ports of Los Angeles and Long Beach are of foreign registry and most use engines produced outside the United States (ARB, 2000, as cited in MMS, 2001).

The emissions from ships are the dominant Pacific OCS NO_x emission source, almost 98 percent of all Pacific OCS NO_x emissions forecast for 2006, and one of the largest single ROC emission source in the Pacific OCS, over 40 percent of the Pacific OCS ROC emissions forecast for 2006 (SBCAPCD, 2004b). SBCAPCD has forecast the emission from marine shipping and tankering in the Santa Barbara Channel to almost double between 2000 and 2020; therefore, it is expected that the cumulative air quality impact of marine shipping and tankering would continue to be the most significant contributor to cumulative air quality impacts in the Pacific OCS. Table 5.4-3 shows SBCAPCD's forecast for NO_x and ROC emissions from ships and commercial boats in the Pacific OCS.

Table 5.4-3. Santa Barbara Channel Pacific OCS Shipping Emissions Estimate 2000-2020 (tons/day)

Pollutant	2000	2005	2010	2015	2020
NO_X	32.5	38.6	44.3	54.3	64.7
ROC	1.1	1.2	1.4	1.7	2.0

Source: SBCAPCD, 2004b.

Onshore and Non-Pacific OCS Offshore Projects

Section 5.2 and Appendix I describe and list the onshore and non-Pacific OCS offshore or coastal projects that are currently approved or in the process of being approved. These projects include few new major air pollutant emission sources, with only the proposed Tranquillon Ridge Project, Cabrillo Deepwater Port LNG Facility, and Crystal Clearwater Port Project being in Federal Waters. The Venoco Project and Molino Gas Project located in State waters or onshore in coastal areas may also have fairly significant air pollutant emission potential. All of these projects would require permitting with the SBCAPCD or VCAPCD for any ongoing stationary source emissions or any major drilling operations (i.e., greater than 25 ton/year emissions); which would require application of BACT and emission offsets to those sources subject to permit.

Oil Spills

The worst-case oil spill scenario for existing activities is a 22,800 barrel spill from a tanker operating off the coast. The total hydrocarbon emissions resulting from a 22,800 barrel oil spill is estimated to be almost 900 tons. The short-term air quality impacts would be expected to diminish within days of the spill due to the rapid volatilization of the light end hydrocarbons and oil weathering processes. Though a marine tanker spill would result in a significant magnitude of hydrocarbons exposed to the atmosphere, the location of such a spill is expected to be far from nearshore areas with their greater susceptibility to health effects. Oil tankers offshore southern California voluntarily transit the coast north of Point Conception at distances of 90 km (50 nm) or more offshore. Therefore, the concentration of hydrocarbon emissions reaching sensitive onshore areas would generally be low due to dispersion of the emissions with distance over water and that oil spill emissions decrease with time and become more diffuse as the spill spreads over a larger area with time.

5.4.2.2 Incremental Impacts of Exploration and Development of the Undeveloped Leases on Air Quality Under the Hypothetical Development Scenario

There are several activities that would be associated with the development of the undeveloped leases. The hypothetical development scenario is discussed in Section 5.2. Under such a scenario, the incremental development activities include delineation drilling using a MODU (forecast only for leases in the Point Sal, Purisima Point and Gato Canyon Units), well drilling and production at existing platforms, four new platform installations with well drilling and production, offshore pipeline installation, offshore power cable installation, crew and supply boats and helicopters, the completion of the suspension geologic and biological surveys potentially after the suspension ends for other leases, and potential oil spills.

The hypothetical development timeline would allow some activities to overlap. However, the delineation drilling would occur after the suspension survey actions on leases in the Point Sal, Purisima Point and Gato Canyon Units. Additionally, it is assumed that the delineation drilling activities occur prior to the installation of any new platforms. The peak year (2013) cumulative development emissions were determined and modeled to assess the potential worst-case cumulative impacts.

Survey Impacts

While the surveys are proposed suspension activities, they may be conducted after other lease suspensions have concluded, and the exploratory/delineation drilling for those other leases have been initiated from existing platforms. There would be no temporal overlap between the two independent Point Sal and Purisima Point Unit surveys and the Gato Canyon Unit survey. Potential development activities being initiated for the other leases are located too far away and not of a significant enough combined emission quantity to create the potential for cumulative impacts. Table 5.4-4 shows the worst-case daily survey emissions in comparison with the daily estimated 2005 Pacific OCS emissions. This table shows that the survey emissions are very small in comparison to the Santa Barbara Channel Pacific OCS emissions. Thus, the emissions associated with the shallow hazards and biological surveys in support of the suspensions are not expected to result in any cumulative exceedances of applicable air quality standards.

Ambient air monitoring levels from the nearest air monitoring stations were combined with the predicted OCD modeled concentrations from the Point Sal and Purisima Point Units and the Gato Canyon Unit; their respective Environmental Assessments (EAs) demonstrate negligible short-term impacts to overall regional air quality that are not expected to result in any violation of Federal or State ambient air quality standards (MMS, 2004a, 2004b). It is assumed that the monitoring data represent ambient concentrations from the existing oil and gas facilities and marine shipping and tankering operations in the study area.

Thus, emission increases associated with the proposed surveys are not expected to significantly contribute to emissions from existing offshore oil and gas and marine shipping and tankering activities.

Table 5.4-4. Santa Barbara County 2005 Pacific OCS Ozone Precursor Emission Inventory vs. Survey Emissions - Tons/day (tons/yr)

Category	ROC	NO_x
SBC Total 2005 Pacific OCS Emissions[1]	2.9 (1,065)	39.5 (14,406)
Worst Case Survey Emissions[2]	0.015 (0.3)	0.42 (7.4)

1. From SBCAPCD Draft 2004 Clean Air Plan (SBCAPCD, 2004b)
2. From MMS 2004a, 2004b

Exploration and Delineation Drilling Impacts

Delineation drilling from a Mobile Offshore Drilling Unit is assumed to occur only in the Point Sal, Purisima Point, and Gato Canyon Unit leases once the geologic and biological surveys proposed to be conducted during the suspension period have been completed. The emissions estimate and impacts analysis for the delineation drilling was previously prepared in the Draft EIS (MMS, 2001). The basic assumptions include that a single MODU would be used to sequentially drill a single well at each of the three lease locations. Additionally, it was assumed that the Point Sal and Purisima Point delineation wells would take 68 days to complete and the Gato Canyon delineation well would take 92 days to complete. The other assumptions, fuel use estimates and other specific data used to provide the emissions estimates and modeling analysis summarized here can be found in Section 5.2.1.1 and Appendix 5.4 of the Draft EIS (MMS, 2001).

Santa Barbara APCD Rule 202 F.6 (Drill Rig Engine Exemption) provides a permit exemption for drilling equipment provided that emissions from the equipment are less than 25 tons per year. This exemption would include the MODU's main engines used to power the equipment used during the drilling phase at each of the three locations. Other equipment that is not part of the drilling phase would be subject to permit including marine vessel emissions and various ROC sources. Thus, these drilling operations would each require a Permit to Operate from SBCAPCD and emission sources subject to the permit would be in accordance with BACT and emission offset provisions to ensure a net air quality benefit. Table 5.4-5 presents the total project estimated emissions for each of the three affected leases and the emissions provided in units used for regulatory overview (see Table 5.4-1). A comparison of the New Source Review requirements demonstrates the three drilling project emissions would be above levels requiring application of BACT and emission offsets to those sources subject to permit. The delineation drilling is additionally expected to result in a net emissions increase greater than levels which require an air quality impact analysis (modeling) to ensure activities would not cause a violation or interfere with expeditious attainment of any air quality standard.

The MMS studied the impacts of the projected delineation drilling activities using the Offshore and Coastal Dispersion (OCD) Model. Modeling assumptions are detailed in the Draft EIS Section 5.2.1.1 (MMS, 2001). Peak hour NO_x emissions were determined to occur during the site preparation phase of the drilling operation. Utilizing the site preparation phase allowed for the addition of the crane engines to emissions from the drilling main engines and support vessels. Table 5.4-6 presents the peak hour site preparation and drilling emissions estimate used in the modeling analysis.

Table 5.4-5. Total Drilling Emissions

	Point Sal Total Drilling Emission Estimate (tons)				
	NO_x	CO	ROC	SO_2	PM10
Main Engines	19.98	2.67	0.11	0.45	0.87
Crane Engines	0.71	0.27	0.01	0.01	0.07
Flare	0.14	0.05	0.01	0.01	0.01
Vessels	9.79	4.18	4.83	0.24	1.15
Helicopters	0.31	0.81	0.36	0.04	0.04
Total (tons)	**30.93**	**7.98**	**5.31**	**0.76**	**2.15**
Lbs/hr	**37.90**	**9.78**	**6.51**	**0.93**	**2.63**
Lbs/day	**909.71**	**234.71**	**156.18**	**22.35**	**63.24**
	Purisima Point Total Drilling Emission Estimate (tons)				
	NO_x	CO	ROC	SO_2	PM10
Main Engines	17.97	2.41	0.10	0.41	0.78
Crane Engines	0.71	0.28	0.01	0.01	0.08
Flare	0.14	0.05	0.01	0.01	0.01
Vessels	8.05	3.36	3.72	0.20	0.94
Helicopters	0.25	0.64	0.29	0.03	0.03
Total (tons)	**27.12**	**6.73**	**4.12**	**0.66**	**1.84**
Lbs/hr	**33.24**	**8.25**	**5.05**	**0.81**	**2.25**
Lbs/day	**797.6**	**197.9**	**121.2**	**19.4**	**54.1**
	Gato Canyon Total Drilling Emission Estimate (tons)				
	NO_x	CO	ROC	SO_2	PM10
Main Engines	23.85	3.19	0.13	0.54	1.04
Crane Engines	0.71	0.28	0.01	0.01	0.08
Flare	0.14	0.05	0.01	0.01	0.01
Vessels	7.34	2.70	2.29	0.17	0.79
Helicopters	0.32	1.19	0.58	0.04	0.04
Total (tons)	**32.37**	**7.40**	**3.01**	**0.77**	**1.96**
Lbs/hr	**39.67**	**9.07**	**3.69**	**0.94**	**2.40**
Lbs/day	**952.06**	**217.65**	**88.53**	**22.65**	**57.65**

Source: MMS, 2001
Note: The lb/hr and lbs/day values for Point Sal and Gato Canyon have been corrected from those presented in the DEIS to reflect drilling periods of 68 days and 92 days, respectively.

Table 5.4-6. Delineation Drilling Peak Hour Emissions Estimates

	Delineation Peak Hour Emission Estimates (lbs)				
Drilling Phase	NO_x	CO	ROC	SO_2	PM10
Site Preparation	189.45	47.95	13.44	3.92	16.24
Drilling	43.16	9.93	2.35	0.93	2.96

Source: MMS, 2001

Table 5.4-7 lists the highest predicted concentrations to onshore pollutant concentrations for both the site preparation and drilling phases for each of the three delineation drilling locations and compares them with the maximum allowable increases over the baseline concentration established by SBCAPCD. The concentrations demonstrate that the emission impacts, with the exception of the Gato Canyon Unit 1-hour NO_2 impacts during delineation drilling site preparation, are well within the maximum NO_x, SO_x, and PM10 allowable limits for a Class II area. The modeled concentrations demonstrate that the proposed Gato Canyon Unit NO_2 emissions may exceed the lower level of the 1-hour maximum increment range established by the SBCAPCD for NO_x allowable limits for a Class II area. The increment range has been established by SBCAPCD to represent consumption of the increment and does not constitute a State or Federal standard. According to SBCAPCD regulations, the applicant may consume the full increment range given they provide for an alternative fee based mitigation to the SBCAPCD. Concentrations of SO_2 and PM10 are additionally well below the allowable increases for those pollutants.

The table further demonstrates that based on the modeled emission estimates, the onshore impacts on air quality from drilling activities are estimated to be well below federally allowable increases in NO_2, SO_2, and PM10 emissions as regulated by 40 CFR 51.166(c) and further reflected in SBCAPCD Rule 803. Any activity eventually determined to be subject to SBCAPCD permit requirements would be subject to BACT and be fully offset at a greater than a 1:1 ratio to result in a net air quality benefit to Santa Barbara County in accordance with SBCAPCD Rules and Regulations.

Table 5.4-7. Delineation Drilling Modeling Results Summary (micrograms per cubic meter (μg/m^3)

Pollutant	Averaging Period	Class II Maximum Allowable Increase	National/State Ambient Air Quality Standard	Site Prep Modeled Impact	Drilling Phase Modeled Impact
Point Sal					
NO_2	1-hour	100-470[1]	470[2]	82.1	24.2
	Annual Average	25.0	100	0.03	0.03
PM10	24-hour Average	12-30	150	0.43	0.06
	Annual Average	17.0	50	0.00	0.00
SO_2	1-hour	NS	655[3]	2.3	0.62
	3-hour Average	512.0	1300	0.84	0.21
	24-hour Average	91.0	365	0.11	0.03
	Annual Average	20.0	80	0.00	0.00
Purisima Point					
NO_2	1-hour	100-470[1]	470[2]	75.8	16.6
	Annual Average	25.0	100	0.03	0.03
PM10	24-hour Average	12-30	150	0.62	0.05
	Annual Average	17.0	50	0.00	0.00
SO_2	1-hour	NS	6553	2.1	0.62
	3-hour Average	512.0	1300	0.82	0.21
	24-hour Average	91.0	365	0.13	0.03
	Annual Average	20.0	80	0.00	0.00
Gato Canyon					
NO_2	1-hour	100-470[1]	470[2]	200	32.8
	Annual Average	25.0	100	0.03	0.03
PM10	24-hour Average	12-30	150	0.89	0.08
	Annual Average	17.0	50	0.00	0.00
SO_2	1-hour	NS	6553	5.4	0.94
	3-hour Average	512.0	1300	1.8	0.28
	24-hour Average	91.0	365	0.2	0.04
	Annual Average	20.0	80	0.00	0.00

Source: MMS, 2001
1. Santa Barbara APCD incremental limit.
2. State of California ambient standard.
3. State Standard. No National Standard.

Development Cumulative Impacts

The assumed development scenario for the undeveloped leases is described in Section 5.2. The development includes horizontal well drilling from existing platforms, platform construction (4 new platforms), pipeline and power cable construction, the continued use of existing platforms, associated support and onshore activities, and potential oil spills. Emissions have been estimated for the various activities considering the schedule of development described in Section 5.2. The annual emissions from 2006 through 2030 have been conservatively estimated and the cumulative period emissions from 2006 through 2030 are provided in Table 5.4-8. The emission estimates were calculated using conservative emission factors that may overestimate the emissions potential from the construction and production activities. The emission calculations and assumptions are provided in Appendix B.

Table 5.4-8. Total Cumulative Development Emissions 2006-2030 (tons)

Total Cumulative Emissions With Development of the Undeveloped Leases (tons over the period 2006-2030)					
Activity	**NO_x**	**CO**	**SO_x**	**ROC**	**PM10**
Subsurface Surveys	7.4	1.2	0.1	0.3	0.4
Delineation Wells	90.4	22.1	2.2	12.4	6.0
Platform Construct	702.1	166.4	48.0	51.5	11.3
Pipeline Install	715.1	287.5	14.9	82.2	35.5
Power Cable Install	106.0	22.3	5.6	3.0	7.4
Development Wells	865.1	410.7	128.8	119.1	126.4
Production	2,655.9	1,398.6	517.3	1,984.7	202.8
Spills	--	--	--	7.8	--
Service Vessels and Helicopters	32.3	35.8	3.1	3.3	4.4
Total	5,174.3	2,344.7	719.9	2,264.2	394.0

Source: MMS, 2004a, 2004b, 2004c

The peak emission year for the assumed development scenario was determined to be 2013. The activities during the peak year include well drilling, platform construction, platform operations, pipeline and power cable construction, associated construction and operation activities (i.e. service vessels and helicopters), and one 200 bbl oil spill. The delineation drilling and survey activities would be completed prior to the peak emission year. Table 5.4-9 provides the peak year emission estimate in terms of tons/year and average tons/day and average lbs/day.

Table 5.4-9. Peak Year Cumulative Emissions

Peak Year Cumulative Emissions With Development of the Undeveloped Leases (2013)					
Activity	**NO_x**	**CO**	**SO_x**	**ROC**	**PM10**
Platform Construction	409.4	97.1	28.0	30.0	30.2
Pipeline Installation	649.4	260.8	13.6	74.6	64.4
Power Cable Installation	88.1	18.6	4.7	2.5	6.2
Development Wells	57.0	27.0	8.5	7.8	8.3
Production	143.6	75.6	28.0	115.1	11.0
Spills	--	--	--	7.8	--
Service Vessels and Helicopters	1.0	1.4	0.1	0.1	0.1
Total (tons)	1,348.5	480.5	82.8	240.0	120.2
Hourly (lbs)	307.8	109.4	18.9	50.8	27.4

Source: MMS, 2004c

Note: 1) The spill emissions presented are total hydrocarbon emissions which will overestimate the actual ROC emissions.
2) Hourly emissions do not include helicopter emissions or oil spill emissions.

The current SBCAPCD NO_x and ROC planning inventory from the Draft 2004 Attainment Plan (SBCAPCD, 2004b) does not show construction emissions in the Pacific OCS inventory. Additionally, the Attainment Plan inventory shows that the entire oil production related emission sources are fairly constant from the year 2000 through the year 2020 at 300 tons per year of NO_x and 380 tons of ROC emissions (not including emissions from related service vessels and helicopters). This indicates that the development peak year emission estimates exceed the emissions assumed in the planning inventory for Pacific OCS oil and gas emission sources. However, the total Pacific OCS inventory includes a significant increase in overall Pacific OCS vessel emissions that indicate that the total Pacific OCS inventory would climb to almost 24,000 tons per year of NO_x and over 1,200 tons per year of ROC by 2020. The 2013 peak year emissions, using a linear average of the Draft Attainment Plan's 2010 and 2015 forecast emissions, would be approximately 7 percent of the forecast total Pacific OCS NO_x emissions and 20 percent of the forecast Pacific OCS ROC emissions for 2013.

The MMS modeled the cumulative impacts from the assumed development scenario using the OCD model. The detailed description of the modeling assumptions are provided in Section 6.2.1 of the Draft EIS (MMS, 2001). The modeling analysis presented in the Draft EIS was revised to use more current ambient background data and the emission estimates for the peak year of development. The results of the modeling analysis are provided in Table 5.4-10.

Table 5.4-10. Maximum Predicted Cumulative Onshore Pollutant Concentrations

(micrograms per cubic meter ($\mu g/m^3$)						
Pollutant	Averaging Period	Class II Maximum Allowable Increase	Ambient Air Quality Standard	Santa Barbara Maximum Background Concentration[3]	Maximum Modeled Concentration*	Total Pollutant Concentration
NO_2	1-hour	100-470[1]	470[2]	44	402	446
	Annual Average	25.0	100	5	1.77	6.77
PM10	24-hour Average	12-30	150	96	13.1	109.1
	Annual Average	17.0	50	20.3	0.14	20.44
SO_2	1-hour	NS	655[4]	2.66	10.8	13.46
	3-hour Average	512.0	1300	7.99	8.0	15.99
	24-hour Average	91.0	365	2.66	2.9	5.56
	Annual Average	20.0	80	2.66	0.12	2.78

Source: MMS, 2004c
1. Santa Barbara APCD incremental limit.
2. State of California ambient standard.
3. Vandenberg (south) 2003 ambient data
4. State Standard. No National Standard.

The meteorological data used were Buoy 46011 and B46023 for 1990 and B46023 for 1991 and 1992. Onshore surface data were from the Santa Maria National Weather Service site; mixing height data were derived from the Vandenberg radiosonde site. The platform installation and platform drilling emissions were modeled as point sources. The pipeline and power cable installation and vessels were modeled as line sources (a series of point sources along the installation route).

The modeled concentrations demonstrate that the cumulative development scenario emissions exceed the 1-hour maximum increment range established by the SBCAPCD for NO_x allowable limits for a Class II area. Concentrations of SO_2 are well below allowable increases and PM10 24-hour concentrations marginally exceed the allowable increment.

The most recent validated ambient air concentrations were obtained from the SBCAPCD and added to the incremental concentrations predicted by the OCD model for a comparison against Federal and State ambient air quality standards. The EPA screening approach of using the national default of a NO_2/NO_x ratio of 0.75 was applied to the predicted concentrations to account for the atmospheric conversion of NO to NO_2. As the ambient standards apply only to NO_2, a conversion factor of NO to NO_2 must be applied. The 1-hour NO_2 standard of 470 $\mu g/m^3$ is approached (446 m/m^3) but not exceeded for the near-shore pipeline installation portion of the project as the pipeline installation approaches the surf zone. The comparison indicates that increases in the onshore average concentrations of NO_2, SO_2 and PM10 from the assumed development projects are estimated to be less than the maximum increases allowed under both the Federal and State standards. Table 5.4-10 presents the modeled concentrations per pollutant in relation to maximum allowable increases and Federal and State ambient air quality standards.

5.4.3 Summary and Conclusion

Without development of the undeveloped leases, regional air impacts during the period 2006 to 2030 are assumed to result from ongoing oil and gas activities, marine shipping and tankering operations and the eventual decommissioning of the existing offshore facilities. The largest contributor to Pacific OCS air quality would continue to be marine shipping and tankering with incremental contributions from facility decommissioning exhibited in the later years. Pacific OCS emissions attributable to existing oil and gas operations are projected to decline over the 2006 through 2030 time period of this analysis.

The largest contributor to short-term air quality impacts under the hypothetical development scenario would result from platform and pipeline installation activities during the years 2012 through 2013. The worst-case scenario emissions are predicted during the near-shore pipeline installation activities and are expected to be limited in duration to very short time frame. Emissions associated with the proposed survey activities do not overlap temporally or spatially with the cumulative peak year emissions projected for 2013 and therefore do not contribute any increment to peak year emissions.

All of the assumed development projects would be expected to be above NSR threshold emission levels for BACT, emission offsets and air quality impact analyses and would be required to comply with those provisions in SBCAPCD Rules and Regulations. Any project and emission sources eventually determined to be subject to SBCAPCD permit requirements would be subject to BACT and would likely be required to be fully offset at a greater than a 1:1 ratio, resulting in a net air quality benefit to Santa Barbara County in accordance with SBCAPCD Rules and Regulations. However, future year emission offsets may be problematic based on the limited present day availability of offsets and the requirement that all new or modified projects have an air quality benefit per NSR requirements.

Anticipated air quality impacts from the three oil spill scenarios are expected to be rare, of short duration, and very localized. Ambient air concentrations resulting from oil spills are expected to result in low to moderate, short-term impacts to regional air quality dependent upon the location and duration of the spill, and meteorological conditions exhibited at the time affecting the evaporation rate of the hydrocarbons.

Given the current trends in air quality Santa Barbara County may be designated to be in attainment for the State ozone ambient air quality standard by the time these eventual development projects are expected to commence, and may be also reach attainment with the State PM10 standard at some prior to 2030. These projects would then be considered in relation to the regulations enforce at the time, thus, future permitting and compliance of these projects may be subject to Prevention of Significant Deterioration (PSD) or similar standards, and emission threshold requirements designed to ensure the continued protection of air attainment areas.

The hypothetical nature of full development of the undeveloped leases over the next 25 years most probably results in a low confidence for the prediction of regional air quality impacts. The assumptions utilized for the estimating of peak hour, peak year and total emissions provided in previous sections are the best information available and are considered very conservative estimates of the overall emission potential for these projects. Should the proposed delineation projects prove successful, eventual development of the undeveloped units and Lease OCS-P 0409 would be subject to a more comprehensive and less speculative review during the mandated environmental impact analysis of the respective Development and Production Plans (DPP). The supporting technical and environmental information required in the DPPs would provide for a more definitive evaluation of the associated air quality impacts expected with the development of the undeveloped leases.

In summary, the cumulative impacts are determined to be moderate, exceeding threshold emission levels (BACT, Offset, and AQIA emission levels) and threshold impact levels (allowable SBCAPCD Class II impact thresholds). However, the emissions would be mitigated through the use of BACT and Offsets and the modeled impacts, although determined to be greater than that of the Class II impact thresholds, are determined to not cause any exceedances of Federal standards or cause any significant contributions to existing exceedances of State ambient air quality standards.

Because impacts associated with air quality are regional in nature, a unit-specific summary table of the impacts associated with development of each of the undeveloped units and Lease OCS-P 0409 is not applicable to this analysis.

5.5 Physical Oceanography

There are no post-suspension activities that would physically alter oceanographic conditions. No impacts, locally or regionally, would occur. A description of existing oceanographic conditions is provided in Section 4.5.

5.6 Water Quality

5.6.1 Significance Criteria

The following significance criteria were used in this analysis to determine whether post-suspension activities would result in significant impacts to water quality.

- **High (Significant).** Activities may cause or contribute to changes in standard, measurable water quality parameters resulting in unreasonable degradation[1] to the water quality over an area, defined as greater than 10,000 m (32,000 ft) from the discharge point[1].
- **Moderate (Significant).** Activities may cause or contribute to changes in standard, measurable water quality parameters resulting in unreasonable degradation to the water quality over an area, defined as from 5,000 to 10,000 m (16,000 to 32,000 ft) from the discharge point.
- **Low (Insignificant).** Activities do not cause or contribute to changes in standard, measurable water quality parameters resulting in unreasonable degradation to the water quality over an area defined as from 100 to 5,000 m (320 to 16,000 ft) from the discharge point.
- **Negligible.** A negligible impact to water quality may cause changes in water quality parameters for a short period, within 100 m (320 ft), but might still be worthy of an enforcement action by the Environmental Protection Agency (EPA) or the U. S. Coast Guard (USCG). This might take the form of a violation of a National Pollutant Discharge Elimination System (NPDES) permit, either by exceeding a limit or by creating an oil sheen (also a violation of USCG regulations). However, the act of violation, under this scenario, would not constitute an unreasonable degradation to water quality. Marine oil spills are not regulated under NPDES regulations or permits.

5.6.2 Impacts of Post-Suspension Activities

This section addresses post-suspension activities in marine waters that could occur during the period of 2006 through 2030.

5.6.2.1 Cumulative Impacts without Activities on the Undeveloped Leases on Water Quality

The potential sources of impacts to water quality without development of the undeveloped leases include the following:

- Future activities on existing leases including drilling from platforms and oil and gas production
- New production wells from Platform Holly in State Tidelands
- Tranquillon Ridge Unit development in State waters
- Oil spills from facilities and pipelines
- Abandonment of exploratory wells on OCS-P 0320 and OCS-P 0241
- Decommissioning activities
- Municipal and industrial wastewater discharges
- River runoff and other nonpoint sources

[1] EPA's regulations at 40 CFR 125.121(e)(1-3) state that unreasonable degradation of the marine environment means: (1) Significant adverse changes in ecosystem diversity, productivity and stability of the biological community within the area of discharge and surrounding biological communities; (2) Threat to human health through direct exposure to pollutants or through consumption of exposed aquatic organisms; (3) Loss of esthetic, recreational, scientific or economic values which is unreasonable in relation to the benefit derived from the discharge.

- Oil spills from non-Pacific OCS tankering activities
- Offshore LNG facilities in the project area including Cabrillo Deepwater Port off Port Hueneme and Crystal Clearwater Port Project on Platform Grace off Oxnard

Offshore Oil and Gas

For offshore oil and gas development and production activities water quality-related impacting agents would include turbidity not associated with drilling activities, drilling discharges, produced water, and other effluents. These are discussed below.

Turbidity

Of the potential impacting agents listed above, only well abandonment and decommissioning activities would cause turbidity in the water column due to anchors from the MODU used to abandon exploratory wells or the derrick barge vessel used to conduct most of the decommissioning activities. Anchoring activities can cause increases in turbidity but only for a limited time and for a limited extent into the water column (from the bottom up, as opposed to the top down), and not into the photic zone. Anchors impact the sea floor and raise clouds of sediment a few meters into the water column. The particulate material is then redistributed by the bottom currents until it settles some distance away. This distance is dependent primarily on grain size and bottom speed. Only transient impacts to water quality would occur, either vertically or horizontally, since these silty sediments likely would settle to background within 500 m and would not rise vertically within the water column in such a fashion to affect background sediment levels (normally 1 to 5 mg/l) over a large area (SAIC 1986; 1995, as cited in MMS, 2001) Thus, only negligible impacts to water quality are expected from well abandonment and decommissioning activities.

Discharges

A variety of discharges are associated with offshore oil and gas activities. All effluents from offshore oil activities are regulated by the new General NPDES permit. The limitations under this permit cover a wide range of parameters including, toxicity, metals, oil and grease, chlorine, and sheens, foam and floating solids. The permit covers 22 possible effluents. Table 5.6-1 lists potential effluents from offshore oil and gas facilities. Not all of these effluents would be discharged from all facilities. Each of these effluents is discussed below.

Table 5.6-1. Possible Effluents, the Type of Facility (Platform/MODU), Distance of Influence on Water Quality, and Limitations from the New General NPDES Permit

Effluent*	Estimated Distance of Effect (meters)**	General Permit Limits
001 Drilling Discharges (muds and cuttings) (MODU & Platform)	1,000	Total volume limits applied to each platform End-of well toxicity No discharge of oil-based drilling mud or mud contaminated with diesel Limits on cadmium and mercury in barite Continuous constituent and additive inventory Static sheen test Use of generic mud
002 Produced Water (Platform)	100	Weekly oil and grease samples (29 mg/l monthly average; 42 mg/l daily max.) Flow limits applied for each platform Quarterly monitoring of metals and other parameters Whole effluent toxicity (chronic)
003 Well Treatment, Completion and Workover Fluids (Platform)	100	Volume monitoring No discharge of free oil monitored by static sheen test Once per job oil and grease samples (29 mg/l monthly average; 42 mg/l daily max.)

Effluent*	Estimated Distance of Effect (meters)**	General Permit Limits
004 Deck Drainage (MODU & Platform)	100	Volume monitoring No discharge of free oil monitored by visual observations
005 Sanitary / Domestic Wastes (MODU & Platform)	100 / At the point of discharge	Flow rate Observation of floating solids (for facilities manned by 9 or fewer persons) Residual chlorine and foam for domestic wastes (for facilities manned by 9 or more persons)
006 Blow-out Preventer Fluid (MODU & Platform)	100 / At the point of discharge	No free oil in the receiving water Floating solids and foam
007 Desalination Unit Discharge (MODU & Platform)	At the point of discharge	Floating solids and foam
008 Fire Control System Test Water (MODU & Platform)	At the point of discharge	Chemical inventory Chlorine (for antifouling) Floating solids and foam
009 Noncontact Cooling Water (MODU & Platform)	100 / At the point of discharge	Flow rate Chemical inventory (if chemicals are used in the effluent) Chlorine (for antifouling) Floating solids and foam
010 Ballast and Storage Displacement Water (MODU)	100 / At the point of discharge	Flow rate No free oil in the receiving water Floating solids and foam
011 Bilge Water (MODU)	100 / At the point of discharge	Flow rate No free oil in the receiving water Floating solids and foam
012 Boiler Blowdown (MODU & Platform)	At the point of discharge	Floating solids and foam
013 Test Fluids (MODU & Platform)	100 / At the point of discharge	Flow rate No free oil in the receiving water Chemical inventory Floating solids and foam
014 Diatomaceous Earth Filter Media (Platform)	At the point of discharge	No free oil in the receiving water Floating solids and foam
015 Bulk Transfer Material Overflow (MODU & Platform)	At the point of discharge	Floating solids and foam
016 Uncontaminated Water (MODU & Platform)	At the point of discharge	Floating solids and foam
017 Water flooding (Platform)	100	No free oil in the receiving water Chemical inventory Floating solids and foam
018 Laboratory wastes (MODU & Platform)	100 / At the point of discharge	No free oil in the receiving water Floating solids and foam
019 Excess Cement Slurry (MODU & Platform)	100 / At the point of discharge	Flow rate No free oil in the receiving water Floating solids and foam
020 Muds, Cuttings and Cement at Seafloor (MODU & Platform)	100 / At the point of discharge	No free oil in the receiving water Floating solids and foam

Effluent*	Estimated Distance of Effect (meters)**	General Permit Limits
021 Hydrotest water (Platform)	100 / At the point of discharge	Flow rate No free oil in the receiving water Chemical inventory Chlorine Floating solids and foam
022 H2S Gas Processing	100 / At the point of discharge	Flow rate
Waste Water (Platform)	100 / At the point of discharge	No free oil in the receiving water Floating solids and foam

* For clarity, the words, “Platform” and “MODU,” are inserted in the “Effluent” column; this indicates when some effluents would only occur from one source or the other or both.

** As seen in the General Permit Limits column, some limits consist of water quality-related limitations (e.g., chlorine) and others consist of nonwater quality-related limits (e.g., floating foam and solids). Water quality limits must be met within 100 m of the discharge (according to the General NPDES permit) while nonwater quality-related limits must be met at the point of discharge.

Drilling Discharges

Drilling discharges include drilling muds and cuttings. The parameters that could affect water quality due to this discharge are turbidity, hydrocarbons, metals, and additives used in the drilling-mud systems.

Drilling Muds

Drilling mud is discharged under two general conditions. First, during drilling, some mud adheres to the drilled cuttings and is discharged in small quantities with the cuttings. Second, when the driller needs to change the mud system or comes to the end of the well, much of the mud system is discharged (some small amount may remain in the well, and some may be lost to the formation). The following paragraphs discuss the processes by which drilling mud is moved from the point of discharge, through the water column and to sea floor and beyond to eventual mixing with existing sediments. This discussion includes how studies have traced drilling discharges, how currents move the material, and the role of resuspension.

The most comprehensive study done on drilling discharge fates and effects is the CaMP. The purpose of this 8-year, three-phase project, was to examine the effects of drilling discharges on nearby deep-water rocky reef habitats. In the process, an immense amount of auxiliary data was collected and analyzed. Much of the information presented below comes from these studies. Monitoring of Platforms Hermosa, Harvest and Hidalgo during CaMP was conducted from 1986 to 1994. During this time 44 wells were drilled. Drilling muds were discharged at 34 m (109 ft) below the surface at Hidalgo and Hermosa and 91 m (291 ft) at Harvest and were highly variable, ranging from zero to 1,300 bbl per day with typical discharges of 100 to 200 bbl/day.

Fate of Drilling Muds

The fate of drilling discharges is important because the amount that remains in the water column, and eventually settles to the sea floor, can help to determine the extent of any environmental impact. To determine the fate of drilling muds, barium has often been used as a tracer. It is used as a weighting agent (materials used to increase the weight of the column of drilling mud — enabling better well control — without overly increasing the volume) and is the single most common metal used in drilling mud formulations (SAIC and MEC, 1995, as cited in MMS, 2001). For example, Jenkins et al. (1988, as cited in MMS, 2001) traced barium in sediments which was discharged with drilling muds during the drilling of an exploratory well in State waters near Gaviota. About 866,000 kg (1,905,200 lbs) of barite ($BaSO_4$) was used in the drilling of the well. The currents in the area caused the drilling mud plume to deposit the barite and other associated solids in a fairly narrow pattern to the west of the drilling site. The authors found that barium levels reached background with 1,500 m (4,800 ft) of the well site.

Coats (1991, as cited in MMS, 2001) used the deposition of barium to study the lighter fractions of drilling muds that were initially deposited at mid- and far-field locations (greater than 0.5 and 1.0 km (0.31 to 0.62 miles) from the discharge point, respectively). Barium in the drilling fluids used was 150 times more concentrated than that in natural sediments, allowing detection of relatively small fractions of drilling particulates in samples at distances up to 6,800 m (21,760 ft) from the discharge point. From 1986 to 1989, the three Point Arguello platforms, Hermosa, Hidalgo and Harvest, released an estimated 5,120,000 kg (11,264,000 lbs) of barite, with an annual average of 1,280,000 kg (2,816,000 lbs) (Steinhauer et al., 1991, Chapter 2, as cited in MMS, 2001). Furthermore, other metals, including iron, lead, zinc, mercury, arsenic, chromium, cadmium, nickel and copper had concentrations closer to local ambient levels (Steinhauer et al., 1991, Chapter 6, as cited in MMS, 2001).

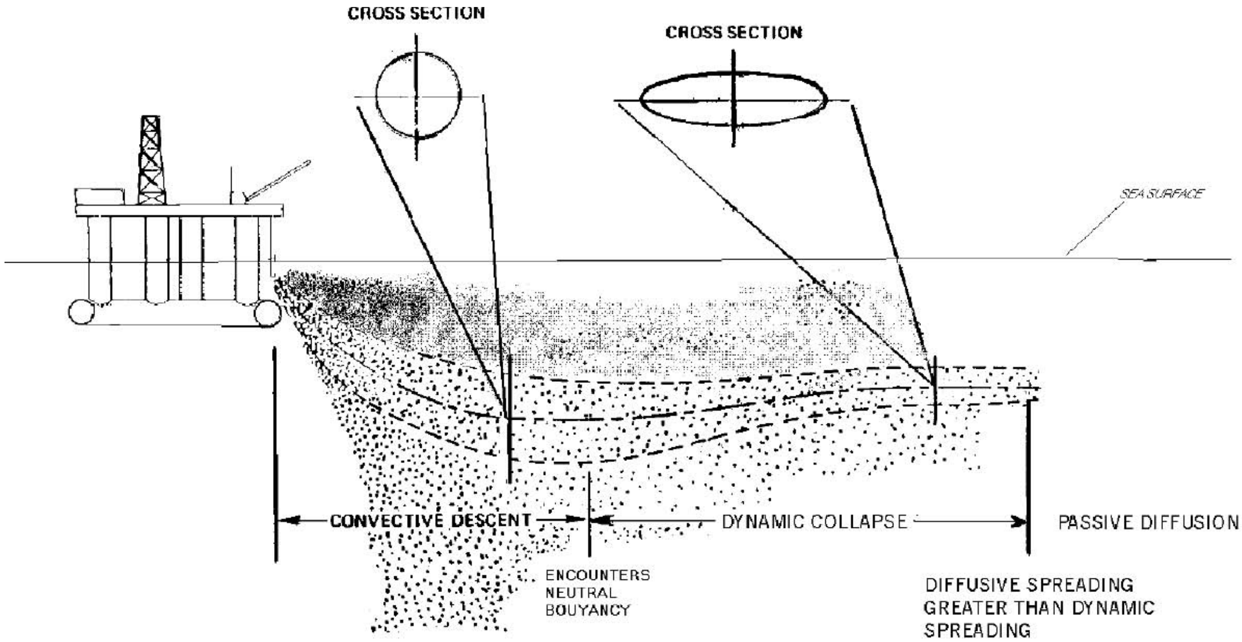
Coats (1991, as cited in MMS, 2001) suggested that discharged drilling muds accounted for 1.97 percent of the suspended sediment flux (direct impingement out of the water column) at one of the near-field stations in CaMP, indicating that this factor could be used to determine barium enrichment. Further, due to this small fraction of total suspended material derived from drilling material, compared to natural sources, any increase in other inorganic contaminants would also be small and be below statistical power to detect changes.

Steinhauer et al. (1991, Chapter 2, as cited in MMS, 2001) noted that after drilling ceased at Platform Hidalgo in 1989, barium levels gradually declined to near-background by October 1989 (between 749 and 959 µg/g). Overall, within 1.5 years after drilling ceased in the Arguello Field, barium collected in sediment traps had dropped to background. Since barium can be reliably used to trace fates of drilling mud discharges, it can be reasonably concluded that the drilling discharges from the Hidalgo drilling activity were also dispersed to background.

Dispersion of discharged drilling muds occurs upon initial discharge by local mid-depth and near-bottom currents, and later by bottom currents resuspending the material. A good example of the type of mid-depth and near-bottom currents that disperse drilling mud discharges was noted during the CaMP studies (Coats, 1991; Savoie et al., 1991, as cited in MMS, 2001). To a large extent, fluctuations in mid-depth current flow dictated trajectories and depositional patterns of drilling muds, while near-bottom currents played a major role in resuspension and further dispersion of this effluent (surface waves — even during storm conditions — did not influence resuspension dynamics due to the water depth). At the Point Arguello area, where this study was conducted, mid-depth and near-bottom currents followed isobaths to the extent that drilling discharges were deposited parallel to shore in a fairly narrow band. Currents in this area were poleward at mid-depth (54 m (173 ft)) and near-bottom (126 m [403 ft]) and did not exhibit a seasonal reversal, as did surface currents, although they did weaken around the same time.

Once a drilling fluid plume has passed through the influence of the initial gravity-driven phase of the discharge (labeled as dynamic collapse in Figure 5.6-1), it begins to disperse by passive diffusion. The fine clay particulate material, commonly used in drilling fluids, tend to flocculate (clump together) when they contact seawater. This electrostatically driven process results in much of the particulate settling to the sea floor sooner than if flocculation did not occur. Some of the clay particles do not flocculate. These may remain in the water column indefinitely, eventually diffusing to background levels. These lighter, smaller particles have been calculated to dilute to greater than 1,500 to 1 beyond a distance of 32 to 96 m (100 to 300 ft) from the point of discharge (A. D. Little, 1984a, as cited in MMS, 2001). Between 70 and 80 percent of the drilling mud volume was water (sea or fresh) while fractions of coarse sand, coarse silt and slit/clay ranged (in percent) from 0.77 to 1.55; 9.91 to 12.28; and 7.27 to 17.87, respectively.

Figure 5.6-1.
Idealized View of Drilling Mud Discharge – Not to Scale (from Battelle, 1991).



Modeled seafloor deposition of solids, based on discharges and oceanographic conditions at Platform Hidalgo, showed that only 17 to 20 percent of the solids settled out within a 16.6-hour period (Coats, 1991, as cited in MMS, 2001). The remaining 80 percent of the solids would be distributed over an increasingly large volume of water and area of seafloor resulting in very small, and probably undetectable, additions to the ambient levels of particulate material. Similarly, sediment traps and subsequent modeling at Platform Hermosa showed that heavier particles fell close to the platform and covered about 2.75 km^2 (679.5 acres) while silts and clays were widely dispersed (greater than 16 km (9.9 miles) in some cases). Measured current speeds of 7 cm/s (0.14 knots) were strong enough to transport material about 6 km/day (3.7 miles/day).

Given a discharge depth of 34 m (111 ft), a water depth of 183 m (603 ft), an average current speed of 7 cm/s (0.15 knots), and the following sinking rates per 100 m (310 ft): (sand/and other coarse materials, 0.32 hours; coarse silt, 20 hours, light slit/clay, 56 hours), it can be seen that the lighter particles would be very widely dispersed in a large volume of water. While the concentration of mud particulates could exceed the ambient concentration by about 500 times during a mud dump at 100 m (320 ft) from the discharge point (according to a generalized model), this condition is temporary due to dispersion of the particulate material over a wide area and throughout the water column.

Modeling at the end of the CaMP studies confirmed this assumption of wide dispersion, giving an average bottom accumulation of drilling particulate material of 1.5 to 7.5 microns (1 micron equal 1 millionth of a meter), corresponding to a very large footprint of 100 to 550 km^2 (24,710 to 135,905 acres) depending on particle size, as well as the dispersion of 40 to 80 percent of the finest-grained material beyond the study region (SAIC and MEC, 1995, as cited in MMS, 2001). One source of information that explains why so much of the finer particulate material remains in the water column comes from Kolpack et al. (1972, as cited in MMS, 2001). In this paper, the authors noted that flood-associated sediments from rivers formed several mid-water sediment layers associated with thermal stratification. These mid-water density strata prevented some fine particulate matter from settling to the sea floor and were, instead, advected with mid-water column currents. If a drilling mud outfall was above a sufficiently strong thermocline, then much of the fine particulate material could be advected within the mid-water column currents in much the same way as the documented river sediments.

Resuspension of Drilling Muds. Boundary layer (near-bottom) currents cause resuspension of drilling muds, as well as natural sediments, and are the other primary factor in the dissipation of drilling discharge particulates (Parr et al., 1991, as cited in MMS, 2001). In nondepositional environments with relatively strong currents, the mud solids may be resuspended from their original site of deposition and be moved to lower energy areas. Resuspension of surficial sediment in the Point Arguello area averaged over 25 g/m^2/day, and was the most likely source for much of the material captured by sediment traps since the ambient fallout of detrital and terrigenous material ranged from 0.6 to 2.5 g/m2/day (Steinhauer et al., 1991, Chapter 6, as cited in MMS, 2001). However, resuspension of drilling muds is not considered a water quality issue for two reasons: (1) no resuspension process would raise sedimentary material greater than one or two meters above the sea floor; and, (2) the same resuspension process that moves drilling mud material would also raise natural sediments, further mixing the two together and dispersing the drilling mud component.

As noted above, several aspects of drilling muds can affect water quality. These include turbidity, hydrocarbons, metals, and additives. These are discussed briefly below.

Turbidity. Increases in turbidity would arise from the discharge of drilling muds and cuttings. The new General NPDES Permit does not directly regulate this parameter. While it is apparent from the discussion above that much of the drilling mud fraction remains in the water column for extended distances and periods of time, dispersion processes continue to work on the particulate, spreading it in three dimensions. This process would eventually reduce the particulate loading to background. A conservative estimate for drilling-related particulates to reach background is 7,000 m (22,960 ft). However, natural variations in particulates range widely throughout the water column, up to several orders of magnitude greater than measured background levels (SAIC and MEC, 1995, as cited in MMS, 2001). Thus, any increase in particulate material due to drilling activities, even over a wide area, would not cause an impact to water quality since it would be temporary and transient, within natural variability, and dispersed to background.

Metals. Barium, chromium, cadmium, mercury, iron, zinc, lead, arsenic, nickel and copper can all be found in drilling muds. However, only barium, in the form of barite (barium sulfate — $BaSO_4$ — the form of barium that is added to drilling muds) is added to mud formulations. Iron is generally not present while many of the others, including silver, vanadium, cadmium, mercury, arsenic, nickel and copper, are contaminants in barite. Lead and zinc were detected during the CaMP studies and were traced back to the use of pipe dope, a material used to lubricate the threads on drilling pipe when building or taking apart drill pipe strings (SAIC and MEC, 1995, as cited in MMS, 2001).

Seawater background concentrations of metals are (in µg/l): arsenic, 3; copper, 2; mercury, 0.0005; silver, 0.16; and zinc, 8 (EPA, 2000a, as cited in MMS, 2001). All other metals are presumed not to occur in sea water at detectable levels. By comparison these metals were found in drilling mud samples taken from the mud pits on the platform, before discharge, to be (in µg/g dry weight2): arsenic, 0.28; copper, 30; mercury, 0.13; silver, 0.28; and zinc, 290 (Steinhauer et al., 1991, Chapter 6, as cited in MMS, 2001). As can be seen, some metals are higher, some lower and some about the same as in natural seawater. All the metals in drilling fluids, except barium, are found in the less than 1 ppm range. Additionally, once the effluent is discharged and becomes dispersed, as discussed above, levels of the metals in the effluent would decrease to background.

Further, Steinhauer et al. (1991, as cited in MMS, 2001) found that zinc and barium were the only metals analyzed from drilling mud samples at Platform Hidalgo found to be significantly higher than those found in the surface sediments. Similarly, only concentrations of lead, zinc and barium were significantly elevated in drill cuttings relative to concentrations in marine sediments. The presence of lead and zinc in the CaMP study, while unexpected but detectable, was judged to not have any impact on the benthic environment by SAIC and MEC (1995, as cited in MMS, 2001).

Neither barium nor iron (as an alternative to barite) are monitored in the new General Permit. Only mercury and cadmium are monitored in the barite. EPA's justification for this is that, so-called "clean" barite would exhibit low levels of contamination of, not only mercury and cadmium, but of the other metals, as well (EPA, 2000b, as cited in MMS, 2001). The use of chromlignosulfonate is specifically prohibited due to the potential presence of hexavalent chromium, a toxic form of chromium. As a result, the EPA does not require a full metals analysis of drilling fluid formulations in the new General NPDES Permit. None of the metals used or contained in the drilling muds for these activities would cause impacts to water quality.

Additives. The new (and old) General NPDES permit allows the use of eight generic mud types. These eight types were determined by the EPA to be of low toxicity. Additives commonly used in one or more of the eight generic drilling fluids include bentonite, barite, caustic, lignosulfonate, lignite, lime, sodium bicarbonate, cellulose polymers. Because of the low toxicity of the eight generic muds, the EPA determined that these eight types not cause harm to the water quality or the organisms in the water as long as the operator stays within the permissible contents of the various additives (EPA 1984, as cited in MMS, 2001).

Drilled Cuttings

Drilled cuttings are produced as a result of the drill bit pulverizing penetrated formations. Sizes of cuttings range from pebble (about 0.6 cm (0.25 inches) to fine sand (less than 0.25 cm [1/10 inches]). Cuttings also vary in terms of specific gravity, of density, which, along with size, determines how fast they sink in water. Denser and larger particles will sink faster than, for example particles of the same size but are less dense. Because of their large size and weight (relative to drilling mud particulates, which are clay-sized and of nearly the same density), drilled cuttings fall more quickly through the water column than drilling muds. The references to "coarse material" in the above discussion on drilling muds refer to cuttings. While the fall is not vertical, no cuttings are expected to remain in the water column more than an hour after they leave the end of the disposal caisson (de Margerie, 1989), which would be between 30 m and 40 m (100 and 130 ft) below the sea surface.

Little research has been conducted on drilled cuttings due to this tendency to fall more directly to the sea floor and contact a limited area of the sea floor near the discharge point. However, an estimated maximum of 33 percent of the cuttings volume could be drilling muds adhering to the cuttings (de Margerie, 1989, as cited in MMS, 2001). Consequently, while there would be a continuous plume of muds that come loose from the cuttings during their fall through the water column, some proportion of the cuttings pile near the base of the drilling vessel would consist of muds.

Steinhauer et al. (1991, as cited in MMS, 2001) conducted an analysis of drilled cuttings discharged from Platform Hidalgo during the CaMP studies. Similarly to the analysis of metals in drilling muds, only lead zinc and barium were significantly elevated above the background levels found in the natural sediments. The authors surmised that barium was elevated due, in part, to drilling through barium-enhanced sediments, as well as from the remainder of drilling muds that adhered to the cuttings. The source of the lead and zinc was from the pipe dope, as noted above.

Since the cuttings would not remain in the water column for very long and fall relatively close to the discharge point, there would be no impacts to the water quality.

Produced Water

Produced water from existing and future offshore oil and gas facilities may have an effect on water quality. Materials such as oil and grease and other hydrocarbons (for example, benzene, toluene, xylene, phenol, naphthalene, and compounds of similar structure), metals, including arsenic, cadmium, chromium, lead, mercury, nickel, silver and zinc, and some inorganic compounds, such as sulfides and cyanides may be present in produced waters.

Produced water discharges under the NPDES regulations are under the purview of the EPA. The effluent is treated prior to discharge by various means. The most common treatment system used involves a combination of heat, chemicals (for example, emulsion breakers) and the use of mechanical forces (such as corrugated plates, bubbling air, etc.). Since NPDES permits allow up to a daily maximum of 42 ppm dissolved components of oil to remain in the effluent some amount of oil is discharged into the sea with this effluent.

The National Research Council (NRC, 1985, as cited in MMS, 2001) used estimates of the amount of oil dissolved in produced water effluents and multiplied by the amount of produced water discharged for the United States as a whole. The authors gave three levels of dissolved oil in produced water: 35 ppm; 50 ppm; and, 70 ppm (due to a range of NPDES permit limits at the time). The resulting annual, nation-wide, amount of oil discharged into the sea per year from produced water effluents were 10,900 bbl (30 ppm), 15,600 bbl (50 ppm), and 21,800 bbl (70 ppm); no estimate was given for MMS OCS Regions.

For the decade from 1989 to 1998, a spreadsheet compiled by MMS (Dave Panzer, MMS, pers. comm., 2001, as cited in MMS, 2001) indicated that a range of 615.5 bbl (30 ppm), 1,025.9 bbl (50 ppm), and 1,477 bbl (72 ppm) were estimated to have been discharged into the Pacific OCS waters. All of these estimates are high because not all of the currently discharging 13 platforms discharged produced water for the entire decade. Table 5.6-2 shows the number of platforms in the Pacific OCS Region and how many discharged produced water. Also, the NPDES permit limit for oil and grease is given. As the table shows, 8 platforms discharged produced water for the entire decade, while others discharged for fewer years. Of a total of 160 possible platform-years (16 discharging platform times 10 years) of discharging produced water, 129 platform-years of produced water was actually discharged, or a factor of 80 percent of the total possible platform-years (129/160). Modifying the values given above by a factor of 80 percent results in barrels of oil discharged in the produced water effluent by all platforms in the Pacific OCS Region of 492 bbl (30 ppm); 820.7 bbl (50 ppm) and 1,182.7 bbl (72 ppm). To reiterate, this is the estimated amount of dissolved oil discharged into Pacific OCS water for the decade from 1989 to 1998. It would be inaccurate to estimate the amount of oil discharged into the sea from produced water effluent by year since the number and identity of the platforms changed throughout the period, including the amount of oil and grease allowed in any particular platform's NPDES permit.

All of the components in produced water, except the temperature of the discharge in most cases, are high relative to the ambient characteristics of the receiving water. All of these aspects, thus, could affect or change the water quality. However, EPA allows dilution of the regulated components of the effluent (except oil and grease) to a 100 m (320 ft) radius, at which point the effluent must meet the permit limits. For the new General permit these limits are either Federal limits or California Ocean Plan limits, whichever is more restrictive. The calculated dilution ratio for many platforms range from about 500:1 to nearly 2,000:1. This means that any value of a monitored produced water parameter sampled at the NPDES sampling point on the platform would be divided by 500 to 2,000 to determine compliance with the permit. While this does not ameliorate any of the affects noted above, within 100 m (320 ft) of the discharge point it does help to ensure that water quality limits are not exceeded beyond 100 m (320 ft) from the platform.

Table 5.6-2. Platforms that Have Discharged Produced Water, the Number of Years Discharging, and the NPDES Permit Limit for Oil and Grease

Platform	Years Discharged (1989–1998)	NPDES Oil and Grease Permit Limit (ppm)	Platform	Years Discharged (1989–1998)	NPDES Oil and Grease Permit Limit (ppm)
Edith	10	72	C	8	72
Gail	10	29	Harmony	7	29
Gilda	10	72	Harvest	7	72
Habitat	10	72	Hidalgo	7	72
Hogan	10	72	Hermosa	7	72
Hillhouse	10	72	Grace	6	29
A	10	72	Gina	4	72
B	10	72	Irene	3	29

The above discussion notwithstanding, a few studies on produced water have shown that, while changes in water quality parameters may not be detectable, some results have suggested that processes may occur that may be more far-reaching than EPA's 100 m (320 ft) regulatory limit. For example:

- Osenberg et al. (1992, as cited in MMS, 2001) found that mussel tissue growth increased with increasing distance from the Carpinteria produced water outfall.[2] This trend was noted out to at least 500 m (1,600 ft).
- Osenberg et al. (1992, as cited in MMS, 2001) also found that barium uptake in the shells of outplanted mussels generally decreased with distance from the outfall. This data was somewhat confounded since for some data collections, for unknown reasons, there was no clear trend with distance. This was unexpected since barium commonly precipitates (forms solids) in the presence of sulfates, which are abundant in nearshore waters (Higashi et al., 1997).
- Raimondi and Schmitt (1992, as cited in MMS, 2001) found that planktonic larvae (red abalone larvae) can be adversely affected by produced water plumes, even from the open coast, high energy environment outfall at Carpinteria, and at distances beyond which modeled produced water effluents indicated that background concentrations should be occurring.
- Waterborne contaminants may have caused effects over a much greater spatial scale than did the particulate fractions (Osenberg et al., 1992, as cited in MMS, 2001). This was consistent with laboratory findings where the water-soluble fraction of the Carpinteria produced water was responsible for the most biological effects (Higashi et al., 1992, as cited in MMS, 2001).
- Krause et al. (1992, as cited in MMS, 2001) found that laboratory tests on sea urchin larvae development showed effects at concentrations down to 1 ppm, about what the concentration would be at 500 m (1,600 ft) from the open coast, high energy environment outfall at Carpinteria.
- Krause (1993, as cited in MMS, 2001) found up to a 10 percent reduction in sea urchin egg fertilization at concentrations of greater than a factor of 106.
- Raimondi and Reed (1996, as cited in MMS, 2001) found that, in general, physical/chemical predictors were poor indicators of biological impact. For example, they noted that although barium uptake in the shells of mussels was seen at 500 and 1,000 m (1,600 and 3,200 ft, respectively) from the Carpinteria outfall, concentrations of produced water and the barium were as low as 0.0001 percent of the whole effluent.
- Washburn et al. (1998, as cited in MMS, 2001) found that modeled runs of the Carpinteria outfall produced results similar to and supportive of the biological effects found by the above authors.

Within 100 m (320 ft) of the discharge point, Wagner (1994, as cited in MMS, 2001) conducted bioassays on two species of mysids (opossum shrimp) with produced water at concentrations ranging from 0.18

[2] Since this particular study site was in 10 to 12 m (33 to 40 ft) water depth, it may not be directly applicable to a similar situation at an offshore platform because of the water depth and the ability of a produced water plume to spread and disperse vertically as well as horizontally.

percent to 10 percent of the whole produced water effluent. These ranges of concentration would certainly be within 100 m (320 ft) of any produced water discharge point in the offshore California OCS. For example the range of current dilution ratios is 467:1 to 2,481:1. Putting these ratios in terms of concentrations reveals that, for example, a dilution ratio of 10:1 would equal a concentration of 10 percent.

Wagner's endpoints were Lowest Observed Effect Concentration (LOEC) for both survival and growth, defined as the lowest concentration at which survival or growth effects are statistically significantly different from the control (the lower the value, the more toxic the produced water). The LOECs for survival ranged from 3.2 percent to 10 percent while the LOECs for growth ranged from 0.18 percent to 7 percent. As is evident, Wagner's test concentrations, in dilution ratio terms, ranged from 180:1 to 10:1, all of which would be well within 100 m (320 ft) of the discharging platforms (although it is unknown how far this might be).

One important aspect of the results presented in Wagner (1994, as cited in MMS, 2001) can be seen in her Figures 10 through 12. There was no indication of effects on survival until at least concentrations of 1.5 to 2 percent (150:1 to 200:1 dilution). Once that point was reached, however, test animal survival decreased markedly. While growth also decreased with increasing concentration, the "break point" at which changes began to appear occurred at slightly lower concentrations than those of survival (1 to about 1.5 percent). While this conclusion may be intuitive (that is, nonlethal effects would occur at lower concentrations than lethal ones), Wagner's results are nevertheless instructive regarding application of the laboratory results to the field, such as the distance between the discharge point and where those effects might occur.

Similarly, Cherr et al. (1993, as cited in MMS, 2001) found that at (what the investigators stated to be) low concentrations of produced water, ranging from 3 to 10 percent, caused morphological changes in purple sea urchin (*Strongylocentrotus purpuratus*) embryos. Contrarily, experimental results indicated that kelp gametophytes were not particularly sensitive to produced water. However, preliminary results did indicate that produced water caused inhibition in the nuclear processes of gametophyte development (Cherr and Fan, 1996, as cited in MMS, 2001).

The results given above, when taken together, indicate that more information is needed to ensure that produced water discharges, indeed, do not change water quality parameters to the extent that biological systems are impacted. Ongoing and future studies are anticipated to provide a better estimate of concentrations and dilution with distance both from the discharge point to 100 m (320 ft) as well as to points beyond 1,000 m (3,200 ft).

Other Effluents

- **Well Treatment, Completion and Workover Fluids.** Well completion fluids are salt solutions, weighted brines, polymers, and various additives used to prevent damage to the well bore during operations which prepare the drilled well for hydrocarbon production (EPA, 2000b, as cited in MMS, 2001). The General permit would require volume monitoring, no discharge of free oil monitored by using a static sheen test and a once per job oil and grease samples with limits set at 29 mg/l monthly average or 42 mg/l daily maximum (EPA, 2000a, as cited in MMS, 2001).
- **Deck Drainage.** Deck drainage is mostly water that contains materials that is washed from the decks into drains and thence into the sea. Materials on the deck may range from small spills of hydrocarbons, drilling-related material, and cleaning solutions. The decks may be washed down, testing of fire systems may wash these materials down the drains, or rain may fall. The drains lead to a tank where solids fall to the bottom and any hydrocarbons float to the surface. In some cases, hydrocarbons are removed by treatment in an oil-water separator of some type. The solids would eventually be removed, containerized, and sent to shore for disposal while the hydrocarbons would be collected and stored until they can be added to the test barge. The new General permit would require volume monitoring and no discharge of free oil, monitored by visual observations.

- **Sanitary and Domestic Wastes.** Sanitary wastes are human body wastes from toilets and urinals. These wastes are treated by treatment machines onboard the platforms and include maceration and the addition of chlorine to kill fecal coliform bacteria. Chlorine is limited to less than 10 mg/l but greater than, and as close as possible, to 1 mg/l. Domestic wastes are materials from sinks, showers, laundries, safety showers, eyewash stations, and galleys. No treatment of these materials is necessary. However, if foam appears on the sea surface, then domestic wastes must be checked to ascertain if the foam is coming from there. The above requirements apply only for facilities manned by more than 10 persons.
- **Blowout Preventer Fluid.** These are fluids used to actuate the hydraulic equipment on blowout preventers. During testing or use, they could be spilled. No discharge of free oil, floating solids or foam is permitted.
- **Desalination Unit Wastes (Brines).** This effluent is wastewater associated with the process of creating fresh water from seawater. It is in the form of concentrated seawater, usually around 40 parts per thousand (ppt). No floating solids or foam re permitted.
- **Fire Control System Test Water.** This effluent is seawater used during the training of personnel in fire protection and the testing and maintenance of fire protection equipment. This water may be treated with chlorine or other biocide to control fouling of the piping. Permit requirements include a monthly chemical inventory, monitoring of chlorine used, no floating solids or foam.
- **Non-Contact Cooling Water.** This effluent is seawater used to cool machinery via heat exchangers. The water does not contact the machinery itself, it merely removes heat and is discharged directly into the sea. Permit requirements address flow rate, chemical inventory, chlorine monitoring and no floating solids or foam.
- **Ballast and Storage Displacement Water.** This is seawater used to stabilize MODUs and other vessels draft and trim. Permit requirements address flow rate, prohibit discharge of free oil, and prohibit floating solids or foam.
- **Bilge Water.** Bilge water is seawater which collects in the lower internal areas of a drilling vessel's hull and may be contaminated with oil and grease or rust. Bilge water is directed to an oil/water separator before discharge, which occurs intermittently. Permit requirements address flow rate, chemical inventory, chlorine monitoring and no floating solids or foam.
- **Boiler Blowdown.** This is the discharge of circulation water and minerals from boilers necessary to minimize solids build-up in the boilers (if any). This is an intermittent discharge. The General Permit specifies no floating solids or foam.
- **Test Fluids.** These are discharges that could occur if hydrocarbons are tested for formation pressure and content. Permit requirements address flow rate, no discharge of free oil, chemical inventory, no discharge of floating solids or foam.
- **Bulk Transfer Material Overflow.** This refers to bulk materials, such as barite, bentonite, or cement which may be discharged during transfer operations from supply ships to platform. This often takes the form of dust in the form of small particles of the material being blown through the loading system below the sea surface. Permit requirements specify no discharge of floating solids or foam.
- **Uncontaminated Freshwater.** This effluent could come from such sources as air conditioning condensate or potable water transfer operation spills. Permit requirements specify no discharge of floating solids or foam.
- **Laboratory Wastes.** This discharge includes small volumes of discharges associated with laboratory testing occurring on the platform. Given the small volume of this waste, it is not expected to pose an environmental risk. Permit limitations include no discharge of free oil, no discharge of floating solids or foam.
- **Excess Cement Slurry, and Drilling Muds, Cuttings, and Cement at the Seafloor.** These wastes result from marine riser disconnect and well abandonment and plugging. Permit limits specify no discharge of free oil, no discharge of floating solids or foam.
- **Hydrotest Water.** This effluent is water used to test the integrity of pipes. Permit requirements address flow rate, chemical inventory chlorine and prohibitions on oil, floating solids and foam.
- **Hydrogen Sulfide Gas Processing Water.** This effluent is wastewater related to the processing of hydrogen sulfide gas on platforms. Permit limits include flow rate, and prohibitions on floating solids, foam and free oil.

None of the discharges described above, except for produced water and muds and cuttings, would affect the water quality within the study area.

Oil Spills

Section 5.3 discusses the cumulative oil spill risk for the study area, as well as probabilities and mean spill sizes. Effects on water quality from oil spills can range from a few days to several weeks or months, depending on the size of the spill, the type of oil spilled, and the response dedicated to the spill. Expected water quality effects due to spills could occur in the top 10 to 20 m (32 to 64 ft) of the water column, depending on sea state and the type of oil. These effects include turbidity, biological and chemical oxygen demand and release of hydrocarbons, such as BETX (benzene, ethylbenzene, toluene and xylene), into the water column. The surface slick would be affected by several factors including wind and wave action, dissolution, and volatilization losses. The majority of the dissolved components (BETX and others, which make up about 20 to 50 percent of crude oils) would be lost to volatilization and other processes with 24 to 48 hours (Jordan and Payne, 1980, as cited in MMS, 2001). They would also be subject to dispersion and dilution, as well as to degradation via photolysis and microbial processes. Clean-up actions would also contribute to the minimization of impacts to water quality.

In addition to the spills discussed below, small spills, in the range of less than 1 bbl to 5 to 10 bbl, may occur from any of several sources (for example, minor platform operational mishaps or diesel transfers). For these sized spills, no impacts to water quality would be expected.

A 200 bbl spill. Historically, responses to spills of this size have lasted from a few days to a couple of weeks before mechanical recovery and natural processes removed the oil from the sea surface (for example, Platform Irene pipeline, 1997 and Platform Heritage, 1996). Meanwhile, processes within the water column, such as dispersion and dissolution, would have served to spread various light-end hydrocarbons (benzene, ethylbenzene, toluene and xylene) to background levels. Depending on the oil, these light-end hydrocarbons would vary in concentration in the water column. Also, depending on the sea state, mixing of oil and its components into the water column would contribute to dispersion, perhaps as deep as 10 m (32 ft), until background levels were reached.

A 2,000 bbl pipeline spill. There has never been a pipeline spill of this magnitude in the Pacific OCS. While the Platform Irene spill emanated from a pipeline, the amount of oil spilled was estimated to be 163 bbl. Another aspect of pipeline spills that is somewhat confounding, compared to spills from facilities or tankers (see below), is that some pipelines carry wet oil and others dry oil. Wet oil has not been dewatered and may carry as much as 80 percent water and only 20 percent oil. This was the case for the Platform Irene spill. The total amount of fluid escaping from the pipeline for that spill was estimated to be 815 bbl.

It is unclear what effect the presence or absence of water in an oil spill would have on the fate of oil that emerges into the water column from a pipeline laying on sea floor. It depends, in part, on the emulsion characteristics of the oil/water mixture and how well mixed and tightly bound that mixture is. For example, some amount of the fluid spilled during the Irene event was water only, separated on the bottom of the pipeline, but not emulsified with the oil. This water probably had dissolved portion of oil in it and was dispersed and diluted into the water column. If a 2,000 bbl spill occurred under these circumstances, water quality could be affected for several kilometers down-current. However, this would dissipate after several days to background.

Dry oil spills would contribute dissolved components from the bottom to the sea surface for as long as the oil leaked from the pipeline.[3] However, since most of the oil would eventually arrive at the sea surface, the depth of the water through which the oil passed would define the amount of hydrocarbons from the oil would remain in the water column. The resulting hydrocarbon plume would disperse more or less rapidly depending on the type of oil, water depth, current speed, and sea state. Once this subsurface plume dissipates, the remaining oil on the sea surface would be subject to the same processes as described above for the 200 bbl spill, except that much of the dissolved components would have been removed during the passage of the oil through the water column. Under this scenario, more water column effects would probably occur during the initial spill than later.

Non-Offshore Oil and Gas Activities

Water quality in the study area may be generally divided into two subregions. These subregions include:

- Point Sur to the western entrance of the Santa Barbara Channel; and
- The northern Southern California Bight: Santa Barbara Channel to Point Fermin

These subregions are generally based on the level of activity that is occurring both onshore and offshore. For example, traveling from north to south, population, shipping traffic, nonpoint pollution sources, and on- and offshore oil and gas activities increase, while river runoff generally decreases. These factors result in a general increase in pollution from north to south in the coastal ocean.

Municipal and Industrial Wastewater Discharges. Only two Publicly Owned Treatment Works (POTWs), or sewage treatment plants, discharge directly into the Pacific Ocean in San Luis Obispo County (Table 4.6-4). Three others discharge into local rivers which empty into the ocean. All the dischargers are small, according to EPA criteria (less than 25 million gallons per day (mgd)). There are six POTWs that discharge treated effluent to the Santa Barbara Channel (Table 4.6-6). They are all small dischargers whose effluents are at a mixed primary/secondary level of treatment (SCCWRP, 1996, as cited in MMS, 2001). Only a few other point sources of pollution exist along the shorelines of the Channel, including several power plants spaced along the Santa Barbara, Ventura and northern Los Angeles County coastlines.

The 1975-1978 BLM-sponsored baseline studies in the Southern California Bight (SCB) indicated that most of the metal and hydrocarbon loads of the four basins examined (Santa Barbara Channel, San Pedro, Santa Monica, and San Nicolas) were derived from industrial and municipal wastes, entering the marine environment through direct discharge, indirect runoff and atmospheric transport, all centering around the Los Angeles metropolitan area (BLM, 1979, as cited in MMS, 2001).

There are no known analyses of trends for POTW-related discharges for the time period under consideration here (2006 to 2030). However, historical trends are that population, overall volumes of discharges, and mass emissions of measured pollutants have all increased. Nevertheless, the rate of increase of mass emission has been less than the other two parameters since treatment technology has improved and been upgraded throughout the study area and agency regulation has been intensified (SCCWRP, 1996; 1998, as cited in MMS, 2001).

River Plumes. The Santa Maria River, on the border of Santa Barbara and San Luis Obispo Counties, and the Santa Ynez River, which flows into the ocean between Points Purisima and Arguello, are the major sources of pollution that could exist in the San Luis Obispo/northern Santa Barbara County area. Pollutants to the coastal ocean that could be associated with these rivers are predominantly agriculturally based and may include dairy and ranching-related pollutants (for example, animal wastes) and pesticides.

[3] The terms µg/l and µg/g dry weight both represent parts per billion (ppb), and are only loosely comparable since they are determined using different methods. However, this analysis is given to show differences and trends, rather than absolute comparisons, since the effluent undergoes high dilution upon discharge.

The two major rivers that empty into the Santa Barbara Channel, the Santa Clara and Ventura, both in Ventura County, drain a mix of agricultural and urban lands. The plumes for all these rivers, during these periods of high flow, can extend some distance from the shoreline and affect the offshore areas in terms of sediment and possibly some pollution (Hickey and Kaschel, unpubl; Mertes et al., 1998, as cited in MMS, 2001).

The river system with the most particulate discharge is the Ventura/Santa Clara river combination while the Santa Ynez and Santa Maria Rivers do not appear to contribute much sedimentation (Mertes et al., 1998, as cited in MMS, 2001). Hickey and Kaschel (unpublished, as cited in MMS, 2001) show figures during extreme El Niño-like events. During winter, high runoff periods associated with storm and rain conditions followed by upwelling-favorable winds have driven these river plumes south past Point Conception and to the vicinity of San Miguel Island (Hickey and Kaschel, unpublished, as cited in MMS, 2001). These river plumes occur only during periods of very high flow and may cross the Santa Barbara Channel to the waters of the Channel Islands National Marine Sanctuary (for the Ventura/Santa Clara Rivers) and, for the Santa Ynez/Santa Maria River plumes, reach south past Point Conception. Sediments that erode from the land and reach the coast in runoff carry various contaminants bound to sediment particles, including trace metals, organic compounds and phosphorus (NRC, 2001, as cited in MMS, 2001). The sediments themselves can constitute a potentially serious form of pollution, including by decreasing water clarity.

Climatological forecasters from the National Aeronautical and Space Administration (NASA) and the NOAA have indicated that the Pacific Basin has entered a Pacific Decadal Oscillation (PDO). The PDO is a long-term ocean temperature fluctuation of the Pacific Ocean that waxes and wanes approximately every 10 to 20 years (MMS, 2001). As this applies to the rivers in the study area, NASA and NOAA scientists believe that there will be fewer very wet years, such as has often been present during the so called, “El Niño” years. The present cool or negative phase of the PDO looks like, and tends to produce climate similar to, the La Niña of the past two winters and springs, to the extent that rainfall was as much as 20 to 40 percent below normal. While winter rains and the resultant high flows would still occur during this phase of the PDO, the scale of these flows would probably be less and occur less often during any single year.

The largest amount of sediment input into the offshore come from rivers. Consider that from 1986 to 1989, the three Point Arguello platforms, Hermosa, Hidalgo, and Harvest, released an estimated 5,120,000 kg (11,264,000 lbs) of barite, with an annual average of 1,280,000 kg (2,816,000 lbs) (Steinhauer et al., 1991, Chapter 2). At the same time, the rivers draining into the southern Santa Maria Basin (from north to south: Arroyo Grande Creek, the Santa Maria River, San Antonio Creek and the Santa Ynez River) were estimated to have added 650,000 kg/year (1,430,000 lb/year) to the Basin. Since drilling has subsequently ceased on the platforms but runoff has continued, since 1989 an additional 7,150,000 kg (15,730,000 lbs) of barium has been added to the southern Santa Maria Basin from river runoff (because this region of California was experiencing a drought during the 1986 to 1989 drilling period, input of suspended material from rivers was probably less than both normal and El Niño conditions). Nevertheless, the rains that did occur caused near-bottom clouds of suspended sediments several orders of magnitude greater than measured background levels (SAIC and MEC, 1995, as cited in MMS, 2001).

Storm Drains. Storm drain-associated runoff is the largest source of unregulated pollution to the waterways and coastal areas of the United States (CCC, 2000, as cited in MMS, 2001). However, storm drain-associated pollution would be confined to the near-coastal vicinity since, even during high runoff periods, the volume would not be enough to carry pollutants very far offshore. Also, many storm drains empty into local rivers and streams, mixing with those high-flow effluents.

Natural Oil and Gas Seeps. Natural seeps contribute significant amounts of hydrocarbons to the marine environment in the form of locally elevated hydrocarbons in the water column and substantial slicks on the sea surface. Most known seeps occur on the mainland shelf, including at Point Conception, Coal Oil Point and Santa Barbara/Rincon in the Santa Barbara Channel, and in the Santa Monica Bay (Anderson et al., 1993, as cited in MMS, 2001). There may also be natural oil and gas seeps along the central California coast, but there is little information on these. Natural seeps, in general, would have little impact on water quality parameters.

Offshore LNG Facilities. Two offshore LNG facilities may be placed in the project area before 2030. These facilities include the Cabrillo Deepwater Port off Port Hueneme and the Crystal Clearwater Port Project on Platform Grace off Oxnard. A variety of effluents may be discharged into the ocean from these offshore facilities. All ocean discharges would be required to comply with an NPDES permit and would be required to meet pollutant limitations within a specified distance from the discharge. Therefore, adverse effects on water quality would be expected to be limited to within 100 m or so of the discharge point.

5.6.2.2 Incremental Impacts of Exploration and Development of the Undeveloped Leases on Water Quality

Under the hypothetical development scenario potential sources of impact to water quality from exploration and delineation drilling and full development of the undeveloped leases (a total of four platforms) are as follows:

- Cavern Point Unit – exploration and subsequent development from Platform Gail
- Rocky Point Unit – development from Platforms Hermosa and Hidalgo
- Gato Canyon Unit – delineation drilling and development from a new platform
- Bonito Unit – delineation drilling and development from Platform Hidalgo
- Santa Maria Unit – development from a new platform
- Point Sal Unit – delineation drilling and development from a new platform
- Purisima Point Unit – delineation drilling and development from a new platform
- Lease OCS-P 0409 – development from a new platform
- Lion Rock Unit – development from a new platform
- Sword Unit – delineation drilling and development from Platform Hermosa.

The four new platforms are hypothesized to be located on the Point Sal Unit, Santa Maria Unit, and Gato Canyon Units and Lease OCS-P 0409. The following discussions assume such development would occur.

Exploration and Delineation Drilling Activities

Exploration and delineation drilling can affect water quality from turbidity generated during anchoring of the MODU and by effluents discharged from the drilling vessel. Table 5.6-3 lists the potential water quality impacts from delineation drilling. The water quality impacts of anchoring and effluent discharges were described earlier in this section. Turbidity generated by MODU anchors is limited to the near bottom area a few hundred meters from the anchor and is transitory. None of the discharges associated with delineation drilling except muds and cuttings would affect water quality in the study area.

Table 5.6-3. Potential Impacting Agents and the Associated Specific Pollutants, Potential Water Quality Parameters Affected, and the Estimated Distance from the Point of Discharge the Parameter Could Be Affected

Impacting Agent	Pollutant(s)	Affected Water Quality Parameter(s)	Estimated Distance of Effect (meters)*
Anchoring activities	Particulate material	Turbidity	100 to 500
Drilling muds	Particulate material	Turbidity	7,000
	Barium, chromium, cadmium, mercury, iron, zinc, and other metals	Increased metal levels	1,000
	Additives including: sodium bicarbonate, ground nut shells, mica, cellophane, cellulose polymers, starch, aluminum stearate, alcohols, bactericides	General pollution**	1,000
Drilled cuttings	Particulate material	Turbidity	1,000
Well completion fluids	Oil and grease	Increased hydrocarbons	100
Deck drainage	Oil and grease	Increased hydrocarbons	100
Treated sewage	Chlorine	Increases in chlorine	100
	Fecal coliform bacteria	Bacterial contamination	100
	Floating solids and foam	General pollution	At the point of discharge
Domestic wastes	Floating solids and foam	General pollution	At the point of discharge
Excess cement slurry	Particulate material	Increases in turbidity	100
	Carbonates and other chemicals	General pollution	100
Blowout preventer fluid	Oil and grease	Increases in hydrocarbons	100
	Floating solids and foam	General pollution	At the point of discharge
Desalination unit discharge	Floating solids and foam	General pollution	At the point of discharge
Fire control system test water	Floating solids and foam	General pollution	At the point of discharge
	Chlorine (for antifouling)	Increase in chlorine	100
	Chemical inventory (if chemicals are used in the effluent)	General pollution	100
Noncontact cooling water	Floating solids and foam	General pollution	At the point of discharge
	Chlorine (for antifouling)	Increase in chlorine	100
	Chemical inventory (if chemicals are used in the effluent)	General pollution	100
Ballast storage and displacement water	Oil and grease	Increases in hydrocarbons	100
	Floating solids and foam	General pollution	At the point of discharge
Bilge water	Oil and grease	Increases in hydrocarbons	100
	Floating solids and foam	General pollution	At the point of discharge
Boiler blowdown	Floating solids and foam	General pollution	At the point of discharge
Test fluids	Floating solids and foam	General pollution	At the point of discharge
	Chlorine (for antifouling)	Increase in chlorine	100
	Chemical inventory (if chemicals are used in the effluent)	General pollution	100
Uncontaminated water	Floating solids and foam	General pollution	At the point of discharge
Laboratory wastes	Oil and grease	Increases in hydrocarbons	100
	Floating solids and foam	General pollution	At the point of discharge
Muds, cuttings and cement at the sea floor	Oil and grease	Increases in hydrocarbons	100
	Floating solids and foam	General pollution	At the point of discharge

* In most cases this distance may equal background levels or concentrations of the pollutant.
** EPA defines a pollutant as a material that does not occur naturally at the levels input into the receiving waters.
Not all pollutants are specifically regulated via limitations or other monitoring tools.

The impacts of drilling discharges were described in detail and are summarized in the following paragraphs.

Some drilling muds flocculate and fall from the water column to the sea floor. Those that do not flocculate may drift some distance (perhaps greater than 16 km) from the point of discharge. This dispersion process may dilute to 1500 to 1 within 32 to 96 m (100 to 300 ft) from the point of discharge (A. D. Little, 1984a, as cited in MMS, 2001). The fine particulate material may average around 12 percent of the total volume of the drilling mud discharged. While the concentration of mud particulates, during a mud dump, could exceed the ambient concentration by about 500 times at 100 m (320 ft) from the discharge point (according to a generalized model), this condition is temporary due to dispersion of the particulate material over a wide area and throughout the water column. Average bottom accumulation of drilling particulate material of 1.5 to 7.5 microns (1 micron equals 1 millionth of a meter) was measured by SAIC, and MEC (1995, as cited in MMS, 2001), corresponding to a depositional area of 100 to 550 km^2 (24,710 to 123,500 acres) depending on particle size, as well as the dispersion of 40 to 80 percent of the finest-grained material beyond the CaMP study region.

Drilled cuttings fall more quickly to the sea floor than do drill muds and are not expected to remain in the water column more than an hour after they leave the end of the disposal caisson (de Margerie, 1989). A continuous plume of drilling mud drifts from the cuttings discharge due to muds adhering to the cuttings would drift down-current. Also, there would be some amount of mud in the cuttings pile near the base of any facility that had discharged cuttings. Since the cuttings would not remain in the water column for very long and fall relatively close to the discharge point, there would be only negligible impacts to water quality. The earlier discussion in this section also discussed the resuspension of drilling muds, turbidity, and effects of metals and additives, all of which resulted in a finding of low impact to the water quality.

Construction and Installation Activities

Construction and installation activities could include placement of four platforms, which entails the use of a large derrick barge and the attendant anchors. Also, the laying pipelines, through the use of a pipelaying barge would also use many anchor placements and retrievals. These two potential impacting agents to water quality could result in the resuspension of sediments from anchor placement and the actual setting of the platform on the sea floor and the discharge of sewage from the vessels involved in the construction activities.

Resuspension of sediments is a minor water quality issue since these sediments would resettle to the sea floor fairly quickly and be lost in the natural signal of the area. Natural turbidity includes the existing nephaloid layer and episodic pulses of sediments that could come through any of the development sites and arise from onshore river input to the offshore environment. Sewage from the vessels involved in the construction activities are required to be treated in a USCG-approved system. These treatment systems macerate and chlorinate the effluent prior to discharge so that fecal coliform and other harmful bacteria and viruses are killed. At the same time, the amount of chlorine added to the system is carefully controlled so as not to impact marine waters with a high load of chlorine. Some systems include a dechlorinating step, especially for large vessels, so that a large amount of chlorine is removed from the effluent prior to discharge. Only a negligible impact to water quality would occur from any of the construction and installation activities.

Development and Production Activities

The activities discussed in this section include past, present, and foreseeable actions that may produce impacts during the period 2006 through 2030, the period during which assumed development of the undeveloped leases would likely occur. Most of the major impact-producing agents are those discussed above and summarized briefly below. Potential effects from oil spills from offshore oil and gas activities and tankering were also addressed previously in this section.

The following analysis is general, and specific units or groups of units are noted only when appropriate. Nevertheless, the unit-specific development scenarios in Section 5.2 consider the information below and in Table 5.6-3 and Table 5.6-4:

- The location of the platforms due to development of the undeveloped leases
- The number of well slots available on each platform
- The number of wells anticipated to be used for development purposes
- The estimated timeframe for installation and development drilling
- The amount of drilling muds and cuttings estimated to be discharged during development
- The amount of produced water to be discharged during production.

Table 5.6-4. Key Information Necessary for the Qualitative Cumulative Analysis Including the Undeveloped Leases (Most Likely Hypothetical Development Scenario).

Unit / Lease(s) / Water Depth (ft)*	Well Slots	Development Wells	Timing of Development Drilling (total years)	Muds and Cuttings Discharged (10^3 bbl)	Produced Water Discharged (10^6 bbl)**
Gato Canyon / 0460 / 560	28	20	2008–2012 (5)	Muds – 193 Cuttings – 68	39
— / 0409 / 450	60	45	2009–2017 (9)	Muds – 603 Cuttings – 145	115
Point Sal / 0422 / 300	60	49	2009–2020 (12)	Muds – 650 Cuttings – 156	118
Santa Maria / 0431 / 300	60	46	2008–2016 (9)	Muds – 658 Cuttings – 158	90
Sword / 0319, 0320, 0322, 0323A / 603 (Hermosa)	--	10	2009-2014 (5)	Muds – 198 Cuttings – 30	33
Rocky Point / 0452, 0453 / 603 (Hermosa), 430 (Hidalgo)	--	12	2003-2005 (3)	Muds – 165 Cuttings – 25	27
Bonito / 0443, 0445, 0446, 0449, 0450, 0499, 0500 / 603 (Hermosa)	--	7	2010 – 2013 (3)	Muds – 96 Cuttings – 15	16
Cavern Point / 0210, 0527 / 739 (Gail)	--	10	2010 – 2013 (3)	Muds – 198 Cuttings – 30	33
Totals	244	199	--	Muds – 2,761 Cuttings - 627	425

* For the Sword, Rocky Point, Bonito, and Cavern Point Units, the water depth is of the platform from which the Units would be developed.
**Amount of produced water expected to be discharged for the life of the projects.

Drilling Discharges. Table 5.2-1 shows the number of wells expected to be drilled from existing production platforms under the hypothetical development scenario. Currently, it is estimated that 50 new wells would be drilled from existing Pacific OCS platforms in the Santa Barbara Channel and Santa Maria Basin. Production activities are expected to continue on all existing, active platforms until decommissioning (see section on Offshore Facilities Decommissioning, below). In addition, exploratory wells would be drilled on undeveloped leases.

When development on the undeveloped leases is considered, a total of up to 199 wells may be drilled over a period of 13 years, discharging up to 2.8 million bbl of drilling muds and 627,000 bbl of cuttings. These impacts would be transitory and limited to the area around the MODU or platform.

As discussed above in Section 5.6.2.1, during high runoff periods river plumes may extend extensive distances into offshore waters. The river system with the most particulate discharge is the Ventura/Santa Clara river combination while the Santa Ynez and Santa Maria Rivers do not appear to contribute much sedimentation (Mertes et al., 1998, as cited in MMS, 2001). Hickey and Kaschel (unpublished) show figures during extreme El Niño-like events. These river plumes occur only during periods of very high flow and may cross the Santa Barbara Channel to the waters of the Sanctuary (for the Ventura/Santa Clara Rivers) and reach south, past Point Conception, for the Santa Ynez/Santa Maria River plumes. While these events are episodic [seasonal for those described by Mertes et al. (1998, as cited in MMS, 2001) and every 5 to 7 years for the Hickey and Kaschel data], they would nonetheless overwhelm the effects of any particulate material discharged by drilling operations, wherever the two plumes might meet.

Volumes of produced water discharged in the course of developing the undeveloped leases are expected to be equivalent to those estimated for existing Pacific OCS platforms. Of the four platforms presumed to be installed under the development scenarios for this analysis, two would have produced water discharges (Gato Canyon and OSMB B). As was described above, studies of produced water effluents have suggested that water quality parameters can be altered to anywhere from 0 to 1,000 m (0 to 3,200 ft) from the discharge point. However, none of the studies provided any definitive evidence of impacts to either water quality parameters or biological systems. Combined with the strict limitations and monitoring that would be conducted under the new NPDES permit, this would serve to minimize impacts to water quality. None of the other discharges emanating from the platforms would have any effect on water quality.

Offshore Facility Decommissioning. It is expected that no Pacific OCS platforms in the Santa Barbara Channel or Santa Maria Basin would be removed before 2012, and a few may be in place as late as 2025 (or 2035, in the case of Platform Irene if the Tranquillon Ridge development occurs). As discussed above, only suspension of sediments from the sea floor and sewage from the vessels in attendance could change water quality parameters. No impacts to water quality are expected from these activities.

Discharges from these decommissioned platforms would also cease. All the existing platforms would be decommissioned by 2025. Meanwhile, the four platforms that could result from development of the oil fields proposed to be delineated may be installed between 2007 and 2008. Discharges from these new platforms would begin shortly after installation, gradually peaking some 10 to 15 years later. Therefore, by 2025, the approximately 33 million bbl per year that were discharged, as of 1999, would no longer be discharged. Since the existing platforms may be decommissioned in small groups, the 33 million bbl would gradually decline. It is estimated that about 70 percent of that volume would disappear by 2020 and the rest by 2025. The new platforms are estimated to discharge about 3 million bbl per year at peak. Thus, by 2025, compared to today, there would be a net benefit to water quality due to the decommissioning of the existing Pacific OCS facilities, even though about 9 million bbl per year would still be discharged until the decommissioning of the new platforms around 2040 to 2050.

Non-Pacific OCS Pollutant Sources

These include onshore river input, sewage treatment plants (POTWs), and oil spills from non-OCS tankering activities. As has been discussed in several sections previously, river input is episodic in nature, so that for one or two months during winter, most of the sediment is discharged from river outflow. If this occurs during an El Niño event, these pollutants could travel substantial distances into the offshore area. The usual seasonal sedimentary discharge from rivers provides much less of this type of discharge to the offshore area and less pollutants from the mostly agricultural watersheds (with some urban-associated pollutants, as well).

All the POTWs in the study area are small (less than 25 million gallons per day), the largest being Oxnard. All are also subjected to inspections and monitoring by the local Regional Water Quality Control

Boards (RWQCBs) according to the NPDES permit specific to the facility. Any impacts associated with these POTWs are limited, at a maximum, to a few hundred meters from the outfall.

The 22,800 bbl oil spill from a tanker would have similar impacts to water quality as those described above.

There are no impacts to water quality that are unit-specific.

Discharges from offshore LNG facilities in the project area would be regulated and monitored to insure no degradation of water quality.

5.6.3 Summary and Conclusion

Table 5.6-5 summarizes the impacts of each phase of activity resulting from a hypothetical development scenario on each unit for which a suspension has been requested. Exploration and delineation drilling would only occur for the Gato Canyon, Purisima Point and Point Sal Units between 2006 and 2030. Therefore, drilling discharges from drilling on these leases would be the only water quality impacts during the exploration and delineation drilling phase. It is assumed that production would occur for all undeveloped leases. Although new platforms would only be constructed on the Gato Canyon, Santa Maria, and Point Sal Units and OCS-P 0409, the other undeveloped leases either would be developed from those four new platforms or from existing platforms. Although discharges from these other undeveloped leases would not occur within those units, the discharge of drilling waste and produced water associated with their exploration and development would add to cumulative water quality impacts at the platforms where development would occur. In addition, development of these leases would add to the cumulative risk of oil spills.

Overall, for the period 2006 to 2030, exploration and delineation drilling, the installation of four platforms, associated discharges, eventual decommissioning, the two land-based sources of pollution (rivers and POTWs), offshore LNG terminals, and oil spills would cause only a low impact to water quality for the following reasons:

- Installation procedures are limited to sewage discharges from the construction vessels and suspension of sediment from the sea floor. Neither of these would cause impacts to water quality.
- Drilling discharges (muds and cuttings) would either, in the case of cuttings, fall relatively quickly to the sea floor, or, for drilling muds, largely remain in the water column, in which case they would spread and disperse with the predominant currents.
- Produced water, starting early in the development phase, would be discharged for the life of the platforms. The rate of discharge of the effluent would gradually increase, reaching a peak discharge rate some 10 to 15 years after beginning. While there is some evidence that water quality parameters may be changed by this effluent, judging by results from biologically based studies, there is no firm evidence that this effect is very wide-spread or ecologically damaging. Further information is needed.
- Decommissioning of existing platforms would cause the cessation of existing discharges, as well. Thus, there would be a gradual net benefit to water quality (even though the overall impact is low), as existing platforms are removed.
- River-based inputs are very episodic, either seasonally or longer, and can bring some unknown amount of land-based (mainly agricultural with some urban) pollutants. While this potential pollutant input would over lap in time and space with any future development activity, their contribution to the pollutant loading of the study area would greatly exceed those of the discharges from this future activity.
- POTW-based pollution causes only a limited amount water quality impacts due to the relatively small volume of the discharges and the inspections and monitoring conducted by the RWQCBs.

- Oil spills are likely to occur over the next 25 years, according to historical statistics. Effects on water quality would vary with the size of the spill, the type of oil, the sea state and other factors. Spills would generally have a minimal impact on water quality over the long term (MMS, 1996, as cited in MMS, 2001).

Table 5.6-5. Summary of Water Quality Impacts by Unit/Lease and Exploration/Development Phase.

Unit/Lease	Exploration and Delineation Drilling	Development and Production	Decommissioning
Cavern Point	Low Impact	Low (drilling discharges) Low (produced water discharges) Negligible to High (oil spill)	No Impact
Gato Canyon	Low (drilling discharges)	Low (drilling discharges) Low (produced water discharges) Negligible to High (oil spill)	Negligible
Rocky Point	Low Impact	Low (drilling discharges) Low (produced water discharges) Negligible to High (oil spill)	No Impact
Sword	Low Impact	Low (drilling discharges) Low (produced water discharges) Negligible to High (oil spill)	No Impact
Bonito	Low Impact	Low (drilling discharges) Low (produced water discharges) Negligible to High (oil spill)	No Impact
Santa Maria	No Impact	Low (drilling discharges) Low (produced water discharges) Negligible to High (oil spill)	Negligible
Purisima Point	Low (drilling discharges)	Low (drilling discharges) Low (produced water discharges) Negligible to High (oil spill)	No Impact
Point Sal	Low (drilling discharges)	Low (drilling discharges) Low (produced water discharges) Negligible to High (oil spill)	Negligible
Lion Rock	No Impact	Low (drilling discharges) Low (produced water discharges) Negligible to High (oil spill)	No Impact
Lease OCS-P 0409	No Impact	Low (drilling discharges) Low (produced water discharges) Negligible to High (oil spill)	Negligible

5.7 Biological Resources

This section includes discussion of the following resource areas: rocky and sandy beach habitats; seafloor resources; kelp beds; fish resources; marine and coastal birds; marine mammals; and, threatened and endangered species. This section also covers estuarine and wetland habitats, refuges, preserves, and marine sanctuaries, and, onshore biological resources.

5.7.1 Rocky and Sandy Beach Habitats

5.7.1.1 Significance Criteria

The criteria used to assess impacts to these resources are:

- **High.** Impacts that result in a measurable decline in a population beyond that which can be explained by normal variability, result in a measurable change regionally in species composition, ecological function or community structure, or result in a measurable reduction in regionally important habitat are considered to be high impacts. These changes would be at a level, areal extent and duration that would be expected to place an individual species at risk, or alter the community structure or habitat on a regional scale for many years. Irreversible alteration of regionally important habitat or reduction of protected habitat would be considered high impacts.
- **Moderate.** Impacts that result in a measurable decline in species composition, species abundance, ecological function or community structure over several localized areas or result in alteration of locally important habitat are considered moderate impacts. These changes, while individually may persist for many years, are localized and cannot be detected on a population or regional level.
- **Low.** Impacts that result in a short-term change in species abundance or composition, a temporary loss in ecological function or community structure, a short-term disturbance or temporary loss of access to locally important habitat are considered to be low impacts.

High and moderate impacts are considered significant; low impacts are considered to be insignificant.

5.7.1.2 Impacts of Post-Suspension Activities

Cumulative Impacts without Activities on the Undeveloped Leases on Rocky and Sandy Beach Habitat

During the post-suspension period, possible sources of cumulative impacts in the study area include continuing cleanup of the onshore Guadalupe Field diluent spill, new cross-beach pipelines associated with the Cabrillo LNG facility, ongoing and proposed oil and gas activities in Federal and State waters, Alaskan and foreign import tankering, and military operations. There are several sources of natural and anthropogenic impacts to sandy and rocky intertidal beaches that have occurred in the past and would be expected in the future. Cumulative impacts to rocky and sandy beaches can also occur due to public use (collecting, fishing, and trampling), construction activities, pollution events from surface runoff and sewage spills, natural oil seeps, and natural occurrences such an extreme storm events, increased ocean water temperature and spreading of disease.

Disease. The most obvious example of a significant impact from natural diseases affecting beaches is the affect the withering foot disease has had on black abalone in the Santa Barbara Channel. This fatal bacterial disease is encouraged to spread during warmer water trends. It was first noted on the Channel Islands in 1985, and documented on the mainland at the Diablo Canyon nuclear power plant near the cooling water discharges, and at Point Conception during the 1992 El Niño. Mortality from this disease has resulted in staggering declines in abalone abundance along the mainland and islands. Black abalone along the mainland and island has been reduced at least 90 percent from population estimates prior to the disease, a high impact. A similar type of wasting disease, which proliferates during warm water conditions, has also affected sea stars and other echinoderms, though exact estimates of the numbers lost to this disease are not known.

El Niño/Extreme Storm Events. Extreme storm events such as those that occur during El Niño years significantly affect beaches, especially high-energy beaches such as on the southern side of the Channel Islands and on the shoreline north of Point Conception. The types of impact caused by extreme storm events were documented at Ocean Beach during the BLM Baseline Study (Littler, 1979, as cited in MMS, 2001). On sandy beaches, wave action completely removes the sand on one beach and deposits unusually large amounts of sand on another. Storm events can significantly alter the substrate at the beach, changing a sandy beach, for example, to a largely cobble beach, thereby causing moderate impacts. Storms also bring an influx of large masses of debris (trees, large plants, rocks and manmade items such as dishwashers, tires, and sofas) down the river depositing them on the beaches near the river mouth. The debris deposited on beaches following large storm events has been known to preclude nesting shorebirds such as the least tern (pers. comm., L. Roberts, 2001, as cited in MMS, 2001). Wrack (stranded seaweed) found on sandy beaches is often removed in storm events, impacting shorebirds and endangered birds such as the snowy plover whose diet depends heavily on the wrack for sources of beetles and insects, a moderate impact. Impacts to rocky beaches in southern and central California have been documented through the ongoing rocky intertidal monitoring program. The heavy pounding surf in the 1997 El Niño broke off large chunks of rock and pounded the shoreline with entrained logs and debris (Raimondi et al., 1999, as cited in MMS, 2001). Statistically significant changes in species abundance and composition were documented in one or more key species key species at 10 of 11 sites, a moderate impact. Species that had significant declines included mussels, barnacles, and a turf algae, *Endocladia* (Raimondi et al., 1999, as cited in MMS, 2001). While significant changes to abalone habitat were observed due to the strong storm activity, a full analysis could not be done to determine significance due to the black abalone declining trends from withering foot syndrome (Raimondi et al., 1999, as cited in MMS, 2001). Even in the relatively calmer Channel, the 1997 El Niño storm's heavy wave action buried the rocky shoreline at Alegria under several feet of cobble. The most recent data on the Marine monitoring program results suggest that as of 2003, 10 of the 11 taxa are at abundances close to or only slightly lower those observed in the 1990s. Compared to numbers reported in the late 1980s to mid-1990s, the black abalone continues to be a low abundances (<10 individuals/plot) on all of the Channel Islands through the 2003 sampling period (Marine, 2004).

Discussions with C. Blanchette (pers. comm., 2004) indicate that from 1998 through 2003 ochre seastar (*Pisaster ochraceus*) recruitment on the rocky intertidal habitats of the Channel Islands was good, with particularly large numbers on Santa Cruz Island. An increase in the number of seastars with "wasting disease" was coincidental with warmer water periods during the summer of 2004 and the number of seastars per unit area on the Channel Islands. Those that survived the warm water period have since (as of December 2004) recovered and numbers appear to be stable.

Natural Oil Seeps. Over 100 bbl of oil seep naturally every day from shallow oil deposits in the Santa Barbara Channel. This natural occurrence has been documented by several researchers, and has been known to exist along the mainland for hundreds of years dating back to the periods when Native Americans inhabited the region (Galloway, 2001, as cited in MMS, 2001). Some of the largest recorded seeps occur at Coal Oil Point; over 2,000 seeps have been recorded in State waters in the Channel alone. The U.S. Geological Survey and MMS are jointly pursuing a study that would document the location and volume of natural seeps in the Santa Maria Basin. Because seep oil looses some of its properties as it migrates to the surface, tarballs from natural oil seeps can be fingerprinted and differentiated from natural oil produced by existing oil and gas facilities. In depositional areas and areas close to origin of seeps, the oil deposited on the shoreline can be thick. This is true of rocky intertidal habitat at Government Point which lies inshore of several identified active seeps. In other areas, such as at the rocky intertidal beach at Boathouse on Vandenberg Air Force Base (VAFB) or at Jalama State Beach, tarballs are most evident in rocky habitat in the barnacle zone or, in sandy habitat, along high tide bands parallel to the shoreline (Engle, 1994, as cited in MMS, 2001). Tarballs which land in the barnacle zone are persistent for many seasons (Raimondi, 1999, as cited in MMS, 2001). Barnacles covered by natural tar die; however, barnacles would recruit and establish new populations on top of residual tar (Raimondi, 2000, as cited in MMS, 2001). Impacts from natural oil seeps are patchy and chronic and represent low impacts. Recently completed studies (sampling from June 2002 through May 2003) for Santa Barbara County suggest that of the 10 beaches between Casmalia Beach (north of Pt. Conception) to Loon Pt. (near Carpinteria), Coal Oil Point continues to receive the largest average number of tar balls per unit time, followed by Arroyo Burro Beach, approximately 5 miles east of Coal Oil Point (Lorenson, et al., 2004). Data collected and analyzed for this study include “finger printing” that would allow spill and tar ball depositional sources to be identified.

Public Use. The public heavily visits rocky and sandy beaches in southern California and, to a lesser extent, visits accessible locations in central and northern California. Most elementary schools, high schools and colleges have programs that include fieldtrips to the beach, particularly the tidepools. Significant impacts from public use have been documented in several locations in southern California where visitor use is high (Anderson et al., 1993; Engle and Davis, 2000b; Richards, 1998, as cited in MMS, 2001). Potential impacts from public use include: trampling, especially detrimental to fragile algal communities; overturned rocks; displaced marine life; collecting of mussels and other invertebrates for fish bait; collecting of limpets, mussels, seaweeds and snails for consumption; and depositing potentially toxic trash. Because of the high visitor use and extreme pressure on the beaches from populated southern California, these individual public impacts are cumulatively significant and range from moderate to high impacts. Due to the concern, several programs have been piloted in high-use areas to control public use. It appears these programs to control public use and collecting may be successful where they are strictly enforced; however, cumulative impacts from other sources are still impacting resources (Engle and Davis, 2000b, as cited in MMS, 2001). Kido and Murray (2003) found that the mean size of owl limpets (*Lottia gigantea*), an intertidal mollusk, was substantially larger within Marine Protected Areas where human visitation and collection was lower than in areas that were open to the public.

Construction Activities. Onshore construction of homes, hotels, commercial businesses, roads in the populated southern California area has impacted sandy and rocky intertidal beaches directly through the construction of water, sewage, cable and oil and gas pipelines, walkways, piers, jetties, and parking lots on and near the beach. These activities significantly modify or eliminate habitat in localized areas, a moderate impact. Indirect impacts include increased public use and increased pollution events (see discussion below) creating moderate to high impacts.

Pollution Events. Anthropogenic sources of pollution include sewage leaks, surface runoff, leaky tank farms, warm water discharges from nuclear energy facilities, and onshore and offshore oil spills from existing Federal and State facilities. As referenced above, these impacts range from moderate to high.

Sewage, Surface Runoff, and Thermal Discharges. Sewage leaks are reported often throughout southern California, especially during heavy rains due to overflow. Small overflow problems would cause temporary beach closure due to public health risks but would only be expected to affect biota on the beach at a low level. Large leaks and smaller, chronic leaks, however, could cause impacts to beach biota due to the increased nutrient load and decreased oxygen. Impacts from sewage outfalls include reduced species diversity and complexity, increased cover of opportunistic algae and diatoms, and increased silt in turf habitats (Engle and Davis, 2000a, as cited in MMS, 2001). Significant changes in species composition over localized areas could occur, particularly in closed systems, due to a species shift toward organisms tolerant of anoxic conditions, resulting in moderate impacts. Chronic incidents such as the leaking oil tanks at Avila Beach, the seeping diluent at the onshore Guadalupe oil fields and the ongoing chronic sewage problems at Malibu and Huntington Beach have caused moderate to high impacts to beach habitat. Thermal discharges have been shown to cause low to moderate impacts by altering rocky intertidal community structure in the area near the origin of the outfall (Murray and Littler, 1986, as cited in MMS, 2001).

Marine Tanker Spills. Tanker spills, particularly from foreign flag vessels transiting to port in San Francisco or Los Angeles, continue to be the most likely source of a spill and the largest potential source of an oil spill offshore California. No Pacific OCS oil is being tankered; the oil tankered offshore California is from foreign sources and Alaska. Based on historic data, it is estimated that there is a 76 percent chance of one or more spills greater than 1,000 bbl from a tanker. The mean (average) spill size from a tanker is calculated as 22,800 bbl for the period between 1985-1999, based on the U.S. Coast Guard data base for accidents in U.S. waters. The median spill size is 5,600 bbl (See Section 5.3, Oil Spills, Risk, Movement, and Response). Glenn Ford's coastline model predicts that between 9 and 161 km (6 to 100 miles) of coastline could be contacted if a 22,800 bbl oil spill occurs. The mean length of coastline contacted for that size spill is 38 km (24 miles). If a 22,800 bbl spill occurred, it is expected that a substantial portion of shoreline (tens of kilometers in the area closest to the origin of the spill) would be heavily oiled, causing significant impacts to biota over a wide area, a high impact. Beaches closest to the origin of the spill and depositional beaches along the mainland and islands would be the most likely impacted, including areas with protected regions such as the Channel Islands Marine Sanctuary. These depositional beaches occur in the lee of each point along the central California coast and along the calm, sandy beaches found on the Channel side of the offshore islands. On high-energy sandy beaches, oil may be buried fast, making cleanup difficult. High-energy sandy beaches are a high priority for oil spill response for this reason. The deposition process buries pockets of oil, which continue to release toxic compounds into the habitat long after the spill is invisible on the surface. For this size spill, it is assumed that a substantial area of shoreline would be heavily oiled and, therefore, overall impacts to sandy beaches from the oil would be high. In areas where the oil is heavy and coats rocky intertidal habitat, strands in tidepools, or strands in wide bands in the high intertidal, impacts would be high. The primary concern would be direct contact with long-lived animals such as seastars, limpets, abalone, and important communities such as algal assemblages and mussel beds. Impacts on these animals and communities from oil could result in mortality and/or sublethal changes affecting reproduction, recruitment or settling. For a 22,800 bbl spill, it is assumed that a substantial amount of the shoreline would sustain heavy oiling and, therefore, overall impacts to rocky intertidal resources from the oil would be high. Significant impacts would be expected also during cleanup activities due to the movement of heavy equipment across the sand, through sensitive dune habitat, and trampling in rocky intertidal areas.

If hot water wash is attempted to clean rocky intertidal habitat, as was done in cleanup of the Valdez oil spill, high impacts would be expected to rocky intertidal resources from the cleanup alone. Hot water washing has been proven in numerous studies to render rocky habitat sterile, resulting in irreversible impacts (Lees et al., 1999, as cited in MMS, 2001). Rocky intertidal areas are generally better off not cleaned or only gently cleaned. Trampling activities caused by workers in the intertidal causes significant impacts (Lees et al., 1999, as cited in MMS, 2001). Impacts from the cleanup activity could be lessened if activities are limited to a few people using absorbent pads and picking up tar patties, and all types of pressure washing are avoided. Heavily oiled rocky habitat would be severely impacted by the oil, but without the added significant physical cleanup impacts, the habitat would recover (Lees et al., 1999, as cited in MMS, 2001). Marine tanker spills are the most likely source of impact to shorelines along the California coastline. Ports such as the San Francisco Bay and Los Angeles Harbor are especially vulnerable due to number of vessels and offloading activities. The majority of American flag tankers voluntarily transit outside the Channel Islands enroute to port, reducing their potential to impact shoreline resources in the Santa Barbara Channel. However, since foreign flag tankers transit through the Santa Barbara Channel in vessel traffic lanes, which go within one nautical mile of Anacapa Island, they pose the most serious risk to the protected resources on the islands. In general, shorelines within the Channel Islands National Park and Sanctuary and along the mainland in the Channel are more vulnerable to a vessel spill because of their proximity to vessel traffic lanes.

Oil Spills. Oil spills may also occur from existing platforms in Federal and State waters. Section 5.3 discusses the cumulative oil spill risk for the study area. The size of spill possible from individual facilities is substantially smaller than from a tanker due to volume present, platform technology and oil gravity. The level of impacts from a given spill would depend on many factors, including the type, rate and volume of oil spilled; distance spill originates from shore, weather and oceanographic conditions at the time of the spill, etc. These parameters would determine the quantity of oil that is dispersed into the water column, the degree of weathering, evaporation and dispersion of the oil that takes place before it contacts the shoreline and the actual amount, concentration and composition of the oil that contacts the shoreline.

During the period between 1970 and 2003, 1,038 Pacific OCS-related oil spills have occurred, totaling approximately 844 bbl of oil spilled from sources related to development and production activities while about 1.05 billion bbl of oil was produced. The probabilities of a spill between 50 and 999 bbl and over 1,000 bbl (with a most likely spill size of 2,000 bbl) at existing Federal and State facilities are discussed in Section 5.3. For a small spill 200 bbl or less, one may expect that the amount of shoreline contacted would range from 1 to 19 km (0.5 to 12 miles), with a mean of 4 km (2.5 miles). The only Pacific OCS spill outside the 1969 blowout to reach shoreline, the Platform Irene pipeline spill, serves as an example of the types of impacts that might occur from a 200 bbl spill. In the case of the September 1997 Platform Irene pipeline accident, 167 bbl of oil were spilled approximately 5 km (3 miles) offshore Surf Beach, 10 to 15 miles north of the Point Arguello platforms. In general, very little oil was observed along the rocky shoreline as a result of the spill. The primary oiling occurred at the sandy beaches near the location of the pipeline at Surf Beach. Impacts occurred due to oiling of the sand and cleanup activities near Surf Beach in heavily and moderately oiled beaches. Oil was observed at one rocky site near Point Arguello in the lower to middle intertidal. Sticky globs of tar were seen on black abalone and seastars (Raimondi, 1998, as cited in MMS, 2001). Statistical results based on the pre-spill data from the long-term monitoring program found that the spill had little or no affect, however, on the monitored rocky intertidal sites within 5 to 24 km (3 to 15 miles) of the spill (Raimondi, 1998, as cited in MMS, 2001).

In a 200 bbl spill, the beach initially hit, and closest to the origin of the spill, would be the most heavily impacted, and would be more likely to be affected by fresh oil. Other parts of the shoreline are more likely to be contacted by weathered oil and tarballs. A spill 200 bbl or less would be expected to contribute low to moderate impacts depending on the amount of shoreline heavily contacted. A majority of the shoreline within the total area contacted by oil would be expected to contain a patchy distribution of oil from plate sized tar patties to a light sheen, distributed primarily along bands parallel to the shoreline. Cleanup activities on sandy beaches may cause impacts equal to the oil spill itself. Movement of heavy equipment across the sand, for example, impacts beaches by crushing organisms found in the sand.

Longer-lived animals such as the Pismo clam would sustain the longest impact from equipment. Sand crabs, which make up the majority of the biomass on the sandy beach, would take up oil into their tissues in areas of heaviest oiling (pers. comm., Dugan, 2001, as cited in MMS, 2001). Uptake into the food chain of contaminated crabs by shorebirds could also occur, causing longer reaching impacts. Once the oiled sand is removed, however, the sand crabs would be expected to return to pre-spill abundance and toxicity levels within a few months, by repopulating from cleaner areas. Oil that is buried in sand layers and not removed can continue to cause toxicity affects to buried animals long after the spill occurs. Sandy beach recovery for light to moderately oiled areas can be as short as weeks, if natural wave action assists in sand removal, or, for moderately to heavily oiled areas, as long as two to seven years if the oil is buried quickly or if cleanup operations significantly injure long-lived buried animals.

Rocky intertidal beaches are somewhat less likely to be impacted by oil spills, particularly smaller spills, due to natural wave action, which keeps oil away from cliffs and rocky benches (U.S. Coast Guard, 2000, as cited in MMS, 2001). Once impacted, however, primary impacts include smothering, uptake in tissues, and contamination of other animals using rocky habitat such as seabirds and marine mammals. Oil tends to strand high in the intertidal in the barnacle zone. Tarballs in this zone are persistent, lasting several seasons (Raimondi et al., 1999, as cited in MMS, 2001). Oil can also persist in individual tidepools. Seaweeds such as kelp secrete an oily substance that helps prevent oil from adhering to their fronds. However, most algae in the higher intertidal, and algae such as surf grass in the low intertidal, would be susceptible to oiling and would sustain long-term impacts if covered by oil (Foster et al., 1971, as cited in MMS, 2001). The coastline in the Santa Barbara Channel and Santa Maria Basin is regularly exposed to large volumes of natural oil seepage; individual seeps at Coal Oil Point release over 100 bbl per day. Because of this background exposure to low levels of oil, the patchy occurrence of tarballs from a small accidental spill is unlikely to cause any measurable impact. Recovery of the black abalone could exceed seven to ten years if a significant portion of the local population was directly contacted and heavily oiled. Overall impacts from a spill 200 bbl or less would be expected to be low on rocky intertidal resources due to the amount of shoreline expected to be heavily impacted. Impacts could be moderate if the black abalone population is heavily contacted by oil at more than one location.

A 2,000 bbl spill is predicted to contact between 3 and 53 km (1.8 and 33 miles) of coastline, with a mean value of 12 km (7.5 miles). As previously discussed, the shoreline closest to the spill origin would be expected to be the most heavily impacted. For the purposes of this analysis, it is assumed that 3 to 12 km (1.8 to 7.4 miles) of coastline would be moderately to heavily oiled, and another 10 to 40 km (6 to 25 miles) would be lightly or very lightly oiled in the patchy pattern typical of offshore spills. Based on this, it is expected that significant impacts could occur at several sandy beaches and several rocky intertidal beaches, resulting in moderate impacts. If a significant portion of the abalone habitat were heavily oiled, impacts would be high for that population.

Incremental Impacts of Exploration and Development of the Undeveloped Leases on Rocky and Sandy Beach Habitat

Refer to the cumulative projects table in Appendix I for a description of the projects being evaluated as part of the undeveloped leases under a hypothetical development scenario. Impacts to rocky and sandy beach habitat would occur primarily from new pipeline construction and oil spills, as discussed below.

Pipeline Construction Activities. Rocky and sandy beach resources can be affected through the construction of onshore pipelines, and by oil spill impacts from existing and future platforms. Pipelines are required by the State Lands Commission to be buried through the surf zone. Depending on the rocky or sandy resources at the landfall, pipelines would be trenched and buried, laid on the surface, or drilled through the surf zone at depth. The California Coastal Commission required Chevron to construct the Point Arguello pipelines using a "drilled" crossing. This approach minimized impacts to sandy beach resources since no trenching was required, but caused erosion impacts elsewhere on the route (pers. comm., Storrer, 2001, as cited in MMS, 2001). The Santa Ynez pipelines were trenched through sandy onshore beaches. Given likely landfall locations identified in the hypothetical development scenario, it is likely that pipelines would be trenched through sandy beach landfalls and unlikely that rocky beach resources would be impacted through pipelaying activities.

Impacts to sandy beach resources such as crabs, clams and other buried animals from construction of onshore pipelines occur through the physical displacement by trench digging, and crushing or injuring them through the use of heavy equipment. Disturbance from heavy equipment is localized and expected over a maximum 100-foot-wide corridor, a low impact. Animals such as sand crabs would be temporarily displaced, with repopulation of the area occurring within a few weeks to a few months, a low impact. Longer lived animals such as Pismo clams, if they were present and were injured or displaced through trenching, could be expected to require a few years to recover, particularly to the age class prior to the disturbance. However, the impact to Pismo clams is expected to be low given that the number of Pismo clams that could be impacted would be small and would not be expected to cause a measurable change in species abundance or composition. Plant resource impacts would be felt if the pipeline construction occurred in a dune habitat. These would be localized but could be significant if the habitat is altered, a moderate impact. Previous pipeline construction projects have mitigated impacts to fragile dune habitat through several measures including narrowing the construction corridor to less than 50 feet in these areas (A. D. Little, 1985, as cited in MMS, 2001). Mitigation rerouting pipelaying to avoid dune habitat could reduce the impact to low.

Oil Spills. As discussed in Section 5.3, the cumulative oil spill risk for the area of the undeveloped leases results from several sources including: ongoing and projected oil and gas production from existing Pacific OCS facilities in the Santa Barbara Channel and Santa Maria Basin; several potential development projects (Rocky Point, Cavern Point, Tranquillon Ridge); ongoing production from one facility in State waters in the Santa Barbara Channel; two likely oil and gas projects in State waters; and the tankering of Alaskan and foreign-import oil through area waters. The most likely case for a Pacific OCS-related oil spill is one or more spills in the 50 to 1,000 bbl range occurring over the life of one of the hypothetical platforms (2009–2030). It is assumed, based on historical data, that such a spill would be 200 bbl or less in volume. The probability of one or more spills 200 bbl or less in size occurring from existing and proposed offshore oil and gas activities is discussed in Section 5.3. The maximum reasonably foreseeable oil spill volume from future offshore oil and gas activities is 2,000 bbl, assumed for purposes of analysis, to be a pipeline spill. The probability that one or more spills in the 2,000 bbl range would occur from these activities if all leases are developed is also analyzed in Section 5.3. Impacts from a 200 bbl spill and a 2,000 bbl spill are discussed under "Oil Spill from Existing Oil and Gas Facilities" above. Assuming that the spill occurs from a pipeline or facility near shore, it is anticipated that the shoreline adjacent to the spill origin would be heavily or moderately oiled and that other rocky and sandy beaches would patchily receive light sheen, and or tarballs. Impacts from a 200 bbl spill would be expected to be low, except if abalone habitat were heavily oiled which would be moderate. Impacts from a 2,000 bbl spill would be expected to heavily to moderately oil several rocky and sandy beaches, causing moderate impacts. There is a higher likelihood that oil from a 2,000 bbl spill could contact enough abalone habitat to affect the population, a high impact.

5.7.1.3 Summary and Conclusion – Rocky and Sandy Beach Habitats

Sandy and rocky beaches are impacted in central and southern California by many natural and anthropogenic sources. Natural disease can significantly impact certain populations such as the black abalone, causing high impacts due to mortality. Natural events such as the extreme storm conditions and warm water trends associated with El Niño events cause significant localized changes both to the habitat and the species found on rocky and sandy beaches, a moderate impact. Natural oil seeps contribute over a hundred barrels of oil to marine waters each day, resulting in patchy, chronic impacts causing low impacts to biota on sandy and rocky beaches. Beaches in southern California are especially impacted due to the population pressure and high public use. Because of the high public pressure, impacts in southern California range from moderate to high. Low to moderate impacts from public use of the beaches are found north of Point Conception and on the Channel Islands due to inaccessibility. Anthropogenic sources of pollution such as surface runoff, leaky oil tanks onshore, and chronic sewage problems have and continue to cause significant impacts ranging from moderate to high.

Existing oil and gas facilities pose a potential risk of an oil spill which could cause impacts ranging from low to moderate, unless black abalone habitat is directly contacted resulting in moderate to high potential impacts, depending on the size of the spill. The most serious oil spill risk to shoreline resources is from tankering activities offshore California, estimated to produce high impacts on rocky and sandy beaches. A hypothetical development of the undeveloped leases by placing four new platforms and several miles of new subsea and intertidal pipelines could contribute measurable changes in cumulative impacts to sandy or rocky beach resources, unless mitigation measures are required. The potential development could lead to up to an additional four platforms offshore Santa Barbara County. Pipeline construction activities for the addition of two pipeline corridors through the shore to onshore facilities could impact beach resources during trenching activities, which could produce low impacts in sandy areas, or moderate impacts if dune habitat is altered. The potential risk of an oil spill from Pacific OCS activities would be increased with addition of potential production from the undeveloped leases. Oil spill impacts could be high if the black abalone habitat is heavily oiled in several locations.

A summary of the potential effects that the hypothetical post-suspension period activities could have on the intertidal habitats and biota within each unit is provided in Table 5.7-1, below. Exploration and delineation drilling would occur well offshore and thus would not be expected to result in any impacts to the intertidal habitat or resources. Similarly, the predicted low impacts for all the units during development and production are based on the assumption that the nearshore and intertidal portions of the production platform-associated pipelines and powercables would be placed into directionally drilled tunnels, thus reducing or eliminating potential construction-related impacts. The potential moderate to high impacts are those related to the effects of an oil spill. The severity of intertidal impacts from oil spills would depend on the type and volume of petroleum spilled and the proximity of the source to the intertidal resources.

Table 5.7-1. Comparison of Impacts to Rocky and Sandy Beaches by Undeveloped Unit/Lease and Development Phase.

Unit/Lease	Exploration and Delineation Drilling	Development and Production	Decommissioning
Cavern Point	None	Low/Moderate to High (oil spill) for all units	Low for all units
Gato Canyon			
Rocky Point			
Sword			
Bonito			
Santa Maria			
Purisima Point			
Point Sal			
Lion Rock			
Lease OCS-P 0409			

5.7.2 Seafloor Resources

5.7.2.1 Significance Criteria

The criteria used to assess impacts to seafloor resources are:

- **High.** Impacts that result in a measurable decline in a population beyond that which can be explained by normal variability, result in a measurable change regionally in species composition, ecological function or community structure, or result in a measurable reduction in regionally important habitat are considered to be high impacts. These changes would be at a level, areal extent, and duration that it would be expected to place an individual species at risk, or alter the community structure or habitat on a regional scale for many years. Irreversible alteration of regionally important habitat or reduction of protected habitat would be considered high impacts.
- **Moderate.** Impacts that result in a measurable decline in species composition, species abundance, ecological function or community structure over several localized areas or result in alteration of locally important habitat are considered moderate impacts. These changes, while individually may persist for many years, are localized and cannot be detected on a population or regional level.
- **Low.** Impacts that result in a short-term change in species abundance or composition, a temporary loss in ecological function or community structure, a short-term disturbance or temporary loss of access to locally important habitat are considered to be low impacts.

In this analysis, high and moderate impacts are considered significant; low impacts are considered to be insignificant.

5.7.2.2 Impacts of Post-Suspension Activities

Appendix I provides a listing of the cumulative projects considered in this analysis. Cumulative impacts to seafloor resources may occur from commercial fishing operations, ongoing and potentially foreseeable oil and gas activities in Federal and State waters, and non-anthropogenic and anthropogenic sources of sediment and contaminants.

Cumulative Impacts without Activities on the Undeveloped Leases on Seafloor Resources

The sources of cumulative impacts under this scenario include bottom trawling activities, existing oil and gas activities, new LNG facilities, fiber optic cable installation activities, and the natural and anthropogenic sources of turbidity. Overall impacts to seafloor resources are high for hard bottom habitat, and low for soft bottom habitat. Moderate to high impacts were identified to hard bottom from ongoing bottom trawl fishing. Due to the rarity of the habitat, the fragility of the resources, and the long-term recolonization process, it is expected that ongoing cumulative fishing activities cause locally significant impacts on individual reefs and to slow growing species such as vase sponges (moderate) and may cause impacts felt at the population level (high). Low impacts to soft bottom habitat were identified due to the ability of the resources to quickly recolonize following disturbances.

Discharges. A natural source of sedimentation is the turbidity current or flow. This sediment-laden, density-driven current "avalanches" along the seafloor bringing pulses of sediment from the continental shelf toward deep water (see Section 4.6). These flows are the most pronounced during onshore flooding years in which large amounts of sediment are discharged into the marine environment by rivers, creeks and storm drains. The largest volume of sediment recorded occurred in 1969 following extreme flooding events (Kolpack and Drake, 1985, cited in MMS, 2001). In contrast, sediment input to the environment from drilling muds and cuttings is periodic, localized, and of substantially less volume overall. Natural sediment flows and resuspension processes overwhelm the turbidity plumes from past or ongoing oil and gas drilling activities in the Santa Maria Basin or Santa Barbara Channel both in terms of volume of sediment and areal extent of effect (Drake, Kolpack, and Fischer, 1972, as cited in MMS, 2001).

Anthropogenic sources of pollution that may affect seafloor resources in the study area, especially biota closer to shore, include point source discharges (sewage outfalls), dredging activities, surface runoff, thermal discharges (nuclear generating stations), and the Guadalupe oil field "spill." Hydrocarbons from seepage from onshore tanks in the Guadalupe oil field was detected offshore in the CaMP study (SAIC and MEC, 1995, as cited in MMS, 2001). The dredging activity would have localized turbidity impacts and is unlikely to overlap with resources affected by the post-suspension activities. Overall impacts from these anthropogenic sources of pollution are difficult to quantify, but they are expected to create increased turbidity, increased uptake of heavy metals, oils and potentially toxic substances by the biota. These impacts would be expected to be highest nearshore, near sources of pollution. These impacts range from low to moderate on the resource.

Bottom Trawling Activities. One activity with a high potential to directly impact seafloor resources is the past, present, and future bottom trawling commercial fishing activities. Bottom trawling for halibut and other groundfish has historically occurred in the upper portion of the Santa Maria Basin along the eastern portions of the Purisima Point and Point Sal Units, and rockfish trawling occurs in deeper waters in the Bonito Unit and in State waters near Point Conception (see Sections 4.13 and 5.13). Rockfish trawling also occurs near the State 3-Mile Limit and across the Gato Canyon Unit. Primary activity for trawling associated with groundfish fisheries such as halibut would be expected to occur to soft bottom habitat. However, rockfish trawling activities primarily affects hard bottom habitats; recently legislated restrictions for rockfish trawling are discussed in Section 4.13. The use of roller gear off the Pacific coast, while reducing impacts from otter door troughs to the seafloor, has permitted fishing in formerly inaccessible rocky areas (NMFS, 1998, as cited in MMS, 2001).

Impacts from bottom trawling fishing activities in the Santa Maria Basin and Santa Barbara Channel range from low to high. In the soft bottom environment, troughs made by trawling gear create short-term depressions in sandy sediments, or may create troughs lasting months to years in clay or mud sediments. Biological effects on the soft bottom habitat, however, would be considered low from groundfish fishing due to the level of activity in the Santa Maria Basin/western Santa Barbara Channel, and the fact that the community would be expected to recolonize within a relatively short period of time. However, habitat alteration of higher relief rocky reefs could create moderate to high impacts depending on the amount and extent to which complex communities have and continue to be altered. Fishing gear impacts seafloor resources by removing marine plants, corals and sessile organisms, upending rocks, leveling rock formations, re-suspending sediments (NMFS, 1998, as cited in MMS, 2001). These impacts irreversibly alter the marine habitat complexity. Other than regulations that prohibit trawling within certain areas (i.e., Marine Protected Areas and specified depth restrictions) no restriction about the location that this fishing can occur, outside the fishermen's own concern for hanging up their equipment on the higher relief rocks. It is speculated that much of the hard bottom habitat in the area has been altered. In the absence of reliable field data, residual impacts are assumed to range from low to high, depending on the areal extent of impact and the overall impact on the population. NMFS views the impact to occur on a region wide basis, indicating a possible high impact. They conclude that: ". . . there are few, if any, large virgin marine habitats off the Pacific Coast." Due to the high relief rocky nature of Pacific coast bottom habitat, however, there may be pockets of habitat that have undergone few alterations by trawl gear. High relief rock piles that are not accessible to trawl gear are usually accessible to commercial longline and recreational hook-and-line gear. Similarly, marine canyons that have not been trawled may be used by commercial longliners."

Existing Oil and Gas Activities. In a cumulative sense, soft and hard substrate habitat has been physically impacted by previous oil and gas activities on other leased areas within central and southern California. Drilling of exploratory and development wells, placing platforms and constructing pipelines, discharging muds and cuttings are all activities that impacted seafloor resources (refer to Section 4.7.2, Impacts from Previous Oil and Gas Activities). Indeed, it is in large part because of the potential cumulative impact on regionally important hard substrate resources that extensive mitigation has been required by MMS to protect even small areas of hard substrate habitat (see Appendix H). However, it has been shown in detailed field studies of exploratory oil and gas drilling activities (MEC, 1995, as cited in MMS, 2001) and platform and pipeline construction activities (Dunaway and Schroeder, 1989; Hardin et al., 1993, as cited in MMS, 2001) that these mitigation measures have been effective in mitigating impacts to hard bottom habitat. Therefore, cumulative residual impacts to these habitats and resources from previous oil and gas activities are low.

Fiber Optic Cable Installations. In the past few years a number of companies have applied for and installed fiber optic cables for commercial communication purposes (see Appendix I). The Global West Fiber Optic Cable which traverses the California coastline from Bodega Bay to Point Loma (San Diego) was laid offshore just outside existing Pacific OCS leases in the Santa Maria Basin and south of the Santa Ynez Unit in the Santa Barbara Channel. It comes to shore at Santa Barbara and Morro Bay. The cable was buried in the area just south of Gato Canyon along the 220-fathom (1,320 feet) water depth. It also goes through the Sword and Bonito Units, crossing four canyons. Global West is using a cable that conforms to the contours of the seafloor so that it can go into the canyons. They have made an effort to avoid laying cable over rocky habitat and in areas of existing oil and gas pipelines. The project's EIR anticipates that 43.5 miles of cable (7 percent of the total mileage) would not be buried because it is laid in areas of hard bottom. Of that distance, 5.6 miles of the cable that is laid on hard bottom occurs in the area from Estero Bay to Santa Barbara, with most of the hard bottom habitat identified near San Luis Obispo (Estero Bay). Short segments crossing the canyons in the Bonito Unit are identified as being laid over hard substrate (Global West, 1999, as cited in MMS, 2001). Impacts to benthic resources in general are low due to the small size of the fiber optic cable and the lack of anchoring or other physical disturbances required to lay the cable.

Incremental Impacts of Exploration and Development of the Undeveloped Leases on Seafloor Resources

The potentially foreseeable projects and the hypothetical development projects from the undeveloped leases are detailed in Appendix I and Section 5.2. Refer to Figures 5.2-1 and 5.2-2 for locations of the four hypothetical platforms analyzed in this scenario. Unless dynamically positioned lay barges are used, the oil and gas activity with the highest potential to impact seafloor resources is pipeline construction during development activities due to the high number of anchoring events.

In the assumed hypothetical development scenario, offshore pipelines would connect the northern and southern offshore Santa Maria Basin platforms (OSMB A and C, respectively) to the central Santa Maria Basin platform (OSMB B), and would bring combined production to shore west of Casmalia (Shuman Canyon). New pipelines would also connect the Gato Canyon Unit platform to onshore facilities at Los Flores Canyon, coming ashore in the same pipeline corridor as for the Santa Ynez Unit pipelines. In this scenario, it is assumed that a lay barge would be used to place the pipelines, making one pass per line.

Assuming platform locations conform with MMS criteria and are at least 3,280 feet from identified hard bottom habitat, impacts to these habitats from drilling discharges would be low. If new platforms were located within 1,000 feet of this habitat, impacts from smothering would be likely, causing moderate impacts. If facilities were located between 1,000 and 3,280 feet from hard bottom, the severity of the impact would depend on the water depth, current direction and other factors but are considered to be low to moderate. Refer to Section 5.6 for a detailed discussion of impacts from discharges.

Abandonment of platforms has the potential to create similar impacts to those contemplated during installation of the platforms, a moderate impact (anchoring impacts, turbidity increases). Additionally, the loss of the habitat provided by the platform itself would adversely affect the environment. While it is obvious that the platforms provide a hard substrate that is utilized by many plants, animals and fish; it is not yet understood what the overall contribution the platforms make to the ecosystem in the Santa Barbara Channel. This problem is complicated by the fact that the platforms are manmade structures that do not exactly mimic natural rocky reefs. Abandonment and removal of offshore platforms would reduce the amount of available solid, high-relief substrate within Santa Barbara Channel, and would eliminate the primary source of organic material (mussels) to the shell mounds under each platform. Love, et al., 1999 (as cited in MMS, 2001) and others have documented the epibiota that attaches to the submerged portion of offshore platforms. While removal of platforms would result in the loss of that biological community at that specific location, the loss of that habitat and the associated biota represents a small percentage of the available substrate within the Santa Barbara Channel, and is thus considered to be a minor (low to moderate) impact to the regional marine biological community.

Point Sal and Purisima Units: Approximately 3,000 anchoring events occurred when the oil, gas and water lines were constructed for the Point Arguello platforms. Of these, roughly two-thirds of the anchoring events occurred in laying the ten-mile lines to shore, which would be comparable to laying three of the four consolidated lines being laid the approximately eight miles to shore from hypothetical OSMB platform B. The other inter-platform pipelines (from OSMB platforms A and C to OSMB platform B) are speculated to be almost as long, measuring six to seven miles each. Based on the estimate from the Point Arguello construction, it is estimated that 7,000 to 8,000 anchoring events would be required for all pipeline construction activities in these two units. Due to the relatively small number of rocky features in the Point Sal and Purisima Units, it is reasonable to assume that anchoring on rocky features would be able to avoid impacting hard substrate habitat. However, if pipeline routes were to travel near hard bottom features, impacts could be moderate from anchoring activities given the sheer number of events that could occur on one feature. Abandonment of the platforms could also cause moderate impacts, both from anchoring impacts and also due to the loss of habitat. Impacts from anchoring on the soft bottom habitat would cause localized turbidity near the bottom that would disperse rapidly in the currents and have no significant impacts on benthic organisms (URS, 1986, as cited in MMS, 2001), the platform structure itself.

Gato Canyon Unit. Anchoring activity, several hundred events, could cause moderate impacts due to the high number of anchoring events, which could impact hard substrate habitat. The nearshore habitat in this area could also be expected to be rocky, thus pipeline crossings could impact those habitats and associated biota. Abandonment of the platforms could also cause moderate impacts due to anchoring events and loss of habitat from the platform structure itself. Impacts from abandonment could be moderate due to the potential to impact hard bottom features on the north part of the lease.

Exploration and Delineation Drilling. Physical impacts to hard bottom seafloor resources, due to the potential to impact stable hard bottom communities with anchors and chains, could be moderate. Both the drilling of individual wells with multiple anchoring events, and the drilling of several wells with multiple anchoring events near sensitive hard substrate habitat would likely result in long-term impacts to plants and animals, and alter habitat in several localized areas, a moderate impact.

Due to the comparatively low volume of mud discharged during the drilling of delineation wells, the water depth of proposed wellsites, and proximity of wellsites to identified hard substrate (see Appendix K), impacts on seafloor resources from drilling discharges would be expected to be low to moderate. Wellsites located a distance of 3,280 feet from identified hard bottom substrate would introduce low impacts to seafloor resources. Discharges from wellsites located within 3,280 feet could produce moderate impacts to hard bottom habitat due to smothering, depending on the actual distance from the feature, predominate currents and quality of the habitat on the feature. Unless MMS-specified mitigations are incorporated into the drilling plan, overall impacts on seafloor resources from the proposed delineation wells combined would be moderate, due to the potential to impact hard bottom communities.

Other Pacific OCS Activity from Other Undeveloped Leases. Potential activities on the other undeveloped leases include drilling exploratory or development wells from existing platforms into the Rocky Point Unit, Cavern Point Unit, Bonito Unit, Sword Unit, and possibly State leases. These activities would add drilling muds and cuttings to the environment, which, except for the drilling from Point Arguello platforms into Rocky Point Unit, would not be near hard bottom features. Discharges from Point Arguello platforms were monitored over a ten-year period; based on that study, the additional drilling discharges could be expected to cause low impacts. The only other potentially foreseeable activities that could impact seafloor resources are the abandonment of temporarily abandoned wells in the Sword Unit (Lease OCS-P0320) and on OCS-P0241 on the Dos Cuadras lease. As assumed, anchoring would avoid potential hard bottom substrate and anticipated impacts to seafloor resources would thus be low. The potential for accidental oil spills is not discussed because it would not be expected to impact seafloor resources (see 5.7.2.3, Summary and Conclusions).

Seafloor resources are impacted by several cumulative sources. Bottom trawling by commercial fishermen has the highest potential to directly impact hard bottom habitat by removing marine plants, corals, and sessile organisms, upending rocks, leveling rock formations and resuspending sediments. These impacts are moderate to high. Trawling activities also impact soft bottom habitat by altering the habitat temporarily and increasing turbidity, a low impact. Fiber optic cable installations cross canyons and other hard bottom features and would be buried in soft bottom habitat, a low impact. Natural turbidity flows, which are especially pronounced during extreme flooding events, produce large volumes of sedimentation and turbidity over a large area. These flows can contribute low to moderate impacts on seafloor resources. The hypothetical development and other activities from the undeveloped leases could contribute impacts to seafloor resources through anchoring, discharges during installation and drilling, and removal of habitat during abandonment. Impacts range from low to moderate, depending on whether hard bottom habitat is affected. Based on studies of anchoring during development activities, properly mitigated anchoring activity offshore during construction should not produce significant impacts on the offshore biota (Hardin et al., 1993, as cited in MMS, 2001). These impacts can be reduced if platforms and pipelines avoid hard bottom, and if anchoring activities during installation include vertical handling procedures, anchor handling boats, shut down plans during inclement weather, precautions against dragging individual anchors and post-installation monitoring.

Overall impacts to the relatively rare high relief hard bottom habitat would be expected to be high from several cumulative sources. Every effort should be made to continue to mitigate potential impacts to this resource. Overall impacts to soft-bottom resources are low, largely due to the high variability of the resource and the biota's tolerance to change and ability to recolonize.

5.7.2.3 Summary and Conclusions – Seafloor Resources

A summary of the potential effects that the post-suspension period activities could have on the seafloor habitats and biota within each unit is provided in Table 5.7-2, below. The differences in the impacts for the units are based on the hypothetical potential activities within each undeveloped Unit and Lease OCS-P 0409. Impacts to seafloor resources would be expected to be related to anchoring, drilling, and placement and removal of structures. Seafloor resources within those Units that would be explored and developed from existing platforms are expected to be exposed to low impacts. Delineation and exploratory drilling, construction and operation of platforms and pipelines, and decommissioning of those structures would result in low to moderate impacts to the seafloor resources. Low impacts are expected to occur to the low-relief solid and sedimentary seafloor and the associated biota, with high-relief features being potentially exposed to moderate impacts from those activities. Avoidance of the sensitive high-relief solid substrate features would be expected to reduce the impacts. The relatively large area of rocky habitat within the Gato Canyon Unit increases the likelihood of impacts from all hypothetical activities there.

Table 5.7-2. Comparison of Impacts to Seafloor by Undeveloped Unit/Lease and Exploration/Development Phase.

Unit/Lease	Exploration and Delineation Drilling	Development and Production	Decommissioning
Cavern Point	Low	Low (rock features over 5 miles NW of Platform Gail)	None
Gato Canyon	Moderate	Moderate	Moderate
Rocky Point	Low	Low (no rocky features with this unit)	None
Sword	Low	Low (CaMP studies have shown discharges from existing platforms did not affect this area)	None
Bonito	Low	Low (CaMP studies have shown discharges from existing platforms did not affect this area)	None
Santa Maria	none	Low to Moderate	None
Purisima Point	none	Low to Moderate	Low to Moderate
Point Sal	Low to Moderate	Low to Moderate	Low to Moderate
Lion Rock	none	Low (no rock features reported in this area)	None
Lease OCS-P 0409	none	Low (no rock features reported in this area)	Low

5.7.3 Kelp Beds

5.7.3.1 Significance Criteria

The criteria used to assess impacts to kelp beds are:

- **High.** Impacts that result in a measurable decline in a population beyond that which can be explained by normal variability, result in a measurable change regionally in species composition, ecological function or community structure, or result in a measurable reduction in regionally important habitat are considered to be high impacts. These changes would be at a level, areal extent, and duration that it would be expected to place an individual species at risk, or alter the community structure or habitat on a regional scale for many years. Irreversible alteration of regionally important habitat or reduction of protected habitat would be considered high impacts.
- **Moderate**. Impacts that result in a measurable decline in species composition, species abundance, ecological function or community structure over several localized areas or result in alteration of locally important habitat are considered moderate impacts. These changes, while individually may persist for many years, are localized and cannot be detected on a population or regional level.
- **Low.** Impacts that result in a short-term change in species abundance or composition, a temporary loss in ecological function or community structure, a short-term disturbance or temporary loss of access to locally important habitat are considered to be low impacts.

Impacts identified as high or moderate impacts are considered to be significant. Impacts identified as low impacts are considered insignificant.

5.7.3.2 Impacts of Post-Suspension Activities

Cumulative Impacts without Activities on the Undeveloped Leases on Kelp Beds

Impacts without development of the undeveloped leases to kelp resources include natural storm events, El Niño events with increased water temperature, urchin predation and commercial fishing activities, point source discharges, kelp harvesting, boat traffic, and nearshore construction activities.

Natural Storms. Seasonal storm events, and especially extreme storm events, can significantly reduce kelp beds by ripping up fronds in the nearshore area, a moderate impact. Storms also introduce large amounts of sedimentation, which impact kelp bed resources by reducing productivity, a low impact.

El Niño. Weather conditions brought about during El Niño significantly impact kelp resources. The increased ocean water temperatures, extreme storm events, and heavy sedimentation of nearshore waters associated periodic El Niño events provide the largest source of impact to nearshore kelp beds. The most significant of these is increased water temperature. Kelp prefers cool water and significant diebacks occur during warm water trends, which last several years, a high impact since it is felt regionally at the population level. Sedimentation associated with the most recent El Niño produced turbid waters over a mile offshore in the Channel, throughout the kelp zone, and lasted several weeks. This turbidity directly impacts the productivity of the kelp and impacts kelp associated animals, a low to moderate impact depending on the duration of the turbidity.

Urchin Predation/Commercial Fishing. Natural factors such as predation by urchins, when combined with other sources of impact, namely, commercial fishing, have a significant impact on the size and health of kelp bed. This is a high impact that is felt at the population level. In a healthy kelp bed, urchins play an important role and do not deplete the kelp resource. However, in areas where commercial fishing occurs, natural urchin predators are eliminated, and the natural balance between red and purple urchins is broken, an ecological imbalance occurs. “Urchin barrens” are created, that is, areas heavily populated by urchins and devoid of kelp and other algae. The size of the kelp beds is highly variable and dependent on environmental and anthropogenic factors. As mentioned before, kelp is very sensitive to changes in water temperature, dying back substantially during El Niño warm water events and reestablishing during cooler water periods. During warm water years, both kelp and urchins die off, but the urchins fare better than the kelp. Urchins would forage large areas, move into the intertidal, and would forage a wide range of species if kelp is not available. Because urchins can survive the warm water periods, when the cooler water returns in urchin barrens, kelp cannot reestablish, even though water temperature is optimal for kelp. In areas actively monitored by the National Park Service, areas off Santa Barbara Island, the south side of Santa Cruz Island and non-reserve parts of Anacapa Island continue to be urchin barrens and have not come back despite a recent influx of cool water. In the National Park Service's monitoring in 1999, they found 11 of 16 kelp-monitoring sites were dominated by echinoderms. The purple urchin was dominant at all but two sites; sea cucumbers and the brittle star were also dominant at two sites occupied by purple urchins (Kelp Forest Inquirer, 2000, as cited in MMS, 2001). This is evidenced by the monitoring of kelp beds within and outside no-take reserves at Anacapa Island and that fact that the beds within the reserve retain healthy kelp communities (pers. comm., D. Lerma, 2001, J. Engle, 2001, as cited in MMS, 2001). Recently completed diver and Remotely Operated Vehicle (ROV) surveys of the kelp beds within the Channel Islands National Marine Sanctuary found similar patterns of urchin and brittle star infestations as have been recorded previously (D. Kushner, pers. comm., 2004).

Dredging and Point Source Discharges. A number of factors were considered in a symposium to study the effect of waste disposal on kelp (Bascom, 1983, as cited in MMS, 2001). While it was recognized that there was a general lack of data concerning the complexity of natural and manmade factors that affect kelp (Jackson, 1983, as cited in MMS, 2001), it was speculated that losses of kelp canopy can result from increases in suspended sediment and associated reductions in water clarity resulting from point source discharges (Dean and Deysher, 1983, as cited in MMS, 2001). Thermal discharges are believed responsible for the reduction of kelp beds near San Onofre in near shore waters (Dean and Deysher, 1983, as cited in MMS, 2001). Further it was speculated that sewage outfalls might provide a food source for sea urchins in kelp forests, allowing their persistence long after the kelp was gone and preventing natural reestablishment (North, 1983, as cited in MMS, 2001). This would serve to promote and exacerbate the formation of urchin barrens discussed earlier.

Kelp Harvesting. Kelco regularly harvests the top few feet of kelp for use in a variety of commercial products including ice cream and shampoo. This harvesting is permitted by the California Department of Fish and Game. This practice has occurred in the Santa Barbara Channel for over twenty years. There are no known serious impacts to kelp or the kelp community from the harvesting practices. Kelco has voluntarily cut back production during El Niño diebacks (pers. comm., J. Engle, as cited in MMS, 2001). Impacts from continued harvesting is expected to be low.

Boat Traffic. Boat traffic through kelp beds impacts the kelp community through the breakage of kelp fronds, introduction of pollutants such as diesel, noise that scatters associated fish, and potential injury to visiting sea otters. Impacts range from low to moderate, depending on the number of boating activities in or adjacent to defined kelp beds. This impact is especially pronounced near piers and harbors where boat traffic is heaviest.

Nearshore Construction Activities. Nearshore construction activities such as construction of pipelines, sewage outfall lines, or thermal discharge pipes could impact kelp beds by displacing kelp plants, increasing local turbidity, temporarily displacing resident animals and altering the habitat over a localized area. These are generally localized, low impacts, lasting a few weeks to a few months. Reestablishment of kelp may take longer if the impact occurs during a period of dieback from warm oceanic waters.

Incremental Impacts of Exploration and Development of the Undeveloped Leases on Kelp Beds

Potential sources of impact from the undeveloped leases under the hypothetical development scenario include pipeline construction in the nearshore area, boat traffic, and oil spills. Installation of a central pipeline through the surf zone in the Santa Maria Basin to support Purisima Point Unit and Point Sal Unit production would be expected to cause low impacts to nearshore resources as no kelp beds along that part of the coastline. A nearshore crossing for the Gato Canyon Unit pipelines would be expected to cause impacts similar or less than the construction of the Santa Ynez Unit pipelines through this same crossing. Kelp and other macroalgae characterize the nearshore biota along the pipeline corridor. Surficial kelp is founded on both rocky and sedimentary bottom in water depths from 20 to 30 feet (Exxon, 1991, as cited in MMS, 2001). Dominant understory algal plants include the sea palm (*Pterogophora*) and a flowering plant (*Zostera* cf *asiatica*). Based on previous experience, a trenched crossing would be expected to take one to two months to move from the subtidal area to the intertidal.

Conduits have already been installed in the nearshore area in the Gato Canyon area, put in place to lessen future impacts through the same area. Less disruption to kelp resources would be likely than in the previous pipeline installation for any future pipeline in the Gato Canyon area, a low impact. Current technology for shoreline crossings, being used commonly by fiber optic cable companies, entails a drilled crossing started a half-mile or more offshore and drilled through the surf zone to an onshore location 1,000 feet onshore. This technology would further reduce disruption to resources in the kelp beds as well as in the surf zone. Drilled crossings also take less time to complete, roughly half that of a conventional trenching activity. Impacts from nearshore construction to kelp resources would be expected to be low. Crew boats and supply boats servicing offshore facilities use designated vessel traffic corridors, which, among other things, mitigate impacts to kelp bed habitat. Impacts from Pacific OCS–related boat traffic are expected to be low for this reason.

Kelp plants produce a natural oil that largely prevents petroleum from adhering to their fronds (BLM, 1982, as cited in MMS, 2001). Kelp forests, while in the area of oil from the 1969 blowout, were largely unaffected. It is not anticipated that oil spills would significantly impact kelp beds themselves, though their inhabitants (sea otters, for example) could be adversely affected (refer to the Marine Mammal and Fish Resources sections in this document).

Due to the distance offshore and the lack of kelp resources within the area of potential impacts, no cumulative effects to kelp beds would be expected from the delineation well and well abandonment activities.

5.7.3.3 Summary and Conclusion – Kelp Beds

Kelp resources are the most heavily impacted by the synergistic affect El Niño warm water conditions play in the role between kelp, sea urchins, and commercial fishing. Fishing practices reducing urchin predators and resulting in high increases in urchin predation on kelp, along with the dieback conditions caused by warm water, have a high impact on the kelp bed health. Other activities such as harvesting, discharges and boat traffic provide ongoing low levels of impact. Nearshore construction activities create localized disturbances. The incremental impact of offshore Pacific OCS development, including potential development of the undeveloped leases, is low and results primarily from localized disturbances in the surf zone during pipeline construction activities.

A summary of the potential effects that the post-suspension period hypothetical development activities could have on the kelp resources within each unit is provided in Table 5.7-3, below. The differences in the impacts for the units have been discussed above and are presented in tabular form below. Due to either the lack of likely assumed activities within kelp areas or the lack of kelp within assumed activity areas, coupled with the assumption that project-related vessel traffic would utilize pre-plotted transit corridors, the impacts to kelp from the post-suspension period activities hypothetical development would be low. No impacts to kelp beds would be expected from the delineation well and well abandonment activities.

Table 5.7-3. Comparison of Impacts to Kelp Beds by Undeveloped Unit/Lease and Development Phase.

Unit/Lease	Exploration and Delineation Drilling	Development and Production	Decommissioning
Cavern Point	No impacts for all units and lease	Low for all units and lease	None
Gato Canyon			Moderate
Rocky Point			None
Sword			None
Bonito			None
Santa Maria			None
Purisima Point			Low to Moderate
Point Sal			Low to Moderate
Lion Rock			None
Lease OCS-P 0409			Low

5.7.4 Fish Resources

5.7.4.1 Significance Criteria

The impact level analysis for fish resources adopts the following impact level criteria:

- **High:**
  - A measurable change beyond normal variability in species composition, ecological function, or community structure over several local areas or a large regional area for a period of 5 years or longer; or
  - A measurable reduction in regionally important habitat for more than 5 years, or adverse modifications of 10 percent or more of the habitat used by a given population lasting longer than 5 years.
- **Moderate:**
  - A measurable change in species composition or abundance beyond that of normal variability within several localized areas for a period of 1 to 5 years;
  - A measurable change in ecological function or community structure within several localized areas for less than 5 years; or
  - A reduction in or disturbance to locally important habitat for more than 5 years.
- **Low:**
  - A short-term (less than 1 year) change in species composition or abundance;
  - A temporary loss in ecological function or community structure; or
  - A short-term disturbance or loss of access to locally important habitat.

5.7.4.2 Impacts of Post-Suspension Activities

Under Section 305(b)(2) of the Magnuson Fishery Conservation and Management Act (16 U.S.C. 1801 et seq.), as amended by the Sustainable Fisheries Act on October 11, 1996, Federal agencies are required to consult with the Secretary of Commerce on any actions that may adversely affect Essential Fish Habitat (EFH). The Department of Commerce published an interim final rule (50 CFR Part 600) in the Federal Register (December 19, 1997, Volume 62, Number 244), which detailed the procedures under which Federal agencies would fulfill their consultation requirements. As set forth in the regulations, EFH Assessments must include: (1) a description of suspension and post-suspension activities; (2) an analysis of the effects, including cumulative effects, of the action on EFH, the managed species, and associated species by life history stage; (3) the Federal agency's views regarding the effects of the action on EFH; and (4) proposed mitigation if applicable. Section 600.920 (h) describes the abbreviated consultation process MMS would like to follow for the proposed project. The purpose of the abbreviated consultation process is to address specific Federal actions that may adversely affect EFH, but do not have the potential to cause substantial adverse impacts.

Cumulative Impacts without Activities on the Undeveloped Leases on Fish Resources

Potential sources of impacts to fish resources and EFH would come from effluent discharges, decommissioning of several or all of the existing Pacific OCS platforms, oil spills and other activities (fishing and non-fishing related).

Effluent Discharges. Table 5.2-1 shows anticipated future wells for the existing State and Federal platforms. Effluent discharges are regulated by the EPA under the new General NPDES permit (see Sections 4.6 and 5.6). The permitted discharges are based on water quality criteria determined outside the 100-meter (323 feet) radius mixing zone beyond each platform's discharge pipe. However, the discharge pipes are located directly beneath the platforms, where up to 39 species federally managed in the Pacific Groundfish Fishery Management Plan have been documented. Several of the species are in decline due to various factors. EPA has amended the new General NPDES permit to require the platform operators to evaluate the direct lethal, sublethal, and bioaccumulative effects of produced water on fish species occupying the mixing zone. The platform operators will also be required to model dilution and dispersion plumes from the point of discharge. If these permit requirements indicate substantial adverse effects to fish species, the platform operators would develop appropriate mitigation measures to protect them.

Decommissioning. The oil and gas extraction activities on the existing Pacific OCS units currently under development would continue through 2025 and potentially 2035 in the case of Tranquillon Ridge. Over the next 20 years all existing oil and gas platforms in Federal and State waters are expected to be removed. Between 2010 and 2025, MMS predicts that platforms would be decommissioned in groups of 3 to 9 based on age, size, geographic location, and heavy lift vessel (HLV) capability (see Section 5.2). Section 5.7.6 discusses the potential cumulative impacts to marine fish resources from offshore facility decommissioning activities, including the removal of wells, platforms, and associated pipelines. Table 5.2-3 presents estimated removal dates for existing oil and gas structures offshore southern California. It is expected that no Pacific OCS platforms in the Santa Barbara Channel or Santa Maria Basin would be removed before 2012, and a few may be in place as late as 2030 (or 2035, in the case of Platform Irene if the Tranquillon Ridge development occurs).

For purposes of this discussion, it is assumed that decommissioning would encompass the complete removal of a platform and associated pipelines, with none of the leg structure left in place to form an artificial reef. To date, only one facility in the Pacific OCS has been decommissioned — the OS&T vessel that formerly served the Santa Ynez Unit platforms in the Santa Barbara Channel. In addition, six offshore platforms in State waters in the Channel have been removed — two in 1988 and four in 1996.

Recently completed studies (*i.e.* Love, et al., 2003) suggest that offshore oil and gas production platforms provide important habitat for rockfish and may be important to regional fish production. Whether the habitat provided by the platforms increase the number of rockfish or merely draw individuals away from natural rock substrate is still debated. However, because species differ greatly in life history, population dynamics, and geographic distribution, it is possible that platforms could have a more substantial effect on some key species. These species of special concern could include several rockfish species whose low abundance has triggered severe restrictions on harvest and stock rebuilding plans. Bocaccio, for example, is estimated to have declined to about 1 percent of virgin biomass. Love et al. (2000, as cited in MMS,

2001) reported that Platform Gail had a density of adult bocaccio an order of magnitude greater than the average density found on 61 natural reefs in appropriate depths.

In the short term there could be several local impacts of removing platforms from the ocean. For example, explosives could result in fish mortality on or near the platform. Organisms on adjacent or nearby natural hard substrate could be damaged by anchors, or anchor scars could alter substrate and impact its value as habitat for benthic species. When the platform is removed from the ocean all the sessile organisms on it would die, and the mobile species (fish and invertebrates) would survive only if they could successfully relocate to suitable habitat elsewhere. On a long-term local basis, anchor scars and damage to the bottom could persist, thus altering the habitat quality for species associated with hard bottom substrate. A set of species associated with soft bottom would likely develop in the area previously occupied by the platform.

Mussel mounds located beneath the platform would also be impacted. With no supply of shells, organic material, settled larvae and young stages arriving from the top layers of the water column, the biomass and species composition of the community associated with the mussel mounds would be impacted. If the mussel mounds are removed, further impacts could occur. If explosives are used, many organisms in the vicinity could die. Removal would also result in loss of the habitat. Sessile organisms would die and mobile ones would only survive if they could find suitable natural habitat nearby. To the degree that chemicals or other anthropogenic materials have become entrained in the mussel mound, these might be released during the process of removal and might potentially affect biota locally.

Prior to conclusions provided Love et al*.,* 2003, it was generally thought that complete removal of California platforms would have low regional effects on fish stocks. Studies conducted on the existing Santa Barbara Channel and Santa Maria Basin platforms suggest that those structures may have regional importance to some fish species and support a substantial population of rockfish when compared to natural reefs (Love, et al*.,* 2003). Pipelines would be abandoned in place, and are not expected to add to the cumulative effects on fish resources of the Santa Barbara Channel.

Likely blasting-related impacts to marine fish resources would include mortality to fish species (especially those with air bladders) occurring in the immediate vicinity of the structure. In addition to these effects, decommissioning activities would result in loss of the potentially important habitat to fish resources, and potential damage to natural habitat in the immediate area. The principal potential impacts to natural habitat would be similar to those expected to occur as the result of construction activities, and are described in Section 5.7.4.2.2.

Oil Spills. As discussed in Section 5.3, the cumulative oil spill risk for the study area results from several sources: ongoing and projected oil and gas production from existing Pacific OCS facilities in the Santa Barbara Channel and Santa Maria Basin; several proposed development projects on the Pacific OCS; ongoing production from one facility in State waters in the Santa Barbara Channel; two potentially foreseeable oil and gas projects in State waters; and, the tankering of Alaskan and foreign-import oil through area waters.

Section 5.3 presents the estimated mean number of spills of various sizes, and the probability of their occurrence as a result of the described activities. Oil spill risks for both existing and potential future Pacific OCS are discussed below.

The most likely oil spill scenario for existing and proposed offshore oil and gas activities is that one or more oil spills in the 50 to 1,000 bbl range would occur and would most likely be 200 bbl or less in volume. The probability that one or more spills of this size would occur is discussed in Section 5.3. The maximum reasonably foreseeable oil spill volume from future offshore oil and gas activities is 2,000 bbl, which is assumed, for purposes of analysis, to be a pipeline spill. The probability of a spill of this size occurring is 22.3 percent. Based on data from tanker spills in U.S. waters, the mean size for a tanker spill is assumed to be 22,800 bbl. The probabilities and rationale for these estimated spill sizes is presented in Section 5.3. The potential impacts to marine fish resources in the study area from spills of each of these volumes are discussed below.

The level of impacts from such spills would depend on many factors, including the type, rate, and volume of oil spilled, and the weather and oceanographic conditions at the time of the spill. These parameters would determine the quantity of oil that is dispersed into the water column; the degree of weathering, evaporation, and dispersion of the oil before it contacts a shoreline; the actual amount, concentration, and composition of the oil at the time of shoreline or habitat contact; and a measure of the toxicity of the oil.

Fate and Effects. When an oil spill occurs, many factors determine whether that oil spill will cause: heavy, long lasting biological damage; comparatively little damage or no damage; or, some intermediate degree of damage. Among these factors are volume spilled, geographic location, oceanographic and meteorological conditions, season, oil type, and oil spill response and cleanup preparedness and method. Interpolating from the model of Ford (1985, as cited in MMS, 2001), a spill of 200 bbl could oil 0.6 to 12 miles of coastline. The likely result would be patches of light to heavy tarring of the intertidal zone along this up to 12-mile stretch resulting in localized changes to the community structure. The recovery time would depend on the environment. High energy rocky coast would be mostly self-cleaned within several months, while low energy lagoons and soft-sediment embayments can retain stranded oil residue for several years. The same impacts would be expected from a 2,000 bbl oil spill, and from a 23,000 bbl oil spill, but over a larger area. It is estimated that a 2,000 bbl oil spill contact three to 33 miles of coastline and a 23,000 bbl oil spill could contact nine to 100 miles of coastline.

Oil in the marine environment can, in sufficient concentrations, cause adverse impacts to fish (NRC, 1985; GESAMP, 1993, as cited in MMS, 2001). The effects can range from mortality to sublethal effects that inhibit growth, longevity, and reproduction. Benthic macrofaunal communities can be heavily impacted, as well as intertidal communities that provide food and cover for fishes.

The field observations of an oil spill's impacts on the marine environment are taken mostly from very large oil spills that have occurred throughout the world over the past three decades. The *Exxon Valdez* spilled about 270,000 bbl of crude oil into Prince William Sound, and the *Sea Empress* released about 540,000 bbl of crude oil off southwest Wales. The *American Trader* spilled about 10,000 bbl of crude oil offshore Huntington Beach, California. Due to pending litigation, a complete environmental impact analysis of the September 1997 Platform Irene oil pipeline spill of 163 bbl off the south-central California coast is not available.

Fishes. Fish can be affected directly by oil, either by ingestion of oil or oiled prey, through uptake of dissolved petroleum compounds through the gills and other body epithelia, through effects on fish eggs and larval survival, or through changes in the ecosystem that supports fish. Although fish can accumulate hydrocarbons from contaminated food, there is no evidence of food web magnification. Fish have the capability to metabolize hydrocarbons and can excrete both metabolites and parent hydrocarbons from the gills and the liver (NRC, 1985, as cited in MMS, 2001). Nevertheless, oil effects in fish can occur in many ways: histological damage; physiological and metabolic perturbations; and, altered reproductive potential (NRC, 1985, as cited in MMS, 2001). Many of these sublethal effects are symptomatic of stress and may be transient and only slightly debilitating. However, all repair or recovery requires energy, and this may ultimately lead to increased vulnerability to disease or to decreased growth and reproductive success.

The egg, early embryonic, and larval-to-juvenile stages of fish seem to be the most sensitive to oil. Damage may not be realized until the fish fails to hatch, dies upon hatching, or exhibits some abnormality as a larva, such as an inability to swim (Malins and Hodgins, 1981, as cited in MMS, 2001). There are several reasons for this vulnerability of early life stages. First, embryos and larvae lack the organs found in adults that can detoxify hydrocarbons. Second, most do not have sufficient mobility to avoid or escape spilled oil. Finally, the egg and larval stages of many species are concentrated at the surface of the water, where they are more likely to be exposed to the most toxic components of an oil slick.

The *Exxon Valdez* oil spill (about 270,000 bbl) provides several examples of how oil affects fish. For the sensitive stages of fish (eggs, larvae, and juveniles) the spill could not have occurred at a worse time. Pacific herring spawned along the shores of Prince William Sound within weeks of the *Exxon Valdez* oil spill in March 1989, resulting in increased egg mortality and larval deformities. Also, fry from pink salmon emerged from their gravel spawning redds and entered the nearshore marine environment during the spill. Site-specific occurrences of instantaneous mortality suggest that a significant reduction in herring larval production occurred because of the oil spill (Brown et al., 1996, as cited in MMS, 2001). Brown et al. (1996, as cited in MMS, 2001) estimated that over 40 percent of the 1989 year-class was affected by *Exxon Valdez* oil at toxic levels. The herring population in Prince William Sound also suffered heavy losses in 1993 due to disease. However, it is not known what role, if any, exposure to oil may have played in the disease outbreak; natural variability and density-de-pendent effects could not be ruled out as the cause of the small year-class and disease. Despite the reduction in larval production, reduced abundance in the 1989 year-class recruiting as 4-year old adults in 1993 could not be determined because natural processes affecting herring recruitment are poorly understood (Brown et al., 1996, as cited in MMS, 2001).

Pink salmon, Dolly Varden, sockeye salmon, and cutthroat trout exposed to oil from the *Exxon Valdez* spill all showed reduced growth rates the season following the oil spill. Pink salmon also showed increased egg mortality in oiled-versus-unoiled streams through the 1993 season (Rice et al., 1996, as cited in MMS, 2001). Geiger et al. (1996, as cited in MMS, 2001) estimated that 1.9 million adult pink salmon failed to return to Prince William Sound in 1990, primarily because of a lack of growth in the critical nearshore life stage when they entered seawater in spring 1989 during the height of the spill. By 1991, 60,000 wild adult pink salmon failed to return. In perspective, in the years preceding the oil spill, returns of wild pink salmon in Prince William Sound varied from a maximum of 23.5 million fish in 1984 to a minimum of 2.1 million in 1988. Since the spill, returns of wild pinks have varied from a high of about 12.7 million fish in 1990 to a low of about 1.9 million in 1992. The decade preceding the oil spill was a time of very high productivity for pink salmon in the sound, and, given the tremendous natural variation in adult returns, it was impossible to measure directly the extent to which wild salmon returns since 1989 were influenced by the oil spill. Based on intensive studies and mathematical models following the oil spill, researchers determined that wild adult pink salmon returns to the sound's Southwest District in 1991 and 1992 were most likely reduced by a total of 11 percent (EVOSTC, 1999, as cited in MMS, 2001).

After the *American Trader* spilled about 10,000 bbl of North Slope crude oil offshore Huntington Beach, California, oil stranded along 13.5 miles of coastline (Gorbics et al., 2000, as cited in MMS, 2001). The natural resource trustees (representatives from USFWS, CDFG, and NOAA) determined that post larval juvenile white sea bass were adversely impacted by the oil. Specifically, 0.4 to 0.5 inch juvenile fish were killed by oil when it mixed with drift algae found near the surf line. The drift algae found in this area are the normal habitat for juvenile white sea bass and other croakers during and after the time of the spill (Gorbics et al., 2000, as cited in MMS, 2001).

Despite the fact that laboratory experiments and field observations indicate that fish are susceptible to adverse effects from hydrocarbons, with the exception of the *Exxon Valdez* oil spill, no direct impacts on fishery stocks have been observed following catastrophic spills. This is due in part to the complexities involved with the natural process of recruitment, which produces tremendous natural variations in year-class abundance that bear little relation to the size of the parent stock. Thus, any impacts from catastrophic oiling on fish stocks are probably masked by the natural variations in abundance. Also, massive fish kills during oil spills have not occurred, or if they have it is only in the egg and larval stages found in the surface waters. Adult fish have the ability to move away from an impacted area. One of the worst spills in recent times, the tanker *Sea Empress*, released about 540,000 bbl of crude oil and about 4,000 bbl of fuel oil into the sea off Milford Haven waterway in southwest Wales on February 15, 1996. Oil came ashore along 200 km of coastline, much of it in a National Park and an area of international scientific interest. The *Sea Empress* Environmental Evaluation Committee, an independent committee set up by the UK government, reported that "Although tissue concentrations of oil components increased temporarily in some fish species, most fish were only affected to a small degree, if at all, and very few died" (SEEEC, 1998, as cited in MMS, 2001). The study found that about 40 percent of the oil evaporated soon after the spill and around 52 percent dispersed into the water where it was broken down by microorganisms. Surveys at sea showed that the oil was not deposited in sediments in significant quantities. Between five percent and seven percent (about 36,000 bbl) of the oil stranded on shore; however, one year after the spill less than one percent remained on the shore.

Although many factors contribute to the overall impacts realized from an at-sea oil spill, fish are generally not adversely impacted at the population level. Given the high energy and high productivity environment of the Point Arguello area, the common meteorological and oceanographic conditions, and the oil spill preparedness and response capabilities in place, direct measurable effects to any fish stock abundance from a 200 to 23,000 bbl oil spill off the coast of Point Arguello, California are unlikely.

Food Web and Habitat. Indirect effects from oil through changes in the ecosystem that supports fish also occur. In simplistic terms, this ecosystem would include all prey species and habitats the fish use during all life stages.

Perhaps the most important food on which all fish rely during their larval and juvenile stage is plankton. In general, the studies to date indicate that zooplankton are more susceptible to effects from oil spills than are phytoplankton. Even if a large number of algal cells were affected during a spill, regeneration time of the cells (nine to 12 hours), together with the rapid replacement by cells from adjacent waters, probably would obliterate any major impact on a pelagic phytoplankton community (NRC, 1985, as cited in MMS, 2001). After the *Tsesis* spill in the Baltic Sea, there was a decrease in zooplankton in the vicinity of the wreck. The quantity of phytoplankton increased briefly and it was concluded that the change was due to a decrease in the amount consumed by zooplankton. Similar results have been obtained in long-term oiling experiments. Individual organisms in oil spills have been affected in a number of ways: direct mortality (fish eggs, copepods, mixed plankton), external contamination by oil (chorion of fish eggs, cuticles and feeding appendages of crustacea), tissue contamination by aromatic constituents, abnormal development of fish embryos, and altered metabolic rates (Longwell, 1977; Samain et al., 1980, as cited in MMS, 2001). The effects appear to be short-lived and there are seldom prolonged changes in biomass or standing stocks of zooplankters in open water near spills, due largely to their wide distribution and rapid regeneration (Van Horn et al., 1988, as cited in MMS, 2001). During the *Exxon Valdez* spill, Celewycz and Wertheimer (1996, as cited in MMS, 2001) studied the impact of the spill on zooplankton and epibenthic crustaceans, potential prey species of pink salmon. They did not detect any reduction in abundance of either zooplankton or epibenthic crustaceans between oiled and non-oiled locations in either 1989 or 1990.

Intertidal and subtidal macrophytes provide shelter and food for fish and for fish prey species at various life stages along the northern Santa Barbara County coast. The habitats involved here include both high energy rocky shorelines, sand and cobble beaches, and the nearshore subtidal environment. Intertidally, the red alga *Endocladia muricata* and the brown alga *Pelvetia* spp. are species common to the area, as is surf grass (*Phyllospadix spp.)*. Giant kelp (*Macrocystis pyrifera*) is common to the nearshore subtidal area. Intertidal macrophytes seem to be more vulnerable to oiling than subtidal macrophytes. Losses of intertidal algal cover have been described after several spills. However, recovery appears to occur quite readily (Topinka and Tucker, 1981, as cited in MMS, 2001), though imbalances in the macrophyte community can persist for years. The proliferation of opportunistic intertidal algal species after a spill is invariably a direct result of the elimination, by the oil, of naturally occurring grazers — limpets and other intertidal herbivores (NRC, 1985, as cited in MMS, 2001). Little evidence exists that kelp is harmed by oil (MMS, 1992, as cited in MMS, 2001). An oil spill of 200 bbl would probably result in light to heavy tarring of the intertidal zone if oceanographic conditions carried the oil to shore. Impacts to intertidal macrophytes would be minimal and patchy over an estimated 10 km or less of shoreline. Raimondi (1998, as cited in MMS, 2001) reported that species abundance at two research sites within the exposure zone of the 163 bbl Irene pipeline spill showed no significant changes that could be attributed to the oil spill. Barnacle abundance at one site decreased in the Fall 1997 and Spring 1998 surveys, however no fresh tar or oil was observed at the site. During the Spring 1998 surveys, the same site also showed decreases in mussels and surf grass cover, but these impacts were attributed to the effects of strong El Niño–enhanced storms that ravaged the site in January and February of 1998. No measurable impacts would be expected to subtidal macrophytes from a 200 bbl oil spill.

Fluctuations of benthic and intertidal invertebrate populations may affect the fishes that normally feed on them. Considerable work has been done studying the effects of oil on macroinvertebrates. Most susceptible are those species inhabiting the intertidal zone, especially those found in lagoons, embayments, estuaries, marshes, and tidal flats. This risk derives from two factors: high oil concentrations and shallow depth of the water column. Aside from the physiologically toxic effect, intertidal organisms may be entrapped or suffocated by oil. In fact, a major impact of the *Sea Empress* spill was to the intertidal invertebrate community. Heavy limpet mortalities were recorded, and periwinkles and topshells died, though in lesser numbers. Amphipod mortalities were extensive, although substantial recolonization was evident at most sites one year later (SEEEC, 1998, as cited in MMS, 2001). Gorbics et al. (2000, as cited in MMS, 2001) reported that overall mortality of bean clams as a result of the *American Trader* spill (about 10,000 bbl of crude oil) in February 1990 was estimated to be 24 percent. Sand crabs showed an increase in the body burden of aliphatic hydrocarbons until June 1990. It can be assumed that the oil from the *American Trader* that stranded along approximately 13.6 miles of coastline near Huntington Beach resulted in a significant increase in the mortality of intertidal invertebrates (Gorbics et al., 2000, as cited in MMS, 2001).

It can take several years for limpet and other mollusk populations to recover completely at heavily impacted sites. A 200 to 23,000 bbl oil spill in the western Santa Barbara Channel that contacted shore would likely result in mortality to various intertidal macroinvertebrates, including barnacles, limpets, mussels, starfish, anemones, and black abalone. Smothering would be the most common cause of mortality and would be limited to direct contact with weathered tar balls from the oil spill. After the 163 bbl Irene pipeline spill in September 1997, sand crabs within the spill zone showed significant hydrocarbon contamination (J. Dugan, UCSB, pers. comm., as cited in MMS, 2001). Sand crabs are an important component of the diet of several fishes. Though fish can metabolize hydrocarbons they accumulate, this process requires energy and may lead to an increased vulnerability to disease and decreased growth or reproductive success. Since sand crabs were contaminated after the oil spill, one can also assume that other invertebrates such as myssids, amphipods, and polychaetes were affected. In fact, one predatory polychaete has not repopulated some areas of the spill zone, though it can be found in areas outside the zone (J. Dugan, UCSB, pers. comm., as cited in MMS, 2001).

Coastal and offshore waters and benthic subtidal environments are important habitat for all fish species. The coastal and offshore waters are any areas seaward of the low tide level and include bays, open coastal waters, and the deep ocean. Oil spills in the open ocean do not appear to have as severe an effect on the biota as oil in coastal water or in the shore zone (NRC, 1985, as cited in MMS, 2001). This may be due to the fact that the shore zone and coastal waters are subject to serious effects from chronic pollution and an oil spill in this area is impacting a stressed environment. Benthic subtidal environments may be impacted when oil spilled onto the surface of the water column is transferred to bottom sediments through sorption on clay particles and subsequent sinking, sinking of dead organisms, uptake and packaging as fecal pellets by zooplankton, or direct mixing to the bottom in shallow water. This may impact fish both directly and indirectly. After the *Tsesis* oil spill, herring reproduction was significantly reduced in the spill area. Nellbring et al. (1980, as cited in MMS, 2001) reported that the reduced reproduction was due to a decrease in amphipod populations that graze on fungi growing on the fish eggs, leaving the eggs susceptible to fungal damage. Oiling of the sediments following the *Amoco Cadiz* spill had deleterious effects on plaice and sole, including reduced growth and increased incidence of fin and tail rot (Conan and Friha, 1981, as cited in MMS, 2001). In fact, flatfish may be particularly susceptible, since they spend a considerable amount of time lying on the bottom or even partially buried in the sediments.

An evaluation of the literature reveals that oil spills can cause mortality and sublethal effects on fish at all life stages, their prey, and their habitat. However, whether or not these impacts result in measurable adverse effects on EFH or fish resources is more difficult to determine. In 1985, a National Research Council committee found "no irrevocable damage to marine resources on a broad oceanic scale" as a result of oil pollution from either chronic, routine sources or from occasional major spills. At the same time, however, it cautioned that further research is needed before an unequivocal assessment of the environmental impact of oil pollution can be made, particularly as it applies to specific locations and conditions.

Given the national oil spill data collected from the Gulf of Mexico and Pacific OCS programs over the last 30 years, MMS expects that such a spill would probably be less than 200 bbl, and the maximum reasonably foreseeable is 2,000 bbl. Given the location, normal meteorological and oceanographic conditions, and oil spill response capabilities of the study area, low adverse effects are expected to EFH or fish resources from an oil spill in this size range. Any direct mortalities to fish would probably occur only in the egg and larval stages found in the surface waters in the immediate vicinity of the spill. Depending on the oceanographic conditions at the time of the spill, some oiling of the intertidal zone along the south or central California coast or the northern Channel Islands is expected. Under normal conditions for the study area, significant mixing and weathering of the oil would evaporate much of the toxic light-end hydrocarbons into the atmosphere, disperse the oil into the water column, and likely break the slick into smaller patches. The weathered tar balls would likely cause some mortality to intertidal macrophytes and invertebrates through smothering. Elevated hydrocarbon levels in nearshore invertebrates would be likely, leading to increased stress and potential decreases in growth and reproduction in fish feeding upon the invertebrates. These effects are expected to be short-term under normal conditions; however, oil may become sequestered in the sediments of low-energy embayments and persist for several years.

Accidental oil spills present an ongoing source of potential impacts to fish resources. The cumulative risk of oil spills arises from multiple sources, including offshore oil and gas activities in Federal and State waters and both Alaskan and foreign-import tankering. Tankering represents the greatest risk of an oil spill in the Santa Barbara Channel. This risk is tempered by recently implemented or proposed mitigation (such as the rerouting of tankers farther offshore along the central California coast) and, as discussed in Section 5.3, by modern oil spill response capabilities. The mean spill size derived from the U.S. Coast Guard database for accidents in U.S. waters is 22,800 bbl. A spill this size could contact up to 100 miles of coastline. Fish resources and EFH would likely experience low impacts from a spill this size. The water quality from the Point Conception area north and offshore the Channel Islands remains good. This area is very productive and is important habitat for many marine fish species. A large oil spill would impact the water quality of this habitat. Although only minimal adverse impacts to fish populations and their prey species would be likely from such an event, EFH in the Southern California Bight is stressed due to overfishing, and degraded water quality in estuaries south of Point Conception. Degradation of the water quality north of Point Conception due to an oil spill would cause further stress to EFH. The impacts to water quality from an open ocean spill would be short-term and not expected to last more than several days.

The potential for an oil spill occurring from continued oil and gas activities at the existing platforms on the Pacific OCS and State tidelands represents an insignificant incremental increase to the overall cumulative oil spill risk for fish resources.

Other Activities. NMFS (1998a and b, as cited in MMS, 2001) has identified several fishing and non-fishing activities that may cause adverse impacts to federally managed fish species and EFH along the Pacific Coast. These include dredging and discharge of dredged material, water intake structures, aquaculture, wastewater discharge, oil and hazardous waste spills, coastal development, agricultural runoff, commercial marine resource harvesting, and commercial fishing. Most of these activities occur throughout the California, Oregon, and Washington coastal habitat and all of these activities and impacting agents exist in the southern and central California coastal zone. As a result, marine water quality has been impacted by municipal, industrial, and agricultural waste discharges and runoff in much of the Santa Barbara Channel (MMS, 1992, as cited in MMS, 2001).

An estimated 1.34 billion gallons of treated municipal sewage per day are discharged into the waters off southern California (SCCWRP, 1990, as cited in MMS, 2001). Despite current efforts to limit sewage discharge, pollution and its effects on fish of the Santa Barbara Channel would remain at its present level over the next 25 to 40 years due to increasing coastal population.

Fishing pressure exerted by the combined efforts of commercial and marine recreational fishers is one of the most important man-induced stresses on some fish resources. Fishing pressures are expected to remain high in southern and central California as demand increases and fishing practices become more efficient. This would result in continuing short- and long-term declines in some fish stocks. Furthermore, NMFS (1998, as cited in MMS, 2001) stated that fishing gear impacts the biological seafloor resources by removing marine plants, corals and sessile organisms, upending rocks, leveling rock formations, and re-suspending sediments which irreversibly alters the marine habitat complexity. There are few, if any, large virgin marine habitats off the Pacific Coast. High relief rock piles that are not accessible to trawl gear are usually accessible to commercial longline and recreational hook-and line gear. Recent restrictions to trawling in areas where specific rockfish species are known have been instituted by State and Federal resource agencies. These restrictions are designed to reduce losses of fish resources from trawling activities.

The production from existing platforms on the Pacific OCS and in State waters is expected to continue through 2025. Table 5.2-1 shows the number of new wells expected to be drilled by field from existing platforms. The major impact agents are those discussed in Section 5.6. Impacts to fish resources and EFH from future activities other than decommissioning are expected to be low and would not add significantly to the overall impacts on fish resources of the Santa Barbara Channel.

Accidental oil spills present an ongoing source of potential impacts to fish resources. The cumulative risk of oil spills arises from multiple sources, including offshore oil and gas activities in Federal and State waters and both Alaskan and foreign-import tankering. Tankering represents the greatest risk of an oil spill in the Santa Barbara Channel

Incremental Impacts of Exploration and Development of the Undeveloped Leases on Fish Resources

Under the hypothetical exploration and development scenario described earlier, potential sources of impacts to fish resources and EFH would come from geophysical surveys, exploration and delineation drilling, construction, operation, and decommissioning of up to four platforms and associated activities, effluent discharges, new pipelines, and oil spills.

Geophysical Surveys. Several studies have examined the effects of seismic energy on various life stages of fish (e.g., Dalen and Knutsen, 1986; Falk and Lawrence, 1973; Greene, 1985; Holliday, et al., 1987;

Kostyuchenko, 1973; Pearson, et al., 1987; Turnpenny and Nedwell, 1994, as cited in MMS, 2001). The studies indicate that direct damage to adult fishes is mainly to the swimbladder and at fairly close ranges to the air gun. The lethal range for coregonid fishes does not extend beyond 19 feet (Falk and Lawrence, 1973, as cited in MMS, 2001). Damage to anchovies does not extend past three feet (Holliday et al., 1987, as cited in MMS, 2001). The risk of mortality to juvenile or adult fish would therefore be limited to the occasional fish that was close to the air gun array when shooting began; other fish would move beyond the potentially lethal range (Turnpenny and Nedwell, 1994, as cited in MMS, 2001).

Direct effects on fish eggs and larvae appear to be minimal. Holliday et al. (1987, as cited in MMS, 2001) reported that northern anchovy eggs and 15- to 22-day-old larvae were not significantly affected by sound pressures 3 to 4 times the level expected from a seismic air gun array passing directly over a specimen at 10 feet. However, 2-day-old and 4-day-old yolk-sac larvae suffered subtle, but statistically significant reductions in survival and growth rates when exposed to the same pressure levels. Since no physical damage was detected in the yolk-sac larvae, it was postulated that the observed survival and growth rate reductions were due to interference with the change in feeding behavior from yolk nutrition to active plankton-feeding. Pearson et al. (1988, as cited in MMS, 2001) exposed Dungeness crab zoeae to one discharge from a seven–air gun array and found no significant difference in survival or behavioral response compared to controls. In general, the acoustic pulse from air guns has relatively little effect on marine invertebrates, presumably due to their lack of a swim bladder.

Air gun energy appears to have behavioral effects on fish. Generally, pelagic schooling fishes seem to swim away and leave the area, while demersal fishes appear to respond by flattening to the bottom. Pearson et al. (1987, as cited in MMS, 2001) exposed several species of rockfish to acoustic energy in a controlled test. Three behavior patterns were noted: (1) the school dove to the bottom and remained motionless; (2) the school dove to midwater and swam rapidly in changing directions; and (3) the school broke into smaller schools and fled in different directions. These patterns were not always maintained throughout the exposure, indicating that fish may habituate to the sound. The fish returned to their pre-exposure behavioral patterns within minutes after the end of the sound presentations eliciting responses. Rockfish aggregations, as measured by fathometer, showed no significant areal difference between control and seismic sound emission trials, although a decrease in aggregation height was detected (Pearson et al., 1987, as cited in MMS, 2001). Perhaps more importantly, this study showed a decrease in CPUE (catch per unit effort) of 52.4 percent during air gun exposure. However, the study did not conclude how long this decrease in CPUE would be expected to last, or over how great a distance this reduction might occur. Studies by Engas et al. (1993, as cited in MMS, 2001) and Lokkeborg and Soldal (1993, as cited in MMS, 2001) reported that cod and haddock show significant catch reductions over areas of several kilometers and periods of at least 5 days.

Since 1963, more than 400 geological and geophysical surveys, including both 2-D and 3-D seismic surveys, have been conducted in the Santa Barbara Channel and Santa Maria Basin, and many others have occurred in State waters. Most of these surveys occurred during the 1970’s and 1980’s; the most recent seismic survey offshore southern California was the Exxon 3-D seismic survey conducted in the western Santa Barbara Channel in 1995 (MMS, 1995, as cited in MMS, 2001). Currently none of the Pacific OCS operators have proposed 3-D seismic surveys as part of post-suspension activities.

Exploration and Delineation Drilling. The primary impact-producing activities associated with assumed delineation drilling and related activities would include drilling discharges, anchoring of the MODU, and explosive abandonment of the exploratory wells, if this option is used. Drilling discharges would be associated with exploration/delineation drilling of the undeveloped leases from existing platforms. The following sections describe the sources and types of these potential impacts.

<u>Drilling Discharges</u>. The drilling muds and cuttings of Pacific OCS oil and gas facilities could potentially affect fish species through direct toxicity through exposure in the water or ingestion of prey that have

bioaccumulated toxins from the discharges, or through damage to essential fish habitat. The EPA Biological Assessment for the new General NPDES permit for offshore Pacific OCS facilities in southern California waters concludes that direct toxicity to listed fish species, or their food base, should be minimal (SAIC, 2000a, 2000b, as cited in MMS, 2001). All such discharges are required to meet NPDES water quality criteria, which were established to protect biological resources outside the 323-feet (100-meter) mixing zone. Significant impacts from Pacific OCS discharges generally have not been associated with fish. In fact, Love (1999, as cited in MMS, 2001) suggests that offshore platforms may provide nursery grounds for some species of rockfish. And a successful mariculture operation sold mussels collected from Pacific OCS platform legs to local restaurants for over a decade. The mussels have consistently passed all FDA criteria for marketing shellfish. Impacts from drilling mud discharges from non-project delineation wells are expected to be low.

Cuttings generally are not highly toxic, but depending on the subsurface formations being penetrated, they may contain toxic metals, naturally occurring radioactive elements, or petroleum. Cuttings generally do not disperse far from the discharge point. Impacts from drilling cuttings discharges from the five assumed exploration wells range from low to moderate, depending on the location of the wellsites in relation to high relief habitat, and mitigation applied. Several of the potential wellsite locations are proposed near potential hard substrate habitat. If biological surveys of canyons and potential outcrop features identify important high relief habitat within 1,000 feet of the wellsite, discharges of cuttings from delineation wells may result in moderate impacts to hard substrate.

Direct smothering and turbidity can adversely affect filter-feeding organisms such as the sponges, cup corals, and anemones found on naturally occurring hard bottom reefs. Because habitat supporting these animals occurs within the immediate vicinity of the Point Arguello platforms and pipelines, intensive monitoring was conducted during drilling activities at the three Point Arguello platforms from 1986 to 1995. Conclusions from Phase II and III that pertain to hard substrate habitats are as follows:

1. Four of 22 taxa displayed significant time/dose interactions representing possible negative responses to the drilling mud discharges in specific habitat. These taxa were: sabellids in deep low-relief habitat, *Caryophyllia* sp(p) in deep low relief and deep high-relief habitat, galatheid crabs in deep low-relief habitat, and *Halocynthis hilgendorfi igborja* in deep low-relief habitat. Combined trends for the various taxa were not statistically significant.
2. It was concluded that any biological effects due to the drilling muds were related to physical effects of the increased particle loading, not chemical toxicities.
3. Adverse biological effects on the benthos from this study, as in other documented studies, were limited to within 1 km of the discharge source.

Currently there are eight generic water-based muds which have been approved for use by EPA. Discharge of oil-based drilling fluids into marine waters is not authorized by EPA. The major toxic constituents of drilling muds are trace metals including arsenic, cadmium, chromium, lead, mercury, and zinc. The toxicity of water-based drilling mud to juvenile lobster and flounder was investigated by Neff et al. (1989, as cited in MMS, 2001). They found that both species accumulated small amounts of barium but no detectable chromium during 99 days of exposure to sandy sediment heavily contaminated with the settleable fraction of a used water-based lignosulfonate drilling mud. There was some physiological and biochemical evidence of stress in both species, but growth was not significantly affected. The authors concluded that, for the species and life stages tested, there is little evidence for toxicity of water-based drilling mud.

“Produced water” is the water present in the source petroleum. No produced water is expected to be discharged from any of the proposed delineation drilling/well testing activities.

Given the short-term nature and limited scope of delineation drilling, low impacts to marine fish resources and EFH are expected from drilling discharges.

Anchoring Activities. Usually, up to eight anchors would be set and raised for each well site. The anchors would impact the sea floor and raise clouds of sediment a few meters into the water column. The silty sediments would likely settle to background within approximately 1,650 feet, and would not rise vertically within the water column in such a fashion to affect background sediment levels (normally 1 to 5 mg/l) over a large area (SAIC, 1986; 1995, as cited in MMS, 2001).

Section 5.7.2, Sea Floor Resources, concludes that physical impacts to seafloor resources from anchoring operations are low (sedimentary areas) to moderate (high relief hard bottom communities). The impacts would result in a long-term impact in a locally important habitat or over a very localized area. High impacts are not expected even if hard bottom is contacted since the level of activity, five delineation wells with 40 anchoring events, is unlikely to cause sufficient disturbance to be felt at a population or regional level. If appropriate mitigation measures are adopted, the impacts to fish resources and EFH would be low, or insignificant.

Well Abandonment. Once the drilling and testing would be completed, each of the delineation wells would be permanently plugged and abandoned. Part of the removal process involves cutting the well casing string approximately 15 feet below the sea floor. The well casing may be cut mechanically, or with explosives. In the latter case, shaped charges are lowered inside the casing and detonated. Commonly, such charges weigh in the range of 35 to 45 lbs (Howorth et al., 1996; Howorth 1997, as cited in MMS, 2001).

Based on a 10 percent kill probability and using a 56 lb charge, the following can be expected (Goertner 1981, as cited in MMS, 2001):

- In water depths of 500 feet, 1-oz fish near the surface can be killed out to a horizontal range of about 700 feet. The only other fish which are vulnerable to injury are those near the bottom within a radius of 30 to 40 feet from the charge.
- For severance explosions in water depth of 1000 feet, no significant kills of fish will occur.

If explosives are used in the well abandonment process, the charge would be detonated in the well casing approximately 15 feet below the seafloor. This positioning of the charge would dampen the explosion and restrict the shock and acoustic effects. Thus, the 10 percent kill zone described by Goertner would likely shrink.

The use of explosives for well abandonment on the Pacific OCS would require the implementation of a wildlife mitigation plan designed to minimize impacts to marine life (Howorth 1997, as cited in MMS, 2001). Typically, such a plan has included the use of shipboard observers who would be charged with collecting injured or dead fish after the detonation. The detonation could also be postponed if the diver setting the charge reports an appreciable number of fish over the wellhead.

The latest wellhead removal on the Pacific OCS using explosives, occurred in 1997 on Lease OCS-P 0215, offshore Ventura. The diver placing the charge reported about 20 juvenile rockfish over the wellhead before detonation. After the detonation, 17 rockfish and 6 surfperch were collected by observers. In addition, 18 California barracuda were recovered (Howorth 1997, as cited in MMS, 2001). The barracuda, an epipelagic fish, probably happened to be swimming over the detonation site just as the charge went off. A similar incident involving barracuda occurred on one occasion during the 4H platform removal project (Howorth 1996, as cited in MMS, 2001).

A small number of fish would be expected to be lost after the explosive removal of a wellhead. However, given the short duration of the project, few fish would be expected to be attracted to the wellhead and a low mortality is expected. Overall, impacts from this source are expected to be low. Low effects to fish resources and EFH are expected.

Pacific OCS Platform Placement and Removal. As discussed earlier, three platforms would be needed to recover reserves in the northern offshore Santa Maria Basin including the Lion Rock, Purisima Point, Point Sal, and Santa Maria Units. One platform would be needed to develop the Gato Canyon Unit. These have all been included in the hypothetical development scenario. Assuming that scenario occurs, on a long-term local basis, anchor scars and damage to the bottom could persist, thus altering the habitat quality for species associated with hard bottom substrate. The platforms would also become home to species associated with hard bottom substrate which could adversely affect native habitat and species composition of the area. Species associated with soft bottom that were in the area before the platform would likely be adversely impacted by platform emplacement. Mussel mounds would likely develop beneath the platform structures, further altering the natural habitat of the area. The impacts of removal were discussed earlier in this section. The emplacement and removal of 4 new platforms on the Pacific OCS would have low to moderate regional impacts on fish stocks and EFH.

Effluent Discharges. The hypothetical development scenario anticipates that three platforms with 60 well slots each would be placed in the northern Santa Maria Basin area. One platform with 28 well slots would be placed on the Gato Canyon Unit. Each of the three platforms anticipated on the northern Santa Maria Basin would discharge approximately 650,000 bbl of drilling muds and 150,000 bbl of drilling cuttings from 50 to 55 wells over the life of the platforms. The Gato Canyon platform would discharge 193,000 bbl of drilling muds and 68,000 bbl of cuttings from 24 wells over its anticipated lifetime. See Table 5.6-4 for discharges on the other units. Though drilling muds are nontoxic to slightly toxic to fish (Neff, 1987, as cited in MMS, 2001), the physical effects of increased sedimentation can bury hard bottom habitat and food organisms in the local area. Because the direct and indirect effects of drilling muds and cuttings on fish resources and their food supplies and habitat are localized, the cumulative effects from discharges of drilling muds and cuttings on fish resources and EFH would be low.

Produced water from the northern and southern platforms on the northern Santa Maria Basin would be discharged from the central platform. It is assumed that produced water from the Gato Canyon Unit platform would be reinjected there. No impacts to fish resources or EFH would be expected from discharged produced water outside the prescribed mixing zone around the discharge point. As described previously, the fish species located within the 100-meter mixing zone of the produced water discharge point could experience sublethal impacts. These impacts would not be expected to add to the cumulative effects on fish resources in the Santa Barbara Channel.

Pipelines and Power Cables. The anticipated platforms in the northern Santa Maria Basin would require approximately 100 miles of pipeline and 80 miles of power cable. The Gato Canyon Unit platform would require 16 miles of pipeline and 11 miles of power cable. Potential impacts to fish resource habitat, including hard bottom and kelp beds, could result due to anchoring activities by the lay barge, and laying the pipeline through habitat areas. Pre-activity site surveys, active monitoring of the construction phase of the project, and post-activity surveys would help mitigate the impacts. Moderate impacts to fish resources and EFH could occur if contact and damage to significant habitat areas is unavoidable. Offsite mitigation and restoration of kelp beds and hard bottom would be required.

Oil Spills. If all of the undeveloped leases are developed, under the most likely development scenario the probabilities of one or more spills 200 bbl or less in size and in the 2,000 bbl range occurring from these activities are analyzed in Section 5.3. Impacts to fish resources and EFH from any oil spills occurring as a result of the development of the undeveloped leases would be similar to those described above for the 200 and 2,000 bbl spills assumed to occur as a result of offshore oil and gas activities and for the assumed 22,800 bbl tanker spill.

5.7.4.3 Summary and Conclusion – Fish Resources

Several fish stocks in the Santa Barbara Channel are depressed. Unfortunately, it is difficult to apportion the reasons for a fishery's demise among overfishing, habitat degradation, pollution, and natural variability of the population. However, as fishery managers gather more detailed knowledge about fish life histories, including potential linkages between fish recruitment and long-term changes in ocean climate, they would be better able to prevent the overexploitation and resulting population crashes of one fish species after another. Many of these fish stocks have been monitored for less than the span of one of their generations. It may take decades of monitoring to fully ascertain the long-term feasibility of current fishery restrictions, proposed marine protected areas, and other fishery management options.

The 1996 amendments to the Magnusen-Stevens Act addresses sustainable fisheries and sets guidelines for protecting marine fish resources and habitat from fishing related and non-fishing related activities. Some routine offshore oil and gas activities, including construction and drilling, would likely be heaviest during the period 2007–2012; under the hypothetical development scenario much of this activity would be related to the development of the undeveloped leases. Construction activities would occur in the Santa Maria Basin and, to a lesser extent, the western Santa Barbara Channel. Decommissioning of existing offshore oil and gas facilities would begin in the eastern Channel about 2012 and shift westward over a period of years. Thus, there would be periods of potentially habitat altering activities occurring in different parts of the study area at various times. Throughout these periods, routine activities such as production, routine maintenance, and vessel and helicopter support traffic would continue. Overall, the impacts to fish resources in the study area from offshore oil and gas activities, primarily construction and decommissioning, would increase over present levels. However, the areas covered by these activities would be small relative to the available marine fish habitat, and the disturbance would be localized. Cumulative impacts to fish resources and EFH from all the routine oil and gas activities assumed to take place between 2006 and 2030, including those associated with the hypothetical development of the undeveloped leases, are expected to be moderate.

Shallow hazards (air gun) surveys performed during post-suspension activities are expected to have low to no impact on the fish resources within the study area. Likewise, unless a substantial area of deepwater rock habitat is completely destroyed, the drilling of three delineation wells could be expected to have low impacts on these resources. The use of explosives to abandon the two previously completed exploratory wells could have low impacts on the fish resources; if no explosives are used, no impacts to those resources are expected from well abandonment activities.

Accidental oil spills present an ongoing source of potential impacts to fish resources. The cumulative risk of oil spills arises from multiple sources, including offshore oil and gas activities in Federal and State waters and both Alaskan and foreign-import tankering. The greatest oil spill risk to fish resources and EFH in the study area results from tankering operations. This risk is tempered by recently implemented or proposed mitigation (such as the rerouting of tankers farther offshore along the central California coast) and, as discussed in Section 5.3, by modern oil spill response capabilities. Impacts to fish resources and EFH from the oil spills assumed to occur in the study area during the period 2006 through 2030 could range from low to moderate, depending on location, season, volume, and a number of other factors. Without development of the undeveloped leases, the probabilities that one or more oil spills would occur during the period 2006 through 2030 from existing Pacific OCS oil and gas activities are 94.9 percent for a spill of 200 bbl or less and 41.2 percent for a spill of 2,000 bbl. The probabilities that an oil spill would occur as a result of the development of the undeveloped leases are 98.8 percent (200 bbl or less) and 53.9 percent (2,000 bbl). Thus, the potential for an oil spill occurring from hypothetical development of the undeveloped leases would represent a measurable incremental increase to the overall cumulative oil spill risk for fish resources and EFH of the Santa Barbara Channel.

A summary of the potential effects that the post-suspension period activities could have on the fish resources within each unit is provided in Table 5.7-4, below. The differences in the impacts for the Units are based on the potential activities within each unit and are generally related to habitat disturbance or removal. Impacts to marine fish resources would be expected to be related to habitat damage due to anchoring, drilling, and placement and removal of structures. Seafloor resources within those units that would be explored and developed from existing platforms would be expected to be exposed to low impacts. Hypothetically anticipated delineation and exploratory drilling, construction and operation of platforms and pipelines, and decommissioning of those structures would result in low to moderate impacts to the fish resources. As with seafloor habitat discussions, impacts to fish resources can be reduced or eliminated through avoidance of the sensitive high-relief solid substrate features. The relatively large area of rocky habitat within the Gato Canyon Unit increases the likelihood of impacts from all potential activities there. Decommissioning activities could potentially have moderate to high impacts to EFH for managed rockfish if ongoing studies determine that those structures provide a Habitat Area of Particular Concern (HAPC) for certain species.

Table 5.7-4. Comparison of Impacts to Fish Resources by Undeveloped Unit/Lease and Development Phase.

Unit/Lease	Exploration and Delineation Drilling	Development and Production	Decommissioning
Cavern Point	Low	Low	None
Gato Canyon	Low to Moderate	Moderate	Moderate to High
Rocky Point	Low	Low	Low
Sword	Low	Low	None
Bonito	Low	Low	None
Santa Maria	None	Low to Moderate	Moderate to High
Purisima Point	Low to Moderate	Low to Moderate	None
Point Sal	Low to Moderate	Low to Moderate	Moderate to High
Lion Rock	None	Low	None
Lease OCS-P 0409	None	Low to Moderate	Moderate to High

5.7.5 Marine and Coastal Birds

5.7.5.1 Significance Criteria

The following impact level definitions for marine and coastal birds were developed for this analysis:

- **High.** Impacts are expected to include direct mortality, reduced survivorship, declines in reproductive success, shifts in distribution, and possibly, changes in species diversity. Mortality is expected to involve thousands of birds, with many more experiencing sublethal effects. This would be expected to result in measurable changes in distribution and abundance in the study area. Effects are expected to continue for more than 2 years.
- **Moderate.** Impacts are expected to include direct mortality, reduced survivorship, declines in reproductive success, and shifts in distribution. Mortality is expected to involve hundreds of birds from the study area, with many more experiencing sublethal effects. This would be expected to result in measurable changes in distribution and abundance in the study area. Effects are expected to continue for 1 to 2 years.
- **Low.** Impacts result in biologically important (e.g., a change in abundance, species diversity, reproductive success, growth rates, and/or survival) change(s) in a few local populations (e.g., a colony or beach), mainly due to high levels of disturbance. In this analysis, minor changes in behavior (e.g., a bird moving out of the path of an approaching boat) are not considered biologically important and are not indicative of an impact. Mortality, if any, would be limited to the loss of 10's of birds, with many more experiencing sublethal effects. Effects are expected to continue for no more than one year.

High and moderate impacts are considered to be significant, while low impacts are considered insignificant.

5.7.5.2 Impacts of Post-Suspension Activities

This section addresses post-suspension activities resulting from the hypothetical development scenario that potentially could affect marine birds during the period of 2006 through 2030.

Cumulative Impacts without Activities on the Undeveloped Leases on Marine and Coastal Birds

Offshore Oil and Gas Activities

Cumulative impacts related to offshore oil and gas activities that may have long-term (e.g., months or years) effects on marine and coastal birds are oil spills, disturbance from helicopter flights, and platform decommissioning. These impacts have occurred (in the case of past and present operations and past oil spills), or may occur (in the case of proposed projects, potential oil spills, and platform decommissioning) from existing Federal and State projects and proposed State projects (e.g., Tranquillon Ridge) whether or not the undeveloped leases are developed. Other activities associated with oil and gas development, including platform installation and operation, pipeline construction, and vessel traffic, have, at most, very short-term (e.g., a few minutes to a few weeks), biologically unimportant (e.g., movement out of the path of an approaching vessel) effects on birds and do not contribute to cumulative impacts.

Accidental Pacific OCS Oil Spills

Historically, birds in the study area have been affected by Pacific OCS-related oil spills. Based on the discussion of oil spill risks in Section 5.3, the most likely scenario for existing Federal and State offshore oil production and projects proposed by the State is that one or more oil spills in the 50 to 1,000 bbl range would occur from offshore oil and gas activities over the period 2006 though 2030, and that such a spill would most likely be 200 bbl or less in volume. The maximum reasonably foreseeable oil spill volume from future offshore oil and gas activities is 2,000 bbl, assumed for purposes of analysis to be a pipeline spill.

Spilled oil may affect birds in several ways: (1) direct contact with floating or beached oil; (2) toxic reactions; (3) damage to bird habitat; and (4) damage to food organisms. Oil-related mortality is highly dependent on the life histories of the bird species involved. Birds that spend much of their time feeding or resting on the surface of the water are more vulnerable to oil spills (King and Sanger, 1979, as cited in MMS, 2001). Direct contact with even small amounts of oil can be fatal, depending on the species involved. Studies by Dr. Michael Fry (Nero and Associates, 1987, as cited in MMS, 2001) have found that exposure to as little as 3 ml of oil (which amounts to just less than a teaspoon) spread evenly on the wings and breast of Cassin's auklets caused severely matted plumage and was a lethal dose. The principal cause of mortality from oil contact in birds is from feather matting, which destroys the insulating properties of the feathers (Erasmus et al., 1981, as cited in MMS, 2001) and leads to death from hypothermia. Oiling can also result in a loss of buoyancy, which inhibits a bird's ability to rest or sleep on the water (Hawkes, 1961, as cited in MMS, 2001), and can diminish swimming and flying ability (Clark, 1984, as cited in MMS, 2001). Also, an oiled bird's natural tendency is to preen itself in an attempt to remove oil from the plumage. The acute toxicity of such ingested oil (crude or refined) depends on many factors, including the amount of weathering and amount of oil ingested. Birds that receive lethal doses succumb to a host of physiologic dysfunctions (e.g., inflammation of the digestive tract, liver dysfunction, kidney failure, lipid pneumonia and dehydration) (Hartung and Hunt, 1966, as cited in MMS, 2001). Oil that is ingested as a result of preening or eating contaminated prey can cause abnormalities in reproductive physiology, including adverse effects on egg production (Ainley et al., 1981; Holmes, 1984; Nero and Associates, 1987, as cited in MMS, 2001). In addition, the transfer of oil from adults to eggs can result in reduced hatchability, increased incidence of deformities, and reduced growth rates in young (Patten and Patten, 1977; Stickel and Dieter, 1979, as cited in MMS, 2001). Growth reduction may also be the indirect result of an oiled parent's inability to deliver sufficient food to nestlings (Trivelpiece et al., 1984, as cited in MMS, 2001). Finally, seabirds may inhale toxic doses of petroleum vapor when on the water in the vicinity of an oil spill although little information is available about the magnitude of this potential impact (NRC, 2003). Diving bird species might be especially vulnerable to inhalation of fumes from an oil slick. Inhalation of noxious gases from an oil slick could be a particular concern if the slick was near a nesting seabird colony.

Cleanup efforts to remove spilled oil may have impacts of their own. Oil spill response and cleanup activities may involve intrusion into sensitive areas. Human presence while booming off an area, cleaning oil off beaches, or attempting to capture oiled wildlife for rehabilitation near seabird colonies may cause flushing from nests or temporary abandonment. Additionally, many seabirds react to disturbance by leaving their roosts or nests to go sit on the water somewhere nearby. In other words, disturbance of the colony may have the effect of flushing the birds into oiled water. This potential should be evaluated on a case-by-case basis in the event of a spill, prior to a decision to approach a roost or breeding colony.

The level of impact on birds from an oil spill depends on a variety of factors, including the type, rate, and volume of oil spilled and the weather and oceanographic conditions at the time of the spill. These parameters would: determine the quantity of oil that is dispersed into the water column; the degree of weathering, evaporation, and dispersion of the oil before it contacts a shoreline; the actual amount, concentration, and composition of the oil at the time of shoreline or habitat contact; and a measure of the toxicity of the oil. As discussed previously, the marine and coastal bird community in southern California is also complex, with the number of species, the abundance of each species, and their activity (e.g., nesting, migrating, or wintering) in the study area varying with location and time of year. There are also varying degrees of vulnerability to the effects of an oil spill, with seabirds generally being the most sensitive.

Although there is not a high degree of correlation between the size of a spill and the number of birds affected, a 200 bbl spill would generally have far less impact than one of several thousand barrels. However, a spill in the range of 200 bbl would likely result in the loss of at least some seabirds and a few shorebirds, if it were to contact land (e.g., the 163 bbl Torch pipeline spill off Vandenberg AFB, resulted in the loss of seabirds and shorebirds). Because of weathering, dispersion, and cleanup efforts, the effects of a 200 bbl spill would most likely be limited to the general vicinity of the source of the spill. If the spill remains well offshore and does not contact the mainland or islands, the birds that would most likely be affected would include shearwaters, fulmars, phalaropes, gulls, common murres and other alcids. If the spill approaches the mainland coast, especially if it occurs during the winter months when many nearshore species are in the study area, the birds that would most likely be affected include loons, western grebes, California brown pelicans, cormorants, and surf scoters. If contact with the shore occurs, some shorebirds might also become oiled or displaced to other areas; cleanup efforts could exacerbate impacts on shorebirds. It is estimated that a 200 bbl spill could contact from about 1 km (95 percent probability) to 19 km (5 percent probability) of coastline (see Section 5.3). The shorebirds that might be affected include black-bellied plovers, whimbrels, marbled godwits, willets, black turnstones, and sanderlings. Waterfowl and marshbirds could also be affected if oil contacts a wetland (e.g., Carpinteria Marsh or Mugu Lagoon), where these birds occur. Probably the most serious effects would result if a 200 bbl spill were to occur in close proximity to and/or contact one of the Channel Islands during the breeding season, which could result in both the loss of nesting adults and disruption in nesting activities. Cleanup efforts near or on the islands could exacerbate the impact of a spill on nesting seabirds, which are especially sensitive to disturbance. Because of the actions of weathering, dispersion, and cleanup efforts, for a 200 bbl spill to contact one of the islands, it would most likely have to originate from one of the platforms (Grace, Gilda, Gail, or Gina) or associated pipelines at the eastern end of the Santa Barbara Channel. A 200 bbl spill from this area could contact Anacapa Island or the east end of Santa Cruz Island, both of which are within the Channel Islands National Marine Sanctuary and National Park. The breeding birds that could be affected in these areas include: ashy storm-petrels, California brown pelicans, double-crested and Brandt's cormorants, black oystercatchers, western gulls, pigeon guillemots, and Cassin's auklets.

By its very size, the impacts of a 2,000 bbl spill on birds would likely be much greater than that of a 200 bbl spill, depending on the timing, location, and movements of each spill. Such a large spill is likely to affect a much larger area than a 200 bbl spill, and could, therefore, contact a larger number of birds and/or habitat. It is estimated that a 2,000 bbl spill could contact from about 3 km (95 percent probability) to 53 km (5 percent probability) of coastline (see Section 5.3). Unlike the smaller, 200 bbl spill, which would probably only contact Anacapa Island and part of Santa Cruz Island (see above), a 2,000 bbl spill is more likely to contact any one of the northern Channel Islands, including the extensive seabird colonies on San Miguel Island, which is also located within the Channel Islands National Marine Sanctuary and National Park. A 2,000 bbl spill is also more likely to contact a wetland or possibly even more than one.

Overall, the impacts on marine and coastal birds of potential oil spills from existing Federal, State, and State-proposed oil and gas operations is expected to be low. However, impacts would increase to moderate if a 2,000 bbl spill contacts seabird nesting colonies on the Channel Islands.

Helicopter Traffic

Another potential source of impacts from existing and proposed Federal and State offshore oil operations is helicopters. The level of helicopter traffic related to offshore oil and gas activities in the study area is described in Section 5.2. Routinely, 8 to 10 helicopter trips occur offshore each day, including those contracted by MMS. Helicopter flights related to offshore oil may originate from three locations, depending on the purpose and destination of the flights: the Camarillo Airport in Ventura County, and the Santa Barbara and Santa Maria Airports in Santa Barbara County.

Helicopter flights can have a negative impact on seabirds, although seabird reactions to helicopters and other aircraft are complex, depending on: the species involved; colony size; previous exposure levels; and the location, altitude, and number of flights (Hunt, 1985, as cited in MMS, 2001). Seabirds may also habituate to air traffic over time (Hunt, 1985, as cited in MMS, 2001). Low-flying aircraft, especially helicopters, can disturb nesting birds, causing them to leave their nests unattended. Although the adult(s) may be absent from the nest for only a short period of time, eggs and nestlings may be lost either due to exposure or predators, such as western gulls. Birds that nest on offshore rocks and cliffs are especially vulnerable because they may accidentally cause their eggs or young to fall from cliff ledges when they take flight due to a low-flying helicopter. Helicopters may also disturb roosting birds, such as cormorants, gulls, and pelicans. Helicopter flights may especially be a problem in undisturbed areas like the Pacific Northwest or Alaska. Studies in the Bering Sea have demonstrated that repeated aircraft flights near colonies may have been a factor contributing to fewer nesting attempts and reduced reproductive success of nesting seabirds (Biderman and Drury, 1978; Hunt et al., 1978, as cited in MMS, 2001). Due to the high background level of aircraft flight activity that occurs throughout much of the study area, however, birds may be habituated to this type of disturbance. Flights at low altitudes could still be a problem for nesting birds, however.

Probably the most sensitive birds are the nesting seabirds, especially those that nest on cliffs and offshore rocks. The few seabirds that nest along the mainland coast are the only ones that are likely to be exposed to Pacific OCS-related helicopter traffic, as air traffic over the Channel Islands National Marine Sanctuary and the Channel Islands National Park, where most of the breeding seabirds in southern California occur, is restricted to altitudes greater than 1,000 feet. The pigeon guillemot is the most abundant nesting seabird in this area (Carter et al., 1992, as cited in MMS, 2001). Other species, including pelagic cormorant, western gull, and rhinoceros auklet, occur in very small numbers. Most nests in this area are located at Point Sal and Point Arguello. Impacts to these species could occur if low altitude (less than 1,000 feet) flights over their colonies take place during the breeding season. Although pigeon guillemots may be the most abundant nesting seabird in this area, they may not be as sensitive to helicopter flights as other species because they nest in cracks and crevices and abandoned burrows. The flight path across the shoreline for helicopters from Santa Maria is well south of Point Sal and does not cross any seabird nesting areas (E. Rudolfs, Arctic Air, pers. comm., as cited in MMS, 2001). Also, at VAFB, where most of the seabird colonies that might be exposed are located, there is a 1,000-foot flight restriction over the major seabird colonies, which further protects most of the seabirds in this area (N. Read, VAFB, pers. comm., as cited in MMS, 2001). Several international and numerous smaller airports occur along the southern California coast along with several military airports, and air traffic is a constant daily or even hourly occurrence. Birds have probably become habituated to air traffic at least to some extent in the study area. Overall, no impacts to marine and coastal birds are expected from helicopter traffic resulting from existing Federal offshore oil operations.

Platform Decommissioning

For purposes of analysis, it is assumed that decommissioning would encompass the complete removal of a platform and abandonment of pipelines in place. Activities associated with platform removal would only have an effect on birds if explosives are used in the process. To date, only one Pacific OCS facility in the Pacific Region has been decommissioned by non-explosive means — the OS&T vessel that formerly served the Santa Ynez Unit platforms in the Santa Barbara Channel. In addition, six offshore platforms in State waters in the Channel have been removed with the use of explosives — two in 1988 and four in 1996. Other Pacific OCS platforms would be removed during the period 2006 through 2030. Table 5.2-3 presents estimated removal dates for existing oil and gas structures offshore southern California. It is expected that no Pacific OCS platforms in the Santa Barbara Channel or Santa Maria Basin would be removed before 2012, and a few may be in place as late as 2025 (or 2035, in the case of Platform Irene if the Tranquillon Ridge development occurs). Although no impacts to birds have been reported to result from platform removal, under certain circumstances, it is possible that birds could be injured or killed as a result of explosives used for platform removal. Although no injuries to seabirds from platform decommissioning with explosives have been reported, brown pelicans, cormorants, gulls, and phalaropes have been killed or injured due to other sources of underwater explosions (Fitch and Young, 1948, as cited in MMS, 2001). To be killed or injured during platform decommissioning with explosives, a bird would have to be submerged at the exact moment of the explosion. The seabirds that might be injured are those that forage underwater. These include grebes, loons, shearwaters, scoters, and alcids. Many of these species remain relatively close to shore and would not be affected. Gulls might be attracted to the area by the dead fish that result from underwater explosions, but gulls feed on the surface and would not be affected. There is the potential that a few seabirds could be injured or killed with explosives during platform decommissioning; shorebirds, marshbirds, and waterfowl would not be affected.

Because offshore oil platforms provide roosting (and in some cases even nesting) habitat for seabirds, platform removal would eliminate these roosting sites. Offshore structures provide seabirds protection from terrestrial predators and many kinds of human disturbance. In some cases, offshore structures may have considerable value to some seabird species. For example, an offshore pier on State Lease PRC-421 in the Ellwood Oilfield Complex in Santa Barbara County was used by between 12 and 160 California brown pelicans (Gillies, 2004). In addition, Brandt's cormorants nested on the structure.

Impacts of platform removal would not involve any direct mortality to seabirds, but the loss of offshore roosting sites would add to stresses on seabirds that depend on protected roosting sites. Impacts of platform removal to seabirds would be low.

Impacts from Non-Offshore Oil Sources

The biggest threat to seabirds from activities not associated with offshore oil would be from a major tanker spill. Based on the discussion of oil spill risks in Section 5.3, the mean size for an oil spill from a tanker accident is assumed to be 22,800 bbl. By its very size, a 22,800 bbl spill could have far greater impacts to marine and coastal birds than those from offshore oil operations discussed above, depending on the location, timing, and movement of the various-sized spills. The impacts of this size spill on marine and coastal birds would be far worse than those from offshore oil operations discussed above. It is estimated that a 22,800 bbl spill could contact from about 9 km (95 percent probability) to 160 km (5 percent probability) of coastline. However, the possibility of contact with the shore is ameliorated somewhat by the fact that U.S. oil tankers voluntarily maintain a distance of 90 km (50 nm) from the mainland for much of their route. The cleanup process for this size spill would be much more difficult and protracted compared to that for the smaller spills discussed above, especially if a significant proportion of the oil reaches shore. Overall, the impact to marine and coastal birds of a 22,800 bbl, non-OCS tanker spill is expected to range from moderate to high, depending on the timing, location, and movement of the spill.

Other factors that have historically contributed to cumulative impacts on marine and coastal birds include climate and weather events (e.g., El Niño events), pollution (e.g., DDT), habitat loss (e.g., conversion of wetland to marinas), introduced predators (e.g., rats), commercial fishing (e.g., gill net mortality) and disturbance (e.g., beach use, hikers, sea kayakers). Overall, the cumulative impacts of these factors on marine and coastal birds range from low to moderate, depending on the species.

California brown pelicans and other seabirds are highly dependent on the availability of prey. Brown pelicans, for example, are dependent on the availability of anchovy. Pelicans show variations in annual reproductive success paralleling variations in abundance and availability of anchovies, which in turn are affected both by oceanographic patterns and by human fisheries (Briggs et al 1987, as cited in MMS, 2001). El Niño events can reduce prey abundance and subsequently result in lower reproductive success of seabirds. For example, the El Niño-Southern Oscillation of 1982-1983 caused failure of nesting common murres (Baird 1993). Effects of El Niño events on seabirds range from low to moderate depending on the species.

Similarly, overfishing of seabird prey populations is known to decimate seabird populations (Baird 1993). Fishermen often fish in preferred seabird foraging areas and often take species such as northern anchovies that are preferred prey of seabirds. Impacts of overfishing on seabird populations range from low to moderate depending on species.

Discharge of DDT into the Southern California Bight from the late 1950s to the early 1970s had a severe effect on the reproductive success of some seabirds, particularly the California brown pelican and double crested cormorant (Riseborough et al 1971, Gress et al 1973, as cited in MMS, 2001). The impacts of DDT on California brown pelicans and double crested cormorants was high. With the banning of DDT, these populations subsequently have recovered (Anderson et al., 1977, as cited in MMS, 2001, and Anderson and Anderson, 1975).

Loss of breeding habitat for seabirds has particularly affected species such as terns that breed in estuaries and snowy plovers and least terns that breed on sandy beaches. The impact of habitat losses on coastal breeding seabirds is high. However, recent protection and restoration of wetlands and protection of nesting colonies on sandy beaches has helped to offset these habitat losses (Baird 1993, Chambers Group, 2001, as cited in MMS, 2001). Impacts of habitat loss to coastal nesting bird species remain moderate.

Commercial gill net fishing catches and kills large numbers of diving birds (Baird 1993). The annual kill of seabirds by Japanese fisheries in the North Pacific and Bering Sea is estimated to be 250,000 to 750,000 birds per year. Decreases in southern California populations of common murres have been hypothesized to be related to gill net fishing (Baird 1993). Impacts of gill net fishing on seabirds in the past likely ranged from low to moderate depending on species. However, increased regulations has resulted in a substantial decline in gill net fishing in southern California and current impacts to seabirds likely are low.

Human disturbance including noise, introduction of exotic predators such as cats and rats, and direct disturbance to foraging, resting or nesting birds undoubtedly has had a high impact on many species. Protection of important bird areas, eradication of exotic predators, and efforts to direct activities such as military flights and target practice away from bird nesting colonies has helped to reduce human disturbance to seabirds (Baird 1993). Impacts remain low to moderate depending on the species.

Incremental Impacts of Exploration and Development of the Undeveloped Leases on Marine and Coastal Birds

The potential scenario for the exploration and development of the currently undeveloped leases is described in Section 5.2. Of the activities and possible accidental events from development of the undeveloped leases, oil spills, disturbance from helicopter flights, abandonment of exploratory wells and platform decommissioning may have long-term (e.g., months or years) effects on marine and coastal birds. Other activities associated with oil and gas development, including exploration activities, platform and pipeline construction, and vessel traffic, have, at most, very short-term (e.g., a few days or weeks), biologically unimportant (e.g., movement out of the path of an approaching vessel) effects on birds and do not contribute to cumulative impacts.

The oil spill risk analysis provided in Section 5.3 indicates a greater likelihood of both a 200 bbl and a 2,000 bbl oil spill occurring with the development of the undeveloped leases. However, a greater potential for an oil spill to occur does not necessarily indicate a higher level of impact, and the impacts of oil spills to marine and coastal birds that may occur as a result of offshore oil development, including the hypothetical development scenario for the leases, remains low to moderate as described above for existing Federal and State projects and proposed State projects.

Helicopter traffic is expected to increase as a result of the development of the undeveloped leases, especially during construction. However, no change is expected in either the airports used for these flights, the flight paths to and from the various airports, and the flight restrictions currently in place (e.g., VAFB, Channel Islands National Marine Sanctuary). Therefore, helicopter flights associated with the hypothetical development scenario for the undeveloped leases are not expected to contribute to cumulative impacts on marine and coastal birds in the study area.

Another activity associated with potential development of the undeveloped leases, well abandonment, could harm seabirds under certain circumstances. Each of the delineation wells that would be drilled on undeveloped leases would be permanently plugged and abandoned. As part of the abandonment process, the casings for these wells may be cut either mechanically or with explosives. Use of explosives raises the possibility of impacts to seabirds. Impacts to seabirds from explosives used in platform decommissioning were discussed above. Harm to seabirds from well abandonment is less likely than from platform decommissioning because a lower amount of explosives would be used. Although safety information is not available for birds, research on fish (Gertner, 1981, as cited in MMS, 2001) and marine mammals (Young, 1991, as cited in MMS, 2001) indicates that, for the amount of explosives used in well abandonment, a safe distance for these animals ranges from about 1,000 to 2,000 feet, depending on the species. Explosive charges would be set off 5 meters (15 feet) below the sea floor, which would dampen the effect of the blast and reduce the area in which birds could be killed or injured; therefore, a bird would probably have to be submerged directly under the MODU to be affected by well abandonment. Based on the damping effect of the explosions being below the sea floor and the very low probability that seabirds would be both submerged at the exact moment of an explosion and in close enough proximity to be killed or injured, no impacts to marine and coastal birds from well abandonment are expected.

In the case of the hypothetical development scenarios, when potential new platforms on the undeveloped leases would be abandoned and removed, seabirds would lose roosting sites and foraging opportunities. The loss of platforms would add to stresses on seabirds, because they have a limited number of roosting sites where they are protected from terrestrial predators and human disturbance. Impacts of platform removal on the undeveloped leases on seabirds would be low.

5.7.5.3 Summary and Conclusion – Marine and Coastal Birds

Table 5.7-5 summarizes the impacts of each phase of activity on each unit for which a suspension has been requested.

Table 5.7-5. Comparison Impacts to Marine and Coastal Birds by Undeveloped Unit/Lease and Development Phase

Unit/Lease	Exploration and Delineation Drilling	Development and Production	Decommissioning
Cavern Point	Negligible (disturbance)	Negligible (disturbance) Low to moderate (oil spill)	None
Gato Canyon	Negligible (disturbance)	Negligible (disturbance) Low to moderate (oil spill)	Low (explosives) Low (loss of platform for roosting)
Rocky Point	Negligible (disturbance)	Negligible (disturbance) Low to moderate (oil spill)	None
Sword	Negligible (disturbance)	Negligible (disturbance) Low to moderate (oil spill)	None
Bonito	Negligible (disturbance)	Negligible (disturbance) Low to moderate (oil spill)	None
Santa Maria	None	Negligible (disturbance) Low to moderate (oil spill)	Low (explosives) Low (loss of platform for roosting)
Purisima Point	Negligible (disturbance)	Negligible (disturbance) Low to moderate (oil spill)	None
Point Sal	Negligible (disturbance)	Negligible (disturbance) Low to moderate (oil spill)	Low (explosives) Low (loss of platform for roosting)
Lion Rock	None	Negligible (disturbance) Low to moderate (oil spill)	None
Lease OCS-P 0409	None	Negligible (disturbance) Low to moderate (oil spill)	Low (explosives) Low (loss of platform for roosting)

For the 2006 through 2030 time period, this analysis considers the cumulative impacts to marine and coastal birds from: (1) existing and future Federal and State offshore oil activity; (2) crude oil imports by tanker; (3) other anthropogenic (military activities, recreation, commercial fishing) and non-anthropogenic (e.g., El Niño events) impact sources; and, (4) potential development of currently undeveloped Pacific OCS leases.

The cumulative impacts to marine and coastal birds in the study area from all sources for the period 2006 through 2030, including any activities that may occur in the undeveloped leases, range from moderate to high, depending on the species involved and the timing, location, and movement of a 22,800 bbl, non-Pacific OCS tanker spill. A large oil spill poses the greatest risk to marine birds. The likelihood of one or more Pacific OCS-related oil spills is greater with the development of the leases, but the cumulative impacts remain moderate to high.

5.7.6 Marine Mammals

5.7.6.1 Significance Criteria

The impact analysis for marine mammals in this analysis adopts the following impact level criteria:

- **High.** Impacts result in the loss of hundreds of marine mammals from the study area due to direct mortality, reduced survivorship, declines in reproduction, and/or a shift in distribution. Effects are expected to continue for 5 or more years.
- **Moderate.** Impacts result in the loss of tens of marine mammals from the study area due to direct mortality, reduced survivorship, declines in reproduction, and/or a shift in distribution. Measurable, area-wide changes in abundance are not expected unless the impacts are confined to a limited area (e.g., San Miguel Island). Effects are expected to continue for 1 to 5 years.
- **Low.** Impacts result mainly in local changes in behavior (e.g., disruption of foraging) and/or displacement from rookery, haul-out, or foraging habitats due to disturbance. Mortality, if any, would be limited to the loss of a few individuals, although many more might suffer from sublethal effects. Impacts are expected to continue for no more than 1 year.

Impacts below these levels, involving no death or life-threatening injury of any marine mammal, no displacement from preferred habitat, and no more than minor disruption of behavioral patterns, are defined as negligible. For purposes of this document, high and moderate impacts are considered to be significant; low impacts are considered to be insignificant.

5.7.6.2 Impacts of Post-Suspension Activities

Post-suspension activities under the hypothetical development scenario of the undeveloped leases that could affect marine mammals between 2006 and 2030 include delineation and exploratory drilling, platform construction and operation, and platform decommissioning.

Cumulative Impacts without Activities on the Undeveloped Leases on Marine Mammals

This section examines the cumulative impacts to marine mammals without the development of the undeveloped leases in the period 2006 to 2030. The projects discussed in this section include past, present, and foreseeable actions that may produce impacts between 2006 and 2030, the period during which development of the undeveloped leases would likely occur (Appendix I).

Offshore Oil and Gas Activities

Section 4.1 describes existing offshore development and production activities in the Pacific OCS Region. There currently are 23 offshore platforms in the Pacific OCS Region (Table 5.2-3). Of these, 4 are in the Santa Maria Basin, 15 are in the Santa Barbara Channel, and 4 are in San Pedro Bay.

Table 5.2-1 in Section 5.2 shows the number of wells expected to be drilled from existing production platforms. Currently, it is expected that 25 new wells would be drilled from Pacific OCS platforms in the Santa Barbara Channel and Santa Maria Basin. Production activities are expected to continue on all existing, active platforms until decommissioning (see section on Offshore Facilities Decommissioning, below). Potential impacts to marine mammals from these activities are expected to be restricted to brief avoidance responses within about 100 meters (330 feet) of the platform. Impacts to marine mammals of drilling from existing platforms would be negligible.

Vessel Traffic. Section 4.1 discusses crew and supply boat operations in the Pacific OCS. Current levels of support vessel traffic for offshore platforms in both Federal and State waters are presented in Table 4.1-6. It is assumed that support vessel traffic would continue at levels at or below those presented in

Table 4.1-6 during the period 2006 through 2030. Support of development and production activities in the eastern and central Santa Barbara Channel primarily involves crew and supply boats. Crew changes for platforms in the Santa Maria Basin are conducted by helicopter, resulting in lower levels of support boat traffic. In the Channel and Basin, approximately 90 to 140 crew boat and 10 to 12 supply boat trips are made each week. An additional 25-crew boat trip is made each week to State Platform Holly. Support vessels operate out of Port Hueneme, Ventura Harbor, Carpinteria Pier, or Ellwood Pier. It should be noted that many of these trips, particularly to the platforms off Carpinteria, are relatively short and that many trips may service more than one platform.

There is no evidence that sound generated by increased vessel traffic (of which Pacific OCS vessels are a very small part) has impacted marine mammal populations in the eastern Pacific. A low level of vessel sound related to surveying activity is not believed to harass any marine mammal species such that it disrupts their migration, breathing, nursing, breeding, feeding, or sheltering. Impacts are not likely to be adverse and are considered to be negligible.

Odontocete whales and dolphins often tolerate vessel traffic, but may react at long distances if confined (e.g., in shallow water) or previously harassed by boats (Richardson et al., 1995, as cited in MMS, 2001). For example, sperm whales may react to the approach of vessels with course changes and shallow dives (Reeves, 1992), and startle reactions have been observed (Whitehead et al., 1990; Richardson et al., 1995, as cited in MMS, 2001). Depending on the circumstances, reactions may vary greatly, even within species. Although the avoidance of vessels by odontocetes has been demonstrated to result in temporary displacement, there is no evidence that long-term or permanent abandonment of areas has occurred.

There have been specific studies of reactions to vessel sound by several species of baleen whales, including gray (e.g., Wyrick, 1954; Dahlheim et al., 1984; Jones and Swartz, 1984, as cited in MMS, 2001), humpback (e.g., Bauer and Herman, 1986; Watkins, 1986; Baker and Herman, 1989, as cited in MMS, 2001), bowhead (e.g., Richardson and Malme, 1993, as cited in MMS, 2001), and right whales (e.g., Robinson, 1979; Payne et al., 1983, as cited in MMS, 2001). There is limited information on other species. Low-level sounds from distant or stationary vessels often seem to be ignored by baleen whales (Richardson et al., 1995, as cited in MMS, 2001). The level of avoidance exhibited appears related to the speed and direction of the approaching vessel. Observed reactions range from slow and inconspicuous avoidance maneuvers to instantaneous and rapid evasive movements. Baleen whales have been observed to travel several kilometers from their original position in response to a straight-line pass by a vessel (Richardson et al., 1995, as cited in MMS, 2001).

In general, seals often show considerable tolerance of vessels. Sea lions, in particular, are known to tolerate close and frequent approaches by boats (Richardson et al., 1995, as cited in MMS, 2001).

Riedman (1983, as cited in MMS, 2001) reported that playback experiments of recorded industrial sounds associated with offshore oil and gas operations did not affect the behavior, density, or distribution of sea otters within the vicinity of the sound projection study area. Included in the playback experiments were recordings of a geophysical survey vessel using a multiple air gun array. Hence, sea otters are not likely to be adversely affected by sound generated by vessel traffic.

Collisions between marine mammals and vessels can cause major wounds on cetaceans and/or be fatal (e.g., northern right whale, Kraus, 1990, and Knowlton et al., 1997; bottlenose dolphin, Fertl, 1994; sperm whale, Waring et al., 1997, as cited in MMS, 2001). Slow moving cetaceans (e.g., northern right whale) or those spending extended periods of time at the surface (e.g., sperm whale) might be expected to be the most vulnerable. Smaller cetaceans (e.g., dolphins) often approach vessels underway to bow ride; such animals are agile and capable of easily avoiding being struck by vessels.

Vessel collisions can significantly affect small populations of whales (Laist et al., 2001, as cited in MMS, 2001). Of 11 cetacean species known to be hit by vessels, fin whales are struck most frequently; right whales, humpback, sperm whales, and gray whales are hit commonly. There were comparatively few collisions recorded for minke whales, blue whales, and sei whales. Records of collisions with Bryde's whales are rare (Laist et al., 2001, as cited in MMS, 2001). Data compiled from 58 collisions indicate that: all sizes and types of vessels can hit whales; the majority of collisions appear to occur over or near the continental shelf; most lethal or severe injuries are caused by ships 80 meters or longer; whales usually are not seen beforehand or are seen too late to be avoided; and most lethal or severe injuries involve ships traveling 14 knots or faster.

The NOAA Fisheries publishes the Potential Biological Removal (PBR) level as part of its stock assessment for each marine mammal stock under its jurisdiction (Angliss and Lodge, 2002; Carretta et al., 2004). The PBR is defined as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimal sustainable population (16 USC 1362 § 3 (20). The PBRs for some species stocks are low (e.g., blue whale [1.2 animals], humpback whale [1.35 animals], and sperm whale [1.8 animals]), whereas it is higher for other species (e.g., fin whale [15 animals], gray whale [575 animals]) (Angliss and Lodge, 2002; Carretta et al., 2004). Using the PBR as a proxy for a threshold for assessing the potential impacts of surveying activities, a vessel collision with a single marine mammal constitutes an adverse, but insignificant impact. The impact would be low.

Collision(s) involving two or more of the same protected species may amount to an adverse and significant impact, particularly if the impacted species is a blue whale, humpback, or sperm whale.

Based on past experiences in southern California, the MMS believes that accidental collisions between cetaceans and Pacific OCS vessel traffic are unlikely events. Survey vessels are less than 52 meters in length, and would operate at speeds below 12 knots. Much of the time, vessels would be operated at speeds of 5 knots or less. Although large cetaceans have occasionally been struck by freighters or tankers, and sometimes by small recreational boats, no such incidents have been reported with Pacific OCS vessels off California (MMS, unpubl. data, as cited in MMS, 2001).

The MMS also believes accidental collisions between sea otters are unlikely. Sea otters are rare in the offshore areas to be surveyed. Waters that vessels must transit between Port Hueneme and the survey areas are sparsely populated by sea otters. For these reasons, the likelihood of a vessel encountering a sea otter is very unlikely.

Pinnipeds are nimble and considered unlikely to be struck by vessels. There is a single documented collision between a pinniped and a support vessel — an adult male elephant seal struck and presumably killed by a supply vessel in the Santa Barbara Channel in June 1999.

The continued levels of support vessel traffic associated with offshore oil and gas activities in the study area are expected to result in temporary (less than 1-hour), localized disturbances to some marine mammals, primarily baleen whales. Collisions between support vessels and marine mammals, while possible, are considered to be highly unlikely events. Given that at least one collision between a support vessel and a marine mammal has been recorded during the past 30 years of activities in the Pacific OCS, it is possible that one or two such events may occur during the next two decades. Overall the impacts of vessel traffic on marine mammals are considered to be low.

Aircraft. Section 4.1 discusses support helicopter operations in the Pacific OCS. Current levels of support helicopter traffic for offshore platforms in both Federal and State waters are presented in Table 4.1-6. Support helicopter traffic is confined to platforms in the western Santa Barbara Channel and Santa

Maria Basin, where 6 to 8 helicopter trips occur per day. These flights originate from the Santa Barbara and Santa Maria airports.

Beginning in the 1980's, a standard Information to Lessees (ITL) issued in conjunction with Pacific OCS lease sales off southern California provided offshore operators with guidelines for protecting marine mammals and birds from aircraft (Bornholdt and Lear, 1995, as cited in MMS, 2001). The ITL stated that, "Aircraft should operate to reduce effects of aircraft disturbances on seabird colonies and marine mammals, including migrating gray whales, consistent with aircraft safety, at distances from the coastline and at altitudes for specific areas identified by the U.S. Fish and Wildlife Service (FWS), National Marine Fisheries Service (NMFS), and California Department of Fish and Game (CDFG). A minimum altitude of 1,000 feet is recommended near the Channel Islands Marine Sanctuary to minimize potential disturbances. The CDFG and FWS recommend minimum altitude restrictions over many of the colonies and rookeries."

Although the original ITL is no longer in force, operators in the southern Santa Maria Basin are complying with these restrictions (P. Schroeder, MMS, pers. comm., as cited in MMS, 2001). Air traffic over the Channel Islands National Marine Sanctuary is restricted by Federal regulation to altitudes greater than 1,000 feet (15 CFR 922.71(a)(5)). VAFB also has a 1,000-foot flight restriction over identified harbor seal haul-out areas (N. Read, VAFB, pers. comm., as cited in MMS, 2001).

Air-to-water transmission of sound is very complex (Richardson et al., 1995, as cited in MMS, 2001). An understanding of underwater sound from any aircraft depends on: (1) the receiver depth; and, (2) the altitude, aspect, and strength of the source.

The concept of a one-meter sound source means very little when discussing aircraft sound production, and an altitude of 300 meters is the usual reference distance (Richardson et al., 1995, as cited in MMS, 2001). The angle of incidence at the water surface is very important — much incident sound is reflected at angles greater than 13 degrees from the vertical. This 26-degree "cone" of sound is defined physically by Snell's Law and influenced by sea conditions. Water depth and bottom conditions also strongly influence the propagation and levels of underwater sound from passing aircraft; propagation is attenuated in shallow water, especially when the bottom is reflective (Richardson et al., 1995, as cited in MMS, 2001).

The rotors are the primary sources of sound from helicopters (Richardson et al., 1995, as cited in MMS, 2001). The rotation rate and the number of blades determine the fundamental frequencies. Fundamental frequencies are usually below 100 Hz, with most dominant tones below 500 Hz. These are primarily harmonics of the main and tail rotor blade rates, although other tones associated with engines and other rotating parts may also be present.

Richardson et al. (1995, as cited in MMS, 2001) present an estimated source level for a Bell 212 helicopter of about 150 dB at altitudes of 150 to 600 meters, with the dominant frequency a 22 Hz tone with harmonics. Elsewhere a source level of 165 dB is presented for broadband helicopter noise (frequencies 45 to 7070 Hz).

Generally, peak received levels occur as the aircraft passes directly overhead and are directly related to altitude and depth. However, when the aircraft is not passing directly overhead, received levels may be stronger at "midwater" depths. Helicopters tend to radiate more sound forward, and duration varies with depth. For example, a Bell 214 was audible in air for 4 minutes before passing, for 38 seconds at 3-meter depth, and for 11 seconds at 18 meters.

There have been few systematic studies on the reactions of pinnipeds to aircraft, including helicopters (Richardson et al., 1995, as cited in MMS, 2001). Most documented observations of the reactions of pinnipeds to aircraft noise have involved animals hauled out on land. Under these circumstances, recorded reactions range from increased alertness to headlong rushes into the water. In open water, pinnipeds sometimes respond to low-flying aircraft by diving (Richardson et al., 1995; M.O. Pierson, MMS, pers. obs., as cited in MMS, 2001).

There are no data on the received levels at which toothed whales, or odontocetes, react to aircraft (Richardson et al., 1995, as cited in MMS, 2001). Observed reactions include diving, slapping the water with flukes or flippers, and swimming away. Information on the reactions of sperm whales to aircraft has been mixed. Sperm whales have not been observed to exhibit obvious reactions to low-flying helicopters (Richardson et al., 1995, as cited in MMS, 2001). However, sperm whales have been observed to dive immediately in response to a Twin Otter passing 150 to 230 meters overhead (Mullin et al., 1991, as cited in MMS, 2001).

Baleen whales vary in their responses to the approach of aircraft. Richardson et al. (1995, as cited in MMS, 2001) review the recorded behavior of several baleen whale species, including bowhead, right, gray, humpback, and minke whales. They conclude that response depends on the whales' activities and situations, with foraging or socializing groups being less likely to react to the approach of aircraft than individual animals. Observed responses include hasty dives, turns, and other changes in behavior. To date, there is no evidence that aircraft disturbance has resulted in long-term displacement of baleen whales.

Current levels of support helicopter traffic for offshore platforms in both Federal and State waters are presented in Table 4.1-6. It is assumed that helicopter traffic would continue at levels at or below those presented in Table 4.1-6 during the period 2006 through 2030. These levels of helicopter traffic in the study area are expected to result in temporary (less than 1-hour), localized disturbances to some marine mammals. Impacts would be negligible.

Offshore Facility Decommissioning. Potential impacts to marine mammals from offshore facility decommissioning activities, include the removal of wells, platforms, and associated pipelines. Table 4.1-6 presents estimated removal dates for existing oil and gas structures offshore southern California. It is expected that no Pacific OCS platforms in the Santa Barbara Channel or Santa Maria Basin would be removed before 2012, and a few may be in place as late as 2030 (or 2035, in the case of Platform Irene if the Tranquillon Ridge development occurs). Explosives would likely be used during decommissioning and represent the greatest potential for adverse impacts to marine mammals.

Underwater explosions are the strongest man-made point sources of sound in the sea (Richardson et al., 1995, as cited in MMS, 2001). The underwater pressure signature of a detonating explosion is composed of an initial shock wave, followed by a succession of oscillating bubble pulses (if the explosion is deep enough not to vent through the surface) (Urich, 1983; Richardson et al., 1995, as cited in MMS, 2001). Pulse rise time is very brief (within about a microsecond). The shock wave is a compression wave that expands radically out from the detonation point of an explosion. The wave is supersonic, but is quickly reduced to normal acoustic waves (Twachtman Snyder & Byrd, Inc., 2000, as cited in MMS, 2001). The broadband source level of a 20 kg charge is about 279 dB re 1 μPa, with dominant frequencies below 50 Hz (Richardson et al., 1995, as cited in MMS, 2001).

It has been shown that nearby underwater blasts can injure or kill marine mammals (Richardson et al., 1995, as cited in MMS, 2001). Although pinnipeds, odontocetes, and baleen whales are all known to have been killed by underwater explosives, threshold levels for injury or death are not well established (Fitch and Young, 1948; Ketten et al., 1993; Richardson et al., 1995, as cited in MMS, 2001). In general, damage tends to occur at boundaries between tissues of different densities, with gas-containing organs (such as lungs and intestines) and the auditory system being especially susceptible.

Young (1991, as cited in MMS, 2001) calculated safe distances for several marine animals from underwater explosions of various sizes. These calculations were for open-water blasts and did not account for the dampening effects that would occur if a charge were detonated 5 meters below the sea floor. For an approximately 23 kg (50 lbs) charge, the estimated safety distances were 530 meters (1,750 feet) for odontocetes and 300 meters (1,000 feet) for baleen whales.

Richardson et al. (1995, as cited in MMS, 2001) summarize available information on the reported behavioral reactions of marine mammals to underwater explosions. Experience with the use of seal bombs as scare charges indicates that pinnipeds rapidly habituate to and, in general, appear quite tolerant of noise pulses from explosives. Whether hearing damage or other injuries have occurred during these situations is unknown. Likewise, little success has been demonstrated in the use of scare charges to repel odontocetes. An example is the attempted use of seal bombs to move bottlenose dolphins away from platform abandonment areas where larger demolition blasts are about to occur (Klima et al., 1988, as cited in MMS, 2001).

There are few data on the reactions of baleen whales to underwater explosions. Gray whales were apparently unaffected by 9 kg to 36 kg charges used for seismic exploration (Fitch and Young, 1948, as cited in MMS, 2001). However, Gilmore (1978, as cited in MMS, 2001) felt that similar underwater blasts within a few kilometers of the gray whale migration corridor did “sometimes” interrupt migration. In Newfoundland, humpbacks displayed no overt reactions within about 2 km of 200 kg to 2,000 kg explosions. Whether habituation and/or hearing damage occurred was unknown, but at least two whales were injured (and probably killed) (Ketten et al., 1993, as cited in MMS, 2001).

Avoiding impacts to marine mammals and sea turtles from the use of explosives for platform abandonment on the Pacific OCS would require implementation of a wildlife mitigation plan similar to those employed for platform removal in California State waters (Howorth, 1997, as cited in MMS, 2001) and in the MMS Gulf of Mexico OCS Region (NTL 99-G21). Typically, such a plan has included the use of shipboard observers or divers (possibly supplemented by aerial surveys), the establishment of a safety zone around the detonation site, and monitoring of the zone to ensure that no animals are present when the charge is detonated.

Implementation of this mitigation would make it unlikely that any marine mammal injury or mortality would occur as a result of explosives use during platform decommissioning. Since 1986, during explosive removals of offshore platforms in the Gulf of Mexico (where a 915-meter safety zone is employed), no confirmed marine mammal blast injuries or mortality have been reported. Impacts to marine mammals would be negligible.

In addition to potential impacts from explosives, decommissioning activities would result in noise and disturbance to marine mammals during the removal of platform structures and pipelines. The principal potential impacts would be short-term avoidance reactions at distances of 2 km (1 nm) or less from the operations. Impacts would be negligible.

Effluent Discharges. Section 4.1 discusses the treatment and discharge of platform effluents in the Pacific OCS. Table 4.1-8 presents the volumes of produced water discharged by each of the Pacific OCS platforms between 1988 and 2003. For purposes of analysis, it is assumed that a platform may discharge up to 8 million bbl of produced water per year. The exception is Platform Harmony in the western Santa Barbara Channel, which discharges from all three platforms in the Santa Ynez Unit after processing at the onshore Las Flores Canyon facility. Discharge volumes from offshore facilities during the period 2006 through 2030 are expected to be at or below the levels identified in Table 4.1-8.

The EPA Biological Assessment for the new general NPDES permit for offshore Pacific OCS facilities in southern California waters concludes that direct toxicity to marine mammals, or their food base, should be minimal (SAIC, 2000a and b, as cited in MMS, 2001). All such discharges are required to meet NPDES water quality criteria, which were established to protect biological resources outside the mixing zone. Therefore, given that effluent discharge volumes are expected to remain at or below current levels, any contact with Pacific OCS discharges likely would continue to be extremely limited. No measurable effects to marine mammals in the study area are expected. Impacts of effluent discharges would be negligible.

Oil Spills. The cumulative oil spill risk for the study area results from several sources: ongoing and projected oil and gas production from existing Pacific OCS facilities in the Santa Barbara Channel and Santa Maria Basin, ongoing production from one facility in State waters in the Santa Barbara Channel, two potentially foreseeable oil and gas projects in State waters, and the tankering of Alaskan and foreign-import oil through area waters. Tables in Section 5.3 present the estimated mean number of spills of various sizes and the probability of their occurrence as a result of the described activities.

The level of impacts from such spills would depend on many factors, including the type, rate, and volume of oil spilled and the weather and oceanographic conditions at the time of the spill. These parameters would determine the quantity of oil that is dispersed into the water column; the degree of weathering, evaporation, and dispersion of the oil before it contacts a shoreline; the actual amount, concentration, and composition of the oil at the time of shoreline or habitat contact; and a measure of the toxicity of the oil.

Marine mammals vary in their susceptibility to the effects of oiling (Geraci and St. Aubin, 1990; Williams, 1990; Loughlin, 1994a, as cited in MMS, 2001). Oil may affect marine mammals through various pathways: surface contact; oil inhalation; oil ingestion; and, baleen fouling (Geraci and St. Aubin, 1990, as cited in MMS, 2001). Cetaceans risk a number of toxic effects from accidental oil spills at sea (Geraci, 1990, as cited in MMS, 2001). Since cetaceans (like most adult pinnipeds) rely on layers of body fat and vascular control rather than pelage to retain body heat, they are generally resistant to the thermal stresses associated with oil contact. However, exposure to oil can cause damage to skin, mucous, and eye tissues. The membranes of the eyes, mouth, and respiratory tract can be irritated and damaged by light oil fractions and the resulting vapors. If oil compounds are absorbed into the circulatory system, they attack the liver, nervous system, and blood-forming tissues. Oil can collect in baleen plates, temporarily obstructing the flow of water between the plates and thereby reducing feeding efficiency. Reduction of food sources from acute or chronic hydrocarbon pollution could be an indirect effect of oil and gas activities.

It has been suggested that cetaceans could consume damaging quantities of oil while feeding, although Geraci (1990, as cited in MMS, 2001) believes it is unlikely that a whale or dolphin would ingest much floating oil. However, during the *Exxon Valdez* oil spill in 1989, killer whales were not observed to avoid oiled sections of Prince William Sound, and the potential existed for them to consume oil or oiled prey (Matkin et al., 1994, as cited in MMS, 2001). Fourteen whales disappeared from one of the resident pods in 1989–1990, and although there was spatial and temporal correlation between the loss of whales and the spill, no clear cause-and-effect relationship was established (Dahlheim and Matkin, 1994, as cited in MMS, 2001). Fin, humpback, and gray whales were observed entering areas of the Sound and nearby waters with oil and swimming and behaving normally; no mortality involving these species was documented (Harvey and Dahlheim, 1994; Loughlin, 1994b; von Ziegesar et al., 1994; Loughlin et al., 1996, as cited in MMS, 2001).

Baleen whales in the vicinity of a spill may ingest oil-contaminated food (especially zooplankters, which actively consume oil particles) (Geraci, 1990, as cited in MMS, 2001). However, since the principal prey of most baleen whales (euphausiids and copepods) have a patchy distribution and a high turnover rate, an oil spill would have to persist over a very large area to have more than a local, temporary effect.

Since oil can destroy the insulating qualities of hair or fur, resulting in hypothermia, marine mammals that depend on hair or fur for insulation are most likely to suffer mortality from exposure (Geraci and St. Aubin, 1990, as cited in MMS, 2001). Most vulnerable to the direct effects of oiling among the pinnipeds are fur seals and newborn pups, which lack a thick insulating layer of fat (see Section 5.7.7 for a discussion of oil spill impacts on sea otters). Frost et al. (1994, as cited in MMS, 2001) estimated that more than 300 harbor seals died in Prince William Sound as a result of the *Exxon Valdez* oil spill and concluded that pup production and survival were also affected. Indeed, the majority of the dead harbor seals recovered were pups (Spraker et al., 1994, as cited in MMS, 2001). It should also be noted, however, that this mortality estimate has been questioned (Hoover-Miller et al., 2001, as cited in MMS, 2001). In contrast, although Steller sea lions and their rookeries in the area were exposed to oil, none of the data collected provided conclusive evidence of an effect on their population (Calkins et al., 1994, as cited in MMS, 2001).

As stated above, it is assumed that the most likely size for a spill occurring from offshore oil and gas activities in the Pacific OCS is 200 bbl or less. If a spill of this size were to occur in the Santa Barbara Channel or Santa Maria Basin, it could contact the mainland shoreline or one of the northern Channel Islands. The largest aggregations of marine mammals in this area are found on San Miguel Island, which is at the western end of the chain and is part of the Channel Islands National Marine Sanctuary and National Park (Section 4.7.9). However, San Miguel is approximately 40 km (20 nm) from Platform Heritage, the nearest offshore facility. A 200 bbl spill would be unlikely to reach the island and would not be considered a threat to marine mammals on San Miguel.

Data from moored current meters and surface-drifter trajectory observations (Section 5.3) indicate that north of Point Conception a spill could move northward along the mainland coast, typically during relaxation current events when the wind is low. Individual drifters made landfall along the coast as far north as Point Lobos within 10 days. However, when averaged over all flow regimes, the most likely northern limit of shoreline spill contact is Ragged Point, near the southern end of the Big Sur coast and within the Monterey Bay National Marine Sanctuary (Section 4.7.9).

Thus, it is possible that a 200 bbl spill would contact the shoreline in this area, although probably well south of Ragged Point. Predicting the length of coastline affected by an oil spill that comes ashore is extremely difficult due to the complexity of the transport process, which depends on factors such as nearshore wind patterns and currents, coastal bathymetry, tidal movements, and turbulent flow processes. Using historical data on marine spills, Ford (Ford, 1985; Ford and Bonnell, 1987, as cited in MMS, 2001) devised a model to simulate the length of coastline that could be contaminated. A recent assessment of the potential impact of oil spills on California sea otters by Brody et al. (1996, as cited in MMS, 2001) provides support for the general validity of the Ford model.

Based on the multiple regression equations developed by Ford, a 200 bbl spill would be expected to oil a mean stretch of 4 to 5 km (2 to 3 nm) of shoreline (Ford, 1985, as cited in MMS, 2001). The model further predicts a 95 percent probability that a 200 bbl spill reaching shore would contact a length of coastline greater than 1 km (0.5 nm) and a 5 percent probability that it would contact a length of shoreline greater than about 19 km (10 nm). Based on experience with past spills, continuous contact along such a length of shoreline would be unlikely. Rapid spill response (see Section 5.3) would further limit shoreline contact.

Seasonally, the most vulnerable marine mammal resources along the coast between Point Conception and Ragged Point would be harbor seal hauling areas and pupping beaches during early spring. Harbor seal pups are very precocial and may enter the water soon after birth (Hoover, 1988; Riedman, 1990, as cited in MMS, 2001). In addition, harbor seal females may return to the water several times per day between nursing bouts, increasing opportunities for repeated contact with oil (McLaren, 1990, as cited in MMS, 2001). Northern elephant seals, which breed and pup on a rookery near Point Piedras Blancas during the winter, are considered less susceptible to the effects of oiling, given their larger size and the fact that females and pups remain ashore throughout the lactation period (Le Boeuf, 1971; McLaren, 1990; St. Aubin, 1990, as cited in MMS, 2001).

If a 200 bbl spill were to contact a harbor seal haul-out in this area, a few animals could be oiled. The *Exxon Valdez* oil spill demonstrated that harbor seals are susceptible to the effects of oiling (Frost et al., 1994; Lowry et al., 1994; Hoover-Miller et al., 2001, as cited in MMS, 2001). However, based on experience with past spills of this size in this general area (e.g., the 1997 Torch pipeline spill), it is doubtful that a spill of this size would result in mortality.

It is also unlikely that a 200 bbl spill would have more than a negligible impact on pinniped or cetacean populations at sea in the study area. As discussed in the 1984 EIR/EIS for development of the Point Arguello Unit (A. D. Little, 1984, as cited in MMS, 2001), likely impacts could involve the oiling of a few individuals and/or temporary displacement from small areas of the western Santa Barbara Channel or southern Santa Maria Basin.

As stated above, the most likely maximum size of a major oil spill from future oil and gas development — the maximum reasonably foreseeable oil spill volume — is 2,000 bbl. A 2,000 bbl oil spill in this area could have more serious impacts on marine mammals, including longer-term displacement and some mortality. Based on the Ford model, a 2,000 bbl spill would be expected to oil a mean stretch of about 12 km (6 nm) of shoreline (Ford, 1985, as cited in MMS, 2001). The model further predicts a 95 percent probability that a 2,000 bbl spill reaching shore would contact a length of coastline greater than 3 km (1.5 nm) and a 5 percent probability that it would contact a length of shoreline greater than about 52 km (28 nm).

Again, the species most likely to be affected would be harbor seals. A 2,000 bbl spill could cause some pup mortality if it oiled harbor seal pupping beaches during the early spring. Elephant seals might also suffer some pup mortality if their rookery were contacted. Overall, impacts to marine mammals from a spill of this volume would be expected to be low.

Impacts from Non-Offshore Oil Sources

Marine Tankers. None of the oil produced on the Pacific OCS is transported by tanker. However, the tankering of foreign and Alaskan oil along the U.S. west coast does present an oil spill risk. The effects of a 22,800 bbl tanker spill on marine mammals in the study area potentially could be much more serious than a spill from Pacific OCS offshore oil and gas activities. Based on the Ford model, a 22,800 bbl spill would be expected to oil a mean stretch of about 39 km (21 nm) of shoreline (Ford, 1985, as cited in MMS, 2001). The model further predicts a 95 percent probability that a 22,800 bbl spill reaching shore would contact a length of coastline greater than 9 km (5 nm) and a 5 percent probability that it would contact a length of shoreline greater than about 161 km (87 nm). This may be somewhat of an overestimate, since U.S.-flagged oil tankers are now voluntarily transiting the coast north of Point Conception at distances of 90 km (50 nm) or more offshore, and a tanker spill in this area would likely occur relatively far from shore.

The effects of a tanker spill of this size on marine mammals would be most serious if the spill were to contact sensitive shoreline areas. As discussed above, northern fur seals depend on their dense underfur for insulation and thus are very vulnerable to the thermal effects of oiling. If a spill of this volume were to contact the fur seal rookery on Castle Rock off San Miguel Island during the summer breeding season, considerable adult and pup mortality could ensue. California sea lions, which breed nearby at Point Bennett on San Miguel, might also suffer some pup mortality. Local impacts to pinniped populations could range from moderate to high.

Although, as discussed above, cetaceans are considered to be less vulnerable to the effects of oiling than pinnipeds (Geraci, 1990; Würsig, 1990, as cited in MMS, 2001), a 22,800 bbl tanker spill would probably have some effect on cetaceans in the study area. Gray whales do relatively little feeding along the migration route (Oliver et al., 1983; Nerini, 1984, as cited in MMS, 2001); based on experience with the 1969 Santa Barbara spill (Battelle Memorial Institute, 1969; Geraci, 1990, as cited in MMS, 2001), a spill of this size would not be likely to disrupt the gray whale migration through the study area. (Potential impacts on endangered baleen whales are discussed in Section 5.7.7.)

Although Würsig (1990, as cited in MMS, 2001) believes that odontocetes in general are too mobile and wide-ranging to be much threatened by oil, he does think that harbor porpoises may be at greater risk from oil spills than other odontocetes due to their restricted nearshore habitat. The same may be true of the nearshore California population of bottlenose dolphins. Densities of these two species are low in study area waters (Bonnell and Dailey, 1993; Forney et al., 2000, as cited in MMS, 2001), and it is considered unlikely that mortality would occur. However, it is unclear whether either of these species would avoid oiled areas (see Smultea and Würsig, 1995, as cited in MMS, 2001), and a substantial portion of their nearshore foraging habitat could be affected by a spill of this size. This could increase the potential for indirect effects, such as through the consumption of oiled prey. Impacts on nearshore odontocetes would be expected to be low.

Military Activities. Military operations that may have offshore impacts in the study area include those conducted from NAS Point Mugu and VAFB (Section 4.15). A recent Draft EIS (U.S. Navy, 2000, as cited in MMS, 2001) analyzes the potential impacts of ongoing and proposed military activities in the U.S. Navy's Point Mugu Sea Range, which occupies a broad expanse of offshore waters in the Southern California Bight and Santa Maria Basin (Figure 4.15-1). Navy activities in the Sea Range include vessel, aircraft, and missile operations. The Draft EIS concludes that impacts to marine mammals would be less than significant and limited to short-term hearing effects for small numbers of marine mammals and some disturbance to pinnipeds hauled-out on San Nicolas Island.

VAFB is located on the central coast between Point Arguello and Point Sal. The Air Force's primary missions at VAFB are launching and tracking satellites in space, and testing and evaluating missile systems (U.S. Navy, 2000, as cited in MMS, 2001). These operations periodically result in temporary disturbance to marine mammals, particularly harbor seals, along the nearby shoreline (Thorson et al., 1998, as cited in MMS, 2001). Although the effect of launch noise on pinniped hearing is unknown, limited experimental evidence suggests that pinnipeds exposed to sonic booms produced by missiles in flight may be at risk of temporary hearing threshold shifts (Stewart et al., 1996; Thorson et al., 1998, as cited in MMS, 2001).

In addition, the U.S. Navy is developing a new sonar system to improve its antisubmarine warfare (ASW) capabilities. The Navy proposes to deploy up to four Surveillance Towed Array Sensor System Low Frequency Active (SURTASS LFA) sonar systems worldwide for use in training, testing, and military operations. The high source levels and low frequencies (100–500 Hz) employed in this system have raised concerns over potential noise-related impacts to marine mammals. In response, the Navy has prepared an EIS (U.S. Navy, 2001, as cited in MMS, 2001) to analyze the potential impacts of surveying activities and has developed several mitigation and monitoring measures. These include limiting operations in coastal waters to prevent sound pressure levels of 180 dB greater from occurring within 22 km (12 nm) of land. Monitoring during LFA sonar operations would involve visual monitoring for marine mammals and sea turtles during daylight hours by trained personnel, plus both passive and active acoustic monitoring.

Given these measures and the small number of systems to be deployed worldwide, the Navy has concluded that the potential impacts on any stock of marine mammals from injury would be negligible and effects from significant change in a biologically significant behavior would be minimal. However, since the potential for incidental take of marine mammals does exist, the Navy is requesting a Letter of Authorization from NMFS.

Thus, the impacts to marine mammals associated with these activities would also be expected to continue. These include periodic disturbance and possible temporary hearing effects for pinnipeds hauled out along the VAFB shoreline and on the Channel Islands (particularly San Nicolas Island). Operation of the U.S. Navy's SURTASS LFA sonar system in study area waters potentially could have noise-related impacts on marine mammals. As discussed above, however, these impacts would be expected to be low.

Commercial Fisheries. Marine mammals are taken incidentally in a number of commercial fisheries along the U.S. west coast. Off California, the greatest mortality in recent years has been recorded in the nearshore set gillnet and offshore drift gillnet fisheries (Barlow et al., 1998; Ferraro et al., 2000; Forney et al., 2000, as cited in MMS, 2001). However, marine mammal entanglement rates in the drift gillnet fishery have dropped substantially since a Take Reduction Plan involving the use of pingers was implemented in 1997 (Barlow and Cameron, 1999; Forney et al., 2000, as cited in MMS, 2001). The set gillnet fishery also has undergone changes and redistribution of effort since 1994 (Forney et al., 2000, as cited in MMS, 2001). Other fisheries in which marine mammal mortality has been documented include the offshore groundfish trawl fisheries, purse seine fisheries for squid and other species, troll fisheries for salmon and other species, the salmon net pen fishery, and the commercial passenger fishing vessel industry (Forney et al., 2000, as cited in MMS, 2001).

The minimum total fisheries-related take of California or west coast marine mammals currently appears to be more than 1,500 animals per year (Barlow et al., 1998; Ferraro et al., 2000; Forney et al., 2000, as cited in MMS, 2001). More than 1,000 of these are taken in the California angel shark/halibut set gillnet fishery. Most of the remainder are taken in the California-Oregon thresher shark/swordfish drift gillnet fisheries.

Most of this mortality involves pinnipeds and small cetaceans. More than 72 percent (greater than 1,200) of the marine mammals taken are California sea lions; other pinniped species, including harbor seals, northern elephant seals, and a few Steller sea lions, account for about 14 percent (greater than 250). Small cetaceans represent nearly 10 percent of the average annual take. The species most frequently involved include short-beaked common dolphin, harbor porpoise, northern right whale dolphin, Dall's porpoise, Pacific white-sided dolphin, and Risso's dolphin, but almost all cetacean species that occur in this area have experienced fishery-related mortality.

Of these, only the incidental take of harbor porpoises is of concern at the stock level. Harbor porpoise mortality is largely limited to the halibut set gillnet fishery in central California, where fishing effort has approximately doubled since 1995 (with the majority of recent effort in southern Monterey Bay) (Forney et al., 2000, as cited in MMS, 2001). Entanglement rates apparently have increased substantially since the early 1990's, and the estimated mean annual take for recent years (63) is above the calculated Potential Biological Removal (PBR) for the central California stock (42 per year) (Forney et al., 2000, as cited in MMS, 2001). Impacts to harbor porpoises, thus, may be moderate.

Although some mortality of large whales may occur (Heyning and Lewis, 1990; Mazzuca et al., 1998, as cited in MMS, 2001), large rorquals (such as blue and fin whales) are reported to be capable of swimming through nets without entangling (Forney et al., 2000, as cited in MMS, 2001). Because of their nearshore migration route, gray whales may be more susceptible to fisheries-related mortality than other large whales. In the 1990's, three gray whale mortalities were reported from the California-Oregon thresher shark/swordfish drift gillnet fishery and Makah Tribal set gillnet fishery in Washington State (Ferraro et al., 2000, as cited in MMS, 2001). Using these and other data, Ferraro et al. (2000, as cited in MMS, 2001) estimated a minimum annual fisheries mortality rate of 6.0 for the gray whale. They concluded that these mortalities are likely below 10 percent of the PBR and therefore can be considered insignificant.

Incidental take in commercial fishing operations currently is a major source of anthropogenic impacts to marine mammals off California. Whether this level of take will continue is difficult to predict. However, it is likely that additional efforts to reduce take through mitigation, closures, and other legislative actions will occur, and that the incidental take of marine mammals will decline in the coming decades.

Other Anthropogenic Sources of Impacts. Ship strikes are a recognized source of whale mortality. Eleven species are known to have been hit, including fin (the most frequently recorded), right, humpback, sperm, gray and minke whales (Laist et al., 2001, as cited in MMS, 2001). Most lethal or severe injuries to whales appear to be caused by ships measuring 80 meters (260 feet) or more in length and traveling at speeds of 26 kph (14 knots) or greater (Laist et al., 2001, as cited in MMS, 2001).

As is the case with fisheries-related mortality (see above), the gray whale's nearshore migration may increase the potential for collision with ships (Rugh et al., 1999, as cited in MMS, 2001); five gray whale mortalities from ship strikes were recorded off California from 1993 to 1995 (Ferraro et al., 2000, as cited in MMS, 2001). Ferraro et al. (2000, as cited in MMS, 2001) consider this annual mortality rate of one to two gray whales per year to be a minimum estimate. Based on this minimum estimate, at least 24 to 48 gray whales would be killed by vessel strikes between 2006 and 2030. Therefore, the impact to gray whales of vessel collisions would be moderate. Although vessel strikes of the smaller toothed whales are rarely observed, one killer whale ship-strike mortality was recorded in the Bering Sea ground fish trawl fishery in 1998 (Forney et al., 2000, as cited in MMS, 2001).

Pinnipeds, including California sea lions, harbor seals, and northern elephant seals, are occasionally killed in collisions with boats. The average annual mortality of pinnipeds killed by boat strikes in recent years is 3 for California sea lions, 4 for harbor seals and 0.5 for northern elephant seals (Carretta et al., 2004). Based on these averages, the impact to California sea lions and harbor seals of vessel strikes between 2006 and 2030 would be moderate and the impact to northern elephant seals would be low to moderate. As discussed above, the single reported collision between an oil industry support vessel and a marine mammal off southern California involved an elephant seal. Other sources of human-related pinniped mortality in California include shooting, entrainment in power plants, and entanglement in marine debris.

The incidence of marine mammal mortality, especially of larger whales, due to ship strikes will probably increase as overall vessel traffic off California increases. Based on the existing impact level of at least 1 to 2 whales killed per year, this increase in vessel traffic is likely to contribute to impacts that currently are moderate and significant by the criteria established in this document.

For cetaceans, especially baleen whales such as the gray whale, an additional source of potential impact is the whale-watching industry. Whale-watching boats attempt to approach whales as closely as possible, creating a potential for disturbance and displacement from essential habitat. In California, this is a major, seasonal industry — in the 1996–1997 season, more than 40,000 people took part on six Los Angeles-based boats alone (Rugh et al., 1999, as cited in MMS, 2001). Although whale-watching guidelines specify a minimum approach of 100 meters (100 yards) and recommend that boats approach whales from the rear and avoid separating cow-calf pairs, there is little enforcement. Private boats, including jetskis, are a serious problem; at times, 812 boats may be following a single whale (Rugh et al., 1999, as cited in MMS, 2001). It is assumed that whale watching will remain an important local industry in California waters during the period 2006 through 2030 and that activities will continue at or above current levels. Thus, the potential for impacts to cetaceans would also continue. However, recent recommendations for improving whale-watching regulations (Rugh et al., 1999, as cited in MMS, 2001) may help alleviate these problems.

The eastern North Pacific gray whale population is the only marine mammal stock occurring in the study area that is subject to subsistence hunting. The current (1998–2002) International Whaling Commission (IWC) quota allows for a harvest of 140 gray whales per year for local consumption (NMFS, 2001, as cited in MMS, 2001). In Russia between 1990 and 1998, aboriginal hunters averaged 139 whales per year along the Chukhotka Peninsula; the Russian Federation has agreed to take no more than 135 per year during the period 1998–2002 (NMFS, 2001, as cited in MMS, 2001).

No take has been allowed in Alaska by the IWC since 1991. However, there were 2 incidental takes by an Alaskan Native in 1995 (Quan, 1999, as cited in MMS, 2001). The Makah tribe of Washington received a 5-year quota to harvest 20 gray whales for ceremonial and subsistence purposes, with an allowed take of up to 5 per year during the period 1998–2002. One whale was struck and killed in May 1999 (NMFS, 2001, as cited in MMS, 2001).

Marine pollutants present a potential health hazard for marine mammals (O'Shea, 1999, as cited in MMS, 2001). Marine mammals include high-order marine predators that may be affected by the bioaccumulation of contaminants (Reijnders, 1986, as cited in MMS, 2001). Most marine mammal species have large stores of fat, acting both as insulation and as an energy reserve. Lipophilic contaminants can accumulate in this tissue and may be released at high concentrations when the energy reserves are mobilized (UNEP, 1991, as cited in MMS, 2001). No marine mammal deaths in the wild have conclusively been shown to result directly from exposure to organochlorines or toxic elements (O'Shea, 1999, as cited in MMS, 2001). In a few highly polluted areas, reproductive impairment and gross lesions in association with organochlorine contamination have been demonstrated, although there have been few cause-and-effect studies; the evidence for linkages with increased susceptibility to disease is mixed (O'Shea, 1999; O'Shea et al., 1999, as cited in MMS, 2001). Although the detrimental impacts of organochlorine contaminants on marine mammal populations have not been demonstrated with scientific certainty, there is a growing body of circumstantial evidence that such effects are occurring (O'Shea, 1999, as cited in MMS, 2001).

Few west-coast cetacean species have been tested for the presence of contaminants. However, pollutant levels, especially DDT residue levels, measured in California coastal bottlenose dolphins were found to be among the highest of any cetacean examined (O'Shea et al., 1980; Schafer et al., 1984; Forney et al., 2000, as cited in MMS, 2001). Results from the analysis of samples taken from killer whales in British Columbia coastal waters suggest that killer whales in the northeastern Pacific Ocean are highly contaminated with polychlorinated biphenyls (PCBs) and that the marine mammal-eating transient whales may be at particular risk for adverse effects (Ross et al., 2000, as cited in MMS, 2001).

A gray whale contaminant study has been conducted by Tilbury et al. (1999, as cited in MMS, 2001). The authors theorized that gray whale fasting during migration could alter the disposition of toxic chemicals within the whale's bodies. Thus, the whales may retain contaminants such as PCBs during fasting. Elevated levels of certain trace elements (e.g., cadmium) and aluminum in the tissues of stranded and harvested gray whales, compared with other marine mammals, were felt to be consistent with the ingestion of sediment during feeding.

A recent assessment of organochlorine levels in eastern North Pacific gray whales indicates that reproductive females may transfer contaminants to their calves, although the effects of observed contaminant levels on fetal development and calf health have not been determined (Krahn et al., 2000; NMFS, 2001, as cited in MMS, 2001). Tissue samples from two gray whales in Washington State revealed organochlorine (PCB and DDT) concentrations below U.S. Food and Drug Administration regulatory tolerance limits for human consumption based on fish and shell fish guidelines (Ylitalo et al., 1999; NMFS, 2001, as cited in MMS, 2001).

Pinnipeds such as California sea lions and harbor seals are primarily coastal animals and are probably susceptible to the effects of coastal pollution. Organic pollutants are known to cause reproductive failure in harbor seals (Reijnders, 1986, as cited in MMS, 2001). In the early 1970's, DeLong et al. (1973, as cited in MMS, 2001) suggested a possible cause-effect relationship between high levels of organic pollutants and premature births in California sea lions, but this apparently involved only a small percentage of annual pup production. Total DDT residues in California sea lions from southern and central California were high in the early 1970's (average levels up to 911 ppm wet weight) (Le Boeuf and Bonnell, 1971; DeLong et al., 1973, as cited in MMS, 2001); by the early 1990's, sampled levels were substantially lower (average levels of 5 to 24 ppm wet weight) (Lieberg-Clark et al., 1995, as cited in MMS, 2001). This trend, plus the cessation of DDT production, suggests that organochlorine contaminant levels will continue to drop (B.J. Le Boeuf, UC Santa Cruz, pers. comm., as cited in MMS, 2001).

The effects of pollutants on marine mammals are not well understood, but there is evidence that they may affect reproduction or make individuals more susceptible to other mortality factors, such as disease. Although the levels of certain pollutants, such as DDT, are expected to drop, the overall contamination of the marine environment from industrial, agricultural, and municipal sources is likely to increase during the coming decades. The significance of these pollutant levels to marine mammal populations in the study area is unknown, but concern over the potential effects is growing.

Non-Anthropogenic Sources of Impacts. A number of diseases are known to occur in wild marine mammal populations (Geraci and Lounsbury, 1993, as cited in MMS, 2001). Except for leptospirosis in California sea lions (Gilmartin et al., 1976; Dierauf et al., 1985, as cited in MMS, 2001) and northern fur seals (York, 1987, as cited in MMS, 2001), bacteria do not appear to be significant agents of disease in marine mammals (Geraci and Lounsbury, 1993, as cited in MMS, 2001). However, viruses have emerged as serious pathogens in several species of cetaceans and pinnipeds (Geraci and Lounsbury, 1993, as cited in MMS, 2001). Morbillivirus was implicated in the 1987–1988 mass mortality of bottlenose dolphins on the U.S. Atlantic coast (Lipscomb et al., 1994, as cited in MMS, 2001) and apparently killed hundreds of striped dolphins (*Stenella coeruleoalba*) in the Mediterranean in the early 1990's (Duignan et al., 1992, as cited in MMS, 2001). The California coastal population of bottlenose dolphins may be vulnerable to the effects of similar morbillivirus outbreaks (Forney et al., 2000, as cited in MMS, 2001).

One type of morbillivirus, phocine distemper virus, was first described in the late 1980's, and outbreaks in western Europe were associated with the death of thousands of harbor seals (Ham-Lammé et al., 1999, as cited in MMS, 2001). Recent data on west-coast harbor seals reveal that morbillivirus is not endemic in the population, indicating that this population may be extremely susceptible to an epizootic of the disease (Ham-Lammé et al., 1999, as cited in MMS, 2001). A calcivirus, identified as the San Miguel sea lion virus, is known to infect at least 11 species of marine mammals, including sea lions, fur seals, elephant seals, gray and sperm whales, and bottlenose dolphins (Smith et al., 1998, as cited in MMS, 2001).

A number of naturally occurring marine toxins are known to have killed marine mammals (Geraci and Lounsbury, 1993, as cited in MMS, 2001). Saxitoxin produced by the dinoflagellate *Gonyaulax tamarensis* (responsible for paralytic shellfish poisoning in humans) killed at least 14 humpback whales off New England in the late 1980's (Geraci et al., 1989, as cited in MMS, 2001). During the same period, a brevetoxin produced by the dinoflagellate *Gymnodinium breve* was implicated in mass bottlenose dolphin mortality along the U.S. Atlantic coast (Geraci, 1989, as cited in MMS, 2001). In 1998, an outbreak of domoic acid toxicity resulting from a bloom of the diatom *Pseudonitzchia australis* affected tens of California sea lions along the California coast (Gulland, 2000, as cited in MMS, 2001).

For reasons that are not yet understood, gray whales have been stranding with increasing frequency during the last two or three years. Norman et al. (2000, as cited in MMS, 2001) reported that 273 gray whales stranded in 1999 along the west coast of North America from Alaska to Mexico, a number that is 5 to 13 times higher than annual stranding counts from 1995 to 1998 (IWC, 2000; NMFS, 2001, as cited in MMS, 2001). An additional 291 gray whale strandings were recorded in the U.S. and Mexico during the first five months of 2000 (NMFS, 2001, as cited in MMS, 2001). Although the IWC Scientific Committee concluded that the increase in per capita mortality rate indicated by these strandings, plus observed decreases in calf production in 1999 and 2000, could have caused an overall decrease in the abundance of the eastern North Pacific gray whale population, the current status of the stock cannot be assessed without new survey data (NMFS, 2001, as cited in MMS, 2001).

Four strong El Niño events in the past 30 years have adversely affected the annual production, pup mortality, and pup growth of California pinniped populations, particularly on the Channel Islands (DeLong and Melin, 2000, as cited in MMS, 2001). The species affected include the California sea lion, northern fur seal, and, to a lesser extent, northern elephant seal. Such strong El Niño events can reduce population levels for several years.

Each of these phenomena may periodically have significant impacts on marine mammal populations, at least on the local level. However, the likelihood of their occurrence (and the levels of subsequent impacts on marine mammals) during the period 2006–2030 cannot be predicted.

Incremental Impacts of Exploration and Development of the Undeveloped Leases on Marine Mammals

Exploration and Delineation Drilling. Drilling of Exploration and delineation wells may occur during post-suspension activities under the hypothetical exploration and development scenario. Geophysical surveys are anticipated to occur during the suspension period, and thus are not addressed in this discussion. For a discussion of these potential impacts please refer to the MMS's Environmental Assessments for suspension-phase activities. The major impact agents expected from delineation drilling are noise and disturbance and drilling discharges.

It is estimated that noise from drilling activities would last less than 2 months at each well location. The sound levels produced by drilling from conventional, semi-submersible drilling rigs are relatively low (Gales, 1982; Richardson et al., 1995, as cited in MMS, 2001). Greene (1986, as cited in MMS, 2001) estimated source levels of about 154 dB re 1 mPa in the 10 to 500 Hz band for the SEDCO 708 in the Bering Sea. Gales (1982, as cited in MMS, 2001) measured levels of 125 dB re 1 mPa at frequencies of 29 to 70 Hz at distances of 13 to 15 meters from two diesel-powered semisubmersibles, with somewhat lower infrasonic tones at 7 to 14 Hz. No source levels were estimated.

The reactions of pinnipeds (seals and sea lions) to offshore drilling noise have not been extensively studied (Richardson et al., 1995, as cited in MMS, 2001). Observations of ringed and bearded seals in Arctic waters indicate some tolerance of drilling noise. Seals were observed to approach and dive within 50 meters of a sound projector broadcasting steady low-frequency (less than 350 Hz) drilling sound; received levels at this distance were about 130 dB re 1 mPa (Richardson et al., 1990a, 1991, 1995, as cited in MMS, 2001).

Most studies of the reactions of odontocetes (toothed whales) to offshore drilling noise have involved belugas (Richardson et al., 1995, as cited in MMS, 2001). In one study, belugas exposed to playback sounds from the SEDCO 708 semi-submersible rig reacted in one test at a distance of 300 to 500 meters by increasing swimming rate and turning away from the projector. However, most of the belugas passed close to the projector (Stewart et al., 1983; Richardson et al., 1995, as cited in MMS, 2001). In general, odontocetes appear to be fairly tolerant of drill rig noise (Richardson et al., 1995, as cited in MMS, 2001).

For gray whales off the coast of central California, Malme et al. (1984, as cited in MMS, 2001) recorded a 50 percent response threshold to playbacks of semi-submersible drilling noise at a received level of 120 dB re 1 mPa. A similar playback study with humpback whales (Malme et al., 1985, as cited in MMS, 2001) demonstrated no clear avoidance responses at received levels up to 116 dB re 1 mPa. These levels would be reached well within 100 meters of the drill rig in both nearshore and shelf-break waters; therefore, the predicted radius of response for grays, humpbacks, and probably other baleen whales as well, would also be less than 100 meters. Blue whales, which appear to increasingly be using waters of the project area for feeding, would likely only be disturbed within a 100-meter radius of drilling activities.

Richardson et al. (1995, as cited in MMS, 2001) also predicted similar radii of response for odontocetes and pinnipeds.

As discussed in Section 4.7.6, migrating gray whales generally travel within 3 km (1.6 nm) of the shoreline over most of the route, unless crossing mouths of rivers and straits (Dohl et al., 1983; Braham, 1984a, as cited in MMS, 2001). South of Point Conception, the migration pathway widens; gray whales often cross the Santa Barbara Channel and travel through the Channel Islands (Jones and Swartz, 1987; Dohl et al., 1981, 1983; Bonnell and Daily, 1993, as cited in MMS, 2001). The potential drill sites for the units located north of Point Conception (Point Sal, Purisima, and Bonito) would likely be 8 km (4 nm) or more offshore, well beyond the main migration corridor. Migrating gray whales might be expected to pass relatively close to the drill site on the Gato Canyon Unit, which is located in the western Santa Barbara Channel 5 km (2.7 nm) or more from the mainland shore. However, the very small predicted radius of response for semi-submersible drilling noise makes it unlikely that any disruption of gray whale migration would occur.

Therefore, effects on marine mammals from drilling noise associated with potential delineation activities would be expected to be restricted to minor, temporary (less than 1-hour) disturbances within approximately 100 meters of the drilling rig. These impacts are considered to be negligible.

Support vessel traffic for delineation drilling operations would operate out of Port Hueneme, with some possible crew boat trips originating from the Carpinteria Pier. Crew boats would average 2 to 8 trips per month throughout the approximately 14-month period of delineation drilling activities for all four projects; a total of about 90 trips would occur. Supply boat trips would average 8 to 12 per month, for a total of approximately 148 trips over the 14 months. As the location of the delineation drilling activities shifts from units in the Santa Maria Basin eastward into the western Santa Barbara Channel (i.e., the activities on the Gato Canyon Unit), overall support vessel traffic would peak during the first 6 months at about 20 trips per month, then decrease to about 10 trips per month during the final 3 months of activity.

Additionally, fluid produced during the drill stem test of each delineation well would be barged to Long Beach at the end of the testing period. Transportation of the barges would comply with established vessel traffic corridors. A total of 4 to 10 such trips is estimated to occur over the 14-month duration of the delineation drilling activities. The potential impacts to marine mammals of vessel traffic including noise and disturbance and collisions were discussed in Section 5.7.6.

The level of support vessel and barge traffic associated with potential delineation activities would be expected to result in temporary (less than 1-hour), localized disturbances to some marine mammals, primarily baleen whales. Collisions between support vessels and marine mammals, while possible, are considered to be highly unlikely events. Impacts from these sources should be lessened by implementation of the marine mammal avoidance guidelines specified in the operators' Marine Wildlife Contingency Plans' (MWCP) and are expected to be negligible.

Helicopter trips in support of delineation activities would be expected to average 20 to 30 per month. Helicopters would operate out of Santa Barbara Airport for activities in the Bonito and Gato Canyon Units and Santa Maria Airport for the Purisima and Point Sal Units. A total of 354 trips are projected for the duration of the projects.

The level of helicopter traffic associated with delineation activities would be expected to result in temporary (less than 1-hour), localized disturbances to some marine mammals. These impacts should be lessened by implementation of the marine mammal avoidance guidelines specified in the operators' MWCPs and are expected to be negligible.

Finally, during potential delineation activities a variety of permitted effluents would be discharged offshore. The charges on marine mammals include: (1) direct toxicity (acute or sublethal), through exposure in the waters or ingestion of prey that have bioaccumulated pollutants; and, (2) a reduction in prey through direct or indirect mortality or habitat alteration caused by the deposition of muds and cuttings (SAIC, 2000a and b, as cited in MMS, 2001). However, there is no toxicity information on the effects of muds and cuttings and produced-water discharges on marine mammals. Comprehensive reviews by the National Academy of Sciences (1983), the EPA (1985), and Neff (1987), all as cited in MMS (2001), do not address the potential effects of Pacific OCS discharges on these groups of animals (MMS, 1996, as cited in MMS, 2001). Significant impacts from Pacific OCS discharges have not been associated with marine mammals, because they are highly mobile and capable of avoiding such discharge, and their ranges far exceed the extent of the discharge plume.

The EPA Biological Assessment for the new general NPDES permit for offshore Pacific OCS facilities in southern California waters concludes that direct toxicity to listed marine mammals, or their food base, should be minimal (SAIC, 2000a and b, as cited in MMS, 2001). All such discharges are required to meet NPDES water quality criteria, which were established to protect biological resources outside the mixing zone. Therefore, any contact with potential Pacific OCS discharges likely would be extremely limited. No effects to marine mammals in the study area from effluent discharges associated with the proposed delineation wells would be expected.

Platform Construction and Operation. As described in Section 5.2, it is assumed that four platforms and associated pipelines and cables would be built: three in the northern Santa Maria Basin leases and one in the Gato Canyon Unit. The major portion of the offshore construction would be expected during the period 2012–2013, beginning with the Gato Canyon Unit, then shifting to the leases located in the Santa Maria Basin. Each platform installation is estimated to take approximately 3 to 6 months, depending on water depth; pipeline and cable installation are estimated to take about 3 months and 4 months, respectively. Impacts on marine mammals in the study area from these activities would be expected to be limited to temporary, localized disturbance.

Construction activities would include the installation of platform jackets and topsides, the laying of pipelines, platform hook-up and commissioning, and the initiation of drilling. From 1967 to 1992, 19 Pacific OCS platforms and associated pipelines were installed in the Santa Barbara Channel and Santa Maria Basin. All of these platforms are still in place. Seven offshore platforms were installed in State waters in this area between 1958 and 1966, but only one, Platform Holly near Goleta, remains.

Very little information exists on the noise produced by offshore construction activities. Most of the studies of marine construction noise have dealt with the construction of offshore oil industry facilities in shallow arctic waters and have focused on marine dredging (Richardson et al., 1995, as cited in MMS, 2001). These operations can be strong sources of continuous noise in nearshore waters. Broadband source levels of 172 to 185 dB have been recorded for dredging activities (Richardson et al., 1995, as cited in MMS, 2001). Although some higher frequency tones are produced, most of the energy is low frequency, below about 1,000 Hz, and dredge noise is usually undetectable in shallow water at ranges beyond 20 to 25 km (12 to 15 nm).

The effects of dredging and other construction activities on marine mammals have received little study (Richardson et al., 1995, as cited in MMS, 2001). Pile-driving activities at a platform construction site in the Santa Barbara Channel had no apparent effect on the behavior of dolphins passing at an average distance of 3.5 to 4.3 km (1.9 to 2.3 nm) (Dames and Moore, 1990, as cited in MMS, 2001). In two instances, migrating gray whales that were passing 5 to 8 km (3 to 4 nm) from the same platform construction site in the Santa Barbara Channel were not observed to react to pile-driving activities (Dames and Moore, 1990, as cited in MMS, 2001). There are observations from studies in the Arctic indicating that belugas and bowhead whales may tolerate considerable dredge noise, but are more sensitive to moving tug-dredge combinations than to stationary dredges (Malme et al., 1989, as cited in MMS, 2001). In one experimental study of bowhead whales (Richardson et al., 1990b, as cited in MMS, 2001), whales exposed to recorded dredge noise at received levels of 122 to 131 dB re 1 Pa (21 to 30 dB above ambient) exhibited avoidance by stopping feeding and moving away from within 0.8 km (0.4 nm) of the sound projector to locations more than 2 km (1 nm) away. However, there is some evidence of habituation by bowhead whales to actual dredging activity (Richardson et al., 1995, as cited in MMS, 2001).

Migrating gray whales were monitored during an offshore pipeline construction project in the Santa Barbara Channel in 1991-1992 (Woodhouse and Howorth, 1992, as cited in MMS, 2001). The lack of baseline data made it impossible to determine whether gray whale migration pathways were altered. However, hundreds of whales did move through the study area on both the southbound and northbound legs of their migration, and although some animals appeared to make local course changes around construction activities, no evidence was found that gray whales were deterred in their migration activity by the construction. In general, marine mammal reactions to construction activities would likely involve temporary avoidance behavior at distances of 2 km (1 nm) or less from the operations. If the Gato Canyon Unit construction were to occur during winter gray whale migration, some mitigation would probably be required to minimize disturbance and avoid disrupting the species' migration through the study area.

The other routine activities associated with development of the undeveloped leases, including drilling, production, and vessel and helicopter support traffic, would be expected to result in temporary (less than 1-hour), localized disturbances to marine mammals, as discussed above, throughout the period 2006 through 2030. Once production were to begin, support traffic would be expected to remain at levels typical for ongoing offshore oil and gas activities in the Santa Maria Basin.

Volumes of platform effluents discharged in the course of developing the undeveloped leases would be expected to be equivalent to those estimated for existing Pacific OCS platforms (Table 4.1-8). As discussed in previous sections, all platform effluents would be discharged under NPDES permit and would be required to meet NPDES water quality criteria. No measurable effects to marine mammals in the study area would be expected from these discharge volumes.

Impacts to marine mammals from any oil spills occurring as a result of the development of the undeveloped leases would be similar to those described above for the 200 and 2,000 bbl spills assumed to occur as a result of offshore oil and gas activities and for the assumed 22,800 bbl tanker spill. Impacts from a spill of 2,000 bbls or less are expected to be low. Impacts from a 22,800 bbl spill likely would be moderate to high. If oil reached the vicinity of a marine mammal rookery or haul out area, attempts to clean up the oil could disturb hauled out animals and add additional impacts. In addition, vessels and equipment used to clean up and contain oil on the water could disturb marine mammals.

Platform Decommissioning. Decommissioning of the four platforms assumed to be built for development of the undeveloped leases would be expected to result in noise and disturbance to marine mammals during the removal of platform structures and pipelines. The principal potential impacts would be similar to those expected to occur as the result of construction activities, i.e., short-term avoidance reactions at distances of 2 km (1 nm) or less from the operations. As discussed above, implementation of mitigation similar to that employed for platform removal in the Gulf of Mexico would make it unlikely that any marine mammal injury or mortality would occur as a result of the use of explosives in decommissioning operations. Impacts of decommissioning are expected to be negligible.

5.7.6.3 Summary and Conclusion – Marine Mammals

Table 5.7-6 summarizes the impacts of each phase of post-suspension activity resulting from a hypothetical exploration and development scenario on each unit for which a suspension has been requested.

Table 5.7-6. Comparison of Impacts to Marine Mammals by Undeveloped Unit/Lease and Exploration/Development Phase.

Unit/Lease	Exploration and Delineation Drilling	Development and Production	Decommissioning
Cavern Point	Negligible (noise and disturbance)	Negligible (noise and disturbance) Low (vessel collision) Low (oil spill)	None
Gato Canyon	Negligible (noise and disturbance) Low (vessel collision)	Negligible (noise and disturbance) Low (vessel collision) Low (oil spill)	Negligible (noise and disturbance)
Rocky Point	Negligible (noise and disturbance)	Negligible (noise and disturbance) Low (vessel collision) Low (oil spill)	None
Sword	Negligible (noise and disturbance)	Negligible (noise and disturbance) Low (vessel collision) Low (oil spill)	None
Bonito	Negligible (noise and disturbance)	Negligible (noise and disturbance) Low (vessel collision) Low (oil spill)	None
Santa Maria	None	Negligible (noise and disturbance) Low (vessel collision) Low (oil spill)	Negligible (noise and disturbance)
Purisima Point	Negligible (noise and disturbance) Low (vessel collision)	Negligible (noise and disturbance) Low (vessel collision) Low (oil spill)	None
Point Sal	Negligible (noise and disturbance) Low (vessel collision)	Negligible (noise and disturbance) Low (vessel collision) Low (oil spill)	Negligible (noise and disturbance)
Lion Rock	None	Negligible (noise and disturbance) Low (vessel collision) Low (oil spill)	None
Lease OCS-P 0409	None	Negligible (noise and disturbance) Low (vessel collision) Low (oil spill)	Negligible (noise and disturbance)

Currently, the primary source of human-related impacts to marine mammals in the study area is incidental take in commercial fishing operations. For non-threatened and endangered species, the incidental take of harbor porpoises is of greatest concern at present.

Gray whales are also subject to a subsistence harvest in the Russian Arctic, although this source of mortality is not believed to have a significant effect on the population. However, the recent increase in gray whale strandings has raised concerns that an overall population decline may be occurring.

Although the effects of noise and disturbance during post-suspension activities resulting from exploration and development of the undeveloped leases under the hypothetical development scenario would not be expected to be significant in themselves, they would add to the cumulative noise and disturbance levels that marine mammals are subject to in the Santa Barbara Channel and Santa Maria Basin. In general, the presence of multiple sources of noise and disturbance, such as stationary Pacific OCS activities (construction, drilling, and production), ship and boat noise, aircraft, and seismic exploration noise, should result in more frequent masking of communications, behavioral disruption, and short-term displacement. In other areas, there is also some evidence for long-term displacement of marine mammals due to disturbance, particularly in relatively confined bodies of water (summarized in Richardson et al., 1995, as cited in MMS, 2001). Although some Pacific OCS activities off southern California, such as construction and seismic surveys, have declined over the past decade, overall vessel traffic, including commercial, military, and private vessels, is increasing.

These effects may be somewhat mitigated by habituation. Indeed, marine mammal populations in California waters have generally been growing in recent decades (Bonnell and Dailey, 1993; Barlow et al., 1997; Forney et al., 2000, as cited in MMS, 2001), despite a gradual increase in a wide variety of human activities in the area. There is no evidence that the noise and disturbance created by offshore oil and gas activities in both Federal and State waters and by increasing vessel traffic (of which oil and gas support vessels are a small part) have resulted in adverse impacts on marine mammal populations. By the impact level criteria adopted for this document, these impacts are considered to be low.

Given current trends, it is likely that the populations of most marine mammal species will continue to grow (Carretta et al., 2004). For example, as discussed above under Commercial Fisheries, marine mammal entanglement rates in the drift gillnet fishery have dropped substantially since a Take Reduction Plan involving the use of pingers was implemented in 1997. However, the future status of individual populations is difficult to predict. Impacts to marine mammals from incidental take in commercial fishing operations are likely to decrease. Impacts from other anthropogenic sources, such as ship strikes, marine pollutants, and noise from shipping and military activities, may increase as the human population and related activities continue to grow in the region. Although the level of impact of ship strikes associated with development of the undeveloped leases would be low, any additional loss of marine mammals by vessel collisions would add to impacts from all vessels that would be moderate for some species (gray whales, California sea lions, harbor seals) between 2006 and 2030.

Accidental oil spills present an ongoing source of potential impacts to marine mammals. The cumulative risk of oil spills arises from multiple sources, including offshore oil and gas activities in Federal and State waters and both Alaskan and foreign-import tankering. The greatest oil spill risk to marine mammals in the study area results from tankering operations. This risk is tempered by recently implemented or proposed mitigation (such as the rerouting of tankers farther offshore along the central California coast) and, as discussed in Section 5.3, by modern oil spill response capabilities.

Some routine offshore oil and gas activities, including construction and drilling, would likely be heaviest during the period 2012–2013; under the hypothetical development scenario much of this activity would be related to the development of the undeveloped leases. Construction activities would occur in the Santa Maria Basin and, to a lesser extent, the western Santa Barbara Channel. Decommissioning of existing offshore oil and gas facilities would begin in the eastern Channel about 2012 and shift westward over a period of years. Thus, there would be periods of noise and disturbance-producing activities occurring in different parts of the study area at various times. Throughout these periods, routine activities such as production and vessel and helicopter support traffic would continue.

Overall, the impacts to marine mammals in the study area from routine offshore oil and gas activities, primarily noise and disturbance, would increase over present levels. However, the areas covered by these activities would be small relative to the available marine mammal habitat, and the periods of disturbance would be localized. Unless several such projects were to overlap in time and space near essential habitat for a particular population (such as the gray whale migration pathway), cumulative impacts to marine mammals would be unlikely. Cumulative impacts to marine mammals from all the routine oil and gas activities assumed to take place between 2006 and 2030, including those associated with the potential development of the undeveloped leases, are expected to be low.

Impacts to marine mammals from the oil spills assumed to occur in the study area during the period 2006 through 2030 could range from negligible to high, depending on spill size, location, season, and a number of other factors. Most at risk are pinniped pups. Seasonally, the most sensitive areas are rookeries on the northern Channel Islands (particularly San Miguel Island) and along the mainland coast north of Point Conception.

Without development of the undeveloped leases, the probabilities that one or more oil spills would occur during the period 2006 through 2030 from existing Pacific OCS oil and gas activities are 73.9 percent for a spill of 200 bbl or less and 59.1 percent for a spill of 2,000 bbl. The probability of a 22,800 bbl tanker spill occurring during this period is 90.5 percent. Under the hypothetical development scenario for development of the undeveloped leases, these probabilities are 98.8 percent and 53.9 percent, respectively. Thus, the potential for an oil spill occurring from development of the undeveloped leases represents a measurable incremental increase to the overall cumulative oil spill risk for marine mammals.

5.7.7 Threatened and Endangered Species

This section analyzes the impacts on threatened and endangered species in the study area both without and with the development of the undeveloped leases in the period 2006 through 2030. Under the hypothetical exploration and development scenario described earlier, threatened and endangered species could be vulnerable to several potentially adverse impacts from potential operations associated with post-suspension exploration and development of the undeveloped leases.

Subsections of this discussion separately address threatened and endangered fish and marine invertebrates, marine mammals, birds, and sea turtles.

5.7.7.1 Threatened and Endangered Fish and Marine Invertebrates

Significance Criteria

Impact level definitions for threatened and endangered fish and marine invertebrates that are used in this analysis include:

- **High.** Impacts result in a population decline in the study area due to direct mortality, reduced survivorship, declines in reproduction, and/or a shift in distribution. The decline, which could involve more than 5 percent of the total population, would be at a level and over a large enough area that the continued existence or recovery of the species involved would be at risk.
- **Moderate.** Impacts result in a local (e.g., single colony) population decline due to direct mortality, reduced survivorship, declines in reproduction, and/or a shift in distribution. The decline, which could involve from 1 to 5 percent of the total population, could increase the length of time projected for full recovery and removal from the endangered species list, depending on the species involved. Effects are expected to continue for 1 to 5 years.
- **Low.** Impacts result mainly in local (e.g., a small area around a platform, a limited stretch of beach, or rocky shore), short-term (a few days to a few weeks) changes in behavior (e.g., disruption of foraging) and/or displacement from roosting or foraging habitats due to disturbance. Mortality, if any, would be limited to the loss of a few animals up to 1 percent of the total population of the species or stock. A small number of animals would also suffer from sublethal effects. Effects are expected to continue for less than 1 year. Projected recovery time and removal from the endangered species list would not be affected.

Impacts below these levels, involving no death or life-threatening injury of any threatened or endangered organism, no displacement from preferred habitat, and no more than minor disruption of behavioral patterns, are defined as negligible. For the purposes of this analysis, high and moderate impacts are considered to be significant; low impacts are considered to be insignificant.

Impacts of Post-Suspension Activities

Cumulative Impacts without Activities on the Undeveloped Leases on Threatened and Endangered Fish and Marine Invertebrates

Section 5.2 and Appendix I describe the projects considered in the cumulative analysis. Possible sources of cumulative impacts in the study area include on-going and proposed oil and gas activities in Federal and State waters, and Alaskan and foreign-import tankering. Cumulative impacts to threatened and endangered fish also occur from habitat loss due to urbanization, competition and predation with exotic or invasive species, and other anthropogenic and non-anthropogenic sources.

Offshore Oil and Gas Activities. Routine past, present and foreseeable oil and gas development activities in the study area are described in Section 5.2. These activities have had low impacts on threatened and endangered fish species. No new pipeline or onshore facilities are planned for existing Federal and State projects or the proposed Tranquillon Ridge project. Accidental oil spills may impact coastal habitat for the southern steelhead and tidewater goby.

Oil Spills. Section 5.3 discusses the cumulative oil spill risk for the study area, which results from several sources: ongoing and projected oil and gas production from existing Pacific OCS facilities in the Santa Barbara Channel and Santa Maria Basin, several proposed development projects on the Pacific OCS, ongoing production from one facility in State waters in the Santa Barbara Channel, two likely oil and gas projects in State waters, and the tankering of Alaskan and foreign-import oil through area waters. The most likely oil spill scenario is that one or more oil spills in the 50 to 1,000 bbl range would occur from offshore oil and gas activities over the period 2006 through 2030, and that such a spill would be 200 bbl or less in volume. The maximum reasonably foreseeable oil spill volume from offshore oil and gas activities is 2,000 bbl, assumed for purposes of analysis to be a pipeline spill. Tables in Section 5.3 present the estimated mean number of spills of various sizes and the probability of their occurrence as a result of the described activities. Based on data from tanker spills in U.S. waters, the mean size for a tanker spill is assumed to be 22,800 bbl. None of the oil produced on the Pacific OCS is transported by tanker. However, the transport of foreign and Alaskan oil along the U.S. west coast does present an oil spill risk.

A generic discussion of the effects of oil spills on fish is presented in Section 5.2.4**.** Research shows that hydrocarbons and other constituents of petroleum spills can, in sufficient concentrations, cause adverse impacts to fish and can range from mortality to sublethal effects that inhibit growth, longevity, and reproduction.

Tidewater Goby. Endangered tidewater gobies, which are found in shallow coastal lagoons, stream mouths and shallow areas of bays potentially could be impacted by an oil spill. There is some risk that an oil spill might reach the coastal lagoons during a high tide or storm when the sand berms blocking the stream mouths from the ocean have been breached. Breaches usually occur during the winter and spring months and tidewater gobies often move upstream out of the lagoons during this period. Though direct oil contact with gobies would be unlikely, the oil can become sequestered in the sediments and persist until rains flush the sediments from the lagoon. When the gobies return, short-term sublethal effects would also be expected, since gobies burrow into and feed in the sediment and rely on macrofaunal and intertidal communities for food and shelter from predators. The level of impacts, however, are dependent on the volume of oil that reaches their habitat and the amount of weathering and mixing the oil has undergone before reaching the habitat.

However, tidewater gobies along the south-central California coast are quite resilient and have a great ability to disperse and re-colonize areas from which they were previously eliminated (FWS News Release, June 24, 1999, as cited in MMS, 2001). Thus, oil spills associated with existing offshore oil and gas activities are expected to have only minor impacts on tidewater gobies in the study area.

Steelhead Trout. The critical habitat for endangered steelhead trout includes all river reaches and estuarine areas accessible to listed steelhead in coastal river basins from the Santa Maria Basin to Malibu Creek. In the Point Arguello area, this would include the Santa Ynez River, San Antonio Creek, and the Santa Maria River, and perhaps Jalama and Cañada Honda Creeks. South of Point Arguello this would include the Ventura and Santa Clara Rivers, and Malibu Creek. Only winter steelhead occur along the south-central coast. Winter steelhead enter their home streams from November to April to spawn. Juveniles migrate to sea usually in spring.

If an oil spill contacted shore in the study area during the steelhead trout migration, some mortality and short-term sublethal impacts to steelhead might occur. Oil spill response teams would be expected to boom the mouths of creeks and rivers or enhance the existing berms in the event of a spill thus minimizing the chance of oil reaching critical habitat. The toxicity and persistence of the oil in the environment would be low due to the weathering and mixing of the oil at sea and the high-energy environment of the south central coast.

If an oil spill were to hit the mainland coast of south or central California, it would likely contact one or two of the above critical habitats during a period when steelhead are entering or leaving the river. Little mortality would be expected from such an occurrence. However, sublethal effects causing stress may lead to increased vulnerability to disease and perhaps reduced reproduction to impacted individuals. Migration could also be disrupted. Oil avoidance reactions are well documented in salmon. Adults and juveniles can detect sublethal levels of hydrocarbons (Rice, 1973; Weber et al., 1981, as cited in MMS, 2001) and have been observed actively avoiding contaminated areas (Patten, 1977; Weber et al., 1981, as cited in MMS, 2001). Also, in the event of a spill, oil spill response teams would identify river and stream mouths at risk of oil contact and would immediately boom or build protective berms at the river and stream mouths, which could further disrupt migration. These effects are expected to be short-term due to the weathering and mixing that would occur to the oil before it reached the shore, and the high-energy environment of the south central California coast that would further minimize the toxicity and persistence of the oil in the environment.

In conclusion, oil spills associated with existing offshore oil and gas activities are expected to have only minor impacts on steelhead trout if the spill contacts critical habitat during a period when steelhead are migrating. Due to the openness of the south central coast and the high-energy environment of the area, a spill would likely break into smaller slicks and some of the oil would disperse into the water column. Thus, concentrated oiling of steelhead habitat would not be expected.

Other Activities. Steelhead from the Southern California ESU have already been extirpated from much of their historical range. There is a strong concern about the widespread degradation, destruction, and blockage of freshwater habitats within the region, and the potential results of continuing habitat destruction and water allocation problems. There is also concern about the genetic effects of widespread stocking of rainbow trout. Total abundance of steelhead in the South-Central Coast ESU is extremely low and declining. Risk factors for this ESU are habitat deterioration due to sedimentation and flooding related to land management practices and potential genetic interaction with hatchery rainbow trout.

The northern population of tidewater goby is found along coastal areas from Del Norte County south to Los Angeles County. It lost some of its habitat over the past 150 years to farming, development, and pollution (Pacific Region FWS News Release June 24, 1999, as cited in MMS, 2001). Since 1994, the northern population of tidewater gobies has rebounded sharply. Early summer 1999, the Service proposed to delist that population, while maintaining the endangered designation for the southern population.

White Abalone. Although recently reported in relatively shallow water (see Section 4.7.7.1) the white abalone is generally considered to be most common in water depths greater than 60 feet. Because it is found in subtidal habitats, most of which is associated with kelp or in deeper (to 160 feet) water, oil spill effects on this endangered marine mollusk are expected to be low. A spill that resulted in substantial coating of subtidal rocky habitats or significant loss of attached algae within an area that supports white abalone would be considered a high impact. The likelihood of this occurring, however, is low due to the anticipated quick recovery of spilled oil.

Incremental Impacts of Exploration and Development of the Undeveloped Leases on Threatened and Endangered Fish and Marine Invertebrates

The potential scenario for the exploration and development of the currently undeveloped leases is described in Section 5.2. Of the activities and possible accidental events described, only oil spills and construction of onshore facilities may have measurable, long-term (e.g., years) effects on threatened and endangered fish and marine invertebrates (Tidewater goby and southern steelhead, and white abalone). Pipeline construction could also have an impact if it were to occur across steelhead, goby, or while abalone habitat. Other activities associated with oil and gas development, including exploration activities, platform installation and abandonment, discharges, and vessel traffic would not have an impact on threatened and endangered amphibians.

The oil spill risk analysis provided in Section 5.3 indicates a greater likelihood of both a 200 bbl and a 2,000 bbl oil spill occurring with the development of the undeveloped leases. Although a greater potential for an oil spill to occur does not necessarily indicate a higher level of impacts, the potential for an oil spill occurring from development of the undeveloped leases represents a measurable incremental increase to the overall oil spill risk for threatened and endangered fish.

Summary and Conclusion – Threatened and Endangered Fish and Marine Invertebrates

The principal threats to the recovery of southern steelhead is habitat degradation due to several sources including dams, agricultural and forest management practices, and urbanization. The species also faces potential genetic interaction with hatchery rainbow. These threats would continue through the next quarter century, although efforts are underway to alleviate the problems.

The northern population of tidewater gobies has lost habitat over the past 150 years due to farming and development, but has recently rebounded sharply. Early summer 1999, the FWS proposed to delist that population, while maintaining the endangered designation for the southern population.

The white abalone population has been substantially reduced and therefore damage to its habitat (algae-covered rocks) would be considered a high impact. Pre-construction abalone surveys and subsequent relocation of specimens, coupled with ongoing mariculture activities in southern California are designed to enhance the survival of this species and to increase its population.

Overall, the impacts to tidewater gobies and southern steelhead in the study area from routine offshore oil and gas activities, primarily onshore construction, would increase over present levels only if the undeveloped leases are developed. However, the areas that would be impacted by onshore activities would be small relative to the available habitat, and critical areas would likely be avoided. Cumulative impacts to threatened and endangered fish from all the routine oil and gas activities assumed to take place between 2006 and 2030, including those associated with the development of the undeveloped leases, are expected to be low. Properly planned and mitigated offshore activities within the water depth and habitat areas that could support white abalone would likewise reduce potential impacts to low or none.

Without development of the undeveloped leases, the probabilities that one or more oil spills would occur during the period 2006 through 2030 from existing Pacific OCS oil and gas activities are discussed in Section 5.3. The probabilities under the hypothetical scenario for development of the undeveloped leases are also analyzed in Section 5.3. Based on these probabilities, the potential for an oil spill occurring from hypothetical development of the undeveloped leases represents a measurable incremental increase to the overall cumulative oil spill risk for threatened and endangered fish.

Habitat present within the water depths that has the potential to support white abalone is expected along the assumed pipeline corridor for the Gato Canyon development. Moderate impacts to the white abalone population could occur if pre-development surveys were not conducted. If white abalone were found within the area, removal by qualified biologist and husbandry/mariculture of specimen(s) would be expected to reduce those impacts to negligible. Development within the other units would be either in water depths that exceed the white abalone's documented range or are through sedimentary habitat that is not utilized by that species. Table 5.7-7 provides a summary of the potential impacts to non-mammal marine threatened and endangered species under a hypothetical exploration and development scenario.

Table 5.7-7. Comparison of Impacts to Threatened and Endangered Fish and Marine Invertebrates by Undeveloped Unit/Lease and Exploration/Development Phase

Unit/Lease	Exploration and Delineation Drilling	Development and Production	Decommissioning
Cavern Point	None	None	None
Gato Canyon		None to Moderate	None to Moderate
Rocky Point		None	None
Sword			
Bonito			
Santa Maria			
Purisima Point			
Point Sal			
Lion Rock			
Lease OCS-P 0409			

5.7.7.2 Threatened and Endangered Marine Mammals

Significance Criteria

Impact level definitions for threatened and endangered marine mammal in this analysis are as follows:

- **High.** Impacts result in a population decline in the study area due to direct mortality, reduced survivorship, declines in reproduction, and/or a shift in distribution. The decline, which could involve more than 5 percent of the total population, would be at a level and over a large enough area that the continued existence or recovery of the species involved would be at risk.
- **Moderate.** Impacts result in a local (e.g., single colony) population decline due to direct mortality, reduced survivorship, declines in reproduction, and/or a shift in distribution. The decline, which could involve from 1 to 5 percent of the total population, could increase the length of time projected for full recovery and removal from the endangered species list, depending on the species involved. Effects are expected to continue for 1 to 5 years.
- **Low.** Impacts result mainly in local (e.g., a small area around a platform, a limited stretch of beach, or rocky shore), short-term (a few days to a few weeks) changes in behavior (e.g., disruption of foraging) and/or displacement from roosting or foraging habitats due to disturbance. Mortality, if any, would be limited to the loss of a few animals up to 1 percent of the total population of the species or stock. A small number of animals would also suffer from sublethal effects. Effects are expected to continue for less than one year. Projected recovery time and removal from the endangered species list would not be affected.

Impacts below these levels, involving no death or life-threatening injury of any threatened or endangered organism, no displacement from preferred habitat, and no more than minor disruption of behavioral patterns, are defined as negligible. High and moderate impacts are considered to be significant; low impacts are considered to be insignificant.

This analysis is focused on the following species: blue whale; sei whale, humpback whale; northern right whale; sperm whale; Steller sea lion; Guadalupe fur seal; and southern sea otter.

Impacts of Post-Suspension Activities

Cumulative Impacts without Activities on the Undeveloped Leases on Threatened and Endangered Marine Mammals

This section examines the cumulative impacts to threatened and endangered marine mammals without the development of the undeveloped leases in the period 2006 to 2030. The projects discussed in this section include past, present, and foreseeable actions that may produce impacts during the period 2006 through 2030, the period during which development of the undeveloped leases would likely occur. Most of the major impact agents are those discussed in Section 5.7.6 and treated briefly below.

Offshore Oil and Gas Activities. Routine offshore oil and gas activities may result in cumulative impacts to marine mammals, including threatened and endangered species. These include drilling and production activities with associated support activities. The major impact agents expected from these ongoing activities are noise and disturbance and drilling discharges. Platform decommissioning may involve the use of explosives and the possibility of lethal impacts to marine mammals.

Offshore Facility Decommissioning. Section 5.7.6 discusses the potential cumulative impacts to marine mammals from offshore facility decommissioning activities, including the removal of wells, platforms, and associated pipelines. It is expected that no Pacific OCS platforms in the Santa Barbara Channel or Santa Maria Basin would be removed before 2012, and a few may be in place as late as 2030 (or 2035, in the case of Platform Irene if the Tranquillon Ridge development occurs).

Likely impacts to threatened and endangered marine mammals would be limited to minor and temporary (less than 1 hour in duration) disturbance. In addition to these effects, decommissioning activities would result in noise and disturbance to threatened and endangered marine mammals during the removal of platform structures and pipelines. The principal potential impacts would be short-term avoidance reactions at distances of 2 km (1 nm) or less from the operations. Explosives used in platform decommissioning have a slight potential to injure a listed marine mammal.

Development and Production. The predicted radius of response to the noise produced by development and production activities for baleen whales, including endangered species, would also be less than 100 meters (330 feet). Richardson et al. (1995, as cited in MMS, 2001) predicted similar radii of response for odontocetes and pinnipeds.

Vessel Traffic. The levels of support vessel traffic assumed to occur in the study area over the period 2006–2030 are expected to result in temporary (less than 1-hour), localized disturbances to some threatened and endangered marine mammals in the study area, primarily baleen whales. Given that at least one collision between a support vessel and a marine mammal has been recorded during the past 30 years of activities in the Pacific OCS, it is possible that one or two such events may occur during the next two decades.

Aircraft. The levels of helicopter traffic associated with offshore oil and gas activities in the study area are expected to result in temporary (less than 1-hour), localized disturbances to some marine mammals, including threatened and endangered species.

Oil Spills. Section 5.3 discusses the cumulative oil spill risk for the study area, which results from several sources: ongoing and projected oil and gas production from existing Pacific OCS facilities in the Santa Barbara Channel and Santa Maria Basin, proposed development projects on the Pacific OCS, ongoing production from one facility in State waters in the Santa Barbara Channel, two likely oil and gas projects in State waters, and the tankering of Alaskan and foreign-import oil through area waters. As discussed in Section 5.3, the most likely oil spill scenario is that one or more oil spills in the 50 to 1,000 bbl range would occur from offshore oil and gas activities over the period 2006–2030, and that such a spill would be 200 bbl or less in volume. The maximum reasonably foreseeable oil spill volume from offshore oil and gas activities is 2,000 bbl, assumed for purposes of analysis to be a pipeline spill. Tables in Section 5.3 present the estimated mean number of spills of various sizes and the probability of their occurrence as a result of the described activities. Based on data from tanker spills in U.S. waters, the mean size for a tanker spill is assumed to be 22,800 bbl. The potential impacts to threatened and endangered cetaceans and pinnipeds in the study area from spills of each of these three sizes are discussed below. Sea otters are addressed separately.

The level of impacts from such spills would depend on many factors, including the type, rate, and volume of oil spilled and the weather and oceanographic conditions at the time of the spill. These parameters would determine the quantity of oil that is dispersed into the water column; the degree of weathering, evaporation, and dispersion of the oil before it contacts a shoreline; the actual amount, concentration, and composition of the oil at the time of shoreline or habitat contact; and a measure of the toxicity of the oil.

Sea otters, which rely almost entirely on maintaining a layer of warm, dry air in their dense underfur as insulation against the cold, are among the most sensitive marine mammals to the effects of oil contamination (Kooyman et al., 1977; Geraci and St. Aubin, 1980; Geraci and Williams, 1990; Williams and Davis, 1995, as cited in MMS, 2001). Even a partial fouling of an otter's fur, equivalent to about 30 percent of the total body surface, can result in death (Kooyman and Costa, 1979, as cited in MMS, 2001). This was clearly demonstrated by the *Exxon Valdez* oil spill (Davis, 1990; Ballachey et al., 1994; Lipscomb et al., 1994, as cited in MMS, 2001). Earlier experimental studies had indicated that sea otters would not avoid oil (Barabash-Nikiforov, 1947; Kenyon, 1969; Williams, 1978; Siniff et al., 1982, as cited in MMS, 2001), and many otters were fouled by oil during the Alaskan spill; approximately 360 oiled otters were captured and taken to treatment centers over a 4-month period, and more than 1,000 dead sea otters were recovered (Geraci and Williams, 1990; Zimmerman et al., 1994, as cited in MMS, 2001). Ballachey et al. (1994, as cited in MMS, 2001) concluded that several thousand otters died within months of the spill, and that there was evidence of chronic effects occurring for at least 3 years.

As stated above, it is assumed that the most likely size for a spill occurring from offshore oil and gas activities in the Pacific OCS is 200 bbl or less. If a spill of this size were to occur in the Santa Barbara Channel or Santa Maria Basin, it could contact the mainland shoreline or one of the northern Channel Islands, which are part of the Channel Islands National Marine Sanctuary and National Park. However, a 200 bbl spill would be unlikely to reach San Miguel Island, which is approximately 40 km (20 nm) from Platform Heritage, the nearest offshore facility.

Data from moored current meters and surface-drifter trajectory observations indicate that north of Point Conception a spill could move northward along the mainland coast, typically during relaxation current events when the wind is low. Individual drifters made landfall along the coast as far north as Point Lobos within 10 days. However, when averaged over all flow regimes, the most likely northern limit of shoreline spill contact is Ragged Point, near the southern end of the Big Sur coast and within the Monterey Bay National Marine Sanctuary.

It is unlikely that a 200 bbl spill would have more than a negligible impact on cetacean or pinniped populations at sea in the study area, including threatened and endangered species. As discussed in the 1984 EIR/EIS for development of the Point Arguello Unit (A. D. Little, 1984, as cited in MMS, 2001), likely impacts could involve the oiling of a few individuals and/or temporary displacement from small areas of the Santa Barbara Channel or Santa Maria Basin.

As stated above, the most likely maximum size of a major oil spill from future oil and gas development — the maximum reasonably foreseeable oil spill volume — is 2,000 bbl. A 2,000 bbl oil spill in this area could have more serious impacts on marine mammals, including longer-term displacement and some mortality.

If a 2,000 bbl spill were to occur during the summer or fall, it could contact part of the area used for feeding by blue and humpback whales in the Santa Barbara Channel and Santa Maria Basin (see Section 5.3). Based on experiences from past spills, it is unlikely that any direct mortality would result from such a spill, and there is no evidence that blue or humpback whales would avoid oiled areas. In Prince William Sound following the 1989 *Exxon Valdez* oil spill, humpbacks were observed feeding in areas that had been heavily oiled, although none were observed feeding in oil (von Ziegesar et al., 1994, as cited in MMS, 2001). The whales did not appear to favor areas that had not been oiled. However, blue and humpback whales could be temporarily displaced from a portion of their foraging area by the cleanup activities associated with the response to a spill of this size. Impacts to blue and humpback whales from a spill of this size would range from negligible to low.

Although fin whales are seen in the Santa Barbara Channel, they generally occur farther offshore and in waters south of the northern Channel Island chain (Leatherwood et al., 1987; Bonnell and Dailey, 1993; MMS, unpubl. data, as cited in MMS, 2001); they are less likely than blue or humpback whales to be affected by an accidental oil spill.

The remaining endangered whale species are even less common in the study area. Low numbers of sei whales are estimated to frequent California waters — possibly tens to a few hundreds of animals (Bonnell and Dailey, 1993; Barlow et al., 1997; Reeves et al., 1998b, as cited in MMS, 2001). The right whale population in the North Pacific is very small (NMFS, 1991, as cited in MMS, 2001), and right whales are rarely seen off southern California (Carretta et al., 1994, as cited in MMS, 2001). Sperm whales are a pelagic species with a preference for deep waters (Watkins, 1977; Gosho et al., 1984, as cited in MMS, 2001). Although they are occasionally sighted in the Southern California Bight, they are generally found farther offshore (Dohl et al., 1981, 1983; Bonnell and Dailey, 1993, as cited in MMS, 2001). Thus, these species are unlikely to be present in the study area in sufficient numbers to be affected by a 2,000 bbl spill.

Similarly, as discussed in Section 4.7.7, the very low numbers of Steller sea lions and Guadalupe fur seals in southern California waters make it unlikely that either species would come in contact with an oil spill in the study area. No impacts are expected from a 2,000 bbl oil spill.

Impacts to threatened and endangered cetaceans and pinnipeds from any oil spills occurring during this period would be similar to those described in Section 5.7.6 for the 200 and 2,000 bbl spills assumed to occur as a result of offshore oil and gas activities and for the assumed 22,800 bbl tanker spill.

There is a chance that even a 200 bbl spill could contact the mainland shoreline within the present southern sea otter range. For the MMS's 2001 Draft EIS, R.G. Ford Consulting conducted an analysis of the risk of oil spills to the southern sea otter from ongoing and projected production from existing Pacific OCS facilities, from hypothetical development of the undeveloped leases, and from tankering for the period 2006–2030 (Draft EIS Appendix 5.5, MMS, 2001). This analysis provides the basis for the discussion presented in this section.

As described in Draft EIS Appendix 5.5, the analysis used sea otter numbers and distribution as recorded during the spring 1999 survey of the southern sea otter range. For an upper bound for platform and pipeline spills, the model used the estimated maximum reasonably foreseeable spill size of 2,000 bbl. For tanker spills, the size distribution was truncated at 350,000 bbl, which represents the maximum capacity of tankers transiting this portion of the California coast (Ford and Bonnell, 1995, as cited in MMS, 2001); a run was also conducted using the mean tanker spill size of 22,800 bbl. Using output from MMS's OSRA model to estimate the likelihood of shoreline contact, the model simulated the effects of a potential spill from each of the potential sources of risk 100,000 times. To maintain consistency with the oil spill risk analysis presented in Section 5.3, contacts for platform and pipeline spills were calculated for 10-day periods; for tanker spills, with their much greater potential volumes, 30-day runs were used. The results, presented as worst-case percentiles, are shown in the Draft EIS, Appendix Table 5.5-3.

The results of the model runs are ranked in ascending order based on the numbers of otter contacts. For example, the 0.01 worst case is the maximum number of otters that the model predicts would be contacted in 99 out of 100 trials

If a spill were to occur, the magnitude of expected sea otter mortality would vary with a number of factors, including the time of year, volume of oil spilled, wind speed and direction, current speed and direction, distance of the spill from shore, volume of oil contacting the shoreline, condition of the oil contacting the shoreline, the success of containment operations, number of animals contacted, and the effectiveness of otter cleaning and rehabilitation.

In its Final Revised Recovery Plan for the Southern Sea Otter (USFWS, 2003), the FWS makes the assumption that, lacking reliable data on the survivability of oiled sea otters in the wild, all sea otters coming into contact with oil within 21 days of a spill will die. The USFWS recognizes that activation of the California Department of Fish and Game's wildlife care facilities and oil spill response protocols would mitigate these impacts to some extent and that this assumption is probably conservative. Rapid and effective oil spill cleanup response would also lessen impacts on otters in the spill area. As indicated by Brody et al. (1996, as cited in MMS, 2001), sea otter contact with an oil spill does not necessarily equate to mortality.

For ongoing and projected production from existing Pacific OCS facilities during the period 2006–2030, the model predicts that there is a 1 in 100 chance that 26 to 27 otters would be contacted by a 2,000 bbl spill. Likewise, for this period the model predicts that there is only a 1 in 1,000 chance that 77 otters would be contacted by a 2,000 bbl oil spill resulting from existing Pacific OCS activities, and an extremely slight (1 in 10,000) chance that as many as 110 otters would be contacted. Twenty-seven (27) otters represent about 1 percent of the current estimated southern sea otter population (2,825); 77 otters represent about 3 percent. Thus, the model analysis indicates that there is a relatively low probability of sea otter contacts occurring as a result of spill associated with existing Pacific OCS facilities during this period.

This is basically consistent with the conclusion reached by Ford and Bonnell (1995, as cited in MMS, 2001), in their analysis of the potential impacts of an *Exxon Valdez* sized spill on the southern sea otter, that oil spills occurring at the southern end of the otter range present the smallest risk to the population. However, as discussed above, data from moored current meters and surface-drifter trajectory observations (Section 5.3) indicate that north of Point Conception a spill could move northward along the mainland coast under certain conditions.

In summary, model runs for oil spills associated with ongoing and projected production from existing Pacific OCS facilities for the period 2006–2030 indicate that there is a 1 percent chance of contact to 26 to 27 sea otters within 10 days. If all contacts resulted in mortality (a conservative assumption), the impacts to the southern sea otter would be considered moderate as defined by the impact level criteria presented in Section 5.7.6. As discussed above, non-OCS tanker spills represent by far the greatest risk to sea otters. The impacts of a non-OCS tanker spill on sea otters are discussed below under Marine Tankers.

Effluent Discharges. Section 4.1 describes the treatment and discharge of platform effluents in the Pacific OCS. Section 5.7.6 discusses the potential impacts of effluent discharges. As reported, the EPA Biological Assessment for the proposed reissuance of its general NPDES permit for offshore Pacific OCS facilities in southern California waters concludes that direct toxicity to listed marine mammals, or their food base, should be minimal (SAIC, 2000a and b, as cited in MMS, 2001). All such discharges are required to meet NPDES water quality criteria, which were established to protect biological resources outside the mixing zone. Therefore, given that effluent discharge volumes are expected to remain at or below current levels, any contact with Pacific OCS discharges likely would continue to be extremely limited. No measurable effects to threatened and endangered marine mammals in the study area are expected.

Marine Tankers. None of the oil produced on the Pacific OCS is transported by tanker. However, the transport of foreign and Alaskan oil along the U.S. west coast does present an oil spill risk. The effects of a 22,800 bbl tanker spill on marine mammals in the study area potentially could be much more serious than a spill from oil and gas facilities. Although, cetaceans are considered to be less vulnerable to the effects of oiling than pinnipeds (Geraci, 1990; Würsig, 1990, as cited in MMS, 2001), a 22,800 bbl tanker spill would probably have some effect on cetaceans in the study area. It is unlikely that mortality would occur, but blue, humpback, and, to a lesser extent, fin whales could be subject to disturbance and displacement over a greater area and for a longer duration. These impacts would be expected to be low overall.

Given their low densities in the study area, effects of a tanker spill on the remaining threatened and endangered cetacean species would be expected to be negligible.

The oil spill risk analysis for the southern sea otter conducted by R.G. Ford Consulting indicates that non-OCS tanker oil spills during the period 2006 through 2030 would have a 1 in 100 chance of contacting 345 sea otters, a 1 in 1,000 chance of contacting 1,341 sea otters, and a 1 in 10,000 chance of contacting as many as 2,002 otters (MMS Draft EIS Appendix 5.5, 2001). The first two number represent about 12 and 47 percent, respectively, of the current estimated southern sea otter population (2,825). Although an unlikely occurrence, this would be a high impact as defined by the impact level criteria presented in this section.

Another 30-day run of the Ford model was made for the mean tanker spill size of 22,800 bbl, assuming shoreline contact along the mainland north of Point Conception (Draft EIS Appendix 5.5, 2001). The results indicate that such a spill would be a very serious threat to the otter population. It was estimated that a spill of this size would oil a mean stretch of 192 km (104 nm) of coastline, with a 95 percent probability of at least 26 km (14 nm) and a 5 percent probability of up to 922 km (498 nm) being contacted. The model calculated a 10 percent chance that 699 sea otters would be contacted and a 1 percent probability that up to 1,505 would be. The former number represents 25 percent of the current estimated sea otter population (2,825).

Military Activities. Military operations in the study area are expected to have temporary hearing and disturbance effects on marine mammals, primarily pinnipeds on land. It is unlikely that more than one or two individuals of either of the threatened pinniped species found in the study area, the Steller sea lion and Guadalupe fur seal, would ever be present in the vicinity of military operations. Thus, they are not expected to be affected by these activities. If deployed in study area waters, operation of the U.S. Navy's SURTASS LFA sonar system potentially could have noise-related impacts on marine mammals at sea. No information exists on the potential impacts of military operations on sea otters.

It is assumed that military activities in the study area will continue at or near the current levels during the period 2006 through 2030. Thus, the impacts to marine mammals associated with these activities would also be expected to continue. These include periodic disturbance and possible temporary hearing effects for pinnipeds hauled out along the VAFB shoreline and on the Channel Islands (particularly San Nicolas Island). Operation of the U.S. Navy's SURTASS LFA sonar system in study area waters potentially could have noise-related impacts on marine mammals.

Commercial Fisheries. Incidental take in commercial fishing operations currently is not a major source of mortality for threatened and endangered cetaceans and pinnipeds off California. Southern sea otter mortality in Monterey Bay gillnet fisheries has become a concern in recent years (Cameron and Forney, 2000; Forney et al., 2001, as cited in MMS, 2001). However, recent fishery closures in this area are likely to reduce this take significantly if made permanent. Based on data from 1990 to 1998, 16 or more Steller sea lions are taken each year, but most of these animals are taken intentionally in the British Columbia aquaculture predation control program (Ferraro et al., 2000, as cited in MMS, 2001). The estimated annual take of Stellers in the California-Oregon drift gillnet fishery is very low (1.2 animals).

There is no information on fisheries-related mortality for Guadalupe fur seals, although drift and gillnet fisheries exist along the length of Baja California, as well as in U.S. waters (Forney et al., 2000, as cited in MMS, 2001). Fur seals have stranded in central and northern California with net abrasions around the neck, fish hooks, and monofilament line (Hanni et al., 1997; Forney et al., 2000, as cited in MMS, 2001).

Large whales, particularly rorquals such as blue and fin whales, are reported to be capable of swimming through nets without entangling, although some mortality may go unobserved (Forney et al., 2000, as cited in MMS, 2001). Two sperm whales were observed taken in the drift gillnet fishery in 1996 and 1998. Based on 1994–1998 data, the mean annual fisheries take of sperm whales is 2.5 animals, which is above the calculated Potential Biological Removal (PBR) for this stock (Carretta et al., 2004). Some humpback whale mortality in gillnets may also be occurring — two strandings in the Southern California Bight have been attributed to entanglement (Heyning and Lewis, 1990, as cited in MMS, 2001), and incidents of entanglement (predominantly of calves) have been reported from waters off Hawaii and New England (Mazzuca et al., 1998; Weinrich, 1999, as cited in MMS, 2001). The mean annual fisheries take of humpbacks, based on the 1994–1998 data, is less than 0.2 animals. No fisheries take of blue, fin, sei, or northern right whales was reported for the period 1994–1998 (Ferraro et al., 2000; Forney et al., 2000, as cited in MMS, 2001).

Coastal set net fisheries have intensified within the southern sea otter range in recent years (FWS, 2000, as cited in MMS, 2001). Forney et al. (2001, as cited in MMS, 2001) estimated that set gillnets in Monterey Bay may have killed 17 to 125 sea otters during the 4-year period from 1995 to 1998, averaging about 4 to 26 sea otters per year. During 1999, one sea otter was observed taken with a 23 percent observer coverage of the halibut gillnet fishery, yielding a mortality estimate of 5 otters for that calendar year (Cameron and Forney, 2000, as cited in MMS, 2001). This recent incidental take is due to an increased use of set nets in southern Monterey Bay and an increased use of deeper waters in that area by sea otters (FWS, 1999). An emergency closure in waters less than 60 fathoms was implemented for this fishery north of Yankee Point in Monterey County on September 14, 2000, to protect sea otters and seabirds.

Other Anthropogenic Sources of Impacts. The incidence of marine mammal mortality, especially of larger whales, due to ship strikes would probably increase as overall vessel traffic off California increases. However, ship-strike mortality along the Pacific coast is not currently considered to be a significant problem for endangered cetaceans and is not likely to be in the foreseeable future.

Fin whales are the whale species most frequently struck by ships (Laist et al., 2001, as cited in MMS, 2001). Off the U.S. west coast, ship strikes accounted for single fin whale mortalities in 1991, 1996, and

1997; the average observed annual mortality for 1994–1998 was 0.4 animals (Forney et al., 2000, as cited in MMS, 2001). Ship strikes accounted for 2 humpback whale mortalities in 1993, 1 in 1995, and possibly 1 in 1997; the 1994–1998 average was at least 0.2 whales per year (Forney et al., 2000, as cited in MMS, 2001). No ship strikes of other endangered whale species were reported for the period 1994–1998 (Forney et al., 2000, as cited in MMS, 2001). Ship strikes are not a significant source of cetacean mortality in California waters.

Section 5.7.6 discusses the potential impacts of whale-watching activities on cetaceans. In the Santa Barbara Channel, whale-watching activities in the summer and early fall have focused on blue and humpback whales in recent years, and these trips appear to be growing in popularity. In 1999, eight operators conducted whale-watching trips from Channel harbors (NOAA, unpubl. data, as cited in MMS, 2001). It is assumed that whale watching will remain an important local industry in California waters during the period 2006 through 2030 and that activities will continue at or above current levels. Thus, the potential for impacts to cetaceans, including endangered species will also continue. However, recent recommendations for improving whale-watching regulations (Rugh et al., 1999, as cited in MMS, 2001) may help alleviate these problems.

Although a subsistence hunt for Steller sea lions does exist in Southeast Alaska, Stellers from the eastern U.S. stock compose a very small percentage of the total take (12 were recorded between 1992 and 1997; Ferraro et al., 2000, as cited in MMS, 2001). Subsistence hunters in Canada harvest an unknown number. The estimated annual mortality for the eastern U.S. stock from illegal shooting is 2.8 sea lions, but these are reported from Oregon, Washington, and Alaska (Ferraro et al., 2000, as cited in MMS, 2001). There is no information on other sources of human-related mortality for the Guadalupe fur seal.

Illegal shooting is apparently the major non-fisheries source of human-related mortality for sea otters. A review of sea otter mortality from 1968 to 1989 indicated that shooting accounted for 4.6 percent of the recorded deaths (FWS, 1999, as cited in MMS, 2001).

Potential health hazards presented by marine pollutants are potential impacts for marine mammals. The planktivorous diet of blue, right, and, to a lesser extent, sei whales apparently makes them less susceptible to the accumulation of organochlorine and metal contaminants than species such as fin or humpback whales, which seem to feed more regularly on fish (O'Shea and Brownell, 1995; Reeves et al., 1998a and b, as cited in MMS, 2001). Concentrations of organochlorine pesticides, PCBs, and heavy metals have been reported for humpback whale tissues from Atlantic and Caribbean waters (Taruski et al., 1975; NMFS, 1991a, as cited in MMS, 2001). Although there is no evidence that levels of these substances in any baleen whales are presently high enough to cause toxic or other effects, very little is known about the possible long-term effects of exposure to pollutants (O'Shea and Brownell, 1995; Reeves et al., 1998a and b, as cited in MMS, 2001).

Sydeman and Allen (1999, as cited in MMS, 2001) theorized that contaminants might be a contributing factor to the continued decrease of the Steller sea lion population on the Farallon Islands off San Francisco in recent years, possibly through reproductive effects. From 1973 to 1983, premature births accounted for 20 to 65 percent of pup mortality (Hastings and Sydeman, 1998, as cited in MMS, 2001). Although organochlorine and trace metal contaminants have decreased in central California Steller sea lion pups during the past decade, measured levels are still elevated (Jarman et al., 1996a, as cited in MMS, 2001). Currently, no information is available on the potential impacts of marine pollutants on Guadalupe fur seals.

Sea otters' high metabolic demands and consequent daily foraging rate make them vulnerable to contaminant loading (FWS, 1999, as cited in MMS, 2001). Among the trace metals, mercury is of particular concern. There are abundant geologic sources of mercury in the Coast Range and a long history of mining and associated groundwater contamination (FWS, 1999, as cited in MMS, 2001). Several watercourses in the sea otter range, including Elkhorn Slough and San Simeon Creek, have elevated mercury levels (FWS and NMFS, 1998, as cited in MMS, 2001). Livers of otter carcasses collected at Elkhorn Slough contained high levels of mercury — up to 60 mg/kg, compared to the 4 mg/kg considered "normal" for river otters (Wren, 1986, as cited in MMS, 2001). Acute mercury poisoning affects the central nervous system and is associated with sensory and behavioral symptoms. Currently, however, the level of sea otter exposure to mercury and the impacts on the population are unknown.

Although no specific research has been conducted on the effects of organochlorines on sea otters, terrestrial mustelids (*Mustela* spp.) have been shown to be very sensitive to effects (FWS, 1999, as cited in MMS, 2001). Risebrough (1989, as cited in MMS, 2001) measured PCB levels in sea otters that were higher than those known to cause reproductive failure in mink. Jarman et al. (1996b, as cited in MMS, 2001) suggested a connection between PCBs and the high rate of pre-weaning mortality in southern sea otters.

Current measured levels of DDT, DDE, and other organochlorine pesticides in sea otters do not seem to be toxicologically significant (FWS, 1999, as cited in MMS, 2001). However, Nakata et al. (1998, as cited in MMS, 2001) reported that southern sea otters that died from infectious disease and other causes, such as neoplasia, emaciation, and esophageal impaction, did contain elevated concentrations of PCBs and DDTs. Also, a recent review of contaminants in sea otters that compared animals from California, Southeast Alaska, and the Aleutians found comparatively high levels of DDT, DDE, and PCBs in southern sea otters (Bacon et al., 1999; FWS, 2000, as cited in MMS, 2001). Since higher PCB levels were found in otters from the Aleutians, where populations are healthy, the authors thought it unlikely that PCBs alone were having a detrimental effect on the southern sea otter population, although they felt the impacts of high levels of DDT and DDE were less clear.

The anti-fouling agent tributyltin and its degradation products (BTs) have been found in the tissues of dead otters (Kannan et al., 1998, as cited in MMS, 2001). Although their use was limited in the 1980's, BTs persist in the marine environment for several years and are found in areas frequented by large ships, such as Monterey Harbor. BTs are known to suppress the immune potential in mammals. Southern sea otters that died of disease were found to contain higher concentrations of BTs than those that died of trauma (Kannan et al., 1998, as cited in MMS, 2001).

The effects of pollutants on threatened and endangered marine mammals are not well understood, but there is evidence that they may affect reproduction or make individuals more susceptible to other mortality factors, such as disease. Although the levels of certain pollutants, such as DDT, are expected to drop, the overall contamination of the marine environment from industrial, agricultural, and municipal sources is likely to increase during the coming decades. The significance of these pollutant levels to threatened and endangered marine mammal populations in the study area is unknown, but concern over the potential effects, particularly to the southern sea otter, is growing.

Non-anthropogenic Sources of Impacts. Section 5.7.6 discusses the potential impacts of disease on wild marine mammal populations. Little is known of the role played by disease in the natural mortality of large cetaceans, such as the endangered baleen species and the sperm whale (NMFS, 1991a and b; Bonnell and Dailey, 1993; Reeves et al., 1998a and b, as cited in MMS, 2001).

Viral and bacterial diseases, such as the San Miguel sea lion virus and leptospirosis, are found in Steller sea lions (Dierauf, 1990; Sydeman and Allen, 1999, as cited in MMS, 2001). Sydeman and Allen (1999, as cited in MMS, 2001) reported that these diseases were found in debilitated animals at the Farallon Islands and hypothesized that these factors may be contributing to the continued decline of that population. Currently, no information is available on the potential impacts of diseases on Guadalupe fur seals.

The rate of infectious disease in the southern sea otter population may have been high throughout the century, although, except for parasites, the rate has not increased since 1992 (BRD, 1998; FWS, 1999, as cited in MMS, 2001). Thomas and Cole (1996, as cited in MMS, 2001) reported that the rate of infection in the southern sea otter was higher than expected in a wild population. This included infection, primarily of juveniles and pups, by larvae of the acanthocephalan parasite *Polymorphus* spp. Since otters apparently are not suitable hosts for the parasite, the larvae aberrantly migrate through the intestinal wall, which can lead to fatal cases of peritonitis or contribute to decreased resistance to disease.

Thomas and Cole (1996, as cited in MMS, 2001) also found fatal cases of protozoal encephalitis (caused by *Toxoplasma gondii*) and San Joaquin Valley fever (caused by the fungus *Coccidioides immitis*) in subadult and adult otters. Additional deaths were attributed to various bacterial infections (FWS, 1999, as cited in MMS, 2001).

Naturally occurring marine toxins are known to have killed marine mammals, including humpback whales (Geraci et al., 1989; Geraci and Lounsbury, 1993, as cited in MMS, 2001). Potential cumulative impacts to threatened and endangered marine mammals in the study area occur from a number of non-anthropogenic sources, including disease and marine toxins. Each of these phenomena may periodically have significant impacts on marine mammal populations, at least at the local level. However, the likelihood of their occurrence (and the levels of subsequent impacts on marine mammals) during the period 2006–2030 cannot be predicted. The relatively high rate of infectious disease in the southern sea otter population is of particular concern.

Incremental Impacts of Exploration and Development of Undeveloped Leases on Threatened and Endangered Marine Mammals

Development of the undeveloped leases under the hypothetical exploration and development scenario described earlier would involve a number of oil and gas activities in addition to those described earlier in this section. Exploratory and delineation drilling would occur on three undeveloped leases. Wells drilled from MODUs would be permanently plugged and abandoned.

Major impact agents expected from potential exploration and delineation drilling would be noise and disturbance, vessel traffic, and drilling discharges. These impacts would be short-term and would have an insignificant impact on marine mammals including threatened and endangered species. Well abandonment likely would involve the use of explosives. Implementation of a wildlife mitigation plan similar to those employed for platform removal in California State waters (Howorth 1997, as cited in MMS, 2001) and in the MMS Gulf of Mexico OCS Region (NTL 99-G21) would make it unlikely that injury or mortality to any threatened or endangered species of marine mammal would occur as a result of well abandonment operations.

Impacts on marine mammals, including threatened and endangered species, in the study area from these activities would be expected to be limited to temporary, localized disturbance. The other routine activities associated with development of the undeveloped leases, including drilling, production, and vessel and helicopter support traffic, would be expected to result in temporary (less than 1-hour), localized disturbances to threatened and endangered marine mammals, throughout the period 2006–2030. Once production begins, support traffic would be expected to remain at levels typical for ongoing offshore oil and gas activities in the Santa Maria Basin.

Decommissioning of the four platforms assumed to be built for development of the undeveloped leases would be expected to result in noise and disturbance to threatened and endangered marine mammals during the removal of platform structures and pipelines. The principal potential impacts would be similar to those expected to occur as the result of construction activities, i.e., short-term avoidance reactions at distances of two km (1 nm) or less from the operations. Implementation of mitigation similar to that employed for platform removal in the Gulf of Mexico would make it unlikely that any marine mammal injury or mortality would occur as a result of the use of explosives in decommissioning operations.

Volumes of platform effluents discharged in the course of developing the undeveloped leases would be expected to be equivalent to those estimated for existing Pacific OCS platforms. As discussed in previous sections, all platform effluents would be discharged under NPDES permit and would be required to meet NPDES water quality criteria. No measurable effects to threatened and endangered marine mammals in the study area would be expected from these discharge volumes.

If all undeveloped leases are developed, under the hypothetical development scenario the probability of one or more spills 200 bbl or less in size occurring is 98.8 percent (Section 5.3). The probability that one or more spills in the 2,000 bbl range would occur from these activities under the hypothetical development scenario is 53.9 percent.

Impacts to threatened and endangered marine mammals from any oil spills occurring as a result of the development of the undeveloped leases would be similar to those described above for the 200 and 2,000 bbl spills assumed to occur as a result of offshore oil and gas activities and for the assumed 22,800 bbl tanker spill.

As discussed above, R.G. Ford Consulting also conducted an analysis of the risk of oil spills to the southern sea otter from hypothetical development of the undeveloped leases during the period 2006 through 2030 (Draft EIS Appendix 5.5). The results, presented as worst-case percentiles, are shown in Draft EIS Appendix Table 5.5-3.

For the period 2006 through 2030, the model predicts that there is a 1 in 100 chance that 64 to 65 otters would be contacted by an oil spill resulting from hypothetical development of the undeveloped leases. Likewise, for this period the model predicts that there is only a 1 in 1,000 chance that 199 otters would be contacted, and an extremely slight (1 in 10,000) chance that as many as 383 otters would be contacted. Sixty-five otters represent about 2 percent of the current estimated southern sea otter population (2,825); 199 otters represent nearly 7 percent. Thus, the model analysis indicates that there is a relatively low probability of sea otter contacts occurring as a result of spill associated with existing Pacific OCS facilities during this period.

In summary, model runs for oil spills associated with hypothetical development of the undeveloped leases during the period 2006 through 2030 indicate that there is a 1 percent chance of contact to 64 to 65 sea otters within 10 days. If all contacts resulted in mortality (a conservative assumption), the impacts to the southern sea otter would be considered moderate as defined by the impact level criteria presented in Section 5.7.6.

Summary and Conclusion – Threatened and Endangered Marine Mammals

The North Pacific stocks of most of the great whales, including the blue, humpback, fin, sei, northern right, and sperm whale, were reduced to a fraction of their estimated pre-whaling abundance by commercial whaling (Forney et al., 2000, as cited in MMS, 2001). Currently, the eastern North Pacific populations of three endangered whale species, the blue, fin, and humpback whales, appear to be increasing. The status of the eastern North Pacific stocks of the remaining species is uncertain. Although sperm whale populations in the North Pacific as a whole are quite large, abundance off the U.S. west coast is variable (Forney et al., 2000, as cited in MMS, 2001). Sei whales are rare in California waters. The northern right whale population in the North Pacific is believed to be very small, consisting of no more than 100 to 200 animals. Although incidental take in commercial fisheries and ship strikes do occur, these and other identified anthropogenic and non-anthropogenic factors do not appear to have significant impacts on endangered cetacean populations in the study area.

The eastern U.S. stock of Steller sea lions is stable or increasing in the northern portion of the range (particularly in British Columbia), but continues to decline at the southern end in central California (Ferraro et al., 2000, as cited in MMS, 2001). The reasons for this decline are unknown, although possible factors may include reduced prey availability (due to ocean temperature changes), competition with other pinniped species, and the effects of contaminants and disease (Sydeman and Allen, 1999, as cited in MMS, 2001). The Guadalupe fur seal population, in contrast, is growing, although the species remains rare in study area waters.

The status of the southern sea otter population is also somewhat uncertain at present. Following a number of years of uninterrupted growth, the population apparently declined in the late 1990's, when the number of otters seen during the annual spring surveys decreased steadily over a four-year period. Numbers increased again in 2000, when nearly as many were counted as during the peak census in 1995. Major impacts to this population currently result from incidental take in commercial fisheries, shooting, and disease, with possible contribution from environmental contaminants.

The effects of noise and disturbance generated by the post-suspension activities under a hypothetical development scenario would not be expected to be significant themselves, but would add to the cumulative noise and disturbance levels that threatened and endangered marine mammals are exposed to in the Santa Barbara Channel and Santa Maria Basin. However, there is no evidence that the noise and disturbance created by offshore oil and gas activities in both Federal and State waters and by increasing vessel traffic (of which oil and gas support vessels are a small part) have resulted in adverse impacts on threatened and endangered marine mammal populations. By the impact level criteria adopted for this document, these impacts are considered to be low. The very minor effects in space and time that could occur as a result of the potential survey activities are not expected to add measurably to cumulative impacts to threatened and endangered marine mammals in the area.

No oil spills would be expected to result from post-suspension activities under a hypothetical development scenario. However, accidental oil spills do present an ongoing source of potential impacts to marine mammals. The cumulative risk of oil spills arises from multiple sources, including offshore oil and gas activities in Federal and State waters and both Alaskan and foreign-import tankering. The greatest oil spill risk to marine mammals in the study area results from tankering operations. This risk is tempered by recently implemented or proposed mitigation (such as the rerouting of tankers farther offshore along the central California coast) and by modern oil spill response capabilities.

Oil spills associated with ongoing and projected production from existing Pacific OCS facilities in the study area would be expected to result in no more than low impacts to the southern sea otter during this period. Non-OCS tankers represent the greatest oil spill risk to sea otters.

Major impact agents associated with routine past, present, and foreseeable offshore oil and gas activities include noise and disturbance, drilling discharges, and the potential use of explosives in the decommissioning of offshore facilities. Other, non-OCS sources of impacts to threatened and endangered marine mammals, both anthropogenic and non-anthropogenic, are also important.

While the eastern North Pacific stocks of some endangered whale species, including blue, fin, and humpback whales, appear to be increasing, it is impossible to predict what progress these populations may make toward recovery over the next quarter of a century. Given current trends, the Guadalupe fur seal population is also likely to continue to grow. The future status of other threatened and endangered marine mammals in the region is even less certain. With their tiny population, northern right whales are the North Pacific species most at risk of extinction. Southern sea otters have undergone recent fluctuations in numbers and have suffered impacts from incidental take in commercial fisheries. Impacts from other anthropogenic sources, such as ship strikes and marine pollutants, may increase as the human population and related activities continue to grow in the region.

Some routine offshore oil and gas activities, including construction and drilling, would likely be heaviest during the period 2007–2013; under the hypothetical development scenario, much of this activity would be related to the development of the undeveloped leases. Construction activities would occur in the Santa Maria Basin and, to a lesser extent, the western Santa Barbara Channel. Decommissioning of existing offshore oil and gas facilities would begin in the eastern Channel about 2012 and shift westward over a period of years. Thus, there would be periods of noise and disturbance-producing activities occurring in different parts of the study area at various times. Throughout these periods, routine activities such as production and vessel and helicopter support traffic would continue.

Overall, the potential impacts to threatened and endangered marine mammals in the study area from routine offshore oil and gas activities resulting from development of the undeveloped leases, primarily noise and disturbance, would increase over present levels. However, the areas covered by these activities would be small relative to the available marine mammal habitat, and the periods of disturbance would be localized. Cumulative impacts to threatened and endangered marine mammals from all the routine oil and gas activities assumed to take place between 2006 and 2030, including those associated with the development of the undeveloped leases, would be expected to be low.

Based on the oil spill probabilities with and without development of the undeveloped leases discussed in Section 5.3, the potential for an oil spill occurring from development of the undeveloped leases represents a measurable incremental increase to the overall cumulative oil spill risk for threatened and endangered marine mammals. Expected impacts to threatened and endangered cetaceans and pinnipeds remain negligible to low depending on the species. Oil spills would be expected to result in low to moderate impacts to the southern sea otter during this period. Non-OCS tankers remain by far the greatest source of oil spill risk to sea otters.

Assuming development under the hypothetical development scenario, a summary of impacts on marine mammals by undeveloped Unit and Lease OCS-P 0409 is presented in Table 5.7-8.

Table 5.7-8 Comparison of Impacts to Threatened and Endangered Marine Mammals by Undeveloped Unit/Lease and Exploration/Development Phase

Unit/Lease	Exploration and Delineation Drilling	Development and Production	Decommissioning
Cavern Point	Low (noise and disturbance)	Low (noise and disturbance) Low (vessel collision) Moderate (oil spill)	None
Gato Canyon	Low- (noise and disturbance) Low- vessel collision	Low (noise and disturbance) Low (vessel collision) Moderate (oil spill)	Low (noise and disturbance, explosives)
Rocky Point	Low (noise and disturbance)	Low (noise and disturbance) Low (vessel collision) Moderate (oil spill)	None
Sword	Low (noise and disturbance)	Low (noise and disturbance) Low (vessel collision) Moderate (oil spill)	None
Bonito	Low (noise and disturbance)	Low (noise and disturbance) Low (vessel collision) Moderate (oil spill)	None
Santa Maria	None	Low (noise and disturbance) Low (vessel collision) Moderate (oil spill)	Low (noise and disturbance, explosives)
Purisima Point	Low (noise and disturbance) Low (vessel collision)	Low (noise and disturbance) Low (vessel collision) Moderate (oil spill)	None

Unit/Lease	Exploration and Delineation Drilling	Development and Production	Decommissioning
Point Sal	Low (noise and disturbance) Low (vessel collision)	Low (noise and disturbance) Low (vessel collision) Moderate (oil spill)	Low (noise and disturbance, explosives)
Lion Rock	None	Low (noise and disturbance) Low (vessel collision) Moderate (oil spill)	None
Lease OCS-P 0409	None	Low (noise and disturbance) Low (vessel collision) Moderate (oil spill)	Low (noise and disturbance, explosives)

5.7.7.3 Threatened and Endangered Birds

Significance Criteria

The following impact level definitions for threatened and endangered birds were used for this analysis:

- **High.** Impacts are expected to include direct mortality, reduced survivorship, declines in reproductive success, shifts in distribution, and possibly, changes in species diversity. Mortality is expected to involve thousands of birds, with many more experiencing sublethal effects. This would be expected to result in measurable changes in distribution and abundance in the study area. Effects are expected to continue for more than 2 years.
- **Moderate.** Impacts are expected to include direct mortality, reduced survivorship, declines in reproductive success, and shifts in distribution. Mortality is expected to involve hundreds of birds from the study area, with many more experiencing sublethal effects. This would be expected to result in measurable changes in distribution and abundance in the study area. Effects are expected to continue for 1 to 2 years.
- **Low.** Impacts result in biologically important (e.g., a change in abundance, species diversity, reproductive success, growth rates, and/or survival) change(s) in a few local populations (e.g., a colony or beach), mainly due to high levels of disturbance. In this analysis, minor changes in behavior (e.g., a bird moving out of the path of an approaching boat) are not considered biologically important and are not indicative of an impact. Mortality, if any, would be limited to the loss of 10's of birds, with many more experiencing sublethal effects. Effects are expected to continue for no more than one year.

High and moderate impacts are considered to be significant, while low impacts are insignificant.

Impacts of Post-Suspension Activities

Cumulative Impacts without Activities on the Undeveloped Leases on Threatened and Endangered Birds

For the period 2006 through 2030, this analysis considers the cumulative impacts to threatened and endangered birds from: (1) existing and future Federal and State offshore oil activity; (2) crude oil imports by tanker; and (3) other anthropogenic (military activities, recreation, commercial fishing) and non-anthropogenic (e.g., El Niño events) impact sources.

Cumulative impacts related to offshore oil and gas activities that may have measurable, long-term (e.g., months) effects on threatened and endangered birds are oil spills, disturbance from helicopter flights, and platform decommissioning. These impacts have occurred (in the case of past and present operations and past oil spills), or may occur (in the case of proposed projects and potential oil spills) from existing Federal and State projects and proposed State projects (e.g., Tranquillon Ridge) whether or not the undeveloped leases are developed. Pipeline construction could also have an impact if it were to involve nesting or wintering areas. However, no new pipeline landfalls are planned for existing Federal and State projects or for proposed State projects (e.g., Tranquillon Ridge). Other activities associated with oil and gas development, including, platform operation, discharges, and vessel traffic, have, at most, very short-term (e.g., a few hours or days), biologically unimportant (e.g., movement out of the path of an approaching vessel) effects on threatened and endangered birds and do not contribute to cumulative impacts.

Accidental Oil Spills. Historically, birds in the study area have been affected by Pacific OCS-related oil spills (see Section 5.3). Based on the discussion of oil spill risks in Section 5.3, the most likely scenario for existing Federal and State offshore oil production and projects proposed by the State is that one or more oil spills in the 50 to 1,000 bbl range would occur from offshore oil and gas activities over the period 2006 through 2030, and that such a spill would most likely be 200 bbl or less in volume. The maximum reasonably foreseeable oil spill volume from future offshore oil and gas activities is 2,000 bbl, assumed for purposes of analysis to be a pipeline spill.

Spilled oil may affect birds in several ways: (1) direct contact with floating or beached oil; (2) toxic reactions; (3) damage to bird habitat; and (4) damage to food organisms. Oil-related mortality is highly dependent on the life histories of the bird species involved. Birds that spend much of their time feeding or resting on the surface of the water are more vulnerable to oil spills (King and Sanger, 1979, as cited in MMS, 2001). See Section 5.7.5, for a discussion of the potential effects of oil spills and cleanup efforts on birds.

The level of impact on birds from an oil spill depends on a variety of factors, including the type, rate, and volume of oil spilled and the weather and oceanographic conditions at the time of the spill. These parameters would determine the quantity of oil that is dispersed into the water column; the degree of weathering, evaporation, and dispersion of the oil before it contacts a shoreline; the actual amount, concentration, and composition of the oil at the time of shoreline or habitat contact; and a measure of the toxicity of the oil. Vulnerability to oil spills also varies from species to species based on abundance, distribution, seasonal occurrence, and habitat.

Although there is not a high degree of correlation between the size of a spill and the number of birds affected, a 200 bbl spill would generally have far less impact than one of several thousand barrels. However, a spill in the range of 200 bbl has the potential for affecting a few of the threatened and endangered species that occur in the study area (e.g., the 163 bbl Torch pipeline spill off Vandenberg AFB contacted California brown pelicans and western snowy plovers). Because of weathering, dispersion, and cleanup efforts, the effects of a 200 bbl spill would most likely be limited to the general vicinity of the source of the spill. If the spill remains offshore and does not contact the mainland or islands, the only threatened and endangered species that could probably be affected is the California brown pelican. If contact with the shore occurs, California least terns, western snowy plovers, and light-footed clapper rails could also be affected. A 200 bbl spill is not expected to reach Santa Catalina Island, and bald eagles would, therefore, not be affected. It is estimated that a 200 bbl spill could contact from about 1 km (95 percent probability) to 19 km (5 percent probability) of coastline (see Section 5.3). Because of the actions of weathering, dispersion, and cleanup efforts, a spill of this size is only likely to contact shore in close proximity to a platform or pipeline. Brown pelicans occur throughout the study area and are especially widespread during the late summer and fall; therefore, at least a few pelicans would probably be oiled regardless of the location of the spill. The greatest threat to pelicans would be from a spill from one of the platforms (Grace, Gilda, Gail, or Gina) or associated pipelines at the eastern end of the Santa Barbara Channel. A 200 bbl spill from this area could contact Anacapa Island, which is the location of the largest pelican colony along the Pacific coast. A spill in close proximity to, or contacting, this island during the breeding season could result in the loss of adult birds and disrupt nesting activities; cleanup efforts could exacerbate the impact of a spill on nesting pelicans, which are especially sensitive to disturbance.

California least tern colonies in proximity to offshore oil operations are located at Vandenberg Air Force Base, the Santa Clara River mouth, Ormond Beach, and Point Mugu. The number of pairs at most of these locations is generally low (less than 50) except for Point Mugu, which had between 448 and 483 pairs in 2003 (Keane, pers. comm., 2004b). If a 200 bbl spill were to occur and contact one of these tern colonies during the breeding season, some loss of nesting birds and disruption of nesting activities would be expected; cleanup efforts could exacerbate the impact of a spill on nesting terns, which are especially sensitive to disturbance. Based on weathering, dispersion, cleanup efforts, and the distance between tern colonies, probably no more than one colony would be affected.

Light-footed clapper rails in the study area are restricted to two coastal salt marshes, Carpinteria and Mugu Lagoon, both of which are close enough to existing and proposed offshore oil developments to be contacted by a 200 bbl oil spill. The number of rails in these areas is not great, with no more than 10 to 15 birds at either location. However, the number of rails in California is also very small (less than 500), and even the small number of birds in the study area are quite important. Based on weathering, dispersion, cleanup efforts and the distance between Carpinteria and Mugu Lagoon (about 11 miles or 18 km), only one of these areas could be contacted by a 200 bbl spill. Also, to have an effect on rails, oil would have to both contact the shore and enter one of the marshes, the latter of which can be prevented in some cases.

Critical nesting habitat for the western snowy plover in the study area in proximity to existing or proposed offshore oil developments is located at VAFB and Devereaux Beach in Santa Barbara County and the Santa Clara River mouth, Ormond Beach, and Mugu Lagoon in Ventura County. If a 200 bbl spill were to occur and contact one of these areas during the breeding season, some loss of nesting birds and disruption of nesting activities would be expected; cleanup efforts could exacerbate the impact of a spill on nesting plovers, which are especially sensitive to disturbance. Based on weathering, dispersion, cleanup efforts, and the distance between nesting beaches, probably no more than one area would be affected.

By its very size, the impact of a 2,000 bbl spill on threatened and endangered birds would likely be much greater than that of a 200 bbl spill, depending on the timing, location, and movements of each spill. A 2,000 bbl spill would affect a much larger area than a 200 bbl spill, and could, therefore, contact a larger number of birds. It is estimated that a 2,000 bbl spill could contact from about 3 km (95 percent probability) to 53 km (5 percent probability) of coastline. A 2,000 bbl spill could originate from a greater number of locations and still contact Anacapa Island. A 2,000 bbl spill could also contact more than one tern colony, rail marsh, or plover nesting beach. Some oil could also reach Santa Catalina Island and possibly affect the small population of bald eagles that have been reintroduced there. The cleanup process for such a spill would be much more complex and protracted, with potentially greater impacts to threatened and endangered birds.

Overall, the impacts to threatened and endangered birds of potential oil spills from existing Federal, State, and State-proposed oil and gas operations are expected to range from low (if Anacapa Island is not contacted and only one tern colony or plover nesting beach is affected) to moderate (if Anacapa Island is contacted or more than one colony or nesting beach is contacted, or a rail marsh is contacted, or a large amount of oil reaches Santa Catalina Island).

Helicopter Traffic. Another potential source of impacts from offshore oil operations is helicopters. The level of helicopter traffic related to offshore oil and gas activities in the study area is described in Section 4.1. Routinely, eight to 10 helicopter trips occur offshore each day, including those contracted by MMS. Helicopter flights related to offshore oil may originate from three locations depending on the purpose and destination of the flights: the Camarillo Airport in Ventura County, and the Santa Barbara and Santa Maria Airports in Santa Barbara County. See Section 5.7.5, for a discussion of the potential effects of helicopters on birds. Birds are probably the most sensitive to disturbance from helicopter flights during the breeding season. No helicopter fights cross over Anacapa Island or any of the other Channel Islands, and nesting pelicans are, therefore, not affected. Flights from the Camarillo Airport cross the coast at three to four locations along the Ventura County coastline (R. Howell, pers. comm., as cited in MMS 2001), all of which are at least 3 km from either a least tern colony or snowy plover nesting beach. Rails in Ventura County are restricted to Mugu Lagoon, which is located entirely within the Naval Air Warfare Center Weapons (NAWCWPNS) Division Point Mugu, where non-military helicopters flights are not allowed. Flights from the Santa Barbara Airport cross the coast at one location (T. Marr, Petroleum Helicopters, Inc., pers. comm., as cited in MMS, 2001), which is about 5 km from the nearest snowy plover beach (least terns and light-footed clapper rails do not nest in this part of Santa Barbara County). The flight path across the shoreline for helicopters from the Santa Maria Airport does not cross any seabird nesting areas. Based on the fact that flights over nesting areas would either not occur or would be at an altitude of 1,000 feet or more, no impacts to threatened and endangered birds from helicopter flights resulting from existing Federal offshore oil operations are expected.

Platform Decommissioning. Section 5.7.5 discusses the process of exploratory and delineation well abandonment and the possibility of impacts to marine birds. Section 5.2 describes the processes involved in decommissioning offshore facilities. For purposes of this discussion, it is assumed that decommissioning would encompass the complete removal of a platform and associated pipelines. Platform removal would only have an effect on birds if explosives are used in the process. To date, only one facility in the Pacific OCS has been decommissioned (by nonexplosive means) — the OS&T vessel that formerly served the Santa Ynez Unit platforms in the Santa Barbara Channel. In addition, six offshore platforms in State waters in the Channel have been removed with the use of explosives — two in 1988 and four in 1996.

Other Pacific OCS platforms may be removed during the period 2006 through 2030. Table 4.1-6 presents estimated removal dates for existing oil and gas structures offshore southern California. It is expected that no Pacific OCS platforms in the Santa Barbara Channel or Santa Maria Basin would be removed before 2012, and a few may be in place as late as 2025 (or 2035, in the case of Platform Irene if the Tranquillon Ridge development occurs). Although no impacts to brown pelicans have been reported to result from platform removal, under certain circumstances it is possible that pelicans could be injured or killed as a result of explosives used for platform removal. Pelicans capture submerged fish near the surface by plunge diving. Although pelicans remain submerged or partially submerged for only an instant while feeding, a few could be injured or killed with platform decommissioning if they were underwater in the vicinity of the platform when explosives were detonated.

Impacts From Non-Offshore Oil Sources. Based on the discussion of oil spill risks in Section 5.3, the mean size for an oil spill from a tanker accident is assumed to be 22,800 bbl. By its very size, a 22,800 bbl spill could have far greater impacts to threatened and endangered birds than those from offshore oil operations discussed above depending on the location, timing, and movement of the spills. It is estimated that a 22,800 bbl spill could contact from about 9 km (95 percent probability) to 160 km (5 percent probability) of coastline. However, the possibility of contact with the shore is ameliorated somewhat by the fact that oil tankers voluntarily maintain a distance of 90 km (50 nm) from the mainland for much of their route. The cleanup process for a spill of this size would be much more difficult and protracted compared to that for the smaller spills discussed above, especially if a significant proportion of the oil reaches shore. Overall, the impact of a 22,800 bbl tanker spill on threatened and endangered birds is expected to range from low to high, depending on the timing, location, and movement of the spill.

Other factors that have historically contributed to cumulative impacts on threatened and endangered birds in the study area include pollution (e.g., DDT), habitat loss (e.g., conversion of wetland to marinas), predation (especially for least terns and light-footed clapper rails), and other forms of disturbance (e.g., beach use). Overall, the cumulative impacts of these factors on threatened and endangered birds in the study area range from low to moderate, depending on the species.

Incremental Impacts of Exploration and Development of the Undeveloped Leases on Threatened and Endangered Birds

The potential scenario for the exploration and development of the currently undeveloped leases is described in Section 5.2. Of the activities and possible accidental events during development of the undeveloped leases under the hypothetical development scenario, only oil spills, disturbance from helicopter flights, abandonment of exploratory wells and platform decommissioning may have measurable, long-term (e.g., months) effects on threatened and endangered birds. Pipeline construction could also have an impact if it were to involve nesting or wintering areas. However, the assumed locations of pipeline landfalls that may occur as a result of development of the undeveloped leases do not coincide with nesting or wintering areas for threatened and endangered birds. Other activities associated with oil and gas development, including exploration activities, platform installation, discharges, and vessel traffic, have, at most, very short-term (e.g., a few days), biologically unimportant (e.g., movement out of the path of an approaching vessel) effects on threatened and endangered birds and would not contribute to cumulative impacts.

The oil spill risk analysis provided in Section 5.3 indicates a greater likelihood of both a 200 bbl and a 2,000 bbl oil spill occurring with the development of the undeveloped leases. However, a greater potential for an oil spill to occur does not necessarily indicate a higher level of impact, and the impacts of oil spills to threatened and endangered birds that may occur as a result of offshore oil development, including the undeveloped leases, remains low to moderate as described above for existing Federal and State projects and proposed State projects.

Helicopter traffic is expected to increase as a result of the development of the undeveloped leases, especially during construction. However, no change is expected in either the airports used for these flights, the flight paths to and from the various airports, and the flight restrictions currently in place (e.g., VAFB, Channel Islands National Marine Sanctuary). Therefore, helicopter flights associated with the hypothetical development scenario for the undeveloped leases would not be expected to contribute to cumulative impacts on threatened and endangered birds in the study area.

Abandonment of delineation wells drilled from a MODU on the undeveloped leases would have a potential to impact the California brown pelican. Each of the delineation wells would be permanently plugged and abandoned. As part of the abandonment process, the casings for these wells may be cut either mechanically or with explosives. Although no injuries to pelicans from well abandonment with explosives have been reported, pelicans, cormorants, gulls, and phalaropes have been killed or injured due to other sources of underwater explosions (Fitch and Young, 1948, as cited in MMS, 2001). To be killed or injured during well abandonment with explosives, a pelican would have to be submerged at the exact moment of the explosion and in relatively close proximity to the well (e.g., directly under the MODU). Pelicans capture submerged fish near the surface by plunge diving; pelicans remain submerged or partially submerged for only an instant during this process. Also, explosive charges would be set off 5 meters (15 feet) below the sea floor, which would tend to dampen the effect of the blast. Therefore, it is highly unlikely that pelicans would be at risk of injury or death from this process.

Summary and Conclusion – Threatened and Endangered Birds

The cumulative impacts to threatened and endangered birds in the study area from all sources for the period 2006 through 2030, including any activities and accidental events that may be associated with the development of the undeveloped leases, range from moderate to high, depending on the species involved and the timing, location and movement of the assumed 22,800 bbl tanker spill.

A summary of impacts on threatened and endangered marine and coastal birds is provided in Table 5.7-9, below.

Table 5.7-9. Comparison of Impacts to Threatened and Endangered Birds by Undeveloped Unit/Lease and Exploration/Development Phase

Unit/Lease	Exploration and Delineation Drilling	Development and Production	Decommissioning
Cavern Point	None	Low (disturbance) Low to moderate (oil spill)	None
Gato Canyon	Low (disturbance)	Low (disturbance) Low to moderate (oil spill)	Low (explosives, disturbance)
Rocky Point	None	Low (disturbance Low to moderate (oil spill)	None
Sword	None	Low (disturbance Low to moderate (oil spill)	None
Bonito	None	Low (disturbance Low to moderate (oil spill)	None
Santa Maria	None	Low (disturbance Low to moderate (oil spill)	Low (explosives, disturbance)
Purisima Point	Low (disturbance)	Low (disturbance Low to moderate (oil spill)	None
Point Sal	Low (disturbance)	Low (disturbance) Low to moderate (oil spill)	Low (explosives, disturbance)
Lion Rock	None	Low (disturbance) Low to moderate (oil spill)	None
Lease OCS-P 0409	None	Low (disturbance) Low to moderate (oil spill)	Low (explosives, disturbance)

5.7.7.4 Threatened and Endangered Sea Turtles

Significance Criteria

The impact significance criteria for sea turtles are the same as those listed for threatened and endangered marine mammals (see Section 5.7.7.2).

Impacts of Post-Suspension Activities

This analysis is focused on the following species: leatherback sea turtle; green sea turtle; Pacific Ridley sea turtle, and loggerhead sea turtle.

Cumulative Impacts without Activities on the Undeveloped Leases on Threatened and Endangered Sea Turtles

This section examines the cumulative impacts to threatened and endangered sea turtles without the development of the undeveloped leases in the period 2006 to 2030. The projects discussed in this section include past, present, and foreseeable actions that may produce impacts during the period 2006 through 2030, the period during which development of the undeveloped leases would likely occur (Appendix I).

Oil and Gas Activities. Routine offshore oil and gas activities may result in cumulative impacts to sea turtles. These include drilling and production activities with associated support activities, and the abandonment, or decommissioning, of wells and offshore facilities. The major impact agents expected from these proposed activities are noise and disturbance. There is also the chance that a sea turtle could be killed or injured by a vessel associated with oil and gas development. NOAA Fisheries has determined that collisions with OCS support/service vessels could injure or kill protected species including sea turtles in the Gulf of Mexico OCS while engaged in supporting oil and gas activities and in response MMS has updated guidelines to minimize the risk of vessel strikes (Schoennagel, 2003). In addition there is the risk of an oil spill from ongoing and future offshore oil activities. The potential use of explosives in the abandonment of offshore platforms also raises the possibility of lethal impacts to sea turtles.

Noise and Disturbance. In general, the routine activities associated with offshore activities in the study area are expected to have little effect on sea turtle populations over the period 2006 through 2030. There is the potential of death or injury to a sea turtle from explosives that may be used during platform decommissioning. Underwater explosions can cause injury or death to sea turtles at close range. Since 1986, three sea turtles, all loggerheads, are known to have been injured during the use of explosives for platform removal in the Gulf of Mexico (Twachtman, Snyder & Byrd, 2000, as cited in MMS, 2001). One turtle was killed; the other two were rehabilitated and released.

Young (1991, as cited in MMS, 2001) calculated safe distances for several marine animals from underwater explosions of various sizes. These calculations were for open-water blasts and did not take into account the dampening effects of the type of subterranean blasting used for platform removal. For an approximately 23 kg (50 lbs) charge, the estimated safety distance for sea turtles was 640 meters (2,100 feet).

Sea turtles are unlikely to be present in the general vicinity of the detonation area during platform decommissioning operations, and impacts from this source are expected to be negligible. The potential for impacts to sea turtles could be reduced even further through implementation of a wildlife mitigation plan designed to minimize impacts on marine mammals and other marine animals (see discussion in Section 5.7.6). Implementation of mitigation similar to that employed for platform removal in the Gulf of Mexico would make it unlikely that any sea turtle injury or mortality would occur as a result of the use of explosives in decommissioning operations. In addition to these effects, decommissioning activities would result in noise and disturbance to sea turtles during the removal of platform structures and pipelines.

Effluent Discharges. Section 4.1 describes the treatment and discharge of platform effluents in the Pacific OCS. Given the low densities of sea turtles in the study area, impacts are expected to be negligible.

Oil Spills. Section 5.3 discusses the cumulative oil spill risk for the study area, which results from several sources: ongoing and projected oil and gas production from existing Pacific OCS facilities in the Santa Barbara Channel and Santa Maria Basin, several proposed development projects on the Pacific OCS, ongoing production from one facility in State waters in the Santa Barbara Channel, two likely oil and gas projects in State waters, and the tankering of Alaskan and foreign-import oil through area waters. The most likely oil spill scenario is that one or more oil spills in the 50 to 1,000 bbl range, and that such a spill would be 200 bbl or less in volume. The maximum reasonably foreseeable oil spill volume from offshore oil and gas activities is 2,000 bbl, assumed for purposes of analysis to be a pipeline spill. Based on data from tanker spills in U.S. waters, the mean size for a tanker spill is assumed to be 22,800 bbl. Impacts to sea turtles from any oil spills occurring during this period would be similar to those for the 200 and 2,000 bbl spills assumed to occur as a result of offshore oil and gas activities and for the assumed 22,800 bbl tanker spill.

If a sea turtle comes into direct contact with oil, a number of physiological effects may occur (Lutz, 1985; MMS, 1996, as cited in MMS, 2001). Oil spills can adversely affect sea turtles by toxic external contact, toxic ingestion or blockage of the digestive tract, disruption of salt gland function, asphyxiation, and displacement from preferred habitats (Lutz and Lutcavage, 1989; Vargo et al., 1986, as cited in MMS, 2001). Sea turtles are known to ingest oil (Gramanetz, 1988, as cited in MMS, 2001); this may occur during feeding (tar balls may be confused with food) or while attempting to clean oil from flippers. Oil ingestion frequently results in blockage of the respiratory system or digestive tract (Vargo et al., 1986, as cited in MMS, 2001). Some fractions of ingested oil may also be retained in the animal's tissues, as was detected in turtles collected after the *Ixtoc* spill in the Gulf of Mexico (Hall et al., 1983, as cited in MMS, 2001). Sea turtles also might be harmed by breathing toxic fumes from floating oil.

It is unclear whether adult sea turtles actively avoid spilled oil (MMS, 1996, as cited in MMS, 2001). In some instances, turtles have appeared to avoid oil by increasing dive times and swimming away (Maxwell, 1979; Vargo et al., 1986, as cited in MMS, 2001). Other observers have suggested that sea turtles actually may be attracted to some of the components found in crude oil (Kleerekoper and Bennett, 1976, as cited in MMS, 2001).

The low densities of sea turtles in the study area make it unlikely that any turtle would come in contact with an oil spill of 200 to 2,000 bbl. A 22,800 bbl tanker spill would have a greater probability of contacting sea turtles at sea, but no more than one or two animals would likely be affected. Impacts on sea turtle populations would be expected to be negligible.

Military Activities. Military operations that may have offshore impacts in the study area include those conducted from NAS Point Mugu and VAFB, and the U.S. Navy's proposed deployment of the SURTASS LFA sonar system. A recent Draft EIS (U.S. Navy, 2000, as cited in MMS, 2001) analyzes the potential impacts of ongoing and proposed military activities in the U.S. Navy's Point Mugu Sea Range, which occupies a broad expanse of offshore waters in the Southern California Bight and Santa Maria Basin. Navy activities in the Sea Range include vessel, aircraft, and missile operations. The Draft EIS concludes that, given their low densities in the study area, the probability of interaction between Naval activities and sea turtles would be very low and any impacts would be less than significant. The same would likely be true of the U.S. Air Force's missile operations from VAFB. In its Final EIS for the SURTASS LFA sonar system (U.S. Navy, 2001, as cited in MMS, 2001), the U.S. Navy concludes that, given proposed mitigation and the small number of systems to be deployed worldwide, LFA operations would be unlikely to result in significant impacts to sea turtle populations at sea.

Commercial Fisheries. All four species of sea turtles are taken incidentally in commercial fisheries in both pelagic and coastal areas in the North Pacific (NMFS and FWS, 1998a-d, as cited in MMS, 2001). Leatherback sea turtles are caught in gillnets off Washington, Oregon, and California (Stick and Hreha, 1989, as cited in MMS, 2001) and have long been taken in longlines and drift nets in the central North Pacific (NMFS, 1995; NMFS and FWS, 1998a, as cited in MMS, 2001). There is concern that the increasing numbers of Asian longline tuna vessels operating in the Pacific may have devastating cumulative impacts on this species (NMFS and FWS, 1998a, as cited in MMS, 2001).

Green, Pacific ridley, and loggerhead sea turtles are also taken in several commercial and recreational fisheries, including shrimp bottom trawls in the Gulf of California, gillnets, traps, and haul and beach seines (NMFS and FWS, 1998b-d, as cited in MMS, 2001). In other parts of the Pacific, trawls, purse seines, hook and line, longlines, and driftnets all take an unknown number of these species (NMFS and FWS, 1998b-d, as cited in MMS, 2001). Although largely undocumented, take by shrimp trawlers is probably a major mortality factor for green turtles in Mexico (Groombridge, 1982, as cited in MMS, 2001); similar take also occurs off Central America (NMFS and FWS, 1998b, as cited in MMS, 2001). Loggerhead sea turtles apparently are one of the most commonly caught sea turtles in the pelagic squid driftnet fishery (Gjernes et al., 1990; NMFS and FWS, 1998d, as cited in MMS, 2001). Many of the fisheries involved operate outside of U.S. jurisdiction, but efforts have begun to monitor, and potentially reduce, the incidental take of sea turtles in the Hawaiian longline fishery (NMFS, 1999, as cited in MMS, 2001).

Other Anthropogenic Sources of Impacts. Potential cumulative impacts to sea turtles from other human-related activities could occur. On the species' nesting beaches these include the direct take of adults and eggs, coastal construction and other beach activities, and artificial lighting. At sea, they include the direct take of sea turtles, the entanglement or ingestion of debris, and marine pollutants.

Sea turtle populations have been greatly reduced by over-harvesting and, to a lesser extent, coastal development of nesting beaches in developed countries (Ross, 1982, as cited in MMS, 2001). In the Pacific, all four species continue to be subject to a number of human-related threats on their nesting grounds, including the direct take of adults and eggs, coastal construction and other beach activities, and artificial lighting (NMFS and FWS, 1998a-d; NMFS, 1999, as cited in MMS, 2001). These factors can result in direct mortality, disturbance, and loss of habitat.

Although there is no known directed take of sea turtles in U.S. waters, the harvest of sea turtles at sea in other areas is considered a widespread threat to these species that could accelerate the extinction of local and regional stocks (NMFS and FWS, 1998a-d, as cited in MMS, 2001). It is known that leatherbacks are occasionally taken off coasts of Mexico, Peru, and Chile (NMFS and FWS, 1998a, as cited in MMS, 2001) and that green sea turtles are taken illegally in Mexican waters (NMFS and FWS, 1998b, as cited in MMS, 2001).

Collisions with boats (including jetskis) are a potential threat to sea turtles, particularly in heavily populated, nearshore waters (NMFS and FWS, 1998ad; NMFS, 1999, as cited in MMS, 2001). McDonald and Dutton (1992, as cited in MMS, 2001) reported that boat collisions were implicated in 80 percent of green sea turtle deaths recorded in San Diego and Mission Bays.

Entanglement in or ingestion of marine debris is a serious problem for sea turtles in the eastern Pacific (NMFS and FWS, 1998a-d, as cited in MMS, 2001). Sea turtles entangle in abandoned fishing gear, lines, ropes, and nets and, as a consequence, may be unable to submerge to feed or surface to breathe. Apparently mistaking them for prey, leatherbacks, greens, and the other sea turtles commonly ingest debris such as plastic bags, plastic sheets, balloons, latex products, styrofoam, six-pack rings, tarballs, and other refuse. The resulting mortalities may be due to poisoning or obstruction of the esophagus.

Construction activities such as marina and dock development projects and dredging have direct impacts on coastal green, Pacific ridley, and loggerhead sea turtle habitat in Baja and southern California (NMFS and FWS, 1998b-d, as cited in MMS, 2001). In San Diego Bay, green sea turtles may be directly killed by dredging machinery (Stinson, 1984; McDonald and Dutton, 1992, as cited in MMS, 2001). The indirect effects of these activities result from increased levels of ship traffic, pollution, and general activity.

The impacts of environmental contaminants on sea turtles are unknown, although contamination of coastal waters where species such as green and loggerhead sea turtles are likely to be found is widespread (NMFS and FWS, 1998b-d, as cited in MMS, 2001). San Diego Bay, the only identified foraging area for green sea turtles in the western U.S. (Stinson, 1984; Dutton and McDonald, 1990a and b, as cited in MMS, 2001), is heavily polluted with heavy metals and PCBs (NMFS and FWS, 1998b, as cited in MMS, 2001). PCBs are known to cause lesions and mortality in fish and invertebrates, and small lesions have been observed in green sea turtles (McDonald and Dutton, 1990, as cited in MMS, 2001). Coastal pollution may also contribute to declining productivity in algal and seagrass communities (NMFS and FWS, 1998b, as cited in MMS, 2001).

Other known anthropogenic sources of impacts to sea turtles at sea include construction blasting, dynamite “fishing,” and power plant entrapment (NMFS and FWS, 1998a-d, as cited in MMS, 2001).

Non-anthropogenic Sources of Impacts. There are few data on the extent to which disease and parasites affect sea turtle populations in the wild (NMFS and FWS, 1998a-d, as cited in MMS, 2001). Fibropapilloma tumor disease is known to be widespread in the Hawaiian green sea turtle population and may be fatal (NMFS and FWS, 1998b, as cited in MMS, 2001). The disease has not been reported in the Mexican nesting population, but there are some observations of turtles with what has been described as early stages of the disease in San Diego Bay (McDonald and Dutton, 1990, as cited in MMS, 2001).

Only a few predators, including sharks and killer whales, are big enough to consume full-sized sea turtles (NMFS and FWS, 1998a-d, as cited in MMS, 2001). Off Mexico, killer whales have been observed feeding on leatherback and ridley sea turtles (NMFS and FWS, 1998a and c, as cited in MMS, 2001). Billfish attacks on green sea turtles also have been documented (Frazier et al., 1994, as cited in MMS, 2001). Predation on leatherback hatchlings by sharks is thought to be relatively high (NMFS and FWS, 1998a, as cited in MMS, 2001).

Natural phenomena may also have impacts on sea turtle populations. Storms at sea can blow migrating sea turtles off course. El Niño events may cause green, Pacific ridley, and loggerhead sea turtles to migrate northward into colder water, where they can experience cold stunning, and may also reduce food availability (NMFS and FWS, 1998a-d, as cited in MMS, 2001).

There are several cumulative impacts to sea turtles in the study area from a number of non-anthropogenic sources, including disease, predation, and natural phenomena. Each of these may periodically have significant impacts on sea turtle populations, at least at the local level. However, the likelihood of their occurrence (and the levels of subsequent impacts on sea turtles) during the period 2006–2030 cannot be predicted.

Incremental Impacts of Exploration and Development of the Undeveloped Leases on Threatened and Endangered Sea Turtles

Development of the undeveloped leases would involve a number of oil and gas activities in addition to those discussed earlier in this section. Under the hypothetical exploration and development scenario, these activities would include exploration and delineation drilling, abandonment of delineation wells drilled from a MODU on undeveloped leases, and construction of four new platforms on the undeveloped leases. Impacts on sea turtles in the study area from these activities would be expected to be limited to temporary, localized disturbance to a few individuals.

Implementation of mitigation similar to that employed for platform removal in the Gulf of Mexico would make it unlikely that any sea turtle injury or mortality would occur as a result of the use of explosives in well abandonment operations. Impacts would be negligible.

Volumes of platform effluents discharged in the course of developing the undeveloped leases would be expected to be equivalent to those estimated for existing Pacific OCS platforms. As discussed in previous sections, all platform effluents would be discharged under NPDES permit and would be required to meet NPDES water quality criteria. No measurable effects to sea turtles in the study area would be expected from these discharge volumes. Impacts would be negligible.

Tables in Section 5.3 present the estimated mean number of spills of various sizes and the probability of their occurrence with and without the development of the undeveloped leases. Impacts to sea turtles from any oil spills occurring as a result of the development of the undeveloped leases would be similar to those described above for the 200 and 2,000 bbl spills assumed to occur as a result of offshore oil and gas activities and for the assumed 22,800 bbl tanker spill. Impacts would be negligible.

Summary and Conclusion – Threatened and Endangered Sea Turtles

Although recovery plans have been finalized for all four species of sea turtles found on the U.S. west coast (NMFS and FWS, 1998a-d, as cited in MMS, 2001), the trends of these populations over the next quarter of a century are uncertain. Leatherback sea turtles are the species most commonly sighted at sea in this area, but their Mexican nesting populations are decreasing (NMFS, 1999, as cited in MMS, 2001). The same is true for nesting populations of green turtles in Mexico, although their nesting populations in the Pacific are increasing overall (NMFS, 1999, as cited in MMS, 2001). In contrast, nesting populations of Pacific ridley sea turtles in Mexico and Costa Rica are still quite large and apparently increasing (NMFS, 1999, as cited in MMS, 2001). Loggerhead sea turtles nest in the western Pacific; their population status in most areas is unknown (NMFS, 1999, as cited in MMS, 2001). The primary threats to sea turtles along the west coast are incidental take in commercial fisheries and, to a lesser extent, entanglement in and ingestion of marine debris. Primarily warm water species, such as the green, ridley, and loggerhead sea turtles, are also subject to boat collisions in nearshore waters and cold stunning during El Niño episodes.

A summary of potential impacts on threatened and endangered sea turtles under the hypothetical development scenario, by undeveloped Unit and Lease OCS-P 0409 is presented in Table 5.7-10.

Table 5.7-10. Comparison of Impacts to Threatened and Endangered Sea Turtles by Undeveloped Unit/Lease and Exploration/Development Phase.

Unit/Lease	Exploration and Delineation Drilling	Development and Production	Decommissioning
Cavern Point	None	Negligible (disturbance) Negligible (oil spill)	None
Gato Canyon	Negligible (disturbance)	Negligible (disturbance) Negligible (oil spill)	Negligible (explosives, disturbance)
Rocky Point	None	Negligible (disturbance) Negligible (oil spill)	None
Sword	None	Negligible (disturbance) Negligible (oil spill)	None
Bonito	None	Negligible (disturbance) Negligible (oil spill)	None
Santa Maria	None	Negligible (disturbance) Negligible -(oil spill)	Negligible (explosives, disturbance)
Purisima Point	Negligible (disturbance)	Negligible (disturbance) Negligible (oil spill)	None
Point Sal	Negligible (disturbance)	Negligible (disturbance) Negligible (oil spill)	Negligible (explosives, disturbance)
Lion Rock	None	Negligible (disturbance) Negligible (oil spill)	None
Lease OCS-P 0409	None	Negligible (disturbance) Negligible (oil spill)	Negligible (explosives, disturbance)

Overall, the impacts to sea turtles in the study area from routine offshore oil and gas activities, primarily noise and disturbance, would increase over present levels. However, the areas covered by these activities would be small relative to the available habitat, and the periods of disturbance would be localized. Cumulative impacts to sea turtles from all the routine oil and gas activities assumed to take place between 2006 and 2030, including those associated with the development of the undeveloped leases, would be expected to be negligible.

Accidental oil spills present an ongoing source of potential impacts to sea turtles. The cumulative risk of oil spills arises from multiple sources, including offshore oil and gas activities in Federal and State waters and both Alaskan and foreign-import tankering. The greatest oil spill risk to sea turtles in the study area results from tankering operations. This risk is tempered by recently implemented or proposed mitigation (such as the rerouting of tankers farther offshore along the central California coast) and by modern oil spill response capabilities. Impacts to sea turtles from the oil spills assumed to occur in the study area during the period 2006–2030 would be negligible.

Incremental impacts to sea turtles would be negligible because the center of population of these species is elsewhere. Only a few individuals of the protected species occur in the project area. Potential impacts to sea turtles of the undeveloped leases would be unlikely to result in death. At most one or two individuals might be killed by a ship strike or an oil spill between 2006 and 2030. Such an event would have no measurable impact on the population of any sea turtle species.

5.7.7.5 Threatened and Endangered Plant Species

Significance Criteria

Impact level definitions used in this analysis for threatened and endangered plants are as follows:

- **High.** Impacts result in a population decline in the study area due to direct mortality, reduced survivorship, declines in reproduction, and/or a shift in distribution. The decline, which could involve more than 5 percent of the total population, would be at a level and over a large enough area that the continued existence or recovery of the species involved would be at risk.
- **Moderate.** Impacts result in a local (e.g., single colony) population decline due to direct mortality, reduced survivorship, declines in reproduction, and/or a shift in distribution. The decline, which could involve from 1 to 5 percent of the total population, could increase the length of time projected for full recovery and removal from the endangered species list, depending on the species involved. Effects are expected to continue for 1 to 5 years.
- **Low.** Impacts result mainly in local (e.g., a small area around a platform, a limited stretch of beach, or rocky shore), short-term (a few days to a few weeks) changes in behavior (e.g., disruption of foraging) and/or displacement from roosting or foraging habitats due to disturbance. Mortality, if any, would be limited to the loss of a few animals up to 1 percent of the total population of the species or stock. A small number of animals would also suffer from sublethal effects. Effects are expected to continue for less than 1 year. Projected recovery time and removal from the endangered species list would not be affected.

Impacts below these levels, involving no death or life-threatening injury of any threatened or endangered organism, no displacement from preferred habitat, and no more than minor disruption of behavioral patterns, are defined as negligible. For purposes of this document, high and moderate impacts are considered to be significant; low impacts are considered to be insignificant.

Impacts of Post-Suspension Activities

Cumulative Impacts without Activities on the Undeveloped Leases on Threatened and Endangered Plant Species

For the period 2006 through 2030, this analysis considers the cumulative impacts to threatened and endangered plants from: (1) existing and future Federal and State offshore oil activity; (2) crude oil imports by tanker; and (3) other anthropogenic (military activities, recreation, commercial fishing) impact sources.

Although no impacts to either the salt marsh bird’s beak or California sea-blite from past and present Pacific OCS-related oil and gas activities in the Pacific Region have been reported, future oil spills and onshore construction activities have the potential for affecting these plants. No onshore construction activities are planned for any existing Federal or State offshore oil project or the proposed State Tranquillon Ridge project; however, oil spills may occur as a result of these projects whether or not the undeveloped leases are eventually developed.

Pacific OCS Oil Spills. The most likely scenario for existing Federal and State offshore oil production and projects proposed by the State is that one or more oil spills in the 50 to 1,000 bbl range would occur from offshore oil and gas activities over the period 2006 through 2030, and that such a spill would most likely be 200 bbl or less in volume. The maximum reasonably foreseeable oil spill volume from future offshore oil and gas activities is 2,000 bbl, assumed for purposes of analysis to be a pipeline spill. Plant mortality from oil spills can be caused by smothering and toxic reactions to hydrocarbon exposure, especially if oil reaches shore before much of the spill's lighter fractions have evaporated or dissolved. Generally, oiled marsh vegetation dies above the soil interface, but roots and rhizomes survive when oiling is not too severe. Research has shown that recovery to pre-oiling conditions usually occurs within a few growing seasons, depending on the magnitude of exposure (Holt et al., 1975; Lytle, 1975; Delaune, et al., 1979; Alexander and Webb, 1987, as cited in MMS, 2001). The cleanup process, if not conducted with respect to Federal and State regulations, could exacerbate the effects of an oil spill on threatened and endangered plants. Because of weathering, dispersion, and cleanup efforts, a 200 bbl spill is only likely to contact shore in close proximity to a platform or pipeline. California sea-blite is restricted to Morro Bay and would not be affected by a 200 bbl oil spill. Populations of salt marsh bird's beak in the general vicinity of offshore oil development occur at the Carpinteria Marsh in Santa Barbara County, and the Ventura County Game Preserve, Ormond Beach, and Mugu Lagoon in Ventura County. Any of these areas could be contacted by a 200 bbl spill, if it originated from a nearby platform or pipeline. For impacts to actually occur, however, oil would have to contact this plant's habitat. The primary habitat of this species is coastal salt marsh, where it occurs in the upper part of the marsh. Salt marshes can frequently be protected from oil contact. However, if an oil spill were to contact this species' habitat, some plants could be lost; the cleanup process would have to be conducted with strict adherence to Federal and State regulations to prevent additional losses. It is estimated that a 200 bbl spill could contact from about 1 km (95 percent probability) to 19 km (5 percent probability) of coastline, and because of weathering, dispersion, and cleanup efforts, probably no more than one area where this plant occurs would be affected.

By its very size, the impact of a 2,000 bbl spill on threatened and endangered plants would likely be much greater than that of a 200 bbl spill, depending on the timing, location, and movements of each spill. Although it is still unlikely that a 2,000 bbl spill could contact Morro Bay, which is about 84 km (52 miles) from the closest offshore oil project, such a spill could originate from a greater number of locations and still contact salt marsh bird's beak habitat. A 2,000 bbl spill could also contact more than one area where this plant occurs. The cleanup process for such a spill would be much more complex and protracted, with potentially greater impacts. Overall, the impacts to the salt marsh bird's beak from oil spills that may originate from existing Federal, State, and State-proposed oil and gas operations range from low (if only one area is contacted) to moderate (if several areas are contacted). No impacts to the California sea-blite are expected.

Impacts from Non-Offshore Oil Sources. Based on the discussion of oil spill risks in Section 5.3, the mean size for an oil spill from a tanker accident is assumed to be 22,800 bbl. By its very size, the impacts of a 22,800 bbl spill on threatened and endangered plants could be far worse than those from offshore oil operations discussed above, depending on the timing, location, and movements of each spill. It is estimated that a 22,800 bbl spill could contact from about 9 km (95 percent probability) to 160 km (5 percent probability) of coastline, and depending on its location and movements, such a large spill could contact the habitat of both the salt marsh bird's beak and the California sea-blite. The only place where the California sea-blite currently exists is Morro Bay, and if a large amount of oil were to enter the bay and contact this species' habitat, the continued existence of this species could be at risk. However, the possibility of contact with the shore is ameliorated somewhat by the fact that oil tankers voluntarily maintain a distance of 90 km (50 nm) from the mainland for much of their route. If the shoreline is contacted, it might be far more difficult to prevent oil from entering a marsh with this size spill. The cleanup process for a spill of this size would also be much more difficult and protracted compared to that for the smaller spills discussed above, especially if a significant proportion of the oil reaches shore. Overall, the impacts to threatened and endangered plants from a 22,800 bbl, non-OCS tanker spill range from low to high, depending on the location and movement of the spill. The main reason for the endangered status of both the salt marsh bird's beak and California seablite is due to the severe alteration of their already limited salt marsh habitat. California salt marshes have been lost to marina and industrial development, beach recreational facilities, housing development, and other human-related factors. See

Section 4.7.7 for further details on each species. Overall, the cumulative impacts to threatened and endangered plants from habitat loss in the study area range from moderate for the salt marsh bird's beak to high for the California sea-blite.

Incremental Impacts of Exploration and Development of the Undeveloped Leases on Threatened and Endangered Plant Species

The potential scenario for the exploration and development of the currently undeveloped leases is described in Section 5.2. Of the activities and possible accidental events associated with development of the undeveloped leases under the hypothetical development scenario, only oil spills and construction of onshore facilities may have measurable, long-term (e.g., years) effects on threatened and endangered plants (salt marsh bird's beak and California sea-blite). Pipeline construction could also have an impact if it were to involve the habitat of either of these two plant species. However, the assumed locations of pipeline landfalls that may occur as a result of development of the leases (see Section 5.2) do not contact their habitats. Other activities associated with oil and gas development, including exploration activities, platform installation and abandonment, discharges, and vessel traffic would not have an impact on threatened and endangered plants.

The oil spill risk analysis provided in Section 5.3 indicates a greater likelihood of both a 200 bbl and a 2,000 bbl oil spill occurring with the development of the undeveloped leases. Although a greater potential for an oil spill to occur does not necessarily indicate a higher level of impact, with the development of the leases, an oil spill could occur much closer to Morro Bay than is the case for existing facilities. Therefore, the habitat of the California sea-blite could be contacted, if an oil spill were to occur from one of the northernmost of the leases.

Incremental Impacts of the Hypothetical Onshore Development Scenario on Threatened and Endangered Plant Species

When development plans are submitted requesting approval of onshore construction, a detailed survey of the affected areas would be conducted, from which a comprehensive impact analysis could be carried out. Until such an analysis is carried out, it is assumed that the impacts to onshore biological resources from the development of the leases is not known. Although Santa Barbara County's Final North County Siting Study (2000), identified areas "that are relatively unconstrained with respect to development of oil and gas facilities serving offshore production", the potential for impact to threatened and endangered plant species cannot be ruled out. According to the California Natural Diversity Database (CNDDB, 2005) known threatened and endangered plant locations are generally found to the south of Shuman Canyon and outside of the potential pipeline corridor leading to the hypothetical Casmalia processing facility. Until project-level surveys can be conducted to determine the presence or absence of threatened and endangered plants, the potential cumulative impacts would be moderate to high.

Summary and Conclusion – Threatened and Endangered Plant Species

The cumulative impacts to threatened and endangered plants in the study area from all sources for the period from 2006 to 2030, including any activities and accidental events that may be associated with the development of the undeveloped leases, range from moderate to high, depending on the species involved, the size, timing, location and movement of potential oil spills, and continued habitat loss. A summary of impacts on threatened and endangered plant species by undeveloped Units and Lease OCS-P 0409 is presented in Table 5.7-11.

Table 5.7-11. Comparison of Impacts to Threatened and Endangered Plant Species by Undeveloped Unit/Lease and Exploration/Development Phase.

Unit/Lease	Exploration and Delineation Drilling	Development and Production	Decommissioning
Cavern Point	None	Moderate to High - oil spill	None
Gato Canyon	None	Moderate to High - oil spill	None
Rocky Point	None	Moderate to High - oil spill	None
Sword	None	Moderate to High - oil spill	None
Bonito	None	Moderate to High - oil spill	None
Santa Maria	None	Moderate to High - oil spill Moderate – hypothetical onshore facilities	None
Purisima Point	None	Moderate to High - oil spill Moderate – hypothetical onshore facilities	None
Point Sal	None	Moderate to High - oil spill Moderate – hypothetical onshore facilities	None
Lion Rock	None	Moderate to High - oil spill Moderate – hypothetical onshore facilities	None
Lease OCS-P 0409	None	Moderate to High - oil spill Moderate – hypothetical onshore facilities	None

5.7.7.6 Threatened and Endangered Amphibians

Significance Criteria

Of the onshore vertebrates listed as threatened or endangered within the study area, only the California red-legged frog would potentially be impacted. Impact level definitions used in this analysis for threatened and endangered amphibians are as follows:

- **High.** Impacts result in a population decline in the study area due to direct mortality, reduced survivorship, declines in reproduction, and/or a shift in distribution. The decline, which could involve more than 5 percent of the total population, would be at a level and over a large enough area that the continued existence or recovery of the species involved would be at risk.
- **Moderate.** Impacts result in a local (e.g., single colony) population decline due to direct mortality, reduced survivorship, declines in reproduction, and/or a shift in distribution. The decline, which could involve from 1 to 5 percent of the total population, could increase the length of time projected for full recovery and removal from the endangered species list, depending on the species involved. Effects are expected to continue for 1 to 5 years.
- **Low.** Impacts result mainly in local (e.g., a small area around a platform, a limited stretch of beach, or rocky shore), short-term (a few days to a few weeks) changes in behavior (e.g., disruption of foraging) and/or displacement from roosting or foraging habitats due to disturbance. Mortality, if any, would be limited to the loss of a few animals up to 1 percent of the total population of the species or stock. A small number of animals would also suffer from sublethal effects. Effects are expected to continue for less than 1 year. Projected recovery time and removal from the endangered species list would not be affected.

Impacts below these levels, involving no death or life-threatening injury of any threatened or endangered organism, no displacement from preferred habitat, and no more than minor disruption of behavioral patterns, are defined as negligible. For purposes of this document, high and moderate impacts are considered to be significant; low impacts are considered to be insignificant.

Impacts of Post-Suspension Activities

Cumulative Impacts without Activities on the Undeveloped Leases on Threatened and Endangered Amphibians

California Red-legged Frog. For the period 2006 through 2030, this analysis considers the cumulative impacts to threatened and endangered amphibians from: (1) existing and future Federal and State offshore oil activity; (2) crude oil imports by tanker; and (3) other anthropogenic (military activities, recreation, commercial fishing) impact sources.

Future oil spills and onshore construction activities have the potential for affecting California red-legged frog. No onshore construction activities are planned for any existing Federal or State offshore oil project or the proposed State Tranquillon Ridge project; however, oil spills may occur as a result of these projects whether or not the undeveloped leases are eventually developed.

Oil Spills. The most likely scenario for existing Federal and State offshore oil production and projects proposed by the State is that one or more oil spills in the 50 to 1,000 bbl range could occur from offshore oil and gas activities over the period 2006 through 2030, and that such a spill would most likely be 200 bbl or less in volume. The maximum reasonably foreseeable oil spill volume from future offshore oil and gas activities is 2,000 bbl, assumed for purposes of analysis to be a pipeline spill.

The cumulative oil spill risk for the project area results from several sources: ongoing and projected oil and gas production from existing OCS facilities in the Santa Barbara Channel and Santa Maria Basin, several proposed development projects on the Federal OCS, ongoing production from one facility in State waters in the Santa Barbara Channel, two likely oil and gas projects in State waters, and the tankering of Alaskan and foreign-import oil through area waters. The most likely oil spill scenario is that one or more oil spills in the 50-1,000-bbl range would occur from offshore oil and gas activities over the period 2002-2030, and that such a spill would be 200 bbl or less in volume. The maximum reasonably foreseeable oil spill volume from offshore oil and gas activities is 2,000 bbl, assumed for purposes of analysis to be a pipeline spill. The probability of a spill of this size occurring during the period is discussed in Section 5.3. Based on data from tanker spills in U.S. waters, the mean size for a tanker spill is assumed to be 22,800 bbl. None of the oil produced on the Pacific OCS is transported by tanker. However, the transport of foreign and Alaskan oil along the U.S. west coast does present an oil spill risk.

Oil may affect amphibians through various pathways including direct contact, ingestion of contaminated prey, and lingering sublethal impacts due to oil becoming sequestered in sediments and persisting in some cases for years in low energy environments (NRC, 1985, as cited in MMS, 2001). The level of impacts and the persistence of the oil in the environment will depend on the volume of oil that reaches the habitat and the amount of mixing and weathering the oil has undergone before reaching the habitat. An at sea oil spill would not impact breeding or estivation habitat of red-legged frogs which is well upstream of the coast. Adult red-legged frogs move down to the brackish coastal lagoons formed seasonally behind sand berms that close the mouths of rivers and streams along the south central coast. Storms or tides may breach these natural berms, at which point the frogs move upstream to freshwater. There is some risk that an oil spill might reach the coastal lagoons during a high tide or storm when the sand berms have been breached. Red-legged frogs cannot tolerate salinities in excess of 9 ppm and leave the coastal lagoons when seawater breaches the sand berms (pers.com., Norman Scott, USGS-BRD, as cited in MMS, 2001). Though no direct oil contact with frogs is expected, the oil can become sequestered in the sediments and persist until rains flush the sediments from the lagoon. If the sand berms form again and conditions become favorable, some red-legged frogs may return before the contaminated sediments are flushed into the ocean. The level of toxicity would be dependent on the weathering of the oil and the volume of oil that reaches the lagoon.

Data from moored current meters and surface drifter trajectory observations indicate that north of Point Conception, a spill would move northward along the mainland coast nearly 30 percent of the time. The OSRA model runs predict up to a five percent probability that if a spill were to occur between October and March the Pt. Arguello area would be contacted by oil within three days from one of the three launch points. The coastal rivers and streams in the Pt. Arguello area support populations of red-legged frogs (pers. com. Norman Scott, USGS-BRD, as cited in MMS, 2001). Tadpoles have been reported in Jalama and Cañada Honda creeks and adult frogs can be found seasonally in the coastal lagoons of the central California coast. Eggs and tadpoles are not found in the coastal lagoons.

If an oil spill did occur, and the sand berms of the coastal lagoons were breached, sublethal impacts to red-legged frogs might occur if the frogs returned before rains flushed the sediments from the lagoons. Oil spill response teams would be expected to boom the mouths of creeks and rivers or enhance the existing berms in the event of a spill thus minimizing the chance of oil reaching the lagoons. An oil spill that contacts the mainland along the central California coast is unlikely to result in red-legged frog mortalities or sub-lethal effects. However habitat destruction could result from clean-up efforts. Proper preparation and execution of the oil spill contingency plan should protect these areas during an oil spill response. In conclusion, only minor short-term impacts to seasonal habitat of the California red-legged frog would be expected from an oil spill.

Other Cumulative Impacts. Habitat loss and alteration are the primary factors that have negatively affected the California red-legged frog throughout its range. For example, in the Central Valley of California, over 90 percent of historic wetlands have been diked, drained, or filled primarily for agricultural development and secondarily for urban development. Wetland alterations, clearing of vegetation, and water diversions that often accompany agricultural development make aquatic sites unsuitable for California red-legged frogs. Urbanization with its associated roadway, stream channelization, and large reservoir construction projects has significantly altered or eliminated California red-legged frog habitat, with the greatest impact occurring in southern California. The majority of extant localities are isolated and fragmented remnants of larger historical populations. Loss of habitat and decreases in habitat quality will occur as a result of on-site degradation of the stream environment and/or riparian corridor, or through modification of instream flow. Where streams or wetlands occur in urban areas, the quality of California red-legged frog habitat is degraded by a variety of factors. Among these factors are introduction of exotic predators, elimination of streambank vegetation, collecting, and loss of upland habitat.

Water projects, which accompany urban and agricultural growth, have had a negative effect on California red-legged frogs and their habitat. The construction of large reservoirs, such as Lake Oroville, Whiskeytown Reservoir, Don Pedro Reservoir, Lake Berryessa, San Luis Reservoir, Lake Silverwood, Lake Piru, Pyramid Lake, and Lower Otay Lake, have eliminated California red-legged frog habitat or fragmented remaining aggregations (Jennings et al., 1993, as cited in MMS, 2001).

Incremental Impacts of Exploration and Development of the Undeveloped Leases on Threatened and Endangered Amphibians

The potential scenario for the exploration and development of the currently undeveloped leases is described in Section 5.2. Of the activities and possible accidental events described, only oil spills and construction of onshore facilities may have measurable, long-term (e.g., years) effects on threatened amphibians (California red-legged frog). Pipeline construction could also have an impact if it were to occur in California red-legged frog habitat. Other activities associated with oil and gas development, including exploration activities, platform installation and abandonment, discharges, and vessel traffic will not have an impact on threatened and endangered amphibians.

The oil spill risk analysis is provided in Section 5.3. Although a greater potential for an oil spill to occur does not necessarily indicate a higher level of impacts, the potential for an oil spill occurring from development of the undeveloped leases represents a measurable incremental increase to the overall oil spill risk for threatened and endangered amphibians.

Incremental Impacts of the Hypothetical Onshore Development Scenario on Threatened and Endangered Amphibians

When development plans are submitted requesting approval of onshore pipeline and processing facility construction, a detailed survey of the affected areas would be conducted, from which a comprehensive impact analysis could be carried out. Until such an analysis is carried out, the impacts to California red-legged frog cannot be known with certainty. Although Santa Barbara County's Draft North County Siting Study (2000), identified areas "that are relatively unconstrained with respect to development of oil and gas facilities serving offshore production", the potential for impact to California red-legged frog cannot be ruled out. According to the California Natural Diversity Database (CNDDB, 2004) known red-legged frog locations are found in Shuman Canyon and within sump ponds in the Casmalia Oil Field. Until project-level surveys can be conducted to determine the presence or absence of California red-legged frog in the hypothetical potential pipeline and processing facility, the potential cumulative impacts should be considered moderate.

Summary and Conclusion – Threatened and Endangered Amphibians

Although the U.S. Fish and Wildlife Service has issued a Draft Recovery Plan for the California red-legged frog, it is impossible to predict this species' progress toward recovery over the next 30 years. Given current trends, the fragmentation and degradation of California red-legged frog habitat of the south and central coast of California will likely continue due to urbanization and other human-related activities.

Overall, the potential impacts to California red-legged frogs in the study area from routine offshore oil and gas activities, primarily onshore construction, would increase over present levels only if the undeveloped leases are developed. However, the areas that would be impacted by onshore activities would be small relative to the available frog habitat, and critical areas would likely be avoided. Cumulative impacts to California red-legged frogs from all the routine oil and gas activities assumed to take place between 2006 and 2030, including those associated with the development of the undeveloped leases, are expected to be low. The development of the hypothetical pipeline and Casmalia processing facility has the potential to impact areas occupied by this species; however occupied areas would likely be avoided. Nevertheless, until more information is known regarding the specific locations of the facilities and surveys have been conducted for California red-legged frog, impacts associated with hypothetical onshore development are considered to be moderate.

Probabilities and mean oils spill sizes under development scenarios are discussed in Section 5.3. Thus, the potential for an oil spill occurring from development of the undeveloped leases represents a measurable incremental increase to the overall cumulative oil spill risk for California red-legged frogs.

A summary of potential impacts on threatened and endangered amphibian species under the hypothetical development scenario from undeveloped Units and Lease OCS-P 0409 is presented in Table 5.7-12.

Table 5.7-12. Comparison of Impacts to Threatened and Endangered Amphibian Species by Undeveloped Unit/Lease and Exploration/Development Phase.

Unit/Lease	Exploration and Delineation Drilling	Development and Production	Decommissioning
Cavern Point	None	Low - oil spill	None
Gato Canyon	None	Low - oil spill	None

Rocky Point	None	Low - oil spill	None
Sword	None	Low - oil spill	None
Bonito	None	Low - oil spill	None
Santa Maria	None	Low - oil spill Moderate – hypothetical onshore facilities II	None
Purisima Point	None	Low - oil spill Moderate – hypothetical onshore facilities	None
Point Sal	None	Low - oil spill Moderate – hypothetical onshore facilities I	None
Lion Rock	None	Low – oil spill Moderate – hypothetical onshore facilities I	None
Lease OCS-P 0409	None	Low – oil spill Moderate – hypothetical onshore facilities II	None

5.7.8 Estuarine and Wetland Habitats

5.7.8.1 Significance Criteria

Criteria used to assess impacts to these resources are:

- **High.** Impacts that result in a measurable decline in a population beyond that which can be explained by normal variability, result in a measurable change regionally in species composition, ecological function or community structure, or result in a measurable reduction in regionally important habitat are considered to be high impacts. These changes would be at a level, areal extent, and duration that it would be expected to place an individual species at risk, or alter the community structure or habitat on a regional scale for many years. Irreversible alteration of regionally important habitat or reduction of protected habitat would be considered high impacts.
- **Moderate.** Impacts that result in a measurable decline in species composition, species abundance, ecological function or community structure over several localized areas or result in alteration of locally important habitat are considered moderate impacts. These changes, while individually may persist for many years, are localized and cannot be detected on a population or regional level.
- **Low.** Impacts that result in a short-term change in species abundance or composition, a temporary loss in ecological function or community structure, a short-term disturbance or temporary loss of access to locally important habitat are considered to be low impacts. In this document, high and moderate impacts are considered significant; low impacts are considered to be insignificant. Irreversible alteration of wetland habitat, because of the protection afforded it by local and State laws, is considered a high impact. The threshold for significance is determined by scientific judgment, and takes into consideration the relative importance of individual species and/or habitat.

5.7.8.2 Impacts of Post-Suspension Activities

Estuarine and wetland habitats may be vulnerable to several impacts associated with offshore oil and gas development including pipeline and processing facility construction and accidental onshore and offshore oil spills. Although there are no onshore activities planned for the post-suspension activities, the development of the undeveloped leases, if it occurs, would involve onshore activities and the construction of pipelines, which could be in the vicinity of estuarine or wetland habitats. These potential activities are described in Section 5.2.

Any shallow hazard and biological surveys that would occur during post-suspension activities would be conducted in the open ocean well away from estuaries and wetlands. Vessel activity can also disturb wetland or estuarine habitats, but these effects would be limited to the immediate vicinity of the disturbance and would be short in duration. Vessel traffic of various types is common throughout the study area, and species in estuarine and wetland habitats have most likely become habituated to vessel traffic.

For the period 2006 through 2030, this analysis considers the cumulative impacts to estuarine and wetland habitats from: (1) existing and future Federal and State offshore oil activity; (2) other anthropogenic (military activities, agriculture, urban development) impact sources; and, (3) potential development of currently undeveloped Pacific OCS leases.

Cumulative Impacts without Activities on the Undeveloped Leases on Estuarine and Wetland Habitats

Cumulative impacts to wetland resources include sedimentation and contamination due to natural storms and surface runoff, agricultural practices in the watersheds increasing sediment load and pollutants, physical alteration by commercial and residential development, contamination by offshore and onshore sources of oil and other pollutants.

Natural Storms/Surface Runoff. Seasonal storm events, and especially the extreme storm events associated with El Niño conditions, can significantly impact wetland habitat through surface runoff. Primary impacts to the wetlands from surface runoff include increased sedimentation, contamination by metals, hydrocarbons and other pollutants, reduced function due to the influx of large amounts of debris, and reduced salinity. Impacts range from low to moderate, depending on the severity of the storm and location in relation to population centers.

Agricultural Practices. More attention has been paid recently to the significance of agricultural practices upstream in the watershed and the ultimate affect on estuarine and wetland resources. Many efforts are aimed at examining water resource uses at a watershed level so that all potential sources of sedimentation and water use that affect downstream resources can be considered. Grading and farming activities substantially increase sediment load in the watershed and reduce the function of the adjoining wetlands. Use of pesticides, herbicides and other chemicals on the farmland affects plants and animals downstream in the estuary. The affects from these practices are felt in the watersheds throughout California.

Commercial and Residential Development. The single most important impact to wetlands in California, especially southern California, is the widespread direct destruction and alteration of habitat through commercial and residential development. Only a small fraction, less than 9 percent, of the wetland habitat available in 1850 when California became a State, now remains; a reduction from 5 percent area to 0.5 percent area (Southern California Wetland Project, 2000, as cited in MMS, 2001). Indirectly, this increased development also impacts wetlands through increased population pressure, bringing increased public use, pollution, sewage, roads and parking lots to the already impacted habitat. One of the reasons Point Mugu remains as a wetland habitat is due to the restricted building possible on a military base. The areas along the Central Coast to Point Lobos have been considerably less affected by construction activities than southern California, though building continues to occur along the coastline in lowland areas adversely affecting wetland resources.

Pollution Events. Sources of pollution include cars which contribute significant amounts of hydrocarbons in surface runoff, leaks from sewage outfalls and facilities, ongoing oil and gas development in Federal and State waters and tanker spills. Most of the original estuarine habitat in southern California has already been severely altered, much of it possibly beyond repair. In general, while the closed nature of many southern California wetlands affords them protection from introduction of pollution events, pollution events are felt much more strongly in an estuary or wetland than on an adjoining sandy beach because it is a partially closed system. Even smaller pollution events, if they reach or are directly deposited into a wetland, can cause significant long-term impacts due to stagnation, adsorption into the soil and overall lack of flushing.

Marine Vessel Tanker Spills. Tanker spills from foreign flag tankers transiting to Los Angeles harbor continue to be the most likely source of a spill and the largest potential source of an oil spill offshore California (see Oil Spill Risk Section in Section 5.3). The mean (average) spill size from a tanker is calculated as 22,800 bbl for the period between 1985 and 1999. Between 9 and 161 km (5 and 100 miles) of coastline is predicted to be contacted with oil should a spill this size occur. Should a 22,800 bbl occur from a tanker in an area where shoreline contact occurs, it is likely that more than one wetland habitat would be contacted. While oil spill booms and rapid response would be used to reduce the amount of oil entering a wetland, with the large volume released at one time from a tanker spill, such response measures could be overwhelmed and it is likely that oil would enter one or more wetland areas. If a substantial amount of oil enters a wetland, impacts would be high due to rare nature of the habitat, the potential for irreversible alteration of the habitat, loss of animals and plants that may not be able to repopulate from adjacent areas, and loss of endangered plants, animals and fishes. Once oil contaminates the sediment, a given wetland area may be completely lost. If one of the larger wetlands such as Point Mugu or Morro Bay were oiled, losses to wetland habitat regionally would be very high.

The cleanup response can cause impacts as serious as the oil itself. The most critical cleanup response strategy in preventing long-term impacts in a wetland is to prevent oil from reaching the sediment. It has been shown that cleanup methods which require the use of machinery or trampling in the wetland that grind the oil into the sediment can irreversibly damage a wetland (Zengle and Michel, 1996, as cited in MMS, 2001). In-situ burning has been found in heavily oiled areas to successfully remove the oil without introducing the oil into the sediment (Zengle and Michel, 1996, as cited in MMS, 2001). Several strategies have been developed on a worldwide basis to mitigate potentially devastating impacts from tanker spills in wetland areas. These measures would aid recovery of areas, but would not reduce the overall impact to the resource from a tanker spill, a high impact.

Existing Oil and Gas Activities. If it is assumed that a spill occurs from Pacific OCS oil and gas activities, the most likely case is that one or more spills in the 50 to 1,000 bbl range would occur, and that such a spill would be 200 bbl or less in volume. The maximum reasonably foreseeable oil spill volume from offshore oil and gas activities is 2,000 bbl; for this purposes of analysis, this scenario is assumed to be a pipeline spill.

In general, impacts to wetland resources from a 200 bbl spill would be substantially lower than those discussed for a tanker spill. While impacts could be significant if large quantities of oil were to contact a wetland, it is very unlikely that a 200 bbl offshore oil spill could result in volumes of oil on the shoreline sufficient to cause measurable impacts inside a wetland. Most wetland areas are closed naturally during much of the year, or when open during rainy season, have outward flow. The Platform Irene pipeline spilled 167 bbl of oil 2 miles offshore VAFB. The hardest hit beach was Surf, about a mile south of the Santa Ynez River. Because there was an unusually high tide the evening after the spill, a small amount of oil escaped over the natural berm at the Santa Ynez River mouth. Though a very small amount of oil entered the wetland, evidence of sheen or impacts was not discovered the following morning during intensive sampling (K. Wilson, pers. comm., 2004).

Because it is unlikely that oil could enter a wetland in sufficient quantities to cause serious impacts, impacts from a 200 bbl spill are estimated to be low. If oil enters a wetland or estuary, impacts to the resource include irreversible alteration of the habitat, mortality of endangered birds, plants and fish, and loss of plants and animals that may be unable to populate from adjacent areas. For a 2,000 bbl spill, the potential area of contact is larger than that possible for a 200 bbl spill and contact with a wetland is, therefore, greater. A 2,000 bbl spill is predicted to contact between 3 and 53 km (1.8 and 33 miles) of coastline, with a mean value of 12 km (7 miles). Given the possible extent of coastline, impacts could range from low to high for a 2,000 bbl spill. If the oil does not enter a wetland either because wetland is closed to inward flow or because of oil response measures, impacts to the wetland would be low. If a substantial amount of oil enters a wetland, impacts could be high due to rare nature of the habitat. The most critical mitigation measure is prevention; the requirements to ensure that operators are drilling safely and in a manner that does not produce oil spills is the most important step toward protecting wetlands from spilled oil. MMS records of spills, and lack thereof on the Pacific OCS, demonstrate MMS's commitment to prevention.

Should an oil spill occur, concerted efforts would be made by oil response personnel to boom estuary mouths so that oil would not enter these sensitive areas. Regular oil spill drills by Clean Seas focus on strategies for protecting individual wetlands and river mouths. In a wetland area, particularly the larger wetlands with tidal influence, the difficulty is in providing sufficient replicate booms to prevent the oil from entering the wetland, while providing continued water circulation. The strategy for each wetland area has been mapped and practiced for many years and it is expected that this mitigation effort would be highly effective in preventing oil from entering a wetland. This is especially true of the smaller spills (greater than 200 bbl) because more attention can be focused on an individual wetland. Equipment may less effective or ineffective at night, during heavy fog, or in turbulent/wind driven sea conditions. Weather conditions limiting response are more common north of Point Conception. Based on local experience, the fact that a majority of the wetlands are not open to the ocean most of the year, and the likelihood that available mitigation would be effective with smaller spills, potential impacts from a 200 bbl spill are expected to be low. Potential impacts from a 2,000 bbl spill range from low to high and depend on whether and how many wetlands are affected.

Onshore Sources of Oil Spills. There are several hundreds of miles of pipelines onshore carrying oil products that, if spilled, could affect estuarine and wetland habitat. These pipelines carry foreign sources of oil from tanker offloading facilities to distribution centers, and domestic sources of oil, gas and oil products from onshore oil fields, processing facilities and refineries to market. Others bring Pacific OCS or State crude oil production onshore. The age of the pipeline network in the State of California is of serious concern as many of the oil fields and pipeline systems onshore were laid before current technology and inspection systems. A spill originating onshore, especially from a pipeline break crossing a river or streambed could send oil directly into a wetland. Impacts would be considered high due to damage to habitat and resources. Mitigation on newer pipelines such as the Point Arguello onshore segment or SYU pipeline to Los Flores Canyon include automatic shut down valves at river crossings to reduce the potential impacts to wetlands.

Incremental Impacts of Exploration and Development of the Undeveloped Leases on Estuarine and Wetland Habitats

Refer to Appendix I for a description of the cumulative projects listing evaluated as part of the analysis for development of the undeveloped leases under the hypothetical development scenario.

Pipeline Construction Activities. Wetland resources can be affected through the construction of onshore pipelines, and by oil spill impacts from existing and future platforms. In general, pipeline corridors are specifically chosen to avoid wetland areas and are required to do so through Federal, State, and local regulation. Additional mitigation placed on pipeline corridors near streambeds or estuaries include block valves, ensuring onshore spills can be isolated and limited in volume. Potential areas for these hypothetical platforms and associated pipeline corridors would not be located near important estuaries.

Mitigation measures required during the placement of the Santa Ynez Unit pipelines, which has a corridor coincident with the hypothetical Gato Canyon Unit pipeline route, included measures to reduce sedimentation of local streambeds. One of these measures dealt with removal of trees along the route, others with restricting placement of equipment and pipe during construction to minimize disturbance (Santa Barbara County, 1987, as cited in MMS, 2001). These measures were largely successful in reducing impacts to wetland resources; the replanting of trees, however, was not successful in several areas due to drought conditions following pipelaying. It is assumed that should pipelines eventually be proposed to support future offshore facilities, similar measures would be taken to reduce the potential impact on wetland and streambed areas along with additional measures as needed to address any unsuccessful aspects. Additional environmental analysis would be done to evaluate specific impacts of any future project. Given the general location of proposed, impacts to wetlands would be expected to be low from construction activities. Mitigation proposed to address sedimentation and disturbance would further reduce identified impacts.

Oil Spills. As discussed in Section 5.3, the cumulative oil spill risk for the study area results from several sources; ongoing and projected oil and gas production from existing Pacific OCS facilities in the Santa Barbara Channel and Santa Maria Basin, several potential development projects (Rocky Point, Cavern Point, Tranquillon Ridge, and up to four new platforms), ongoing production from one facility in State waters in the Santa Barbara Channel, two likely oil and gas projects in State waters, and the tankering of Alaskan and foreign-import oil through are waters. Tables in Section 5.3 present the estimated mean number of spills of various sized and the probability of their occurrence as a result of the described activities.

If it is assumed that a spill occurs from Pacific OCS oil and gas activities, the most likely case is that one or more spills in the 50 to 1,000 bbl range would occur from offshore oil and gas activities over the life of the hypothetical platforms, and that such a spill would be 200 bbl or less in volume. The maximum reasonably foreseeable oil spill volume from future offshore oil and gas activities is 2,000 bbl, assumed for purposes of analysis to be a pipeline spill. Impacts from a 200 bbl spill and 2,000 bbl are discussed in Section 5.3. While the impacts would be the same, the likelihood of occurrence is slightly increased when hypothetical development of the undeveloped leases are added in. Refer to the Oil Spill Risk Section for a discussion of risk.

5.7.8.3 Summary and Conclusion – Estuarine and Wetland Habitats

Most wetland and estuary habitat in southern California has been severely altered through commercial and residential development, resulting in less than 9 percent available habitat. This makes any impact resulting in loss of this rare habitat a high impact. Past, present and possible future cumulative impacts to wetland resources include: surface runoff resulting in sedimentation, and contamination, which are low to moderate impacts, agricultural practices increasing sediment load and introduction of harmful chemicals, producing moderate to high impacts, commercial and residential development resulting in severe reduction of habitat, a high impact, and pollution events such as sewage discharges, a low to moderate impact, risk of tanker spills, a high impact, risk of spills from existing oil and gas activities, a low to high impact, and risk of spill from all future Pacific OCS development, a low to high impact. Overall potential impact from the hypothetical development scenario is low; overall risk from existing and future Pacific OCS activities ranges from low to high, depending on the extent of oiling, and number of wetlands affected from any one spill event.

Table 5.7-13 summarizes the potential impacts of each phase of activity under the hypothetical development scenario on each unit for which a suspension has been requested.

Table 5.7-13. Comparison of Impacts to Estuarine and Wetland Habitats by Undeveloped Unit/Lease and Exploration/Development Phase.

Unit/Lease	Exploration and Delineation Drilling	Development and Production	Decommissioning
Cavern Point	No impact for all units and lease	Low/Moderate to High (oil spill) for all units	No impact for all units and lease
Gato Canyon			
Rocky Point			
Sword			
Bonito			
Santa Maria			
Purisima Point			

Point Sal			
Lion Rock			
Lease OCS-P 0409			

5.7.9 Refuges, Preserves, and Marine Sanctuaries

5.7.9.1 Significance Criteria

Impacts to refuges, preserves, and marine sanctuaries occur when their resources are affected. Impacts to these resources are addressed throughout Section 5.7, and include discussions of marine mammals, fish, commercial fishing, etc. In addition, Section 5.6 addresses impacts to marine water quality.

5.7.9.2 Impacts of Post-Suspension Activities

Cumulative Impacts without Activities on the Undeveloped Leases on Refuges, Preserves, and Marine Sanctuaries

Impacts to these resources may be found in Sections 5.7.1 through Section 5.7.8. Impacts to the refuges, preserves, and marine sanctuaries could be expected to occur from non-petroleum development activities including public use (damage to intertidal habitat and biota), commercial and recreation fishing within the boundaries of the protected areas (kelp, fish, and seafloor resource impacts), discharges of wastewater (effluent effects on the biota), and oil spills. Restrictions of activities and the existing regulatory requirements for development or discharge into the various refuges, preserves, and marine sanctuaries are expected to keep impacts from those sources low. Dependent upon the type and volume of petroleum, potentially moderate impacts could occur to the resources and habitats from an oil spill.

Incremental Impacts of Exploration and Development of the Undeveloped Leases on Refuges, Preserves, and Marine Sanctuaries

The potential impacts to the biological resources of the Channel Islands and Monterey Bay National Marine Sanctuary and the Channel Islands National Park from the development of undeveloped leases under the hypothetical development scenario are summarized in Table 5.7-14.

Table 5.7-14. Summary of Cumulative Impacts from the Potential Development of Undeveloped Leases to the Biological Resources of Channel Islands and Monterey Bay National Marine Sanctuaries and Channel Islands National Park Under a Hypothetical Development Scenario.

Resource	Impacts
Rocky and sandy beach habitats	Because pipeline and power cable construction would occur outside of the sanctuary and park boundaries no impacts are expected to occur to these resources.
Seafloor resources	Although delineation and exploration drilling, the construction of new platforms and pipelines, and additional drilling from existing platforms would occur, none of these activities would occur within the boundaries of the sanctuaries or park. Likewise, drill cuttings discharges from Platform Gail (the platform closest to sanctuary/park boundaries) would not be expected to affect seafloor resources within those areas. Therefore, no impacts would be expected to these resources.
Kelp beds	Because pipeline and power cable construction would occur outside of the sanctuary and park boundaries, no impacts would be expected to these resources.
Fish resources	Although activities would not occur within sanctuary or park boundaries, fish can be highly mobile and may move in and out of these areas. Impacts to fish resources would be expected to range from negligible to low.
Marine and coastal birds	No impacts would be expected to occur to these resources.
Marine mammals	Although activities would not occur within sanctuary or park boundaries, marine mammals are highly mobile and may move in and out of these areas. Impacts to marine mammals would be expected to range from negligible to low.
Threatened and endangered species	Although activities would not occur within sanctuary or park boundaries, many of these species are highly mobile and may move in and out of these areas. Impacts to threatened and endangered species range from none to low.
Estuaries and wetlands	No impacts would be expected to occur to these resources.
Onshore biological resources	No impacts would be expected to occur to these resources.

5.7.10 Onshore Biological Resources

5.7.10.1 Significance Criteria

In preparation for this analysis, the following impact level definitions were developed:

- **High.** Impacts that result in a measurable decline in a population beyond that which can be explained by normal variability, result in a measurable change regionally in species composition, ecological function or community structure, or result in a measurable reduction in regionally important habitat are considered to be high impacts. These changes would be at a level, areal extent and duration that it would be expected to place an individual species at risk, or alter the community structure or habitat on a regional scale for many years. Irreversible alteration of regionally important habitat or reduction of protected habitat would be considered high impacts.
- **Moderate.** Impacts that result in a measurable decline in species composition, species abundance, ecological function or community structure over several localized areas or result in alteration of locally important habitat are considered moderate impacts. These changes, while individually may persist for many years, are localized and cannot be detected on a population or regional level.
- **Low.** Impacts that result in a short-term change in species abundance or composition, a temporary loss in ecological function or community structure, a short term disturbance or temporary loss of access to locally important habitat are considered to be low impacts. For the purposes of this document, high and moderate impacts are considered to be significant, while low impacts are insignificant.

5.7.10.2 Impacts of Post-Suspension Activities

For the 2006–2030 time period, this analysis considers the cumulative impacts on onshore biological resources from: (1) existing and future Federal and State offshore oil activity; (2) other anthropogenic (military activities, agriculture, urban development) impact sources; and, (3) proposed and potential development of the currently undeveloped Pacific OCS Units and Lease OCS-P 0409.

Cumulative Impacts without Activities on the Undeveloped Leases on Onshore Biological Resources

Cumulative impacts that may have measurable, long-term (e.g., months or years) effects on onshore biological resources in the study area include substantial loss of Federally- or State-listed endangered and threatened species (addressed in Section 5.7.7), substantial loss of Federal Species of Concern, State Species of Special Concern, or locally important species that would jeopardize continued existence of the subject species within the region, loss or long-term disruption of wildlife movement corridors, and substantial loss of natural vegetation, sensitive plant communities, or community diversity in natural vegetation and wildlife habitat.

Construction and Remediation. Construction and remediation activities impacting onshore biological resources would generally include the temporary removal of vegetation, changes in local topography due to earthmoving activities (such as grading), associated changes in erosion and sediment deposition, the potential introduction of invasive weeds, and temporary disturbances to wildlife, wildlife corridors and habitat. The specific location, areal coverage (size), and duration of construction/remediation-related activities would determine the magnitude (significance) of potential impacts to onshore biological resources. Additionally, the ability of a given species or habitat to recover from construction/remediation disturbances would effect the magnitude of both short- and long-term impacts. Construction and remediation related activities are considered temporary in nature and their associated impacts can typically be mitigated to a moderate to low level. Examples of such mitigation include curtailing physical activities to specific time periods (hours, days or months), avoidance through staking and flagging, monitoring, and implementation of post-construction revegetation/restoration plans. Therefore, construction/remediation-related impacts on onshore biological resources that are associated with the potentially foreseeable projects listed in Table I-1 of Appendix I are anticipated to be low to moderate.

Within the immediate study area past construction activities directly associated with Pacific OCS-related oil and gas projects include the Lompoc Oil and Gas Plant, Point Arguello Processing Facility, Las Flores Canyon Oil and Gas Processing Facility, Carpinteria Oil and Gas Processing Facility, Rincon Oil and Gas Processing Facility, and their associated off- to onshore connecting pipelines. Related activities additionally include construction of the All American Pipeline. Impacts to onshore biological resources as a result of construction of these projects have been mitigated to a low to moderate level, or remain in the process of being mitigated to a low or moderate level through on-going restoration/revegetation efforts. No new onshore pipelines or facilities are planned for existing Federal and State projects or State-proposed projects and therefore no impacts on onshore biological resources would occur.

Long-Term Land Conversions. Implementation of some of the potentially foreseeable projects listed in Table I-1 of Appendix I would result in long-term conversions of existing land uses, such as the development of residential housing and commercial facilities. Some of these development projects would result in a net loss of undeveloped land, and thus a net loss of habitat. The loss of habitat would have associated impacts on wildlife and plant species. It is feasible to mitigate many of these impacts, either partially or entirely, through the implementation of measures such as the purchase of lands in other areas for conservation/preservation purposes. Additionally, significant impacts on State and Federally listed species and critical habitat due to land conversions would inherently require project-specific regulatory approvals that would likely include mitigation to minimize short- and long-term effects.

Cumulative impacts to onshore biological resources, therefore, would be anticipated to be low to moderate.

Urban, Industrial and Agricultural Development. Future urban, industrial and agricultural development would result in increased point and non-point discharges into surface waters, stormwater runoff, sedimentation and erosion, pollution, and overall human use/activity. These increases would affect onshore biological resources. Impacts associated with surface water would include direct and indirect impacts on wetland and riparian habitats (see Section 5.7.8). Additional impact discussion on water quality is found on Section 5.6. Increased erosion, pollution and human use would also impact these habitats, and result in both short- and long-term degradation of other onshore habitats and related plant and animal species, including sandy beach habitats, marine and coastal birds, and threatened and endangered plant and animal species. These impacts are addressed in Sections 5.7.1, 5.7.5, and 5.7.7, respectively. Project-specific regulatory permit and environmental review requirements (mitigation measures) would be anticipated to minimize these impacts to the extent feasible. However, the long-term, cumulative impacts on onshore biological resources from these IPFs could be significant depending on the extent, timing and intensity of future urban, industrial and agricultural development. Therefore cumulative impacts would be expected to range from low to high, depending on regional and local biological attributes and constraints.

Decommissioning. Future decommissioning of existing Pacific OCS and State tidelands facilities would involve the removal of both off- to onshore pipelines and onshore oil and gas processing and support facilities. These decommissioning activities would have IPFs similar those associated with construction-related activities and would be temporary in nature. Additionally, these decommissioning activities would likely require implementation of revegetation and restoration plans (and remediation plans, if necessary) as part of required project approvals to mitigate potential short- and long-term impacts. Therefore, effects on onshore biological resources would be anticipated to be low to moderate.

Pacific OCS Oil Spills. Impacts of oil spills associated with onshore pipelines depend on the location and extent of the pipeline rupture in relation to local topography, habitat, and wildlife abundance. The impact to vegetation and wildlife of an oil leak from a buried pipeline is generally limited in extent due to the limited mobility of oil in soil and the likelihood of detection and repair of the problem before the spread of oil is extensive. The cleanup process, which is another source of impacts, would consist of removal and replacement of contaminated soil and revegetation with native species. Although limited in extent, recovery could take several years, depending on the type of vegetation affected by the spill.

Impacts could be more severe, however, if a break occurs at a stream crossing or oil enters a stream or wetland from a nearby spill. Both the areal extent and duration of the impacts could be greater than that for a buried pipeline. Impacts would also be more severe if rare, threatened, or endangered species were involved. Overall, in the onshore study area, past, present, and future impacts to onshore biological resources of potential oil spills from existing Federal, State, and State-proposed oil and gas operations are expected to be low.

Incremental Impacts of Exploration and Development of the Undeveloped Leases on Onshore Biological Resources

The following is a brief discussion of the incremental impacts to onshore biological resources that may occur if the undeveloped Units and Lease OCS-P 0409 are developed. This scenario is detailed in Section 5.2 and includes construction and operation of off- to onshore pipelines (a 24-inch diameter oil emulsion and a 10-inch diameter gas pipeline) and a new processing facility in northern Santa Barbara County, and construction and operation of new off- to onshore pipelines connecting the Gato Canyon Platform to the existing Las Flores Canyon Oil and Gas Processing Facility. It is noted that construction and operation of any of the above facilities would include, as applicable, Federal and State regulatory agency consultations as development plans for these Units and Lease OCS-P 0409 are submitted.

Santa Barbara County (2000) conducted an analysis of the potential locations for a new pipeline corridor and processing facility in northern Santa Barbara County to accommodate potential development of the Santa Maria Basin. Although preliminary, the County's analysis identified two locations near the town of Casmalia (Casmalia East and Casmalia West) that may avoid many of the biological constraints that are known to occur in the area. For the purposes of this EID, it is assumed that the Casmalia East site would be the location for the onshore facility.

In its analysis, Santa Barbara County also identified a pipeline corridor for the Casmalia East facility, which may avoid many of the biological constraints that are known to occur in the area. For the purposes of this EID, it is assumed that the pipeline to this onshore processing facility would be constructed within this corridor. The County estimates the length of this corridor at about seven miles; therefore, the total area affected by the pipeline would be about 85 acres, based on the 100-foot corridor width estimated for the Point Pedernales Pipeline (A. D. Little, 1985, as cited in MMS, 2001). Based on the 16-acre area estimated for the Lompoc Oil and Gas Plant (A. D. Little, 1985, as cited in MMS, 2001), the development of the Santa Maria Basin Units could affect about 100 acres of land. The level of impact to this area would depend on the types of habitat and wildlife species involved, the presence of rare, threatened, and endangered species, and the effectiveness of mitigation measures, including revegetation efforts. Assuming effective mitigation, impacts to onshore biological resources would be anticipated to be low to moderate.

The Casmalia East site is located within the Casmalia Oil Field (County of Santa Barbara, 2000), and this area may already be disturbed to some degree. Although a survey of the biological resources of this site has not been conducted (County of Santa Barbara, 2000), the County indicates a concern for birds of prey and a riparian corridor to the south of the Casmalia East site. When development plans are submitted requesting approval of onshore construction, a detailed survey of the affected areas, including birds of prey and riparian habitat, would be conducted, from which a comprehensive impact analysis could be carried out. Until such an analysis is carried out, it is assumed that the impacts to onshore biological resources from the development of the leases would be low. This is based largely on the results of Santa Barbara County's Draft North County Siting Study (2000), one of the goals of which was to identify areas "that are relatively unconstrained with respect to development of oil and gas facilities serving offshore production."

Development of the Gato Canyon Unit would require the construction of three off- to onshore pipelines, including a 14-inch diameter oil pipeline, 8-inch gas pipeline, and 8-inch diameter water return pipeline. These pipelines would be placed in a 8.8 by 0.8 km (5.5 by 0.5 mile) pipeline corridor from the platform, through State Lease 2991.1, to landfall. At landfall the pipelines would follow the same right-of-way used for Platform Hondo's off- to onshore pipelines. Construction of these pipelines would involve disturbances to onshore biological resources from landfall to Las Flores Canyon. However, these disturbances would be temporary, fall within an existing (previously disturbed) pipeline corridor, and require agency reviews and approvals that would be anticipated to include mitigation measures to minimize construction-related impacts. Therefore, construction-related impacts would be anticipated to be low. Potential oil spills associated with the new 14-inch diameter oil pipeline would be anticipated to result in low impacts, as addressed under the discussion for cumulative impacts without development of the undeveloped leases.

Development of the Bonito, Rocky Point, Sword, and Cavern Point Units would not involve the construction or operation of any new off- to onshore, or onshore facilities and therefore would have no incremental impact on onshore biological resources.

Assumed exploration and delineation drilling activities for the Point Sal, Purisima Point and Gato Canyon Units would not involve the construction or operation of any new onshore facilities and therefore would not impact, individually or cumulatively, onshore biological impacts.

Decommissioning of the onshore facilities associated with the nine undeveloped leases and Lease OCS-P 0409 would be the same as those described above ("Cumulative Impacts Without Development Of The Undeveloped Leases On Onshore Biological Resources"), and would be anticipated to be low to moderate.

5.7.10.3 Summary and Conclusion – Onshore Biological Resources

The cumulative impacts to onshore biological resources from all sources for the period from 2006 to 2030, including any activities and accidental events that may be associated with the development of the undeveloped leases, range from low to moderate, depending on the habitat and species involved, the occurrence of an extensive onshore oil spill, and the level of future urban development.

Table 5.7-15 summarizes the cumulative impacts of each phase of activity for the nine undeveloped Units and Lease OCS-P 0409. Potential impacts to onshore biological resources would be associated with construction and operation of new off- to onshore pipelines and a new facility in the Casmalia area. As referenced above, no onshore activities associated with the Bonito, Rocky Point, Sword or Cavern Point Units would occur; therefore there would be no incremental impact on onshore biological resources for these Units.

Table 5.7-15. Comparison of Impacts to Onshore Biological by Undeveloped Unit/Lease and Exploration/Development Phase .

<table>
<tr><th>Unit/Lease</th><th>Exploration and Delineation Drilling</th><th>Development and Production</th><th>Decommissioning</th></tr>
<tr><td>Cavern Point</td><td rowspan="10">No Impact for all units</td><td>No Impact</td><td rowspan="10">None</td></tr>
<tr><td>Gato Canyon</td><td>No Impact</td></tr>
<tr><td>Rocky Point</td><td rowspan="3">No Impact</td></tr>
<tr><td>Sword</td></tr>
<tr><td>Bonito</td></tr>
<tr><td>Santa Maria</td><td rowspan="5">Low to Moderate</td></tr>
<tr><td>Purisima Point</td></tr>
<tr><td>Point Sal</td></tr>
<tr><td>Lion Rock</td></tr>
<tr><td>Lease OCS-P 0409</td></tr>
</table>

5.8 Cultural Resources

5.8.1 Significance Criteria

5.8.1.1 Archaeological Resources

A significant archaeological resource is one that meets the published criteria of the:

- National Register of Historic Places
- California Environmental Quality Act, Appendix K
- Shipwreck and Historic Maritime Resources Program administered by the State Lands Commission.

Any impact to a significant archaeological resource is considered a high level of impact. Therefore, significant impacts to archaeological resources occur when the integrity of a significant or potentially significant site is eliminated or reduced.

A resource's significance is determined with reference to the following criteria that establish its eligibility for the National Register of Historic Places:

- Associated with events that have made a significant contribution to the broad patterns of our history.
- Associated with lives of persons significant in our past.
- Embody the distinctive characteristics of a type, period or method of construction, or that represent work of a master, or possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.
- Have yielded, or may be likely to yield, information important in prehistory or history.

Under the California Environment Quality Act Guidelines (Appendix K), an archaeological resource is important if it is "unique" or "important" by meeting one of the following criteria:

- Associated with an event or person of recognized significance in California or American History or recognized scientific importance in prehistory.
- Can provide information that is both of demonstrable public interest and is useful in addressing scientifically consequential and reasonable or archaeological research questions.
- Has special or particular quality such as oldest, best example, largest, or last surviving example of its kind.
- Is at least 100 years old and possesses substantial stratigraphic integrity.
- Involves important research questions that historical research has shown can be answered only with archaeological methods.

The Shipwreck and Historic Maritime Resources Program administered by the California State Lands Commission defines "submerged archaeological site" and "submerged historic resource." The definition includes:

- Any submerged object, structure, building, watercraft or vessel and any associated cargo, armament, tackle, fixture, human remains or remnant, or
- Any site, area, person, or place, which is historically or archaeologically significant in prehistory or history or exploration, settlement, engineering, commerce, militarism, recreation or culture of California and which is partially or wholly embedded in or resting on State submerged or tidal lands.

The archaeological or historic significance of a site is determined by reference to its eligibility for the National Register of Historic Places. Any submerged archaeological site or submerged historic resource remaining in State waters more than 50 years is presumed to be archaeologically or historically significant.

5.8.1.2 Native American Concerns

Native Americans are concerned with any project or alteration to the area, which may cause a change to their way of life, with any condition, which may be considered as an intrusion into the spiritual nature of the area, or with any project which may impact prehistoric archaeological sites. The main impacting agents to Native American concerns in regards to post-suspension activities under a hypothetical development scenario are offshore structures, onshore facilities, and oil spills. Please see the more extensive discussion of Native American concerns in the Section 4.8.

Impact level definitions used in this analysis are as follows, with significant impacts being moderate and high.

- **High.** Religious or ceremonial sites unusable for more than a year, or gathering sites contaminated with one or two important subsistence or traditional use resources becoming locally unavailable for 1 to 2 years.
- **Moderate.** Religious or ceremonial sites are disturbed, or a gathering site disturbed with one or more important subsistence or traditional resources becoming locally unavailable for less than a year.
- **Low.** Structures that are located within the viewshed of major religious or ceremonial sites, or gathering sites disturbed with subsistence resources being affected for a period of less than one year, but no resource would become unavailable.

Potential impacts to both archaeological and Native American resources are addressed below.

5.8.2 Impacts of the Post-Suspension Activities

Impacts to archaeological resources may occur in an “area of operations” defined as the geographic area within which direct effects and indirect effects take place. (The “area of operations” is the same as the “area of potential effects.”) Two conditions must be present to have a direct impact to an archaeological resource. First, an operation must physically disturb the bottom. Second, the resource must be present in the area disturbed. Geophysical surveys that would occur during post-suspension activities would not physically disturb the sea bottom; therefore, no project-related impacts to cultural resources would occur. A potential, although rare, source of direct disturbance is the unauthorized recovery of objects by divers or other personnel.

Direct effects include those operations and activities, such as anchor placement, that may affect the physical integrity of bottom-founded archaeological resources. Indirect effects include long-term disturbances that interfere with the detection of the resource by remote sensing instruments, such as deposition of ferromagnetic materials that could “mask” detection of an archaeological resource by a magnetometer. Impacts may result from accidents including oil spills and oil spill cleanup.

Cumulative impacts to Native American resources are in addition to those listed above for archaeological resources. Impacts to pre-historic archaeological sites, even those not considered significant, are a particularly acute concern to Native Americans.

Existing mitigation measures and Unit/Lease stipulations for the protection of cultural resources as they relate to Pacific OCS activities are found in Appendix H.

5.8.2.1 Cumulative Impacts without Activities on the Undeveloped Leases on Cultural Resources

Physical disturbance caused by non-OCS development activities would be the source of project and cumulative impacts to submerged sites and upland sites, as identified in Appendix I. These sources include installation of seafloor cables, construction of sewage treatment infrastructure, commercial trawl fishing, anchoring, dredging, and unauthorized removal of artifacts by recreational scuba divers. Onshore, cumulative impacts may occur from a full range of construction activities and pilferage. Natural processes, such as shoreline erosion, also contribute to the destruction of cultural resources. Because of stringent monitoring and mitigation of Federal, State, and local agencies for actions that may affect cultural resources, permitted actions are likely to cause little cumulative impact.

A recent California Coastal Commission staff report noted that since 1988 the number of registered archaeological sites in San Luis Obispo County increased from 1,000 to 2,055 sites, most of which fall in the County's coastal zone. The report noted that the greatest source of destruction of archaeological resources came from urbanization and uncontrolled public access. Factors that must be addressed to ensure adequate protection of archaeological resources include adequate identification of resources and avoidance and mitigation to known resources (CCC, 2001, as cited in MMS, 2001).

Oil spill–related impacts are not expected to affect offshore cultural resources because of the nature of cleanup operations. Onshore archaeological sites could be affected by oil spills from existing Pacific OCS production facilities or non-OCS tankering and associated containment and cleanup activities. Oil spills could alter the chemical composition of archaeological materials and render them useless for carbon-14 dating. Oil-soaked soils would also be difficult to excavate and process. Oil spill containment and cleanup activities could result in extensive impacts to site deposits from the excavation of containment barriers (dams, berms, and trenches) and the mechanized removal of oil-soaked earth. Conditions in the Operator's Oil Spill Contingency Plan and U.S. Coast Guard's Area Contingency Plan mitigate potential damage during cleanup operations through coordination with Native Americans and consideration of sensitive sites in planning placing of staging areas, trenching operations, and other cleanup activities.

The impact from existing offshore oil and gas platforms on the traditional cultural property at Point Conception would remain as long as the existing platforms are in the viewshed.

5.8.2.2 Incremental Impacts of Exploration and Development of the Undeveloped Leases on Cultural Resources

For Native American concerns, an impact would occur if an exploratory drilling rig (MODU, see Appendix K) or platform (see Section 5.2 for a description of the hypothetical locations of new platforms) is within the viewshed of a sensitive site. If the offshore structures are within the viewshed of Point Conception's traditional cultural property, an impact would occur.

For a MODU to create a moderate or high impact to the site, the drilling unit would have to create a "disturbance" or render the site "unusable" for a year. These effects may be analyzed with reference to National Register Bulletin 38, Guidelines for Evaluating and Documenting Traditional Cultural Properties (Parker and King, 2001, as cited in MMS, 2001). At the time the evaluation was made as to the site's potential eligibility, offshore oil and gas structures from the Point Arguello field were (and still are) visible from Point Conception. As such, their presence did not affect the integrity of relationship or integrity of condition that must be present for a site to be considered eligible.

Bulletin 36 notes "in order to be eligible for inclusion in the Register, a property must have integrity of location, design, setting, materials, workmanship, feeling, and association." In the case of a traditional cultural property, there are two fundamental questions regarding integrity: whether the property has an integral relationship to traditional cultural practices or beliefs; and whether the condition of the property is such that the relevant relationships survive.

> "Assessing the integrity of the relationship between a property and the beliefs or practices that may give it significance involves developing some understanding about how the group that holds the beliefs or carries out the practices is likely to view the property. If the property is known or likely to be regarded by a traditional cultural group as important in the retention or transmittal of a belief, or to the performance of a practice, the property can be taken to have an integral relationship with the belief or practice, and vice-versa" (Parker and King, 2001, as cited in MMS, 2001).

Given the hypothetical development scenarios for the undeveloped leases, post-suspension activities would not appear to alter this integral relationship to cultural practices or beliefs.

For the second criterion, the bulletin notes, "like any other kind of historic property, a property that once had traditional cultural significance can lose such significance through physical alteration of its location, setting, design, or materials. In some cases a traditional cultural property can also lose its significance through alteration of its setting or environment. A property may retain its traditional cultural significance even though it has been substantially modified, however. Cultural values are dynamic, and can sometimes accommodate a good deal of change. The integrity of a possible traditional cultural property must be considered with reference to the views of traditional practitioners; if its integrity has not been lost in their eyes, it probably has sufficient integrity to justify further evaluation" (Parker and King, 2001, as cited in MMS, 2001).

Concern over the past, current, and potential development on Point Conception and the effect that development may have on the qualities of the site have been expressed and are of an ongoing concern to some Chumash people (Khus-Zarate, 1998, as cited in MMS, 2001). Because the development scenarios for the undeveloped leases would not result in new platforms near Point Conception, the post-suspension activities would have a temporary, low impact and do not appear to affect the integrity required by the second criterion.

As noted above, physical disturbance of the seafloor is the primary cause of direct impacts to offshore archaeological resources. For Pacific OCS development, operators are required to either avoid potential sites or conduct further investigations of potential sites to document their true nature and design further mitigation, if necessary. As a result, the greatest potential for impact comes from seafloor disturbance of previously undetected sites by construction of infrastructure (platforms and pipelines). Drilling operations can directly impact prehistoric cultural resources by drilling through buried archaeological deposits. After the infrastructure is installed, potential for seafloor disturbance from Pacific OCS operations ceases.

Indirect offshore impacts resulting from introduction of a rig would include permanent disturbance of the magnetic field from the time of construction to an undetermined but lengthy period until decommissioning. These disturbances can prevent identification of previously undetected cultural resources. Magnetic disturbance surrounding a typical platform covers a roughly circular area with a radius of approximately 460 meters. Indirect impacts from the magnetic field of pipelines would be similar in duration to those associated with platforms. The horizontal zone of magnetic disturbance from a typical large pipeline may extend to 160 meters or more on either side of the centerline.

Onshore, the primary cause of direct impacts is the disturbance to sites by earth moving and excavation associated with pipeline installation and onshore processing facilities. Construction-related activities that could directly or indirectly impact cultural resources include removal of vegetation from a ROW corridor, surface and subsurface disturbance in zones of heavy equipment movement, excavating a common pipeline trench for the lines, and backfilling pipeline trenches and cleaning the ROW with heavy equipment.

Indirect impacts to a site could result from increased erosion of a site attributable to the original action and use of areas outside of construction corridors for expedient movement of construction equipment, and from unauthorized artifact collection.

Following are discussions of the potential effects of specific post-suspension activities at each hypothetical development area.

Accidents. Indirect impacts may result by the accidental deposition of ferro-magnetic debris on the seafloor that would mask the detection of potential archaeological resources by remote sensing instruments. Accidents would not be anticipated to cause unique impacts to cultural resources on any Unit or Lease.

Exploration and Delineation Drilling. Another potential source of disturbance results from delineation drilling (MODU) operations, including setting down the guide base, setting casing, and drilling; and from abandonment operations including cutting the casing and removing guide base. These disturbances occur in the immediate vicinity of the drilling vessel, well within the area of direct effects from vessel anchoring.

Anchoring. The most likely potential source of disturbance comes from anchor deployment and recovery operations for the drilling vessel, barge, and support vessels. The vessel typically deploys eight, 45,000-pound anchors, two from each corner of the rig, placed at predetermined locations varying distances from the rig based on water depth. Anchor scope, the ratio distance at which the anchors are set from the rig to the depth of the exploration well location, varies from unit to unit. In anchoring the MODU, an anchor tender boat motors away from the rig running the anchor chain out to the required length. Approximately half way to the anchor location, the tender begins to lower the anchor on a work wire while continuing toward the final anchor location. Finally, the anchor is lowered to the seafloor and the appropriate tension is placed on the chain. Support vessel and barge anchoring may also act as the source of impacts.

Pilferage. A potential, although rare, source of direct disturbance would be the unauthorized recovery of objects by divers or other personnel. Similarly, should sensitive information be obtained by the public due to the identification and avoidance of a resource from oil and gas activities, it would make it more vulnerable to unauthorized recovery.

Gato Canyon Unit. Development of the Gato Canyon Unit would not be likely to result in impacts to offshore or onshore archaeological resources. Potential impacts would most likely result from encountering previously undetected sites. Pre-construction analysis would likely identify any seafloor anomalies that may be potential archaeological resources and allow planned avoidance of those sites. The platform-to-shore pipelines would intersect areas containing submerged landforms considered highly sensitive for prehistoric sites. However, since the pipeline would not be buried in this area; therefore, no impact would result. Onshore pipeline construction would occur in the Las Flores Canyon area, which has been previously surveyed and is a currently utilized pipeline corridor. In the past, the stringent archaeological resources monitoring and mitigation requirements of Santa Barbara County have reduced the likelihood of direct and indirect impact to onshore archaeological resources, even when the sites were previously undetected.

According to data furnished by the operator, anchors would be deployed between 2,500 and 3,500 feet around the MODU. Delineation drilling operations described above would take place on the Unit at a single location. As noted in Table 4.8-5, no vessels have been reported as lost within the Unit. A Fisherman's Contingency Fund Claim for gear loss due to unknown causes (which may indicate a potential cultural resource site) was reported on OCS-P0462 and 0464, at a location well outside the area of operations. Additional data analysis and survey have been ordered for the area of operations to identify any sites that would need to be avoided.

Northern Santa Maria Basin. A number of concerns expressed by Native Americans regarding the direct and indirect effects of construction would occur as a result of the pipeline and facilities in Shuman Canyon. The traditional use of resources in Shuman Canyon has not been evaluated. However, the impact could be of moderate to high significance if the resources are present and were to become locally unavailable for a period of time.

Offshore development in the Northern Santa Maria Basin would, at most, result in negligible impacts to offshore and onshore archaeological resources. Based on past experience, these impacts would most likely result from encountering previously undetected sites. Pre-construction analysis would likely identify any seafloor anomalies that may be potential archaeological resources and allow planned avoidance of those sites.

Sensitive submerged landforms are present in the offshore area. The landform area located on lease OCS-P0409, the hypothetical location of Platform OSMB A, is associated with the 18,000-year-old shoreline. The area on lease OCS-P0431, the hypothetical location of Platform OSMB C, is seaward of the 16,500-year-old shoreline. Both date to the period well before the time of known human occupation of the area and are not likely to contain prehistoric archaeological resource sites. There are no relict landforms identified on lease OCS-P0422, the area associated with the hypothetical location of platform OSMB C. The hypothetical platform-to-shore pipeline intersects areas containing submerged landforms considered highly sensitive for prehistoric sites. However, since the pipeline would not be buried in this area, no impact would be anticipated.

Several vessels have been lost in the area from the Santa Maria River to Purisima Point. Stranding, where the ship runs aground on the coastline or shallow offshore rocks and reefs, is the primary cause of vessel loss. In addition, the area immediately adjacent to the coastline is considered a sensitive area for locating wrecked vessels. The hypothetical platform-to-shore pipeline traverses this area and has the potential to impact significant shipwreck sites immediately offshore and associated debris onshore if sites are not detected and avoided.

The archaeological site data summarized in Table 4.8-4 reveal that the potential corridor of the pipeline landfall to the processing plant contains several prehistoric and historic sites. In the past, the stringent archaeological resources monitoring and mitigation requirements of Santa Barbara County and VAFB reduced the likelihood of significant direct and indirect impact to onshore archaeological resources, even when the sites were previously undetected.

The extent of the damage to archaeological resources from an oil spill would depend on the area oiled by a spill, the presence of sites in the area, and the nature of cleanup operations. Accident-related impacts on offshore archaeological resources would not be expected. Resources located in the intertidal zone, such as portions of wreck sites around the Channel Islands, could be affected. (All islands within the Channel Islands National Park and Channel Islands National Marine Sanctuary are either listed or eligible for listing as Archaeological Districts on the National Register of Historic Places.) Onshore, archaeological sites could be affected by oil spills and associated containment and cleanup activities. Along the coastline that could be affected by the three spills analyzed, known sites tend to be concentrated around watersheds in less-developed areas. Oil spill–related impacts, should they occur, could be significant depending on the characteristics of the sites affected and the ability to mitigate those impacts. The larger the spill, the greater the likelihood of impacts. In 1997, Federal departments and agencies entered into a programmatic agreement to ensure that historic properties (that is, cultural resources) are taken into account in their planning for a conduct of the emergency response under the National Oil and Hazardous Substances Pollution Contingency Plan (ACHP, 1997, as cited in MMS, 2001).

Point Sal Unit. According to data furnished by the operator, drilling rig anchors would be deployed between 1,100 to 1,900 feet around the MODU. Exploration and delineation drilling operations described above would take place on the Unit at a single location. A prior remote sensing survey and report for lease OCS-P0416 revealed indication of potential archaeological resource sites. Additional data analysis and survey have been ordered for the area of operations to identify any sites that would need to be avoided. The southeast portion of lease OCS-P 0422 may contain a relict lagoon, estuary, or embayment and potential prehistoric resource sites. This area would be unaffected by operations. No vessel is listed as being lost on the leases. No vessels have been reported as lost within the Unit.

Purisima Point Unit. According to data furnished by the operator, rig anchors would be deployed between 1,100 to 1,900 feet around the MODU. Delineation drilling operations described above would take place on the Unit at a single location. A prior remote sensing survey and report for lease OCS-P 0432 revealed indication of potential archaeological resource sites. Additional data analysis and survey have been ordered for the area of operations to identify any sites that would need to be avoided. No vessels have been reported as lost within the Unit.

5.8.3 Summary and Conclusion

Table 5.8-1 summarizes the potential impacts of each phase of activity under a hypothetical development scenario on each unit for which a suspension has been requested.

Table 5.8-1. Summary of Potential Impacts on Cultural Resources by Unit/Lease and Exploration/Development Phase.

Unit/Lease	Exploration and Delineation Drilling	Development and Production	Decommissioning
Cavern Point	None	Low to Moderate/High (oil spill)	Low for all units
Gato Canyon	Low		
Rocky Point	None		
Sword	None		
Bonito	None		
Santa Maria	None	Moderate to High (oil spill and pipeline and facilities in Shuman Canyon)	
Purisima Point	Low		
Point Sal	Low		
Lion Rock	None		
Lease OCS-P 0409	None		

A low level of impact would be expected from the placement of platforms that may be slightly visible from the Point Conception area. Routine operations would not be expected to affect the traditional cultural resource qualities of Point Conception that make it eligible for the National Register. Moderate to high cumulative impacts to archaeological resources from potential construction of offshore and onshore production facilities and offshore spills are possible. Participation by Native Americans in Santa Barbara County's monitoring and mitigation activities have proven very effective in addressing Native American concerns regarding construction impacts, although some disagreements were noted in the past. Potential impacts to traditional resources in Shuman Canyon, if present, could be moderate to high. In past projects, moderate to high impacts have been successfully mitigated by Federal, State, and local regulations and mitigation measures.

Archaeological resources are present in the area. Impacts are not anticipated as a result of the anchoring or delineation drilling since these operations would avoid potential resource sites. Cumulative impacts for these activities are the same as without their occurrence. Significant cumulative impacts to archaeological resources from potential construction of offshore and onshore production facilities are not likely. Oil spill–related impacts, should they occur, could be cumulatively significant for coastal cultural resources.

5.9 Visual Resources

5.9.1 Significance Criteria

The following significance criteria were used to classify the visual impacts from post-suspension activities:

- **High.** The Visual Resources Impact Area (VRIA) encompasses major public viewing areas during the highest-use period (Memorial Day through Labor Day).
- **Moderate.** The VRIA encompasses major public viewing areas during moderate use period (generally, April through Memorial Day and Labor Day through October), as well as of existing visual impacts from major public viewing areas due to offshore development viewing areas during the moderate use period (generally, April through Memorial Day and Labor Day through October).
- **Low.** The VRIA encompasses areas of public viewing during the non-peak season (November, December, January, February, March), as well as existing visual impacts from major public viewing areas due to offshore development during the viewing during the non-peak season (November, December, January, February, March).
- **Negligible.** Impacts at this level would result where the VRIA does not encompass major public viewing areas or where post-suspension activities do not expand the area of existing visual effects from offshore development.

Impacts classified as medium or high are considered significant impacts. Impacts classified as low or negligible are considered not significant.

5.9.2 Impacts of the Post-Suspension Activities

Post-suspension activities resulting from a hypothetical development scenario of the undeveloped leases would include a range of short-term and long-term changes to the visual environment. Survey crews would possibly be visible from certain viewpoints, particularly in clearer weather or when the viewer is stationary, but they would be present for relatively short periods of time. As a result, they would more likely be seen as an item of interest rather than as a distraction. For the few days or weeks the crews would be out on the water, they would be largely indistinguishable from the normal boat and ship traffic of an active coast. Four future oil platforms are included in the hypothetical development scenario. These facilities would be large, industrial in character, and stationary with no pretenses as to their purpose.

The visual impact of offshore production structures and onshore processing facilities has been a matter of substantial public concern since the inception of offshore oil development more than a century ago (Lima, 1994; MMS, 1996, as cited in MMS, 2001). A number of strategies developed to address visual impacts from drilling on offshore leases have been developed, including restrictions on where development would be permitted, technology that would be used for development (platforms, subsea completions, slant drilling from upland locations), and the location of onshore facilities. In 1967, to minimize the number of onshore processing plants, Santa Barbara County developed criteria for the siting of consolidated onshore processing facilities. These criteria were eventually crafted into zoning ordinances requiring the use of consolidated facilities for the processing of offshore oil and gas (Lima, 1997, as cited in MMS, 2001).

The rail line, beaches, and roads described in Section 4.9 are highly sensitive travel routes and use areas. Most of the potential impact would occur from views from these areas.

5.9.2.1 Cumulative Impacts without Activities on the Undeveloped Leases on Visual Resources

Projects identified in the cumulative scenario (continued production, decommissioning, and LNG and desalination project activities, for example) have the potential for moderate or high visual impacts, as they would substantially degrade the visual quality of the area year-round. However, the contribution of existing clusters of platforms, such as those in the Santa Barbara Channel, to cumulative visual impacts would cease when the last platform in the cluster is decommissioned and the above-water structure removed. Onshore facilities, when decommissioned, would be restored to their pre-development condition. However, residual visual impacts (such as pipelines, shoreline industrial facilities, etc) would be expected to remain through the end of the study period (2030). Despite past efforts to site platforms with the greatest possible visual benefit, significant visual impacts remain. Each additional development creates new project-related impacts and increases the area of cumulative impacts. Strategies developed to address residual project-related and cumulative effects to visual resources include siting of facilities, screening of facilities, and payments to dedicated funds to offset the impacts (SAIC, 1984; A. D. Little, 1984, 1985, as cited in MMS, 2001). These strategies have had varying degrees of success. However, most visual impacts resulting from industrial structures, particularly in offshore areas, remain significant and unavoidable due to lack of any feasible mitigation measures to reduce physical intrusions into high quality vistas. (See, for example, SBC, 1993, as cited in MMS, 2001).

5.9.2.2 Incremental Impacts of Exploration and Development of the Undeveloped Leases on Visual Resources

Under the hypothetical development scenario, three new platforms would be visible from the northern portion of Vandenberg Air Force Base (VAFB) and the surrounding area (Lion Rock, Point Sal, and Santa Maria Units). These would all be north of the existing Platform Irene, and would expand the length of the horizon dotted with platforms. While most of the area with sight lines to these platforms would be within the confines of VAFB, which is a restricted-access facility, some, if not all of the new platforms would be visible from Guadalupe Dunes State Park north of the base.

The fourth platform would be located within the Gato Canyon Unit, south and offshore from the ExxonMobil Las Flores Canyon processing site. While the platform would not be visible from any large population centers, it would be visible from Route 1/101, an Eligible State Scenic Highway (CalTrans, 2004). This area includes multiple existing platforms, which contribute to the visual degradation of this area.

The primary post-suspension activity under a hypothetical development scenario that would create physical impacts would be installation of new platforms, as well as the increased vessel traffic from crew and supply boats and helicopters. The development of the undeveloped leases would result in the introduction of new structures and offshore activities. In particular, the new platforms would result in high-level unmitigable significant cumulative impact, because of the incremental increase of these industrial structures offshore, and the lack of any feasible mitigation measures to reduce physical intrusions into high quality coastal vistas.

5.9.3 Summary and Conclusion

The following is a summary of potential visual impacts under a hypothetical development scenario:

- The only source of project and subsequent cumulative visual impacts for the seascape originates from additional platforms from new offshore development since no other foreseeable activity results in above-water structures.
- New platforms do not increase the already significant cumulative impact to visual resources. It does expand the area where those effects are realized.

- Using existing onshore and offshore facilities in new development does not create new visual impacts but may extend the duration over which those impacts are present.
- Pipeline construction and operation is not expected to significantly increase cumulative impacts.
- The construction of onshore processing facilities in the northern Santa Maria Basin may create significant impacts to onshore visual resources.

Table 5.9-1 summarizes the potential impacts of a hypothetical development scenario by Unit and each phase of development. During exploration and development key visual impacts would be related to the vessels required for surveys and platform construction. Although temporary, some of these impacts would be considered high due to their location. During development and production those leases that involve placement of a new platform (the Gato Canyon, Santa Maria, Point Sal and Lion Rock Units) would be anticipated to have high impacts. Because all of the leases require a platform for development, they would all contribute, either directly or indirectly, to potential impacts during decommissioning activities, which would be similar to construction phase activities. It is noted that these impacts would occur after the year 2030 (see Section 5.2)

Table 5.9-1. Summary of Potential Impacts on Visual Resources by Unit/Lease and Exploration/Development Phase.

Unit/Lease	Exploration and Delineation Drilling	Development and Production	Decommissioning
Cavern Point	Moderate to High for all units (vessel and crew traffic)	Moderate	High (timeframe of completion would be beyond 2030)
Gato Canyon		High	
Rocky Point		Moderate	
Sword		Moderate	
Bonito		Moderate	
Santa Maria		High	
Purisima Point		Moderate	
Point Sal		High	
Lion Rock		High	
Lease OCS-P 0409		Moderate	

5.10 Recreation

5.10.1 Significance Criteria

Impacts to coastal and beach recreation and associated tourism from offshore oil and gas development may result from the following:

- Temporary effects from offshore development activity such as use of campground facilities by construction crews, temporary changes in use patterns, or beach or campground closures
- Long-term effects from the presence of onshore infrastructure such as processing facilities and offshore oil platforms that may change use patterns
- Temporary and long-term effects of an oil spill that may change use patterns.

For recreation, an impact is considered significant when it causes:

- Permanent or long-term preclusion of a recreational use or temporary preclusion during peak season use; or
- Long-term loss or degradation of the recreational value of a major recreational use (extending beyond the construction period).

For further specificity, these impacts can be classified as:

- **High.** Complete closure of water-oriented recreational facilities for a short period during the peak season, or a partial closure for most or all of the peak season, or a 15 percent or greater economic loss to the industry over a comparable time period of previous years
- **Moderate.** Complete closure of water-oriented recreational facilities for a period during the low-use season, or a partial closure for an extended period during non-peak season for recreation and tourism, or a 5 percent or greater economic loss to the industry over a comparable time period of previous years.
- **Low.** Partial closure of water-oriented recreational facilities for a short period at any time of year, or a less than 5 percent economic loss to the industry over a comparable time period of previous years.

These categories explicitly recognize that a water-oriented recreational facility does not have to be closed or completely inaccessible in order for significant impacts to occur. A facility may remain open, but the recreation quality diminished to the point that a significant impact (moderate or high) has occurred. Water-oriented recreation is separate from other types of recreation and locations. The determination of impact examines the value of water-oriented recreation as opposed to the entire recreation sector. Moreover, water-oriented activity does not necessarily occur on the water or at or near the water's edge.

5.10.2 Impacts of the Post-Suspension Activities

Post-suspension activities are assumed to include development of the currently undeveloped Pacific OCS leases under a hypothetical development scenario as well as a range of other cumulative projects listed in Appendix I. Visual impacts, which may affect some recreation activities, are discussed in Section 5.9.

5.10.2.1 Cumulative Impacts without Activities on the Undeveloped Leases on Recreation

Appendix I lists other large-scale construction projects in the study area that would result in a migration of temporary workers to the area, contributing to the demand for campsites at public recreational facilities. While not precisely defined, communities in the region often cite coastal recreation and tourism as a public policy and planning goal. Essentially, coastal tourism derives from full appreciation of the unique qualities and resources of a particular coastal region. Once a region's natural and cultural amenities, and the threats to them, are thoroughly characterized, public and private investments can be directed toward their management. Achieving this goal requires meeting a number of difficult objectives. To varying degrees, elements contributing to cumulative effects to recreation include:

- Continued sprawl development
- Restricted public access
- Non-point pollution problems caused by urban and other runoff
- Resolving conflicts among coastal recreation activities
- Other forms of environmental degradation caused by intensifying development and multiplying recreational activities
- Cumulative effects of environmental and socioeconomic trends.

Many factors affect recreational resources including supply, demand, site quality and accessibility, and site closures and restrictions, as well as diversification and expansion of activities (Pollock 1997, as cited in MMS, 2001). Communities recognize recreation opportunities, especially coastal-dependent and coastal-enhanced recreation, as a defining characteristic of the community for both resident and visitor (King 1997, MMS 1996a-c, MMS 2000, as cited in MMS, 2001). Population growth is a robust predictor of demand for recreation (Science Applications Inc, 1984, as cited in MMS, 2001). By 2040, population is projected to grow 145 percent for San Luis Obispo County, 110 percent for Santa Barbara County, and 90 percent for Ventura County.

Routine offshore energy development affects recreational resources through construction activity which may impact recreation facilities, use of campground facilities as temporary housing sites for in-migrant workers engaged in construction of onshore and offshore facilities, and use conflicts created by the presence of offshore and onshore infrastructure. Impacts from upsets and accidents include restriction on access to sites and preclusion of certain activities at sites.

From 1985 through 1995, a socioeconomic monitoring and mitigation program evaluated impacts from offshore oil, gas, and pipeline projects on Santa Barbara and Ventura Counties. While impacts varied from project to project, the impacts from construction worker use of campgrounds were of sufficient magnitude to trigger mitigation payments to Santa Barbara County. Campground use accounted for approximately $99,000 or 1 percent, of the total socioeconomic impact mitigation payment. No mitigation payment for campground impacts was made to Ventura County (MMS, 2000, as cited in MMS, 2001).

Santa Barbara County Findings of Approval for past offshore oil and gas projects in Santa Barbara County have found adverse project and cumulative impacts to recreation, tourism, and aesthetics from construction and operation of the project. To mitigate general, diffused project and cumulative impacts in these and other areas, Santa Barbara County created a Coastal Resources Enhancement Fund (CREF), which receives annual payments over the life of designated projects with funds to be used for efforts that enhance coastal recreation, aesthetic, tourism, or other environmentally sensitive resources (SBC, 1993, as cited in MMS, 2001).

Restrictions of ocean water contact activities, through water quality advisories or beach closings, have occurred and are expected to occur in the area. Also, some areas have been closed to public access to protect the nesting of shorebirds. For the purposes of accidents, researchers suggest that there are three periods of time that need to be evaluated in determining socioeconomic impacts (Deacon and Kolstadt, 2000, as cited in MMS, 2001) from an oil spill:

- Closure period when the beach is officially closed for cleanup.
- Physically degraded period when the beach is open but the experience is degraded because there is still evidence of pollution.

- Perceptually degraded period when the beach is physically clean yet the memory of the accident is fresh enough that the quality of the experience may be somewhat degraded. As such, the duration of impact may exceed the time that the beach is closed or physically degraded.

Seasonal closure of beach areas north of Point Conception for the protection of nesting shorebirds is expected to continue. Advisories and beach closures from degraded water quality attributable to non-point sources are expected to continue. Depending on the duration of these notices, locally significant impacts could result. Other factors, such as closure of access at Point Sal State Beach, or restrictions on access due to seasonal beach erosion, degrade the recreational value of these resources even if they are of a temporary nature. This impact could be moderate to high and locally significant. CREF payments are reduced as each Pacific OCS project contributing to the cumulative effect is decommissioned. While payments into CREF do not mitigate the significant physical impacts (e.g., introduction of visual obstructions, recreational resource closures, etc.) to visual and recreational resources, the funding does improve the general visual and recreational opportunities available throughout the region by providing monies that facilitate programs to help improve or create new resources within the community. However, removal of this funding mechanism in and of itself would not be a significant impact because it represents the existence of fewer projects that could adversely impact important visual and recreational coastal resources. The benefits associated with the general and steady decline of the oil and gas industry would more than outweigh the loss of this fund.

Section 5.3 describes the probability of occurrence of oil spills of various sizes. A spill of 200 barrels from Pacific OCS production would probably not be regionally significant. This would be a low impact because it would be unlikely to result in complete closure of recreational facilities**.** However, closing a remote beach that provides the area's only access for one week to two weeks during a period of high use could be locally significant. Using the above criteria, this would be a moderate to high impact. Significant cumulative impacts could result if attendance had been affected by recent advisories and/or closings from other causes.

A spill size of 2,000 barrels from Pacific OCS production or 22,000 barrels from non-OCS tankering increases the likelihood of regionally significant impacts (moderate to high). The wider the area oiled, the more locations that may be impacted, affecting greater numbers of participants. As the area of affect increases, the ability to substitute activities at different locations becomes more difficult. Deployment of containment booms could result in the closure of small craft harbors. Closing the Santa Barbara, Ventura, or Channel Islands (Oxnard) small craft harbors would preclude much of this vessel activity for the duration of the closure. Similarly, on-island activity would be affected, with greatest reduction in visitor days occurring to Anacapa or Santa Cruz Island. (During the peak season, inter-island substitution may not be possible since the islands have restriction on the maximum number of visitors at any given time and the hauling capacity of park concessionaires is limited by boat occupancy restrictions. The peak season for island visitation occurs March through October, with the greatest use occurring May through June).

Since beach areas are geographically compact and concentrate water-oriented activities, impacts from a spill could be significant (moderate to high), despite the relatively small area affected. Even a small area of closure could result in a significant impact if the area represents a major recreational resource (the Channel Islands, for example), or is the only coastal recreational opportunity (a rural beach access point, for example).

Table 5.10-1 presents data on the length of shoreline that may be affected for various sized oil spills. Cleanup of a smaller spill (200 barrels or less) may take one to two weeks, whereas a larger spill may take up to 30 days or more (pers. comm., Tarpley 2001, as cited in MMS, 2001). Effects to recreation would be location-specific and vary seasonally, but could be significant (moderate to high, depending on location and timing of the spill).

Table 5.10-1. Oil Spills for Cumulative Impact Analysis.

Source	Size of Spill (bbl)	95% Probability That Spill Reaching Shore Will Contact Length of Coastline Greater Than x km (mi)	5% Probability That Spill Reaching Shore Will Contact Length of Coastline Greater Than x km (mi).
Pacific OCS production	200	1.04 (0.65)	18.9 (11.7)
Pacific OCS production	2,000	2.84 (1.76)	52.5 (36.2)
Tankering	22,800	8.87 (5.52)	161.4 (100.3)

Source: MMS, 2001.

5.10.2.2 Incremental Impacts of Exploration and Development of the Undeveloped Leases on Recreation

No significant new demand on the area's recreation facilities would result from post-suspension activities under a hypothetical development scenario. As noted in Section 5.12, Social and Economic Environment, no impacts to population or housing would be expected because post-suspension activities under the development scenario would not substantially increase area population. As such, post-suspension activities would not increase demand for recreation or associated facilities.

Under the hypothetical development scenario discussed previously, post-suspension activities would include new pipelines and four new platforms. The three new platforms and new off- to onshore pipelines associated with the northern Santa Maria Basin would not appear to interfere with recreational uses of the immediate coastal area. Construction of the off- to onshore pipelines would not interfere with on-shore recreation since the pipeline landfall would be within an area with restricted public access by VAFB. Pipeline construction in the area of Point Sal Road could impede access to Point Sal State Park. Campground use by project construction workers would possibly impact campground availability during pipeline construction as well. These potential impacts would incrementally contribute to cumulative impacts from existing offshore oil and gas projects that have been found to be significant (moderate to high), especially during construction. The cumulative potential impact to recreational resources from the hypothetical processing plant new Casmalia is not known, but could be locally significant (moderate to high) during the construction period.

Because of its assumed distance from shore, the Gato Canyon Unit platform would not be expected to interfere with offshore recreational use of the area. Construction of the off- to onshore pipelines would likely preclude certain water contact uses in the near-shore area, such as scuba diving, kayaking, swimming, beach activities and use of the bike path between Refugio State Park and El Capitan State Park. Campground use by project construction workers could impact campground availability during pipeline construction. These potential impacts would incrementally add to cumulative impacts from existing Pacific OCS activities that were previously found to be significant (moderate to high).

Under the hypothetical development scenario, operation and production of these four new platforms would slightly increase the risk of oil spills that could preclude ocean-dependent recreational activities in affected areas. In addition, the platforms and other new industrial facilities potentially would significantly degrade the visual character of the area (see Section 5.9), which in turn degrades the quality of the coastal recreational experience.

The remaining undeveloped Units would use existing off and onshore Pacific OCS related facilities and no new impacts to recreation would be anticipated to occur.

Decommissioning activities would involve platform removal, pipeline removal (off- and onshore), and onshore facility removal and restoration. These activities would generally require the same types of construction equipment, vessels and crews as construction-related operations. Although many of these potential impacts are considered temporary in nature, they have been previously found to be significant and, therefore, are considered to range from low to high, depending on site and activity-specific attributes.

Using the above criteria, the incremental impact of post-suspension activities would be moderate to high, which is considered a significant impact.

5.10.3 Summary and Conclusion

Table 5.10-2 summarizes the potential impacts of each phase of activity under a hypothetical exploration and development scenario on each undeveloped unit and Lease OCS-P 0409.

Table 5.10-2. Summary of Potential Impacts on Recreation by Unit/Lease and Exploration/Development Phase.

Unit/Lease	Exploration and Delineation Drilling	Development and Production	Decommissioning
Cavern Point	Low for all units and lease	Low to High (oil spill and visual degradation)	Low to High for all units and lease
Gato Canyon		Moderate to High (oil spill, campgrounds, and visual degradation)	
Rocky Point		Low to High (oil spill and visual degradation)	
Sword			
Bonito			
Santa Maria		Moderate to High (oil spill, campgrounds, and visual degradation)	
Purisima Point			
Point Sal			
Lion Rock			
Lease OCS-P 0409			

Under a hypothetical development scenario, significant cumulative impacts to recreation could result from increased demand for recreational facilities resulting from the projected increase in the study area's population, oil spills, preclusion of use and/or access, and degradation of recreational enjoyment. Potential incremental impacts to recreation would be significant, particularly for those undeveloped Units and Lease OCS-P 0409 that require construction and operation of a new platform or a new onshore processing facility (i.e. the undeveloped leases of the northern Santa Maria Basin).

5.11 Community Characteristics and Tourism Resources

5.11.1 Significance Criteria

Essentially, coastal tourism derives from full appreciation of the unique qualities, characteristics, and resources of a particular coastal community or region. The following categories classify impacts to community characteristics in general, and to tourism in particular.

- **High**
  - Impacts to the affected activity or community are unavoidable.
  - Proper mitigation would reduce impacts somewhat during the life of the project.
  - The affected activity or community would experience unavoidable disruptions to a degree beyond what is normally acceptable.
  - Once the impacting agent is eliminated, the affected activity or community may retain measurable effects of post-suspension activities indefinitely, even if remedial action is taken.
- **Moderate**
  - Impacts to the affected activity or community are unavoidable.
  - Proper mitigation would reduce impacts substantially during the life of the project.
  - The affected activity or community would have to adjust somewhat to account for disruptions due to impacts of the project.
  - Once the impacting agent is eliminated, the affected activity or community will return to a condition with no measurable effects from post-suspension activities if proper remedial action is taken.
- **Low**
  - Adverse impacts to the affected activity or community could be avoided with proper mitigation.
  - Impacts would not disrupt the normal or routine functions of the affected activity or community.
  - Once the impacting agent is eliminated, the affected activity or community will return to a condition with no measurable effects from post-suspension activities without any mitigation.
- **Negligible**. No measurable impacts.

An impact is considered to be significant if it is in the moderate or high category.

5.11.2 Impacts of Post-Suspension Activities

This section addresses the impacts of post-suspension activities and cumulative effects on San Luis Obispo, Santa Barbara, and Ventura Counties, the areas most proximate to the offshore activities evaluated in this document.

5.11.2.1 Cumulative Impacts without Activities on the Undeveloped Leases on Community Characteristics and Tourism Resources

Tourism is a major regional economic and identity base for the study area. Tourism within the study area is largely contingent on coastal-dependent resources, such as visual quality and recreational resources. Degradation of these resources slowly affects tourism as the area becomes less attractive to travelers. Major oil spills could affect the speed of this decline, as the area is publicized as the location of an oil spill rather than a tourist destination. The onshore and offshore petroleum extraction industry is expected to continue to decline across the region, culminating in the eventual decommissioning of offshore structures and onshore processing plants. This would result in a commensurate decrease in the cumulative impact of oil and gas extraction activities on community characteristics and tourism.

Ventura County. The trend in Ventura County will be part of the general adjustment communities have faced due to the gradual decline in the once-prevalent petroleum extraction industry, and industrial diversification that the communities have addressed since the 1980s. Larger issues of importance to the community's characteristics, such as conversion of agricultural land, urbanization, and population growth would overshadow the decline in petroleum production.

Santa Barbara County. During the period from 2006 to 2030, offshore and onshore petroleum production would continue to decline and offshore structures and the onshore consolidated facilities at Gaviota and Las Flores Canyon would be decommissioned. These consolidated industrial facilities were created to accommodate offshore oil and gas development while minimizing the proliferation of industrial facilities along the coast; they resulted from community-level concern dating back to beginning of offshore development (Lima, 1994, 1997, as cited in MMS, 2001). The decommissioning of the sites, which are required to be restored to pre-development conditions, would be part of the larger debate on how to protect the Santa Barbara coast from encroaching development and conversion of the area into more intense development. Resultant effects to the community would be relatively minor. Local government would have to address declines in the property tax base from onshore processing sites. Mitigation payments to the CREF would cease and the projects it funds would have to secure funding from other sources. However, as a mitigation fund, it would no longer be needed without the continuing impact of the offshore industries and their development activities. Operations at VAFB are expected to continue without effects from the decline and demise of Pacific OCS activity (see Section 5.15).

San Luis Obispo County. Of the three counties within the study area, San Luis Obispo County would have the least effect from the demise of the petroleum industry. Since the County has not experienced offshore development, there would be no adjustments for communities to make as a result of the cessation of the activity in other areas of the Pacific OCS. However, communities would continue to address the consequences of onshore development. Issues regarding development within the coastal zone, such as development in the San Simeon area, would continue.

Based upon the above significance criteria, impacts would be moderate, which is considered significant. The community has had to adjust somewhat to account for disruptions due to visual, recreational, and other impacts resulting from oil and gas exploration. However, removal of the impacting agents would return the area to its previous condition with proper remediation and restoration activities.

5.11.2.2 Incremental Impacts of Exploration and Development of the Undeveloped Leases on Community Characteristics and Tourism Resources

Under the hypothetical development scenario, development of those Units that would use existing platforms and onshore facilities would not be anticipated to contribute to the magnitude of cumulative impacts on community resources. To the extent that development activities would extend the lives of these facilities beyond what had been originally anticipated, the duration of the cumulative impact would be longer. Cumulative tourism impacts from Platforms Irene, Hidalgo, Hermosa and Harvest have been and continue to be mitigated by CREF payments to Santa Barbara County. In addition, under current State law, Santa Barbara County would realize a substantial portion of the State's royalties from Tranquillon Ridge production.

In the northern Santa Maria Basin, the three potential new platforms would represent an extension of offshore platforms in an area that does not currently have such structures. The adjacent onshore area from the coastline to the Casmalia Hills is an area that supports space launch operations at VAFB and onshore production from the Casmalia oil filed. The hypothetical processing site is proximate to closed hazardous waste disposal facility. The remoteness of the area, placement of the facility inland, and compatibility of the potential development with land use in the area minimizes effects. Development should not interfere with the plans to develop the area as a commercial spaceport nor interfere with ongoing military operations at VAFB and its role as a social, cultural, and economic influence on surrounding communities.

Because of its proximity to existing and proposed development, the capacity of Santa Barbara County to address development issues, and the area's adaptability to the presence of onshore and offshore oil and gas production, development of the Gato Canyon Unit under the hypothetical development scenario would not appear to have a cumulative effect on community and tourism values.

Despite above, when taking into account the significant, unavoidable impacts to visual and recreational resources, as discussed in Sections 5.9 and 5.10, respectively, the incremental impacts from potential development of the undeveloped leases would be considered moderate based upon the significance criteria listed in Section 5.11.1. This would be considered a significant impact. The community would have to adjust somewhat to account for disruptions due to visual, recreational, and other impacts as a result of the new platforms, new pipelines, greater likelihood of oil spills (through increased exploration), and an additional onshore processing facility. However, removal of the impacting agents (i.e., through decommissioning) would return the area to its previous condition with proper remediation activities.

5.11.3 Summary and Conclusion

Table 5.11-1 summarizes the potential impacts of each phase of activity under the hypothetical development scenario on each unit for which a suspension has been requested.

Table 5.11-1. Summary of Potential Impacts on Community Characteristics and Tourism by Unit/Lease and Exploration/Development Phase.

Unit/Lease	Exploration and Delineation Drilling	Development and Production	Decommissioning
Cavern Point	None for all units and lease	Moderate for all units and lease (visual and recreational impacts)	Low for all units and lease
Gato Canyon			
Rocky Point			
Sword			
Bonito			
Santa Maria			
Purisima Point			
Point Sal			
Lion Rock			
Lease OCS-P 0409			

Impacts of potential development activities on community characteristics and tourism would be moderate and significant according to the identified significance criteria. While the activities would cause the communities within the study area to adjust to disruptions, these disruptions, and their related impacts, would cease to exist with cessation of activity and proper removal and remediation efforts. These impacts would be anticipated to occur regardless of whether they are associated with prolonged operation of existing facilities or derived from the construction and operation of new facilities.

5.12 Social and Economic Environment

5.12.1 Employment and Population

5.12.1.1 Significance Criteria

The following significance criteria levels were used in the impact analysis to determine whether the post-suspension activities would result in employment and population impacts:

- **High.** Post-suspension activities are likely to result in a long-term (more than two years) regional change in population or employment by at least 50 percent, or a change in the population or employment equal to or greater than 75 percent of the annual change in population or employment. A short-term (less than two years) change in employment or population by at least 75 percent, or a change in the employment or population of 40 percent to 74 percent of the average annual change for the study area.
- **Moderate.** Post-suspension activities are likely to result in a long-term (more than two years) regional change in population or employment by at least 25 percent, or a change in the population or employment is between 40 percent to 75 percent of the annual change in population or employment. A short-term (less than two years) change in employment or population by at least 50 percent, or a change in the employment or population of 10 percent to 39 percent of the average annual change for the study area.
- **Low.** Post-suspension activities are likely to result in a long-term (more than two years) regional change in population or employment of less than 25 percent, or a change in the population or employment of less than 40 percent of the annual change in population or employment. A short-term (less than two years) change in employment or population of less than 50 percent, or a change in the employment or population of less than 10 percent of the average annual change for the study area. This level of change from the baseline is insignificant.

5.12.1.2 Impacts of Post-Suspension Activities

Under the hypothetical development scenario, post-suspension activities would use minimal additional offshore and onshore support services. Excessive use of onshore facilities could induce changes in employment and population. Increased employment would draw from the local labor force and could induce population in-migration. However, as noted in Table 5.2-1, potential development activities associated with the undeveloped leases would result in an increase in crew and supply boat trips of less than six percent over the course of the analysis (2006 through 2030).

Cumulative Impacts without Activities on the Undeveloped Leases on Employment and Population

The trend of declining employment in the oil and gas sector is expected to continue through 2030 given the finite nature of these resources. Decommissioning activities may cause a slight increase in certain specialized segments, but this would probably only slow the decline, not reverse the trend. Based on the other anticipated activities listed in Appendix I, it is anticipated that overall employment and population will continue to grow in the study area, offsetting potential job loss in offshore oil and gas related activities.

Incremental Impacts of Exploration and Development of the Undeveloped Leases on Employment and Population

Under the hypothetical development scenario, the impact on employment and population of delineation drilling and development of the undeveloped leases would be anticipated to be similar to the levels of population and employment increases experienced during the construction of the Santa Ynez Unit project. At its peak level the Santa Ynez Unit project directly employed approximately 1,200 workers (MMS, 2000, as cited in MMS, 2001). Peak employment effects from the Santa Ynez Unit project were estimated to be approximately 3,000 jobs accompanied by peak a population impact of approximately 5,000 people.

Tables 5.12-1 and 5.12-2 show the potential anticipated short-term and long-term impact for development of the undeveloped leases on employment and population. Short-term impacts to employment and population from development of the undeveloped leases would be moderate (a change in the employment or population of 10 percent to 39 percent of the average annual change for the study area), but long-term impacts would be low (a change in the employment or population of less than 10 percent of the average annual change for the study area) and not significant. Concurrent with decommissioning, the incremental impact of the post-suspension activities under the hypothetical development scenario would be more severe if the industry were not expected to decline over the same time period. Overall, the post-suspension activities would be anticipated to have a moderate and significant impact over the short-term.

Table 5.12-1. Short-Term Change in Population, Employment, and Housing from Development of the Undeveloped Leases

Socioeconomic Variable	San Luis Obispo County	Santa Barbara County	Ventura County	Total Study Area
Direct employment	420	660	120	1,200
Indirect/induced employment	802	935	198	1,935
Population	2,222 or 2,653	509	5,384	8115 or 8546
Housing demand	567	569	101	1237
Percent change in demand	0.58%	0.39%	0.04%	0.25%
Housing percent of annual variation in supply	61.42%	83.19%	4.56%	32.29%
Population percent of annual variation, 2000-2020	32.31%	37.69%	4.47%	21.28%

Source: MMS, 2001.

Table 5.12-2. Long-Term Change in Population, Employment, and Housing from Development of the Undeveloped Leases

Socioeconomic Variable	San Luis Obispo County	Santa Barbara County	Ventura County	Total Study Area
Direct employment	25	175	0	200
Indirect/induced employment	48	248	0	296
Population	132	704	0	836
Housing demand	34	151	0	185
Percent change in demand	0.03%	0.10%	0.00%	0.04%
Housing percent of annual variation in supply	3.66%	22.06%	0.00%	4.82%
Population percent of annual variation, 2000-2020	1.92%	9.99%	0.00%	3.30%
Population change as percent of 2020 Total	0.03%	0.13%	0.00%	0.04%

Source: MMS, 2001.

5.12.1.3 Summary and Conclusion – Employment and Population

Table 5.12-3 summarizes the potential impacts of each phase of activity under the hypothetical development scenario on each unit for which a suspension has been requested.

Table 5.12-3. Summary of Potential Impacts on Employment and Population by Unit/Lease and Exploration/Development Phase.

Unit/Lease	Exploration and Delineation Drilling	Development and Production	Decommissioning
Cavern Point	Low for all units and lease	Low (long-term) to moderate (short-term) for all units and lease	Low for all units and lease
Gato Canyon			
Rocky Point			
Sword			
Bonito			
Santa Maria			
Purisima Point			
Point Sal			
Lion Rock			
Lease OCS-P 0409			

Incremental impacts to employment and population from development of the undeveloped leases would be moderate and significant in the short-term. Over the long-term, the impacts of the proposed actions would not be significant in comparison to the regional and industry shifts that are expected to occur during the study period.

5.12.2 Housing

5.12.2.1 Significance Criteria

The following significance criteria levels were used in the impact analysis to determine whether the cumulative projection of post-suspension activities under a hypothetical development scenario would result in housing impacts:

- **High.** Post-suspension activities are likely to result in a long-term (more than two years) local or regional increase or decrease in the rate of change in demand for housing at least 20 percent, or are likely to result in a short-term (less than two years) local or regional increase or decrease in the rate of change in demand for housing of at least 35 percent.
- **Moderate.** Post-suspension activities are likely to result in a long-term (more than two years) local or regional increase or decrease in the rate of change in demand for housing between 10 and 19 percent, or are likely to result in a short-term (less than two years) local or regional increase or decrease in the rate of change in demand for housing of 25 to 35 percent.
- **Low.** Post-suspension activities are likely to result in a long-term (more than two years) local or regional increase or decrease in the rate of change in demand for housing of less than 10 percent, or activities are likely to result in a short-term (less than two years) local or regional increase or decrease in the rate of change in demand for housing of less than 25 percent. This change from the base level is insignificant.

5.12.2.2 Impacts of Post-Suspension Activities

As noted above, post-suspension activities under the hypothetical development scenario would be anticipated to have a moderate impact on population and employment. Similar to these impacts, there would be a moderate and significant short-term impact to housing, while the long-term impact would be low and not significant (Tables 5.12.-1 and 5.12-2).

Cumulative Impacts without Activities on the Undeveloped Leases on Housing

As a result of the potentially foreseeable projects identified in Appendix I, demand for housing would continue to grow as a function of projected population growth. However, projected population growth takes into account expected background levels of overall population, employment, and housing growth, which the cumulative scenario is intended to represent. Even without the undeveloped leases, the demand for housing and employment would continue to increase steadily in parallel and as a direct result of the expected population growth in the area.

Incremental Impacts of Exploration and Development of the Undeveloped Leases on Housing

Under the hypothetical development scenario, the construction of new platforms, pipelines, and new onshore facility in northern Santa Barbara County would create both short-term and long-term impacts on housing. The short-term impacts on housing would be anticipated to be similar to those that occurred with the construction of the Santa Ynez Unit. The peak impact on housing from the Santa Ynez project was 721 total housing units. It is likely that housing impacts would be distributed in northern Santa Barbara County and southern San Luis Obispo County. Incremental impacts to housing from the undeveloped leases would likely be low given the projected without-project housing needs resulting from the expected population growth. It is likely that the rate of housing development expected in the study area would result in sufficient housing stock to accommodate the low level of demand that would be required by the development of the undeveloped leases.

5.12.2.3 Summary and Conclusion – Housing

Table 5.12-4 summarizes the potential impacts of each phase of activity under the hypothetical development scenario on each unit for which a suspension has been requested.

Table 5.12-4. Summary of Potential Impacts on Housing by Unit/Lease and Exploration/Development Phase.

Unit/Lease	Exploration and Delineation Drilling	Development and Production	Decommissioning
Cavern Point	Low for all units and lease	Low for all units and lease	Low for all units and lease
Gato Canyon			
Rocky Point			
Sword			
Bonito			
Santa Maria			
Purisima Point			
Point Sal			
Lion Rock			
Lease OCS-P 0409			

Total population is expected to increase between 2006 and 2030 due to demographic and other factors not related to offshore oil and gas or other identifiable projects. This growth is expected to be consistent with past and current rates of growth for the region and State. Post-suspension activities under a hypothetical development scenario would have a moderate and significant short-term incremental impact on housing, and a low and not significant long-term incremental impact.

5.12.3 Infrastructure

5.12.3.1 Significance Criteria

The following significance criteria levels were used to determine whether post-suspension activities under a hypothetical development scenario would result in cumulative impacts to public infrastructure:

- **High.** Post-suspension activities are likely to result in a long-term (more than two years) local or regional increase or decrease in the rate of change in demand on public or private infrastructure or services by at least 20 percent, or post-suspension activities are likely to result in a short-term (less than two years) local or regional increase or decrease in the rate of change in demand on public or private infrastructure or services by at least 35 percent.

- **Moderate.** Post-suspension activities are likely to result in a long-term (more than two years) local or regional increase or decrease in the rate of change in demand on public or private infrastructure or services by between 10 and 19 percent, or post-suspension activities are likely to result in a short-term (less than two years) local or regional increase or decrease in the rate of change in demand on public or private infrastructure or services by between 25 and 34 percent.
- **Low.** Post-suspension activities are likely to result in a long-term (more than two years) local or regional increase or decrease in the rate of change in demand on public or private infrastructure or services of less than 10 percent, or the post-suspension activities are likely to result in a short-term (less than two years) local or regional increase or decrease in the rate of change in demand on public or private infrastructure or services of less than 25 percent. This change from the base level is insignificant.

5.12.3.2 Impacts of Post-Suspension Activities

As listed in Appendix I, potentially foreseeable activities include a wide range of possible actions between 2006 and 2030. The projects include military, commercial fishing, remediation, and other oil and gas development/decommissioning related projects. Crew and supply boats would continue to service the offshore oil and gas industry and existing onshore development would continue at the present levels of activity. No other activities that would impact infrastructure other than expected variation in port operations have been identified.

Cumulative Impacts without Activities on the Undeveloped Leases on Infrastructure

As existing platforms are decommissioned, crew and supply boats serving the offshore oil and gas industry would decline in number and onshore facilities would be reduced. Concurrently, transportation-related impacts to infrastructure would increase as a result of other projects identified in the cumulative scenario. Impacts would be low and not significant.

Incremental Impacts of Exploration and Development of the Undeveloped Leases on Infrastructure

Development of the undeveloped leases under the hypothetical development scenario would be expected to increase crew and supply vessel traffic and the onshore support of the vessels by less than 3 percent. This scenario would likely result in a short-term increase in truck traffic at the ports associated with the development of new wells and the decommissioning of currently existing wells. Short-term increases in truck traffic would result from barging of drill stem test fluids. It is likely that the fluids would be transported to a test facility in 140 bbl tanker trucks. The exact number of trucks required by Unit and the increase in truck traffic at ports and marinas in southern and central California are not known at this time. However, in comparison to existing traffic levels, effects to the transportation infrastructure would be short-term and low based on the above significance criteria.

Under the hypothetical development scenario, depending on the quality of the crude discovered in the northern Santa Maria Basin, trucks could be required to ship product, most likely in the form of asphalt. Depending on the location of a new northern Santa Barbara County onshore facility, roads, highways and rail lines could be significantly impacted. There are forty-one weekly truck trips related to offshore oil and gas activities in northern Santa Barbara County. In addition to offshore oil and gas related traffic, there are approximately 442 additional weekly truck trips at the junction of Highway 1 and Casmalia Road. The junctions of Highway 1 and Casmalia Road would be impacted by a new facility if the new facility is located at the preferred Casmalia site identified in the County's Final North County Siting Study. If truck transport of asphalt is required from the construction of a northern Santa Barbara County facility there could be an increase in truck trips related to offshore oil and gas development of more than

1,500 tips, or 4,000 percent. The impacts from this change would be high. Table 5.12-5 shows the potential increase in truck traffic resulting from a north county processing facility.

Table 5.12-5. Trucks for a Northern Santa Barbara County Facility with and without Rail Transport

Trucks by Product	Current Level	North County Facility	Percent Change	Rail Transport All Asphalt	Percent Change
Sulfur	6	14	233.3	14	233.3
LPG	35	145	414.3	145	414.3
Heavy Product Fraction	0	1,500	N/A	N/A	N/A
Total Product Trucks	41	1,659	4,046.8	159	387.8
Total Trucks Casmalia Road and Highway 1	483	1,659	343.5	159	32.9

Source: MMS, 2001

Rail transport of asphalt could replace all or part of the transportation from the processing facility. If rail transport replaced all truck transport of asphalt, truck transport would be reduced by 1,500 weekly trips. Rail transport would increase by approximately one 70-car unit train per day. Since there are no unit trains transporting asphalt from northern Santa Barbara County the impact from the addition of one train per day would be high. The COOGER Study (Dames & Moore, 2000) discusses transportation of asphalt from a northern Santa Barbara facility.

Development of the remaining undeveloped Units under the hypothetical development scenario would use existing onshore facilities. Operational impacts associated with development of these leases would slightly increase the number of weekly and monthly trucks to these facilities to accommodate additional product (such LNGs and LPGs); however, this incremental increase would be considered small, and would also be subject to existing Santa Barbara County conditions of approval for traffic and transportation for these onshore facilities. Impacts would thus be anticipated to be low.

Decommissioning of the undeveloped and developed leases would likely have activities and impacts similar to construction. These impacts, depending on location and duration, would be anticipated to range from low to moderate.

5.12.3.3 Summary and Conclusion – Infrastructure

Table 5.12-6 summarizes the impacts of each phase of activity under the hypothetical development scenario on each unit for which a suspension has been requested. Impacts are expected to be low without development of the undeveloped leases. Depending on the location of a new northern Santa Barbara County, potential oil and gas facility impacts on infrastructure could be high.

Table 5.12-6. Summary of Potential Impacts on Infrastructure by Unit/Lease and Exploration/Development Phase.

Unit/Lease	Exploration and Delineation Drilling	Development and Production	Decommissioning
Cavern Point	Negligible	Low	Low to moderate for all units and lease
Gato Canyon	Negligible		
Rocky Point	Negligible		
Sword	Negligible		
Bonito	Negligible		
Santa Maria	None	Moderate to High (asphalt truck transport)	
Purisima Point	Negligible		
Point Sal	Negligible		
Lion Rock	None		
Lease OCS-P 0409	None		

5.12.4 Public Services and Finance

5.12.4.1 Significance Criteria

The following significance criteria levels were used in the impact analysis to determine whether post-suspension activities under a hypothetical development scenario would result in impacts to public services and finance:

- **High.** Post-suspension activities are likely to result in a long-term (more than two years) local or regional increase or decrease in the rate of change in demand for public or private services by at least 20 percent, or the post-suspension activities are likely to result in a short-term (less than two years) local or regional increase or decrease in the rate of change in demand for public and private services by at least 35 percent.
- **Moderate.** Post-suspension activities are likely to result in a long-term (more than two years) local or regional increase or decrease in the rate of change in demand on public or private or services by between 10 and 19 percent, or post-suspension activities are likely to result in a short-term (less than two years) local or regional increase or decrease in the rate of change in demand on public or private services by between 25 and 34 percent.
- **Low.** Post-suspension activities are likely to result in a long-term (more than two years) local or regional increase or decrease in the rate of change in demand on public or private services of less than 10 percent, or post-suspension activities are likely to result in a short-term (less than two years) local or regional increase or decrease in the rate of change in demand on public or private services of less than 25 percent. This change from the base level is insignificant.

5.12.4.2 Impacts of Post-Suspension Activities

In general, the primary causes of change in demand for public and private services are due to a substantial change in the demographic, economic, or social conditions of an area.

Cumulative Impacts without Activities on the Undeveloped Leases on Public Services and Finance

The existing demand for public and private services would continue to change as a result of demographic and other factors not related to offshore oil and gas or other identifiable projects. Property taxes in Santa Barbara and Ventura Counties would continue to be enhanced by revenue generated by offshore-related onshore development. However, as oil and gas projects move from production to decommissioning, valuation of the facilities for property taxes would decline, resulting in a commensurate decrease in payments to local jurisdictions. However, the general trend for the study area is that of an increasing population, the associated housing demand, housing cost, and demand and revenue for public services. Current regional socioeconomic forecasts account for these expected demographic and economic shifts.

Incremental Impacts of Exploration and Development of the Undeveloped Leases on Public Services and Finance

The fee-for-service arrangement for local agency land use permitting and regulatory activities for offshore oil and gas projects would be expected to continue as a process for review of future exploration and development.

Using the above significance criteria and population, employment, and housing analyses, the incremental impact of potential development activities under the hypothetical development scenario would be moderate and significant. If increases in population or housing require commensurate increases in demand for public services and stress on public finances, there would be a short-term moderate and significant impact on public services and finance. However, over the long-term, post-suspension activities would not result in a substantial variation from expected trends. Therefore, the development of the undeveloped leases incremental contribution to demand on public services would be expected to be low because the associated activities would not result in a substantial increase in the area's population. Population growth and associated demand for services would likely steadily increase even without the project.

5.12.4.3 Summary and Conclusion – Public Services and Finance

Table 5.12-7 summarizes the potential impacts of each phase of activity under the hypothetical development scenario on each unit for which a suspension has been requested.

Table 5.12-7. Summary of Potential Impacts on Public Services and Finance by Unit/Lease and Exploration/Development Phase.

Unit/Lease	Exploration and Delineation Drilling	Development and Production	Decommissioning
Cavern Point	Low	None for all units and lease	Low for all units and lease
Gato Canyon	Low		
Rocky Point	Low		
Sword	Low		
Bonito	Low		
Santa Maria	None		
Purisima Point	Low		
Point Sal	Low		
Lion Rock	None		
Lease OCS-P 0409	None		

The post-suspension activities under the hypothetical development scenario would be expected to have a moderate impact on public finance and services, resulting from significant short-term impacts to population, employment, and housing.

5.12.5 Non-Residential Land Use

5.12.5.1 Significance Criteria

For the purposes of this analysis, non-residential land uses include uses not pertaining to housing, such as commerce, agriculture, or industry. The following significance criteria levels were used in the impact analysis to determine whether the post-suspension activities under the hypothetical development scenario would result in impacts to non-residential land use:

- **High.** New onshore facilities are required to meet the demands of post-suspension activities and conversions from other non-industrial land uses are required. Land uses vary from those anticipated in Federal, State, or local plans and projections and result in displacement of competing uses and post-suspension activities.

- **Moderate.** Existing onshore facilities can be modified to meet the demands from post-suspension activities, but modifications may require a change in the plant footprint and permitted capacities or new facilities are required. Land use may vary from those anticipated in Federal, State, or local plans and projections.
- **Low.** Existing onshore facilities can accommodate change in demand from post-suspension activities without expansion beyond current plant footprint and permitted capacities. Any changes in land use are consistent with Federal, State, or local plans and projections. The change from the baseline is insignificant.

5.12.5.2 Impacts of Post-Suspension Activities

The post-suspension activities include a wide range of offshore and onshore development projects.

Cumulative Impacts without Activities on the Undeveloped Leases on Non-Residential Land Use

Existing onshore facilities are expected to continue substantially as they are. No changes in the onshore support facilities are expected. Land uses supporting offshore oil and gas would continue as long as oil production is possible. As part of decommissioning, the land use designation of former on-shore processing facilities may change in accordance with local land use plans and practices. Various projects identified as part of the cumulative scenario, such as LNG expansion or construction of desalination plants, would likely result in the conversion of non-industrial land uses. This would result in a moderate to high significant impact.

Incremental Impacts of Exploration and Development of the Undeveloped Leases on Non-Residential Land Use

The development of facilities associated with the development of the undeveloped leases under the hypothetical development scenario, including a new processing facility in northern Santa Barbara County and new pipeline and power cable landfalls and rights-of-way, would potentially affect non-residential land uses along the coast. It is likely that the new Casmalia processing facility would require some lands to be converted to an industrial use, resulting in a moderate to high significant impact.

5.12.5.3 Summary and Conclusion – Non-Residential Land Use

Table 5.12-8 summarizes the potential impacts of each phase of activity under the hypothetical development scenario on each unit for which a suspension has been requested.

Table 5.12-8 Summary of Potential Impacts on Non-Residential Land Use by Unit/Lease and Development Phase

Unit/Lease	Exploration and Delineation Drilling	Development and Production	Decommissioning
Cavern Point	Low to moderate for all units	Moderate to high for all units	Moderate to high for all units
Gato Canyon			
Rocky Point			
Sword			
Bonito			
Santa Maria			
Purisima Point			
Point Sal			
Lion Rock			
Lease OCS-P 0409			

Post-suspension activities under the hypothetical development scenario would likely result in a moderate to high significant impact to non-residential land use.

5.13 Commercial Fishing and Kelp Harvest

Commercial fishing has been an integral part of California economics since the turn of the century (MBC, 1989, as cited in MMS, 2001). Conflicts with offshore oil and gas operations surfaced as early as the 1940's. Many of the conflicts have been mitigated through oil and gas industry funding of programs, direct payment to fishermen for lost fishing opportunity and damaged or lost gear, better communication, and the avoidance of major oil spills as production increased on the Pacific OCS from 80,000 bbl per day to 220,000 bbl per day since 1985.

The following measures have been proposed by the oil industry as a means of reducing conflicts and improving communication between commercial fishermen and the operators during post-suspension phase activities:

- Industry will consult with the Joint Oil/Fisheries Liaison Office to identify and contact potentially affected fishers and fleets.
- Industry will hold meetings with representatives of the potentially affected fishing fleets to provide information to all potentially affected fishermen describing the location of the proposed drilling program, the area to be traversed, the planned dates of initiation and completion, and to obtain feedback.
- Industry will prepare a Notice to Fishermen and Claim Form to be sent to all potentially affected fishermen who would likely be precluded from fishing during the proposed operations explaining the procedures for submitting a claim for lost revenue. This process will include meeting with individual fishermen to discuss each claim submitted, and the determination of a fair and reasonable mitigation/ remuneration based on historic fish catch records using the appropriate mitigation/remuneration methodology.
- A local fisherman will captain a scout boat to survey the proposed well site area prior to the MODU arriving onsite. The scout boat captain will attempt to contact the owner of any gear found at the site and arrange for relocation of the gear.
- Industry will notify fishermen in writing 30 days prior and verbally 3 days prior to the commencement of operations. Notifications will be sent to the U.S. Coast Guard, Santa Barbara County Planning and Development Department, Energy Division, the Joint Oil/Fisheries Liaison Office, and the Marine Advisory Newsletter in Goleta. Notices will also be distributed to and posted at area fuel docks, ice supply houses, wholesale fish buyers, and Harbor Master's offices in the area harbors.
- Industry will notify the Joint Oil/Fisheries Liaison Office immediately following the completion of the drilling program.
- Industry will immediately notify MMS of any conflict with commercial fishermen before, during, and after the drilling operations.
- Industry will ensure that all vessels and workboats associated with the proposed project will comply with the traffic corridors established by the Joint Oil/Fisheries Liaison Committee.
- Industry and boat captains associated with the proposed project will keep logs documenting equipment lost overboard. Industry will notify MMS of all lost items.
- Industry will require all offshore personnel involved in the proposed project to attend the Western States Petroleum Association's Fisheries Training Program, appropriately abridged.
- Industry will hold at least two pre-survey coordination meetings with MMS and other interested agencies to review the status of the implementation of these mitigation measures.

5.13.1 Significance Criteria

Changes or impacts to commercial fishing resulting from the development of the undeveloped leases under the hypothetical development scenario will be analyzed according to the following criteria:

- **High**
  - Fishermen are precluded from 10 percent or more of the fishing grounds during proposed post-suspension exploration and development activities
  - 10 percent or more of the fishermen are precluded from a fishing area for all or most of a fishing season
  - A decrease in catchability of target species exceeds 10 percent of the average annual landing
- **Moderate**
  - Fishermen are precluded from 1 to 10 percent of the fishing grounds during the post-suspension exploration and development activities;
  - 1 to 10 percent of the fishermen are precluded from a fishing area for all or most of a fishing season
  - A decrease in catch of target species between 1 to 10 percent of the average annual landing.
- **Low**
  - Fishermen are precluded from 1 percent or less of the fishing grounds during post-suspension exploration and development activities
  - 1 percent or less of the fishermen are precluded from a fishing area for all or most of a fishing season
  - A decrease in catch of target species less than 1 percent of the average annual landing.

For the purposes of this document, high and moderate level impacts are considered significant, while low level impacts are considered insignificant.

5.13.2 Impacts of Post-Suspension Activities

There are no scheduled or anticipated oil and gas lease sales in Federal waters of the Pacific OCS or in State waters. Thus, no additional production platforms are expected to be installed on the Pacific OCS after the development of the currently active leases and the undeveloped leases. However, the proposed offshore Cabrillo LNG facility is planned for development during this period, as are delineation wells within the study area and the permanent abandonment of two exploration wells in Leases OCS-P 0320 and 0431. These activities would require barges and other vessels to be moored at the respective sites and would result in some preclusion of commercial fishing areas.

Section 5.2.1 discusses the major impact agents associated with past, present, and foreseeable offshore oil and gas activities that may produce impacts during the 2006 to 2030 period. These include on-going and proposed oil and gas activities in Federal and State waters, including new LNG facilities, and decommissioning of existing facilities which may cause space-use or preclusion conflicts, and accidental or upset conditions (oil spills or hydrogen sulfide gas releases). Alaskan and foreign-import tankering, dredging and discharge of dredged material, aquaculture, coastal development, agriculture runoff, and recreational fishing also add to the cumulative impacts on commercial fishing through adverse effects on marine fish resources.

5.13.2.1 Cumulative Impacts without Activities on the Undeveloped Leases on Commercial Fishing and Kelp Harvest

The projects discussed in this section include past, present, and foreseeable actions that may produce impacts during the period 2006 through 2030. Potential cumulative impacts are discussed below.

Oil and Gas Activities. These activities include geophysical surveys, construction, drilling and production associated support activities, and the abandonment, or decommissioning, of wells and offshore facilities. The major impact producing agents expected from these activities are space-use and preclusion. The potential use of explosives in the abandonment of wells and offshore platforms also raises the possibility of lethal impacts to fish resources. Upset conditions such as oil spills may also impact commercial fishing.

Geophysical Surveys. Except for the shallow hazards surveys proposed for some of the 36 leases, no seismic surveys have been proposed for the Pacific OCS or State waters in the near future, and none are currently foreseen for the period 2006 through 2030.

Construction. Currently, no oil and gas lease sales are scheduled or anticipated in Federal or State waters off California. Therefore, without development of the undeveloped leases, and except for the possible construction of the Cabrillo LNG facility, it is assumed no new production platforms or pipelines would be installed during the period 2006 through 2030. The preclusion of the area to commercial fishing during construction of the LNG facility is expected to be relatively short -term and local in nature, with low impacts to drift net fishing operations. Water depths and seafloor type at the proposed LNG platform location precludes extensive trawling in the area, and drift net fishing is the most common type of commercial gear used there.

Development and Production. Table 5.2-1 in Section 5.2.1 shows the number of wells expected to be drilled from existing production platforms. Currently, it is expected that 75 new wells would be drilled from OCS platforms in the Santa Barbara Channel and Santa Maria Basin. Production activities are expected to continue on all existing, active platforms until decommissioning (see section on Offshore Facilities Decommissioning, below), with the possible addition of the Cabillo LNG platform. This project, due to the relatively small area of preclusion, is expected to result in low impacts to commercial fishing due to the location and water depth where drift net fishing is the most common gear type used. As discussed in earlier, potential impacts to commercial fishermen from these activities are expected to be restricted to short-term preclusion and space-use conflicts due to vessel traffic and routine maintenance and repairs of platforms and pipeline facilities.

Offshore Facility Decommissioning. Table 5.2-3 presents estimated removal dates for existing oil and gas structures offshore southern California. It is expected that no Pacific OCS platforms in the Santa Barbara Channel or Santa Maria Basin would be removed before 2010, and a few may be in place as late as 2020 (or 2030, in the case of Platform Irene if the Tranquillon Ridge development occurs). The principal potential impacts would be similar to those expected to occur as the result of construction activities (i.e., short-term preclusion and space-use conflicts). Some long-term impacts to commercial trawlers may occur due to anchor scars and debris left on the sea floor. Section 5.7.4 analyzes the impacts of explosive removals on fish resources.

Oil Spills. The cumulative oil spill risk for the study area results from several sources: ongoing and projected oil and gas production from existing Pacific OCS facilities in the Santa Barbara Channel and Santa Maria Basin; several proposed exploration and development projects on the Pacific OCS; ongoing production from one facility in State waters in the Santa Barbara Channel; two possible oil and gas projects in State waters; and, the tankering of Alaskan and foreign-import oil through area waters. Tables 5.3-2 and 5.3-3 present the estimated mean number of spills of various sizes and the probability of their occurrence as a result of the described activities.

The level of impacts from oil spills would depend on many factors, including the type, rate, and volume of oil spilled and the weather and oceanographic conditions at the time of the spill. These parameters would determine: the quantity of oil that is dispersed into the water column; the degree of weathering, evaporation, and dispersion of the oil before it contacts a shoreline; the actual amount, concentration, and composition of the oil at the time of shoreline or habitat contact; and a measure of the toxicity of the oil. The impacts to commercial fishing and fish resources from any oil spills occurring during this period would be similar to those described in Section 5.3.4 for the 200 and 2000 bbl spills assumed to occur as a result of offshore oil and gas activities, and for the assumed 23,000 bbl tanker spill. Those impacts would include fouling of commercial fishing gear and vessels and possible closure of harbors (precluding commercial fishing vessels access to and/or from fishing areas).

Military Activities. It is assumed that military activities in the study area would continue at or near the current levels during the period 2006 through 2030. Thus, the impacts to commercial fishing associated with these activities would also be expected to continue at current levels.

Resources Agency Concerns. The California Department of Fish and Game, Marine Region, (Leet et al., 2001, as cited in MMS, 2001) has identified several fishing and non-fishing activities that may cause adverse impacts on commercial fishing along the Pacific Coast and within the Santa Maria Basin. These include environmental events like El Niño and their impact on animal and plant species, over-harvest of species such as shelf rockfish, interactions between fishing gear and marine mammals, pollution from human activities, and competition among user both consumptive and non-consumptive user groups.

The National Marine Fisheries Service (1998; 2003a,b, as cited in MMS, 2001) has also identified several fishing and non-fishing activities that may cause adverse impacts on commercial fishing along the Pacific Coast and within the Santa Maria Basin. These include dredging and discharge of dredged material, intake of water and associated fish and shellfish resources by coastal intake structures, wastewater discharge, oil and hazardous waste spills, coastal development and coastal environmental degradation, agricultural runoff, and recreational fishing. In addition, fisheries could be impacted by degradation of water quality, which has resulted from municipal, industrial, and agricultural waste discharges and runoff in much of the Southern California Bight (MMS, 1992, as cited in MMS, 2001).

The cumulative effect of the above activities has been a major influence on commercial fishing off the south-central California coast. Further, recent restrictions on the trawl fishery by State and Federal agencies have also reduced the area where commercial trawling is allowed. The LNG facility construction would occur in the eastern Santa Barbara Channel in an area that has historically supported drift net fishing. Continued operation of existing oil and gas facilities, including periodic oil spills and spill-response activities, combined with proposed LNG facilities, would create a moderate level of impact, which is a potentially significant cumulative impact.

5.13.2.2 Incremental Impacts of Exploration and Development of the Undeveloped Leases on Commercial Fishing and Kelp Harvest

Under the hypothetical development scenario, prior to installing any production facilities, some of the operators would drill delineation wells from a semi-submersible type MODU into the Point Sal, Purisima Point, and the Gato Canyon Units. Such delineation activities are described in Appendix K. Several actions associated with these activities would have the potential to impact commercial fisheries. These activities include towing the MODU between well sites, anchoring activities, support vessel traffic, and barging activities. The temporary nature of these activities and incorporation of mitigations would result in impacts from the delineation drilling activities on commercial fishing operations to be low. Exploration on Bonito, Sword, Rocky Point, and Cavern Point Units would take place from existing platforms.

Impacts Common to All Units

Vessel Traffic. Commercial fishermen are found throughout the Santa Barbara Channel and Santa Maria Basin, and conflicts could occur as the MODU included in the hypothetical development scenario would be towed to each of the well sites. Also, crew boats and supply boats would travel to and from the drill site on a regular basis. The conflicts could include preclusion from the area, lost fishing time, and damage to equipment. Any traps or gillnets in the traffic corridor of the drilling areas could become entangled and damaged or lost when the MODU and support vessels pass through the area. Trawlers, purse seiners, trollers, and hook and line fishers could be forced to move from the area or change course, resulting in lost fishing time.

As described in Appendix K, support vessel traffic for the potential delineation drilling operations would operate out of Port Hueneme, with some possible crew boat trips originating from the Carpinteria Pier. Crew boats would average 2 to 8 trips per month throughout the 14 months of delineation drilling activities; a total of about 90 trips would occur. Supply boat trips would average 8 to 12 per month, for a total of approximately 148 trips over the 14 month period. As the location of the delineation drilling activities would shift from units in the Santa Maria Basin eastward into the western Santa Barbara Channel, overall support vessel traffic would peak during the first 6 months at about 20 trips per month, then decrease to about 10 trips per month during the final 3 months of activity. Additionally, fluid produced during the drill stem test of each delineation well would be barged to Long Beach at the end of the testing period. Transportation of the barges would comply with established vessel traffic corridors. A total of 4 to 10 such trips would be estimated to occur over the 14 month duration of the potential delineation drilling activities.

The Santa Barbara Channel/Santa Maria Basin Oil Service Vessel Traffic Corridor Program is intended to minimize interactions between oil industry operations and commercial fishing operations. It was developed cooperatively by the two industries through the Joint Oil/Fisheries Liaison Office. In addition to providing transit corridors in and out of area ports, the program routes support traffic along the Channel seaward of an outer boundary line. East of Gaviota, the outer boundary is defined by the 30-fathom line; west of Gaviota, and north of Point Conception as far as Pedernales Point, it follows the 50-fathom line. In the area west of Gaviota, the 50-fathom (300-feet) line is 2 nautical miles or more offshore. Transit to and from drilling sites would occur within vessel corridors established for oil and gas service vessels in the Santa Barbara Channel. Although vessel traffic would increase during potential drilling activities, the oil industry would minimize conflicts with commercial fishermen by traveling within the established corridors.

Conflicts would be more likely to occur in the Santa Maria Basin where traffic corridors have not been established due to minimal oil and gas activity in the area. Conflicts can be mitigated by negotiating traffic corridors to the proposed well sites on the Purisima Point and Point Sal Units. Low impacts to commercial fishing would be estimated from vessel traffic associated with the exploration and development activities under the hypothetical development scenario. Proposed mitigation measures would further minimize the impacts, if adopted.

Siting/Anchoring of the MODU. Under the hypothetical development scenario, the MODU would be moored with eight anchors, which would extend 5 to 7 times the water depth from the MODU. The drilling sites would range in water depth from 233 to 1,156 feet. On average, this could amount to approximately 0.16 to 7.4 square miles of ocean area that would be precluded from commercial fishing while the MODU would be onsite (approximately 90 days at each site). Historically, approximately 940 mi^2 of commercial trawl grounds are available in the Santa Barbara Channel/Santa Maria Basin. Thus, each well site could take up to 0.01 percent of those historically-available trawl grounds. This does not take into account the tendency of trawlers to fish along specific depth contours, for debris that may be lost, recently legislated closures of historical trawl grounds to protect rockfish resources, or for the differences in productivity within trawl grounds. For these reasons, the actual area precluded could be somewhat higher than estimated and the economic losses associated with preclusion more variable.

Some degree of lateral flexibility in anchor placement allows avoidance of potential sea floor hard bottom resources. A site-specific mooring analysis and ocean bottom surveys would be conducted to ensure correct anchor placement. The mooring analysis would factor in any subsea obstructions, obstacles, and hard bottom habitat. The anchors would be set to avoid these areas, and ensure that the anchors are placed in adequate soils to provide the required holding capacity. By using an anchor of sufficient holding power, drag related scarring could be minimized to the 10 to 100 feet necessary to properly set the anchor. MEC Analytical Systems (1995, as cited in MMS, 2001) evaluated the area of anchor impacts on hard bottom from exploratory operations occurring between 1968 and 1989. The study showed that the width of anchor scars ranged from 3 to 25 feet and the length averaged 820 feet.

Under the hypothetical development scenario, delineation drilling activities would take place within an area corresponding to California Department of Fish and Game Fish Blocks 632 (Point Sal Unit), 638 (Purisima Point Unit), and 654 and 655 (Gato Canyon Unit). Some types of fishing could be potentially affected more than others, and depending on the time of year certain fisheries could be affected. Commercial fishermen including trawl, troll, hook and line, drift and set gillnet, purse seine, and trap fishermen would be precluded from fishing within the potential drilling areas for up to 90 days at each site. Fishermen precluded from the drilling area would target alternate grounds resulting in crowding and potentially decreased profits for the primary fishermen of those grounds.

Trawl fishing is a mobile fishery. The net is on the bottom and in fairly deep water can be a mile behind the vessel. Trawlers often work on the top edges of steep drop-off slopes; to turn into deeper water would force the net to drop off these slopes. This causes loss of fishing time since the net has to be picked up and reset. Similarly, rocky outcrops, wrecks, or other debris are located randomly with respect to the trawl grounds. These features are hazards to the trawler because of their potential to snag and hang up the net. Through trial and error, trawlers become aware of most of the snags to avoid in favored grounds. Knowledge of these snags also limits the potential maneuverability of the trawler when towing a net(s).

Turning into such a snag may mean loss or damage to the net(s), and potential hazard to the vessel itself if the hang is significant and/or weather/sea conditions are unfavorable. Since turning into such obstructions would be hazardous, most trawlers would have to stop towing and pull their gear in rather than turn. If the MODU described above were to be on site while trawl fishing activity is taking place, it could potentially interfere with trawl fishing. Trawlers typically give about 1,300 feet berth to platforms. The MODU would have an anchor spread of up 1.5 miles from the drilling unit. However, the mooring buoys of the anchor spread are not as easily seen as a drilling rig, so trawlers would likely give even more berth to the mooring buoys.

Conservatively, trawl fishermen should give approximately 1,500 feet berth to the mooring buoys of the MODU unit when it is onsite and the anchor spread is set. For drilling sites ranging in water depth from 233 to 1156 feet, this would amount to from 0.5 to 1.8 mile berth from the MODU. After the MODU would leave the site, trawlers could experience conflicts due to anchor scars for up to 4 years depending on the sediment type and bottom currents of the area.

Drift gillnets may be a mile to mile and half in length and have restricted ability to maneuver. A drift gillnet up to 6,000 feet long and 60 to 100 feet deep can be fished anywhere from right at the surface to 30 to 40 feet below the surface and may drift for up to 18 miles. The end of the gillnet not attached to the fishing vessel usually has a radar reflector/lighted buoy attached to it, but may not be immediately obvious because it is so far from the vessel. Since drift gillnetting is usually done at night, and often during the darker phases of the moon, it would be difficult for the boat operator to be aware of the anchor mooring buoys for the MODU. As a result, drift gillnet fishers would be precluded from a significant area up-current of the MODU site. The preclusion zone would be a triangular-shaped area upcurrent from the MODU. The apex of the triangle would lie at the MODU.

Set gillnets are found in the same general fishing grounds as crab and lobster pots, from shore to 50 fathoms (300 feet), except in certain areas where deepwater rockfish nets are set. The set gillnet is attached to an anchor and buoy line at both ends. Set gillnets range in length from 300 to 2,500 feet in length. North of Point Arguello, rockfish fishermen are currently setting deepwater gillnets along rock outcrops areas in water as deep as 130 fathoms (780 feet), where the hook and line fishery has traditionally worked their gear. Set gillnets would be precluded from within the anchor spread.

The commercial crab fishery seeks rock crab throughout the project area and, in some years, Dungeness crab from Point Arguello north through the SMB. North of Point Conception, gear can found out to 300 feet. Between Santa Barbara and Gaviota, most gear is found inside 180 feet. Crab fishermen set and move their "strings" of 5 to 25 individual traps on an unpredictable time schedule dictated by crab population movements. From a practical standpoint in locating and avoiding a string(s) of pots, it is important to consider the effects of tide and current strength on the line and buoy, and windage on the buoy. During conditions of high tide, strong currents, or high winds, buoys may be below sea surface and invisible. Traps could potentially be placed within the anchor spread of the MODU, however this would result in a significant risk of vessel conflicts as work and crew vessels travel to the MODU.

The numbers of purse seiners and their location within the Santa Barbara Channel are highly variable and uncertain. The species fished are primarily pelagic, such as anchovy, mackerel, squid, and bonito. Because purse seiners follow schools of these pelagic fish, it is difficult, if not impossible, to predict how large or where the fleet would be at a given time. When working an area, the purse seine fleet is made up of a group of vessels. While searching, the vessels often move on erratic or zigzag courses, trying to spot schools visually or on their sonar. Although the season for pelagic fishes is open all year, the California Department of Fish and Game sets catch quotas. When quotas are filled, the fishery is over for that year unless an extended quota is subsequently issued. Purse seining would be precluded from within the anchor spread and from a cone-shaped area up-current of the MODU and anchor spread.

The hook-and-line fishery targets primarily rock cod over relatively deep rocky outcrops. This is mostly a fall and winter month "fallback" fishery for fishers who use other methods during other times of the year. Typically a buoyed vertical longline with groups of baited hooks is placed in the water upcurrent of a rocky outcrop showing fish on a fathometer. The set drifts through the target area while another set or sets are baited and deployed. The sets are then retrieved downcurrent and the process is repeated. Hook-and-line rock cod fishing areas are limited, small areas, and are often separated by many miles (Kronman 1995, as cited in MMS, 2001). Hook and line fishing would be precluded from within the anchor spread and from a cone-shaped area upcurrent of the MODU and anchor spread.

Trolling for salmon, albacore, and occasionally bonito is done primarily in the Santa Maria Basin, and to a lesser extent in the Santa Barbara Channel, depending on the year and ocean conditions. As in the hook-and-line fishery, trollers are often in another fishery, and enter the troll fishery in the off-season of their principal fishery. Trollers work in highly variable areas, since this fleet targets highly migratory and widely ranging fish. Trolling would be precluded from within the anchor spread of the MODU.

Preclusion from the potential drilling areas could cause low impacts on certain commercial fisheries during the proposed delineation activities, depending on the time of year. Also, anchor scars could cause short- to long-term trawling difficulties resulting in low impacts, depending on the bottom soils where the anchors would be placed. These are essentially space-use conflicts, which is a common occurrence in all sectors of high-use areas with multiple user groups such as the Santa Barbara Channel and Santa Maria Basin.

Impacts Unique to Each Unit

Gato Canyon

Disruption of Fishing Operations. Under the hypothetical development scenario, gear damage and/or loss of fishing time would cause a potential short-term impact on commercial fishermen of the Gato Canyon Unit area. Fishermen in areas unaffected by the potential delineation drilling might experience short-term crowding and reduced catch as fishermen precluded from the Gato Canyon area fish alternate grounds. Drift and set netting and trawling are the most common gear types within the project area. Occasional purse seining operations for wetfish contribute relatively large catches. Similarly, irregular large catches of salmon and albacore in the troll fishery occur in the area. Hook and line fish occurs along hard bottom areas inshore from the proposed site. Generally, the following fisheries are active every year in the Gato Canyon Unit area out to Point Conception dependent on the time of year (M. McCorkle, pers. com., as cited in MMS, 2001):

- From August through January the drift gillnet shark fishery occurs outside the 3-mile line from shore
- From October 1 thru May 30, ridgeback shrimp are fished in water depths of 540 feet and shallower
- From February 1 through November 1, spot prawns are trawled between 510 and 840 feet
- During the winter, sea cucumbers are trawled between 360 and 540 feet
- During the summer, sea cucumbers are trawled from the 1 mi line out to 240 feet

In order to analyze the economic losses due to a decrease in catch of the target species and determine if these values exceed 10 percent of the annual value, landings must be estimated. The ensuing analysis is based on the following assumptions:

- Commercial trawl fishing effort would be precluded between the 270 and 1,200 feet isobaths throughout CDF&G Fish Block 654 and 655;
- An average catch of the target species would have been taken in 2002 from CDF&G Fish Block 654 and 655.

Under the hypothetical development scenario, the trawl fishery and the drift gill net fishery would be the most likely to be impacted by the exploration and development activities on the Gato Canyon Unit. The hook and line fishery would also be precluded from within the MODU anchor spread. It is not possible to predict whether the troll and purse seine fisheries would be active in the area due to the wide-ranging movements of the fish involved in these fisheries. The peak swordfish and thresher shark drift net season is October to December. The peak activity in the spot prawn and ridgeback shrimp trawl fishery is in the spring (March to June). The sea cucumber trawl fishery is most active from June thru September. The thresher shark fishery in this part of the SBC has been impacted by the platforms on the Santa Ynez Unit. The area encompassed by the Gato Canyon Unit represents prime thresher shark drift net grounds (Fishermen scoping meeting, April 2001, as cited in MMS, 2001).

Activity on the Gato Canyon Unit between August and January could affect this fishery and would likely cause moderate impacts if the rig were on site for 45 to 90 days of this season. The hook and line rock cod fishery occurs along hardbottom areas inshore of the proposed drilling site and possibly within the anchor pattern of the MODU. This fishery is mostly a fall-back fishery for hook and line fishermen when weather precludes fishing the Point Arguello area. If the anchor spread of the MODU were to preclude hook and line fishing along the hardbottom inshore of the drilling site, these fishermen would experience low impacts.

As it is not known when potential delineation drilling on the Gato Canyon Unit would occur, the type of fishery and severity of impact cannot be determined. Based on current seasons, drilling during the second quarter of a year coincides with the peak months for spot prawn trawl in the area. These fishermen could experience moderate impacts due to preclusion from the spot prawn trawl grounds during the peak fishing months for this species. It would be difficult to schedule operations at a time that would avoid impacts to commercial fishing because the area is fished year-round for various species.

Anchor scars. The well site identified by the operator used in the hypothetical development scenario is in close proximity (2,100 feet) to a well site approved in the original Exploration Plan. The water depth at the site is approximately 755 feet. The proposed eight-point anchor spread predicted for the Gato Canyon Unit project would be 2,500 to 3,500 feet. As a general rule, it is estimated that the length of chain laying on the seafloor is about one quarter to one third of the anchor radius. Thus approximately 825 to 1,155 feet of chain would be expected to rest on the seafloor for each of 8 anchors. Some degree of lateral flexibility in anchor placement allows avoidance of potential sea floor hard bottom resources. A site-specific mooring analysis and ocean bottom surveys would be conducted to ensure correct anchor placement. The mooring analysis would factor in any subsea obstructions, obstacles, and hard bottom habitat. The anchors would be set to avoid these areas, and ensure that the anchors are placed in adequate soils to provide the required holding capacity.

Constructing the platform and associated pipelines and power cables within Lease P-0460 would have similar, but longer period, impacts to commercial fishing as the delineation drilling. Impacts would include preclusion if trawling, set netting, and trap fisheries for the period of time needed to complete the construction activities. Assuming construction vessels utilize the pre-established vessel traffic corridors, the increase in vessel traffic associated with that construction would be expected to result in low impacts to commercial fishing activities. However once in-place, the platform would permanently reduce available trawling grounds within the an assumed 0.25 mile-radius “berth” area centered on the platform. The pipelines and power cables are not expected to affect trawling within the designated California Halibut Trawl Grounds (inshore of the 3-mile limit) within the area, nor should nearshore set gear fisheries be affected.

Point Sal Unit and Purisima Point Unit

Disruption of Fishing Operations. Under the hypothetical development scenario, gear damage and/or loss of fishing time would cause a potential short-term impact on commercial fishermen of the Point Sal and Purisima Point Unit areas. Set netting, trolling, crab trap, trawling, and purse seining are the most common gear types within the project area. Generally, the following fisheries are active every year in the area dependent on the time of year (Timoschuk, pers. com., as cited in MMS, 2001):

- The flatfish trawl fishery
- The pink shrimp and spot prawn trawl fishery
- Rockfish trawl (now limited to areas in 600 feet of water or more), hook-and-line, and set net fisheries
- Salmon troll fishery
- Halibut trawl fishery -270 feet to the 3-mi State boundary
- Purse seining for wetfish
- Rock crab (shore to 300 feet) and Dungeness crab (shore to 20 feet) trap fishery.

In order to analyze the economic losses due to a decrease in catch of the target species and determine if these values exceed 10 percent of the annual value, landings must be estimated. The ensuing analysis is based on the following assumptions:

- Commercial trawl fishing effort would be precluded throughout CDF&G Fish Blocks 632 and 638
- An average catch of the target species would have been taken in 2002 from CDF&G Fish Blocks 632 and 638.

The trawl fishery, set gill net fishery, wetfish purse seine fishery, crab trap fishery, and the troll fishery would be the most likely to be impacted by the exploration and development activities under the hypothetical development scenario on the Point Sal and Purisima Point Units. A drift gillnet fishery for swordfish and thresher shark occasionally produces high catches. However, it is not possible to predict whether the drift net fisheries would be active in the area due to the wide-ranging and sporadic movements of the fish involved in these fisheries into the area. The peak swordfish and thresher shark drift net season is October to December. The peak activity in the spot prawn and pink shrimp trawl fishery is in the spring and summer (April to September), though this fishery generally occurs just outside the proposed drilling sites (Fisherman scoping meeting, April 2001, as cited in MMS, 2001). The troll fishery for salmon is most active from May to August. Rock crab traps are found year-round, while peak

Dungeness crab activity is from December to April. Peak activity in the flatfish trawl fishery occurs from October to May. The rockfish trawl can occur year-round, but is governed by quotas and trip limits.

About 6 trawlers regularly fish the area for halibut during all months of the year. The anchor spread of the MODU would likely preclude halibut trawlers from a portion of the halibut fishing grounds in the area. Low to moderate impacts could be expected depending on the placement of the anchors.

About 12 to 15 trap fishermen from Avila and Morro Bay fish for Dungeness crab in the Point Sal and Purisima Point area from November to June. Rock crab fishermen fish the area during all months of the year. These fisheries would be precluded from within the anchor spread of the MODU and conflicts with support vessels would be expected. Low to moderate impacts to the trap fishery would be expected from activities under the hypothetical development scenario.

The troll fishery for salmon is highly variable in the area. From 5 to several hundred fishermen may participate depending on the year and stock abundance. The peak season is from May to August. Low to moderate impacts would be expected depending on the level of fishing activity.

The schedule for the potential delineation drilling has not been assumed, therefore assessing which fisheries would be impacted is not possible. Irrespective of the schedule, the fisheries that utilize the area within the MODU anchor areas could experience moderate impacts due to preclusion from their fishing grounds during the peak fishing months.

Anchor scars. The potential well sites identified by the operator used in the hypothetical development scenario were approved in the original Exploration Plan. The water depths at the site are approximately 300 feet. The proposed eight-point anchor spread predicted for the Point Sal Unit project would be 1,100 to 1,900 feet, but could extend out to 2,100 feet. Some degree of lateral flexibility in anchor placement allows avoidance of potential sea floor hard bottom resources. A site-specific mooring analysis and ocean bottom surveys would be conducted to ensure correct anchor placement. The mooring analysis would factor in any subsea obstructions, obstacles, and hard bottom habitat. The anchors would be set to avoid these areas, and ensure that the anchors are placed in adequate soils to provide the required holding capacity.

By using an anchor of sufficient holding power, drag related scarring would likely be minimized to the 10 to 100 feet usually necessary to properly set the anchor. The anchor scars would likely persist for 3 to 4 years in the soft sediments of the area. Impacts to commercial trawl fishers would likely be low due to the limited number of anchoring events. The proposed drilling program and associated activities would be expected to take 68 days at each site.

Constructing the platforms and associated pipelines and power cables within the Point Sal and Purisima Point Units and within Lease P-0460 would have similar, but longer period, impacts to commercial fishing as the delineation drilling. In addition, nearshore fisheries, including crab traps and set netting operations could be impacted during pipelaying operations between Platform OSMB and the shoreline. Due to the relatively short period of time and narrow corridor within which those pipelines would be laid, those impacts would be expected to be low. Low to moderate impacts to trawl, set net, and deeper water traps fisheries due to preclusion of the seafloor and water areas around the platform construction sites would be expected. Assuming construction vessels would use the pre-established vessel traffic corridors, the increase in vessel traffic associated with that construction would be expected to result in low impacts to commercial fishing activities.

Once in-place, the platforms would permanently reduce available trawling grounds within the an assumed 0.25 mile-radius “berth” area centered on the platform; a low-level impact. The pipelines and power cables would not be expected to affect trawling or set nets within the area, nor should nearshore set gear fisheries be affected.

Decommissioning of the 4 platforms assumed to be built for development of the undeveloped leases would be expected to result in space-use and preclusion conflicts with commercial fishermen during the removal of platform structures and pipelines. In addition, if ongoing research indicates that rockfish resources benefit from the habitat created by the platforms, the removal of those structures could have low to moderate impacts on that commercially-important group of fish.

5.13.3 Summary and Conclusion

Some routine offshore oil and gas activities, including construction and drilling, and the construction of a new LNG platform in the SBC, would likely be heaviest during the period 2007–2012; under the hypothetical development scenario, much of this activity would be related to the development of the undeveloped leases. Construction activities would occur in the Santa Maria Basin and, to a lesser extent, the western Santa Barbara Channel. The LNG facility construction would occur in the eastern Santa Barbara Channel in an area that has historically supported drift net fishing. Decommissioning of existing offshore oil and gas facilities would begin in the eastern Channel about 2012 and shift westward over a period of years. Thus, there would be periods of intense activity occurring in different parts of the project area at various times. Throughout these periods, routine activities such as production and vessel and helicopter support traffic would continue.

Overall, the impacts to commercial fishing in the project area from routine offshore oil and gas activities, primarily space-use and preclusion, would increase over present levels. However, the areas covered by these activities would be small relative to the available commercial fishing grounds, and the periods of disturbance would be localized. Unless several such projects were to overlap in time and space during peak fishing seasons, cumulative impacts to commercial fishing would be unlikely. However, if 4 platforms are placed in the SMB and SBC along with associated pipelines, fishermen, especially trawlers, would experience moderate impacts due to loss of fishing grounds. Increased vessel traffic would lead to conflicts with the trap fishermen of the area. Cumulative impacts to commercial fishing from all the routine oil and gas activities assumed to take place between 2006 and 2030, including those associated with the development of the undeveloped leases, would be expected to be moderate.

Accidental oil spills present an ongoing source of potential impacts to commercial fishing. The cumulative risk of oil spills arises from multiple sources, including offshore oil and gas activities in Federal and State waters and both Alaskan and foreign-import tankering. The greatest oil spill risk to the commercial fishing industry in the project area results from tankering operations. This risk is tempered by recently implemented or proposed mitigation (such as the rerouting of tankers farther offshore along the central California coast) and, as discussed in Section 5.3**,** by modern oil spill response capabilities.

Without development of the undeveloped leases, the probabilities that one or more oil spills would occur during the period 2006 through 2030 from existing Pacific OCS oil and gas activities are 94.9 percent for a spill of 200 bbl or less and 41.2 percent for a spill of 2,000 bbl. Under the hypothetical scenario for development of the undeveloped leases, these probabilities are 98.8 percent and 53.9 percent, respectively. Thus, the potential for an oil spill occurring from development of the undeveloped leases represents a measurable incremental increase to the overall cumulative oil spill risk for the commercial fishing industry. Impacts to commercial fishing from the oil spills assumed to occur in the project area during the period5 2006–2030 could range from low to moderate, depending on location, season, and a number of other factors. The most sensitive areas, from a commercial fishing perspective, would be near a harbor, resulting in closure. Moderate impacts would be considered significant.

Table 5.13-1 provides a summary of the potential impacts of the development of the undeveloped leases under the hypothetical development scenario on the commercial fishing and kelp harvesting resources.

Table 5.13-1. Comparison of Potential Impacts to Commercial Fishing and Kelp Harvesting by Undeveloped Unit/Lease and Exploration/Development Phase.

Unit/Lease	Exploration and Delineation Drilling	Development and Production	Decommissioning
Cavern Point	None	Low	Low
Gato Canyon	Low to Moderate	Moderate	Moderate
Rocky Point	None	Low	Low
Sword	None	Low	Low
Bonito	None	Low	Low
Santa Maria	None	Low to Moderate	Moderate
Purisima Point	Low to Moderate	Low to Moderate	Moderate
Point Sal	Low to Moderate	Low to Moderate	Moderate
Lion Rock	None	Low	Low
Lease OCS-P 0409	None	Low to Moderate	Moderate

5.14 Marine Recreational Fishing

5.14.1 Significance Criteria

Impacts to marine recreational fishing have been analyzed under the hypothetical development scenario according to the following criteria:

- **High**
  - Fishermen are precluded from 10 percent or more of the fishing grounds during exploration and development activities;
  - 10 percent or more of the fishermen are precluded from a fishing area for all or most of a fishing season; or
  - A decrease in catchability of target species exceeds 10 percent of the average annual landing.
  - Activities that result in precluding recreational diving within more than 1.0 mile of a dive site or within more than 1.0 mile of the activity.
- **Moderate**
  - Fishermen are precluded from 1 to 10 percent of the fishing grounds during exploration and development activities;
  - 1 to 10 percent of the fishermen are precluded from a fishing area for all or most of a fishing season; or
  - A decrease in catch of target species between 1 to 10 percent of the average annual landing.
  - Activities that result in precluding recreational diving within between 0.5 and 1.0 mile of a dive site or within 0.5 to 1.0 mile of the activity.
- **Low**
  - Fishermen are precluded from 1 percent or less of the fishing grounds during exploration and development activities;
  - 1 percent or less of the fishermen are precluded from a fishing area for all or most of a fishing season; or
  - a decrease in catch of target species less than 1 percent of the average annual landing.
  - Activities that result in precluding recreational diving within less than 0.5 mile of the dive site or within less than 0.5 mile of the activity.

For the purposes of this analysis, high and moderate level impacts are considered significant, while low level impacts are considered insignificant.

5.14.2 Impacts of Post-Suspension Activities

The impacting agents occurring during the post-suspension period include a wide range of activities (as defined in Appendix I) that could affect recreational fishing and diving.

5.14.2.1 Cumulative Impacts without Activities on the Undeveloped Leases on Marine Recreational Fishing

The major impact agents associated with routine past, present, and foreseeable offshore oil and gas activities are addressed in Section 5.7.4 for Fish Resources, and Section 5.13 for Commercial Fishing and Kelp Harvest. Other activities include routine on going and proposed oil and gas activities in Federal and State waters that may cause space-use or preclusion conflicts. Alaskan and foreign-import tankering, oil spills, dredging and discharge of dredged material, aquaculture, coastal development, agriculture runoff, and commercial fishing also add to the cumulative impacts on marine recreational fishing through adverse effects on marine fish resources. These impacts, as they relate to Fish Resources, are discussed more thoroughly in Section 5.7.4. Other, non-OCS sources of impacts to recreational fishermen, both anthropogenic and non-anthropogenic, are also discussed. The impacts discussed in this section include past, present, and foreseeable actions that may produce impacts during the period 2006 through 2030, the period during which development of the undeveloped leases under the hypothetical development scenario would likely occur. Potential cumulative impacts are discussed below; more detail is provided in Sections 5.7.4 and 5.13.

There are no scheduled or anticipated oil and gas lease sales in Federal waters of the Pacific OCS or in State waters. Thus, no additional production platforms are expected to be installed on the Pacific OCS after the development of the current active leases and the undeveloped leases. However, the proposed offshore Cabrillo LNG facility is planned for development during this period as are delineation wells within the study area and the permanent abandonment of two exploration wells in Leases OCS-P 0320 and 0431. These activities would require barges and other vessels to be moored at the respective sites but are not expected to result in preclusion of recreational fishing and diving areas.

Section 5.2 discusses the major impact agents associated with past, present, and foreseeable offshore oil and gas activities that may produce impacts during the 2006 to 2030 period. These include on-going and proposed oil and gas activities in Federal and State waters, including new LNG facilities and decommissioning of existing facilities, and accidental or upset conditions (oil spills or hydrogen sulfide gas releases). Alaskan and foreign-import tankering, dredging and discharge of dredged material, aquaculture, coastal development, agriculture runoff, and commercial fishing also add to the cumulative impacts on recreational fishing through adverse effects on marine fish resources.

Oil and Gas Activities. Section 5.2 describes the future offshore oil and gas activities that may result in impacts to the marine recreational fishing industry. These include geophysical surveys, construction, drilling and production activities with associated support activities, and the abandonment, or decommissioning, of wells and offshore facilities. The potential impact agents expected from these proposed activities are vessel traffic, space-use and preclusion conflicts; all are expected to result in low impacts to the recreational fishing and diving. The potential lethal and sub-lethal impacts to fish resources resulting from offshore oil and gas activities may also impact the marine recreational fishing industry and are discussed in Section 5.7.

Space-use and Preclusion Conflicts. The potential impacts from geophysical surveys, construction, and platform-based development and production operations are discussed below.

Geophysical Surveys. Section 4.1 describes geological and geophysical survey activities in the Pacific OCS Region. Since 1963, more than 400 geological and geophysical surveys, including both 2-D and 3-D seismic surveys, have been conducted in the Santa Barbara Channel and Santa Maria Basin, and many others have occurred in State waters. Most of these surveys occurred during the 1970's and 1980's; the most recent seismic survey offshore southern California was the Exxon 3-D seismic survey conducted in the western Santa Barbara Channel in 1995 (MMS, 1995, as cited in MMS, 2001). Additional 3-D seismic surveys may occur during the next few years. However, no Pacific OCS operators have approached MMS with proposals to conduct such surveys to date.

The direct effects of airgun acoustic energy on fish resources are analyzed in Section 5.7.4. This section discusses the behavioral effects of airgun acoustic energy on fishery resources, and the space-use conflicts marine recreational fishermen would experience during a seismic survey.

High energy seismic surveys are conducted from a large support vessel that tows an energy source (airguns) and hydrophone receivers. A computer onboard the support vessel collects and processes the data received from the hydrophones. The energy source towed behind the support vessel consists of linear subarrays (at least seven airguns/array) of 28 to 64 airguns. The hydrophones towed behind the airgun array consists of 1 to 12 cables in parallel, with up to 100 sensors/streamer cable, and may be up to 2,500 feet long and covers an area over 2,500 feet across. Maneuverability of the support vessel during seismic operations is limited and other activities within the survey area are generally precluded.

Some recreational fishermen and recreational diving vessels would experience short-term preclusion from the area or while transiting to and from a site during a seismic survey. This is essentially a space-use conflict, which is a common occurrence in all sectors of high-use areas with multiple user groups such as the Santa Barbara Channel. A seismic vessel with about 2 miles of towed cables would be in the operations area 24 hrs a day for up to 30 days, and would traverse the area continuously during this time. The close lane spacing and non-stop nature of the survey makes it nearly impossible to avoid interference with any recreational fishing operation that would happen to be within the survey area. Recreational fishermen including private vessels and charter boat vessels would be precluded from fishing within the survey area for the duration of the survey.

Recreational fishing from boats in the open waters of the Santa Barbara Channel and Santa Maria Basin is relatively uncommon. One would expect these vessels to either be anchored or drifting over rockfish and lingcod grounds, or trolling for pelagic species such as salmon or albacore. Since the profits of the recreational fishing industry are not governed by the numbers of fish caught, recreational fishing vessels can fish alternate areas away from the survey without suffering an economic loss.

Airgun energy appears to have behavioral effects on fish. Generally, pelagic schooling fishes seem to swim away and leave the area, while demersal fishes appear to respond by flattening to the bottom. Pearson et al. (1987, as cited in MMS, 2001) exposed several species of rockfish to acoustic energy in a controlled test. Three behavior patterns were noted: (1) the school dove to the bottom and remained motionless; (2) the school dove to midwater and swam rapidly in changing directions; and, (3) the school broke into smaller schools and fled in different directions. These patterns were not always maintained throughout the exposure, indicating that fish may habituate to the sound. The fish returned to their pre-exposure behavioral patterns within minutes after the end of the sound presentations eliciting responses. Rockfish aggregations, as measured by fathometer, showed no significant areal difference between control and seismic sound emission trials, although a decrease in aggregation height was detected (Pearson et al., 1987, as cited in MMS, 2001). Perhaps more importantly, this study showed a decrease in CPUE (catch per unit effort) of 52.4 percent during airgun exposure. However, the study did not conclude how long this decrease in CPUE would be expected to last or over how great a distance this reduction might occur.

Studies by Engas et al. (1993, as cited in MMS, 2001) and Lokkeborg and Soldal (1993, as cited in MMS, 2001) have attempted to look at the areal extent of seismic survey effects on behavior and catchrates of cod and haddock during airgun operations and on catchability after cessation of all seismic activity. Although the species in question are not found in the Santa Barbara Channel, they have swimbladders and form aggregations. Significant catch reductions were found to occur at least 6 miles from the seismic survey area (Lokkeborg and Soldal, 1993, as cited in MMS, 2001). Engas et al. (1993, as cited in MMS, 2001) found that distribution of both species had not returned to all pre-survey levels (as seen by hydroacoustics, trawl and hook-and-line sampling) during the 5 days after airgun shooting had ceased. There was some indication of a return to normality in longline catches of cod, but not haddock, within the 5 days, but no recovery was found by either trawling or acoustic methods. Both studies concluded that the fish would not have continued to actively avoid the survey area after the cessation of airgun shooting. The studies cited above demonstrate that it is difficult to support statements that attempt to measure the magnitude of behavior effects and to translate them into a decrease in catchability.

In conclusion, seismic surveys preclude recreational fishermen from the area of the survey for the duration of the survey. Furthermore, fishing success may be adversely affected for up to 10 days following the survey. This decline in fishing success due to behavioral response may be experienced as far as 6 miles from the survey area. Low impacts to the marine recreational fishing industry would be expected since fishermen would be able to fish alternate areas during the survey and suffer no economic loss.

Construction and Operations. As described in Section 5.2, construction activities include the installation of platform jackets and topsides, the laying of pipelines, platform hook-up and commissioning, and the initiation of drilling. Operations include the daily traffic between bases and installations, and maintenance of the platforms and pipelines on the Pacific OCS.

From 1967 to 1992, 19 Pacific OCS platforms and associated pipelines were installed in the Santa Barbara Channel and Santa Maria Basin. All of these platforms are still in place. Seven offshore platforms were installed in State waters in this area between 1958 and 1966, but only one, Platform Holly near Goleta, remains. There currently are 23 offshore platforms in the Pacific OCS. Of these, 4 are in the Santa Maria Basin, 15 are in the Santa Barbara Channel, and 4 are in San Pedro Bay. Except for the development assumed under the hypothetical development scenario, no new offshore construction is expected to occur between 2006 and 2030.

At some platforms on the Pacific OCS, fishermen are precluded from an area up to 840 feet downwind from the platform due to the dangers of a hydrogen sulfide gas release. There is no regulation requiring fishermen to avoid this hazard zone; however, fishermen should be aware of the dangers and have an exit strategy crosswind from these platforms should they decide to work in this hazard zone.

The primary impacts to recreational fishermen from construction and operations of the offshore oil and gas industry include conflicts with vessel traffic and loss of harbor space. Recreational fishing has probably benefited from the placement of platforms and pipelines, which serve as hard substrate and attracts several species of fish and invertebrates. Private fishing vessels and charter boats often target platforms as potential fishing areas due to the fact that platforms attract and serve as habitat for many species of desirable fish and invertebrates. Low impacts have occurred to recreational fishermen due to oil and gas activities.

<u>Vessel Traffic</u>. Support of development and production activities in the eastern and central Santa Barbara Channel primarily involves crew and supply boats. Crew changes for platforms in the Santa Maria Basin are conducted by helicopter, resulting in lower levels of support boat traffic. In the Channel and Basin, approximately 90 to 140 crew boat and 10 to 12 supply boat trips are made each week. An additional 25 crew boat trips are made each week to State Platform Holly. Support vessels operate out of Port Hueneme, Ventura Harbor, Carpinteria Pier, or Ellwood Pier. It should be noted that many of these trips, particularly to the platforms off Carpinteria, are relatively short and that many trips may service more than one platform.

Vessel traffic has the potential to conflict with marine recreational fishing operations through right-of-way interactions, and navigational safety. The Joint Oil/Fisheries Liaison Office (JOFLO) helped draft guidelines that established voluntary, ¼-mile-wide corridors in which crew and supply boats could remain when traveling between offshore platforms and supply bases. The Santa Barbara Channel/Santa Maria Basin Oil Service Vessel Traffic Corridor Program is intended to minimize interactions between oil industry operations and commercial fishing operations. It was developed cooperatively by the two industries through the Joint Committee. In addition to providing transit corridors in and out of area ports, the program routes support traffic along the Channel seaward of an outer boundary line. East of Gaviota, the outer boundary is defined by the 30-fathom (180-feet) water depth; west of Gaviota, and north of Point Conception as far as Pedernales Point, it follows the 50-fathom line. In the area west of Gaviota, the 50-fathom (300-feet) water depth is 2 nautical miles or more offshore. This also helps to minimize interactions with recreational fishing vessels since most are found within 1 nautical mile of shore along the kelp beds.

Transit to and from drilling sites occurs within vessel corridors established for oil and gas service vessels in the Santa Barbara Channel. Although vessel traffic increases during exploration and development activities, the oil industry would minimize conflicts with recreational fishermen by traveling within the established corridors. Conflicts are more likely to occur in the Santa Maria Basin where traffic corridors have not been established due to minimal oil and gas activity in the area, and recreational vessels troll in the open ocean more frequently in this area.

As discussed in Section 5.2 (see Table 5.2-5), the highest levels of support vessel traffic to a platform may be expected during the construction phase. During this phase, crew boat trips may occur as often as three times per day and supply boat trips twice per day for brief periods. Low impacts to recreational fishermen have occurred from oil and gas support and crew vessel traffic.

Offshore Facility Decommissioning. Section 5.7.4 discusses the process of exploratory well abandonment and the associated potential impacts to marine fish resources. Section 5.2 describes the processes involved in decommissioning offshore facilities. For purposes of analysis, it is assumed that decommissioning would encompass the complete removal of a platform and associated pipelines, with none of the leg structure left in place to form an artificial reef, and any shell mounds removed. To date, only one Pacific OCS facility has been decommissioned — the OS&T vessel that formerly served the Santa Ynez Unit platforms in the Santa Barbara Channel. In addition, six offshore platforms in State waters in the Channel have been removed — two in 1988 and four in 1996. It is expected that offshore decommissioning activities during the period between 2006 and 2030 would include the removal of all existing platforms, except Platform Irene if the Tranquillon Ridge project occurs.

Recreational fishermen would be precluded from the area during the decommissioning process. Recreational fishermen would suffer a negative impact from the complete removal of offshore platforms since many recreational fishermen find them to be desirable fishing habitat. However, very low economic impacts would be expected since recreational fishermen have many other areas available, and their profits are not dependent on the numbers of fish caught.

Past and present offshore oil and gas activities have had very negligible impacts to the marine recreational fishing industry. Offshore structures have perhaps removed a small area from sportfishing trolling grounds. However, many recreational fishermen would argue that the platforms and pipelines enhance recreational fishing by serving as artificial reefs that provide suitable substrate to fish in an area that is devoid of these essentials. Some minor inconvenience due to vessel traffic interactions and dock space have also occurred. In conclusion, marine recreational fishermen have experienced low impacts from past and present oil and gas activities on the Pacific OCS.

Oil Spills. The cumulative oil spill risk for the study area results from several sources: ongoing and projected oil and gas production from existing Pacific OCS facilities in the Santa Barbara Channel and Santa Maria Basin; several proposed exploration and development projects on the Pacific OCS; ongoing production from one facility in State waters in the Santa Barbara Channel; two likely oil and gas projects in State waters; and, the tankering of Alaskan and foreign-import oil through area waters.

Tables 5.3-2 and 5.3-3 present the estimated mean number of spills of various sizes and the probability of their occurrence as a result of the described activities. The most likely scenario is that one or more oil spills in the 50 to 1,000 bbl range would occur from offshore oil and gas activities over the period 2006-2030, and that such a spill would be 500 bbl or less in volume. The maximum reasonably foreseeable oil spill volume from offshore oil and gas activities is 2,000 bbl, assumed for purposes of analysis to be a pipeline spill. The potential impacts to the marine recreational fishing industry in the study area from spills of each of these three sizes are discussed below.

The level of impacts from such spills would depend on many factors, including the type, rate, and volume of oil spilled, and the weather and oceanographic conditions at the time of the spill. These parameters would: determine the quantity of oil that is dispersed into the water column; the degree of weathering, evaporation, and dispersion of the oil before it contacts a shoreline; the actual amount, concentration, and composition of the oil at the time of shoreline or habitat contact; and, a measure of the toxicity of the oil.

The impacts of oil on marine fish resources are analyzed in Section 5.7.4. An oil spill in the range of 200 to 23,000 bbl offshore California would result in low adverse impacts to marine fish resources of the region. Any direct mortalities to fish would probably occur only in the egg and larval stages found in the surface waters in the immediate vicinity of the spill.

Elevated hydrocarbon levels in nearshore invertebrates would be likely, leading to increased stress and potential decreases in growth and reproduction in fish feeding upon the invertebrates. These effects are expected to be short-term under normal conditions; however, oil may become sequestered in the sediments of lowenergy embayments and persist for years.

The primary impacts to recreational fishermen would likely be space-use and preclusion conflicts associated with oil spill cleanup. If an oil spill were to occur near a harbor, the harbor would likely be closed and fishing vessels would not be able to leave the harbor to work. Fishermen would also be precluded from fishing in the area of the spill due to fouling of their boats and equipment. The closing of the area near an oil spill would likely last from 5 to 15 days depending on the size of the spill and ocean conditions. Recreational fishermen might avoid the spill area for much longer times due to the drop in the quality of the fishing experience and public perception.

Closure of a Harbor. If a large spill contacts a port, oil containment booms could be placed across the mouth of the port. The U.S. Coast Guard might also close a port temporarily to avoid contamination of the area from vessels returning from the oil spill site. If fishing vessels are prevented from leaving port, as occurred during the 1969 Santa Barbara oil spill, economic losses could be high depending on the time of year and the length of time the port is closed. A 2,000 to 23,000 bbl oil spill that contacts a port and results in the closure of the port for 15 or more days would cause low to moderate impacts to charter boat and party boat operators.

Tainting of Fish. Fish can accumulate hydrocarbons from contaminated food, although this is a temporary effect since fish metabolize hydrocarbons, and can excrete both metabolites and parent hydrocarbons from the gills and the liver (NRC, 1985, as cited in MMS, 2001). Nevertheless, certain fisheries within an oil spill zone are usually closed and public perception also impacts the fishing experience. Recreational fishermen would likely target alternate fishing grounds until the quality of the fishing experience in the spill area returns to previous conditions.

Fouling of Fishing Gear and Vessels. Oil spills can potentially cause economic losses to boat owners and fishermen by contaminating fishing gear and vessels. Oiled vessels would need to be cleaned, and oiled gear either cleaned or replaced. Fishermen would be expected to fish alternate areas to avoid fouling their gear and vessels. Low impacts would be expected. It is unlikely that a 200 bbl spill would have more than a negligible impact on recreational fishing in the study area.

As is discussed in Section 5.3, the mean size of an oil spill from tankers that utilize the area is larger than the mean spill size from a platform or pipeline. The effects of a tanker spill of the largest size analyzed for this study (22,800 bbl) on recreational fishing would be most serious if the spill were to occur near a harbor. As discussed above, harbors could be closed during a spill. If the harbor was closed for 15 or more days, charter and party boat operators would likely experience low to moderate economic impacts.

Other Activities. As fisheries stocks offshore California have declined over the past two decades, Federal and State regulators have imposed quotas and restricted seasons for sportfishermen. The natural and man-induced reasons for the stock declines have been analyzed in Section 4.7. As more fisheries are closed, and seasons are shortened, charter and party boat owners of southern and central California would experience economic hardship.

The Channel Islands National Marine Sanctuary has established a series of Marine Protected Areas within which recreational fishing is limited, but not completely prohibited (see Section 4.7.9). To a certain degree, sportfishing success is not dependent on the number of fish caught, but on the quality of the experience. However, as fisheries are closed or seasons shortened and/or area restrictions or closures increase, some segments of the industry would be impacted on the economic level. Charter and party boat operators and their crew experienced serious financial impacts during closure periods, but private boat owners only suffered the inconvenience of not being able to fish. They were still able enjoy outings during this time including whale watching and sight-seeing to the Channel Islands. Marinas and bait shops likely also experienced economic hardship during the rockfish closure. As the quality of the fishing experience decreases, whether it be from fewer landings to closing of quality fishing grounds, the fewer people would charter or rent boats at the harbors. Thus, fisheries closures and decreased landings due to stock declines would likely have low to moderate economic impacts on charter and party boat operators, crews, marinas and bait shop owners in the study area. Private boat owners and shore and pier fisherman would experience low impacts.

5.14.2.2 Incremental Impacts of Exploration and Development of the Undeveloped Leases on Marine Recreational Fishing

Under the hypothetical development scenario, exploration and delineation drilling activities would occur from a MODU, moored with eight anchors, which would extend 5 to 7 times the water depth from the MODU (Appendix K). Assuming an average of 1,000 feet water depth, this could amount to approximately 5,000 feet around the well sites that would be lost to fishing while the MODU is onsite (approximately 90 days at each site). Most marine recreational fishing occurs inside the State boundary 3 nautical miles from shore. However, some trolling for albacore and salmon can occur during the peak season in both the SMB and SBC. Given the maneuverability of trolling vessels and the small area that would be precluded at each proposed site, conflicts would be expected to be negligible. Preclusion from the proposed drilling areas would cause low impacts on marine recreational fisheries during the proposed delineation activities. Exploration on Bonito, Sword, Rocky Point, and Cavern Point Units would take place from existing platforms.

Development of the undeveloped leases would involve a number of oil and gas activities in addition to those described earlier in this section. As described in section 5.2, it is assumed that four platforms and associated pipelines and cables would be built: three in the northern Santa Maria Basin; and, one in the Gato Canyon Unit (Figures 5.2-1 and 5.2-2). The major portion of the offshore construction expected during the period 2009-2102, beginning with the Gato Canyon Unit, then shifting to the leases located in the Santa Maria Basin. Platform installation would be estimated to take approximately 3 to 5 months, depending on water depth; pipeline and cable installation would be estimated to take about 3 months and 2 months, respectively. Impacts on recreational fishing in the study area from these activities would be expected to cause low impacts.

The other routine activities associated with development of the undeveloped leases, including drilling, production, vessel and helicopter support traffic, and abandonment, would be expected to result in low space-use and preclusion conflicts to recreational fishermen throughout the period between 2006 and 2030. Once production begins, support traffic would be expected to remain at levels typical for ongoing offshore oil and gas activities in the Santa Maria Basin. The probability of an oil spill under the most likely development scenario is discussed in Section 5.3. Impacts to recreational fishing from any oil spills occurring as a result of the development of the undeveloped leases would be similar to those described above for the 200- and 2,000-bbl spills assumed to occur as a result of offshore oil and gas activities and for the assumed mean volume tanker spill of 22,800-bbl.

Because of the lack of recreational fishing within the areas where new platforms would be installed, impacts on recreational fishing in the study area from these activities would be expected to be low, as discussed in Section 4.14. The other routine activities associated with development of the undeveloped leases, including drilling, production, and vessel and helicopter support traffic, would be expected to result in minor space-use and preclusion conflicts to recreational fishermen throughout the period 2006 through 2030. Once production were to begin, support traffic would be expected to remain at levels typical for ongoing offshore oil and gas activities in the Santa Maria Basin.

5.14.3 Summary and Conclusion

Some routine offshore oil and gas activities, including construction and drilling, would likely be heaviest during the period 2009 through 2012; under the hypothetical development scenario, much of this activity would be related to the development of the undeveloped leases. Construction activities would occur in the Santa Maria Basin and, to a lesser extent, the western Santa Barbara Channel. The Cabrillo offshore LNG facility would, however, be constructed off Ventura during this period. Decommissioning of existing offshore oil and gas facilities would begin in the eastern Channel about 2012 and shift westward over a period of years. Thus, there would be periods of intense activity occurring in different parts of the study area at various times. Throughout these periods, routine activities such as production and vessel and helicopter support traffic would continue.

Overall, the impacts to the recreational fishing industry in the study area from routine offshore oil and gas activities, primarily space-use and preclusion, would amount to a negligible increase over present levels. The areas covered by these activities would be small relative to the available fishing grounds, and the periods of disturbance would be localized. Cumulative impacts to marine recreational fishing from all the routine oil and gas activities assumed to take place between 2006 and 2030, including those associated with the development of the undeveloped leases, would be expected to be low (less than significant).

Accidental oil spills present an ongoing source of potential impacts to the recreational fishing industry. The cumulative risk of oil spills arises from multiple sources, including offshore oil and gas activities in Federal and State waters and both Alaskan and foreign-import tankering. The greatest oil spill risk to the recreational fishing industry in the study area results from tankering operations. This risk is tempered by recently implemented or proposed mitigation (such as the rerouting of tankers farther offshore along the central California coast) and by modern oil spill response capabilities. Without development of the undeveloped leases, the spill probability increases slightly. Thus, the potential for an oil spill occurring from development of the undeveloped leases would represent a measurable incremental increase to the overall cumulative oil spill risk for the recreational fishing industry.

Impacts to recreational fishing from the oil spills assumed to occur in the study area during the period between 2006 and 2030 could range from low (all non-oil spill activities) to moderate (near-harbor oil spill), depending on location, season, and a number of other factors. The most sensitive areas, from a recreational fishing perspective, would be near a harbor, resulting in closure.

Table 5.14-1 provides a summary of the potential impacts of the development of the undeveloped leases under the hypothetical development scenario on the recreational fishing and diving activities.

Table 5.14-1. Comparison of Impacts to Marine Recreational Fishing by Undeveloped Unit/Lease and Exploration/Development Phase.

Unit/Lease	Exploration and Delineation Drilling	Development and Production	Decommissioning
Cavern Point	None	Low to Moderate for all units	Low for all units
Gato Canyon	Low		
Rocky Point	None		
Sword	None		
Bonito	None		
Santa Maria	None		
Purisima Point	Low		
Point Sal	Low		
Lion Rock	None		
Lease OCS-P 0409	None		

5.15 Military Operations

5.15.1 Significance Criteria

Impacts on military operations that are addressed in this analysis adopt the impact level criteria described below. High and moderate impacts are considered significant; low impacts are considered insignificant.

- **High.** The level and location of offshore oil and gas activity cause frequent and major involuntary modifications of military operations and commercial launch activities, reductions in the level of activity, or long-term delays. There would be a major, long-term shift of military operations within the Point Mugu Sea Range or at Vandenberg Air Force Base (VAFB).
- **Moderate.** The level and location of offshore oil and gas activity cause occasional and modest modification of military operations and commercial launch activities, a modest reduction in the overall level of activity, and short-term delays. There would be a modest, short-term shift of military operations in the Point Mugu Sea Range.
- **Low.** The level and location of offshore oil and gas activity will cause infrequent and minor modification of military operations and commercial launch activities. There would be a minor reduction in the level of activity, and slight delays in the activity. There would be no shift of military operations in the Point Mugu Sea Range.

Regulatory Setting. Post-suspension activities under the hypothetical development scenario would take place on leases operated by Aera Energy LLC, Plains Exploration and Production, Samedan Oil Corporation, Venoco, Inc., and Arguello, Inc. All of the undeveloped Pacific OCS leases included within the units run by these operators were contractually leased to oil companies during the following Pacific OCS lease sales: OCS Sale 48 in 1979, OCS Sale 53 in 1981, OCS Sale 68 in 1982, and OCS Sale RS2 in 1982. Military stipulations were attached to all lease sales (see Appendix H). Stipulations related to military operations include:

- Require that all vessel and aircraft traffic within designated Military Warning Areas be coordinated with the USAF and the Navy,
- Authorize the U.S. Government to temporarily suspend offshore oil and gas operations and require evacuation of personnel in the interests of national security,
- Require lessees to control electromagnetic emissions so as not to interfere with military operations, and
- Limit the liability and hold the U.S. Government harmless from any damage or injury resulting from the programs and operations of the military.

The MMS has instructed Pacific OCS operators of leases bearing military stipulations to prepare Evacuation and Sheltering Plans for oil and gas personnel. The plans describe procedures for sheltering and evacuation using vessels and aircraft, and provide a list of equipment and operations that would be shut down. Operators are also required to submit shelter worthiness information on their drilling vessels, describing the level of protection sheltering areas provide against impact, flammables, and blast overpressure.

5.15.2 Impacts of Post-Suspension Activities

The primary impact-producing activity of post-suspension activities under the hypothetical development scenario would be associated vessel and aircraft traffic. If of sufficient volume, these activities could create the potential for space-use conflicts with military operations and hazards to personnel. Space-use conflicts could cause military operations to be delayed or interrupted if offshore personnel do not evacuate or shelter in conformance with military lease stipulations. The following sections describe the sources and types of potential impacts.

5.15.2.1 Cumulative Impacts without Activities on the Undeveloped Leases on Military Operations

This section describes routine and non-routine oil and gas activities that may result in cumulative impacts during the period 2006 through 2030 without development of undeveloped leases. The activities include geological and geophysical surveys, exploration drilling, platform construction, development and production, decommissioning, and oil spills. As stated above, all activities within the Pacific OCS must conform to the lease stipulations regarding military operations.

Appendix I describes the potentially foreseeable projects considered in the cumulative impact analysis. Without development of undeveloped leases, this scenario would represent the expected level of activity in the study area. Major activities expected to occur include:

- Future activities on existing leases (including exploratory drilling)
- Crude oil tankering
- Continuing military operations
- Avila Beach tank farm spill and remediation
- Well abandonment
- Molino gas project
- Cabrillo deepwater port LNG facility.

Offshore oil and gas activities that could have a cumulative impact on military operations include geological and geophysical surveys, exploration drilling, platform construction, development and production, decommissioning, and oil spills. To reduce potential conflicts between oil and gas and military operations, military stipulations have been attached to all of the leases. The stipulations control vessel and aircraft traffic in designated areas, include hold harmless conditions and requirements, and reserve the right of the U.S. Government to suspend offshore operations temporarily for national security reasons. To further reduce potential hazards to offshore personnel, the Pacific OCS has required offshore operators conducting operations in Military Warning Areas to develop Evacuation and Sheltering Plans for each offshore facility, including platforms, semi-submersibles, jack-ups, and ships. Existing lease stipulations have ensured that the current level of Pacific OCS oil exploration activity has not substantially affected military operations, and this would be expected to continue.

In general, Pacific OCS activities must:

- Coordinate all vessel and aircraft traffic within designated Military Warning Areas with the USAF and the Navy,
- Temporarily suspend offshore oil and gas operations and require evacuation of personnel in the interests of national security,
- Control electromagnetic emissions so as not to interfere with military operations, and
- Hold the U.S. Government harmless from any damage or injury resulting from the programs and operations of the military.

Geological and Geophysical Surveys. No seismic surveys have been proposed for existing Pacific OCS and State Tidelands leases. Currently, no oil and gas lease sales are scheduled or anticipated on the Pacific OCS or State Tidelands. Therefore future geological and geophysical surveys are likely to be limited to periodic side-scan sonar surveys of pipelines and short-duration geo-hazard surveys covering relatively small geographic areas.

Exploration and Delineation Drilling. No exploratory wells have been drilled on the Pacific OCS since 1989, and no additional exploration on the developed leases is expected. Exploration and development of the undeveloped leases would be expected within this period. However, no further exploration/delineation drilling activity is expected over the period 2006 through 2030 on developed leases.

Platform Construction. Currently, no oil and gas lease sales are scheduled or anticipated on the Pacific OCS or State waters. However, development of the undeveloped leases, which would be expected during this period, would involve installation of new production platforms in the period between 2006 and 2030.

Development and Production. Currently, about two development wells per month are being drilled from Pacific OCS platforms. This number is expected to remain at this level or decrease during the period 2005–2030.

Decommissioning. Three of the existing platforms (Harvest, Hermosa, Hidalgo), located in Military Warning Area W-532 (See Figure 4.15-1), are projected to be decommissioned between 2015 and 2020. The fourth platform (Irene) is projected to be decommissioned during the period 2020 through 2025, but decommissioning could be delayed to 2030 through 2035 if development of the Tranquillon Ridge Field by extended reach drilling is successful.

Oil Spills. The effect of oil spills on military operations would depend on many factors, including the type, rate, and volume of oil spilled, and the weather and oceanographic conditions at the time of the spill. These parameters would determine the quantity of oil dispersed into the water column, and the degree of weathering, evaporation, and dispersion of oil before it contacts a shoreline.

Based on the significance criteria used in this analysis, a spill of 200 bbl, if it were to occur in Military Warning Area W-532, would have a low impact on military operations. In the case of the September 1997 Platform Irene pipeline rupture, 167 bbl of oil were spilled approximately 4.8 km (3 miles) offshore of Surf Beach. The offshore cleanup operations were completed within one week. Approximately two weeks were required to remove oil residues on the beach and shoreline. The spill did not result in any disruption of military operations.

The probability that one or more spills in the 2,000 bbl range would occur from existing and proposed offshore oil and gas activities over the period 2006 through 2009 is discussed in Section 5.3. Based on the significance criteria used in this analysis, a spill of this size, if it were to occur in Military Warning Area W-532, would have low to moderate impacts on military operations depending on the timing and location of the spill. If oil spill cleanup operations did not coincide with previously scheduled military operations in the area, the impacts on military operations would be low. If they coincided, impacts to military operations would be moderate. The time required to clean up a 2,000 bbl spill is estimated to range from 4 to 6 weeks. All oil and gas produced on the Pacific OCS is transported to shore by pipeline. However, foreign and Alaskan oil is transported by tanker along the west coast of the U.S.

Based on the probability of one or more major tanker spills (22,800 bbl) occurring in the study area (see Section 5.3) and the significance criteria used in this analysis, a spill of this size could have a moderate impact on military operations if it occurred in the Military Warning Area W-532, or migrated into the area. The time required to clean up a spill of this size is estimated to range from 30 to 120 days depending on the location of the spill, weather and sea conditions, and whether the spill resulted in shoreline impacts.

Vessel Traffic. There would be substantial vessel and aircraft traffic associated with the post-suspension activities under the hypothetical development scenario (see Table 5.2-5), but this would not represent a substantial incremental increase over existing traffic levels. In addition, the existing military lease stipulations have been effective in avoiding conflicts between oil and gas and military operations and are expected to continue to do so. As noted by military representative of both the U.S. Navy and VAFB, no changes to existing military operations are planned (2004, pers. comm., Tatiana Inouye and Alex Stone and Walter Schobel, respectively).

Therefore, cumulative impacts without the development of undeveloped leases are considered low based on the significance criteria used in this analysis. This means post-suspension activities under the hypothetical development scenario would be expected to cause, at most:

- Infrequent and/or minor modification of military operations and commercial launch activities,
- A minor reduction and/or slight delays, if any, in the level of activity, and
- No shift of military operations in the Point Mugu Sea Range or VAFB.

5.15.2.2 Incremental Impacts of Exploration and Development of the Undeveloped Leases on Military Operations

This section describes the incremental impacts to military operations that would result from the post-suspension activities under the hypothetical development scenario. As noted above, post-suspension activities under that scenario would not represent a substantial increase in the activity occurring within the Point Mugu Sea Range. While such activities would increase the number of platforms and therefore the risk of a potentially disruptive oil spill, decommissioning activities would concurrently decrease the number of platforms, reducing the risk of an oil spill from existing platforms. Overall, with the new platforms hypothesized for the undeveloped leases, oil spill risk in the region would rise slightly. Post-suspension activities would not result in an incremental cumulative effect when considered with the existing and projected level of activity as demonstrated in Appendix I (cumulative scenario). Therefore, cumulative impacts without the post-suspension activities are considered low based on the significance criteria used in this analysis. This means the post-suspension activities would be expected to cause, at most:

- Infrequent and/or minor modification of military operations and commercial launch activities,
- A minor reduction and/or slight delays, if any, in the level of activity, and
- No shift of military operations in the Point Mugu Sea Range or at VAFB.

Space-Use Conflicts and Hazards to Personnel. If MODU drilling activity under the hypothetical development scenario is successful, up to four new platforms could be constructed on the Pacific OCS. Three of the platforms would be constructed in the northern Santa Maria Basin, which is located in Military Warning Area W-532. The development scenario also envisions the construction of a new onshore facility in northern Santa Barbara County (Casmalia) to serve these three new platforms. It is estimated that it would take approximately 3 to 6 months to install a platform, and 3 to 4 months to install pipelines and power cables. The level of supply boat and helicopter traffic in Military Warning Area W-532 is estimated to increase 25 to 50 percent above its current level during the peak construction period. After construction of the platforms, the level of vessel and aircraft traffic in Military Warning Area W-532 is expected to increase 100 percent over its current level as the number of platforms increase from four to eight. This level of activity would continue during the period when all eight platforms are expected to be operating.

The level of vessel and aircraft activity would be expected to return to its current level after Platforms Harvest, Hermosa, Hidalgo, and possibly Irene are decommissioned. During decommissioning operations, the level of vessel and aircraft traffic in Military Warning Area W-532 is estimated to increase 25 to 50 percent above its current level during the peak dismantling period. The time required to decommission a platform is estimated to range from 60 to 90 days. After decommissioning operations are complete, the level of vessel and aircraft activity would return to its current level and remain at that level until the four new platforms in Military Warning Area W-532 would be decommissioned around 2030.

The effect of oil spills on military operations would depend on many factors, including the type, rate, and volume of oil spilled, and the weather and oceanographic conditions at the time of the spill. The probability of one or more spills occurring from existing and proposed offshore oil and gas activities is presented in Section 5.3. Impacts to military operations from oil spills occurring during this period would be similar to those described above, i.e., low to moderate. However, the risk of an oil spill would increase with the addition of new platforms on the undeveloped leases.

5.15.3 Summary and Conclusion

Table 5.15-1 summarizes the potential impacts of each phase of activity under the hypothetical development scenario on each unit for which a suspension has been requested.

Table 5.15-1. Summary of Potential Impacts on Military Operations by Unit/Lease and Exploration/Development Phase.

Unit/Lease	Exploration and Delineation Drilling	Development and Production	Decommissioning
Cavern Point	None	Moderate for all units	Low for all units
Gato Canyon	Low		
Rocky Point	None		
Sword	None		
Bonito	None		
Santa Maria	None		
Purisima Point	Low		
Point Sal	Low		
Lion Rock	None		
Lease OCS-P 0409	None		

Most of the Pacific OCS is used intensively for various military activities, with the exception of most of the Santa Barbara Channel. Offshore oil and gas activities have the potential to affect military activities because of space-use conflicts resulting from additional aircraft and vessel traffic, the placement of permanent or semi-permanent drilling and resultant production structures and activities, and activities stemming from oil spill cleanup efforts. As oil and gas activities expand in southern California, the potential increases for additional space use conflicts with military operations. Under the hypothetical development scenario, after exploratory drilling activity, it is estimated that as many as four new platforms would be installed on the Pacific OCS, including three in Military Warming Area W-532.

During the more than 15-year operational history of oil and gas platforms in Military Warning Area W-532, no military operations have been delayed, canceled, or relocated due to routine offshore oil and gas activity. In addition, there have been no accidents (vessel/aircraft collisions, deaths, or serious injuries) involving oil and gas activities and military operations in the Point Mugu Sea Range since the initiation of exploration and development activities more than 30 years ago. As described earlier, existing military lease stipulations have been effective in avoiding conflicts between oil and military operations. The potential cumulative impact of routine oil and gas activities on military operations therefore would be under the hypothetical development scenario considered low based on the significance criteria used in this analysis.

For non-routine operations, such as oil spills and spill cleanup activities, oil and gas activities have the potential to disrupt military operations, particularly if spills occur in a Military Warning Area or drift into a Military Warning Area due to wind and current movements. Development of the undeveloped leases would slightly increase the risk of oil spills. Small spills of 200 bbl or less would have a low impact on military operations. Moderate spills (2,000 bbl), depending on their location and timing, would have a low to moderate impact on military operations. Large tanker spills (22,800 bbl), particularly if they were to occur in the Point Mugu Sea Range, would have a moderate impact on military operations. Overall, the cumulative impact on military operations from all activities is expected to be moderate.

5.16 High Case Scenario

This section summarizes the potential offshore activities and related disturbances associated with the much more unlikely (high case) estimate of oil and gas resources that could be developed in the study area. This high case assumes that the three platforms (60 well slot size) projected for the development in the northern Santa Maria Basin would be identical to the "base case" (see Section 5.2). It differs in that a slightly greater number of wells are assumed (a total increase of 18 wells). It also assumes that the drilling program, production methods, and well recoveries would be more successful than expected in the base case. Table 5.16-1 presents a comparison of oil and gas resources projected for the most likely (base case) scenario and the more unlikely (high case) scenario for the undeveloped leases.

Table 5.16-1. Comparison of Base Case and High Case Hypothetical Scenario for the Undeveloped Leases.

	Base Case	High Case	Increase
Santa Maria North			
Oil Reserves	115 MMbbl	146 MMbbl	31 MMbbl
Gas reserves	47 BCF	56.5 BCF	9.5 BCF
Oil recovery/well	2.5 MMbbl	2.8 MMbbl	.3 MMbbl
Producing wells	45	52	7
Peak oil year	year 7	year 7	nc
Peak gas year	year 7	year 7	nc
Platforms	1	1	nc
Well slots	60	60	nc
Muds	602,800 BBL	759,000 BBL	156,200 BBL
Cuttings	144,600 BBL	182,100 BBL	37,500 BBL
Santa Maria Central			
Oil Reserves	118 MMbbl	159 MMbbl	41 MMbbl
Gas reserves	24 BCF	32 BCF	8 BCF
Oil recovery/well	2.5 MMbbl	3 MMbbl	.5 MMbbl
Producing wells	49	53	4
Peak oil year	year 8	year 8	nc
Peak gas year	year 8	year 8	nc
Platforms	1	1	nc
Well slots	60	60	nc
Muds	650,000 BBL	697,300 BBL	47,300 BBL
Cuttings	155,925 BBL	167,300 BBL	11,375 BBL
Santa Maria South			
Oil Reserves	90 MMbbl	120 MMbbl	30 MMbbl
Gas reserves	18 BCF	24 BCF	6 BCF
Oil recovery/well	2.1 MMbbl	2.4 MMbbl	.3 MMbbl
Producing wells	46	50	4
Peak oil year	year 8	year 8	nc
Peak gas year	year 8	year 8	nc
Platforms	1	1	nc
Well slots	60	60	nc
Muds	658,000 BBL	708,600 BBL	50,600 BBL
Cuttings	158,000 BBL	170,200 BBL	12,200 BBL
Bonito Unit			
Oil Reserves	22 MMbbl	nc	nc
Gas reserves	11 BCF	nc	nc
Oil recovery/well	3.2 MMbbl	nc	nc
Producing wells	7	nc	nc
Peak oil year	year 5	nc	nc
Peak gas year	year 5	nc	nc
Platforms	Existing (Hidalgo)	nc	nc
Well slots	N/A	nc	nc
Muds	96,000 BBL	nc	nc
Cuttings	15,000 BBL	nc	nc

	Base Case	High Case	Increase
Gato Canyon Unit			
Oil Reserves	77 MMbbl	nc	nc
Gas reserves	46 BCF	nc	nc
Oil recovery/well	4 MMbbl	nc	nc
Producing wells	20	nc	nc
Peak oil year	year 5	nc	nc
Peak gas year	year 5	nc	nc
Platforms	1	nc	nc
Well slots	28	nc	nc
Muds	193,000 BBL	nc	nc
Cuttings	68,000 BBL	nc	nc
Rocky Point Unit			
Oil Reserves	39 MMbbl*	nc	nc
Gas reserves	11.7 BCF*	nc	nc
Oil recovery/well	2.8 MMbbl	nc	nc
Producing wells	14	nc	nc
Peak oil year	Year 4	nc	nc
Peak gas year	Year 4	nc	nc
Platforms	Existing (Platform Hermosa and Hidalgo)	nc	nc
Well slots	NA	nc	nc
Muds	265,000 BBL	nc	nc
Cuttings	62,500 BBL	nc	nc
Cavern Point Unit			
Oil Reserves	22 MMBBL	nc	nc
Gas reserves	20 BCF	nc	nc
Oil recovery/well	2.2 MMbbl	nc	nc
Producing wells	10	nc	nc
Peak oil year	Year 3	nc	nc
Peak gas year	Year 3	nc	nc
Platforms	Existing (Platform Gail)	nc	nc
Well slots	NA	nc	nc
Muds	38,700 BBL	nc	nc
Cuttings	45,300 BBL	nc	nc
Sword Unit			
Oil Reserves	29 MMBBL	nc	nc
Gas reserves	7.3 BCF	nc	nc
Oil recovery/well	2.9 MMbbl	nc	nc
Producing wells	10	nc	nc
Peak oil year	Year 4	nc	nc
Peak gas year	Year 4	nc	nc
Platforms	Existing (Platform Hermosa)	nc	nc
Well slots	NA	nc	nc
Muds	213,000 BBL	nc	nc
Cuttings	50,400 BBL	nc	nc

* The Rocky Point field is already on production via wells drilled from existing platforms (Pt. Arguello) into the eastern half of Lease OCS-P0451. The reserve numbers reflect the entire field's development potential.

Although this increase in resource recovery and associated activities could potentially affect the biological, physical, and socioeconomic resources of the cumulative project study area, the increase would be limited to an increase in oil and gas production in the Santa Maria Basin area. No change/increase in platforms or pipelines is required for the high case. Estimates for the Gato Canyon Unit would remain the same as the base case, as would all the remaining units.

The additional resource recovery would slightly increase the risk of an oil spill and there would be an increase in the volume of muds and cuttings. Oil spills and their associated impacts were already discussed in the base case scenario (Section 5). The risk would increase slightly, but the impacts would remain the same for all resources. Increased muds and cuttings associated with additional wells would add to the effects described for the base case; however, they would not change the impact levels projected for the base case.

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Chapter 4 – Affected Environment

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APPENDICES

APPENDIX A.

GLOSSARY OF TERMS AND ACRONYMS

APPENDIX A: GLOSSARY OF TERMS AND ACRONYMS

APD
Application for Permit to Drill

API
American Petroleum Institute

ASBS
Areas of Special Biological Significance

ATC
Authority to Construct

AQIA
Air Quality Impact Analysis

BACT
best available control technology

BAST
Best available and safest technology

Bbbl
billion barrels

BBO
billion barrels of oil

Bcf
billion cubic feet

BETX
Benzene, ethylbenzene, toluene & xylene

BOP
blowout preventer

B.P.
before present

BRAC
Base Realignment and Closure

CAA
Clean Air Act

CAA
California Abalone Association

CAAQS
California Ambient Air Quality Standards

CalCOFI
California Cooperative Oceanic Fisheries Investigations

CAMP
California Monitoring Program

CARB
California Air Resources Board

CBC
Construction Battalion Center

CCC
California Coastal Commission

CCMP
California Coastal Management Program

CD
Consistency Determination

CDFG
California Department of Fish and Game

CDP
Common Depth Point

CEQ
Council on Environmental Quality

CEQA
California Environmental Quality Act

CFR
Code of Federal Regulations

CFCs
Chlorofluorocarbons

CINMS
Channel Islands National Marine Sanctuary

COA
Corresponding Onshore Area

COE
Corps of Engineers (U.S. Army) (Corps)

COOGER
California Offshore Oil and Gas Energy Resources Study

CPFV
Commercial Passenger Fishing Vessel

CREF
Coastal Resource Enhancement Fund

CSLC
California State Lands Commission

CWA
Clean Water Act

CZO
Coastal Zoning Ordinance

CZM
Coastal Zone Management

CZMA
Coastal Zone Management Act

DEIS
Draft Environmental Impact Statement

DOD
Department of Defense

DOI
Department of the Interior (USDOI)

DOT
Department of Transportation (USDOT)

EA
Environmental Assessment

EELV
Evolved Expandable Launch Vehicle

EEZ
Exclusive Economic Zone

EFH
Essential Fish Habitat

EIA
Energy Information Administration (USDOE)

EIR
Environmental Impact Report

EIS
Environmental Impact Statement

EP
Exploration Plan

ESA
Endangered Species Act

ESP
Environmental Studies Plan et al. and others et seq. and the following

FAA
Federal Aviation Administration

FCF
Fishermen's Contingency Fund

FEIS
Final Environmental Impact Statement

FERC
Federal Energy Regulatory Commission

FMC
Fishery Management Council

FMP
Fishery Management Plan

FONSI
Finding of No Significant Impact

FR
Federal Register

FWPCA
Federal Water Pollution Control Act of 1972

FWS
Fish and Wildlife Service

FY
fiscal year

G&G
Geological and geophysical

GIS
Geographical information system

HAPC
Habitat Areas of Particular Concern

IPF
Impact-producing factor

LLD
Lower limit of detection

MARPOL
International Convention for the Prevention of Pollution from Ships

MBNMS
Monterey Bay National Marine Sanctuary

MEMD
Marine and Estuarine Management Division

MFCMA
Magnuson Fishery Conservation and Management Act of 1976

Mmbbl
Million barrels

MMC
Marine Mammal Commission

MMPA
Marine Mammal Protection Act of 1972

MMS
Minerals Managements Services

MOA
Memorandum of Agreement

MOU
Memorandum of Understanding

MPA
Marine Protected Areas

MPPRAC
Marine Plastic Pollution Research and Control Act of 1987

MRS
State Marine Reserves

MSFCMA
Magnuson-Steven Fishery Conservation and Management Act (1996)

NAAQS
National Ambient Air Quality Standards

NACE
National Association of Corrosion Engineers

NAS
National Academy of Science

NASA
National Aeronautic and Space Administration

NAWCWDPNS
Naval Air Warfare Center Weapons Division

n.d.
No date

NEPA
National Environmental Policy Act

NFEA
National Fishing Enhancement Act

NFESC
Naval Facilities Engineering Service Center

NHAP
National Historic Preservation Act

NMFS
National Marine Fisheries Service

NMS
National Marine Sanctuary

NOAA
National Oceanic and Atmospheric Administration

NOI
Notice of Intent

NOx
Nitrogen Oxide

NPDES
National Pollution and Discharge Elimination System

NRC
National Research Council

NRDA
Natural Resource Damage Assessment

NRDC
Natural Resources Defense Council

NRS
New Source Review

NTL
Notice to Lessees

OCD
Offshore and Coastal Dispersion model

OCRM
Office of Ocean and Coastal Resource Management

OCS
Outer Continental Shelf

OCSLA
Outer Continental Shelf Land Act

OSCP
Oil Spill Contingency Plan

OSRA
Oil Spill Risk Analysis

OS&T
Offshore Storage & Treatment

PAHs
Petroleum Aromatic Hydrocarbons

PM_{10}
Particulate matter smaller than 10 microns

$PM_{2.5}$
Particulate matter smaller than 2.5 microns

POTW
Publicly Owned Treatment Works

ppm
Parts per million

ppt
Parts per thousand

PSD
Prevention of Significant Deterioration

PTO
Permit to Operate

RCRA
Resource Conservation and Recovery Act

ROC
Reactive Hydrocarbons

ROP
Rate of Progress Plan

RPA
Representative of the proposed action

SBCAPCD
Santa Barbara County Air Pollution Control District

SCB
Southern California Bight

SCBPP
Southern California Blight Pilot Project

SCCAB
South Central Coast Air Basin

SCUBA
Self Contained Underwater Breathing Apparatus

SIP
State implementation plan

SLC
California State Land Commission

sp
Species

spp.
Multiple species

SSP
Strategic Studies Plan

SSS
Side Scan Sonar

Stat.
Status

State Tidelands
State Tidelands Submerged Lands

SWEF
Surface Warfare Engineering Facility

SWRCB
State Water Resources Control Board

TAC
Toxic Air Contaminants

tcf
Trillion cubic feet

TMD
Theater Missile Defense

TSP
Total suspended particulate matter

TSS
Traffic Separation Scheme

U.S.
United States

USAF
U.S. Air Force

U.S.C.
United States Code

USCG
U.S. Coast Guard

USCOE
U.S. Corps of Engineers

USDOC
U.S. Department of Commerce

USDOE
U.S. Department of Energy

USDOI
U. S. Department of the Interior

USEPA
U.S. Environmental Protection Agency

USFWS
United States Fish and Wildlife Service

USGS
U.S. Geological Survey

USN
U.S. Navy

VAFB
Vanderburg Air force Base

VOC
Volatile organic compound

WSPA
Western States Petroleum Association

APPENDIX B.

AIR QUALITY EMISSION FACTORS

Table B-1. Cumulative Scenario – Emission Factors and Assumptions

						Emission Factors						
Activity	Platforms	Pipeline (kms)	Days	Wells	Trips	NOx	CO	VOC	SO2	PM10	Units	Reference (as cited in MMS,2001)
Platform Installation	4					175.52	41.6	12.87	11.99	2.82	tons/platform	Jacobs (C -1.3)
Pipeline Installation		186.71				3.83	1.54	0.44	0.08	0.19	tons/km	Jacobs (C -2.2)
Power Cable Installation			186			1140	240	32	60	80	lbs/day	SBCAPCD (SYU ATC 1991)
Production Wells				243		3.56	1.69	0.49	0.53	0.52	tons/well	Jacobs (C -3.3)
Production	4					35.89	18.90	26.82	6.99	2.74	tons/platform (avg.)	SBCAPCD (1996 Inventory)
Vessels												
Crew					166	516.70	54.80	24.79	7.10	31.68	lbs/1000 gals	AP-42 (11-3-3)
Supply					354	550.00	54.80	24.79	7.10	31.68	lbs/1000 gals	AP-42 (11-3-3)
Helicopters												
LTO					1251	2.60	2.10	0.10	0.40	0.10	lbs/hr (5 min cycle)	Jacobs (5-23)
Cruise					1251	2.60	2.10	0.10	0.40	0.10	lbs/hr (1hr 20 min)	Jacobs (5-23)

Source: MMS, 2004c

Table B-2. Cumulative Scenario – Estimated Emissions

Cumulative Scenario -Estimated Emissions (tons per project life)					
Activity	NOx	CO	SOx	VOC	PM10
Platform Installation	702.1	166.4	48.0	51.5	11.3
Pipeline Installation	715.1	287.5	14.9	82.2	35.5
Power Cable Installation	106.0	22.3	5.6	3.0	7.4
Production Wells	865.1	410.7	128.8	119.1	126.4
Production	2,655.9	1,398.6	517.3	1,984.7	202.8
Spills	--	--	--	7.8	--
Service Vessels and Helicopters	32.3	35.8	3.1	3.3	4.4
Total	5076.5	2321.3	717.7	2251.6	387.8

Source: MMS, 2004c
Note: Does not include delineation well drilling emissions or the proposed action survey emissions which will both occur during the cumulative period

Table B-3. Cumulative Scenario – Peak Year Cumulative Emissions

Peak Year Cumulative Emissions With Development of 36 Leases (2013)										
	Hourly During Peak Year (lbs/hr)					Peak Year (tons)				
Activity	NOx	CO	SOx	VOC	PM10	NOx	CO	SOx	VOC	PM10
Platform Construct	93.5	22.2	6.4	6.9	6.9	409.4	97.1	28.0	30.0	30.2
Pipeline Install	148.3	59.5	3.1	17.0	14.7	649.4	260.8	13.6	74.6	64.4
Power Cable Install	20.1	4.2	1.1	0.6	1.4	88.1	18.6	4.7	2.5	6.2
Development Wells	13.0	17.3	1.9	1.8	1.9	57.0	27.0	8.5	7.8	8.3
Production	32.8	6.2	6.4	24.5	2.5	143.6	75.6	28.0	115.1	11.0
Spills	--	--	--	--	--	--	--	--	7.8	--
Service Vessels & Helicopters	0.1	0.0	0.0	0.0	0.0	1.0	1.4	0.1	0.1	0.1
Total	307.8	109.4	18.9	50.8	27.4	1,348.5	480.5	82.8	240.0	120.2

Source: MMS, 2004c
Note: Hourly emissions do not include helicopter emissions.

APPENDIX C.

TITLE 15 CODE OF FEDERAL REGULATIONS PART 930.39: CONTENT OF CONSISTENCY DETERMINATION

§ 930.39 Content of a consistency determination.

(a) The consistency determination shall include a brief statement indicating whether the proposed activity will be undertaken in a manner consistent to the maximum extent practicable with the enforceable policies of the management program. The statement must be based upon an evaluation of the relevant enforceable policies of the management program. A description of this evaluation shall be included in the consistency determination, or provided to the State agency simultaneously with the consistency determination if the evaluation is contained in another document. Where a Federal agency is aware, prior to its submission of its consistency determination, that its activity is not fully consistent with a management program's enforceable policies, the Federal agency shall describe in its consistency determination the legal authority that prohibits full consistency as required by § 930.32(a)(2). Where the Federal agency is not aware of any inconsistency until after submission of its consistency determination, the Federal agency shall submit its description of the legal authority that prohibits full consistency to the State agency as soon as possible, or before the end of the 90-day period described in § 930.36(b)(1). The consistency determination shall also include a detailed description of the activity, its associated facilities, and their coastal effects, and comprehensive data and information sufficient to support the Federal agency's consistency statement. The amount of detail in the evaluation of the enforceable policies, activity description and supporting information shall be commensurate with the expected coastal effects of the activity. The Federal agency may submit the necessary information in any manner it chooses so long as the requirements of this subpart are satisfied.

(b) Federal agencies shall be guided by the following in making their consistency determinations. The activity its effects on any coastal use or resource, associated facilities (*e.g.*, proposed siting and construction of access road, connecting pipeline, support buildings, and the effects of the associated facilities (*e.g.*, erosion, wetlands, beach access impacts), must all be consistent to the maximum extent practicable with the enforceable policies of the management program.

(c) In making their consistency determinations, Federal agencies shall ensure that their activities are consistent to the maximum extent practicable with the enforceable, policies of the management program. However, Federal agencies should give consideration to management program provisions which are in the nature of recommendations.

(d) When Federal agency standards are more restrictive than standards or requirements contained in the management program, the Federal agency may continue to apply its stricter standards. In such cases the Federal agency shall inform the State agency in the consistency determination of the statutory, regulatory or other basis for the application of the stricter standards.

(e) *State permit requirements.* Federal law, other than the CZMA, may require a Federal agency to obtain a State permit. Even when Federal agencies are not required to obtain State permits, Federal agencies shall still be consistent to the maximum extent practicable with the enforceable policies that are contained in such State permit programs that are part of a management program.

§ 930.40 Multiple Federal agency participation.

Whenever more than one Federal agency is involved in a Federal agency activity or its associated facilities affecting any coastal use or resource, or is involved in a group of Federal agency activities related to each other because of their geographic proximity, the Federal agencies may prepare one consistency determination for all the federal activities involved. In such cases, Federal agencies should consider joint preparation or lead agency development of the consistency determination. In either case, the consistency determination shall be transmitted to the State agency at least 90 days before final decisions are taken by any of the participating agencies and shall comply with the requirements of § 930.39.

APPENDIX D.

TITLE 16 U.S. CODE CHAPTER 33, SECTION 1456: COORDINATION AND COOPERATION

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[Laws in effect as of January 7, 2003]
[Document not affected by Public Laws enacted between
January 7, 2003 and February 12, 2003]
[**CITE: 16USC1456**]

TITLE 16--CONSERVATION

CHAPTER 33--COASTAL ZONE MANAGEMENT

Sec. 1456. Coordination and cooperation

(a) Federal agencies

In carrying out his functions and responsibilities under this chapter, the Secretary shall consult with, cooperate with, and, to the maximum extent practicable, coordinate his activities with other interested Federal agencies.

(b) Adequate consideration of views of Federal agencies

The Secretary shall not approve the management program submitted by a state pursuant to section 1455 of this title unless the views of Federal agencies principally affected by such program have been adequately considered.

(c) Consistency of Federal activities with State management programs; Presidential exemption; certification

(1)(A) Each Federal agency activity within or outside the coastal zone that affects any land or water use or natural resource of the coastal zone shall be carried out in a manner which is consistent to the maximum extent practicable with the enforceable policies of approved State management programs. A Federal agency activity shall be subject to this paragraph unless it is subject to paragraph (2) or (3).

(B) After any final judgment, decree, or order of any Federal court that is appealable under section 1291 or 1292 of title 28, or under any other applicable provision of Federal law, that a specific Federal agency activity is not in compliance with subparagraph (A), and certification by the Secretary that mediation under subsection (h) of this section is not likely to result in such compliance, the President may, upon written request from the Secretary, exempt from compliance those elements of the Federal agency activity that are found by the Federal court to be inconsistent with an approved State program, if the President determines that the activity is in the paramount interest of the United States. No such exemption shall be granted on the basis of a lack of appropriations unless the President has specifically requested such appropriations as part of the budgetary process, and the Congress has failed to make available the requested appropriations.

(C) Each Federal agency carrying out an activity subject to paragraph (1) shall provide a consistency determination to the relevant State agency designated under section 1455(d)(6) of this title at the earliest practicable time, but in no case later than 90 days before final approval of the Federal activity unless both the Federal agency and the State agency agree to a different schedule.

(2) Any Federal agency which shall undertake any development project in the coastal zone of a state shall insure that the project is, to the maximum extent practicable, consistent with the enforceable policies of

approved state management programs.

(3)(A) After final approval by the Secretary of a state's management program, any applicant for a required Federal license or permit to conduct an activity, in or outside of the coastal zone, affecting any land or water use or natural resource of the coastal zone of that state shall provide in the application to the licensing or permitting agency a certification that the proposed activity complies with the enforceable policies of the state's approved program and that such activity will be conducted in a manner consistent with the program. At the same time, the applicant shall furnish to the state or its designated agency a copy of the certification, with all necessary information and data. Each coastal state shall establish procedures for public notice in the case of all such certifications and, to the extent it deems appropriate, procedures for public hearings in connection therewith. At the earliest practicable time, the state or its designated agency shall notify the Federal agency concerned that the state concurs with or objects to the applicant's certification. If the state or its designated agency fails to furnish the required notification within six months after receipt of its copy of the applicant's certification, the state's concurrence with the certification shall be conclusively presumed. No license or permit shall be granted by the Federal agency until the state or its designated agency has concurred with the applicant's certification or until, by the state's failure to act, the concurrence is conclusively presumed, unless the Secretary, on his own initiative or upon appeal by the applicant, finds after providing a reasonable opportunity for detailed comments from the Federal agency involved and from the state, that the activity is consistent with the objectives of this chapter or is otherwise necessary in the interest of national security.

(B) After the management program of any coastal state has been approved by the Secretary under section 1455 of this title, any person who submits to the Secretary of the Interior any plan for the exploration or development of, or production from, any area which has been leased under the Outer Continental Shelf Lands Act (43 U.S.C. 1331 et seq.) and regulations under such Act shall, with respect to any exploration, development, or production described in such plan and affecting any land or water use or natural resource of the coastal zone of such state, attach to such plan a certification that each activity which is described in detail in such plan complies with the enforceable policies of such state's approved management program and will be carried out in a manner consistent with such program. No Federal official or agency shall grant such person any license or permit for any activity described in detail in such plan until such state or its designated agency receives a copy of such certification and plan, together with any other necessary data and information, and until--

(i) such state or its designated agency, in accordance with the procedures required to be established by such state pursuant to subparagraph (A), concurs with such person's certification and notifies the Secretary and the Secretary of the Interior of such concurrence;

(ii) concurrence by such state with such certification is conclusively presumed as provided for in subparagraph (A), except if such state fails to concur with or object to such certification within three months after receipt of its copy of such certification and supporting information, such state shall provide the Secretary, the appropriate federal agency, and such person with a written statement describing the status of review and the basis for further delay in issuing a final decision, and if such statement is not so provided, concurrence by such state with such certification shall be conclusively presumed; or

(iii) the Secretary finds, pursuant to subparagraph (A), that each activity which is described in detail in such plan is consistent with the objectives of this chapter or is otherwise necessary in the interest of national security.

If a state concurs or is conclusively presumed to concur, or if the Secretary makes such a finding, the provisions of subparagraph (A) are not applicable with respect to such person, such state, and any Federal license or permit which is required to conduct any activity affecting land uses or water uses in the coastal zone of such state which is described in detail in the plan to which such concurrence or finding applies. If such state objects to such certification and if the Secretary fails to make a finding under clause (iii) with respect to such certification, or if such person fails substantially to comply with such plan as submitted, such person shall submit an amendment to such plan, or a new plan, to the Secretary of the Interior. With respect to any amendment or new plan submitted to the Secretary of the Interior pursuant to the preceding sentence, the applicable time period for purposes of concurrence by conclusive presumption under subparagraph (A) is 3 months.

(d) Application of local governments for Federal assistance; relationship of activities with approved management programs

State and local governments submitting applications for Federal assistance under other Federal programs, in or outside of the coastal zone, affecting any land or water use of natural resource of the coastal zone shall indicate the views of the appropriate state or local agency as to the relationship of such activities to the approved management program for the coastal zone. Such applications shall be submitted and coordinated in accordance with the provisions of section 6506 of title 31. Federal agencies shall not approve proposed projects that are inconsistent with the enforceable policies of a coastal state's management program, except upon a finding by the Secretary that such project is consistent with the purposes of this chapter or necessary in the interest of national security.

(e) Construction with other laws

Nothing in this chapter shall be construed--

(1) to diminish either Federal or state jurisdiction, responsibility, or rights in the field of planning, development, or control of water resources, submerged lands, or navigable waters; nor to displace, supersede, limit, or modify any interstate compact or the jurisdiction or responsibility of any legally established joint or common agency of two or more states or of two or more states and the Federal Government; nor to limit the authority of Congress to authorize and fund projects;

(2) as superseding, modifying, or repealing existing laws applicable to the various Federal agencies; nor to affect the jurisdiction, powers, or prerogatives of the International Joint Commission, United States and Canada, the Permanent Engineering Board, and the United States operating entity or entities established pursuant to the Columbia River Basin Treaty, signed at Washington, January 17, 1961, or the International Boundary and Water Commission, United States and Mexico.

(f) Construction with existing requirements of water and air pollution programs

Notwithstanding any other provision of this chapter, nothing in this chapter shall in any way affect any requirement (1) established by the Federal Water Pollution Control Act, as amended [33 U.S.C. 1251 et seq.], or the Clean Air Act, as amended [42 U.S.C. 7401 et seq.], or (2) established by the Federal Government or by any state or local government pursuant to such Acts. Such requirements shall be incorporated in any program developed pursuant to this chapter and shall be the water pollution control and air pollution control requirements applicable to such program.

(g) Concurrence with programs which affect inland areas

When any state's coastal zone management program, submitted for approval or proposed for modification pursuant to section 1455 of this title, includes requirements as to shorelands which also would be subject to any Federally supported national land use program which may be hereafter enacted, the Secretary, prior to approving such program, shall obtain the concurrence of the Secretary of the Interior, or such other Federal official as may be designated to administer the national land use program, with respect to that portion of the coastal zone management program affecting such inland areas.

(h) Mediation of disagreements

In case of serious disagreement between any Federal agency and a coastal state--

(1) in the development or the initial implementation of a management program under section 1454 of this title; or

(2) in the administration of a management program approved under section 1455 of this title;

the Secretary, with the cooperation of the Executive Office of the President, shall seek to mediate the differences involved in such disagreement. The process of such mediation shall, with respect to any disagreement described in paragraph (2), include public hearings which shall be conducted in the local area concerned.

(i) Application fee for appeals

(1) With respect to appeals under subsections (c)(3) and (d) of this section which are submitted after November 5, 1990, the Secretary shall collect an application fee of not less than $200 for minor appeals and not less than $500 for major appeals, unless the Secretary, upon consideration of an applicant's request for a fee waiver, determines that the applicant is unable to pay the fee.

(2)(A) The Secretary shall collect such other fees as are necessary to recover the full costs of administering and processing such appeals under subsection (c) of this section.

(B) If the Secretary waives the application fee under paragraph (1) for an applicant, the Secretary shall waive all other fees under this subsection for the applicant.

(3) Fees collected under this subsection shall be deposited into the Coastal Zone Management Fund established under section 1456a of this title.

(Pub. L. 89-454, title III, Sec. 307, as added Pub. L. 92-583, Oct. 27, 1972, 86 Stat. 1285; amended Pub. L. 94-370, Sec. 6, July 26, 1976, 90 Stat. 1018; Pub. L. 95-372, title V, Sec. 504, Sept. 18, 1978, 92 Stat. 693; Pub. L. 101-508, title VI, Sec. 6208, Nov. 5, 1990, 104 Stat. 1388-307; Pub. L. 102-587, title II, Sec. 2205(b)(13), (14), Nov. 4, 1992, 106 Stat. 5051.)

References in Text

The Outer Continental Shelf Lands Act, referred to in subsec. (c)(3)(B), is act Aug. 7, 1953, ch. 345, 67 Stat. 462, as amended, which is classified generally to subchapter III (Sec. 1331 et seq.) of chapter 29 of Title 43, Public Lands. For complete classification of this Act to the Code, see Short Title note set out under section 1331 of Title 43 and Tables.

The Federal Water Pollution Control Act, referred to in subsec. (f), is act June 30, 1948, ch. 758, as amended generally by Pub. L. 92-500, Sec. 2, Oct. 18, 1972, 86 Stat. 816, which is classified generally to chapter 26 (Sec. 1251 et seq.) of Title 33, Navigation and Navigable Waters. For complete classification of this Act to the Code, see Short Title note set out under section 1251 of Title 33 and Tables.

The Clean Air Act, referred to in subsec. (f), is act July 14, 1955, ch. 360, 69 Stat. 322, as amended, which is classified generally to chapter 85 (Sec. 7401 et seq.) of Title 42, The Public Health and Welfare. For complete classification of this Act to the Code, see Short Title note set out under section 7401 of Title 42 and Tables.

Codification

In subsec. (d), ``section 6506 of title 31'' substituted for ``title IV of the Intergovernmental Coordination [Cooperation] Act of 1968 [42 U.S.C. 4231 et seq.]'' on authority of Pub. L. 97-258, Sec. 4(b), Sept. 13, 1982, 96 Stat. 1067, the first section of which enacted Title 31, Money and Finance.

Amendments

1992--Subsec. (c)(3)(B). Pub. L. 102-587, Sec. 2205(b)(13), made technical amendment to directory language of Pub. L. 101-508, Sec. 6208(b)(3)(B). See 1990 Amendment note below.

Subsec. (i). Pub. L. 102-587, Sec. 2205(b)(14), designated existing provisions as par. (1), added pars. (2) and (3), and struck out at end of par. (1) ``The Secretary shall collect such other fees as are necessary to recover the full costs of administering and processing such appeals under subsection (c) of this section.''

1990--Subsec. (c)(1). Pub. L. 101-508, Sec. 6208(a), amended par. (1) generally. Prior to amendment, par. (1) read as follows: ``Each Federal agency conducting or supporting activities directly affecting the coastal zone shall conduct or support those activities in a manner which is, to the maximum extent practicable, consistent with approved state management programs.''

Subsec. (c)(2). Pub. L. 101-508, Sec. 6208(b)(1), which directed the insertion of ``the enforceable policies of'' before ``approved State management programs'', was executed by making the insertion before ``approved state management programs'' to reflect the probable intent of Congress.

Subsec. (c)(3)(A). Pub. L. 101-508, Sec. 6208(b)(2), in first sentence inserted ``, in or outside of the coastal zone,'' after ``to conduct an activity'', substituted ``any land or water use or natural resource of'' for ``land or water uses in'', and inserted ``the enforceable policies of'' after ``the proposed activity complies with''.

Subsec. (c)(3)(B). Pub. L. 101-508, Sec. 6208(b)(3)(A), substituted ``land or water use or natural resource of'' for ``land use or water use in'' in first sentence.

Pub. L. 101-508, Sec. 6208(b)(3)(B), as amended by Pub. L. 102-587, Sec. 2205(b)(13), inserted ``the enforceable policies of'' after ``such plan complies with'' in first sentence.

Subsec. (d). Pub. L. 101-508, Sec. 6208(b)(4), substituted ``, in or outside of the coastal zone, affecting any land or water use of natural resource of'' for ``affecting'' and inserted ``the enforceable policies of'' after ``that are inconsistent with''.

Subsec. (i). Pub. L. 101-508, Sec. 6208(c), added subsec. (i).

1978--Subsec. (c)(3)(B)(ii). Pub. L. 95-372 inserted ``, except if such state fails to concur with or object to such certification within three months after receipt of its copy of such certification and supporting information, such state shall provide the Secretary, the appropriate federal agency, and such person with a written statement describing the status of review and the basis for further delay in issuing a final decision, and if such statement is not so provided, concurrence by such state with such certification shall be conclusively presumed'' after ``as provided for in subparagraph (A)''.

1976--Subsec. (b). Pub. L. 94-370, Sec. 6(2), struck out provisions requiring that in case of serious disagreement between Federal agency and state in development of program, Secretary shall seek to mediate the differences in cooperation with the Executive Office of the President and incorporated such provision into subsec. (h).

Subsec. (c)(3). Pub. L. 94-370, Sec. 6(3), designated existing provisions as subpar. (A) and added subpar. (B).

Subsec. (h). Pub. L. 94-370, Sec. 6(4), added subsec. (h) which incorporates former provision of subsec. (b) relating to mediation by Secretary of disagreements between Federal agencies and state.

Section Referred to in Other Sections

This section is referred to in sections 1453, 1455, 1456a, 1462, 1465 of this title; title 43 sections 1340, 1351.

APPENDIX E.

CALIFORNIA PUBLIC RESOURCES CODE DIVISION 20, CALIFORNIA COASTAL ACT, CHAPTER 3

APPENDIX E: California Coastal Act
Public Resources Code Division 20
Chapter 3: Coastal Resources Planning and Management Policies

Article 1: General

30200.

(a) Consistent with the coastal zone values cited in Section 30001 and the basic goals set forth in Section 30001.5, and except as may be otherwise specifically provided in this division, the policies of this chapter shall constitute the standards by which the adequacy of local coastal programs, as provided in Chapter 6 (commencing with Section 30500), and the permissibility of proposed developments subject to the provisions of this division are determined. All public agencies carrying out or supporting activities outside the coastal zone that could have a direct impact on resources within the coastal zone shall consider the effect of such actions on coastal zone resources in order to assure that these policies are achieved.

(b) Where the commission or any local government in implementing the provisions of this division identifies a conflict between the policies of this chapter, Section 30007.5 shall be utilized to resolve the conflict and the resolution of such conflicts shall be supported by appropriate findings setting forth the basis for the resolution of identified policy conflicts.

Article 2: Public Access

30210.

In carrying out the requirement of Section 4 of Article X of the California Constitution, maximum access, which shall be conspicuously posted, and recreational opportunities shall be provided for all the people consistent with public safety needs and the need to protect public rights, rights of private property owners, and natural resource areas from overuse.

30211.

Development shall not interfere with the public's right of access to the sea where acquired through use or legislative authorization, including, but not limited to, the use of dry sand and rocky coastal beaches to the first line of terrestrial vegetation.

30212.

(a) Public access from the nearest public roadway to the shoreline and along the coast shall be provided in new development projects except where

(1) it is inconsistent with public safety, military security needs, or the protection of fragile coastal resources,

(2) adequate access exists nearby, or

(3) agriculture would be adversely affected. Dedicated accessway shall not be required to be opened to public use until a public agency or private association agrees to accept responsibility for maintenance and liability of the accessway.

(b) For purposes of this section, "new development" does not include:

(1) Replacement of any structure pursuant to the provisions of subdivision (g) of Section 30610.

(2) The demolition and reconstruction of a single-family residence; provided, that the reconstructed residence shall not exceed either the floor area, height or bulk of the former structure by more than 10 percent, and that the reconstructed residence shall be sited in the same location on the affected property as the former structure.

(3) Improvements to any structure which do not change the intensity of its use, which do not increase either the floor area, height, or bulk of the structure by more than 10 percent, which do not block or impede public access, and which do not result in a seaward encroachment by the structure.

(4) The reconstruction or repair of any seawall; provided, however, that the reconstructed or repaired seawall is not seaward of the location of the former structure.

(5) Any repair or maintenance activity for which the commission has determined, pursuant to Section 30610, that a coastal development permit will be required unless the commission determines that the activity will have an adverse impact on lateral public access along the beach. As used in this subdivision, "bulk" means total interior cubic volume as measured from the exterior surface of the structure.

(c) Nothing in this division shall restrict public access nor shall it excuse the performance of duties and responsibilities of public agencies which are required by Sections 66478.1 to 66478.14, inclusive, of the Government Code and by Section 4 of Article X of the California Constitution.

30212.5.

Wherever appropriate and feasible, public facilities, including parking areas or facilities, shall be distributed throughout an area so as to mitigate against the impacts, social and otherwise, of overcrowding or overuse by the public of any single area.

30213.

Lower cost visitor and recreational facilities shall be protected, encouraged, and, where feasible, provided. Developments providing public recreational opportunities are preferred. The commission shall not:

(1) require that overnight room rentals be fixed at an amount certain for any privately owned and operated hotel, motel, or other similar visitor-serving facility located on either public or private lands; or

(2) establish or approve any method for the identification of low or moderate income persons for the purpose of determining eligibility for overnight room rentals in any such facilities.

30214.

(a) The public access policies of this article shall be implemented in a manner that takes into account the need to regulate the time, place, and manner of public access depending on the facts and circumstances in each case including, but not limited to, the following:

(1) Topographic and geologic site characteristics.

(2) The capacity of the site to sustain use and at what level of intensity.

(3) The appropriateness of limiting public access to the right to pass and repass depending on such factors as the fragility of the natural resources in the area and the proximity of the access area to adjacent residential uses.

(4) The need to provide for the management of access areas so as to protect the privacy of adjacent property owners and to protect the aesthetic values of the area by providing for the collection of litter.

(b) It is the intent of the Legislature that the public access policies of this article be carried out in a reasonable manner that considers the equities and that balances the rights of the individual property owner with the public's constitutional right of access pursuant to Section 4 of Article X of the California Constitution. Nothing in this section or any amendment thereto shall be construed as a limitation on the rights guaranteed to the public under Section 4 of Article X of the California Constitution.

(c) In carrying out the public access policies of this article, the commission and any other responsible public agency shall consider and encourage the utilization of innovative access management techniques, including, but not limited to, agreements with private organizations which would minimize management costs and encourage the use of volunteer programs.

Article 3: Recreation

30220.
Coastal areas suited for water-oriented recreational activities that cannot readily be provided at inland water areas shall be protected for such uses.

30221.
Oceanfront land suitable for recreational use shall be protected for recreational use and development unless present and foreseeable future demand for public or commercial recreational activities that could be accommodated on the property is already adequately provided for in the area.

30222.
The use of private lands suitable for visitor-serving commercial recreational facilities designed to enhance public opportunities for coastal recreation shall have priority over private residential, general industrial, or general commercial development, but not over agriculture or coastal-dependent industry.

30222.5.
Ocean front land that is suitable for coastal dependent aquaculture shall be protected for that use, and proposals for aquaculture facilities located on those sites shall be given priority, except over other coastal dependent developments or uses.

30223.
Upland areas necessary to support coastal recreational uses shall be reserved for such uses, where feasible.

30224.
Increased recreational boating use of coastal waters shall be encouraged, in accordance with this division, by developing dry storage areas, increasing public launching facilities, providing additional berthing space in existing harbors, limiting non-water-dependent land uses that congest access corridors and preclude boating support facilities, providing harbors of refuge, and by providing for new boating facilities in natural harbors, new protected water areas, and in areas dredged from dry land.

Article 4: Marine Environment

30230.
Marine resources shall be maintained, enhanced, and, where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.

30231.
The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface water flow, encouraging waste water reclamation,

maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.

30232.

Protection against the spillage of crude oil, gas, petroleum products, or hazardous substances shall be provided in relation to any development or transportation of such materials. Effective containment and cleanup facilities and procedures shall be provided for accidental spills that do occur.

30233.

(a) The diking, filling, or dredging of open coastal waters, wetlands, estuaries, and lakes shall be permitted in accordance with other applicable provisions of this division, where there is no feasible less environmentally damaging alternative, and where feasible mitigation measures have been provided to minimize adverse environmental effects, and shall be limited to the following:

(1) New or expanded port, energy, and coastal-dependent industrial facilities, including commercial fishing facilities.

(2) Maintaining existing, or restoring previously dredged, depths in existing navigational channels, turning basins, vessel berthing and mooring areas, and boat launching ramps.

(3) In wetland areas only, entrance channels for new or expanded boating facilities; and in a degraded wetland, identified by the Department of Fish and Game pursuant to subdivision (b) of Section 30411, for boating facilities if, in conjunction with such boating facilities, a substantial portion of the degraded wetland is restored and maintained as a biologically productive wetland. The size of the wetland area used for boating facilities, including berthing space, turning basins, necessary navigation channels, and any necessary support service facilities shall not exceed 25 percent of the degraded wetland.

(4) In open coastal waters, other than wetlands, including streams, estuaries, and lakes, new or expanded boating facilities and the placement of structural pilings for public recreational piers that provide public access and recreational opportunities.

(5) Incidental public service purposes, including, but not limited to, burying cables and pipes or inspection of piers and maintenance of existing intake and outfall lines.

(6) Mineral extraction, including sand for restoring beaches, except in environmentally sensitive areas.

(7) Restoration purposes.

(8) Nature study, aquaculture, or similar resource-dependent activities.

(b) Dredging and spoils disposal shall be planned and carried out to avoid significant disruption to marine and wildlife habitats and water circulation. Dredge spoils suitable for beach replenishment should be transported for such purposes to appropriate beaches or into suitable longshore current systems.

(c) In addition to the other provisions of this section, diking, filling, or dredging in existing estuaries and wetlands shall maintain or enhance the functional capacity of the wetland or estuary. Any alteration of coastal wetlands identified by the Department of Fish and Game, including, but not limited to, the 19 coastal wetlands identified in its report entitled, "Acquisition Priorities for the Coastal Wetlands of California," shall be limited to very minor incidental public facilities, restorative measures, nature study, commercial fishing facilities in Bodega Bay, and development in already developed parts of south San Diego Bay, if otherwise in accordance with this division. For the purposes of this section, "commercial fishing facilities in Bodega Bay" means that not less than 80 percent of all boating facilities proposed to be developed or improved, where such improvement would create additional berths in Bodega Bay, shall be designed and used for commercial fishing activities.

(d) Erosion control and flood control facilities constructed on watercourses can impede the movement of sediment and nutrients which would otherwise be carried by storm runoff into coastal waters. To facilitate the continued delivery of these sediments to the littoral zone, whenever feasible, the material removed from these facilities may be placed at appropriate points on the shoreline in accordance with other applicable provisions of this division, where feasible mitigation measures have been provided to minimize adverse environmental effects. Aspects that shall be considered before issuing a coastal development permit for such purposes are the method of placement, time of year of placement, and sensitivity of the placement area.

30234.

Facilities serving the commercial fishing and recreational boating industries shall be protected and, where feasible, upgraded. Existing commercial fishing and recreational boating harbor space shall not be reduced unless the demand for those facilities no longer exists or adequate substitute space has been provided. Proposed recreational boating facilities shall, where feasible, be designed and located in such a fashion as not to interfere with the needs of the commercial fishing industry.

30234.5.

The economic, commercial, and recreational importance of fishing activities shall be recognized and protected.

30235.

Revetments, breakwaters, groins, harbor channels, seawalls, cliff retaining walls, and other such construction that alters natural shoreline processes shall be permitted when required to serve coastal-dependent uses or to protect existing structures or public beaches in danger from erosion and when designed to eliminate or mitigate adverse impacts on local shoreline sand supply. Existing marine structures causing water stagnation contributing to pollution problems and fish kills should be phased out or upgraded where feasible.

30236.

Channelizations, dams, or other substantial alterations of rivers and streams shall incorporate the best mitigation measures feasible, and be limited to (1) necessary water supply projects, (2) flood control projects where no other method for protecting existing structures in the flood plain is feasible and where such protection is necessary for public safety or to protect existing development, or (3) developments where the primary function is the improvement of fish and wildlife habitat.

30237.

(a) This section shall apply only to the Bolsa Chica wetlands or a portion thereof in the County of Orange. The County of Orange or any landowner may petition the Department of Fish and Game, on or before October 1, 1983, to prepare a habitat conservation plan. Upon receipt of the petition, the Department of Fish and Game and the State Coastal Conservancy, in cooperation with the county and any landowner, shall jointly prepare a habitat conservation plan in order to carry out the following objectives:

(1) To provide for the conservation of the habitat of fish and wildlife resources.

(2) To anticipate and resolve potential conflicts between the conservation of fish and wildlife resources or their habitat and actions by local, state, or federal agencies and private persons.

(3) To provide for greater certainty and predictability regarding the conservation of fish and wildlife resources and their habitat and regarding private and public activities potentially affecting those resources.

(b) With respect to the preparation of the habitat conservation plan, the Department of Fish and Game shall be the lead agency for wetland identification purposes and the State Coastal Conservancy shall be the lead agency for the purposes of identifying land use alternatives. Upon completion of the habitat conservation plan and on or before July 20, 1984, the Department of Fish and Game and the State Coastal Conservancy shall jointly forward it to the commission for approval. The commission shall approve the plan if it finds it raises no substantial issue as to conformity with the planning and management policies of this chapter. If the plan is approved by the commission, it may be incorporated into the county's local coastal program.

(c) All costs of preparation of the habitat conservation plan, including, but not limited to, additional necessary personnel temporarily appointed by the Department of Fish and Game and the State Coastal Conservancy, shall be paid by the petitioner or petitioners. If additional personnel are necessary, the Department of Finance shall review the requests to ensure that the personnel required will be utilized to carry out only the purposes of this section. If the Department of Finance finds the additional personnel required will be utilized only to carry out the purposes of this section, the temporary appointment requests shall be processed and approved by the Department of Finance in an expedited fashion, in no event longer than 10 working days after the requests are made. Furthermore, these requests for temporary appointments shall be exempt from all state personnel hiring requirements and procedures, except for affirmative action requirements, for the review provided in this subdivision by the Department of Finance, and from any personnel hiring limitations during the time period set forth in this section for the preparation of the habitat conservation plan.

Article 5: Land Resources

30240.

(a) Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on those resources shall be allowed within those areas.

(b) Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas.

30241.

The maximum amount of prime agricultural land shall be maintained in agricultural production to assure the protection of the areas' agricultural economy, and conflicts shall be minimized between agricultural and urban land uses through all of the following:

(a) By establishing stable boundaries separating urban and rural areas, including, where necessary, clearly defined buffer areas to minimize conflicts between agricultural and urban land uses.

(b) By limiting conversions of agricultural lands around the periphery of urban areas to the lands where the viability of existing agricultural use is already severely limited by conflicts with urban uses or where the conversion of the lands would complete a logical and viable neighborhood and contribute to the establishment of a stable limit to urban development.

(c) By permitting the conversion of agricultural land surrounded by urban uses where the conversion of the land would be consistent with Section 30250.

(d) By developing available lands not suited for agriculture prior to the conversion of agricultural lands.

(e) By assuring that public service and facility expansions and nonagricultural development do not impair agricultural viability, either through increased assessment costs or degraded air and water quality.

(f) By assuring that all divisions of prime agricultural lands, except those conversions approved pursuant to subdivision (b), and all development adjacent to prime agricultural lands shall not diminish the productivity of prime agricultural lands.

30241.5.

(a) If the viability of existing agricultural uses is an issue pursuant to subdivision (b) of Section 30241 as to any local coastal program or amendment to any certified local coastal program submitted for review and approval under this division, the determination of "viability" shall include, but not be limited to, consideration of an economic feasibility evaluation containing at least both of the following elements:

(1) An analysis of the gross revenue from the agricultural products grown in the area for the five years immediately preceding the date of the filing of a proposed local coastal program or an amendment to any local coastal program.

(2) An analysis of the operational expenses, excluding the cost of land, associated with the production of the agricultural products grown in the area for the five years immediately preceding the date of the filing of a proposed local coastal program or an amendment to any local coastal program.

For purposes of this subdivision, "area" means a geographic area of sufficient size to provide an accurate evaluation of the economic feasibility of agricultural uses for those lands included in the local coastal program or in the proposed amendment to a certified local coastal program.

(b) The economic feasibility evaluation required by subdivision (a) shall be submitted to the commission, by the local government, as part of its submittal of a local coastal program or an amendment to any local coastal program. If the local government determines that it does not have the staff with the necessary expertise to conduct the economic feasibility evaluation, the evaluation may be conducted under agreement with the local government by a consultant selected jointly by local government and the executive director of the commission.

30242.

All other lands suitable for agricultural use shall not be converted to nonagricultural uses unless (1) continued or renewed agricultural use is not feasible, or (2) such conversion would preserve prime agricultural land or concentrate development consistent with Section 30250. Any such permitted conversion shall be compatible with continued agricultural use on surrounding lands.

30243.

The long-term productivity of soils and timberlands shall be protected, and conversions of coastal commercial timberlands in units of commercial size to other uses or their division into units of noncommercial size shall be limited to providing for necessary timber processing and related facilities.

30244.

Where development would adversely impact archaeological or paleontological resources as identified by the State Historic Preservation Officer, reasonable mitigation measures shall be required.

Article 6: Development

30250.

(a) New residential, commercial, or industrial development, except as otherwise provided in this division, shall be located within, contiguous with, or in close proximity to, existing developed areas able to accommodate it or, where such areas are not able to accommodate it, in other areas with adequate public services and where it will not have significant adverse effects, either individually or cumulatively, on coastal resources. In addition, land divisions, other than leases for agricultural uses, outside existing developed areas shall be permitted only where 50 percent of the usable parcels in the area have been developed and the created parcels would be no smaller than the average size of surrounding parcels.

(b) Where feasible, new hazardous industrial development shall be located away from existing developed areas.

(c) Visitor-serving facilities that cannot feasibly be located in existing developed areas shall be located in existing isolated developments or at selected points of attraction for visitors.

30251.

The scenic and visual qualities of coastal areas shall be considered and protected as a resource of public importance. Permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, to minimize the alteration of natural land forms, to be visually compatible with the character of surrounding areas, and, where feasible, to restore and enhance visual quality in visually degraded areas. New development in highly scenic areas such as those designated in the California Coastline Preservation and Recreation Plan prepared by the Department of Parks and Recreation and by local government shall be subordinate to the character of its setting.

30252.

The location and amount of new development should maintain and enhance public access to the coast by (1) facilitating the provision or extension of transit service, (2) providing commercial facilities within or adjoining residential development or in other areas that will minimize the use of coastal access roads, (3) providing non-automobile circulation within the development, (4) providing adequate parking facilities or providing substitute means of serving the development with public transportation, (5) assuring the potential for public transit for high intensity uses such as high-rise office buildings, and by (6) assuring that the recreational needs of new residents will not overload nearby coastal recreation areas by correlating the amount of development with local park acquisition and development plans with the provision of onsite recreational facilities to serve the new development.

30253.

New development shall:

(1) Minimize risks to life and property in areas of high geologic, flood, and fire hazard.

(2) Assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area or in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs.

(3) Be consistent with requirements imposed by an air pollution control district or the State Air Resources Control Board as to each particular development.

(4) Minimize energy consumption and vehicle miles traveled.

(5) Where appropriate, protect special communities and neighborhoods which, because of their unique characteristics, are popular visitor destination points for recreational uses.

30254.

New or expanded public works facilities shall be designed and limited to accommodate needs generated by development or uses permitted consistent with the provisions of this division; provided, however, that it is the intent of the Legislature that State Highway Route 1 in rural areas of the coastal zone remain a scenic two-lane road. Special districts shall not be formed or expanded except where assessment for, and provision of, the service would not induce new development inconsistent with this division. Where existing or planned public works facilities can accommodate only a limited amount of new development, services to coastal-dependent land use, essential public services and basic industries vital to the economic health of the region, state, or nation, public recreation, commercial recreation, and visitor-serving land uses shall not be precluded by other development.

30254.5.

Notwithstanding any other provision of law, the commission may not impose any term or condition on the development of any sewage treatment plant which is applicable to any future development that the commission finds can be accommodated by that plant consistent with this division. Nothing in this section modifies the provisions and requirements of Sections 30254 and 30412.

30255.

Coastal-dependent developments shall have priority over other developments on or near the shoreline. Except as provided elsewhere in this division, coastal-dependent developments shall not be sited in a wetland. When appropriate, coastal-related developments should be accommodated within reasonable proximity to the coastal-dependent uses they support.

Article 7: Industrial Development

30260.

Coastal-dependent industrial facilities shall be encouraged to locate or expand within existing sites and shall be permitted reasonable long-term growth where consistent with this division. However, where new or expanded coastal-dependent industrial facilities cannot feasibly be accommodated consistent with other policies of this division, they may nonetheless be permitted in accordance with this section and Sections 30261 and 30262 if (1) alternative locations are infeasible or more environmentally damaging; (2) to do otherwise would adversely affect the public welfare; and (3) adverse environmental effects are mitigated to the maximum extent feasible.

30261.

Multi-company use of existing and new tanker facilities shall be encouraged to the maximum extent feasible and legally permissible, except where to do so would result in increased tanker operations and associated onshore development incompatible with the land use and environmental goals for the area. New tanker terminals outside of existing terminal areas shall be situated as to avoid risk to environmentally sensitive areas and shall use a monobuoy system, unless an alternative type of system can be shown to be environmentally preferable for a specific site. Tanker facilities shall be designed to (1) minimize the total volume of oil spilled, (2) minimize the risk of collision from movement of other vessels, (3) have ready access to the most effective feasible containment and recovery equipment for oilspills, and (4) have onshore deballasting facilities to receive any fouled ballast water from tankers where operationally or legally required.

30262.

(a) Oil and gas development shall be permitted in accordance with Section 30260, if the following conditions are met:

(1) The development is performed safely and consistent with the geologic conditions of the well site.

(2) New or expanded facilities related to that development are consolidated, to the maximum extent feasible and legally permissible, unless consolidation will have adverse environmental consequences and will not significantly reduce the number of producing wells, support facilities, or sites required to produce the reservoir economically and with minimal environmental impacts.

(3) Environmentally safe and feasible subsea completions are used if drilling platforms or islands would substantially degrade coastal visual qualities, unless the use of those structures will result in substantially less environmental risks.

(4) Platforms or islands will not be sited where a substantial hazard to vessel traffic might result from the facility or related operations, as determined in consultation with the United States Coast Guard and the Army Corps of Engineers.

(5) The development will not cause or contribute to subsidence hazards unless it is determined that adequate measures will be undertaken to prevent damage from that subsidence.

(6) With respect to new facilities, all oilfield brines are reinjected into oil-producing zones unless the Division of Oil, Gas, and Geothermal Resources of the Department of Conservation determines to do so would adversely affect production of the reservoirs and unless injection into other subsurface zones will reduce environmental risks. Exceptions to reinjections will be granted consistent with the Ocean Waters Discharge Plan of the State Water Resources Control Board and where adequate provision is made for the elimination of petroleum odors and water quality problems.

(7)(A) All oil produced offshore California shall be transported onshore by pipeline only. The pipelines used to transport this oil shall utilize the best achievable technology to ensure maximum protection of public health and safety and of the integrity and productivity of terrestrial and marine ecosystems.

(B) Once oil produced offshore California is onshore, it shall be transported to processing and refining facilities by pipeline.

(C) The following guidelines shall be used when applying subparagraphs (A) and (B):

(i) "Best achievable technology," means the technology that provides the greatest degree of protection taking into consideration both of the following:

(I) Processes that are being developed, or could feasibly be developed, anywhere in the world, given overall reasonable expenditures on research and development.

(II) Processes that are currently in use anywhere in the world. This clause is not intended to create any conflicting or duplicative regulation of pipelines, including those governing the transportation of oil produced from onshore reserves.

(ii) "Oil" refers to crude oil before it is refined into products, including gasoline, bunker fuel, lubricants, and asphalt. Crude oil that is upgraded in quality through residue reduction or other means shall be transported as provided in subparagraphs (A) and (B).

(iii) Subparagraphs (A) and (B) shall apply only to new or expanded oil extraction operations. "New extraction operations" means production of offshore oil from leases that did not exist or had never produced oil, as of January 1, 2003, or from platforms, drilling island, subsea completions, or onshore drilling sites, that did not exist as of January 1, 2003. "Expanded oil extraction" means an increase in the geographic extent of existing leases or units, including lease boundary adjustments, or an increase in the number of well heads, on or after January 1, 2003.

(iv) For new or expanded oil extraction operations subject to clause (iii), if the crude oil is so highly viscous that pipelining is determined to be an infeasible mode of transportation, or where there is no feasible access to a pipeline, shipment of crude oil may be permitted over land by other modes of transportation, including trains or trucks, which meet all applicable rules and regulations, excluding any waterborne mode of transport.

(8) If a state of emergency is declared by the Governor for an emergency that disrupts the transportation of oil by pipeline, oil may be transported by a waterborne vessel, if authorized by permit, in the same manner as required by emergency permits that are issued pursuant to Section 30624.

(9) In addition to all other measures that will maximize the protection of marine habitat and environmental quality, when an offshore well is abandoned, the best achievable technology shall be used.

(b) Where appropriate, monitoring programs to record land surface and near-shore ocean floor movements shall be initiated in locations of new large-scale fluid extraction on land or near shore before operations begin and shall continue until surface conditions have stabilized. Costs of monitoring and mitigation programs shall be borne by liquid and gas extraction operators.

(c) Nothing in this section shall affect the activities of any state agency that is responsible for regulating the extraction, production, or transport of oil and gas.

<u>30263.</u>

(a) New or expanded refineries or petrochemical facilities not otherwise consistent with the provisions of this division shall be permitted if (1) alternative locations are not feasible or are more environmentally damaging; (2) adverse environmental effects are mitigated to the maximum extent feasible; (3) it is found that not permitting such development would adversely affect the public welfare; (4) the facility is not located in a highly scenic or seismically hazardous area, on any of the Channel Islands, or within or contiguous to environmentally sensitive areas; and (5) the facility is sited so as to provide a sufficient buffer area to minimize adverse impacts on surrounding property.

(b) New or expanded refineries or petrochemical facilities shall minimize the need for once-through cooling by using air cooling to the maximum extent feasible and by using treated waste waters from inplant processes where feasible.

30264.

Notwithstanding any other provision of this division except subdivisions (b) and (c) of Section 30413, new or expanded thermal electric generating plants may be constructed in the coastal zone if the proposed coastal site has been determined by the State Energy Resources Conservation and Development Commission to have greater relative merit pursuant to the provisions of Section 25516.1 than available alternative sites and related facilities for an applicant's service area which have been determined to be acceptable pursuant to the provisions of Section 25516.

30265.

The Legislature finds and declares all of the following:

(a) Offshore oil production will increase dramatically in the next 10 years from the current 80,000 barrels per day to over 400,000 barrels per day.

(b) Transportation studies have concluded that pipeline transport of oil is generally both economically feasible and environmentally preferable to other forms of crude oil transport.

(c) Oil companies have proposed to build a pipeline to transport offshore crude oil from central California to southern California refineries, and to transport offshore oil to out-of-state refiners.

(d) California refineries would need to be retrofitted if California offshore crude oil were to be used directly as a major feedstock. Refinery modifications may delay achievement of air quality goals in the southern California air basin and other regions of the state.

(e) The County of Santa Barbara has issued an Oil Transportation Plan which assesses the environmental and economic differences among various methods for transporting crude oil from offshore California to refineries.

(f) The Governor should help coordinate decisions concerning the transport and refining of offshore oil in a manner which considers state and local studies undertaken to date, which fully addresses the concerns of all affected regions, and which promotes the greatest benefits to the people of the state.

30265.5.

(a) The Governor, or the Governor's designee, shall coordinate activities concerning the transport and refining of offshore oil. Coordination efforts shall consider public health risks, the ability to achieve short- and long-term air emission reduction goals, the potential for reducing California's vulnerability and dependence on oil imports, economic development and jobs, and other factors deemed important by the Governor, or the Governor's designee.

(b) The Governor, or the Governor's designee, shall work with state and local agencies, and the public, to facilitate the transport and refining of offshore oil in a manner which will promote the greatest public health and environmental and economic benefits to the people of the state.

(c) The Governor, or the Governor's designee, shall consult with any individual or organization having knowledge in this area, including, but not limited to, representatives from the following:

(1) State Energy Resources Conservation and Development Commission.
(2) State Air Resources Board.
(3) California Coastal Commission.
(4) Department of Fish and Game.
(5) State Lands Commission.
(6) Public Utilities Commission.
(7) Santa Barbara County.
(8) Santa Barbara County Air Pollution Control District.

(9) Southern California Association of Governments.
(10) South Coast Air Quality Management District.
(11) Oil industry.
(12) Public interest groups.
(13) United States Department of the Interior.
(14) United States Department of Energy.
(15) United States Environmental Protection Agency.
(16) National Oceanic and Atmospheric Administration.
(17) United States Coast Guard.

(d) This act is not intended, and shall not be construed, to decrease, duplicate, or supersede the jurisdiction, authority, or responsibilities of any local government, or any state agency or commission, to discharge its responsibilities concerning the transportation and refining of oil.

APPENDIX F.

CALIFORNIA COMBINED COASTAL MANAGEMENT PROGRAM/FINAL ENVIRONMENTAL IMPACT STATEMENT, CHAPTER 11, SECTIONS (a) AND (b)

Coastal Mgmt Plan / FEIS

CHAPTER 11

MANAGING THE COAST (6): THE NATIONAL INTEREST AND THE CONSISTENCY OF FEDERAL ACTIONS

The California Legislature, in passing the 1976 Coastal Act, declared that the California coastal zone "is a distinct and valuable natural resource of vital and enduring interest to all the people" and that its "permanent protection . . . is a paramount concern to present and future residents of the State and nation." (30001)

The Coastal Act, in its declaration of the necessity for continued State coastal planning and management through the Coastal Commission, specifies two of the reasons: (1) "to protect regional, state, and national interest in assuring the maintenance of the long-term productivity and economic vitality of coastal resources necessary for the well-being of the people of the state;" and (2) "to provide maximum state involvement in Federal activities allowable under Federal law or regulations or the U. S. Constitution which affect California's coastal resources." (30004(b)). These are the statutory foundations for the consideration of the national interest in the CCMP's management of the coastal zone - discussed in Section A below - and the administration of the Federal consistency clause - Section B below.

This chapter describes how California has taken the national interest into account in the development of its coastal management program and describes the process the Coastal Commission uses to consider greater than local concerns in the siting of certain types of facilities that have been clearly defined as being in "the national interest." This is not intended to be a statement, rule, or regulation defining the "national interest"; rather, it is a demonstration of how the program addressed the national interest in its development and a description of the procedures used by the Coastal Commission to identify, participate in the planning for, and give adequate consideration to the national interest in the implementation of the CCMP. Relevant Federal agencies have had extensive opportunities to review and participate in the development of both Sections A and B below, as well as in the development of the overall California Coastal Management Program.

A. The National Interest in the California Coastal Zone

The California Coast Is A National Resource

The California coastline is of more than local or even State importance; it is a resource of national significance; it comprises more than half the western coastline of the contiguous 48 states.

Visitors from across the country enjoy the scenic beauty and recreational facilities along the coast. Foreign goods bound for consumers in inland States and U. S. products on their way to distant countries pass through California ports. Petroleum and other minerals, timber, and farm and fishery products from the coastal zone are shipped to the rest of the nation.

Use of the coastal land area and adjacent waters for national defense and national security is of paramount importance and is among the highest priority in the management of the coastal zone. Many of the military installations located along the coast have defense missions requiring operational use of the coastal zone. In addition, military installations are important components in their local areas, and represent a stable and substantial contribution to the coastal and State economy.

Recognizing the distinct and irreplaceable value of this country's coastline, the Congress enacted the Coastal Zone Management Act, which states, ". . . it is national policy . . . to preserve, protect, develop, and where possible, to restore or enhance, the resources of the nation's coastal zone for this and succeeding generations" (Section 303(e)). This language is almost identical to one of the objectives of Proposition 20, ". . . to preserve, protect, and where possible, to restore the resources of the coastal zone" (27001); and to one of the basic declarations of the Coastal Act, "the permanent protection of the (California coastal zone) is a paramount concern to present and future generations of the state and nation." (30001)

Under the CZMA, California has received financial assistance for the development of its coastal management program. The Coastal Act is the foundation of the CCMP submitted to the Department of Commerce. Once approved by the Secretary of Commerce, the CCMP provides the basic policies for determining both State and national interests in the California coastal zone. The CZMA further requires Federal agencies to comply with the approved State coastal management program to the maximum extent practicable. (Sections 307(c) and (d))

To ensure the national interest is adequately addressed in the CCMP, the CZMA requires that the State coastal "management program provides for adequate consideration of the national interest involved in planning for, and in the siting of facilities (including energy facilities in, or which significantly affect, such state's coastal zone), and that the program assures that local land and water use regulations within the coastal zone do not unreasonably restrict or exclude uses of regional benefit. (Section 306(e)(2))

Table 1

CONSIDERATION OF THE NATIONAL INTEREST IN CALIFORNIA'S COASTAL MANAGEMENT PROGRAM

National Interest in Siting Facilities for:	Associated Facilities	Cognizant Federal Agencies Modified From List Provided by OCZM (15 CFR 923.15)	National Interest Considered in Coastal Act and Conservancy Act Sections
1. Energy production and transmission.	Oil and gas wells; storage and distribution facilities; refineries; nuclear, conventional powerplants; deepwater ports	Federal Energy Administration, Federal Power Commission, Bureau of Land Management, Nuclear Regulatory Commission, Geological Survey, Dept. of Transportation, Corps of Engrs., Maritime Administration.	30260, 30261, 30262, 30263, 30264, 30413, 30232, 30250(b), 30254, 30255, 30515, 30001.2, 30603, 30501, 30001.5, 30004, 30250(b), 30255, 30232, 30515, 30001.2, 30403(a)(5), 30501(c), 30413(b),(c), 30700, 30700.5, 30701, 30702, 30705, 30706, 30707, 30708, 30233, 30008
2. Recreation (of an interstate nature).	National seashores, parks, forests; large and outstanding beaches and recreational waterfronts; wildlife reserves; wilderness and recreation areas.	National Park Service, Forest Service, Bureau of Outdoor Recreation, Fish and Wildlife Service.	30250(c), 30252, 30254, 30255, 30212.5, 30213, 30220, 30221, 30222, 30223, 30501(c), 30210, 30211, 30212, 30001, 30001.5, 30004(b), 30240(b), 30235, 30233, 30234, 30008
3. Interstate Transportation.	Interstate highways, airports, aids to navigation; ports and harbors, railroads.	Department of Transportation, Corps of Engineers, Maritime Administration, Interstate Commerce Commission.	30001, 30001.2, 30001.5, 30003, 30004(b), 30254, 20255, 30700, 30700.5, 30701, 30702, 30703, 30705, 30706, 30707, 30708, 30261, 30262, 30501(c), 30232, 30233, 30008
4. Production of food and fiber.	Prime agricultural land and facilities; forests; mariculture facilities, fisheries.	Department of Agriculture, Fish and Wildlife Service, National Marine Fisheries Service.	30001, 30001.2, 30001.5, 30004(b), 30501(c), 30234, 30703, 30241, 30242, 30243, 20250, 30255, 30230, 30231, 30233, 30008, 31150-31155, 31200-31215
5. Preservation of life and property.	Flood and storm protection facilities; disaster warning facilities.	Corps of Engineers, Federal Insurance Administration, NOAA, Soil Conservation Service, ASCS, HUD	30001, 30004(b), 30231, 30232, 30235, 30236, 30253(1),(2), 30501(c), 30250(b), 30008
6. National defense and aerospace.	Military installations defense manufacturing facilities; aerospace launching and tracking facilities.	Department of Defense, NASA	30003, 30008
7. Historic, cultural aesthetic and conservation values.	Historic sites, natural areas; areas of unique cultural significance; wildlife refuges; areas of species and habitat preservation.	Register of Historic Places, National Park Service, Fish and Wildlife Service, National Marine Fisheries Service, HUD.	30001, 30001.5, 30004(b), 30230, 30231, 30232, 30233, 30235, 30236, 30240, 30244, 30250(a), 30251, 30253(5), 30255, 30501(c), 30008, 31251-31265, 31300-31306, 31350-31356
8. Mineral resources.	Mineral extraction facilities needed to directly support activity.	Bureau of Mines, Geological Survey.	30001, 30001.2, 30001.5, 30004(b), 30008, 30501(c), 30255, 30262 30233(6), 30705(5)

Section 923.15 of the CZMA regulations provide that "No separate national interest 'test' need be applied and submitted other than evidence that the . . . national interest facilities have been considered in a manner similar to all other uses, and that appropriate consultation with . . . Federal agencies . . . has been conducted." The following sections are the required evidence.

Planning for the National Interest

Previous experience has demonstrated the difficulty of defining the national interest in the planning and siting of facilities. There are typically many different participants with various interpretations. Throughout the development of the California Coastal Management Program, efforts were made to solicit comments and review statements to ensure that there would be no inherent conflict between the national interest and the policy base of the program. The California Coastal Management Program is a comprehensive program designed to consider the multiple water and land uses in the coastal zone. Accordingly, trade-offs must be made with respect to the allocation of land and water resources with priority designations being required to resolve conflicts. Because of the widespread participation in the development of the program, the policies are reflective of the needs and interests of local, State, and national governments. Furthermore, the California Coastal Act of 1976 and other elements of the CCMP provide substantive policies and procedural requirements for continuing to give adequate consideration of the national interests in facility siting in the future.

Recognizing its responsibilities to the rest of the nation, California in its coastal planning has made every effort to consider the national interest in issues affecting the coast. The Coastal Management Program recognizes national defense and national security as important aspects of national interest, because without the attainment of these objectives all other goals and objectives can be threatened. The Coastal Act's policies on the protection of agricultural land and marine and wildlife habitat recognize the importance of California farm production and fisheries to the rest of the nation and also acknowledge the world food shortage. The policies calling for recreational and public oriented uses to have a high priority along the coast reflect the increasing popularity of the coast as a tourist destination.

The Coastal Act's energy and industrial development policies, especially important because of the increased interest and activities resulting from the Department of the Interior's leasing of Outer Continental Shelf (OCS) areas for petroleum exploration and extraction, take into account California's role in addressing national energy needs. The energy policies are based on a willingness to respond with a broader State role in meeting the nation's energy needs while, at the same time, properly planning for and protecting California's environmental, economic, and legal interests.

Table 1 illustrates how California's management program has addressed the national interest. The first three columns of the table are drawn from NOAA's regulations on the CZMA national interest requirements. (15 C.F.R. 923.15). The right hand column of the table lists the Coastal Act and Conservancy Act sections that address these requirements which are other than local in nature. In addition to these statutory sections, other regulation provisions that are an integral part of the CCMP further accommodate national interest considerations. (See for example, 4A . 4, Section 00041. of Local Coastal Program Regulation, Appendix 5). Further evidence of the Coastal Commission's consideration of national interest is provided by the December 10, 1976, report to the Congress by the Comptroller General of the United States which documents the long and extensive participation of Federal agencies in the development of the CCMP.[1]

The Coastal Commission is given authority under Section 30330 of the Coastal Act to exercise the primary responsibility for the implementation of the Coastal Act and to exercise any and all powers granted to the State by the Federal CZMA. The Commission looks to the following sources for policies and information that must be taken into account to adequately consider national interests in exercising both its planning and management responsibility:[2]

a. Federal laws and regulations;

b. Policy statements from the President of the U.S. (e.g., National Energy Plan);

c. Special reports, studies, and comments from Federal and State Agencies;

d. Testimony received at public hearings and Coastal Commission deliberations;

e. Certificates, policy statements, and solicited opinions issued on specific projects by Federal regulatory agencies such as FPC, ERDA, FEA, etc.;

f. Statements of the national interest issued by NOAA, and other Federal agencies.

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[1]The Coastal Zone Management Program: An Uncertain Future. (See especially pp. 59-61.)

[2]Priorities are not intended by the order of the sources.

The process of synthesizing these various sources of information is broken down into four basic steps which can occur concurrently.

1. Planning for Facility Siting Impacts

The Coastal Commission is empowered to prepare and adopt any additional plans and maps and undertake any studies it deems necessary and appropriate to accomplish the purposes, goals, and policies of the Coastal Act, provided that adoption occurs only after public hearing (30341). This authority gives the Commission long- and short-range planning capability to determine impacts of land and water uses in the coastal zone, in advance of specific development permit requests. This authority will benefit all parties concerned with facilities siting. The public hearing requirements ensure that all interested parties will have an opportunity to participate in the management process.

2. Review of Applications for Coastal Development Permits

During the period until local coastal programs are developed and certified, a Coastal Commission permit is required to construct or carry out development in the coastal zone. The Commission ordinarily requires a local approval in concept of proposed project before it will complete the processing of a Coastal Commission permit. This requirement can be waived for good cause.

A permit applicant is generally required to provide the following information:

a. Description of the proposed development project site and vicinity using maps, plans, photos, etc.;

b. Present use and plans;

c. Alternatives to the project or mitigation measures to lessen impact;

d. Description of the applicant's legal interest in the property;

e. An Environmental Impact Report or Statement or a negative declaration if required; and

f. Additional information as required by the Commission.

Each application is reviewed by the staff in one of the Regional Coastal Commission offices and an evaluation is made to determine whether the proposed activity is compatible with the Coastal Act. The Regional Commission acts on the recommendation of the staff.

The national interest is also considered as part of this evaluation. When appropriate, Federal agencies are afforded an opportunity to assist the Commission staff in this evaluation by providing information and Federal agency views on the proposed development. Applications for major permits (i.e., those not eligible for an administrative permit under the Commission's regulations) are reviewed by a Regional Commission at a public hearing. Federal agencies and other interests are thus given the opportunity to voice the national interest which is considered by the Regional Commission in making its decision. Projects that the State Legislature defined as being of greater than local importance and proposals for development in important resource areas are subject to appeal to the State Coastal Commission. The State Commission can also "pull up" for direct consideration any permit application to a Regional Commission to expedite the review process.

On appeal or on projects directly reviewed by the State Commission, the staff evaluates the proposal, including any national interest aspects of the development. Federal agencies and other interests are allowed to participate in the staff's evaluation both by making their interests known to the staff in preparing its recommendation to the Commission and in the Commission's public hearing. Finally, aggrieved parties (including Federal agencies) can seek judicial review of a Commission decision if they believe that the national interest is not adequately considered.

3. Federal Consistency Determinations

Section B of this chapter outlines in some detail the procedures that California will use in evaluating the consistency of Federal activities and projects subject to the requirements of Section 307 of the CZMA. The consideration of national interest are required to be incorporated into the development of local coastal programs which will, when certified, form one basis for the Coastal Commission's consistency determination; and (2) the State Coastal Commission will retain the primary authority for evaluating projects and activities subject to the Federal Consistency determinations.

4. Local Coastal Program Development

Preparation of local coastal programs will involve all local, regional, State, and Federal agencies having an interest in the planning area. Integrating the policies and proposals of various agencies and resolving conflicts will require extensive cooperation. Local governments are responsible for providing maximum opportunities for involvement of all affected public agencies. Specific procedures for seeking participation for determining key decision points involving other agencies will be defined in the LCP work programs and carried out during the LCP preparation.

At the same time, public agencies - local, regional, State, and Federal - have an obligation to provide information and assistance to the local governments. Moreover, it is in their interest to do so, because, after certification of the LCP, all governmental agencies, with the exception of certain Federal activities, must carry out their development activities within the coastal zone consistent with the LCP.

Because local governments will participate in the State's implementation of the Federal consistency provisions, LCPs can affect Federal actions; therefore, it is essential that the views of Federal agencies affected by the local program be considered in its development. In the Commission's Local Coastal Program Manual (Attachment A), specific Federal agencies that have a particular interest or can provide information on each of 14 policies are identified in the section, "Agencies and Sources of Information." The Federal agencies will be provided the opportunity to articulate their perceptions of the national interest and to provide technical information so that local governments can consider this in preparing their LCPs.

The Coastal Act states that "the Legislature . . . finds and declares the public has the right to fully participate in decisions affecting coastal planning, conservation, and development; that achievement of sound coastal conservation and development is dependent upon public understanding and support; and that the continuing planning and implementation of programs for coastal conservation and development should include the widest opportunity for public participation." (Section 30006) Citizen participation cannot change the State's coastal policies as set forth by the Legislature in the Coastal Act. But within the flexibility allowed in applying those policies at the local level, public involvement will be an important factor in planning, implementing, and reflecting greater than local concerns in California's coastal conservation and development program.

One aspect of public participation is public hearing requirements. Section 30503 of the Coastal Act specifically requires that "local governments shall hold a public hearing or hearings on that portion of the program which has not been subjected to public hearings within four years of such submissions." State planning and zoning laws also require a public hearing by both the planning commission and the local legislative body prior to adoption of all general plans or zoning ordinance amendments. In addition, Section 30510(a) of the Coastal Act provides for the submittal of the LCP pursuant to a resolution adopted by the local government after public hearing. Finally, the Regional Commission and, if appealed or raised on its own motion, the State Coastal Commission will hold public hearings for the review and approval of LCPs.

Important as public hearings are, the full public participation envisioned by the Coastal Act will be much earlier in the planning, with informational meetings, advisory reviews, and other such means of giving the widest possible range of interests an opportunity to participate in the plan preparation and to reflect national interest.

The Coastal Commission, under Section 30339 of the Coastal Act, has the responsibility for "ensur(ing) full and adequate participation by all interested groups and the public" in the Commission's work, and "recommend(ing) to any local government preparing or implementing a local coastal program and to any State agency . . . any additional measures to assure open consideration and more effective public participation . . . " The Commission will, to the extent staff resources permit, provide assistance to local governments with their citizen participation efforts, and promote citizen awareness at the statewide and regional level through various methods such as publishing a newsletter and providing assistance in organizing public forums on regional issues.

Finally, and perhaps most importantly, the Commission's regulations for local coastal program development required that local governments must consider recommended uses of more than local importance in their LCP preparation. The LCP regulations require that "at a minimum, all notices for public review sessions, availability of review drafts, studies, or other relevant documents or actions pertaining to the preparation of a local coastal program shall be mailed to: (1) any member of the public who has so requested . . .; and (2) all of the State and Federal agencies listed in . . . the Local Coastal Program Manual." (Act 5 Section 00050, LCP Regulations.) In this way, organizations concerned about the national interest and Federal agencies will be assured of having the opportunity to participate in the local coastal program development and to express their views to the Coastal Commission for consideration in determining whether a LCP should be certified.

Federal/State Cooperation to Protect the National Interest

California has received extensive assistance and cooperation from many Federal agencies in the preparation of the California Coastal Management Program. (Chapter 13 discusses this participation in greater detail.) Through this process, there was an opportunity for national interests, as perceived by Federal agencies, to be incorporated into the preparation of the Coastal Program. Although there is expected to be general support for the Coastal Act objectives among Federal agencies, there may be disagreements in applying the Coastal Act's policies to particular circumstances. Continued cooperation can ensure that the national interest is protected through a uniform application of the Coastal Act policies to the entire coastal zone by whichever local, State, or Federal agency has regulatory jurisdiction.

Where the California Coastal Management Program would conflict with an overriding national need under circumstances unforeseen when the CCMP was being prepared, it may be necessary for the Federal government to deviate from the program policies in carrying out a Federal activity or project that is in the national interest. The CZMA makes provisions for this deviation by requiring that Federal activities and projects must be consistent with the CCMP only "to the maximum extent practicable." The CZMA also provides that Federal licenses, permits, and assistance can be authorized by the Secretary of Commerce despite a determination by the State of inconsistency with the California Coastal Program - if the activity or project is found to be consistent with the objectives of the CZMA, as amended, or otherwise necessary in the interest of national security. (This finding, however, would not compel the responsible Federal agency to authorize such an activity or project.) Such cases of Federal override are expected to be rare. Except for ational defense and national security needs as established by the President and the Congress, the determination of national interest needs, along with any measures necessary to mitigate the adverse impacts of meeting these needs, should be made cooperatively by the affected local, regional, State and Federal agencies.

The consideration of the national interest in non-Federal projects is accommodated in the CCMP by providing for an appeal of a local decision to the State Coastal Commission on specific types of projects that the Legislature found would be of greater than local significance, namely major public works projects and major energy facilities. Local governments are also required to consider these and other uses of more than local importance in the preparation of the LCPs. Most Federal developments and activities will fall into this category. If, for some reason, the need for a public works project or energy facility development that would serve a greater than local public need is not anticipated at the time the local coastal program is being prepared, a special provision in the Coastal Act allows the State Commission to amend the LCP to accommodate the facility.

Excluded Federal Lands

The national interest in the coast also includes consideration of activities of Federal agencies in facility construction, grant programs, and regulatory programs. To bring the activities of the many Federal agencies within the context of comprehensive planning, the CZMA included the "Federal consistency" requirements (quoted below) and encouraged Federal agencies to coordinate and cooperate with the State to meet the purposes of the CZMA. However, the CZMA also excludes "from the coastal zone . . . lands the use of which is by law subject solely to the discretion of or which is held in trust by the Federal Government, its officers or agents." (Section 304(a)). In response to the CZMA, the California Coastal Act includes identical language. (Section 30008). Because there was some disagreement as to the scope of this exclusion clause, NOAA requested an advisory opinion from the U.S. Attorney General in an attempt to clarify the matter. An August 1976 opinion held that all lands owned by the United States are excluded from the coastal zone. In its draft Section 307 regulations, NOAA has proposed to also exclude from the coastal zone lands leased or otherwise used or held in trust by the Federal Government based on further Justice Department review of its August, 1976, opinion. While the Coastal Commission does not agree with either of these opinions, based on comprehensive management principles, it will abide by these preliminary conclusions in the administration of the CCMP for purposes of the CZMA. However, the Coastal Commission reserves the right to include Federally-owned and/or leased lands in the coastal zone in the event judicial, legislative, or administrative modification should occur.

Although all lands owned by the Federal government are excluded from the California coastal zone, Federal activities, including development projects on these lands which directly affect the coastal zone, must be consistent, to the maximum extent practicable, with the California Coastal Management Program. Under CZMA Sections 307(c)(1) and (2), Federal agencies are responsible for determining whether their activities directly affecting the coastal zone are consistent to the maximum extent practicable with the California Coastal Management Program. If the Coastal Commission disagrees with a Federal agency decision, mediation by the Secretary of Commerce or judicial review may be sought. Federal agencies, and in particular the Navy which is the Federal agency most dependent on coastal installations for its continued operations, have displayed increasing sensitivity to environmental issues in their operations. The Navy has cooperated in the development of the California Coastal Management Program by making its interests known to the State. It is Navy policy to conduct Navy activities to the maximum extent practicable consistent with the CCMP so long as national defense objectives are met.

Other Federal agencies have also indicated their willingness to cooperate in a similar manner. There has, for example, been extensive cooperation with the Army Corps of Engineers, which shares regulatory authority with the Coastal Commission over the waters and wetlands of the coastal zone; with the Federal Power Commission on the siting of LNG facilities; and with the Environmental Protection Agency on air and water quality standards. Through a continuation of this process of discussion, negotiation, and mediation when necessary, among local, State, and Federal interests, differences can be addressed cooperatively, and the entire coastal zone can be treated as an interrelated environmental and socio-economic system.

To compliment Federal agencies' efforts to avoid Federal conflicts with the State's management program, State and local planning for the areas surrounding Federal lands will be coordinated with local Federal representatives so, to the maximum extent practicable, these areas are used in a manner consistent with national needs. As a result of this coordination, the California Coastal Management Program will assist in protecting Federal lands from incompatible surrounding uses. It is anticipated that Federal land-holding agencies, being equally aware that environmental problems do not respect jurisdictional boundaries, will do their utmost to comply with applicable Coastal Management Program policies as required by the CZMA.

Considering the National Interest in Energy Facilities

As outlined in Chapter 9, the California Coastal Act requires that the public welfare must be considered both in permit and local coastal program certification decisions where coastal dependent industrial facilities, and particularly energy facilities, are involved (30260). In addition, energy facility developments are accorded special treatment after local coastal programs have been certified (30515). Where these programs would prevent the development of an energy facility that is needed to serve an area greater than that included within the certified local coastal program, the Commission can amend the local program after a careful balancing of social, economic, and environmental effects and after consideration of impacts on the public welfare.

In addressing these required findings, the Commission will consider the expressions of the national interest in proposed energy facilities, in local coastal programs. The Commission will also consider the information, policies, and other expressions of national interest provided by the following agencies:[3]

Office of the President, e.g., National Energy Plan;

U.S. Congress, e.g., Federal legislation;

Interior Department, e.g., OCS leasing schedules;

Federal Energy Administration, e.g., Report to Congress on Disposition of Alaskan Oil;

Federal Power Commission, e.g., certificates for LNG importation projects;

Nuclear Regulatory Commission, Office of Technology Assessment, General Accounting Office, Commerce Department.

State Mechanisms for Considering the National Interest in Energy

At the broadest level of energy planning, under the Warren-Alquist Energy Resources Conservation and Development Act, the State Energy Resources Conservation and Development Commission is responsible for planning for California's energy needs by analyzing the demand and supply of all forms of energy, and by evaluating the economic, environmental, and other impacts of energy policy alternatives. (Public Resources Code Section 25300-25309.) The results of such analyses and the Energy Commission's policy recommendations are submitted to the Governor and Legislature every two years as the Energy Commission's Biennial Report. The first nine-volume report has been issued after extensive hearings on drafts of the report. The Coastal Commission will consider the conclusions and recommendations of the Energy Commission in making energy facility siting and planning decisions under the Coastal Act.

The California Public Utilities Commission is responsible both for determining the State's interest in major gas supply projects in proceedings before the Federal Power Commission, and for making FPC positions known to the Coastal Commission. The Coastal Commission considers both PUC and FPC briefs and judgments in its gas facility siting and planning responsibilities.

Mechanisms for dealing with the national interest in specific types of energy facilities are discussed in Chapter 9.

B. Consistency of Federal Actions

Federal Requirements

Section 307 of the CZMA includes what are generally referred to as "Federal consistency" provisions. These provisions require the following:

- Federal activities

  "(c)(1) Each Federal agency conducting or supporting activities directly affecting the coastal zone shall conduct or support those activities in a manner which is, to the maximum extent practicable, consistent with approved State management programs."

- Federal development projects

  "(2) Any Federal agency which shall undertake any development project in the coastal zone of a state shall insure that the project is, to the maximum extent practicable, consistent with approved State management programs."

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[3]List not intended to be exclusive.

o Federal licenses and permits

"(3)(A) After final approval by the Secretary of a state's management program, any applicant for a required Federal license or permit to conduct an activity affecting land or water uses in the coastal zone of that state shall provide in the application to the licensing or permitting agency a certification that the proposed activity complies with the state's approved program and that such activity will be conducted in a manner consistent with the program. At the same time, the applicant shall furnish to the state,or its designated agency,a copy of the certification, with all necessary information and data. Each coastal state shall establish procedures for public notice in the case of all such certifications, and, to the extent it deems appropriate, procedures for public hearings in connection therewith. At the earliest practicable time, the state,or its designated agency,shall notify the Federal agency concerned that the state concurs with or objects to the applicant's certification. If the state,or its designated agency,fails to furnish the required notification within six months after receipt of its copy of the applicant's certification, the state's concurrence with the certification shall be conclusively presumed. No license or permit shall be granted by the Federal agency until the state,or its designated agency,has concurred with the applicant's certification, or until, by the state's failure to act, the concurrence is conclusively presumed, unless the Secretary, on his own initiative or upon appeal by the applicant, finds, after providing a reasonable opportunity for detailed comments from the Federal agency involved and from the state, that the activity is consistent with the objectives of this title or is otherwise necessary in the interest of national security."

o Licenses and permits

(B) After the management program of any coastal state has been approved by the Secretary under Section 306, any person who submits to the Secretary of the Interior any plan for the exploration or development of, or production from, any area which has been leased under the Outer Continental Shelf Lands Act (43 U.S.C. 1331, et seq.) and regulations under such Act shall, with respect to any exploration, development, or production described in such plan and affecting any land use or water use in the coastal zone of such state, attached to such plan a certification that each activity which is described in detail in such plan complies with such state's approved management program and will be carried out in a manner consistent with such program. No Federal official or agency shall grant such person any license or permit for any activity described in detail in such plan until such state or its designated agency receives a copy of such certification and plan, together with any other necessary data and information, and until - - -

"(i) such state or its designated agency, in accordance with the procedures required to be established by such state pursuant to subparagraph (A), concurs with such person's certification and notifies the Secretary and the Secretary of the Interior of such concurrence;"
"(ii) concurrency by such state with such certification is conclusively presumed, as provided for in subparagraph (A);" or
"(iii) The Secretary finds, pursuant to subparagraph (A), that each activity which is described in detail in such plan is consistent with the objectives of this title or is otherwise necessary in the interest of national security."

"If a state concurs or is conclusively presumed to concur, or if the Secretary makes such a finding, the provisions of subparagraph (A) are not applicable with respect to such person, such state, and any Federal license or permit which is required to conduct any activity affecting land uses or water uses in the coastal zone of such state which is described in detail in the plan to which such concurrence or finding applies. If such state objects to such certification and if the Secretary fails to make a finding under clause (iii) with respect to such certification, or if such person fails substantially to comply with such plan as submitted, such person shall submit an amendment to such plan, or a new plan, to the Secretary of the Interior. With respect to any amendment or new plan submitted to the Secretary of the Interior pursuant to the preceding sentence, the applicable time period for purposes of concurrence by conclusive presumption under subparagraph (A) is 3 months."

o Federal assistance

"(d) State and local governments submitting applications for Federal assistance under other Federal programs affecting the coastal zone shall indicate the views of the appropriate state or local agency as to the relationship of such activities to the approved management program for the coastal zone. Such applications shall be submitted and coordinated in accordance with the provisions of Title IV of the Intergovernmental Coordination Act of 1968 (82 Stat. 1098). Federal agencies shall not approve proposed projects that are inconsistent with a coastal state's management program, except upon a finding by the Secretary that such project is consistent with the purposes of this title or necessary in the interest of national security."

In summary, Section 307 requires that Federal activities directly affecting the coastal zone, including development projects, must be consistent to the maximum extent practicable with a Federally approved State coastal management program. Federal agencies are generally constrained from taking the following actions unless a state has found that proposed activities would be consistent with its management program:

a. issuing a license or permit for any activity affecting the coastal zone;

b. providing financial assistance to State or local government proposals affecting the coastal zone; and

c. granting a license or permit for an activity affecting the coastal zone, covered by a plan for the exploration or development of, or production from, areas leased under the Outer Continental Shelf Lands Act.

Federal activities, including development projects undertaken by Federal agencies on Federally owned lands, are subject to the Federal consistency provisions when the actions directly affect the coastal zone under the jurisdiction of the California Coastal Management Program.

A State finding that an activity regulated or supported by a Federal agency would be inconsistent with the State coastal management program can be appealed to the Secretary of Commerce (the Department of Commerce is responsible for administering the CZMA) who can overrule the State and allow the proposed activity to be conducted if it is found the proposed action is either consistent with the objectives of the CZMA or necessary in the interest of national security. Although states are given the responsibility for making these determinations of Federal consistency under the CZMA, in California the local coastal programs will be regarded as a refinement of the State coastal management program and local governments will, therefore, be afforded the opportunity to participate in determining whether Federal activities and Federal projects would be consistent with the State (and the local) coastal program.

The Federal consistency provisions will provide local governments with considerably more involvement in decisions on Federal activities along the coast, but under the CZMA the views of Federal agencies that would be affected by the local program must be considered in the development of the program before it can be applied to Federal actions.

Administration of the Federal Consistency Provisions

Once the California program is approved by the Secretary of Commerce, the Coastal Commission intends to carry out its responsibilities in connection with the Federal consistency provisions as follows:

(a) Federal activities including development projects directly affecting the coastal zone (Sections 307(c)(1) and (2)).

(i) Memoranda of Understanding with Federal Agencies.

Federal agencies will be requested to enter into memoranda of understanding with the Coastal Commission with regard to any Federal activities including development projects in the coastal zone that would require a coastal agency permit if they were undertaken by other than a Federal agency. These memoranda of understanding will be used to assist the Federal agency in assuring that the Federal activity or development project is consistent to the maximum extent practicable with the State's management program. In most cases a public hearing will be held on the requested memorandum of understanding, with the Federal agency invited to participate. The local government having jurisdiction over the area where the proposed activity or development project would be located will also be invited to participate in the public hearing. Local government representatives will be afforded the opportunity to assist the Coastal Commission in its deliberations by presenting a determination regarding the consistency of the Federal action with the certified local coastal program.

If the Coastal Commission determines that the proposed activity or development project is consistent to the maximum extent practicable with the management program, it will request that the Federal agency enter into a memorandum of understanding. If the Coastal Commission determines that the proposed Federal activity or development project is inconsistent with the management program, it will not enter into a memorandum of understanding with the Federal agency. In the latter case, if the Federal agency disagrees with the Coastal Commission's finding and decides to go forward with the action, it will be expected to (a) advise the Coastal Commission in writing that the action is consistent, to the maximum extent practicable, with the coastal management program, and (b) set forth in detail the reasons for its decision. In the event the Coastal Commission seriously disagrees with the Federal agency's consistency determination it may request that the Secretary of Commerce seek to mediate the serious disagreement as provided by Section 307(h) of the CZMA, or it may seek judicial review of the dispute.

If a Federal agency does not choose to participate in the voluntary memorandum of understanding process, the Federal agency must utilize some other procedure (OMB A-95 project notifications, Environmental Impact Statements, etc.) supplemented as necessary pursuant to the requirements of the CZMA. Regardless of the alternative notification process used by a Federal agency, it must assure that the Coastal Commission is notified of all Federal activities including development projects in the coastal zone at the earliest practicable time in the planning process. The process must also provide adequate opportunity for the Coastal Commission to hold a public hearing and to determine the consistency of the proposed action with the CCMP. The notification must include a description of the activity, a discussion relating the coastal zone effects of the action to the relevant requirements of the management program, and sufficient supporting information for the Coastal Commission to review the Federal agency's consistency determination.

(ii) Consistency of Federal Activities Not Requiring Coastal Permits.

Memoranda of understanding will not be requested with regard to Federal activities including development projects which would not otherwise require coastal agency permits. However, such actions conducted by any Federal agency which will directly affect coastal zone resources will be expected to be undertaken in a manner consistent, to the maximum extent practicable, with California's coastal program as required by the CZMA. The Coastal Commission, with the assistance of local government representatives, will review Federal agency decisions to determine whether Federal actions directly affect the coastal zone, and if there is such an impact, whether the Federal action is consistent to the maximum extent practicable with the coastal program. This review process will include a timely notice and public hearing, with the Federal agency and local governments having jurisdiction over the affected area being invited to participate in the public hearing. Local government representatives will be afforded the opportunity to assist the Coastal Commission in its consideration of the Federal agency's consistency determination by presenting a determination of the consistency of the Federal activity or project with the certified local coastal programs for the affected jurisdictions. If the Coastal Commission finds that the Federal activity or development project directly affects the coastal zone and is not consistent with the management program, and the Federal agency disagrees and decides to go forward with the action, it will be expected to (a) advise the Coastal Commission in writing that the action is consistent, to the maximum extent practicable, with the coastal management program, and (b) set forth in detail the reasons for its decision. In the event the Coastal Commission seriously disagrees with the Federal agency's consistency determination, it may request that the Secretary of Commerce seek to mediate the serious disagreement as provided by Section 307(h) of the CZMA, or it may seek judicial review of the dispute.

(iii) State Monitoring and Review of Federal Activities Including Development Projects.

To assist in implementing the procedures set forth in paragraphs (i) and (ii) above, the Coastal Commission will monitor all Federal activities including development projects that may directly affect the coastal zone. This monitoring effort will rely upon existing inter-governmental coordination procedures - the A-95 notification and review process, review of environmental impact statements, and review of Corps of Engineers public notices - supplemented as necessary with special coordination with individual Federal agencies. The Coastal Commission will make every effort to notify Federal agencies of potential inconsistent Federal activities as early as possible in the Federal agencies' planning process. At the same time, it is expected that each Federal agency proposing to conduct Federal activities including development projects which may directly affect the coastal zone will notify the Coastal Commission at the earliest practicable time. These reciprocal efforts can assist the parties in identifying potential conflicts with the State's management program and, once identified, the Federal agency and the Coastal Commission can work towards early resolution of the problem.

(b) Federal Licenses and Permits Subject to Certification for Consistency.

(i) Federal License and Permit List.

The following Federal agency licenses and permits will be subject to the certification process for consistency with the management program, under Section 307(c)(3) of the CZMA, if the activity being licensed or permitted affects land or water uses in the coastal zone:

Department of Defense - U.S. Army Corps of Engineers:

- Permits and licenses required under Sections 9 and 10 of the Rivers and Harbors Act of 1899;
- Permits and licenses required under Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972;
- Permits and licenses required under Section 404 of the Federal Water Pollution Control Act of 1972 and amendments; and
- Permits for artificial islands and fixed structures located on the Outer Continental Shelf (Rivers and Harbors Act of 1899 as extended by 43 U.S.C. 1333(f)).

Nuclear Regulatory Commission:

- Permits and licenses required for siting and operation of nuclear power plants.

Department of the Interior - Bureau of Land Management - U.S. Geological Survey:

- Permits and licenses required for drilling and mining on public lands (BLM).
- Permits for pipeline rights-of-way on the Outer Continental Shelf.
- Permits and licenses for rights-of-way on public lands.

Environmental Protection Agency:

- Permits and licenses required under Sections 402 and 405 of the Federal Water Pollution Control Act of 1972 and amendments.
- Permits and applications for reclassification of land areas under regulations for the prevention of significant deterioration (PSD) of air quality.

Department of Transportation - U.S. Coast Guard:

- Permits for construction of bridges under 33 USC 401, 491-507 and 525-534.
- Permits for deepwater ports under the Deepwater Port Act of 1974 (PL 93-627).

Department of Transportation - Federal Aviation Administration:

- Certificates for the operation of new airports. (Federal Aviation Regulations, Part 139)

Federal Power Commission:

- Licenses for construction and operation of hydroelectric generating projects including primary transmission lines.
- Certifications required for interstate gas pipelines.
- Permits and licenses for construction and operation of facilities needed to import, export, or transship natural gas or electrical energy.

This listing is intentionally limited to those Federal licenses and permits that may significantly affect coastal land and water uses. This is desirable to minimize the administrative burdens on the governmental entities as well as on the applicant. If it is found that the issuance of other Federal permits and licenses causes significant effects on coastal land and water uses, the consistency requirements will be applied to those permits or licenses through administrative addition to the list above.

(ii) License and Permit Activities Within the Coastal Zone.

Within the coastal zone, a Coastal Commission permit will be required from non-Federal applicants for the above activities. A memorandum of understanding will be requested from Federal agency applicants for the above activities. The issuance of a Coastal Commission permit* or agreement on a memorandum of understanding will be deemed to be a determination by the State that the proposed Federal license or permit activity is consistent with the management program, and no further certification will be required. In cases where no Coastal Commission permit has been applied for but where one is required, the Coastal Commission will process a certification of consistency concurrent with the permit application. The Coastal Commission will not review whether a Federal license or permit activity in the coastal zone is consistent with the management program except in connection with a Coastal Commission permit application if a permit is required.

To ensure that the national interest is adequately protected, where the State's primary management authority over the above activities has been delegated to a local government upon the certification of a local coastal program, the local decision will be automatically reviewed by the Coastal Commission. The Coastal Commission's decision on the appeal, or on the review of a local permit that was not or could not be appealed, will be deemed to be the State's determination of the consistency of the proposed activity with the California Coastal Management Program. Consequently, the Coastal Commission will have the lead role and during its deliberations it will consider the views of local governments with certified local coastal programs for the affected areas.

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*The issuance of a permit for an electric transmission line or a thermal power plant by the State Energy Resources Conservation and Development Commission pursuant to Section 30413 of the Coastal Act is considered a Coastal Commission permit for purposes of this section.

(iii) License and Permit Activities Outside of the Coastal Zone.

Outside of the coastal zone (for example, on excluded Federal lands or on uplands beyond the coastal zone boundary), consistency certifications for the above licenses and permits will be required only in cases where the Coastal Commission determines that the activity being licensed or permitted could have a substantial effect on land and water uses in the coastal zone. This determination will be made on a case-by-case basis in the course of the monitoring program described in paragraph (a)(iii). It is not anticipated that many licenses and permits outside of the coastal zone will require certification. At the same time, those that do will probably be of considerable interest to the public because of the potential for substantial impact on the coast. Consequently, consistency certifications for Federal license or permit activities outside of the coastal zone will be processed as much as possible as if they were applications for Coastal Commission permits under the Coastal Act and its implementing regulations to allow for timely public notice and hearings. The local governments having jurisdiction over the area that would be affected by the proposed activity will be invited to participate in the public hearing. Local government representatives will be afforded the opportunity to participate in the Commission's deliberations and to present a determination of the consistency of the proposed activity with the certified local coastal programs for the affected jurisdictions.

(iv) Coastal Commission Objections to Federal License and Permit Activities.

If, in connection with the review of proposed Federal license or permit activities under paragraphs (ii) or (iii), the Coastal Commission determines that a non-Federal applicant's proposed license or permit activity is not consistent with the State's management program as required by Section 307(c)(3)(A) of the CZMA, the Federal agency may not issue the license or permit unless the Secretary of Commerce, on her own initiative or upon appeal by the applicant, finds, after providing an opportunity for comments from the Federal agency involved and from the Coastal Commission, that the activity is consistent with the objectives of the CZMA or is otherwise necessary in the interest of national security. If the Coastal Commission objects to the consistency of a Federal applicant's proposed license or permit activity, and the Federal agency decides to go forward with the activity, the Coastal Commission may use the mediation or judicial review dispute resolution procedures described in paragraph (a)(i). In its draft Section 307 regulations, NOAA has proposed to exclude Federal agencies from the license and permit certification requirements and the appeal provisions of the CZMA. While the Coastal Commission does not fully agree with this position, it will abide by NOAA's decision in the administration of the CCMP for purposes of the CZMP. The Coastal Commission, however, reserves the right to subject Federal agencies to the certification requirement in the event administrative, judicial, or legislative modification should occur.

(c) Federal Licenses and Permits Described in Detail in OCS Plans.

The following Federal agency licenses and permits will be subject to the certification process for consistency with the management program under Section 307(c)(3)(B) of the CZMA if the activity being licensed or permitted is described in detail in an OCS exploration or development plan and affects land or water uses in the coastal zone:

Department of the Interior - U.S. Geological Survey

Approval of offshore drilling operations.

Approval of design plans for the installation of platforms.

Approval of gathering and flow lines.

Any other OCS-related Federal license or permit activities described in paragraph (b)(i) (for example, BLM pipeline rights-of-way on the OCS) which U.S.G.S. determines should be described in detail in OCS plans.

In accordance with the CZMA, Federal license and permit activities described in detail within exploration or development plans for OCS areas adjacent to California waters that have been leased under the Outer Continental Shelf Lands Act, will be subject to certification and State review. This process will assure that Federal license and permit activities described in detail in such plans, and affecting land or water uses in the coastal zone, are consistent with the State's management program. Consistency certifications for OCS plans will be processed as much as possible as if they were applications for coastal permits under the Coastal Act and its implementing regulations to allow for timely public notice and hearings. Local governments having jurisdiction over areas affected by OCS activity will be invited to participate in the public hearing. Local government representatives will be afforded the opportunity to participate in the Coastal Commissions deliberations and to present determinations of the consistency of the proposed OCS activity with the certified local coastal programs for the affected jurisdictions.

If the Coastal Commission determines that one or more of the Federal license or permit activities described in detail in an OCS plan are not consistent with the coastal management program as required by Section 307(c)(3)(B) of the CZMA, Federal agencies may not issue the licenses or permits described in detail in the OCS plan unless the Secretary of Commerce, on her own initiative or upon appeal by the lessee, finds, after providing an opportunity for comments from the Federal agencies involved and the Coastal Commission, that the Federal license or permit activities are consistent with the objectives of the CZMA or are otherwise necessary in the interest of national security.

(d) Federal Assistance Subject to Consistency with the Management Program.

To review State and local government applications for Federal assistance under Federal programs affecting the coastal zone, the Coastal Commission will use the Project Notification and Review System of OMB Circular A-95 authorized under Title IV of the Intergovernmental Coordination Act of 1968 and administered by Regional Clearinghouses and statewide by the Office of Planning and Research.

The scope of Coastal Commission review will be limited to ensuring that the proposed project is consistent with the coastal management program. In the event the Coastal Commission determines that the proposed project is not consistent with the management program, the Coastal Commission will attempt to resolve the inconsistency through negotiation with the applicant. If no resolution is possible, the Commission will forward its determination to the appropriate Federal agency and, as required by Section 307(d) of the CZMA, the Federal agency will not approve the proposed project unless the Secretary of Commerce finds that the project is consistent with the purposes of the CZMA or is in the interest of national security.

C. Incorporation of Federal Air and Water Quality Standards

Although the Coastal Plan recommended that California institute air or water quality standards more restrictive than Federal requirements in certain areas in order to address unique problems, the Coastal Act did not go as far. The Coastal Act does uphold Federal standards as enforced by existing State agencies. Local coastal programs must also incorporate as necessary the air and water quality standards prior to certification. Section 30522 of the Coastal Act states, "Nothing in this chapter shall permit the commission to certify a local coastal program which provides for a lesser degree of environmental protection than that provided by the plans and policies of any state regulatory agency." While the Coastal Commission cannot require local governments to incorporate more stringent standards, nothing prohibits the local governments from incorporating more stringent standards into their LCPs; however, these standards will not be applicable until they have been officially approved by the State regulatory agencies pursuant to the provisions of the Federal air and water quality laws. Section 30253(3) requires new development to be consistent with requirements imposed by an air-pollution control district or the State Air Resources Control Board.

The State Water Resources Control Board is recognized as having primary responsibility for the coordination and control of water quality and the administration of water rights pursuant to applicable law. The Coastal Commission is responsible for seeing that proposed development and local coastal programs do not frustrate the State Water Resources Control Board's programs. However, Section 15 of the Coastal Act amended the State Water Code to ensure that water agencies support the Coastal Commission's management program to protect the coastal marine environment. Treatment works within the coastal zone and those outside the coastal zone that serve the coastal zone require a coastal permit determined on siting and visual appearance, geographic limits, and development projections. The Coastal Commission must make the final determination on a permit prior to the time of final approval of the project by the State Water Resources Control Board. (30412)

The State Air Resources Board and local air pollution control districts, having been established pursuant to State law and consistent with Federal law, are the principal public agencies responsible for air quality, emission standards, and air pollution control programs. The Coastal Commission is not to modify air pollution standards set by the Air Resources Board, which, it is expected, will recommend ways that the Coastal Commission can assist in air quality programs. (30414)

APPENDIX G.

INFORMATION ADDRESSING ISSUES RAISED BY THE CALIFORNIA COASTAL COMMISSION IN A LETTER TO MMS DATED AUGUST 5, 1999

APPENDIX G. Information Addressing Issues Raised by the California Coastal Commission in a Letter to MMS dated August 5, 1999.

The following issues were discussed in a letter dated August 5, 1999, from the California Coastal Commission to MMS regarding activities on the undeveloped leases (see letter at end of this appendix). The Commission's primary concern was that changed circumstances and new information should be considered in evaluating environmental impacts of the proposed activities. On August 13, 1999, MMS sent letters to the operators of the undeveloped leases who requested suspensions telling them to address these issues in a report to MMS. MMS reviewed the operators' responses and determined that the issues did not affect the suspension decisions because they all would be addressed in appropriate suspension NEPA analysis (e.g. noise) or could and would be adequately and appropriately addressed when the operators submit new or revised exploration or development plans for review. Further, no drilling activity requested in such plans will be allowed to be undertaken on leases pending: complete environmental analysis, submittal of detailed plans for exploration or development, the maximum review of proposed action allowed under all applicable laws and regulation including review by the California Coastal Commission of whether proposed actions are consistent with State requirements, to the extent allowed by law. The issues discussed by the California Coastal Commission and MMS's responses are summarized in Table G-1, below. Additionally, Table G-1 cross-references applicable sections of this Environmental Information Document (EID) that relate to these issues and the hypothetical future exploration and development activities (in *italics*).

Table G-1. Issue Responses, to the Issue, and EID Reference.

Issue	Responses to the Issue and EID Reference
Issue 1. Proposed activities affect the sea otter population.	• Sea otters already coexist with limited OCS oil and gas production activities in the Santa Maria Basin. Studies of recent sea otter movements indicate that the otter range has expanded into the Santa Barbara Channel and coexist with OCS oil and gas production there, as well. • The primary potential impact to sea otters from OCS activities is from accidental oil spills. Hypothetical development resulting from delineation drilling activities in the undeveloped leases north of Point Conception is likely to result in a small incremental increase in the probability that an oil spill will occur. • Operators will address this issue in their plans or the revisions to their plans. • During plan reviews, potential impacts to sea otters from the proposed activities will be assessed through Endangered Species Section 7 consultations with the FWS and mitigation required by FWS will be incorporated by MMS as permit conditions for potential future exploration and development activities. • . • *This EID addresses potential impacts to the sea otter population in sections 5.7.3, Kelp Beds; 5.7.6, Marine Mammals; and 5.7.7.2, Threatened and Endangered Marine Mammals.*

Issue	Responses to the Issue and EID Reference

Issue 2. Possible effects on the Monterey Bay National Marine Sanctuary, which was not a sanctuary at the time plans were originally reviewed.	• The southern boundary of the Sanctuary is approximately 45 miles north of the active lease area.
	• During certain times of the year, winds and currents along the central California coast make it possible for oil from a spill in the Santa Maria Basin to be carried northward into Sanctuary waters. The risk to the Sanctuary is a small incremental increase over the existing risk of a spill and is reduced due to the weathering of the oil that would occur during the time it takes for the oil to travel to the Sanctuary.
	• Operators will address this issue in their plans or revisions to their plans. The distance from each undeveloped unit or lease to the Sanctuary waters is given below.
	  • Cavern Point Unit – over 120 miles
	  • Gato Canyon Unit – over 100 miles
	  • Sword Unit – over 80 miles
	  • Bonito Unit – over 65 miles
	  • Rocky Point Unit – approximately 77 miles
	  • Santa Maria Unit – over 40 miles
	  • Purisima Point Unit – over 40 miles
	  • Lease OCS-P 409 – over 40 miles
	  • Point Sal Unit – over 40 miles
	  • Lion Rock Unit – over 40 miles
	• *This EID addresses potential impacts to the Monterey Bay National Marine Sanctuary in Section 5.7.9, Refuges, Preserves and Marine Sanctuaries. Sections 4.7, Biological Resources, and 5.7, Biological Resources, discuss the important biological resources that prompted the creation of the Monterey Bay National Marine Sanctuary.*

Issue 3. Changes in State and local air quality regulations and their implementation affect future exploration or development.	• MMS and operators recognize the change in the authority and the role of the local air pollution control districts and acknowledge that they will apply to either the Ventura or Santa Barbara County Air Pollution Control Districts. • As a result of a 1990 amendment to the Clean Air Act, all existing and future OCS sources will be permitted by the local air agencies and must be in full compliance with local air quality rules and regulations. • The transfer of Air Quality Authority to the EPA and subsequent delegation to the local Air Pollution Control Districts provide greater oversight and more stringent air quality regulation to OCS exploration and development projects • Under New Source Review provisions contained within the local air regulations, all new or modified projects must result in a "net air quality benefit." This requires the applicant to provide emission offsets in greater levels than emissions expected for the project • In addition, the operators will address this issue in their plans or the revisions to their plans. • *This EID addresses current State and local air quality regulations and potential impacts to air quality in sections 4.4, Air Quality (specifically, 4.4.3, Regulatory Setting), and 5.4, Air Quality. Discussion relevant to air quality analysis is also presented in Section 4.3, Climate and Meteorological Conditions.*

Issue	Responses to the Issue and EID Reference
Issue 4. Changes in water quality regulations and anticipated further changes in those regulations.	• A new General NPDES permit was effective on December 1, 2004 and found to be consistent by the California Coastal Commission. The new General permit replaced a 20-year old General permit, two Individual permits that have existed unchanged since 1977, and six Individual permits, issued between 1993 and 1995. • The new General permit provides more stringent discharge regulation to OCS exploration and development projects and meets the California Ocean Plan standards. • Generally, the new General Permit permit reduces impacts to hard bottom habitat by limiting discharge from each platform or discharge source, setting toxicity limits that prevent toxic materials from being discharged, and prohibits the discharge of diesel and hexavalent chromlignosulfonate. • In addition, the operators will address this issue in their plans or the revisions to their plans. • *This EID addresses current water quality regulations (including the updated NPDES permit) and potential impacts to water quality in sections 4.6, Water Quality (specifically, 4.6.2, Regulatory Setting), and 5.6, Water Quality.*
Issue 5. New information concerning the impacts of drill muds and cuttings on hard bottom habitat.	• The best available information on impacts of drilling muds and cuttings comes, primarily, from the California Monitoring Program (CaMP) studies, conducted near Point Arguello between 1984 and 1994 and the MMS and operators are familiar with this information. • In 1991, the Hard Bottom process was established to identify, avoid, and/or mitigate impacts to hard bottom habitats. If potential hard bottom is identified within 1,000 m of a wellsite, the operator either develops an avoidance plan or a biological data collection and mitigation plan. • The operators will address this issue in their plans or the revisions to their plans • During plan review, MMS, along with other agencies, fishers, and area experts, will work with the operators in developing plans to avoid or survey and mitigate impacts to hard bottom habitats. • If needed, new sea floor survey information will be required, including high-resolution side scan sonar, which will depict locations of potential hard bottom areas so that impacts to these areas can be avoided or mitigated. • *This EID addresses potential impacts to hard bottom habitat in Section 5.7.2, Seafloor Resources.*
Issue 6. New information concerning the effects of undersea noise on marine mammals and other marine life.	• Potential noise impacts from surveys during the suspension periods are not expected to be significant and were addressed in the MMS Environmental Assessments of the proposed suspensions. To ensure impacts to marine mammals are negligible, mitigation measures were identified in consultation with NOAA Fisheries. • Operators will address this issue in their plans or the revisions to their plans. • During plan review, potential noise impacts will be assessed by MMS in consultation with NOAA Fisheries and other appropriate parties, and mitigation, if needed, will be incorporated by MMS as conditions of approval. • MMS, in conjunction with various State, Federal, and local agencies, the geophysical and oil industry, and environmental groups, agreed on a set of guidelines for mitigation of potential impacts to marine mammals from high energy seismic surveys (HESS). No high-energy seismic surveys are currently proposed for the undeveloped leases. • *This EID addresses potential impacts to marine mammals and other marine life, including those from undersea noise, in sections 5.7.4, Fish Resources; 5.7.5, Marine and Coastal Birds, 5.7.6, Marine Mammals; and 5.7.7, Threatened and Endangered Species.*

Issue	Responses to the Issue and EID Reference

Issue 7. Changes in technology since review of earlier plans.	• The use of new technology is required to be addressed in the revised or new plans via MMS's operating regulations. Operators will need to comply with changes in the regulations, including compliance with any revised standards.
	• Generally, operators identified advances in geological and geophysical data acquisition and processing, and improvements in extended-reach drilling capability.
	• Advances in technology including computers and automation can be seen in various areas. These advances may change activities and associated impacts in several ways:
	  • New technology may allow the operator to change the fundamental activity proposed in an EP or DPP (e.g., extended-reach drilling from an existing facility rather than drilling from a MODU or the installation of a new platform);
	  • New technology can reduce the risk associated with a given activity (e.g., improved equipment such as blowout preventers);
	  • New and existing mitigation may be more effective (e.g., improved oil skimming and response capability);
	  • Exploration and delineation of a reservoir can be completed with fewer wells;
	  • New technology may decrease the MODU's time-on-location or time needed to drill.
	• *Where appropriate, new technology is implicitly included in the EID. For example, discussions in section 5.2 describe the activities and the equipment necessary. Also, as noted above, oil-spill clean up capability has improved and that is implicitly included, where appropriate, in section 5.3.*

Issue 8. Changes in operators, and their compliance with environmental protections required under current Federal, State, and local regulations, since the submittal of the original EP's.	• New operators have acquired all the units since the original EP's were submitted. • In the early 1990's, offshore properties in the Pacific Region began to shift ownership from the major companies, which had originally held the resource rights and often constructed offshore production and onshore processing facilities, to small and medium-size companies. • MMS strictly holds all new operators to all laws and regulations pertaining to offshore oil and gas operations. • By law, all companies must meet the same requirements to become operators. • MMS sees that all operators demonstrate financial responsibility and requires addition bonding, if needed. • *This issue is not addressed in the EID.*
Issue 9. Cumulative impacts of the exploration and development of the undeveloped units and lease.	• Potential cumulative impacts from surveys during the suspension periods are not expected to be significant and were considered in the MMS Environmental Assessments for the suspensions. • Per the requirements of the National Environmental Policy Act, MMS will analyze cumulative impacts as appropriate in the environmental documents it prepares for these plans. • Operators will address this issue in their plans or revisions to their plans. • *This EID addresses cumulative impacts of the exploration and development of the undeveloped leases on a section-by-section basis in sections 5.3, Oil Spills, Risk, Movement and Response, through 5.15, Military Operations. This EID also includes a comprehensive list of the comprehensive scenario upon which these analyses are based, which is presented as Appendix I, Summary of Potentially Foreseeable Activities and Hypothetical Development Scenario.*

STATE OF CALIFORNIA—THE RESOURCES AGENCY GRAY DAVIS, GOVERNOR

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August 5, 1999

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SUBJECT: Submittal of New Exploration and Development and Production Plans in Lieu of Revised Plans

Dear Mr. Rosenbusch and Dr. Reed:

Thank you for the opportunity to review the May 1999 requests for the suspension of production or operation on the 40 undeveloped federal oil and gas leases offshore of California. The Coastal Commission and its staff look forward to working closely with your agency throughout the process of determining if or to what extent the leases will be explored and developed.

It is important that the Coastal Commission has the opportunity to examine fully the potential effects of the proposed new exploration and development activities to coastal zone resources through the federal consistency provisions of the Coastal Zone Management Act ("CZMA"). In addition to the position the Commission has taken with respect to review of any decision by the Minerals Management Service regarding requests for suspension,[1] it is our position that any proposals by the lessees to submit "revisions" or "updates" to previously approved exploration plans ("EPs") and development and production plans ("DPPs") must be submitted to the Coastal Commission for consistency review as new plans.

[1] As set forth in Coastal Commission Chairperson Wan's July 27, 1999 letter to Interior Secretary Bruce Babbitt and the Minerals Management Service.

The unit exploration proposed in the suspension requests was not contemplated under the EPs approved for individual leases between 1983 and 1985. Changes in exploration and development technologies, new information, and changed circumstances must all be fully considered in the review of the proposals. It is for these reasons, among others, as further discussed below, that we believe the proposed new exploration or development activities should be the subject of new, not revised or updated, EPs and DPPs.

We respectfully request that the MMS direct the lessees to submit new exploration and development and production plans in lieu of revisions to existing plans and require the lessees to submit new consistency certifications for all these EPs and DPPs. Of course, such new EPs and DPPs must also comply fully with the requirements of the National Environmental Quality Act ("NEPA") and the California Environmental Quality Act ("CEQA").

Changed circumstances and new information must be considered in evaluating the environmental impacts of the proposed new exploration activities. These include, but are not limited to, the following:

- *Sea Otter Range*

Since the time that the existing EPs for the subject leases were approved, the range of the California sea otter has extended south into the Santa Barbara Channel. Despite the species' increasing range, the sea otter population level is declining. An oil spill resulting from exploration or production activities in the Santa Maria Basin or the Santa Barbara Channel could threaten the survival of this species.

- *Monterey Bay National Marine Sanctuary*

Since the approval of the existing EPs, Congress designated the Monterey Bay National Marine Sanctuary, in recognition of the importance of protecting this unique marine habitat and coastal recreational area. An oil spill originating from any of the 40 undeveloped OCS leases could reach the sanctuary causing devastating impacts to this protected area.

- *Air Quality Control Regulations*

1990 Clean Air Act Amendments transferred the authority to regulate emissions generated on the OCS from the MMS to the EPA. Through its implementing regulations, the EPA has delegated air quality regulation for the central coast area to the San Luis Obispo and Santa Barbara County Air Pollution Control Districts. Accordingly, the emissions generated by the proposed OCS exploration and development activities will be subject to standards set by the local air pollution control districts. Both the regulatory process and the relevant standards concerning OCS air emissions have substantially changed since the existing EPs were approved for the 40 leases.

- *Water Quality Control Regulations*

In 1993, the U.S. EPA enacted new effluent limitation guidelines for discharges of produced water, drilling muds, and cuttings under the NPDES permit program. The proposed new exploratory wells will be required to comply with these stricter water quality standards through either new individual NPDES permits or the general NPDES permit. The EPA is expected to replace the 1983 general permit with a new general permit incorporating the stricter standards later this year. Adoption of the new general NPDES permit will be instrumental in assuring that the proposed exploration and development of the 40 OCS leases is conducted in compliance with up-to-date water quality objectives. Compliance with these new water quality standards was not considered at the time that the existing EPs were approved. The new general NPDES permit and any new individual permits will be subject to new Commission federal consistency review.

- *Hard Bottom Habitat Committee*

The MMS led Hard Bottom Habitat Committee has developed new information concerning the impacts of drilling mud and cutting discharges to hard bottom habitat. Consideration of this new information may result in the identification of coastal zone effects that are substantially different from those previously reviewed under the existing EPs. The Commission will consider these effects through its federal consistency review of the proposed exploration and development plans.

- *Undersea Noise*

Recent studies show that undersea noise generated from subsea surveys, well drilling and other activities related to oil and gas exploration and development may cause potentially significant adverse effects on marine mammals and other marine life. The Commission will consider this new information in its review of the proposed exploration and development plans.

- *Technological Changes*

Since the time that the existing EPs for the subject leases were approved, the oil industry has made substantial advances in extended reach drilling, 3D seismic surveys and other technologies related to oil field exploration and development. These advances must be considered in determining whether newly proposed exploration and development will be carried out in the least environmentally damaging feasible manner. A thorough alternatives analysis should be provided through the environmental review process for the proposed exploration and development plans.

- *Operator Changes*

The operators of the 40 leases have all changed since the time that the existing EPs for the leases were approved. A number of the new operators have little or no experience with relevant California environmental regulations. It is crucial to evaluate the operators' capabilities to fully comply with the environmental protections required under current federal, state, and local regulations.

Cumulative Impacts

The exploration and development of the 40 leases could cause significant cumulative impacts both onshore and offshore in the coastal zone. A complete analysis of coastal zone effects is required to inform the Commission's federal consistency review of the proposed exploration and development activities. To date, such a cumulative impact study has not been completed. We understand, however, from Mr. Rosenbusch's July 12, 1999 letter to Governor Davis that the MMS will conduct such an analysis as part of its NEPA review for the first new or revised exploration or development plan submitted to you.

Coastal Commission Federal Consistency Review Process

As discussed above, proposed exploration and development activities relative to the 40 undeveloped existing federal leases raise significant issues regarding coastal zone effects that are substantially different from those previously reviewed by the Commission. The Commission will conduct new federal consistency review for all proposed exploration plans, development and production plans and NPDES permits. In light of technological advancements, changed circumstances, new information, and potential cumulative impacts affecting the exploration and development of these leases, we are of the opinion that new EPs and DPPs must be submitted for any proposed exploration and development activities.

We greatly appreciate your keeping the Commission informed throughout this process thus far. We look forward to continuing to work closely with your agency to assure that any new OCS exploration and development that may be approved is conducted in a manner that is fully consistent with California's certified Coastal Management Program.

Sincerely,

Peter Douglas

Peter M. Douglas
Executive Director

cc: Honorable William M. Daley, Secretary of Commerce
Honorable Bruce Babbitt, Secretary of the Interior
Governor Gray Davis
Honorable Dianne Feinstein
Honorable Barbara Boxer
Honorable Lois Capps
Honorable John Burton
Honorable Antonio Villaraigosa
Attorney General Bill Lockyer
Lt. Governor Cruz Bustamante
Secretary for Resources Mary Nichols
Honorable Kathleen Connell, Controller
Timothy Gage, Director, Department of Finance
Paul Thayer, Executive Officer, State Lands Commission
Robert Hight, Director, Department of Fish & Game
Jeffrey Benoit, Director, Office of Ocean and Coastal Resource Management, NOAA
Thomas Kitsos, Deputy Director, MMS
Coastal Commissioners
Senator Jack O'Connell
Assemblyman Abel Maldonado
Assemblywoman Hannah-Beth Jackson
Frank Holmes, Western States Petroleum Association

APPENDIX H.

REGULATORY FRAMEWORK, LEASE STIPULATIONS, AND UNIT HISTORY

APPENDIX H. REGULATORY FRAMEWORK, LEASE STIPULATIONS, AND UNIT HISTORY

Section H.1 of this Appendix addresses applicable Federal laws and policies associated with Pacific Outer Continental Shelf (Pacific OCS) oil and gas activities. Section H.2 provides a summary table of the current ownership, suspension history, lease sale stipulations (conditions of approval, including mitigation measures for environmental protection), and exploration history of the Pacific OCS undeveloped Units and Leases.

H.1 APPLICABLE FEDERAL LAWS AND POLICIES

This appendix references only those portions of Federal public laws enacted by Congress related directly or indirectly to the Minerals Management Service's (MMS) regulatory responsibilities for mineral leasing, exploration, and development and production activities on leases located in the submerged lands of the OCS. It also includes responsibilities and jurisdictions of other Federal agencies and departments that also are involved in the regulatory process of oil and gas operations on the OCS. This is not intended to be a comprehensive summary of all laws associated with proposed exploration and development activities that significantly might affect the OCS. Explanations are merely to acquaint the reader with the law and are not meant as legal interpretations. Readers should consult the entire text of the law for additional requirements and information.

The Outer Continental Shelf Lands Act

Under the Outer Continental Shelf Lands Act (OCSLA), the Department of the Interior is required to:

- Manage the orderly leasing, exploration, development, and production of oil and gas resources on the Federal OCS;
- Ensure the protection of the human, marine, and coastal environments;
- Ensure that the public receives a fair and equitable return for these resources; and
- Ensure that free-market competition is maintained.

Within the U.S. Department of Interior, MMS is charged with the responsibility of managing and regulating the development of OCS oil and gas resources in accordance with the provisions of the OCSLA. The MMS operating regulations are presented in Chapter 30, Code of Federal Regulations (CFR), Part 250. The MMS responsibilities and procedures in this regard are described in Section 1.5.2.

The OCS Lands Act extends the authority of the Secretary of the Army through the U.S. Army Corps of Engineers to the OCS to prevent obstruction to navigation in U.S. navigable waters.

The OCSLA grants authority to the USCG to promulgate and enforce regulations covering lighting and warning devices, safety equipment, and other safety-related matters pertaining to life and property on fixed OCS platforms and drilling vessels.

In accordance with the OCSLA (43 U.S.C. 1354) and the Export Administration Act of 1969 (50 App U.S.C. 2405(d), oil that is produced on the U.S. OCS must go to a U.S. port.

The National Environment Policy Act and the Council on Environmental Quality

The National Environment Policy Act (NEPA) requires all Federal agencies to use a systematic, interdisciplinary approach to protection of the human environment. Such an approach ensures the integrated use of natural and social sciences in any planning and decision making that may have an impact on the environment. The NEPA also requires the preparation of a detailed EIS on any major Federal action that may have a significant impact on the environment. The EIS must address any adverse environmental effects that cannot be avoided or mitigated, alternatives to the proposed action, the relationship between short-term resources and long-term productivity, and irreversible and irretrievable commitments of resources.

In 1979, the Council on Environmental Quality (CEQ) established uniform procedures for implementing the procedural provisions of NEPA. These regulations provide for the use of the NEPA process to identify and assess reasonable alternatives to proposed actions that avoid or minimize adverse effects of these actions upon the quality of the human environment. "Scoping" is used to identify the scope and significance of important environmental issues associated with a proposed Federal action through coordination with Federal, State, and local agencies; the general public; and any interested individual or organization prior to the development of an impact statement. The process also identifies and eliminates from further detailed study issues that are not significant or that have been covered by prior environmental review.

The Marine Mammal Protection Act

Under the Marine Mammal Protection Act (MMPA) of 1972, the Secretary of Commerce is responsible for the protection of all cetaceans and pinnipeds (except walruses) and has delegated authority for implementing the MMPA to the National Marine Fisheries Services (NMFS). The Secretary of the Interior is responsible for walruses, polar bears, sea otters, manatees, and dugongs and has delegated responsibility to USFWS for providing overview and advice to the responsible regulatory agencies on all Federal actions bearing upon the conservation and protection of these marine mammals.

The MMPA established a moratorium on the taking of marine mammals in waters under U.S. jurisdiction. The Act defines "take" to mean "hunt, capture, or kill or attempt to harass, hunt, capture, or kill any marine mammal." "Harassment" is defined as any act of pursuit, torment, or annoyance that has the potential to injure a marine mammal or marine mammal stock in the wild (level A); or has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (level B). The moratorium may be waived when the affected species or population stock is within its optimum sustainable population range and would not be disadvantaged by the authorized taking, e.g., be reduced below its maximum net productivity level, which is the lower limit of the optimum sustainable population range. The Act directs the Secretary, upon request, to authorize the unintentional taking of small numbers of marine mammals incidental to activities other than commercial fishing (e.g., offshore oil and gas exploration and development) when, after notice and opportunity for public comment, the Secretary finds that the total of such taking during the 5-year (or less) period would have a negligible impact on the affected species.

The Act also specifies that the Secretary shall withdraw, or suspend for a specified period of time, permission to take marine mammals incidental to oil and gas production, and other activities if the applicable regulations regarding methods of taking, monitoring, or reporting are not being complied with, or the taking is having, or may be having, more than a negligible impact on the affected species or stock.

In 1994, a new subparagraph (D) was added to Section 101(a)(5) to simplify the process of obtaining "small take" exemptions when unintentional taking is by incidental harassment only. Specifically, the incidental take of small numbers of marine mammals by harassment can now be authorized for periods of up to one year without rulemaking, as required by Section 101(a)(5)(A), which remains in effect for other authorized types of incidental taking.

To ensure that activities on the OCS adhere to MMPA regulations, MMS must actively seek information concerning impacts of OCS activities on local species of marine mammals. Since 1986, MMS, the U.S. Army Corp of Engineers, and OCS operators have been following strict NMFS recommendations to prevent adverse impacts on endangered marine turtles and avoid the incidental taking of marine mammals.

The Magnuson - Stevens Act of 1976

The Magnuson - Stevens Act of 1976 (MFCMA) (16 U.S.C. 1801-1882) established and delineated an area from the States' seaward boundary to approximately 200 nautical miles (nmi) out as a fisheries conservation zone for the United States and its possessions. The Act created eight regional Fishery Management Councils (FMCs) and mandated a continuing planning program for marine fisheries management by the FMCs. The Act, as amended, requires that a Fishery Management Plan (FMP) based upon the best available scientific and economic data be prepared for each commercial species (or related group of species) of fish that is in need of conservation and management within each respective region.

The Act was reauthorized by Congress through passage of the Sustainable Fisheries Act of 1996. The reauthorization implements a number of reforms and changes. For example, one change required the National Marine Fisheries Service (NMFS) to designate and conserve Essential Fish Habitat (EFH) for species managed under an existing FMP. The intentions of such changes are to minimize, to the extent practicable, any adverse effects on habitat caused by fishing or nonfishing activities and to identify other actions to encourage the conservation and enhancement of such habitat. The phrase "essential fish habitat" as defined in the Sustainable Fisheries Act encompasses "those waters and substrate necessary to fishes for spawning, breeding, feeding, or growth to maturity."

EFH present within the Pacific OCS fall under the jurisdiction of the Pacific Fishery Management Council (PFMC). A total of 89 species are covered by three FMP's: Coastal Pelagic Species, Groundfish Species, and Pacific Coast Salmon. FMPs are amended and updated as new information from studies and public input is received and assessed.

MMS will enter into formal consultation with NMFS for EFH as part of this EIS process.

The Endangered Species Act

The Endangered Species Act of 1973, as amended, establishes protection and conservation of threatened and endangered species and the ecosystems upon which they depend. The Act is administered by U.S. Fish and Wildlife Service (FWS) and NMFS. Section 7 of the Act governs interagency cooperation and consultation. The MMS formally consults with NMFS and FWS to ensure that activities on the OCS under MMS jurisdiction do not jeopardize the continued existence of threatened or endangered species and/or result in adverse modification or destruction of their critical habitat. As a part of the process for developing this EIS, MMS will complete Section 7 consultation with both FWS and NMFS regarding the proposed delineation projects in the Southern California Planning Area of the Pacific OCS.

The FWS and NMFS make recommendations regarding modifications of oil and gas operations to minimize adverse environmental impacts; however, it remains the responsibility of MMS to ensure that proposed actions do not impact threatened or endangered species.

The Marine Protection, Research, and Sanctuary Act

The Marine Protection, Research, and Sanctuaries Act of 1972 established the National Marine Sanctuary Program, which is administered by the National Oceanic and Atmosphere Administration (NOAA) of the Department of Commerce. The Southern California Planning Area encompasses all or part of two sanctuaries: Channel Islands National Marine Sanctuary (NMS), which was designated in 1980; and Monterey Bay NMS, designated in 1992. National Marine Sanctuary Program Regulations prohibit exploring for, developing, and producing hydrocarbons within the Channel Islands NMS, except pursuant to leases executed prior to March 30, 1981, and except the laying of pipeline, provided specified oil spill contingency equipment is available at the site of such operations (15 CFR 922.71(a)(1)). The Regulations prohibit exploring for, developing, and producing hydrocarbons within the Monterey Bay NMS (15 CFR 922.132(a)(1)).

National Historic Preservation Act

Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470-470t) requires the head of any Federal agency, having direct or indirect jurisdiction over a proposed Federal or federally assisted undertaking in any State and the head of any Federal department or independent agency having authority to license any undertaking shall, prior to the approval of the expenditure of any Federal funds on the undertaking or prior to the issuance of any license, as the case may be, take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register.

The historic properties (i.e., archaeological resources) on the Outer Continental Shelf (OCS) include historic shipwrecks, sunken aircraft, lighthouses, and prehistoric archaeological sites that have become inundated due to the 120-meter rise in global sea level since the height of the last ice age (ca. 19,000 years ago). As the OCS is not federally-owned land, and as the Federal government has not claimed direct ownership of historic properties on the OCS, the MMS only has the authority under Section 106 of the NHPA to ensure that our funded and permitted actions do not adversely affect significant historic properties. Beyond avoidance of adverse impacts, we do not have the legal authority to manage the historic properties on the OCS.

The Oil Pollution Act

The Oil Pollution Act (OPA 90) establishes a single uniform Federal system of liability and compensation for damages caused by oil spills in U.S. navigable waters. OPA 90 requires removal of spilled oil and establishes a national system of planning for and responding to oil spill incidents. OPA 90 includes provisions to (1) improve oil-spill prevention, preparedness, and response capability; (2) establish limitations on liability for damages resulting from oil pollution; (3) provide funding for natural resource damage assessment; (4) implement a fund for the payment of compensation for such damages; and (5) establish an oil pollution research and development program. The Secretary of Interior is given authority over offshore facilities and associated pipelines (except deepwater ports) for all Federal and State waters, including responsibility for spill prevention, oil-spill contingency plans, oil-spill containment and clean-up equipment, financial responsibility certification, and civil penalties. The Coast Guard is responsible for enforcing vessel compliance with OPA 90.

The Clean Water Act

The Federal Water Pollution Control Act (FWPCA) of 1972, as amended, commonly referred to as the Clean Water Act (CWA), authorizes the U.S. Environmental Protection Agency (USEPA) to issue National Pollutant Discharge Elimination System (NPDES) permits to regulate discharges into waters of the United States. On March 4, 1993, the USEPA Source Performance Standards that set more restrictive conditions than were previously applied to discharges on the OCS.

Presently, two types of permits exist to regulate offshore oil and gas facility-associated effluents. One type is a General permit and the other is a series of Individual permits The General permit was issued in

1983, reissued in January 1984, and expired in June 1984 with no new General permit (1984 General permit) to take its place. This permit covers 14 of the 23 platforms in the MMS Pacific Region. The remaining nine platforms are presently covered by Individual permits. Two of the Individual permits were issued in 1977 and have never been updated, while the permits for the remaining seven platforms were all applied after the 1984 General permit had expired. All the newer Individual permits are more stringent and cover a wider array of effluents than the General permit.

In October 1996, EPA, Region 9 began the process of issuing a new General permit (referred to hereafter as the "new General permit. In January 2001, the new General permit received California Coastal Commission (CCC) Consistency Certification. At present, EPA is considering how to handle the conditions and how to reissue the changed permit. There is no anticipated date of issuance.

The new General permit is more stringent than either the 1984 General permit or any of the Individual permits. The Individual permits are more stringent than the 1984 General permit by decreasing limits on some components of produced water, requiring more frequent monitoring, and monitoring an increased total number of effluents. The 1984 General permit regulated 12 discharges while the new draft permit will regulate those and 10 others.

An NPDES permit would be required for delineation drilling discharges. Individual operators or the MODU owner could apply for 1) coverage under the new permit when it becomes effective or 2) an individual permit.

Section 404 of the CWA delegates regulatory authority to the Secretary of the Army over discharge of dredged or fill material in wetlands. Permits for structures in State waters must consider environmental requirements before the issuance pursuant to Section 404 of the CWA.

The USCG has jurisdiction to enforce the CWA on the OCS. Under the CWA, the USCG approves the procedures to be followed and the equipment used for the transfer of oil from vessel to vessel and between onshore and offshore facilities and vessels. The USCG conducts pollution surveillance patrols to detect oil discharges with territorial sea and contiguous zone and has enforcement authority over violations. The USCG also has strike team responsibilities should an oil spill occur.

Rivers and Harbors Act

Section 10 of the Rivers and Harbors Act of 1899 requires that permits be issued for all offshore construction, including pipelines, in U.S. navigable waters. Structure permits for exploratory drilling vessels and for fixed and mobile platforms are issued by the Corps. Permits must also be issued for onshore facilities in which dredging and filling of U.S. navigable waters are involved.

Clean Air Act

The Clean Air Act of 1970 directs the attainment and maintenance of National Ambient Air Quality Standards (NAAQS). The 1990 Amendments to this Act affect attainment and maintenance of NAAQS (Title I), motor vehicles and fuel reformulation (Title II), hazardous air pollutants (Title III), acid deposition (Title IV), facility operating permits (Title V), stratospheric ozone protection (Title VI), and enforcement (Title VII).

Section 328 of the 1990 Clean Air Act Amendments (CAAA) transfers authority for air quality on the OCS to the EPA. On September 4, 1992, the EPA Administrator promulgated requirements (40 CFR Part 55) to control air pollution from OCS sources to attain and maintain Federal and State air quality standards and to comply with CAAA provisions for the Prevention of Significant Deterioration. The promulgated regulations require OCS sources to comply with applicable onshore air quality rules in the corresponding onshore area (COA). EPA delegated authority to the corresponding onshore Air Districts on November 5, 1993 to implement and enforce the requirements of 40 CFR Part 55. The full transfer of authority to Santa Barbara County APCD, Ventura County APCD, South Coast Air Quality Management District and San Luis Obispo County APCD to regulate OCS air emissions pursuant to 40 CFR Part 55 transpired on September 4, 1994.

The EPA instituted final rules for determining general conformity of federal actions with federal and state air quality implementation plans (SIP) on November 30, 1993. Section 176(c) of the CAA, the General Conformity Rule, requires federal agencies to ensure that actions undertaken in nonattainment or maintenance areas are consistent with the applicable implementation plan. A Federal agency must make a determination that a federal action conforms to the applicable implementation plan before the action is taken.

The Resource Conservation and Recovery Act

The Resource Conservation and Recovery Act RCRA) provides a framework for the safe disposal and management of hazardous and solid wastes. Most oilfield wastes have been exempted from coverage under RCRA's hazardous waste regulations. Any hazardous wastes generated on the OCS that are not exempt must be transported to shore for disposal at a hazardous waste facility. Exempt wastes taken from the POCS for disposal are regulated in California.

The Coastal Zone Management Act

Pursuant to the Coastal Zone Management Act (CZMA) and the Coastal Zone Reauthorization Amendments of 1990, all Federal activities must be consistent to the maximum extent practicable with the enforceable policies of each affected State's coastal zone management (CZM) program. Each State's CZM program sets forth objective, policies, and standards regarding public and private use of land and water resources in the coastal zone.

A State with an approved CZM plan reviews Exploration Plans (EP's) and Development and Production Plans (DPP's) to determine whether the proposed activities are consistent with that State's CZM plan. The MMS may not approve 1) an Application for Permit to Drill for an EP or 2) a permit for activities described in a DPP unless the State concurs, or is conclusively presumed to have concurred, that the plan is consistent with its CZM plan.

The MMS expects the operators proposing delineation drilling to submit revisions to approved EP's in September 2001. MMS will examine the proposed revisions in accordance with 250.203(n)(2). If the revisions could result in a significant change to the impacts previously identified and evaluated or requires additional permits then the revisions would be subject to all of the procedures in 250.203 including review for Coastal Zone Consistency.

Ports and Waterways Safety Act

The Ports and Waterways Safety Act (33 U.S.C. 1223) authorizes Coast Guard to designate safety fairways, fairway anchorages, and traffic separation schemes (TSSs) to provide unobstructed approaches for vessels using ports. The Coast Guard provides listings of designated fairways, anchorages, and TSSs in 33 CFR 166 and 167. In general, no fixed structures such as platforms are allowed in fairways. Temporary underwater obstacles such as anchors and attendant cables or chains attached to floating or semisubmersible drilling rigs may be placed in a fairway under certain conditions. Fixed structures may be placed in anchorages, but the number of structures is limited.

A TSS is a designated routing measure designed to separate opposing streams of traffic by appropriate means and by the establishment of traffic lanes (33 CFR 167.5). The Coast Guard published a final rule on July 31, 2000 realigning the San Francisco TSS, extending the Santa Barbara Channel (SBC) TSS 18 nmi and linking the SBC TSS to the San Francisco TSS. The remainder of the TSS through the SBC and the Los Angeles TSS remain the same.

Merchant Marine Act of 1920 (Jones Act)

The Merchant Marine Act of 1920, commonly referred to as the Jones Act (P.L. 66-261) regulates coastal shipping between U.S. ports and inland waterways. The Act provides that "no merchandise shall be transported by water, or by land and water…between points in the United States…in any other vessel than a vessel built in and documented under the laws of the United States and owned by persons who are citizens of the United States... " Therefore, the Act requires that all goods shipped between different ports in the U.S. or its territories must be:

- Carried on vessels built and documented (flagged) in the U.S.,
- Crewed by U.S. citizens or legal aliens licensed by Coast Guard, and
- Owned and operated by U.S. citizens.

The rational behind the Jones Act and earlier Cabotage laws was that the United States needed a merchant marine fleet to ensure that its domestic waterborne commerce remains under government jurisdiction for regulatory, safety, and national defense considerations. The same general principles of safety regulations are applied to other modes of transportation in the United States. While other modes of transportation can operate foreign-built equipment, these units must comply with U.S. standards. However, many foreign-built ships do not meet the standards required of U.S.-built ships and thus are excluded from domestic shipping.

The U.S. Customs Service has determined that facilities fixed or attached to the OCS for the purpose of oil exploration as described under Section 1333(a) of Title 43, United States Code, are considered points within the U.S. Therefore, OCS oil facilities are considered U.S. sovereign territory and fall under the requirements of the Jones Act. This carries the implication that all shipping to and from these facilities related to oil exploration on the OCS can only be conducted by vessels meeting the requirements of the Jones Act. Therefore, OCS facilities can only be legally served by U.S.-registered vessels and aircraft that are properly endorsed for coastwise trade under the laws of the U.S.

Executive Order 12898: Environmental Justice

The environmental-justice policy, based on Executive Order 12898, requires agencies to incorporate into NEPA documents analysis of the environmental effects of their proposed programs on minorities and low-income populations and communities. Scoping and review for the EIS is an open process that provides an opportunity for all participants, including minority and low-income populations, to express concerns that can be addressed in the EIS.

H.1.1 MMS Regulatory Authority

The MMS is charged with responsibility for managing and regulating the development of OCS oil and gas resources in accordance with the provisions of OCSLA (described in Section 1.5.1). MMS operating regulations are provided in 30 CFR, Chapter 250. The MMS's established regulatory framework (including review, evaluation, and decision-making processes) is applicable to all on-lease activities considered in this EIS.

The MMS procedures for managing and regulating OCS activities, including those applicable to Exploration activities, are summarized below.

The MMS is responsible for regulating and monitoring the oil and gas operations and activities on the Federal OCS. The MMS has established operating regulations and procedures to ensure that proposed activities are orderly, safe, and pollution-free. These regulations include technical and environmental reviews and evaluations by the MMS to ensure all operations are conducted in a safe and environmentally sound manner. The focus of the regulations is to reduce the risks associated with actions conducted in the offshore environment. The lessee or operator has the primary responsibility for ensuring all operations meet or exceed MMS's regulatory requirements.

The MMS operating regulations, 30 CFR 250, are designed to, ". . . regulate all operations conducted under a lease, right of use and easement, or right-of-way to promote orderly exploration, development, and production of mineral resources and to prevent unreasonable harm or damage to, or waste of, any natural resource (including any mineral deposits in areas leased or not leased), any life (including fish and other aquatic life), property, or the marine, coastal, or human environment." The operating regulations provide requirements and guidance on each phase of offshore operations. The operating regulations incorporate by reference numerous industry practices, methods, codes, and measurements that are accepted as standards in conducting offshore operations. This allows the integration of the most current practices into all aspects of offshore work.

Prior to commencing exploration, development, or production activities on a lease, operators must submit detailed plans of these activities for MMS review, evaluation, and decision. No activities may occur until approval has been granted by MMS. Proposed activities are evaluated through established technical, safety, and environmental review processes. Specific requirements must be addressed in these plans relative to operating conditions and environmental considerations. Supporting environmental information required may include archaeological, biological, and geohazards surveys and reports. If a plan is approved, operators must still submit applications for specific operations for review and approval prior to commencing operations. Upon approval of activities, lessees must comply with all lease stipulations, operational regulations, permit requirements, mitigation measures, and other applicable Federal laws and regulations.

All proposed operations must meet or exceed the safety standards set by MMS. The MMS requires use of the Best Available and Safest Technology (BAST) for OCS operations, which include state-of-the-art drilling technology, production safety systems, completion of oil and gas wells, oil-spill response plans, pollution control equipment, and specifications for platform/structure designs.

The MMS completes a technical and safety review of all proposed production facility designs and installation procedures. All proposed facilities in the POCS Region are reviewed for structural integrity. These detailed classical engineering reviews entail an intense evaluation of all operator proposals for fabrication, installation, modification, and repair of all mobile and fixed structures in the POCS Region.

To ensure that new structures are designed, fabricated, and installed using standardized procedures to prevent structural failures, MMS uses third-party (a Certified Verification Agent) expertise and technical input in the verification process. All surface production facilities, including separators, treaters, compressors, headers, and flowlines, must be designed, installed, and maintained in a manner that provides for efficiency, safety of operations, and protection of the environment. Safety systems utilized for drilling, well workover activities, and production operations on the OCS must be designed, installed, used, maintained, and tested in a manner to ensure the safety and protection of the human, marine, and coastal environments. All tubing installations open to hydrocarbon-bearing zones below the surface must be equipped with safety devices that automatically shut off the flow from the well in the event of an emergency (unless the well is incapable of flowing).

The MMS evaluates the design, fabrication, installation, and maintenance of pipelines. Proposed pipeline routes are evaluated for potential geologic hazards and other natural or man-made seafloor or subsurface features or conditions that could have an adverse impact on the pipeline. Routes are also evaluated for potential impacts on archaeological resources and biological communities. Operators are required to periodically inspect pipeline routes, and routine overflights are conducted to inspect pipeline routes for leakage.

The Oil Pollution Act of 1990 (OPA, 90) requires removal of spilled oil and establishes a national system for planning for and responding to oil-spill incidents. MMS mandates that the operator of a lease possess a pro-active spill prevention program, a current viable oil-spill contingency plan, financial responsibility certification, and a system to ensure that the operator can obtain oil-spill containment and cleanup equipment quickly. The MMS regulations (30 CFR 254) require all owners and operators of oil processing and handling, storage, or transportation facilities located seaward of the coastline to submit an Oil Spill Response Plan (OSRP) for approval before an owner/operator can use a facility. The facility must be operated in compliance with the approved plan. All MMS approved OSRPs are required to be reviewed and updated every two years.

A Certificate of Financial Responsibility (COFR Program) is required for every POCS Region drilling, workover, production, and pipeline operation that may involve the accidental release of hydrocarbon liquids into the environment. The MMS determines the amount of financial responsibility required for offshore facilities as prescribed by OPA 90. The OPA agency analysis applies an assessment protocol to estimate the operator's likely liability for a worst-case spill from a facility or class of facility. The responsible party must demonstrate to MMS (or state) that sufficient funds for cleanup and damage liability would be available if needed.

All operators on the OCS involved in production of sour hydrocarbons that could result in atmospheric hydrogen sulfide concentrations above 20 parts per million (ppm) are required to file a contingency plan for hydrogen sulfide that includes procedures to ensure the safety of the workers on the production facility. All operators are required to adhere to National Association of Corrosion Engineers (NACE) Standard Material Requirement MRO75-97 for Sulfide Stress Cracking Resistant Metallic Materials for Oilfield Equipment (NACE, 1990). The American Petroleum Institute (API) has also developed "Recommended Practices for Oil and Gas Producing and Gas Processing Plant Operations Involving Hydrogen Sulfide" (API, 1995). The MMS issued an NTL titled "Hydrogen Sulfide (H2S) Requirements" to provide guidance on sensor location, sensor calibration, respirator breathing time, measures for protection against hydrogen sulfide, requirements for classifying an area for the presence of hydrogen sulfide, requirements for flaring and venting of gas containing hydrogen sulfide, and other issues pertaining to operations that involve hydrogen sulfide.

The MMS has pollution prevention and control regulations (30 CFR 250.300) to ensure lessees do "…not create conditions that will pose an unreasonable risk to public health, life, property, aquatic life, wildlife, recreation, navigation, commercial fishing, or other uses of the ocean…" during offshore oil and gas operations. Control and removal of pollution is the responsibility of the lessee and is performed at the expense of the lessee. Operators are required to install curbs, gutters, drip pans, and drains on structures and deck areas in a manner necessary to collect all contaminants and debris not authorized for discharge. Disposal of any solid waste into the marine environment is prohibited. Fixed and floating structures, drilling rigs, manned production platforms/structures, and support vessels operating under a Federal oil and gas lease are required to develop Waste Management Plans and to post placards reflecting discharge limitations and restrictions. Operational discharges such as produced water, drilling fluids, and cuttings are regulated by USEPA through the NPDES program; MMS may restrict the rate of drilling fluid discharge or prescribe alternative discharge methods.

The MMS administers an active civil penalties program. This program provides a high-profile compliance and enforcement tool. A civil penalty in the form of substantial monetary fines may be issued against any operator that commits a violation that may constitute a threat of serious, irreparable, or immediate harm or damage to life, property, or the environment. The MMS may make recommendations for criminal penalties if a willful violation occurs. In addition, the regulation in 30 CFR 250 directs MMS to suspend any operation in the POCS Region if the lessee has failed to comply with a provision of any applicable law, regulation, or order or provision of a lease or permit. Furthermore, the Secretary may invoke his authority under 30 CFR 250 and cancel a lease.

The MMS conducts both announced and unannounced on-site inspections of all production facilities to ensure compliance with lease terms, NTLs, and approved plans, and to ensure that safety and pollution-prevention requirements of regulations are met. These inspections focus primarily on the facility's safety equipment and on the records the operator maintains that reflect the periodic testing required by the Operating Regulations. Inspectors may require the activation of some safety equipment on a facility to ensure it is working properly.

The MMS encourages all operators to participate in the Safety and Environmental Management Program (SEMP) that is detailed in the American Petroleum Institute's Recommended Practice, API RP 75. This comprehensive environmental and safety program addresses all facets of oil and gas operations.

H.1.2 Coast Guard Regulatory Authority

Primary responsibility for the enforcement of U.S. maritime laws and regulations in GOM waters falls upon Coast Guard. The Coast Guard's responsibilities for regulating activities on the OCS, the continental shelf, and in ports and harbors, as applicable to the proposed action, are presented in Title 33 CFR, chapters 1-199; Title 43 U.S.C. section 1331; Title 46 U.S.C., Part A and B; and OPA 90. The Coast Guard is responsible for managing and regulating provisions for safe navigation of vessels in U.S. waters, as well as the enforcement of environmental and pollution prevention regulations. As such, Coast Guard provides for the regulation and enforcement of hazardous working conditions on the OCS, for the management and regulation of measures for pollution prevention in territorial waters, and for ensuring that the provisions of OPA 90 and the MPPRCA (i.e., MARPOL Annex V) are implemented.

H.1.3 Memorandum of Understanding (MOU) Between MMS and Coast Guard

On December 16, 1998, MMS and Coast Guard updated and signed a Memorandum of Understanding (MOU) concerning responsibilities for offshore facilities on the OCS. Given the overlap in jurisdictions of MMS and Coast Guard regarding some issues, the MOU delineates lead responsibilities for managing OCS activities in accordance with OCSLA and OPA 90.

Because of jurisdictional overlap and the large array of regulatory provisions pertaining to activities on the OCS, MMS and Coast Guard have established a formal Memorandum of Understanding (MOU) that defines their respective roles. The MOU, dated August 1989 and updated December 1998 (and published in the Federal Register on January 15, 1999), defines the responsibilities of both agencies regarding the management of oil and gas activities in the OCS. The MOU is designed to minimize duplication and promote consistent regulation of facilities under the jurisdiction of both agencies.

The MOU assigns both agencies with responsibility for the various aspects of the design, implementation, and operation of OCS facilities. Generally, the MOU identifies MMS as the lead agency for matters concerning the equipment and operations directly involved in the production of oil and gas. These include among others: design and operation of risers, permanent mooring foundations of the facility, drilling and well production and services, inspection and testing of all drilling-related equipment, and platform decommissioning. Issues regarding the safe operation of the facility, its systems, and the equipment needed to support all operations on board generally fall under the jurisdiction of Coast Guard. These include among others: design of vessels, their seakeeping characteristics, propulsion and dynamic positioning systems, supply and lightering procedures and equipment, utility systems, safety equipment and procedures, and pollution prevention and response procedures.

Both agencies will continue to be responsible for accident investigations and will coordinate to minimize duplication of efforts. For those incidents where both agencies have an investigative interest in the systems involved, one agency will assume lead investigative responsibility, with supporting participation provided by the other agency.

H.1.4 Mitigation Measures

In each OCS planning area, oil and gas exploration and development activities have the potential for causing adverse environmental impacts. Many measures have been implemented by the MMS to “mitigate” or prevent and lessen possible impacts on environmental resources from both OCS and non-OCS activities. Mitigating measures are protective measures designed to prevent adverse impacts and to lessen and mitigate unavoidable impacts. The MMS develops and administers these requirements, which are part of the lease-term conditions at lease issuance.

In order to mitigate adverse environmental impacts for actions associated with a specific project (i.e., proposed plans for exploration, development, production, and site-clearance activities in an area located on an OCS lease block), additional mitigation requirements may be necessary. Conditions of plan approval are mechanisms determined by MMS to control or mitigate potential environmental or safety problems that are associated with a specific proposal. Special stipulations that limit operations are in addition to the lease-term stipulations. During the life of the action, these protective measures are specific to the individual activities proposed in a plan and are imposed following environmental reviews (according to the NEPA) of the OCS lease location and potential resources.

Lease-Term Stipulations

Some of these protective measures are developed and applied to specific blocks in a planning area before leasing a block and are based on the following:

- existing policies and laws;
- knowledge of the resources present in the planning area where the block is being offered for lease by the MMS; and
- current industry practices.

If a block is leased as a result of a lease sale, these protective measures are identified as lease-term stipulations and are attached to and become part of the lease and its conditions. These stipulations are designed to protect potentially sensitive resources in the affected block and to reduce possible multiple-use conflicts and are the requirements that the lessee must meet to mitigate adverse impacts. They also may be considered to apply to all activities that occur on the leased area throughout the life of the lease.

This EIS evaluates impacts of the proposal, delineation drilling, and cumulative impacts including development of the 36 undeveloped leases. The 36 undeveloped leases include the leases proposed for delineation drilling. The 36 undeveloped leases resulted from Lease Sales P4, 48, 53, 68, RS-2, and 80. The following lease-term stipulations apply, as appropriate, to the 36 undeveloped leases and, as such, are considered as part proposal for delineation drilling and future development.

Stipulations for Lease Sales, P4, 48, 53, 68, RS-2, 80

Sale P4 Stipulation No. 1

The lessee, recognizing that mineral explorations and exploitation and recovery operations on the leased areas of tide and submerged lands can impede tactical military operations, hereby recognizes and agrees that the United States reserves and has the right to temporarily suspend operations of the lessee under this lease in the interests of national security requirements. Such temporary suspension of operations, including the evacuation of personnel, will come into effect upon the order of the Air Force Western Test Range Safety Officer, or higher authority, that national security interests necessitates such action. It is understood that any temporary suspension of operations ordered by said official may not exceed 72 hours, however, any suspension may be extended by order of the Secretary of Defense. During such periods equipment may remain in place.

Sale P4 Stipulation No. 2

The lessee assumes all risk of damage or injury to any person or persons who are the agents, employees, or invitees of the lessee, its agents, subcontractors or any independent contractor doing business with the lessee in connection with any activities being performed by the lessee on the leased premises, and of any damage to any property of the lessee, its agents, employees, invitees, subcontractors or independent contractors doing business with the lessee and which occurs on the leased premises, and which injury to such person or property occurs by reason of the activities of any agency of the U.S. Government being conducted as a part of or in connection with the programs and activities of the Air Force Western Test Range, whether such injury or damage is caused in whole or in part by any act or omission, regardless of negligence or fault, of the United States or its contractors, or any of their officers, agents or employees, and whether or not based upon any concept of strict or absolute liability or otherwise; and the lessee agrees to indemnify and save harmless the United States against, and to defend at its own expense, all such claims for loss, damage, or injury sustained by the lessee, its agents, employees, invitees, subcontractors, or any independent contractors doing business with the lessee in connection with its activities on the leased premises, or their agents or employees, which such claims may arise by reason of injury or damage occurring in connection with the programs and activities of the said Air Force Western Test Range, whether the same be caused in whole or in part, by the negligence or fault of the United States or its contractors or any of their officers, agents, and employees, or based upon any concept of strict liability or otherwise.

Sale 48 Stipulation No. 1-A

(a) The lessee agrees that prior to operating or causing to be operated on its behalf boat or aircraft traffic into individual, designated warning areas, the lessee shall coordinate and comply with instructions from the Commander, Space and Missile Test Center (SAMTEC) and the Commander, Pacific Missile Test Center (PMTC), or other appropriate military agency. Such coordination and instruction will provide for positive control of boats and aircraft operating into the warning areas at all times.

(b) The lessee, recognizing that mineral exploration and exploitation and recovery operations on the leased areas of submerged lands can impede tactical military operations, hereby recognizes and agrees that the United States reserves and has the right to temporarily suspend operations of the lessee under this lease in the interests of national security requirements. Such temporary suspension of operations, including the evacuation of personnel, and appropriate sheltering of personnel not evacuated (an appropriate shelter shall mean the protection of all lessee personnel for the entire duration of any Department of Defense activity from flying or falling objects or substances), will come into effect upon the order of the Supervisor, after consultation with the Commander, Space and Missile Test Center

(SAMTEC) and the Commander, Pacific Missile Test Center (PMTC), or other appropriate military agency, or higher authority, when national security interests necessitate such action. It is understood that any temporary suspension of operations for national security may not exceed seventy-two hours; however, any such suspension may be extended by order of the Supervisor. During such periods equipment may remain in place.

(c) The lessee agrees to control his own electromagnetic emissions and those of his agents, employees, invitees, independent contractors or subcontractors emanating from individual, designated defense warning areas in accordance with requirements specified by the Commander, Space and Missile Test Center (SAMTEC) and the Commander, Pacific Missile Test Center (PMTC), or other appropriate military agency, to the degree necessary to prevent damage to, or unacceptable interference with, Department of Defense flight, testing or operational activities conducted within individual, designated warning areas. Necessary monitoring, control, and coordination with the lessee, his agents, employees, invitees, independent contractors or subcontractors, will be effected by the Commander of the appropriate onshore military installation conducting operations in the particular warning area: Provided, however, that control of such electromagnetic emissions shall permit at least one continuous channel of communication between a lessee, its agents, employees, invitees, independent contractors or subcontractors and onshore facilities.

Sale 48 Stipulation No. 1-B

(a) The lessee agrees that prior to operating or causing to be operated on its behalf boat or aircraft traffic into individual, designated warning areas, the lessee shall coordinate and comply with instructions from the Commander, Space and Missile Test Center (SAMTEC) and the Commander; the Commander, Pacific Missile Test Center (PMTC); and the Commander, Fleet Area Control and Surveillance Facility (FACSFAC), or other appropriate military agency. Such coordination and instruction will provide for positive control of boats and aircraft operating into the warning areas at all times.

(b) The lessee, recognizing that mineral exploration and exploitation and recovery operations on the leased areas of submerged lands can impede tactical military operations, hereby recognizes and agrees that the United States reserves and has the right to temporarily suspend operations of the lessee under this lease in the interests of national security requirements. Such temporary suspension of operations, including the evacuation of personnel, and appropriate sheltering of personnel not evacuated (an appropriate shelter shall mean the protection of all lessee personnel for the entire duration of any Department of Defense activity from flying or falling objects or substances), will come into effect upon the order of the Supervisor, after consultation with the Commander, Space and Missile Test Center (SAMTEC); the Commander, Pacific Missile Test Center (PMTC); and the Commander, Fleet Area Control and Surveillance Facility (FACSFAC), or other appropriate military agency, or higher authority, when national security interests necessitate such action. It is understood that any temporary suspension of operations for national security may not exceed seventy-two hours; however, any such suspension may be extended by order of the Supervisor. During such periods equipment may remain in place.

(c) The lessee agrees to control his own electromagnetic emissions and those of his agents, employees, invitees, independent contractors or subcontractors emanating from individual, designated defense warning areas in accordance with requirements specified by the Commander, Space and Missile Test Center (SAMTEC); the Commander, Pacific Missile Test Center (PMTC); and the Commander, Fleet Area Control and Surveillance Facility (FACSFAC) or other appropriate military agency, to the degree necessary to prevent damage to, or unacceptable interference with, Department of Defense flight, testing or operational activities conducted within individual, designated warning areas. Necessary monitoring, control, and coordination with the lessee, his agents, employees, invitees, independent contractors or subcontractors, will be effected by the Commander of the appropriate onshore military installation conducting operations in the particular warning area: Provided, however, that control of such electromagnetic emissions shall permit at least one continuous channel of communication between a lessee, its agents, employees, invitees, independent contractors or subcontractors and onshore facilities.

Sale 48 Stipulation No. 2

Whether or not compensation for such damage or injury might be due under a theory of strict or absolute liability or otherwise, the lessee assumes all risks of damage or injury to persons or property, which occurs in, on, or above the Outer Continental Shelf, to any person or persons or to any property of any person or persons who are agents, employees or invitees of the lessee, its agents, independent contractors or subcontractors doing business with the lessee in connection with any activities being performed by the lessee in, on, or above the Outer Continental Shelf, if such injury or damage to such person or property occurs by reason of the activities of any agency of the U.S. Government, its contractors, or subcontractors, or any of their officers, agents or employees, being conducted as a part of, or in connection with, the programs and activities of the Space and Missile Test Center (SAMTEC), the Pacific Missile Test Center (PMTC), or other appropriate military agency.

Not withstanding any limitations of the lessee's liability in section 14 of the lease, the lessee assumes the risk whether such injury or damage is caused in whole or in part by any act or omission, regardless of negligence or fault, of the United States, its contractors or subcontractors, or any of their officers, agents, or employees. The lessee further agrees to indemnify and save harmless the United States against all claims for loss, damage, or injury sustained by the lessee, and to indemnify and save harmless the United States against all claims for loss, damage, or injury sustained by the agents, employees, or invitees of the lessee, its agents or any independent contractors or subcontractors doing business with the lessee in connection with the programs and activities of the aforementioned military installations and agencies, whether the same be caused in whole or in part by the negligence or fault of the United States, its contractors, or subcontractors, or any of their officers, agents, or employees and whether such claims might be sustained under theories of strict or absolute liability or otherwise.

Sale 48 Stipulation No. 3

If the Supervisor, having reason to believe that a site, structure or object of historical or archaeological significance, hereinafter referred to as a "cultural resource," may exist in the lease area, gives the lessee written notice that the lessor is invoking the provisions of this stipulation, the lessee shall upon receipt of such notice comply with the following requirements:

Prior to any drilling activity or the construction or placement of any structure for exploration or development on the lease, including but not limited to, well drilling and pipeline and platform placement, hereinafter in this stipulation referred to as "operation," the lessee shall conduct remote sensing surveys to determine the potential existence of any cultural resource that may be affected by such operations. All data produced by such remote sensing surveys as well as other pertinent natural and cultural environmental data shall be examined by a qualified marine survey archaeologist to determine if indications are present suggesting the existence of a cultural resource that may be adversely affected by any lease operation. A report of this survey and assessment prepared by the marine survey archaeologist shall be submitted by the lessee to the Supervisor and the Manager, Bureau of Land Management (BLM), Outer Continental Shelf (OCS) Office for review.

If such cultural resource indicators are present the lessee shall (1) locate the site of such operation so as not to adversely affect the identified location; or (2) establish, to the satisfaction of the Supervisor, on the basis of further archaeological investigation conducted by a qualified marine survey archaeologist or underwater archaeologist using such survey equipment and techniques as deemed necessary by the Supervisor, either that such operation shall not adversely affect the location identified or that the potential cultural resource suggested by the occurrence of the indicators does not exist.

A report of this investigation prepared by the marine survey archaeologist or underwater archaeologist shall be submitted to the Supervisor and the Manager, BLM OCS Office for their review. Should the Supervisor determine that the existence of a cultural resource which may be adversely affected by such operation is sufficiently established to warrant protection, the lessee shall take no action that may result in an adverse effect on such cultural resource until the Supervisor has given directions as to its preservation.

The lessee agrees that if any site, structure, or object of historical or archaeological significance should be discovered during the conduct of any operations on the leased area, he shall report immediately such findings to the Supervisor and make every reasonable effort to preserve and protect the cultural resource from damage until the Supervisor has given directions as to its preservation.

Sale 48 Stipulation No. 4

(a) Wells: Subsea well-heads and temporary abandonments, or suspended operations that leave protrusions above the sea floor, shall be protected, if feasible, by a shroud which will allow commercial trawl gear to pass over the structure without snagging or otherwise damaging the structure or the fishing gear. Latitude and longitude coordinates of these structures along with water depths, shall be submitted to the Supervisor. The coordinates of such structures will be determined by the lessee utilizing state-of-the-art navigation systems with accuracy of at least 50 feet (15.25 meters) at 200 miles (322 kilometers).

(b) Pipelines: All pipelines, unless buried, including gathering lines, shall have a smooth-surface design. In the event that an irregular pipe surface is unavoidable due to the need for valves, anodes or other structures, they shall be protected by shrouds which will allow trawl gear to pass over the object without snagging or otherwise damaging the structure or the fishing gear.

Sale 48 Stipulation No. 5

(a) If the Supervisor has reason to believe that areas of special biological interest in the lease area contain biological communities or species of such extraordinary or unusual value (even though unquantifiable) that no threat of damage, injury, or other harm to the community or species would be acceptable, he shall give the lessee written notice that the lessor is invoking the provisions of this stipulation and the lessee shall comply with the following requirements: Prior to any drilling activity or the construction or placement of any structure for exploration or development on lease areas including, but not limited to, well drilling and pipeline and platform placement, hereinafter referred to as "operation," the lessee shall conduct site specific surveys as approved by the Supervisor and in accordance with prescribed biological survey requirements to determine the existence of any special biological resource including, but not limited to:

- Very unusual, rare, or uncommon ecosystems or ecotones.
- A species of limited regional distribution that may be adversely affected by any lease operations.

If the results of such surveys suggest the existence of a special biological resource that may be adversely affected by any lease operation, the lessee shall: (1) relocate the site of such operation so as not to adversely affect the resources identified; (2) establish to the satisfaction of the Supervisor, on the basis of the site-specific survey, either that such operation will not have a significant adverse effect upon the resource identified or that a special biological resource does not exist. The Supervisor will review all data submitted and determine, in writing, whether a special biological resource exists or may be significantly affected by lessee's operations. The lessee may take no action until the Supervisor has given the lessee written directions on how to proceed.

(b) The lessee agrees that if any area of biological significance should be discovered during the conduct of any operations on the leased area, he shall report immediately such findings to the Supervisor, and make every reasonable effort to preserve and protect the biological resource from damage until the Supervisor has given the lessee directions with respect to its protection.

Sale 48 Stipulation No. 6

(a) Pipelines will be required, (1) if pipeline rights-of-way can be determined and obtained, (2) if laying of such pipelines is technologically feasible and environmentally preferable, and (3) if, in the opinion of the lessor, pipelines can be laid without net social loss, taking into account any incremental costs of pipelines over alternative methods of transportation and any incremental benefits in the form of increased environmental protection or reduced multiple use conflicts. The lessor specifically reserves the right to require that any pipeline used for transporting production to shore be placed in certain designated management areas. In selecting the means of transportation, consideration will be given to any recommendation of the intergovernmental planning program for leasing and management of transportation of Outer Continental Shelf oil and gas with the participation of Federal, State, and local government and the industry. Where feasible, and environmentally preferable, all pipelines, including both flow lines and gathering lines for oil and gas, shall be buried to a depth suitable for adequate protection from water currents, sand waves, storm scouring, fisheries' trawling gear, and other uses as determined on a case-by-case basis.

(b) Following the completion of pipeline installation, no crude oil production will be transported by surface vessel from offshore production sites, except in the case of emergency. Determinations as to emergency conditions and appropriate responses to these conditions will be made by the Supervisor. Where the three criteria set forth in the first sentence of this stipulation are not met and surface transportation must be employed, all vessels used for carrying hydrocarbons to shore from the leased area will conform with all standards established for such vessels, pursuant to the Ports and Waterways Safety Act of 1972 (46 U.S.C., 391a), as amended.

Sale 48 Stipulation No. 7

Exploratory drilling operations, emplacement of structures (platforms) or seafloor wellheads for production or storage of oil or gas, and the emplacement of pipelines will not be allowed within the potentially unstable portions of the lease block unless or until the lessee has demonstrated to the Supervisor's satisfaction that mass movement of sediments is unlikely or that exploratory drilling operations, structures (platforms), casing, wellheads, and pipelines can be safely designed to protect the environment in case such mass movement or faulting occurs at the proposed location. If exploratory drilling operations are allowed, site-specific surveys shall be conducted to determine the potential for mass movement of sediments. If emplacement of structures (platforms) or seafloor wellheads for production or storage of oil or gas is allowed all potential mass movement of sediments in the lease block must be mapped. Down-hole pressure actuated control devices must be located below the base of the potentially unstable sediments located in the area in order to protect the environment in case such mass movement occurs at the proposed location. This may necessitate all exploration for and development of oil and gas be performed from locations outside of the area of instability, either within or outside of this lease block.

Sale 48 Stipulation No. 8

(a) The royalty rate on production saved, removed, or sold from this lease is subject to consideration for reduction under the same authority that applies to all other oil and gas leases on the Outer Continental Shelf (30 CFR 250.12(a)). The Director, Geological Survey, may grant a reduction for only one year at a time. Reduction of royalty rates will not be approved unless production has been underway for one year or more.

(b) Although the royalty rate specified in Sec.6(a) of this lease or as subsequently modified in accordance with applicable regulations and stipulations is applicable to all production under this lease, not more than 16 2/3 percent of the production saved, removed, or sold from the lease area may be taken as royalty in amount, except as provided in sec. 15 (d) of this lease; the royalty on any portion of the production saved, removed, or sold from the lease in excess of 16 2/3 percent may only be taken in value of the production saved, removed, or sold from the lease area.

Sale 48 Stipulation No. 9

To be included in any leases resulting from this sale for the sliding scale royalty tracts listed in paragraph 4 of this notice.

(a) The royalty rate on production saved, removed or sold from this lease is subject to consideration for reduction under the same authority that applies to all other oil and gas leases on the Outer Continental Shelf (30 CFR 250.12 (a)). The Director, Geological Survey, may grant a reduction for only one year at a time. Reduction of royalty rates will not be approved unless production has been underway for one year or more.

(b) Although the royalty rate specified in Sec. 6(a) of this lease or as subsequently modified in accordance with applicable regulations and stipulations is applicable to all production under this lease, not more than 16 2/3 percent of the production saved, removed or sold from the lease area may be taken as royalty on any portion of the production saved, removed or solved from the lease in excess of 16 2/3 percent may only be taken in value of the production saved, removed or sold from the lease area.

Sale 48 Stipulation No. 13

No producing well may be drilled so that the well bore in the producing intervals is closer than 500 feet to the seaward boundary of the State except that the 500 feet constraint shall not apply:

(a) If oil or gas pools or fields underlying both the Outer Continental Shelf and lands subject to the jurisdiction of California are included in a production unit entered into by the relevant lessees and approved by the lessors.

(b) If, in the absence of a production unit as described in (a) above, the State of California permits production from State lands from a point closer than 500 feet from the Federal-State boundary. In the event that such production from State lands does occur, the Federal lessee shall be allowed to produce from offset wells equally close to the boundary in the area of Federal jurisdiction.

Sale 53 Stipulation No. 1

(a) If the DCMOFO has reason to believe that biological populations or habitats exist and require protection, he shall give the lessee notice that the lessor is invoking the provisions of this stipulation and the lessee shall comply with the following requirements. Prior to any drilling activity or the construction or placement of any structure for exploration or development on lease areas including, but not limited to, well drilling and pipeline and platform placement hereinafter referred to as "operation," the lessee shall conduct site-specific surveys as approved by the DCMOFO and in accordance with prescribed biological survey requirements to determine the existence of any special biological resource including, but not limited to:

- Very unusual, rare, or uncommon ecosystems or ecotones.
- A species of limited regional distribution that may be adversely affected by any lease operations.

If the results of such surveys suggest the existence of a special biological resource that may be adversely affected by any lease operation, the lessee shall: (1) relocate the site of such operation so as not to adversely affect the resources identified; or (2) establish to the satisfaction of the DCMOFO, on the basis of the site-specific survey, either that such operation will not have a significant adverse effect upon the resource identified or that a special biological resource does not exist. The DCMOFO will review all data submitted and determine, in writing, whether a special biological resource exists and whether it may be significantly affected by the lessee's operations. The lessee may take no action until the DCMOFO has given the lessee written directions on how to proceed.

(b) The lessee agrees that if any area of biological significance should be discovered during the conduct of any operations on the leased area, he shall report immediately such findings to the DCMOFO, and make every reasonable effort to preserve and protect the biological resource from damage until the DCMOFO has given the lessee directions with respect to its protection.

Sale 53 Stipulation No. 2

If the DCMOFO, having reason to believe that a site, structure or object of historical or archaeological significance, hereinafter referred to as a "cultural resource," may exist in the lease area, gives the lessee written notice that the lessor is invoking the provisions of this stipulation, the lessee shall upon receipt of such notice comply with the following requirements.

Prior to any drilling activity or the construction or placement of any structure for exploration or development on the lease, including but not limited to, well drilling and pipeline and platform placement, hereinafter in this stipulation referred to as "operation," the lessee shall conduct remote sensing surveys to determine the potential existence of any cultural resource that may be affected by such operations. All data produced by such remote sensing surveys as well as other pertinent natural and cultural environmental data shall be examined by a qualified marine survey archaeologist to determine if indications are present suggesting the existence of a cultural resource that may be adversely affected by any lease operation. A report of this survey and assessment prepared by the marine survey archaeologist shall be submitted by the lessee to the DCMOFO and the Manager for review.

If such cultural resource indicators are present the lessee shall: (1) locate the site of such operation so as not to adversely affect the identified location; or (2) establish, to the satisfaction of the DCMOFO, on the basis of further archaeological investigation conducted by a qualified marine survey archaeologist or underwater archaeologist using such survey equipment and techniques as deemed necessary by the DCMOFO, either that such operation shall not adversely affect the location identified or that the potential cultural resource suggested by the occurrence of the indicators does not exist.

A report of this investigation prepared by the marine survey archaeologist ,or underwater archaeologist shall be submitted to the DCMOFO and the Manager for their review. Should the DCMOFO determine that the existence of a cultural resource which may be adversely affected by such operation is sufficiently established to warrant protection, the lessee shall take no action that may result in an adverse effect on such cultural resource until the DCMOFO has given directions as to its preservation.

The lessee agrees that if any site, structure, or object of historical or archaeological significance should be discovered during the conduct of any operations on the leased area, he shall report immediately such findings to the DCMOFO and make every reasonable effort to preserve and protect the cultural resource from damage until the DCMOFO has given directions as to its preservation.

Sale 53 Stipulation No.3

(a) Exploratory drilling operations, emplacement of structures (platforms) or seafloor wellheads for production or storage of oil or gas or , and the emplacement of pipelines will not be allowed within the potentially unstable portions of this lease block unless or until the lessee has demonstrated to the DCMOFO's satisfaction that mass movement of sediments is unlikely or that exploratory drilling operations, structures (platforms), casing, wellheads and pipelines can be safely designed to protect the environment in case such mass movement occurs at the proposed location. This may necessitate that all exploration for and development of oil or gas be performed from locations outside of the area of unstable sediments, either within or outside of this lease block.

If exploratory drilling operations are allowed, site-specific surveys shall be conducted to determine the potential for unstable bottom conditions. If emplacement of structures (platforms) or seafloor wellheads for production or storage of oil or gas are allowed, all such unstable areas must be mapped. The DCMOFO may also require soil testing before exploration and production operations are allowed.

(b) Exploratory drilling operations, emplacement of structures (platforms) or seafloor wellheads for production or storage of oil or gas or emplacement of pipelines will not be allowed within the potentially unstable portions of this lease block unless or until the lessee has demonstrated to the DCMOFO's satisfaction that exploratory drilling operations, structures (platforms), casing, wellheads and pipelines can be safely designed to protect the environment at the proposed location. This may necessitate that all exploration for and development of oil or gas be performed from locations outside of the area of submarine canyons or channels, either within or outside of this lease block.

If exploratory drilling operations are allowed, site-specific surveys shall be conducted to determine the potential for unstable bottom conditions. If emplacement of structures (platforms) or seafloor wellheads for production or storage of oil or gas are allowed, all such unstable areas must be mapped. The DCMOFO may also require soil testing before exploration and production n operations are allowed.

(c) Exploratory drilling operations, emplacement of structures (platforms) or seafloor wellheads for production or storage of oil or gas and emplacement of pipelines will not be allowed in the vicinity of a fault until the lessee has demonstrated to the DCMOFO's satisfaction that exploratory drilling operations, structures (platforms), casing, wellheads and pipelines can be safely designed to protect the environment at the proposed location. This may necessitate that all exploration for and development of oil or gas be performed from locations outside of the area of potential fault movement, either within or outside of this lease block.

If exploratory drilling operations are allowed, site-specific surveys shall be conducted to determine the potential for active faulting. If emplacement of structures (platforms) or seafloor wellheads for production or storage of oil or gas are allowed, all fault zones must be mapped. The DCMOFO may also require soil testing before exploration and production operations are allowed.

Sale 53 Stipulation No. 4

(a) The lessee agrees that prior to operating or causing to be operated on its behalf boat or aircraft traffic into individual, designated warning areas, the lessee shall coordinate and comply with instructions from the Commander, Western Space and Missile Center (WSMC), the Commander, Pacific Missile Test Center (PMTC), and the Commander, Fleet Area Control and Surveillance Facility (FACSFAC), or other appropriate military agency. Such coordination and instruction will provide for positive control of boats and aircraft operating in the warning areas at all times.

(b) The lessee, recognizing that mineral exploration and exploitation and recovery operations of the leased areas of submerged lands can impede tactical military operations, hereby recognizes and agrees that the United States reserves and has the right to temporarily suspend operations of the lessee under this lease in the interests of national security requirements. Such temporary suspension of operations, including the evacuation of personnel, and appropriate sheltering of personnel not evacuated (an appropriate shelter shall mean the protection of all lessee personnel for the entire duration of any Department of Defense activity from flying or falling objects or substances), will come into effect upon the order of the DCMOFO, after consultation with the Commander, Western Space and missile Center (WSMC), the Commander, Pacific Missile Test Center (PMTC), and the Commander, Fleet Area Control and Surveillance Facility (FACSFAC) or other appropriate military agency or higher authority, when national, security interested necessitate such action. It is understood that any temporary suspension of operations for national security may not exceed seventy-two hours; however, any such suspension may be extended by order of the DCMOFO. During such periods equipment may remain in place.

(c) The lessee agrees to control his own electromagnetic emissions and those of his agents, employees, invitee, independent contractors or subcontractors emanating from individual, designated defense warning areas in accordance with requirements specified by the Commander, Western Space and Missile Center (WSMC), the Commander, Pacific Missile Test Center (PMTC), or other appropriate military agency, to the degree necessary to prevent damage to, or unacceptable interference with Department of Defense flight, testing of operations activities conducted within individual, designated warning areas. Necessary monitoring, control, and coordination with the lessee, his agents, employees, invitee, independent contractors or subcontractors, will be effected by the Commander of the appropriate onshore military installation conducting operations in the particular warning area: provided, however, that control of such electromagnetic emissions shall permit at least one continuous channel of communication between a lessee, its agents, employees, invitee, independent contractors or subcontractors and onshore facilities.

Sale 53 Stipulation No. 5

Whether or not compensation for such damage or injury might be due under a theory of strict or absolute liability or otherwise, the lessee assumes all risks of damage or injury to persons or Property, which occurs in, on, or above the Outer Continental Shelf , to any person or persons or to any property of any person or persons who are agents, employees or invitee of the lessee, its agents, independent contractors or subcontractors doing business with the lessee in connection with any activities being performed by the lessee in, on, or above the Outer Continental Shelf, if such injury or damage to such person or property occurs by reason of the activities of any agency of the U.S. Government, its contractors, or subcontractors, or any of their officers, agents or employees, being conducted as a part of, or in connection with, the programs and activities of the Western Space and Missile Center (WSMC), the Pacific Missile Test Center (PMTC), or other appropriate military agency.

Notwithstanding any limitations of the lessee's liability in section 14 of the lease, the lessee assumes the risk whether such injury or damage is caused in whole or in part by any act or omission, regardless of negligence or fault, of the United States, its contractors or subcontractors, or any of their officers, agents, or employees. The lessee further agrees to indemnify and save harmless the United States against all claims for loss, damage, or injury sustained by the lessee, and to indemnify and save harmless the United States against an claims for loss, damage, or injury sustained by the agents, employees, or invitee of the lessee, its agents or any independent contractors or subcontractors doing business with the lessee in connection with the programs and activities of the aforementioned military installations and agencies, whether the same be caused in whole or in part by the negligence or fault of the United States, its contractors, or subcontractors, or any of their officers, agents, or employees and whether such claims might be sustained under theories of strict or absolute liability or otherwise.

Sale 53 Stipulation No. 6

(a) Pipelines will be required: (1) if pipeline rights-of-way can be determined and obtained; (2) if laying of such pipelines is technologically feasible and environmentally preferable; and (3) if, in the opinion of the lessor, pipelines can be laid without net social loss, taking into account any incremental costs of pipelines over alternative methods of transportation and any incremental benefits in the form of increased environmental protection or reduced multiple use conflicts. The lessor specifically reserves the right to require that any pipeline used for transporting production to shore be placed in certain designated management areas. In selecting the means of transportation, consideration win be given to any recommendation of the intergovernmental planning program for assessment and management of transportation of Outer Continental Shelf oil and gas with the participation of Federal, State, and local governments and the industry.

(b) Following the completion of pipeline installation, no crude oil production will be transported by surface vessel from offshore production sites, except in the case of emergency. Determinations as to emergency conditions and appropriate responses to these conditions will be made by the DCMOFO.

(c) Where the three criteria set forth in the first sentence of this stipulation are not met and surface transportation must be employed, all vessels used for carrying hydrocarbons to shore from the leased area will conform with all standards established for such vessels, pursuant to the Port and Tanker Safety Act of 1978 (PL 95-474).

Sale 53 Stipulation No. 7

(a) Wells. Subsea wellheads and temporary abandonments, to suspended operations that leave protrusions above the seafloor, shall be protected, feasible, in such a manner as to allow commercial trawling gear to pass over the structure without snagging or otherwise damaging the structure or the fishing gear. Latitude and longitude coordinates of these structures, along with water depths, shall be submitted to the DCMOFO. The coordinates of such structures will be determined by the lessee utilizing state-of-the-art navigation systems with accuracy of at least +/-50 feet (15.25 meters) at 200 miles (322 kilometers).

(b) Pipelines. All pipelines, unless buried, including gathering lines, shall have a smooth surface design. In the event that an irregular pipe surface is unavoidable due to the need for valves, anodes or other, structures, those irregular surfaces shall be protected in such a manner as to allow trawling gear to pass over the object without snagging or otherwise damaging the structure or the fishing gear.

Sale 53 Stipulation No. 8

The lessee shall include in his exploration and development plans. submitted under 30 CFR 250.34, a proposed fisheries training program for review and approval by the DCMOFO. The training program shall be for the personnel involved in vessel operations (related to offshore exploration and development and production operations), and platform and shore-based supervisors. The purpose of the training program shall be to familiarize persons working on the project of the value of the commercial fishing industry, the methods of offshore fishing operations, the potential conflicts between fishing operations and offshore oil and gas activities, the locations of marine mammal and bird rookery sites in the area, the seasonal abundance and sensitivities of these animals to disturbance, and the Federal laws that have been established to protect endangered and threatened species from harassment and injury. The program shall be formulated and implemented by qualified instructors.

Sale 53 Stipulation No. 9

(a) The royalty rate on production saved, removed or sold from this lease is subject to consideration for reduction under the same authority that applies to an other oil and gas leases on the Outer Continental Shelf (30 CFR 250.21). The Director, U.S. Geological Survey, may grant a reduction for only one year at a time and reduction of royalty rates win not be approved unless production has been underway for one year or more.

(b) Although the royalty rate specified in section 6(a) of this lease or as subsequently modified in accordance with applicable regulations and stipulations is applicable to all production under this lease, not more than 16 2/3 percent of the production saved, removed or sold from the lease area may be taken as royalty in amount, except as provided in section 15 (d); the royalty on any portion of the production saved, removed or sold from the lease in excess of 16 2/3 percent may only be taken in value of the production saved, removed or sold from the lease area.

Sale 53 Stipulation No. 10

(1) No producing well may be drilled where the well bore in the producing intervals is closer to the seaward boundary of the State of California than the distance agreed to between the State and the Department based on analysis of pertinent site-specific data, except that in no event shall the agreed distance be further than 750 feet from the seaward boundary of the State. In the absence of an agreed distance, no well shall be drilled closer than 500 feet to the seaward boundary of the State.

(2) The constraint in paragraph (1) shall not apply:

(a) If oil or gas pools or fields underlying both the outer Continental Shelf and lands subject to the jurisdiction of California are included in a production unit entered into by the relevant lessees and approved by the lessors, or in a production unit entered into by the Federal lessee and the State of California when it is a carried, non-operating owner.

(b) If, in the absence of a production unit as described in (a) above, the State of California permits production from State lands from a point closer than 750 feet from the Federal-State boundary. In the event that such production from State lands does occur, the Federal lessee shall be allowed to produce from offset wells equally close to the boundary in the area of Federal jurisdiction.

Sale 68 Stipulation No. 1

(a) If the DMMOFO has reason to believe that biological populations or habitats exist and require protection, he shall give the lessee notice that the lessor is invoking the provisions of this stipulation and the lessee shall comply with the following requirements. Prior to any drilling activity or the construction or placement of any structure for exploration or development on lease areas including, but not limited to, well drilling and pipeline and platform placement, hereinafter referred to as "operation," the lessee shall conduct site-specific surveys as approved by the DMMOFO and in accordance with prescribed biological survey requirements to determine the existence of any special biological resource including, but not limited to:

- Very unusual, rare, or uncommon ecosystems or ecotones.
- A species of limited regional distribution that may be adversely affected by any lease operations

If the results of such surveys suggest the existence of a special biological resource that may be adversely affected by any lease operation, the lessee shall: (1) relocate the site of such operation so as not to adversely affect the resources identified; (2) establish to the satisfaction of the DMMOFO on the basis of the site-specific survey, either that such operation will not have a significant adverse effect upon the resource identified or that a special biological resource does not exist. The DMMOFO will review all data submitted and determine, in writing, whether a special biological resource exists and whether it may be significantly affected by lessee's operations. The lessee may take no action until the DMMOFO has given the lessee written directions on how to proceed.

(b) The lessee agrees that if any area of biological significance should be discovered during the conduct of any operations on the leased area, he shall report immediately such findings to the DMMOFO, and make every reasonable effort to preserve and protect the biological resource from damage until the DMMOFO has given the lessee directions with respect to its protection.

Sale 68 Stipulation No. 2

If the DMMOFO has reason to believe that a site, structure, or object of historical or archaeological significance, hereinafter referred to as a "cultural resource," may exist in the lease area, and gives the lessee written notice that the lessor is invoking the provisions of this stipulation, the lessee shall upon receipt of such notice comply with the following requirements:

Prior to any drilling activity or the construction or placement of any structure for exploration or development on the lease, including but not limited to, well drilling and pipeline and platform placement, hereinafter in this stipulation referred to as "operation," the lessee shall conduct remote sensing surveys to determine the potential existence of any cultural resource that may be affected by such operations. All data produced by such remote sensing surveys as well as other pertinent natural and cultural environmental data shall be examined by a qualified marine survey archaeologist to determine if indications are present suggesting the existence of a cultural resource that may be adversely affected by any lease operation. A report of this survey and assessment prepared by the marine survey archaeologist shall be submitted by the lessee to the DMMOFO and the Manager for review.

If such cultural resource indicators are present the lessee shall: (1) locate the site of such operation so as not to adversely affect the identified location; or (2) establish, to the satisfaction of the DMMOFO, on the basis of further archaeological investigation conducted by a qualified marine survey archaeologist or underwater archaeologist using such survey equipment and techniques as deemed necessary by the DMMOFO, either that such operation shall not adversely affect the location identified or that the potential cultural resource suggested by the occurrence of the indicators does not exist.

A report of this investigation prepared by the marine survey archaeologist or underwater archaeologist shall be submitted to the DMMOFO and the Manager for their review. Should the DMMOFO determine that the existence of a cultural resource which may be adversely affected by such operation is sufficiently established to warrant protection, the lessee shall take no action that may result in an adverse effect on such cultural resource until the DMMOFO has given directions as to its preservation.

The lessee agrees that if any site, structure, or object of historical or archaeological significance should be discovered during the conduct of any operations on the leased area, he shall report immediately such findings to the DMMOFO and make every reasonable effort to preserve and protect the cultural resource from damage until the DMMOFO has given directions as, to its preservation.

Sale 68 Stipulation No. 3

All or portion of this tract may contain mass transport deposits, steep slopes, or active faulting. Exploratory drilling operations, emplacement of structures (platforms) or seafloor wellheads for production or storage of oil or gas, and the emplacement of pipelines will not be allowed within the potentially unstable portions of the lease block unless or until the lessee has demonstrated to the

DMMOFO's satisfaction that mass transport of sediments is unlikely or faulting is unlikely, or that exploratory drilling operations, structures (platforms), casing, wellheads, and pipelines can be safely designed to protect the environment in case such mass transport or faulting occurs at the proposed location. This may necessitate that all exploration for and development of oil and gas be performed from locations outside of the area of instability, either within or outside of this lease block.

If exploratory drilling operations are allowed, site-specific surveys shall be conducted to determine the potential for faulting and mass transport of sediments. If emplacement of structures (platforms) or seafloor wellheads for production or storage of oil or gas is allowed, all active faults or mass transport deposits in the lease must be mapped. The DMMOFO may also require soil testing before exploration and production operations are allowed.

Sale 68 Stipulation No. 4

(a) The lessee agrees that prior to operating or causing to be operated on its behalf boat or aircraft traffic into individual, designated warning areas, the lessee shall coordinate and comply with instructions from the Commander, Western Space and Missile Center (WSMC), and the Commander, Pacific Missile Test Center (PMTC), and the Commander, Fleet Area Control and Surveillance Facility (FACSFAC), or other appropriate military agency. Such coordination and instruction will provide for positive control of boats and aircraft operating into the warning areas at all times.

(b) The lessee, recognizing that mineral exploration and exploitation and recovery operations of the leased areas of submerged lands can impede tactical military operations, hereby recognizes and agrees that the United States reserves and has the right to temporarily suspend operations of the lessee under this lease in the interests of national security requirements. Such temporary suspension of operations, including the evacuation of personnel, and appropriate sheltering of personnel not evacuated (an appropriate shelter shall mean the protection of all lessee personnel for the entire duration of any Department of Defense activity from flying or falling objects or substances), will come into effect upon the order of the DMMOFO, after consultation with the Commander, Space and Missile Test Center (WSMC), and the Commander, Pacific Missile Test Center (PMTC), and the Commander, Fleet Area Control and Surveillance Facility (FACSFAC), or higher authority, when national security interests necessitate such action. It is understood that any temporary suspension of operations for national security may not exceed seventy-two hours; however, any such suspension may be extended by order of the DMMOFO. During such periods equipment may remain in place.

(c) The lessee agrees to control his own electromagnetic emissions and those of his agents, employees, invitees, independent contractors or subcontractors emanating from individual, designated defense warning areas in accordance with requirements specified by the Commander, Space and Missile Center (WSMC), and the Commander, Pacific Missile Test Center (PMTC), and the Commander, Fleet Area Control and Surveillance Facility (FACSFAC), or other appropriate military agency, to the degree necessary to prevent damage to, or unacceptable interference with, Department of Defense flight, testing or operational activities conducted within individual, designated warning areas. Necessary monitoring, control, and coordination with the lessee, his agents, employees, invitees, independent contractors or subcontractors, will be effected by the Commander of the appropriate onshore military installation conducting operations in the particular warning area: provided, however, that control of such electromagnetic emissions shall permit at least one continuous channel of communication between a lessee, its agents, employees, invitees, independent contractors or subcontractors and onshore facilities.

Sale 68 Stipulation No. 5

Whether or not compensation for such damage or injury might be due under a theory of strict or absolute liability or otherwise, the lessee assumes all risks of damage or injury to persons or property, which occurs in, on, or above the Outer Continental Shelf, to any person or persons or to any property of any person or persons who are agents, employees or invitees of the lessee, its agents, independent contractors or subcontractors doing business with the lessee in connection with any activities being performed by the lessee in, on, or above the Outer Continental Shelf, if such injury or damage to such person or property occurs by reason of the activities of any agency of the U.S. Government, its contractors, or subcontractors, or any of their officers, agents or employees, being conducted as a part of, or in connection with, the programs and activities of the Western Space and Missile Center (WSMC), the Pacific Missile Test Center (PMTC), or other appropriate military agency.

Not withstanding any limitations of the lessee's liability in section 14 of the lease, the lessee assumes the risk whether such injury or damage is caused in whole or in part by any act or omission, regardless of negligence or fault, of the United States, its contractors or subcontractors, or any of their officers, agents, or employees. The lessee further agrees to indemnify and save harmless the United States against all claims for loss, damage, or injury sustained by the lessee, and to indemnify and save harmless the United States against all claims for loss, damage, or injury sustained by the agents, employees, or invitees of the lessee, its agents or any independent contractors or subcontractors doing business with the lessee in connection with the programs and activities of the aforementioned military installations and agencies, whether the same be caused in whole or in part by the negligence or fault of the United States, its contractors, or subcontractors, or any of their officers, agents, or employees and whether such claims might be sustained under theories of strict .or absolute liability or otherwise.

Sale 68 Stipulation No. 6

No structures or drilling rigs will be allowed within portions of the tracts described below because of Department of Defense activities.

Tract No.	Restricted Portion
68-101	S ½ NE ¼ SE ¼
68-105	E ½ N ¼
68-112	South and East of a Diagonal line from NE corner to SW corner
68-125	South and East of a Diagonal line from NE corner to SW corner
68-164 (34N3 6W only)	W ½ E ½ E ½ , W ½ E ½ , E ½ , E ½ W ½ (Federal portions only)
68-169	W ½ E ½ NE ¼, W ½ NE ¼
68-204	NE ¼
68-207	E ½
68-212	N ½
68-213	N ½

Sale 68 Stipulation No. 7

(a) Pipelines will be required: (1) if pipeline rights-of-way can be determined and obtained; (2) if laying of such pipelines is technologically feasible and environmentally preferable; and (3) if, in the opinion of the lessor, pipelines can be laid without net social loss, taking into account any incremental costs of pipelines over alternative methods of transportation and any incremental benefits in the form of increased environmental protection or reduced multiple use conflicts. The lessor specifically reserves the right to require that any pipeline used for transporting production to shore be placed in certain designated management areas. In selecting the means of transportation, consideration will be given to any recommendation of the intergovernmental planning program for assessment and management of transportation of Outer Continental Shelf oil and gas with the participation of Federal, State, and local government and the industry.

(b) Following the development of sufficient pipeline capacity no crude oil production will be transported by surface vessel from offshore production sites, except in the case of emergency. Determinations as to emergency conditions and appropriate responses to these conditions will be made by the DMMOFO.

(c) Where the three criteria set forth in the first sentence of this stipulation are not met and surface transportation must be employed, all vessels used for carrying hydrocarbons to shore from the leased area will conform with all standards established for such vessels, pursuant to the Ports and Waterways Safety Act of 1978 (46 U.S.C., 1221 et seq.), as amended.

Sale 68 Stipulation No. 8

(a) Wells. Subsea wellheads and temporary abandonments, or suspended operations that leave protrusions above the seafloor, shall be protected, if feasible and as appropriate, in such a manner as to allow commercial fisheries trawling gear to pass over the structure without snagging or otherwise damaging the structure or the fishing gear. Latitude and longitude coordinates of these structures, along with water depths, shall be submitted to the DMMOFO. The coordinates of such structures will be determined by the lessee utilizing state-of-the-art navigation systems with accuracy of at least 50 feet (15.25 meters) at 200 miles (322 kilometers).

(b) Pipelines. All pipelines, unless buried, including gathering lines, shall have a smooth-surface design. In the event that an irregular pipe surface is unavoidable due to the need for valves, anodes or other structures, it shall, be protected in such a manner as to allow trawling gear to pass over the object without snagging or otherwise damaging the structure or the fishing gear.

Sale 68 Stipulation No. 9

(1) No producing well may be drilled where the well bore in the producing intervals is closer to the seaward boundary of the State of California based on analysis of pertinent site-specific data, except that in no event shall the agreed distance be further than 750 feet from the seaward boundary of the State. In the absence of an agreed distance, no well shall be drilled closer than 500 feet from the seaward boundary of the State.

(2) The constraint in paragraph (1) shall not apply:

(a) If oil or gas pools or fields underlying both the outer Continental Shelf and lands subject to the jurisdiction of California are included in a production unit entered into by the relevant lessees and approved by the lessors, or in a production unit entered into by the Federal lessee and the State of California when it is carried, nonoperating owner.

(b) If, in the absence of a production unit as described in (a) above, the State of California permits production from State lands from a point closer than 750 feet from the Federal-State boundary. In the event that such production from State lands does occur, the Federal lessee shall be allowed to produce from offset wells equally close to the boundary in the area of Federal jurisdiction.

Sale RS-2 Stipulation No. 1

If the DMMOFO has reason to believe that a site, structure, or object of historical or archaeological significance, hereinafter referred to as a “cultural resource,” may exist in the lease area, and gives the lessee written notice that the lessor is invoking the provisions of this stipulation, the lessee shall upon receipt of such notice comply with the following requirements:

Prior to any drilling activity or the construction or placement of any structure for exploration or development on the lease, including but not limited to, well drilling and pipeline and platform placement, hereinafter in this stipulation referred to as “operation,” the lessee shall conduct remote sensing surveys to determine the potential existence of any cultural resource that may be affected by such operations. All data produced by such remote sensing surveys as well as other pertinent natural and cultural environmental data shall be examined by a qualified marine survey archaeologist to determine if indications are present suggesting the existence of a cultural resource that may be adversely affected by any lease operation. A report of this survey and assessment prepared by the marine survey archaeologist shall be submitted by the lessee to the DMMOFO and the Manager for review.

If such cultural resource indicators are present the lessee shall: (1) locate the site of such operation so as not to adversely affect the identified location; or (2) establish, to the satisfaction of the DMMOFO, on the basis of further archaeological investigation conducted by a qualified marine survey archaeologist or underwater archaeologist using such survey equipment and techniques as deemed necessary by the DMMOFO, either that such operation shall not adversely affect the location identified or that the potential cultural resource suggested by the occurrence of the indicators does not exist.

A report of this investigation prepared by the marine survey archaeologist or underwater archaeologist shall be submitted to the DMMOFO and the Manager for their review. Should the DMMOFO determine that the existence of a cultural resource which may be adversely affected by such operation is sufficiently established to warrant protection, the lessee shall take no action that may result in an adverse effect on such cultural resource until the DMMOFO has given directions as to its preservation.

The lessee agrees that if any site, structure, or object of historical or archaeological significance should be discovered during the conduct of any operations on the leased area, he shall report immediately such findings to the DMMOFO and make every reasonable effort to preserve and protect the cultural resource from damage until the DMMOFO has given directions as to its preservation.

Sale RS-2 Stipulation No. 2

(a) If the DMMOFO has reason to believe that biological populations or habitats exist and require protection, he shall give the lessee notice that the lessor is invoking the provisions of this stipulation and the lessee shall comply with the following requirements. Prior to any drilling activity or the construction or placement of any structure for exploration or development on lease areas including, but not limited to, well drilling and pipeline and platform placement, hereinafter referred to as "operation," the lessee shall conduct site-specific surveys as approved by the DMMOFO and in accordance with prescribed biological survey requirements to determine the existence of any special biological resource including, but not limited to:

- Very unusual, rare, or uncommon ecosystems or ecotones.
- A species of limited regional distribution that may be adversely affected by any lease operations.

If the results of such surveys suggest the existence of a special biological resource that may be adversely affected by any lease operation, the lessee shall: (1) relocate the site of such operation so as not to adversely affect the resources identified; or (2) establish to the satisfaction of the DMMOFO, on the basis of the site-specific survey, either that such operation will not have a significant adverse effect upon the resource identified or that a special biological resource does not exist. The DMMOFO will review all data submitted and determine, in writing, whether a special biological resource exists and whether it may be significantly affected by lessee's operations. The lessee may take no action until the DMMOFO has given the lessee written directions on how to proceed.

(b) The lessee agrees that if any area of biological significance should be discovered during the conduct of any operations on the leased area, he shall report immediately such findings to the DMMOFO, and make every reasonable effort to preserve and protect the biological resource from damage until the DMMOFO has given the lessee directions with respect to its protection.

Sale RS-2 Stipulation No. 3b

Exploratory drilling operations, emplacement of structures (platforms) or seafloor wellheads for production or storage of oil and gas, and the emplacement of pipelines will not be allowed within the potentially unstable portions of this lease block unless or until the lessee has demonstrated to the DMMOFO's satisfaction that exploratory drilling operations, structures (platforms), casing, wellheads and pipelines can be safely designed to protect the environment at the proposed location. This may necessitate that all exploration for and development of oil and gas be performed from locations outside of the area of submarine canyons or channels, either within or outside of this lease block.

If exploratory drilling operations are allowed, site-specific surveys shall be conducted to determine the potential for unstable bottom conditions. If emplacement of structures (platforms) or seafloor wellheads for production or storage of oil or gas is allowed, all such unstable areas must be mapped. The DMMOFO may also require soil testing before exploration and production operations are allowed.

Sale RS-2 Stipulation No. 4

Whether or not compensation for such damage or injury might be due under a theory of strict or absolute liability or otherwise, the lessee assumes all risks of damage or injury to persons or property, which occur in, on, or above the Outer Continental Shelf, to any person or persons or to any property of any person or persons who are agents, employees or invitees of the lessee, its agents, independent contractors or subcontractors doing business with the lessee in connection with any activities being performed by the lessee in, on, or above the Outer Continental Shelf, if such injury or damage to such person or property occurs by reason of the activities of any agency of the U.S. Government, its contractors, or subcontractors, or any of their officers, agents or employees, being conducted as a part of, or in connection with, the programs and activities of the Western Space and Missile Center (WSMC), Vandenberg AFB, Lompoc, California; The Pacific Missile Test Center (PMTC), Pt. Mugu, California; and the Fleet Area Control and Surveillance Facility (FACSFAC), San Diego, California.

Not withstanding any limitations of the lessee's liability in section 14 of the lease, the lessee assumes the risk whether such injury or damage is caused in whole or in part by any act or omission, regardless of negligence or fault, of the United States, its contractors or subcontractors, or any of their officers, agents, or employees. The lessee further agrees to indemnify and save harmless the United States against all claims for loss, damage, or injury sustained by the lessee, and to indemnify and save harmless the United States against all claims for loss, damage, or injury sustained by the agents, employees, or invitees of the lessee, its agents or any independent contractors or subcontractors doing business with the lessee in connection with the programs and activities of the aforementioned military installations and agencies, whether the same be caused in whole or in part by the negligence or fault of the United States, its contractors, or subcontractors, or any of their officers, agents, or employees and whether such claims might be sustained under theories of strict or absolute liability or otherwise.

The lessee agrees to control his own electromagnetic emissions and those of his agents, employees, invitees, independent contractors or subcontractors emanating from individual, designated defense warning areas in accordance with requirements specified by the Commander of Western Space and Missile Center (WSMC), Vandenberg AFB, Lompoc, California; The Pacific Missile Test Center (PMTC), Pt. Mugu, California; and the Fleet Area Control and Surveillance Facility (FACSFAC), San Diego, California, to the degree necessary to prevent damage to, or unacceptable interference with, Department of Defense flight, testing or operational activities conducted within individual, designated warning areas. Necessary monitoring, control, and coordination with the lessee, his agents, employees, invitees, independent contractors or subcontractors, will be effected by the Commander of the appropriate onshore military installation conducting operations in the particular warning area: provided, however, that control of such electromagnetic emissions shall permit at least one continuous channel of communication between a lessee, its agents, employees, invitees, independent contractors or subcontractors and onshore facilities.

The lessee agrees that prior to operating or causing to be operated on its behalf boat or aircraft traffic into individual, designated warning areas, the lessee shall coordinate and comply with instructions from the Commander of Western Space and Missile Center (WSMC), Vandenberg AFB, Lompoc, California; The Pacific Missile Test Center (PMTC), Pt. Mugu, California; and the Fleet Area Control and Surveillance Facility (FACSFAC), San Diego, California, or other appropriate military agency. Such coordination and instruction will provide for positive control of boats and aircraft operating in the warning area at all times.

Sale RS-2 Stipulation No. 5

The lessee, recognizing that mineral exploration and exploitation and recovery operations of the leased areas of submerged lands can impede tactical military operations, hereby recognizes and agrees that the United States reserves and has the right to temporarily suspend operations of the lessee under this lease in the interests of national security requirements. Such temporary suspension of operations, including the evacuation of personnel, and appropriate sheltering of personnel not evacuated (an appropriate shelter shall mean the protection of all lessee personnel for the entire duration of any Department of Defense activity from flying or falling objects or substances), will come into effect upon the order of the DMMOFO, after consultation with the Commander of Western Space and Missile Center (WSMC), Vandenberg AFB, Lompoc, California; The Pacific Missile Test Center (PMTC), Pt. Mugu, California; and the Fleet Area Control and Surveillance Facility (FACSFAC), San Diego, California, or other appropriate military agency, higher authority, when national security interests necessitate such action. It is understood that any temporary suspension of operations for national security may not exceed seventy-two hours; however, any such suspension may be extended by order of the DMMOFO. During such periods equipment may remain in place.

Sale RS-2 Stipulation No. 6

(a) Pipelines will be required: (1) if pipeline rights-of-way can be determined and obtained; (2) if laying of such pipelines is technologically feasible and environmentally preferable; and (3) if, in the opinion of the lessor, pipelines can be laid without net social loss, taking into account any incremental costs of pipelines over alternative methods of transportation and any incremental benefits in the form of increased environmental protection or reduced multiple use conflicts. The lessor specifically reserves the right to require that any pipeline used for transporting production to shore be placed in certain designated management areas. In selecting the means of transportation, consideration will be given to any recommendation of the intergovernmental planning program for assessment and management of transportation of Outer Continental Shelf oil and gas with the participation of Federal, State, and local government and the industry.

(b) Following the development of sufficient pipeline capacity, no crude oil production will be transported by surface vessel from offshore production sites, except in the case of emergency. Determinations as to emergency conditions and appropriate responses to these conditions will be made by the DMMOFO.

(c) Where the three criteria set forth in the first sentence of this stipulation are not met and surface transportation must be employed, all vessels used for carrying hydrocarbons to shore from the leased area will conform with all standards established for such vessels, pursuant to the Ports and Waterways Safety Act of 1978 (33 U.S.C., 1221 et seq.).

Sale RS-2 Stipulation No. 7

(a) Wells. Subsea well-heads and temporary abandonments, or suspended operations that leave protrusions above the seafloor, shall be protected, if feasible and as appropriate, in such a manner as to allow commercial fisheries trawling gear to pass over the structure without snagging or otherwise damaging the structure or the fishing gear. Latitude and longitude coordinates of these structures, along with water depths, shall be submitted to the DMMOFO. The coordinates of such structures will be determined by the lessee utilizing state-of-the-art navigation systems with accuracy of at least " 50 feet (15.25 meters) at 200 miles (322 kilometers).

(b) Pipelines. All pipelines, unless buried, including gathering lines, shall have a smooth-surface design. In the event that an irregular pipe surface is unavoidable due to the need for valves, anodes or other structures, it shall, as appropriate, be protected in such a manner as to allow trawling gear to pass over the object without snagging or otherwise damaging the structure or the fishing gear.

Sale RS-2 Stipulation No. 8

The lessee shall include in his exploration and development plans, submitted under 30 CFR 250.34, a proposed fisheries training program for review and approval by the DMMOFO. The training program shall be for the personnel involved in vessel operations (related to offshore exploration and development and production operations), and platform and shore based supervisors. The purpose of the training program shall be to familiarize persons working on the project of the value of commercial fishing industry, the methods of offshore fishing operations, the potential conflicts between fishing operations and offshore oil and gas activities, the locations of marine mammal and bird rookery sites in the area, the seasonal abundance and sensitivities of these animals to disturbance, and the Federal laws that have been established to protect endangered species from harassment and injury. The program shall be formulated and implemented by qualified instructors.

Sale RS-2 Stipulation No. 9

(a) The royalty rate on production from this lease is subject to consideration for reduction under the same authority that applies to all other oil and gas leases on the Outer Continental Shelf (30 CFR 250.21). The Director, Minerals Management Service, may grant a reduction for only one year at a time and reduction of royalty rates will not be approved unless production has been underway for one year or more.

(b) Although the royalty rate specified in Sec.6(a) of this lease or as subsequently modified in accordance with applicable regulations and stipulations is applicable to all production under this lease, not more than 16 2/3 percent of the production from the lease area may be taken as royalty in amount, except as provided in sec. 15(d); the royalty on any portion of the production from the lease in excess of 16 2/3 percent may only be taken in value of the production from the lease area.

Sale 80 Stipulation No. 1 - Protection of Biological Resources

(a) If the Regional Manager (RM) has reason to believe that biological populations or habitats exist and require protection, the RM shall give the lessee notice that the lessor is invoking the provisions of this stipulation and the lessee shall comply with the following requirements. Prior to any drilling activity or the construction or placement of any structure for exploration or development on lease areas including, but not limited to, well drilling and pipeline and platform placement, hereinafter referred to as "operation," the lessee shall conduct site-specific surveys as approved by the RM and in accordance with prescribed biological survey requirements to determine the existence of any special biological resource including, but not limited to:

- Very unusual, rare, or uncommon ecosystems or ecotones.
- A species of limited regional distribution that may be adversely affected by any lease operation.

If the results of such surveys suggest the existence of a special biological resource that may be adversely affected by any lease operation, the lessee shall: (1) relocate the site of such operation so as not to adversely affect the resources identified; (2) modify operations in such a way as not to adversely affect the significant biological populations or habitats deserving protection; or (3) establish to the satisfaction of the RM on the basis of the site-specific survey, either that such operation will not have a significant adverse effect upon the resource identified or that a special biological resource does not exist. The RM will review all data submitted and determine, in writing, whether a special biological resource exists and whether it may be significantly affected by lessee’s operations. The lessee may take no action until the RM has given the lessee written directions on how to proceed.

(b) The lessee agrees that, if any area of biological significance should be discovered during the conduct of any operations on the leased area, the lessee shall report immediately such findings to the RM, and make every reasonable effort to preserve and protect the biological resources from damage until the RM has given the lessee directions with respect to its protection.

Sale 80 Stipulation No. 2 - Protection of Cultural Resources

(a) “Cultural Resource” means any site, structure, or object of historical or archaeological significance. “Operations” means any drilling, mining, or construction or placement of any structure for exploration, development, or production of the lease.

(b) If the Regional Manager (RM) believes a cultural resource may exist in the lease area, the RM will notify the lessee in writing. The lessee shall then comply with subparagraphs (1) through (3).

(1) Prior to commencing any operations, the lessee shall prepare a report, as specified by the RM, to determine the potential existence of any cultural resource that may be affected by such operations. The report, prepared by an archaeologist and geophysicist, shall be based on an assessment of data from remote sensing surveys and other pertinent cultural and environmental information. The lessee shall submit this report to the RM for review.

(2) If the evidence suggests that a cultural resource may be present, the lessee shall either:

(i) Locate the site of such operation so as not to adversely affect the area where the cultural resource may be; or

(ii) Establish, to the satisfaction of the RM that a cultural resource does not exist or will not be adversely affected by operations. This shall be done by further archaeological investigation, conducted by an archaeologist and a geophysicist, using survey equipment and techniques deemed necessary by the RM. A report of the investigation shall be submitted to the RM for review.

(3) If the RM determines that a cultural resource is likely to present on the lease and may be adversely affected by such operation, the RM will notify the lessee immediately. The lessee shall take no action that may adversely effect the cultural resource until the RM has told the lessee how to protect it.

(c) If the lessee discovers any cultural resource while conducting operations on the lease area, the lessee shall report the discovery immediately to the RM. The lessee shall make every reasonable effort to preserve the cultural resource until the RM has told the lessee how to protect it.

Sale 80 Stipulation No. 3 - Operational Control, Electromagnetic Emissions, And Evacuation

(a) The lessee agrees that, prior to operating or causing to be operated on its behalf boat or aircraft traffic into individual designated warning areas, the lessee shall coordinate and comply with instructions from the Commander, Western Space and Missile Center (WSMC), the Commander, Pacific Missile Test Center (PMTC), and the Commander, Fleet Area Control and Surveillance Facility (FACSFAC), or other appropriate military agency. Such coordination and instruction will provide for positive control of boats and aircraft operating in the warning area at all times.

(b) The lessee agrees to control its own electromagnetic emissions and those of his agents, employees, invitees, independent contractors or subcontractors emanating from individual, designated defense warning areas in accordance with requirements specified by the Commander WSMC, Commander PMTC, and the Commander FACSFAC, or other appropriate military agency, to the degree necessary to prevent damage to or unacceptable interference with Department of Defense flight, testing or operations activities conducted within individual, designated warning areas. Necessary monitoring, control, and coordination with the lessee, its agents, employees, invitees, independent contractors or subcontractors, will be effected by the Commander of the appropriate onshore military installation conducting operations in the particular warning area: provided, however, that control of such electromagnetic emissions shall permit at least one continuous channel of communication between a lessee, its agents, employees, invitees, independent contractors or subcontractors and onshore facilities.

(c) The lessee, recognizing that mineral exploration and exploitation and recovery operations of the leased areas of submerged lands can impede tactical military operations, hereby recognizes and agrees that the United States reserves and has the right to temporarily suspend operations of the lessee under this lease in the interests of national security requirements. Such temporary suspension of operations, including the evacuation of personnel and appropriate sheltering of personnel not evacuated (appropriate shelter shall mean the protection of all lessee personnel for the entire duration of any Department of Defense activity from flying or falling objects or substances) will come into effect upon the order of the Regional Manager (RM) after consultation with the Commander WSMC, Vandenberg AFB, Lompoc, California, or other appropriate military agency, higher authority, when national security interests necessitate such action. It is understood that any temporary suspension of operations for national security may not exceed 72 hours; however, any such suspension may be extended by order of the RM. During such periods equipment may remain in place.

Sale 80 Stipulation No. 4 - Hold Harmless

Whether or not compensation for such damage or injury might be due under a theory of strict or absolute liability or otherwise, the lessee assumes all risks of damage or injury to persons or property which occur in, on, or above the Outer Continental Shelf, to any person or persons or to any property of any person or persons who are agents, employees or invitees of the lessee, its agents, independent contractors or subcontractors doing business with the lessee in connection with any activities being performed by the lessee in, on, or above the Outer Continental Shelf, if such injury or damage to such person or property occurs by reason of the activities of any agency of the U.S. Government, its contractors or subcontractors, or any of their officers, agents, or employees, being conducted as a part of, or in connection with, the programs and activities of the Western Space and Missile Center, Pacific Missile Test Center, or other appropriate military agency.

Not withstanding any limitations of the lessee's liability in section 14 of the lease, the lessee assumes the risk whether such injury or damage is caused in whole or in part by any act or omission, regardless of negligence or fault, of the United States, its contractors or subcontractors, or any of their officers, agents, or employees. The lessee further agrees to indemnify and save harmless the United States against all claims for loss, damage, or injury sustained by the lessee, and to indemnify and save harmless the United States against all claims for loss, damage, or injury sustained by the agents, employees, or invitees of the lessee, its agents, or any independent contractors or subcontractors doing business with the lessee in connection with the programs and activities of the aforementioned military installations and agencies, whether the same be caused in whole or in part by the negligence or fault of the United States, its contractors, or subcontractors, or any of their officers, agents, or employees and whether such claims might be sustained under theories of strict or absolute liability or otherwise.

Sale 80 Stipulation No. 5 - Transportation of Hydrocarbon Products

(a) Pipelines will be required: (1) if pipeline rights-of-way can be determined and obtained; (2) if laying of such pipelines is technologically feasible and environmentally preferable; and (3) if, in the opinion of the lessor, pipelines can be laid without net social loss, taking into account any incremental costs of pipelines over alternative methods of transportation and any incremental benefits in the form of increased environmental protection or reduced multiple use conflicts. The lessor specifically reserves the right to require that any pipeline used for transporting production to shore be placed in certain designated management areas. In selecting the means of transportation, consideration will be given to any recommendation of the Pacific Regional Technical Working Group with the participation of Federal, State, and local government and the industry.

(b) Following the development of sufficient pipeline capacity, no crude oil production will be transported by surface vessel from offshore production sites, except in the case of emergency. Determinations as to emergency conditions and appropriate responses to these conditions will be made by the Regional Manager.

(c) Where the three criteria set forth in the first sentence of this stipulation are not met and surface transportation must be employed, all vessels used for carrying hydrocarbons to shore from the leased area will conform with all standards established for such vessels, pursuant to the Ports and Waterways Safety Act of 1972 (33 U.S.C., 1221 et seq.).

Sale 80 Stipulation No. 6 - Wells and Pipelines

(a) Wells. Subsea well-heads and temporary abandonments, or suspended operations that leave protrusions above the seafloor, shall be protected, if, feasible, in such a manner as to allow commercial trawl gear to pass over the structure without snagging or otherwise damaging the structure or the fishing gear. Latitude and longitude coordinates of these structures, along with water depths, shall be submitted to the Regional Manager. The coordinates of such structures will be determined by the lessee utilizing state-of-the-art navigation systems with accuracy of at least “ 50 feet at 200 miles.

(b) Pipelines. All pipelines, unless buried, including gathering lines, shall have a smooth-surface design. In the event that an irregular pipe surface is unavoidable due to the need of valves, anodes or other structures, those irregular surfaces shall be protected in such a manner as to allow trawl gear to pass over the object without snagging or otherwise damaging the structure or the fishing gear.

Sale 80 Stipulation No. 7 - Fisheries and Wildlife Training Program

The lessee shall include in its exploration and development plans, submitted under 30 CFR 250.34, a proposed fisheries and wildlife training program for review and approval by the Regional Manager. The training program shall be for all personnel involved in exploration, development, and production operations, and for platform and shorebased supervisors. The purpose of the training program shall be to familiarize persons working on the project of the value of the commercial fishing industry, the methods of offshore fishing operations, the potential conflicts between fishing operations and offshore oil and gas activities, the locations of marine mammal and bird rookery sites in the area, the locations of gray whale and other endangered whale migration routes in the area, the seasonal abundance and sensitivities of these animals to disturbance, and the Federal laws that have been established to protect endangered and threatened species from harassment or injury. Additionally, the lessee shall include in the training program required above, information on the behavior of gray whales migration and how to avoid conflicts with this migration. The program shall be formulated and implemented by qualified instructors.

Stipulation No. 8 - Hazardous Waste

Prior to any drilling activity or the construction or placement of any structure for exploration or development on the lease, including but not limited to well drilling and pipeline and platform placement, hereinafter in this stipulation referred to as “operation,” the lessee shall investigate the potential existence of any radioactive waste, munitions, or toxic chemical waste on the lease. This investigation shall consist of examination of date acquired in the course of the shallow geologic hazard survey as conducted in accordance with the current Notice to Lessees issued by the Regional Manager (RM) and examination of the dump site records. This survey shall be over an acceptable grid and shall employ a magnetometer, water depth recorder, and dual side scan sonar or other equipment as determined necessary by the RM. If the results of the survey indicate the presence of such dumped materials, further investigation as to their nature may be required. A report of this investigation shall be included in the shallow geologic hazards survey report.

If the presence of dumped material is established, the lessee shall: (1) locate the site of the operation so as not to disturb the material; (2) conduct the operation in a manner that minimally disturbs the ocean floor (e.g., dynamically positioned drilling vessel); or (3) establish to the satisfaction of the RM, on the basis of further investigation, that disturbance of the material would not result in any adverse effects on the human or marine environments.

Stipulation No. 9 - Protection of Important Biological Resources

(a) The lessee shall be required to maintain state of-the-art oil spill containment and cleanup equipment (in accordance with the requirements of the previously agreed upon U.S. Coast Guard (USCG) Notice No. 5740) onsite and in the vicinity of exploratory drilling and development and production operations. In addition, suitable means of deployment and personnel trained in deployment and use of this equipment must be available. Such deployment for exploration, development, and production operations shall have the capability of immediate initiation of oil spill containment and cleanup.

(b) In the case of spills larger than can be contained by equipment on exploration vessels or production platforms, the lessee shall maintain state-of-the art equipment on the vessels which, based on the proximity to the Channel Islands National Marine Sanctuary, are capable of responding to a request for assistance and being on the scene within 2 to 4 hours of the request if local conditions permit. The lessee shall install on exploration vessels and production platforms real-time monitoring capability to assist the USCG in acquiring meteorological and oceanographic data necessary to make accurate predictions of the trajectory of oil spills. This information shall support oil spill containment and cleanup operations. When a spill greater than 1 barrel occurs, the lessee shall notify the California Office of Emergency Services within 24 hours of such a spill.

(c) Development and production operations will be required to include the capability to automatically detect the loss of oil and gas at any time.

Stipulation No. 10 - Testing Of Oil Spill Containment Equipment

The lessee shall conduct semi-annual full-scale drills at the request of the lessor for platforms and operator-controlled contracted cleanup vessels for deploying equipment in open water to test the equipment and the contingency plan. These drills must involve all primary equipment identified in the oil spill contingency plans as satisfying Outer Continental Shelf Operating Order No. 7. At least two of these drills shall include the primary equipment controlled and operated by the appropriate cooperative. These drills will be unannounced and held under realistic environmental conditions in which deployment and operations can be accomplished without endangering safety of personnel. Representatives of the U.S. Coast Guard, Minerals Management Service. and California Coastal Commission may be present as observers. The lessor's inspectors will frequently inspect oil and gas facilities where oil spill containment and cleanup equipment are maintained in order to assure readiness.

Stipulation No. 11 - Onshore Oil Processing

Any initial processing of oil will be conducted at an onshore facility, if feasible, subject to the granting of necessary permits by local authorities within a reasonable period of time as provided for in State of California law. If after review by local and State authorities these permits cannot be acquired, then the Regional Manager shall determine, in cooperation and participation with the State, what further action needs to be taken in regard to the lessee's development and production plan. Exceptions to the initial onshore processing include standard oil/gas/water separation processes and necessary treatment of oil prior to being pumped from the platform into a pipeline to shore, if pipeline transport is determined practicable.

Stipulation No. 12 - Protection of Commercial Fisheries

(a) The lessee, operator(s), subcontractor(s), and all personnel involved in exploration, development, and production operations shall endeavor to minimize conflicts between the oil and gas industry and the commercial fishing industry.

Prior to submitting a plan of exploration or development to the lessor, appropriate oil and gas personnel shall contact potentially affected commercial fishermen or their representatives to discuss potential conflicts with the siting, timing, and methods proposed. Through this consultation the lessee shall assure that, whenever feasible, exploratory and development activities are compatible with seasonal fishing operations and will not result in permanently barring commercial fishing from important fishing grounds.

A discussion of the resolutions reached during this consultation process and a discussion of any unresolved conflicts shall be included in the Plan of Exploration or Development/Production. The lessee shall send a copy of the Plan of Exploration or Development/Production to the fisheries liaison office and the marine extension office at the same time they are submitted to the lessor to allow concurrent review and comment as part of the lessor's plan approval process.

In accordance with 30 CFR 250.34-1(b)(1), copies of such plans are sent to appropriate State agencies, such as the California State Lands Commission, California Department of Fish and Game, and the California Coastal Commission.

(b) In particular, the lessee shall show in the Plan of Exploration or Development/Production crew and supply boat operation routes which will be used to minimize impacts to commercial fishing, marine mammals, and endangered and threatened species. Conflicts foreseen in the planning stages or that develop later shall be resolved whenever feasible and as quickly as possible.

(c) The lessee also shall include in the Plan of Development/ Production analyses of the effects of its operations on the allocation and use of local dock space by fishing boats and crew and supply boats. These analyses shall include present (baseline) uses, predicted oil and gas uses which increase the level of demand, and an assessment of individual and cumulative impacts. Conflicts foreseen in the planning stages or that develop later shall be resolved whenever feasible and as quickly as possible.

(d) The lessee shall be required to employ jackup drilling rigs for drilling exploratory wells in primary commercial fishing trawl grounds as determined by the Regional Manager (RM) when water depths are 275 feet or less. The RM may approve other drilling vessels when geological or bottom conditions prohibit the use of jack-ups. When considering the use of other drilling vessels, the RM will consult with the California Department of Fish and Game to determine the effects of the vessels on commercial fishing.

(e) All activities associated with exploration and development operations shall be conducted to avoid the creation of obstacles to commercial fishing operations. If the RM has reason to believe that the site has not been adequately cleared, additional surveys shall be required to detect the location of any obstacles to commercial fishing.

Stipulation No. 13 - Protection of Marine Biota

All drilling muds discharged from exploration and development and production operations must contain only those components approved by the U. S. Environmental Protection Agency in accordance with National Pollutant Discharge Elimination System permits issued for this lease.

When drilling fluid discharges are proposed within 1000 meters of Areas of Special Biological Significance, a National Marine Sanctuary, or other sensitive areas as determined by the Regional Manager, the lessee shall include the results of a drilling fluids dispersion model for anticipated discharges in a Plan of Exploration or Development/Production.

Stipulation No. 14 - Disposal of Drilling Discharges

The Regional Manager (RM) may require the lessee to modify muds and cutting discharge operations or transport the material to disposal sites approved by the U.S. Environmental Protection Agency (EPA). After consultation with the EPA, the RM shall determine the method of disposal based upon review of the data obtained from the surveys and studies established pursuant to Stipulation No. 1 and from other relevant sources of information.

Stipulation No. 15 - Suspension of Operations

The Director shall suspend or temporarily prohibit production or any other operation or activity pursuant to this lease if such suspension or cessation of operations or activities is necessary to complete operations or activities described in a development and production plan approved by the Regional Manager pursuant to 3 0 CFR part 250.34.

Stipulation No. 16 - Protection of Mackerel Fishery in San -Pedro Bay

(a) The lessee shall be required to employ jackup drilling rigs for drilling exploratory wells as determined by the Regional Manager (RM) when water depths are 275 feet or less. The RM may approve other drilling vessels when geological or bottom conditions prohibit the use of jack-ups. When considering the use of other drilling vessels, the RM will consult with the California Department of Fish and Game to determine the effects of the vessels on commercial fishing.

(b) Lessees shall not employ pendant buoys on drilling vessels or shall place pendant buoys at a depth sufficient to avoid conflict with the mackerel fishery on these blocks. Anchor patterns will be designed to minimize displacement area.

Stipulation No. 17 - Protection of Air Quality

Lessees shall comply with the following requirements until the Minerals Management Service completes rulemaking procedures concerning air quality regulations applicable to oil and gas operations on the Outer Continental Shelf off California. Any revisions to the current air quality rules will be applied to all exploratory and development/production operations on leases issued as a result of this sale.

(a). For drilling vessels used in exploration activities, the lessee shall apply control technologies for NOX identified by the Regional Manager (RM) or apply other control measures that result in equivalent emissions limitations. The lessee shall use only those pollution control technologies which can be approved by the U.S. Coast Guard (USCG), the American Bureau of Shipping (ABS), and/or other agencies as appropriate.

(b) The lessee shall provide the RM with the schedule and location of proposed exploration activities at least 2 months in advance of the activities.

(c) For all plans of development/production the lessee shall provide, in a manner specified by the RM, an evaluation of the impacts of emissions of NOX and VOC on onshore concentrations of N02 and 03.

(d) For development/ production facilities and for oil transport vessels while attached to the facility, the lessee shall apply control technologies for NOX and VOC identified by the RM, or apply other control measures that result in equivalent emission limitations. The lessee shall use only those pollution control technologies which can be approved by the USCG, the ABS, and/or other agencies as appropriate.

(e) The lessee shall install best available control technology; approved by the RM and by the USCG, the ABS, and/or other agencies, as appropriate, to reduce VOC emissions resulting from the transfer of oil from storage facilities to a transport vessel.

H.2 Current Ownership, Suspension History, Lease Stipulations, and Exploration History

Table H.1 provides a summary of the current ownership, suspension history, lease stipulations, and exploration history of the undeveloped Units and Leases of the Pacific OCS.

Table H-1. Summary of the Current Ownership, Suspension History, Lease Stipulations, and Exploration History of the Undeveloped Units and Leases of the Pacific OCS

Unit and Leases	Owner(s)	Operator	Lease Sale, Lease Date, Orig. 5-Year Term	Lease Term Extensions * Suspension of Production ᵗ Suspension of Operations	Lease Sale Stipulations	Status
N/A OCS-P 0409	Aera Delta Ogle OLAC Samedan	Aera	53 7/81 6/86	• 7/86-6/87 SOP* for proposed installation of Platform Julius • 7/87-6/89 SOP to obtain permits for construction and installation of Platform Julius. • 6/89-6/90 SOP to obtain permits, reinterpret 3D seismic data, participate in cooperative effort to secure a drilling rig (IROCC). • 7/90-6/94 SOP to reinterpret 3D seismic data, participate in rig cooperative, unitize with Lion Rock Unit • 1/93-6/99 Directed SOOᵗ for COOGER Study. • 7/99-8/16/99 Directed SOO for additional MMS review time on SOP request. • 8/17/99-11/15/99 Directed SOO to provide additional information • 11/12/99-11/01/02 SOP to proceed toward production.	• Protection of Biological Resources • Protection of Cultural Resources. • Operational Controls, electromagnetic Emissions, and Evacuation • Hold Harmless. • Transportation of Hydrocarbon Products • Wells and Pipelines. • Fisheries and Wildlife Training Program	• 9 exploratory wells approved by CCC. • 6 wells drilled between11/82 and3/84. • 3 previously approved wells have not been drilled.
Lion Rock Unit OCS-P 0396 0402 0408 0414	Aera REM Petroleum	Aera	53 7/81 6/86	• 6/86-6/88 SOP to acquire and interpret 3D seismic data • 6/88-6/90 SOP to drill unit well by 1/90. • 7/90-6/94 SOP to participate in rig cooperative (IROCC). Drill and test well. Unitize with 0409. • 1/93-6/99 Directed SOO for COOGER Study. • 7/99-8/16/99 Directed SOO for additional MMS review time on SOP request. • 8/17/99-11/15/99 Directed SOO to provide additional information • 11/12/99-11/01/02 SOP to proceed toward production.	• Protection of Biological Resources • Protection of Cultural Resources. • Operational Controls, electromagnetic Emissions, and Evacuation • Hold Harmless. • Transportation of Hydrocarbon Products • Wells and Pipelines. • Fisheries and Wildlife Training Program	• 24 exploratory wells approved by CCC for Lion Rock Unit. • 6 wells drilled between 6/82-4/85. • 18 previously approved wells have not been drilled.
Lion Rock Unit OCS-P 0397 0403	Aera RME Petroleum PXP	Aera	53 7/81 6/86	• 6/86-6/88 SOP to acquire and interpret 3D seismic data • 6/88-6/90 SOP to drill unit well by 1/90. • 7/90-6/94 SOP to participate in rig cooperative (IROCC). Drill and test well. Unitize with 0409. • 1/93-6/99 Directed SOO for COOGER Study. • 7/99-8/16/99 Directed SOO for additional MMS review time on SOP request. • 8/17/99-11/15/99 Directed SOO to provide additional information • 11/12/99-11/01/02 SOP to proceed toward production	• Protection of Biological Resources • Protection of Cultural Resources. • Potential Geologic Hazards, Part (c). • Operational Controls, electromagnetic Emissions, and Evacuation • Hold Harmless. • Transportation of Hydrocarbon Products • Wells and Pipelines. • Fisheries and Wildlife Training Program	see previous
Point Sal Unit OCS-P 0415 0421	Aera Delta PXP Ogle OLAC Samedan	Aera	53 7/81 6/86	• 6/86-12/87 SOP to acquire and interpret 3D seismic data; simulation of Monterey reservoir. • 12/87-12/89 SOP to drill unit well by 6/89, finalize 3D analysis • 7/89-6/94 SOP to participate in rig cooperative (IROCC), drill and test well, evaluate results, commence development planning. • 1/93-6/99 Directed SOO for COOGER Study. • 7/99-8/16/99 Directed SOO for additional MMS review time on SOP request. • 8/17/99-11/15/99 Directed SOO to provide additional information	• Protection of Biological Resources • Protection of Cultural Resources. • Operational Controls, electromagnetic Emissions, and Evacuation • Hold Harmless. • Transportation of Hydrocarbon Products • Wells and Pipelines. • Fisheries and Wildlife Training Program	• 14 exploratory wells approved by CCC for Point Sal Unit. • 4 wells drilled between 1/84 and 9/85. • 10 previously approved wells have not been

Unit and Leases	Owner(s)	Operator	Lease Sale, Lease Date, Orig. 5-Year Term	Lease Term Extensions * Suspension of Production t Suspension of Operations	Lease Sale Stipulations	Status
				• 11/12/99-11/01/02 SOP to proceed toward production, spud delineation well.		drilled.
Point Sal Unit OCS-P 0416 0422	Aera Delta PXP Ogle OLAC Samedan	Aera	53 7/81 6/86	• 6/86-12/87 SOP to acquire and interpret 3D seismic data; simulation of Monterey reservoir. • 12/87-12/89 SOP to drill unit well by 6/89, finalize 3D analysis • 7/89-6/94 SOP to participate in rig cooperative (IROCC), drill and test well, evaluate results, commence development planning. • 1/93-6/99 Directed SOO for COOGER Study. • 7/99-8/16/99 Directed SOO for additional MMS review time on SOP request. • 8/17/99-11/15/99 Directed SOO to provide additional information. • 11/12/99-11/01/02 SOP to proceed toward production, spud delineation well.	• Protection of Biological Resources. • Protection of Cultural Resources. • Potential Geologic Hazards, Part (c). • Operational Controls, electromagnetic Emissions, and Evacuation. • Hold Harmless. • Transportation of Hydrocarbon Products. • Wells and Pipelines. • Fisheries and Wildlife Training Program. • Drilling Restrictions near State Boundary	see previous
Purisima Point Unit OCS-P 0426	Aera	Aera	53 7/81 6/86	• 6/86-6/88 SOP to acquire and interpret 3D seismic data. • 6/88-6/90 SOP to drill unit well by 1/90. Analyze 3D data. • 7/90-6/94 SOP to reinterpret 3D seismic, redefine unit boundaries, participate in rig cooperative (IROCC), drill and test well, evaluate results. • 1/93-6/99 Directed SOO for COOGER Study. • 7/99-8/16/99 Directed SOO for additional MMS review time on SOP request. • 8/17/99-11/15/99 Directed SOO to provide additional information. • 11/12/99-02/01/03 SOP to proceed toward production, spud delineation well.	• Protection of Biological Resources. • Protection of Cultural Resources. • Operational Controls, electromagnetic Emissions, and Evacuation. • Hold Harmless. • Transportation of Hydrocarbon Products. • Wells and Pipelines. • Fisheries and Wildlife Training Program. • Drilling Restrictions near State Boundary	• 21 exploratory wells approved by CCC for Purisima Point Unit. • 3 wells drilled between 11/82 and 9/83. • 18 previously approved wells have not been drilled.
Purisima Point Unit OCS-P 0427 0432	Aera PXP Ogle OLAC Devon Energy Samedan	Aera	53 7/81 686	• 6/86-6/88 SOP to acquire and interpret 3D seismic data. • 6/88-6/90 SOP to drill unit well by 1/90. Analyze 3D data. • 7/90-6/94 SOP to reinterpret 3D seismic, redefine unit boundaries, participate in rig cooperative (IROCC), drill and test well, evaluate results. • 1/93-6/99 Directed SOO for COOGER Study. • 7/99-8/16/99 Directed SOO for additional MMS review time on SOP request. • 8/17/99-11/15/99 Directed SOO to provide additional information. • 11/12/99-12/01/03 SOP to proceed toward production, spud delineation well.	• Protection of Biological Resources. • Protection of Cultural Resources. • Potential Geologic Hazards, Part (c). • Operational Controls, electromagnetic Emissions, and Evacuation. • Hold Harmless. • Transportation of Hydrocarbon • Products. • Wells and Pipelines. • Fisheries and Wildlife Training • Program. • Royalty Rate Adjustment. • Drilling Restrictions near State • Boundary	see previous

Unit and Leases	Owner(s)	Operator	Lease Sale, Lease Date, Orig. 5-Year Term	Lease Term Extensions * Suspension of Production t Suspension of Operations	Lease Sale Stipulations	Status
Purisima Point Unit OCS-P 0435	Aera PXP	Aera	53 7/81 6/86	• 6/86-6/88 SOP to acquire and interpret 3D seismic data. • 6/88-6/90 SOP to drill unit well by 1/90. Analyze 3D data. • 7/90-6/94 SOP to reinterpret 3D seismic, redefine unit boundaries, participate in rig cooperative (IROCC), drill and test well, evaluate results. • 1/93-6/99 Directed SOO for COOGER Study. • 7/99-8/16/99 Directed SOO for additional MMS review time on SOP request. • 8/17/99-11/15/99 Directed SOO to provide additional information. • 11/12/99-02/01/03 SOP to proceed toward production, spud delineation well.	• Protection of Biological Resources. • Protection of Cultural Resources. • Operational Controls, electromagnetic Emissions, and Evacuation. • Hold Harmless. • Transportation of Hydrocarbon Products. • Wells and Pipelines. • Fisheries and Wildlife Training Program. • Royalty Rate Adjustment. • Drilling Restrictions near State Boundary	see previous
Santa Maria Unit OCS-P 0425	Aera Total FinaElf	Aera	53 7/81 6/86	• 7/86-11/86 Unit held by drilling. • 11/86-11/87 SOP for heavy oil study, acquisition and interpretation of 3D seismic data. • 11/87-11/89 SOP for 3D seismic interpretation. • 11/89-6/94 SOP for 3D seismic interpretation, redefining unit boundaries, participate in rig cooperative (IROCC), drill and test well, evaluate results. • 1/93-6/99 Directed SOO for COOGER Study. • 7/99-8/16/99 Directed SOO for additional MMS review time on SOP request. • 8/17/99-11/15/99 Directed SOO to provide additional information. • 11/12/99-11/01/02 SOP to proceed toward production.	• Protection of Biological • Resources. • Protection of Cultural Resources. • Operational Controls, • electromagnetic • Emissions, and Evacuation. • Hold Harmless. • Transportation of Hydrocarbon • Products. • Wells and Pipelines. • Fisheries and Wildlife Training Program.	• 31 exploratory wells approved by CCC for Santa Maria Unit. • 5 wells drilled between 5/82 and 6/86. • 26 previously approved wells have not been drilled
Santa Maria Unit OCS-P 0430	Aera Total FinaElf	Aera	53 7/81 6/86	• 7/86-11/86 Unit held by drilling. • 1/86-11/87 SOP for heavy oil study, acquisition and interpretation of 3D seismic data. • 1/87-11/89 SOP for 3D seismic interpretation. • 11/89-6/94 SOP for 3D seismic interpretation, redefining unit boundaries, participate in rig cooperative (IROCC), drill and test well, evaluate results. • 1/93-6/99 Directed SOO for COOGER Study. • 7/99-8/16/99 Directed SOO for additional MMS review time on SOP request. • 8/17/99-11/15/99 Directed SOO to provide additional information. • 11/12/99-11/01/02 SOP to proceed toward production.	• Protection of Biological Resources. • Protection of Cultural Resources. • Operational Controls, electromagnetic Emissions, and Evacuation. • Hold Harmless. • Transportation of Hydrocarbon Products. • Wells and Pipelines. • Fisheries and Wildlife Training Program	see previous
Santa Maria Unit OCS-P 0431	Aera[1] Total FinaElf[16]	Aera	53 7/81 6/86	• 7/86-11/86 Unit held by drilling. • 11/86-11/87 SOP for heavy oil study, acquisition and interpretation of 3D seismic data. • 11/87-11/89 SOP for 3D seismic interpretation. • 11/89-6/94 SOP for 3D seismic interpretation, redefining unit boundaries, participate in rig cooperative (IROCC), drill and test well, evaluate results. • 1/93-3/99 Directed SOO for COOGER Study. • 7/99-8/16/99 Directed SOO for additional MMS review time on SOP	• Protection of Biological Resources. • Protection of Cultural Resources. • Operational Controls, electromagnetic Emissions, and Evacuation. • Hold Harmless. • Transportation of Hydrocarbon Products. • Wells and Pipelines. • Fisheries and Wildlife Training Program. • Royalty Rate Adjustments.	

Unit and Leases	Owner(s)	Operator	Lease Sale, Lease Date, Orig. 5-Year Term	Lease Term Extensions * Suspension of Production t Suspension of Operations	Lease Sale Stipulations	Status
				request. • 8/17/99-11/15/99 Directed SOO to provide additional information. • 11/12/99-11/01/02 SOP to proceed toward production.	• Drilling Restrictions near State Boundary	
Santa Maria Unit OCS-P 0433	Ogle OLAC PXP RAM Samedan	Aera	53 7/81 6/86	• 7/86-11/86 Unit held by drilling. • 1/86-11/87 SOP for heavy oil study, acquisition and interpretation of 3D seismic data. • 11/87-11/89 SOP for 3D seismic interpretation. • 11/89-6/94 SOP for 3D seismic interpretation, redefining unit boundaries, participate in rig cooperative (IROCC), drill and test well, evaluate results. • 1/93-3/99 Directed SOO for COOGER Study. • 7/99-8/16/99 Directed SOO for additional MMS review time on SOP request. • 8/17/99-11/15/99 Directed SOO to provide additional information. • 11/12/99-11/01/02 SOP to proceed toward production.	• Protection of Biological • Resources. • Protection of Cultural Resources. • Operational Controls, electromagnetic Emissions, and Evacuation. • Hold Harmless. • Transportation of Hydrocarbon Products. • Wells and Pipelines. • Fisheries and Wildlife Training Program. • Royalty Rate Adjustments.	see previous
Santa Maria Unit OCS-P 0434	Aera Total FinaElf	Aera	53 7/81 6/86	• 7/86-11/86 Unit held by drilling. • 11/86-11/87 SOP for heavy oil study, acquisition and interpretation of 3D seismic data. • 1/87-11/89 SOP for 3D seismic interpretation. • 11/89-6/94 SOP for 3D seismic interpretation, redefining unit boundaries, participate in rig cooperative (IROCC), drill and test well, evaluate results. • 1/93-6/99 Directed SOO for COOGER Study. • 7/99-8/16/99 Directed SOO for additional MMS review time on SOP request. • 8/17/99-11/15/99 Directed SOO to provide additional information. • 11/12/99-11/01/02 SOP to proceed toward production.	• Protection of Biological Resources. • Protection of Cultural Resources. • Operational Controls, electromagnetic Emissions, and Evacuation. • Hold Harmless. • Transportation of Hydrocarbon Products. • Wells and Pipelines. • Fisheries and Wildlife Training Program. • Royalty Rate Adjustments. • Drilling Restrictions near State Boundary	
Bonito Unit OCS-P 0443	PXP Poseidon	PXP	53 7/81 6/86	• 6/86-6/88 SOP to acquire and interpret 3D seismic data. • 6/88-6/89 SOP to interpret 3D seismic data. • 6/89-12/89 SOP to complete 3D analysis, resolve permitting problems. • 12/89-12/94 SOP to process and interpret 3D seismic data, permitting delays at Gaviota, participate in rig cooperative (IROCC), spud unit well in first quarter 1994. • 1/93-6/99 Directed SOO for COOGER Study. • 7/99-8/16/99 Directed SOO for additional MMS review time on SOP request. • 8/17/99-11/15/99 Directed SOO to provide additional information. • 11/12/99-05/01/02 SOP to proceed toward production, spud delineation well.	• Protection of Biological Resources. • Protection of Cultural Resources. • Potential Geologic Hazards, Part (b) • Operational Controls, electromagnetic Emissions, and Evacuation. • Hold Harmless. • Transportation of Hydrocarbon Products. • Wells and Pipelines. • Fisheries and Wildlife Training Program. • Royalty Rate Adjustments.	• 24 wells approved by • CCC for Bonito Unit. • 10 wells drilled between 4/82 and 9/85. • 14 previously approved wells have not been drilled.
Bonito Unit OCS-P 0445 0449 0500	PXP Poseidon	PXP	53 7/81 6/86	• 6/86-6/88 SOP to acquire and interpret 3D seismic data. • 6/88-6/89 SOP to interpret 3D seismic data. • 6/89-12/89 SOP to complete 3D analysis, resolve permitting problems. • 12/89-12/94 SOP to process and interpret 3D seismic data, permitting delays at Gaviota, participate in rig cooperative (IROCC), spud unit well	• Protection of Biological Resources. • Protection of Cultural Resources. • Potential Geologic Hazards, Part (b) • Operational Controls, electromagnetic Emissions, and Evacuation.	

Unit and Leases	Owner(s)	Operator	Lease Sale, Lease Date, Orig. 5-Year Term	Lease Term Extensions * Suspension of Production ᵗ Suspension of Operations	Lease Sale Stipulations	Status
				in first quarter 1994. • 1/93-6/99 Directed SOO for COOGER Study. • 7/99-8/16/99 Directed SOO for additional MMS review time on SOP request. • 8/17/99-11/15/99 Directed SOO to provide additional information. • 11/12/99-05/01/02 SOP to proceed toward production, spud delineation well.	• Hold Harmless. • Transportation of Hydrocarbon • Products. • Wells and Pipelines. • Fisheries and Wildlife Training Program • Royalty Rate adjustments.	
Bonito Unit OCS-P 0446	PXP Poseidon	PXP	53 7/81 6/86	• 6/86-6/88 SOP to acquire and interpret 3D seismic data. • 6/88-6/89 SOP to interpret 3D seismic data. • 6/89-12/89 SOP to complete 3D analysis, resolve permitting problems. • 12/89-12/94 SOP to process and interpret 3D seismic data, permitting delays at Gaviota, participate in rig cooperative (IROCC), spud unit well in first quarter 1994. • 1/93-6/99 Directed SOO for COOGER Study. • 7/99-8/16/99 Directed SOO for additional MMS review time on SOP request. • 8/17/99-11/15/99 Directed SOO to provide additional information. • 11/12/99-05/01/02 SOP to proceed toward production, spud delineation well.	• Protection of Biological Resources. • Protection of Cultural Resources. • Potential Geologic Hazards, Part (b) • Operational Controls, electromagnetic Emissions, and Evacuation. • Hold Harmless. • Transportation of Hydrocarbon Products. • Wells and Pipelines. • Fisheries and Wildlife Training • Program. • Royalty Rate Adjustments. • Drilling Restrictions near State Boundary	see previous
Bonito Unit OCS-P 0499	PXP Poseidon	PXP	RS2 9/82 8/87	• 6/86-6/88 SOP to acquire and interpret 3D seismic data. • 6/88-6/89 SOP to interpret 3D seismic data. • 6/89-12/89 SOP to complete 3D analysis, resolve permitting problems. • 12/89-12/94 SOP to process and interpret 3D seismic data, permitting delays at Gaviota, participate in rig cooperative (IROCC), spud unit well in first quarter 1994. • 1/93-6/99 Directed SOO for COOGER Study. • 7/99-8/16/99 Directed SOO for additional MMS review time on SOP request. • 8/17/99-11/15/99 Directed SOO to provide additional information. • 11/12/99-05/01/02 SOP to proceed toward production, spud delineation well.	• Protection of Biological Resources. • Protection of Cultural Resources. • Potential Geologic Hazards, Part (b) • Operational Controls, electromagnetic Emissions, and Evacuation. • Hold Harmless. • Transportation of Hydrocarbon Products. • Wells and Pipelines. • Fisheries and Wildlife Training Program. • Royalty Rate Adjustments.	
Rocky Point Unit OCS-P 0452 0453	Whiting	Arguello	53 7/81 6/86	• 6/86-6/88 SOP to drill from Hermosa to 0451. • 6/88-6/90 SOP for extended production test for well B-7. • 3/90-12/94 SOP for one year production test, permitting problems at Gaviota. • 1/93-3/99 Directed SOO for COOGER Study. • 7/99-8/16/99 Directed SOO for additional MMS review time on SOP request. • 8/17/99-11/15/99 Directed SOO to provide additional information. • 11/12/99-06/01/01 SOP to proceed toward production, spud development well.	• Protection of Biological Resources. • Protection of Cultural Resources. • Operational Controls, electromagnetic Emissions, and Evacuation. • Hold Harmless. • Transportation of Hydrocarbon Products. • Wells and Pipelines. • Fisheries and Wildlife Training Program. • Drilling Restrictions near State Boundary	• 6 wells approved by CCC. • 4 wells drilled between 9/82 and 6/84. • 2 previously approved wells have not been drilled.

Unit and Leases	Owner(s)	Operator	Lease Sale, Lease Date, Orig. 5-Year Term	Lease Term Extensions * Suspension of Production ᵗ Suspension of Operations	Lease Sale Stipulations	Status
Sword Unit OCS-P 0319	Amber PXP Ogle OLAC Samedan Atofina	Samedan	48 9/79 8/84	• 8/84-8/85 SOP to evaluate seismic data, spud unit well by 1/85. • 2/85-5/85 Drilling delineation well. • 8/85-11/85 SOP to analyze well test results. • 1/85-12/87 SOP to spud well by 7/87. • 12/87-6/89 SOP to process and interpret 3D seismic data. • 6/89-6/94 SOP to continue seismic interpretation, • drill 3 wells, participate in rig cooperative (IROCC), develop technology for heavy oil, submit development plan. • 1/93-6/99 Directed SOO for COOGER study. • 7/99-8/16/99 Directed SOO for additional MMS review time on SOP request. • 8/17/99-11/15/99 Directed SOO to provide additional information. • 11/12/99-08/01/03 SOP to proceed toward production, spud delineation well.	• Operational Controls, electromagnetic Emissions, and Evacuation. • Hold Harmless. • Protection of Cultural Resources. • Wells and Pipelines. • Protection of Biological Resources. • Transportation of Hydrocarbon Products.	• 11 wells approved by • CCC. • 3 wells drilled between 3/82 and 2/85. • 8 previously approved wells have not been drilled.
Sword Unit OCS-P 0320 0322 0323A	Amber Atofina Colton Delta Elf PXP Ogle OLAC Samedan OEDC	Samedan	48 9/79 8/84	• 8/84-8/85 SOP to evaluate seismic data, spud unit well by 1/85. • 2/85-5/85 Drilling delineation well. • 8/85-11/85 SOP to analyze well test results. • 11/85-12/87 SOP to spud well by 7/87. • 12/87-6/89 SOP to process and interpret 3D seismic data. • 6/89-6/94 SOP to continue seismic interpretation, drill 3 wells, participate in rig cooperative (IROCC), develop technology for heavy oil, submit development plan. • 1/93-6/99 Directed SOO for COOGER study. • 7/99-8/16/99 Directed SOO for additional MMS review time on SOP request. • 8/17/99-11/15/99 Directed SOO to provide additional information. • 11/12/99-08/01/03 SOP to proceed toward production, spud delineation well.	• Operational Controls, electromagnetic Emissions, and Evacuation. • Hold Harmless. • Protection of Cultural Resources. • Wells and Pipelines. • Protection of Biological Resources. • Transportation of Hydrocarbon Products.	see previous page
Gato Canyon Unit OCS-P 0460	Amber Delta PXP Nycal Ogle OLAC Samedan RME	Samedan	68 8/82 7/87	• 8/87-7/89 SOP for interpretation of 3D seismic data, drill and test unit well. • 1/89-4/89 Drilling delineation well. • 7/89-7/91 SOP for acquisition and interpretation of 3D seismic data to delineate western portion of unit, participate in rig cooperative (IROCC). • 6/90-7/94 SOP to complete 3D interpretation, spud unit well by 12/93. • 1/93-6/99 Directed SOO for COOGER Study. • 7/99-8/16/99 Directed SOO for additional MMS review time on SOP request. • 8/17/99-11/15/99 Directed SOO to provide additional information. • 11/12/99-05/01/03 SOP to proceed toward production, spud delineation well.	• Protection of Biological Resources. • Protection of Cultural Resources. • Potential Geologic Hazards. • Operational Controls, electromagnetic Emissions, and Evacuation. • Hold Harmless. • Transportation of Hydrocarbon Products. • Wells and Pipelines. • Drilling Restrictions near State Boundary.	• 4 wells approved by CCC. • A-2 wells 5/85 and 1/89. • 2 wells have not been drilled.
Gato Canyon Unit OCS-P	Amber Delta PXP Nycal	Samedan	68 8/82 7/87	• 8/87-7/89 SOP for interpretation of 3D seismic data, drill and test unit well. • 1/89-1/89 Drilling delineation well. • 7/89-7/91 SOP for acquisition and interpretation of 3D seismic data to	• Protection of Biological Resources. • Protection of Cultural Resources. • Potential Geologic Hazards. • Hold Harmless.	see previous page

Unit and Leases	Owner(s)	Operator	Lease Sale, Lease Date, Orig. 5-Year Term	Lease Term Extensions * Suspension of Production t Suspension of Operations	Lease Sale Stipulations	Status
0464	Ogle OLAC Samedan RME			delineate western portion of unit, participate in rig cooperative (IROCC). • 6/90-7/94 SOP to complete 3D interpretation, spud unit well by 12/93. • 1/93-6/99 Directed SOO for COOGER Study. • 7/99-8/16/99 Directed SOO for additional MMS review time on SOP request. • 8/17/99-11/15/99 Directed SOO to provide additional information. • 11/12/99-05/01/03 SOP to proceed toward production, spud delineation well.	• Transportation of Hydrocarbon Products. • Wells and Pipelines. • Drilling Restrictions near State Boundary.	
Cavern Point Unit OCS-P 0210	Poseidon	Venoco	P4 4/68 3/73	• 3/73-7/90 Lease 0210 was in the Santa Clara Unit and held by unit production. • 11/89-7/90 Lease 0527 was in the Santa Clara Unit and held by unit production. • 7/90-12/94 SOO to complete permitting for exploration plan, reinterpret seismic data, participate in rig cooperative (IROCC), spud unit well. • 1/93-3/99 Directed SOO for COOGER Study. • 7/99-8/16/99 Directed SOO for additional MMS review time on SOP request. • 8/17/99-11/15/99 Directed SOO to provide additional information. • 11/12/99-07/01/02 SOO to proceed toward exploration, spud exploration well.	Federal Register, Vol.32, No. 250	No wells drilled.
Cavern Point Unit OCS-P 0527	Poseidon	Venoco	80 12/84 11/89	• 3/73-7/90 Lease 0210 was in the Santa Clara Unit and held by unit production. • 11/89-7/90 Lease 0527 was in the Santa Clara Unit and held by unit production. • 7/90-12/94 SOO to complete permitting for exploration plan, reinterpret seismic data, participate in rig cooperative (IROCC), spud unit well. • 1/93-6/99 Directed SOO for COOGER Study. • 7/99-8/16/99 Directed SOO for additional MMS review time on SOP request. • 8/17/99-11/15/99 Directed SOO to provide additional information. • 11/12/99-07/01/02 SOO to proceed toward exploration, spud exploration well.	• Protection of Biological Resources. • Protection of Cultural Resources. • Operational Controls, electromagnetic Emissions, and Evacuation. • Hold Harmless. • Transportation of Hydrocarbon Products. • Wells and Pipelines. • Fisheries and Wildlife Training Program. • Protection of Important Biological Resources, Parts (a), and (b). • Testing of Oil Spill Containment Equipment. • Onshore Oil Processing. • Protection of Commercial Fisheries. • Protection of Marine Biota. • Protection of Air Quality.	No wells drilled.

APPENDIX I.

SUMMARY OF POTENTIALLY FORESEEABLE ACTIVITIES AND HYPOTHETICAL DEVELOPMENT SCENARIO

APPENDIX I. SUMARY OF POTENTIALLY FORESEEABLE ACTIVITIES AND HYPOTHETICAL DEVELOPMENT SCENARIO

This Appendix provides summary tables of the potentially foreseeable activities (projects) that may occur between 2006 and 2030. The two tables presented in this Appendix include:

- Table I-1, Potentially Foreseeable Activities (2006-2030), including Pacific OCS activities associated with existing, developed Units (or leases).
- Table I-2, Hypothetical Development Scenario and Post-Suspension Activities on the Undeveloped Leases (2006 – 2030).

	Table I-1. Potentially Foreseeable Activities (2006 – 2030).
Name	**Summary**
Offshore Oil and Gas Activities	
Future Activities on Existing OCS Leases	• Additional production from new wells would slow the decline of production and is expected to occur over the life of the existing facilities • Drilling operations are currently underway at Platforms Heritage, and Hidalgo. In the future it is anticipated that drilling may occur on Platforms Heritage, Harmony, Hidalgo, Harvest, Hogan, and Gail. • Table 5.2-2 shows the number of wells expected to be drilled by field from existing Federal platforms. No new production wells are expected on State Platforms with the exception of Platform Holly (see State Tidelands below). • Operational impacts associated with the development and production of oil and gas resources from these existing facilities have been fully analyzed, mitigated and permitted by applicable Federal, State, and local authorities. • The risk of an oil spill from the existing OCS facilities has previously been individually and cumulatively analyzed. These analyses are reviewed in Section 5.3 and have not changed significantly since their completion. • There are no scheduled or anticipated oil and gas lease sales scheduled or anticipated in Federal or State waters. Therefore, with no new leasing, once the development of the undeveloped leases occurs, no additional new production platforms are anticipated to be installed.
Decommissioning	• Over the next 28 years all existing oil and gas platforms in Federal and State waters are expected to be removed. Platform decommissioning scenarios are outlined in Table 5.2-3. • Some decommissioning has already occurred. The Offshore Storage and Treatment Vessel and Single Anchor Leg Mooring was removed from the Santa Ynez Unit in Federal waters in 1994, and Platforms Hazel, Heidi, Hilda, and Hope were removed from State waters in 1996. • Platform decommissioning projects are likely to be phased and occur in the following chronological sequence: (1) South Coast; (2) Eastern Santa Barbara Channel; (3) Western Santa Barbara Channel and Southern Santa Maria Basin; (4) Western Santa Barbara Channel; (5) Southern Santa Maria Basin; and, (6) Northern/Southern Santa Maria Basin and Gato Canyon. • There are no proposals anticipated for decommissioning of platforms during the next few years.
Tranquillon Ridge Project	• Plains Exploration & Production Corp. (PXP) is seeking approval to develop the Tranquillon Ridge area offshore Point Pedernales in the southern Santa Maria Basin from Platform Irene, located on Lease OCS P-0441, approximately 6 miles northwest of Point Pedernales. • One well from Platform Irene is producing from Tranquillon Ridge. • The proposed Tranquillon Ridge Project would involve the drilling of up to 30 Extended Reach Drilling (ERD) wells (22 development wells and 8 utility and re-drills) from Platform Irene into State Tidelands. Total well drilling and completion times are anticipated to range between 60 and 120 days per well. Oil and gas produced by the proposed project would be transported to shore via Platform Irene's existing pipeline system to the Lompoc Oil and Gas Processing Facility. • The Tranquillon Ridge project would extend over approximately 15 years. PXP estimates that the project will recover 180-200 MMbbl of oil and 40 Bcf of gas. • An EIR on the proposed project was completed in June 2002, which recommended that the project not be approved by the California State Lands Commission (CSLC) for a State Tidelands lease. • In October 2002 Nuevo (the owner/operator prior PXP) filed a lawsuit against Santa Barbara County

	Table I-1. Potentially Foreseeable Activities (2006 – 2030).
Name	Summary
	following the Board of Supervisors' final action to deny the Tranquillon Ridge application. • In May 2003, the Court sustained the County's demurer to Nuevo's petition and complaint regarding the County's denial of the Tranquillon Ridge application. The Court ruled that California Environmental Quality Act (CEQA) does not require the County to certify an EIR where the County has elected to deny the project application. The Court allowed Nuevo to amend its complaint on two issues: (1) the contract claim (whether the County had a contractual duty to certify the EIR); and (2) Nuevo may amend to allege that the County's findings are not supported by substantial evidence. • Currently a settlement is being negotiated and permitting is expected to occur over the next year. Based on that schedule drilling would begin in 2006 and production could occur for up to 30 years.
Molino Gas Project	• Molino Energy Company gained approval for the project from the County of Santa Barbara in 1996. The project involves use of ERD technology from an onshore site to recover sweet gas reserves in offshore State Tidelands. The drilling site is located just east of the Gaviota facility. • It was initially envisioned that the project could produce up to 60 MMcfd of sales quality sweet gas and up to 1,050 BPD of natural gas liquids (NGL)s over a project life of 20-25 years. • The gas would be sold to SoCal Gas and transported directly into the transmission line. The NGLs would initially be trucked to the Gaviota facility and later shipped to the facility via a new pipeline. • This onshore site was approved to produce natural gas reserves from the Caliente, Gaviota, and Molino offshore fields using six to eight wells. The project was discontinued after an exploratory well did not yield commercial quantities of gas. The facility's equipment has been removed and site cleanup and restoration are ongoing. • Harvest Natural Resources, Inc., the new project owner is in the process of submitting a restoration and revegetation plan for the facility.
Development of the Carpinteria Field Area (Carone Petroleum Corporation)	• In 1966, Chevron installed Platforms Hope and Heidi to develop State leases PRC-4000 and 3150 (lease PRC 7911 is the southern portion of the original PRC-3150 lease). Lease PRC-3133, on the eastern edge of the Carpinteria Field, was later developed by Exxon using extended-reach wells from Platform Heidi. Carpinteria Field production peaked in 1968 at a rate of 38,000 barrels of oil per day. In 1992, Chevron shut-in the Hope and Heidi wells. In 1996, the wells were abandoned and the platforms removed. In 1996, the CSLC assigned leases PRC- 4000 and 7911 to the Carone Petroleum Corporation. Carone has also applied to the CSLC for assignment of lease PRC 3133. • In September 1999, Carone submitted an application for a Plan of Development (POD) for 25 new production, or injection, wells that would be developed from Platform Hogan located in the Pacific OCS. These would be extended-reach wells into the State leases with bores located up to 12,000 feet "eastward" of the platform. Carone anticipated that few changes would need to be made to the existing infrastructure in order to implement the POD. • The CSLC released a Notice of Preparation of an EIR on June 6, 2001. • In October 2002, Carone requested that work on the EIR be suspended in order to conduct a Level III structural survey of Platform Hogan. It was agreed that it would be important to include the results of that survey in the EIR. On May 1, 2004, Carone requested that work on the EIR be restarted. No changes to the original POD have occurred during the intervening time and staff believes, therefore, that the June, 2001 NOP and comments received thereto are germane to the content of the EIR. • CSLC anticipates release of the Draft EIR for public review in early 2005.

	Table I-1. Potentially Foreseeable Activities (2006 – 2030).
Name	**Summary**
Additional Projects Related to Offshore Oil and Gas in Santa Barbara County	
AERA	• The AERA Gas Processing Site is located in Canada de la Huerta, located approximately 20 miles north of the city of Santa Barbara. • This site once housed facilities for processing natural gas produced from subsea wells in the Molino Offshore field. Contamination was found in 1986 and a Remedial Action Plan was approved in 1994 by the Department of Toxic Substances and Control (DTSC). • The site is designated as a State Superfund site and supplemental soil remediation work and soil vapor extraction well installation were underway in April 2004. Supplemental soil remediation work is underway at the site to clean up additional PCB and mercury-contaminated soil. Excavation to install the Soil Vapor Extraction and Air Sparge Pilot Test equipment began in mid-April 2004. • Quarterly ground water monitoring, soil sampling and bioassays are ongoing in accordance with the December 2001 Sampling Plan Addendum for the Groundwater Characterization and Remediation Monitoring Program. Samples were taken on March 16 and 17, 2004. Another Ecological Risk Assessment has been prepared and remediation work is expected to be ongoing for 2 to 3 years.
ARCO Dos Pueblos	• The ARCO Dos Pueblos project is located on a bluff top on the ocean-side of U.S. 101 approximately 1.5 miles west of the Winchester Canyon. • This site once housed facilities that produced and processed oil and gas from the Elwood field. Production ceased in 1997, wells were plugged and abandoned, and the site's facilities were removed. • Initially a golf course was proposed at the site following abandonment and remediation, but the project was denied by the California Coastal Commission and is currently in litigation. • ARCO is currently negotiating easement agreements and finalizing project details in order to resubmit an application to Santa Barbara County and City of Goleta for the removal of its abandoned pipelines and remediation activities, which Aera hopes to complete by the end of 2005. Future use of the site is unknown.
Plains-Arguello Point Arguello Project	• This is an ongoing project consisting of three offshore platforms (Hermosa, Harvest and Hidalgo) that produce and process oil and gas from the Point Arguello Offshore field. Pipelines are used to transport oil and gas produced and processed offshore to onshore terminal facilities. These facilities use the sales quality gas to generate electricity and steam for use onsite. Excess electricity can be sold to the public utility grid. The processed crude oil is pumped into the All-America Pipeline (AAPL). The Gaviota Oil and Gas Processing Facility is located on the mountain side of Highway 101 opposite the Shell Pipeline Company, LP Gaviota Oil Terminal. It receives oil and gas from the Point Arguello field west of Point Conception. • All existing Point Arguello oil and gas is processed offshore on the platforms even though it is sour gas. • Plains-Arguello, Inc. submitted an application to Santa Barbara County in March 2004 to bypass the Shell-owned and operated Gaviota Terminal (GTC). The application was deemed complete on June 21st and an Initial Study was prepared. The project would consist of two phases: during Phase 1 a new pipeline tying directly into the AAPL would be constructed on the north side of Highway 101 in the Gaviota Facility. Approximately 1,800 feet of 12-inch pipe, 200 feet of 6-inch pipe, 200 feet of 4-inch pipe, and 100 feet of 3-inch pipe would be installed in various locations during Phase 1 to make the necessary connections. Crude oil would then be transported directly to the AAPL instead of through GTC's storage tanks. Phase 1 would take approximately 100 days to complete. • Phase 2 would consist of construction of another 40,000-barrel floating roof storage tank at the Gaviota Facility to accommodate Lease 451 East production, although this stage is not expected to begin until 2006. This tank would be 85 feet in diameter and 40 feet high, and would be used as the primary shipping tank. Approximately 350 feet of 10-inch piping would be installed during this phase. Phase 2 would take approximately 60 days to complete, and would bring the total storage capacity at the Gaviota Facility to 92,100 barrels. If successful, production could occur for 15 years. • Partial abandonment of the onshore facilities would be conducted in three phases. Phase 1 (approximately 3 months in duration) would reduce the visual profile of the facility by taking down the tallest items of equipment that are most visible from Highway 101. Phase 2 (approximately 3 years) would remove all saleable process equipment. During Phase 3 (approximately 10 months), the remainder of the excess process equipment would be removed from the site. The sale of the oil and gas processing equipment is underway.

	Table I-1. Potentially Foreseeable Activities (2006 – 2030).
Name	**Summary**
Chevron-AERA Flowlines	• The Chevron-AERA flowlines are located approximately 28 miles west of Santa Barbara at Gaviota. • This site once housed flowlines that serviced gas wells in the Molino field. The flowlines were removed in 2000 and site cleanup and restoration is ongoing. • A Technical Work Plan and site assessment have been prepared for the Chevron-AERA flowline remediation project. The workplan and site assessment were deemed necessary following the discovery of two areas of soil contamination. One area exists near the bank of Alcatraz Creek and the other area exists on the beach. The workplan and site assessment will be used to characterize the lateral and vertical extent of contamination at these two locations. • Chevron-AERA has requested to delay remediation efforts until abandonment of the GTC facility takes place.
Venoco	• This is an ongoing project consisting of an offshore platform (Holly) that produces oil and gas from the South Ellwood field. Pipelines are used to transport oil and gas produced offshore to onshore processing and storage facilities. Crude oil is pumped into storage tanks prior to being loaded onto a barge for shipment to refineries out of the County. Natural gas is distributed by pipeline to the Southern California Gas Company. • Venoco is proposing to return State Lease 421 to production. The proposed plan was submitted in May 2004 to the County of Santa Barbara and City of Goleta. The project includes: the removal of old production equipment from oil piers 421-1 and 421-2; repairs to an access road; rock rip-rap wall, caisson at the end of pier 421-1; installation of a drilling rig and new oil separation and processing equipment on pier 421-2; and reactivation of the oil well on pier 421-2 with a capacity to produce up to 700 barrels of crude oil per day. • The piers are expected to be repaired by the end of 2004. Permitting and environmental review for recommissioning would take approximately one year and re-drilling is anticipated to begin in late 2005 or 2006.
Fiber Optic Data Transmission Cables	
Global West (Global Photon) Fiber Optic Cable Project	• In 2001 Global West installed a fiber optic telecommunications line linking major metropolitan areas along the California coast using buried undersea cable. • The cable includes seven landfalls including San Francisco, Monterey Bay North, Monterey Bay South, San Luis Obispo, Santa Barbara, Manhattan Beach and San Diego. The routing of this cable traverses through a portion of the Sword Unit.
MCI Worldcom Fiber Optic Cable Project	• The MCI Worldcom fiber optic cable project consists of five cables landed at the Montana de Oro State Park landing site. • These cables land through new directional bore pipes constructed adjacent to the AT&T landing. • Currently only three of the five cables have been installed; the remaining two will be installed once demand meets their need. • San Luis Obispo County and the Coastal Commission both approved the project in 2001.
Pac Landing Corp (Tyco/Global Crossing) Fiber Optic Cable System	• The PAC Landing Corp fiber optic cable project entails the offshore landing of three cables and consolidation of cables into one line extending to a telecommunications switching facility located in the City of Grover Beach, San Luis Obispo County. The telecommunications facility has already been constructed. • 3 cables were installed in State waters, two of which are part of the Pacific Crossing Submarine Cable (PC-1) System and the third cable is part of the Pan- American Crossing Submarine Cable System (PAC). • The Grover Beach landing site provides a connection for cable originating in Japan and proceeding to Washington State. The site is also the Pacific origin of the PAC Cable System, which proceeds to Tijuana, Mexico from Grover Beach and was completed in November 2000.

	Table I-1. Potentially Foreseeable Activities (2006 – 2030).
Name	**Summary**
AT&T China-U.S. Cable E1 and China-U.S. Cable S7 Systems	• The AT&T China/U.S. fiber optic cable project consists of two cables landed at the Montana de Oro State Park landing site. • The two cables are housed within the last remaining directional bore pipe constructed by AT&T in 1992. The China-U.S. Cable E1 cable follows an alignment that is located north of the AT&T TPC- 5 Segment T1 cable. The China-U.S. Cable S7 cable follows an alignment located between the AT&T TPC-5 Segment T1 and AT&T HAW-5 cables.
Liquefied Natural Gas (LNG) Projects	
Cabrillo Deepwater Port LNG Facility (BHP Billiton)	• The proposed project is located 21 miles offshore Port Hueneme, Ventura County. • Permanently moored import facility (floating storage & regasification unit, FSRU) to include 3 storage tanks, eight vaporizers, and an underwater, 21.1-mile pipeline that would connect to an existing SoCal Gas pipeline with an average capacity of 800 MMcfd. Maximum water depth at the location of the planned mooring is about 2,900 feet. • An EIR for the project was published in November 2004; the project is projected to go online in 2008.
Crystal Clearwater Port Project (Crystal Energy)	• The proposed import facility would use but reconfigure Platform Grace, located 11 miles offshore of the City of Oxnard (Ventura County) in the Santa Barbara Channel. • Reconfiguration would involve installing a cool-down tank, 4 LNG pumps, 4 vaporizers, and reinstalling and upgrading of the platform's power-production capability. The platform is located in 318 feet of water. A new subsea pipeline would transport the gas from the platform to the SoCal Gas onshore pipeline located near Camarillo, California. No additional on-site storage is expected. If on-site storage is required, Crystal Energy would contract for storage service from existing facilities. • The application was filed with the US Coast Guard in January 2004 and re-filed in July 2004. An application was with the CSLC in February 2004. • The MMS has reviewed a draft DPP revision for Platform Grace that incorporates the LNG project, but has not yet deemed the project complete. • The project is projected to go online in 2008.
Sound Energy Solutions LNG Import Terminal (Owned by California LNG Project Corporation dba Sound Energy Solutions)	• The proposed project is located onshore at the Port of Long Beach on approximately 25 acres at Pier T East, Berth 126 • Import facility to include an LNG carrier berth, two full containment storage tanks, shell and tube vaporizers, metering and odorizing facilities, equipment for recovering natural gas liquids, LNG vehicle fuel truck-loading facility, and a new 2.3-mile natural gas pipeline connecting to an existing SoCal Gas pipeline. Average capacity would be 700 MMcfd with a peak capacity of 1,000 MMcfd and a storage capacity of 320,000 cubic meters) • The application was filed on 1/26/04 and the projected online date is 2008.
Desalinization Projects	
Desalinization Projects	Projects approved and conditionally approved by the California Coastal Commission include: • Chevron Gaviota Oil and Gas Processing Plant • City of Morro Bay • City of Santa Barbara • Department of Parks & Recreation, Hearst San Simeon State Historical Monument • Monterey Bay Aquarium • Proposed Hotel/Conference Sterling Center, Sand City • SCE, Santa Catalina Island Projects associated with offshore oil and gas platforms: • In addition to onshore desalination facilities, a number of oil and gas structures in the Pacific OCS have desalination units that produce water for onsite uses. • For example, RO units are located on Platforms Habitat, Henry, Hillhouse, and Hondo; distillation units are located on Platforms Gail, Grace, Harvest, Hermosa. • Each unit produces 12,000 to 17,000 gallons per day (gpd), except for the units on Hillhouse and Henry, which produce 2,000 to 2,900 gpd and the unit on Habitat which produces 5,000 gpd of potable

	Table I-1. Potentially Foreseeable Activities (2006 – 2030).
Name	**Summary**
	water and 6,000 gpd of "demineralizer feedwater" (used for NO_X abatement in the platform's gas turbine). Platforms Gail, Harvest, Hermosa, and Hidalgo have two units each. • No desalination units are located on platforms in State waters; fresh water is supplied through pipelines from shore.
Military Operations	
Military Operations and Commercial Space Launches[1]	• The Point Arguello Unit and Rocky Point Unit leases are located in the Naval Air Warfare Center Weapons Division (NAWCWD) Point Mugu Sea Range (PMSR). The PMSR covers a 36,000 square-mile area offshore San Luis Obispo, Santa Barbara, Ventura, Los Angeles, Orange, and San Diego Counties. • The PMSR currently supports test and evaluation of sea, land, and air weapons systems as well as various categories of training activities. The NAWCWD has recently proposed to expand operations in the PMSR and has prepared a Draft EIS/Oversea EIS for the proposal (U.S. Navy, 2000), which provides a detailed discussion of the operations conducted in the PMSR. The operations include missile testing, and training exercises including fleet, amphibious, and special warfare training. • NASA, military, and commercial space launches would continue.
Point Mugu Sea Range Operations[1]	• Cabrillo Port lies immediately outside of the Point Mugu Sea Range. Missile and aircraft overflights associated with ongoing operations on San Nicolas Island would occur about eight times per year along the northern and southern shorelines of the island. The Navy at Point Mugu is using an existing underwater launch site near San Clemente Island and a soft-landing missile recovery area at San Nicolas Island to support Tomahawk Land Missile Testing. The San Nicolas Island landing site is used only if the missile is in full control and must be guided to ensure a soft impact termination (parachute recovery). Tomahawk testing and training occurs an average of once per year (Department of Defense, 2002; Parisi, 2004). • The Navy at Point Mugu has established an inert ordnance delivery area on San Nicolas Island. Inert bombs are delivered from Navy or Marine Corps fixed-wing aircraft using laser-targeting systems to identify targets. Overflights associated with inert ordnance delivery occur about 10 times per year, but these overflights do not occur at low altitudes (Department of Defense, 2002; Parisi, 2004). • The National Aeronautics and Space Administration (NASA) is evaluating the Hyper-X research vehicle, a Mach-10 aircraft that could provide access to spacecraft. The parts of the program on the Point Mugu Sea Range include B-52 taxi and captive carry flight tests, research vehicle booster release and splashdown, research vehicle free flight, and research vehicle splashdown (Department of Defense, 2002). The USAF at Edwards Air Force Base tests the F-22 aircraft's ability to perform low-level flight maneuvers at supersonic speeds. Twenty-four low-level supersonic sorties per year would take place over open ocean areas within the Point Mugu Sea Range and in adjacent air space off the coast of California. Flight tests would involve use of one F-22 aircraft, an F-15 or F-16 as a chase aircraft, and a tanker aircraft for aerial refueling (Department of Defense, 2002).
SOCAL Range Complex 1[1]	• The SOCAL Range Complex is immediately south of the Point Mugu Sea Range. It includes the following training ranges: San Clemente Island; the Southern California Anti-submarine warfare Range (SOAR); FLETA HOT; the shallow water training range (SWTR); and, the shore bombardment range (SHOBA). San Clemente Island (SCI) is the tactical training range complex supporting the SOCAL Range Complex. • The San Clemente Island land, air, and sea ranges provide the U.S. Navy, U.S. Marine Corps, and other military services with space and facilities that they use to conduct readiness training. • The SOAR Range supports aircraft, surface ships, and submarines conducting basic through advanced level training against threats from submarines. SWTR is a proposed underwater range that may be installed in the next two years. • FLETA HOT is a live-fire exercise range and an aircraft emergency jettison area. SHOBA is a shore bombardment and gunnery range for naval gunfire support (Tahimic, 2004; Parks, 2004). LNG carriers would transit the SOCAL Range Complex on the course to the FSRU.

	Table I-1. Potentially Foreseeable Activities (2006 – 2030).
Name	**Summary**
Other Offshore and Nearshore Projects	
Crude Oil Tankering	• Marine transportation of Alaskan and foreign-import oil occurs offshore California. • Table 4.1-9 shows volume and number of oil tankers offshore California visiting Ports of San Francisco and of Los Angeles/ Long Beach and El Segundo. In 2000, 877 oil tankers visited the ports of Los Angeles/Long Beach and El Segundo. Of these tankers, 192 were United States-flagged oil tankers and 685 were foreign-flagged oil tankers.
Commercial Fishing Operations	• Commercial fisheries in the Southern California Bight (SCB) and Santa Maria Basin (SMB) date back to the mid-nineteenth century. • The nearshore waters along the coast from Los Angeles County to Monterey County and the waters just off the Channel Islands contain giant kelp beds that provide habitats for numerous species of commercially important fish and shellfish species. The majority of fish are caught within these areas. • Recently there have been changes in groundfish management, including limiting where trawling can occur, establishing permits for gear, and limiting the expansion of bottom trawling.
Point Source Discharges	• 5 Publicly Owned Treatment Works (POTWs), or sewage treatment plants, discharge into either rivers or the Pacific Ocean in San Luis Obispo County. All the dischargers are small, according to U.S. Environmental Protection Agency (EPA) criteria (less than 25 million gallons discharged per day [mgd]). • The 6 POTWs that discharge treated effluent to the Santa Barbara Channel are all small dischargers whose effluents are at a mixed primary/secondary level of treatment (SCCWRP, 1996). • There are no other industrial wastewater discharges north of Point Conception. However, several power plants spaced along the coastlines of southern Santa Barbara, Ventura, and northern Los Angeles Counties do discharge heated water, and some chlorine is used to prevent fouling of heat exchangers. • In October 2004 the EPA Region 9 issued a new NPDES general permit for Offshore Oil and Gas Exploration, Development and Production Operations Offshore Southern California. The new permit became effective December 1, 2004 and is discussed in Sections 4.6 and 5.6 (Water Quality). • After EPA reviews the results of the study, EPA will modify the permit to include water quality based effluent limitations for those pollutants that have been shown to have reasonable potential to exceed either the California Ocean Plan or EPA's Section 304 (a) criteria at the edge of the 100-meter mixing zone. The effluent limitations will be based on the more stringent of either water quality criteria.
Nonpoint Source Discharges	• Urban and storm water runoff is the largest source of unregulated pollution to waterways and coastal areas of the United States. Locally, urban and storm runoff results in an increase in health risks to swimmers near storm drains, high concentrations of toxic metals in harbor and ocean sediments, and toxicity to aquatic life. The runoff systems in southern California are different from those in other areas because the flow is mostly confined to the winter months. Over the dry months, contaminants accumulate in the flow systems and are then released as pulses when winter storms strike. During winter storms, these drainage systems release most of the fresh water that flows into the coastal ocean.
Guadalupe Diluent Spill And Remediation	• The Guadalupe Oil Field site is located on the central coast of California approximately 15 miles south of San Luis Obispo. It is part of the Unocal LeRoy Lease, which covers approximately 3,000 acres within the Nipomo Dunes system, a National Natural Landmark. The City of Guadalupe is located approximately 3 miles east of the site. • Oil exploration and production began on the site with the Sand Dune Oil Company in October 1947. Unocal acquired the field in the early 1950s and continued to operate it until March 1990. At its peak, in 1988, there were 215 potential producing wells. • The crude oil produced from the site was extremely viscous and Unocal used several methods to enhance recovery of this heavy crude, including diluent mixing. Over time, leaks that developed in the tanks and pipelines used to distribute it around the field, have led to serious contamination of the ground water below the site. • Diluent has accumulated in 64 plumes (separate-phase) at the water table in the dune sand aquifer, about 3 to 40 meters (10 to 130 feet) down, with some plumes as much as 1.8 meters (6 feet thick). • Dissolved diluent has resulted in ground water contamination beneath much of the site, with a flux towards the Pacific Ocean (to the west) and the Santa Maria River (to the south). • Remedial activities to remove or contain the diluent that have already taken place under emergency

	Table I-1. Potentially Foreseeable Activities (2006 – 2030).
Name	**Summary**
	permits issued by the County of San Luis Obispo or the California Coastal Commission include installation of a bentonite wall, beach excavation, installation of an High-Density Polyethylene (HDPE) wall, installation of a sheetpile wall, breaching of the Santa Maria River, installation of a polyvinyl chloride (PVC) barrier wall, the removal of a sump, and other work. • Unocal has also proposed to abandon the site. This would include removal of most pipelines from the field, and all surface facility tanks, buildings and other miscellaneous equipment. • Excavation of the remaining Phase I Cleanup Abatement Order (CAO) sites cannot begin until a Supplemental EIR evaluating trucking impacts of offsite disposal alternatives is certified and all agency permits and approvals have been obtained, which is expected by fall 2005. After which the remaining excavations (200,000-350,000 cubic yards of soil) at approximately 15 sites are planned to be completed by 2008-2009 with monitoring for 10 years afterwards.
Avila Beach Tank Farm Spill And Remediation	• The community of Avila Beach is located on the northern end of San Luis Bay near Point San Luis. The Unocal Avila Terminal facility has been used for petroleum hydrocarbon storage and transfer activities since 1910. • Unocal has spilled petroleum products including: gasoline, diesel and crude oil to soil and ground water beneath the beach, roads, commercial and residential properties of Avila Beach. • These spills were reportedly caused by historic leaks from Unocal's pipelines and possibly the tank farm. Five pipelines are currently active and another five to ten lines are abandoned in place under Front Street. There are no known leaks in the active pipelines at this time. Unocal has not used these pipelines since the summer of 1996. • Unocal's remediation efforts are divided into four main areas of concern: the beach, which is divided into the west and east beaches; Front Street; north of Front Street, and the intertidal plume. All four areas have underground gasoline-grade, diesel- grade, and crude or residual-grade hydrocarbon contamination. The hydrocarbons are found both above and below ground water, are attached to the soil grains (sand and silt) and within the soil pore spaces. • Over 460 soil borings and 70 monitoring wells were taken and analyzed by various agencies. Levels of hydrocarbon contamination exceeded those found to cause cancer, reproductive toxicity, and other acute and chronic health problems. • Due to legal efforts on the part of local groups, joined by the California Attorney General's office, and the RWQCB, the County of San Luis Obispo produced an agreement that will require Unocal to fully remediate the contamination and rebuild the town and economy of Avila Beach. • Unocal's remediation project includes two general aspects: excavation of all petroleum contamination under the beach, Front Street, and all areas where contamination exceeds 100 parts per million, and excavation and removal of the petroleum, and replacement with new, clean soil and nutrients. Monitoring and sampling, including testing of groundwater four times a year will help ensure the project meets State standard. • Unocal completed remediation in spring 2004.
Grace Mariculture Project	• Platform Grace is located 10.5 miles off the coast of Ventura, California in the eastern Santa Barbara Channel. Installed by Chevron Corporation in 1979, Platform Grace is situated in 330 feet of water in the U.S. Exclusive Economic Zone and operates as a transfer station for the oil production from another platform to shore. ChevronTexaco sold Platform Grace to Venoco, Inc. in 1999 and Venoco leased Platform Grace to the Hubbs-SeaWorld Research Institute (HSWRI) in August 2003. • The Grace Mariculture Project is a 3-year research program of HSWRI designed to test the feasibility of using offshore oil and gas platforms for the sustainable development of marine aquaculture (mariculture). • The project would culture white seabass, striped bass, rockfish, California halibut, California yellowtail and bluefin tuna, as well as shellfish such as abalone and mussels. • The project is currently in the permitting stage. Approval for the 3-year project could occur as early as mid-winter 2005, but will more likely be late 2005.

	Table I-1. Potentially Foreseeable Activities (2006 – 2030).
Name	**Summary**
Channel Islands National Marine Sanctuary Boundary Expansion	• The Channel Islands National Marine Sanctuary (CINMS) encompasses 1,252 square nautical miles (NM) (1658 square miles, 4294 square km) surrounding the five northern Channel Islands. The sanctuary boundaries extend from the mean high tide to 6 NM (6.9 miles, 11 km) offshore surrounding Anacapa, Santa Cruz, Santa Rosa, San Miguel, and Santa Barbara Islands. The management plan for CINMS was put into effect in 1982 and currently is being updated. • A Draft EIS has been prepared to analyze the potential impacts of expanding the boundaries of the sanctuary. Depending on the boundary concept selected, Cabrillo Port may or may not be within sanctuary boundaries. The installation of the FSRU and pipeline will not preclude the sanctuary from including this area in its new boundaries. However, if the proposed FSRU location is within the new boundaries being considered, this will be taken into consideration by CINMS when making final decisions (i.e., the pros/cons of including that area in the marine sanctuary) • A Supplemental EIS will address potential boundary changes. • Additional information regarding the sanctuary is provided in Section 4.
Port of Hueneme Warehouse Additions	• The Port of Hueneme is a break bulk cargo shipping facility. The majority of its cargo comprises automobiles, fruit, and liquid fertilizer. The Port receives an annual average of 145 automobile ships, 130 refrigerated-cargo conventional vessels, and 12 liquid fertilizer cargo vessels. Currently, six vessels provide daily support to the offshore oil platforms. Three tugs operate at the Port of Hueneme. A 30,000-square-foot (2,787-square-meter) refrigerated warehouse has recently been added to the existing facility and another one is scheduled to be built, which means that two additional refrigerated cargo vessels will be using the Port of Hueneme weekly (Berg, 2004).
Casmalia Hazardous Waste Disposal Facility Remediation	• The Casmalia Hazardous Waste Disposal Facility is an approximate 252-acre site located north of the community of Casmalia in northern Santa Barbara County. The facility accepted hazardous waste materials between 1973 and 1989. It was placed on the U.S. EPA "National Priority List" as a "Superfund" clean-up site in September 2001. • Four phases of remediation/clean-up efforts have been identified for the facility: Phase 1 (investigation, maintenance and cap construction [6 to 7 years]); Phase 2 (continued investigation, continued closure/clean-up construction, and initial long-term remediation operation and maintenance [approximately 12 years]; and, Phases 3 and 4 (continued long-term remediation maintenance and operation [30 years per phase – 2014 through 2044 and 2045 through 2072, respectively]). • In total the four phases of remediation extend between 1996 and 2072. Phase 2 is currently anticipated to be complete by 2013.
Naples Residential Development	• The proposed Naples residential development is located on an approximate 450-acre site west of the community of Ellwood (Goleta) in Santa Barbara County. Approximately 54 homes north and south of Highway 101 are proposed, as well as recreational facilities and public parking. The project's environmental review (Environmental Impact Report) is anticipated to start in the fall of 2005.

[1] To minimize potential hazards and conflicts with military operations, the MMS has placed stipulations on the OCS leases in the project area. The stipulations control vessel traffic in designated areas, include "hold-harmless" requirements, and reserve the right of the United States to suspend offshore operations temporarily for national security reasons. Prior to a vehicle launch, provisions for control of air and marine traffic, stabilization of platform operations, and for personnel shelter and evacuation measures are coordinated by the WSMC, U.S. Coast Guard, MMS, and the platform operators. These measures have proven to be effective in minimizing hazards and conflicts.

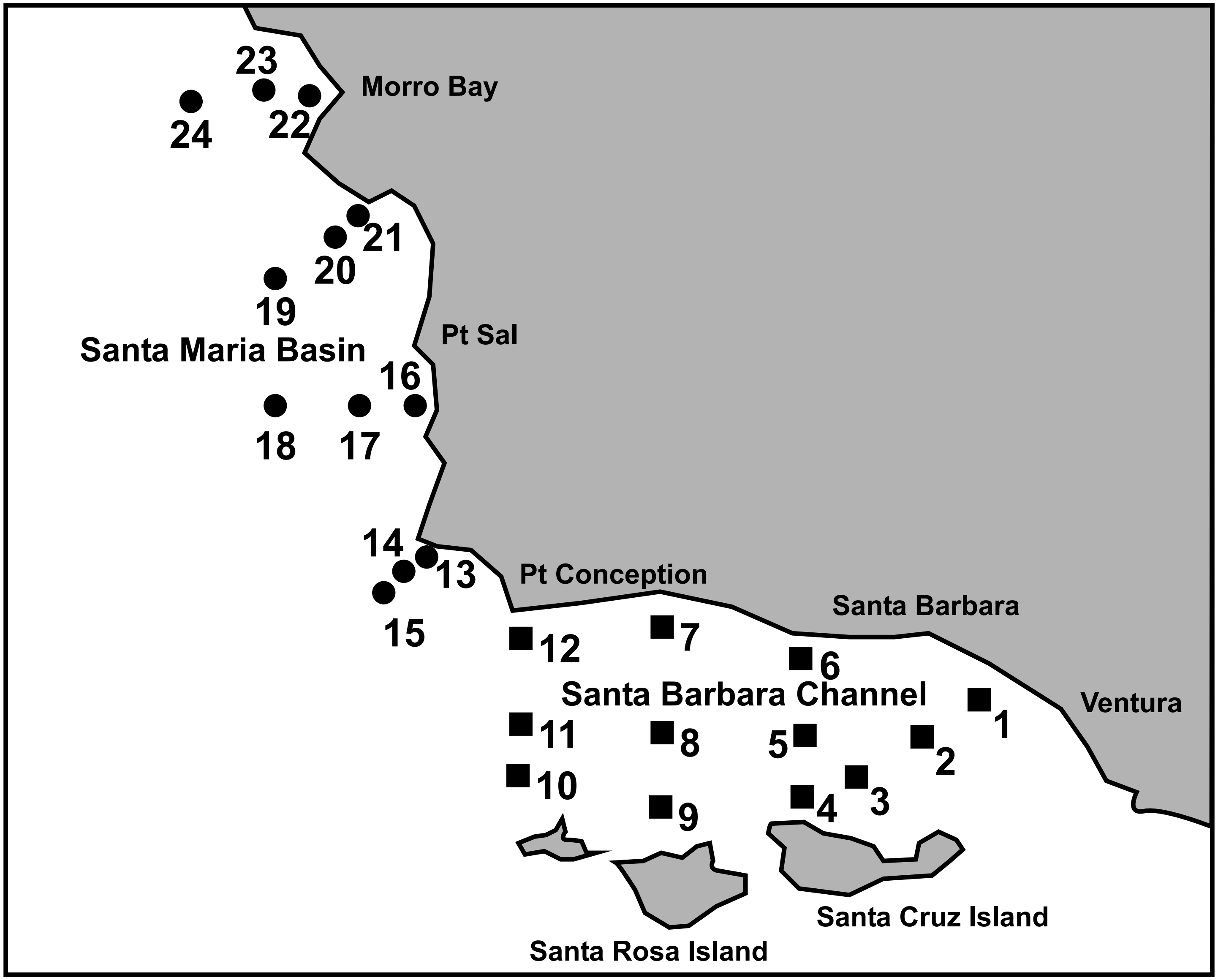
	Table I-2. Hypothetical Development Scenario and Post-Suspension Activities on the Undeveloped Leases (2006 – 2030).
Name	**Summary**
Federal Offshore OCS Projects Delineation and Exploration Drilling	• Delineation and development drilling activities are anticipated to occur in Federal waters during the period 2006 through 2009. These activities would require MMS review and approval, including environmental review, prior to implementation. Delineation drilling of three wells is expected to occur on the Point Sal, Purisima Point and Gato Canyon Units between 2006 and 2009 using a Mobile Offshore Drilling Unit (MODU). Appendix K provides a description of these anticipated MODU delineation drilling activities. Exploration drilling from existing platforms would take place on Platform Hidalgo for exploration into the Bonito Unit; Platform Hermosa for exploration into the Sword Unit; and Platform Gail for exploration into Cavern Point.
Cavern Point Unit Exploration	• Venoco Inc. is the operator of the Cavern Point Unit. The unit includes Leases OCS-P 0210 and 0527 in the Santa Barbara Channel offshore Ventura County. The Cavern Point Unit is bounded by the Channel Islands National Marine Sanctuary on the south and the producing Santa Clara Unit on the north and east. • Up to two exploratory wells are planned to be drilled into the unit from Platform Gail (located in the Santa Clara Unit). Drilling, evaluating, and (if appropriate) abandoning the first well would take approximately 100 days. No construction of either offshore or onshore facilities is proposed. If the exploratory wells find hydrocarbons in the Cavern Point Unit, they will serve as the basis for planning and future evaluation of potential development. According to current scenarios, oil and gas would be transported from Platform Gail via existing pipeline to Platform Grace, then onshore to the Carpinteria facility.
Rocky Point Unit Development	Arguello Inc. is the operator of the Rocky Point Unit. The Rocky Point Unit includes Leases OCS-P 0452 and 0453 in the southern offshore Santa Maria Basin. Twenty development wells, 14 oil wells and 6 service wells would be drilled from Platforms Harvest, Hermosa, and Hidalgo to develop the entire Rocky Point Field (these 20 wells include those already encompassed in the DPP revisions for the eastern half of OCS-P 0451, some of which are currently producing)*. Seven wells each would be drilled from Platforms Harvest and Hermosa and six from Platform Hidalgo. The wells would be extended-reach wells with horizontal displacement of 4.6-6.4 kilometers (2.5-3.5 miles). Drilling each well would require 3 to 4 months. * The Rocky Point field is already on production via wells drilled from existing platforms (Pt. Arguello) into the eastern half of Lease OCS-P0451. The reserve numbers and peak production (vol./day) shown in Table 5.2-4 reflect the entire field's development potential. • Oil would be dehydrated and stabilized on the platforms, then sent to the Gaviota facility via the PAPCO pipeline. At Gaviota, the oil would be metered and heated, stored temporarily in the Gaviota Terminal Company storage tanks, then transported via the All-American Pipeline (AAPL) to various refining destinations. • Rocky Point gas would be sweetened on the platforms and (1) sent via pipeline for sales onshore, (2) used to generate electricity and heat for platform operations, (3) sent to shore to fuel the Gaviota cogeneration units, and/or (4) injected into the Point Arguello Field, the Rocky Point Field, or both.
Sword Unit Development	• Samedan Oil Corporation (Samedan) is the current operator of the Sword Unit. The Sword Unit includes Leases OCS-P 0319, 0320, 0322, and 0323A. A portion of Lease OCS-P 0323 was relinquished and the remaining lease was redesignated 0323A to reflect the change. Eleven development wells, 10 oil wells and 1 service well, would be drilled from Platform Hermosa, located on Lease OCS-P 0316. The wells would be extended-reach wells with horizontal displacements of 6.4 to 8.3 kilometers (3.5 to 4.5 miles). Drilling each well would require 3 to 4 months. • Oil would be dehydrated and stabilized on the platforms, then sent to the Gaviota facility via the PAPCO pipeline. At Gaviota, the oil would be metered and heated, stored temporarily in the Gaviota Terminal Company storage tanks, then transported via the All-American Pipeline to various refining destinations. • Sword gas would be sweetened on Platform Hermosa and (1) sent via pipeline for sales onshore, (2) used to generate electricity and heat for platform operations, (3) sent to shore to fuel the Gaviota cogeneration units, and/or (4) injected into the Point Arguello Field.

	Table I-2. Hypothetical Development Scenario and Post-Suspension Activities on the Undeveloped Leases (2006 – 2030).
Name	**Summary**
Cavern Point Unit Development	• The Cavern Point Unit includes Leases OCS-P 0210 and 0527, north of Santa Rosa Island in the Santa Barbara Channel. Eleven development wells, 10 oil wells and 1 service well, would be drilled from Platform Gail, located in the Santa Clara Unit. The wells would be extended-reach wells with horizontal displacements of 6.4-8.3 kilometers (3.5-4.5 miles). Drilling each well would require 3 to 4 months. The service well would be drilled into the Sockeye Field and would not be an extended reach well. • The oil and gas would be sent to the Carpinteria onshore processing facility via Platform Grace using existing pipelines. The oil and gas would be processed using existing capacity. Produced water would be injected or disposed overboard at Platform Gail.
Exploration Well Abandonment, OCS-P 0320 #2	• Well OCS-P 0320 #2 was drilled and temporarily abandoned in 1985. Samedan proposes to permanently abandon well OCS-P 0320 #2 using a Mobile Offshore Drilling Unit (MODU). • The sequence of activities would be as follows; (1) the MODU would anchor over the well, (2) the well would be entered and temporary plugs removed, (3) permanent cement plugs would be placed, (4) the wellhead and casing would be removed, and (5) anchors removed and the MODU moved offsite. • Samedan estimates 11 days to conduct abandonment activities.
Exploration Well Abandonment, OCS-P 0241 #2	• Well OCS-P 0241 #2 was drilled and temporarily abandoned in 1968. The operator proposes to permanently abandon the well using a MODU. • The sequence of activities would be as follows; (1) the MODU would anchor over the well, (2) the well would be entered and temporary plugs removed, (3) permanent cement plugs would be placed, (4) the wellhead and casing would be removed, and (5) anchors removed and the MODU moved offsite. • It would likely take 11 days to conduct abandonment activities.

APPENDIX J.

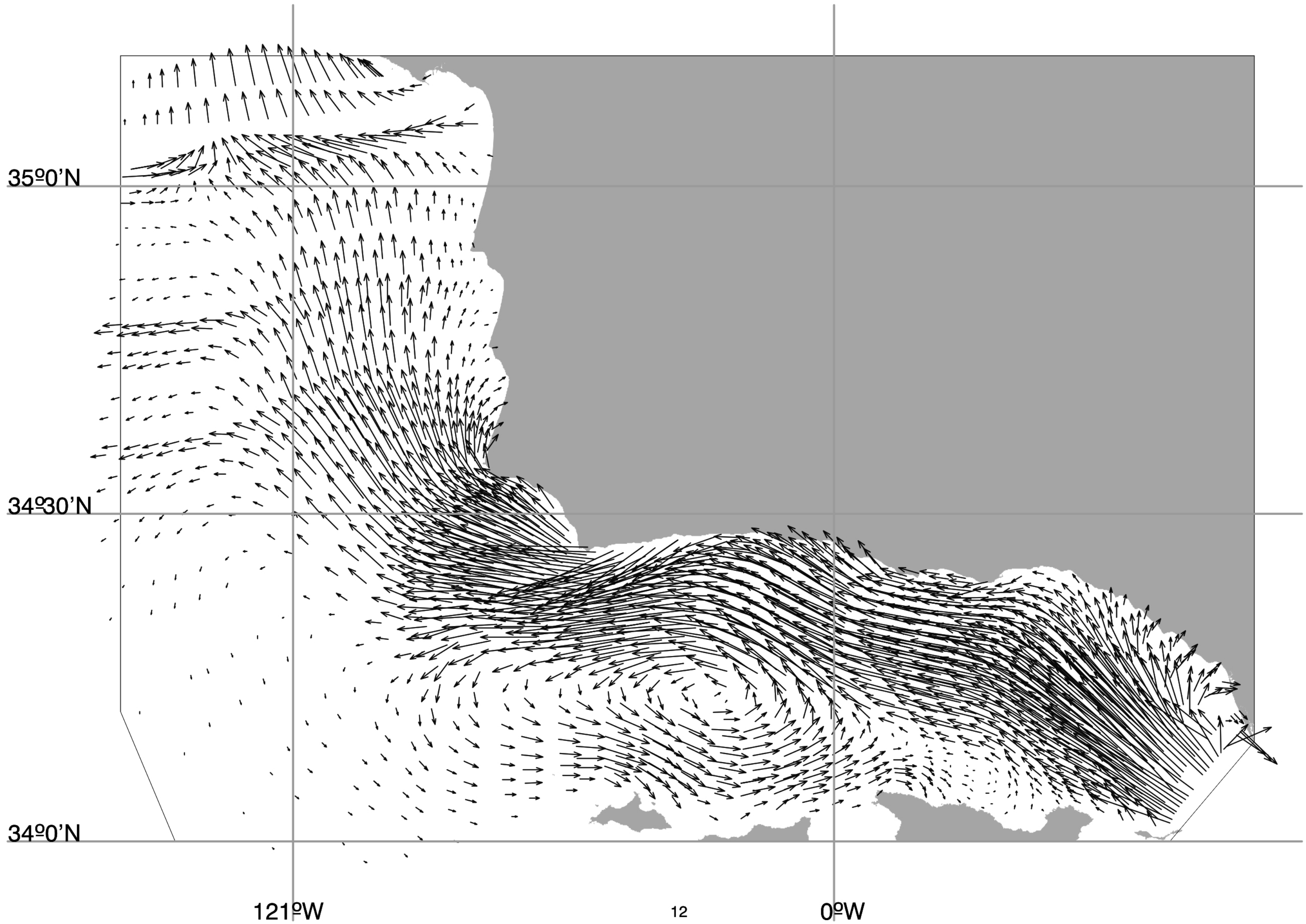
FIGURES FOR OIL SPILL ANALYSIS

Figure J-12	GNOME Modeled 7 hour, 2000 bbl oil spill scenario for platform Gail (depicted by “+”), located in the center of the Channel near its eastern entrance, during an upwelling flow regime and a 1.5 m/s NW wind. GNOME model output indicates that of 2000 bbl released: 0 bbl beach, 148 bbl evaporate or are dispersed, 160 bbl are still floating, and 1692 bbl have moved out of the model domain heading southeast out of the eastern Santa Barbara Channel entrance and along the southern California coastline. After 3 and 10 days, the GNOME model gives the same output of 150 bbl of oil evaporated and dispersed and 1850 bbl out of the model domain heading southeast out of the Santa Barbara Channel by way of its eastern entrance and along the southern California coastline.
Figure J-13	MMS OSRA Model output for a 10 day event at platform Hidalgo during the winter season. The boxes are U. S. Geological Survey 7.5 Minute Quad series maps presenting the calculated probabilities (in percentages) of oil contact with the shoreline contained within each map.
Figure J-14	MMS OSRA Model output for a 10 day event at platform Hidalgo during the spring season. The boxes are U. S. Geological Survey 7.5 Minute Quad series maps presenting the calculated probabilities (in percentages) of oil contact with the shoreline contained within each map.
Figure J-15	MMS OSRA Model output for a 10 day event at platform Hidalgo during the summer season. The boxes are U. S. Geological Survey 7.5 Minute Quad series maps presenting the calculated probabilities (in percentages) of oil contact with the shoreline contained within each map.
Figure J-16	MMS OSRA Model output for a 10 day event at platform Hidalgo during the fall season. The boxes are U. S. Geological Survey 7.5 Minute Quad series maps presenting the calculated probabilities (in percentages) of oil contact with the shoreline contained within each map.
Figure J-17	MMS OSRA Model output for a 10 day event at platform Gail during the winter season. The boxes are U. S. Geological Survey 7.5 Minute Quad series maps presenting the calculated probabilities (in percentages) of oil contact with the shoreline contained within each map.
Figure J-18	MMS OSRA Model output for a 10 day event at platform Gail during the spring season. The boxes are U. S. Geological Survey 7.5 Minute Quad series maps presenting the calculated probabilities (in percentages) of oil contact with the shoreline contained within each map.
Figure J-19	MMS OSRA Model output for a 10 day event at platform Gail during the summer season. The boxes are U. S. Geological Survey 7.5 Minute Quad series maps presenting the calculated probabilities (in percentages) of oil contact with the shoreline contained within each map.
Figure J-20	MMS OSRA Model output for a 10 day event at platform Gail during the fall season. The boxes are U. S. Geological Survey 7.5 Minute Quad series maps presenting the calculated probabilities (in percentages) of oil contact with the shoreline contained within each map.



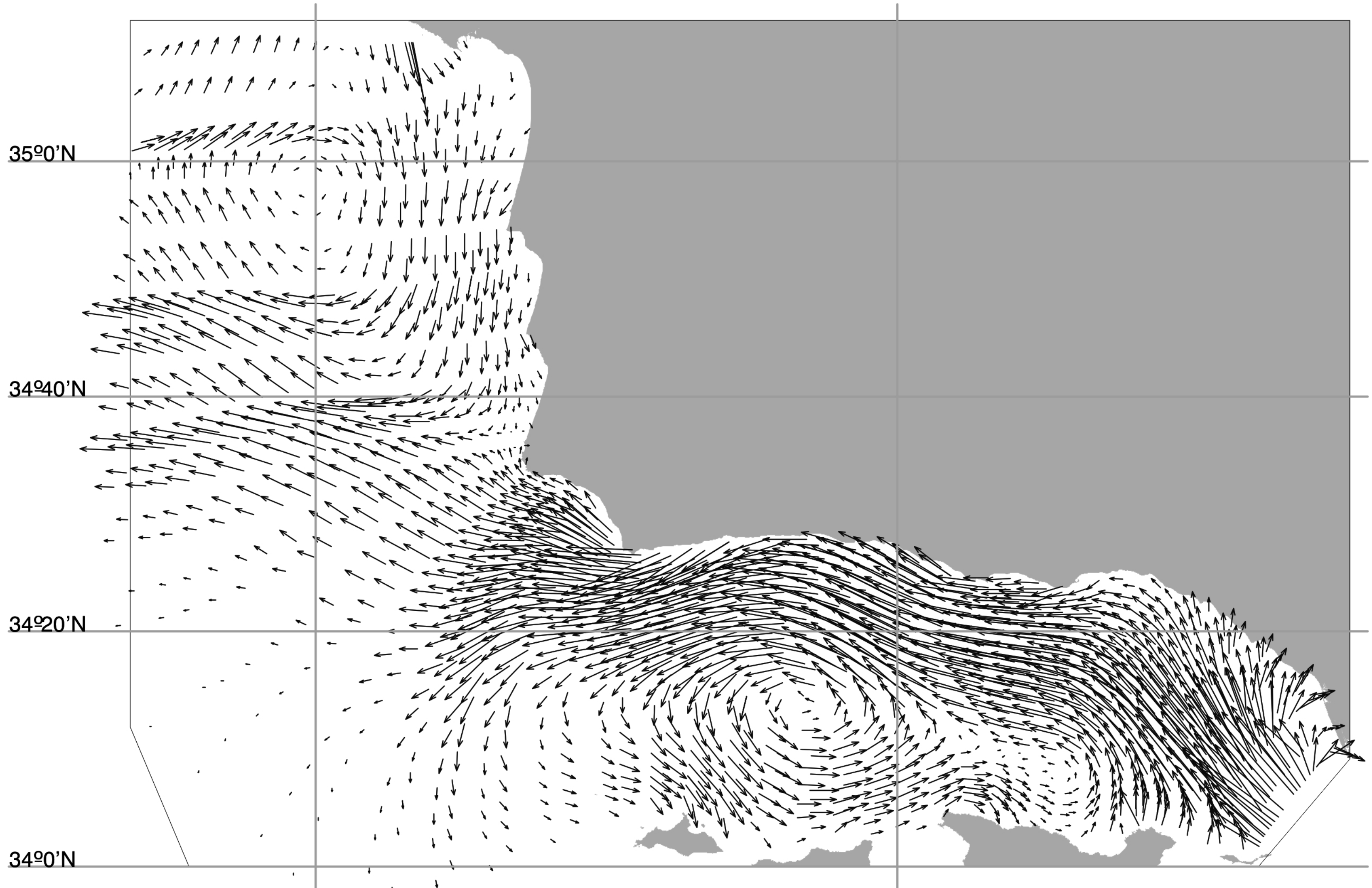
Source: Revised from MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 5.1.3.2-1)

Figure J-1. Launch Point Locations for Free-floating Surface Drifter Deployments.



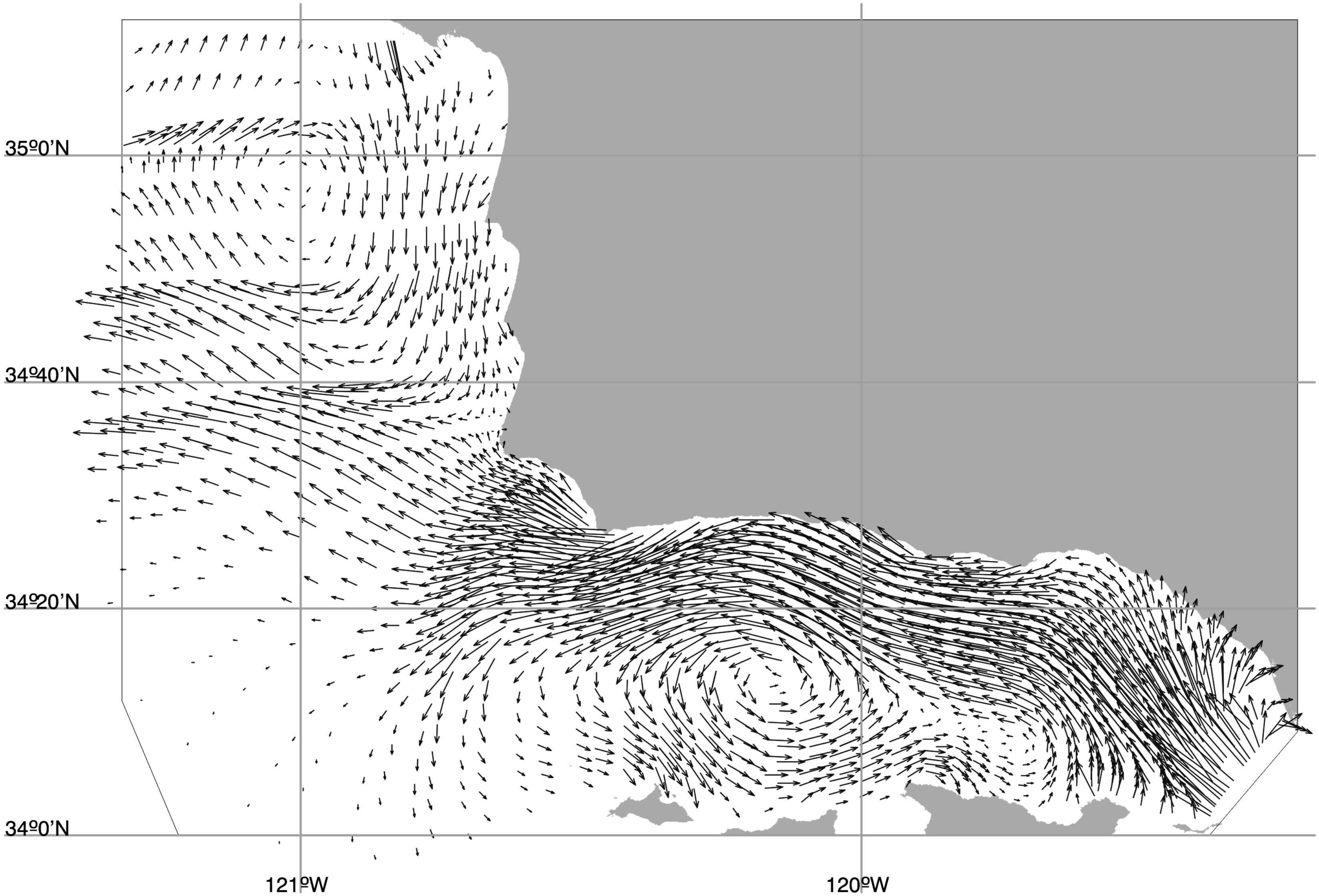
Source: MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 5.1.3.2-2)

Figure J-2. Synoptic representation of the relaxation current flow regime characteristic of the Santa Barbara Channel-Santa Maria Basin area prepared by Scripps scientists and used by NOAA in their GNOME Model.



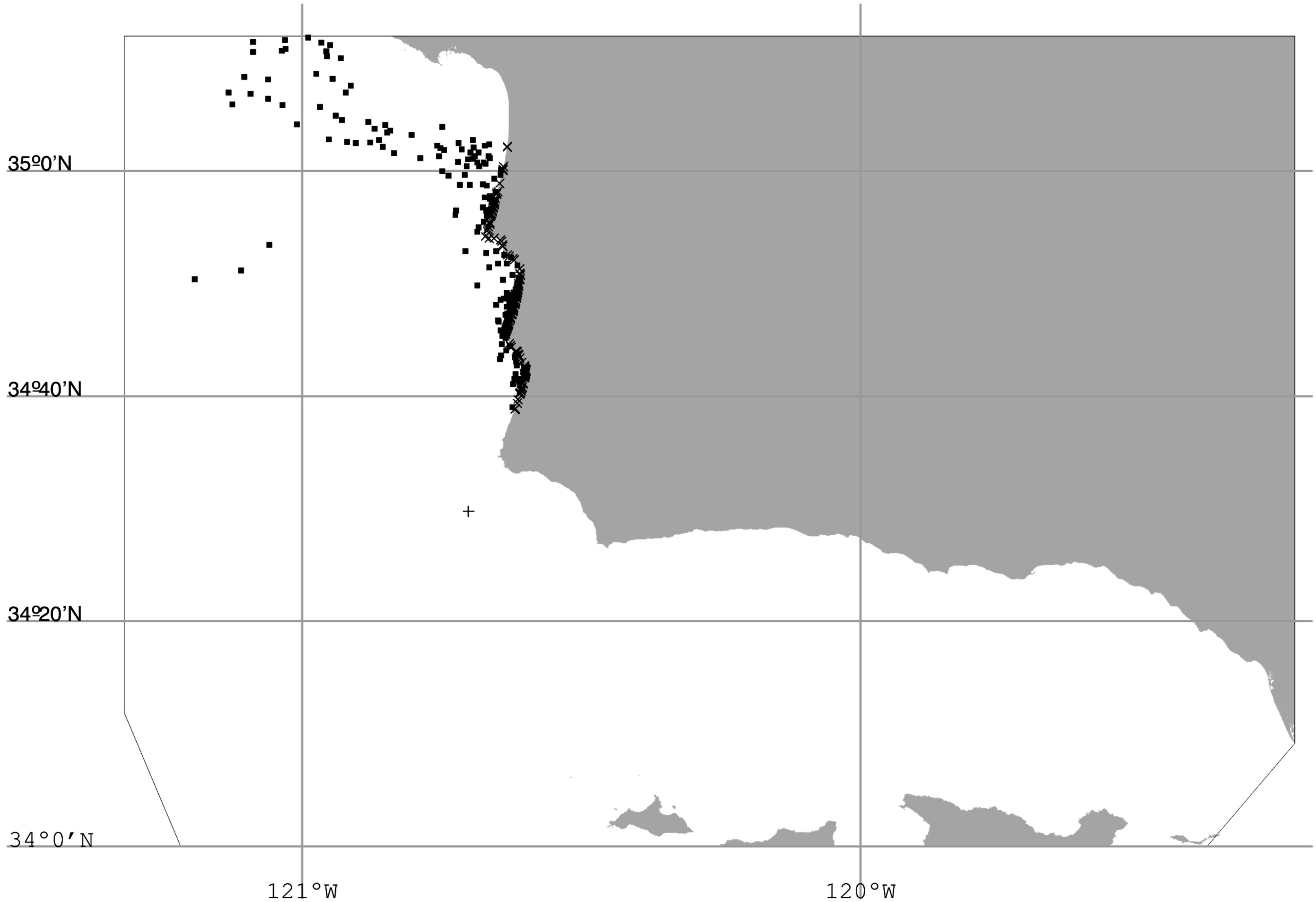
Source: MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 5.1.3.2-3)

Figure J-3. Synoptic representation of the convergent current flow regime characteristic of the Santa Barbara Channel-Santa Maria Basin area prepared by Scripps scientists and used by NOAA in their GNOME Model.



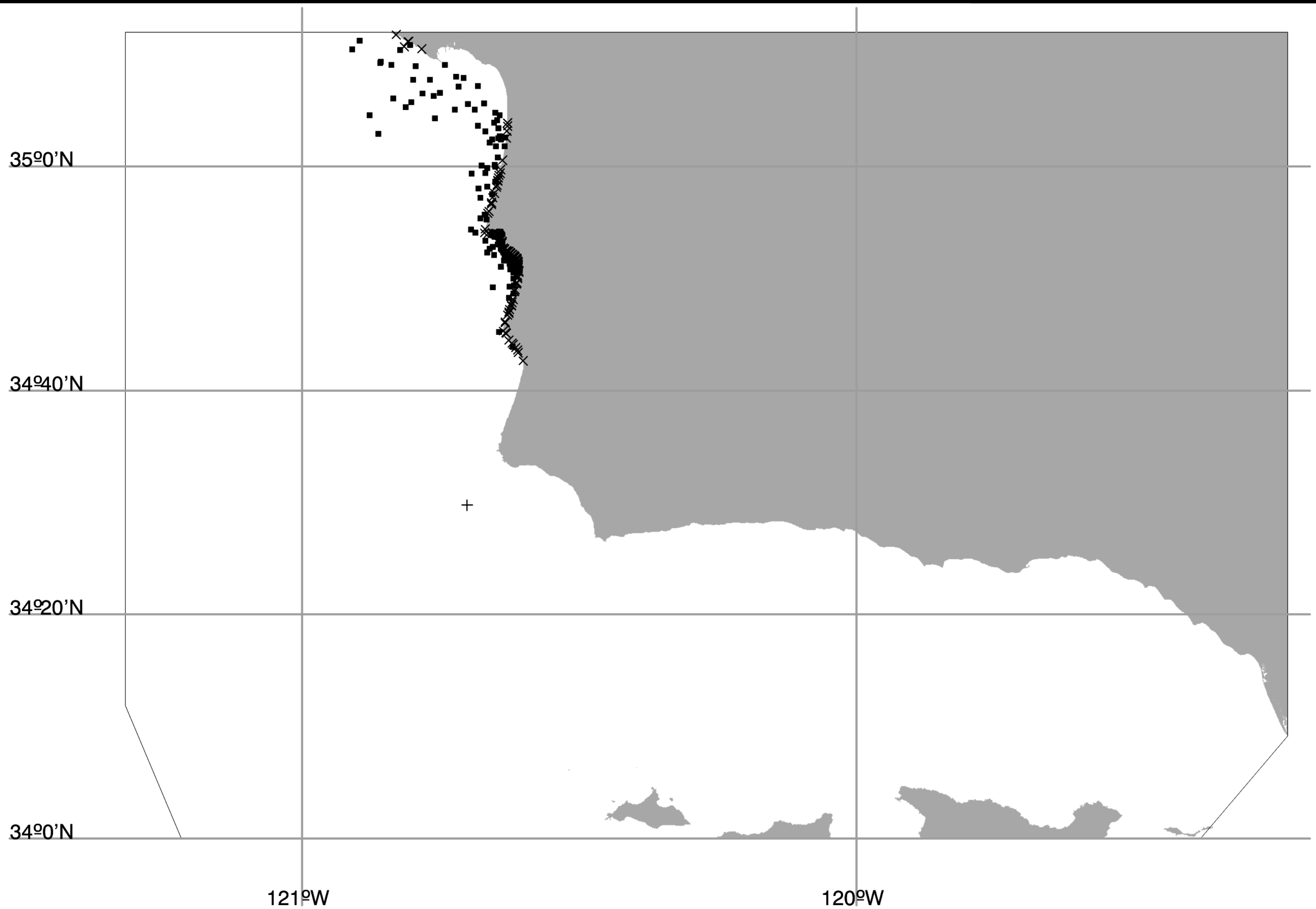
Source: MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 5.1.3.2-4)

Figure J-4. Synoptic representation of the upwelling current flow regime characteristic of the Santa Barbara Channel-Santa Maria Basin area prepared by Scripps scientists and used by NOAA in their GNOME Model.



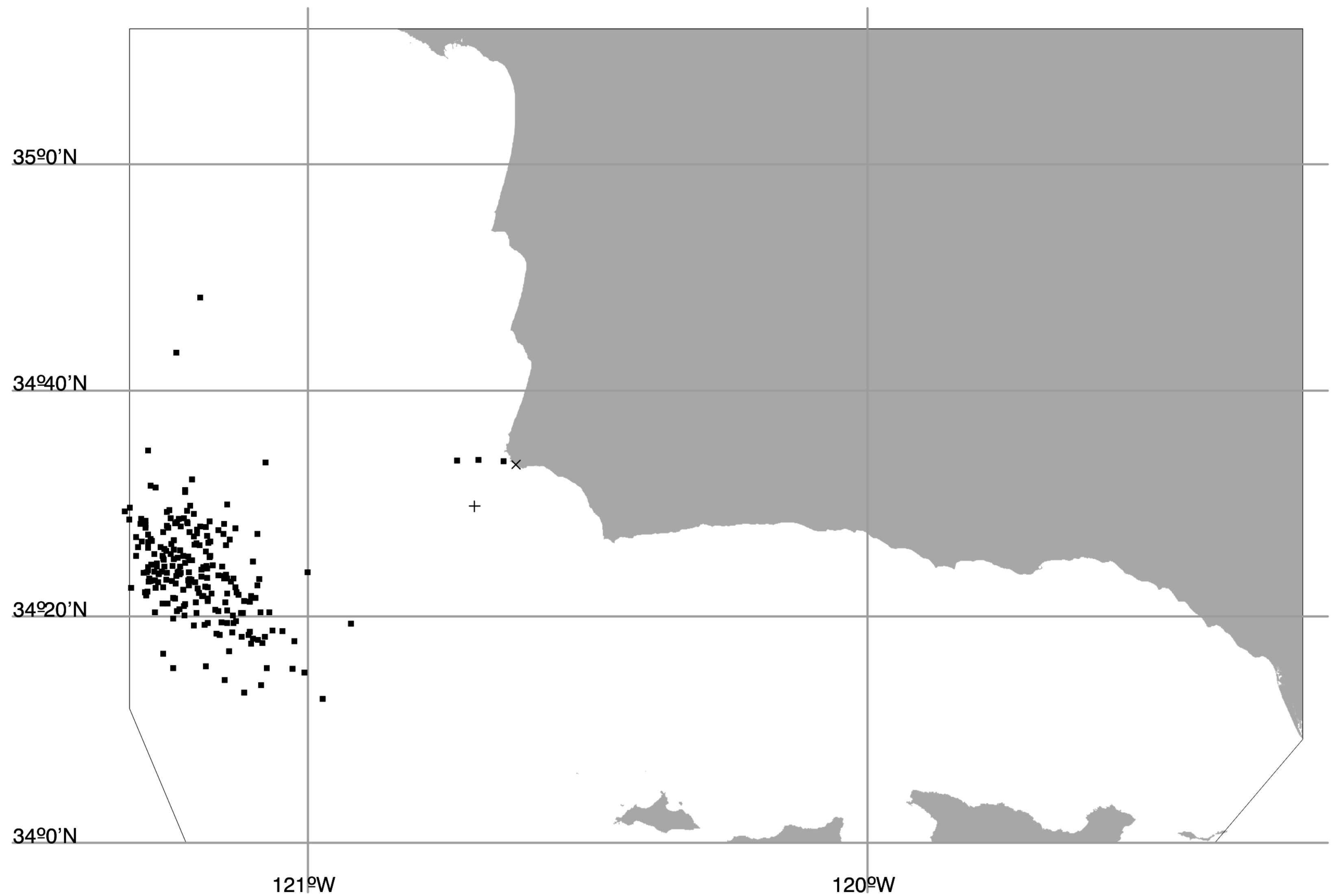
Source: MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 5.1.3.2-7)

Figure J-5. GNOME Modeled 10 day, 2000 bbl oil spill scenario for platform Hidalgo (depictedby "+"), located offshore of Point Arguello, during a relaxation flow regime and a 4 m/s NW wind. GNOME model output indicates that of 2000 bbl released: 358 bbl beach, 950 bbl evaporate or are dispersed, 318 bbl are still floating, and 374 bbl have moved out of the model domain heading north in the Santa Maria Basin.



Source: MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 5.1.3.2-8)

Figure J-6. GNOME Modeled 10 day, 2000 bbl oil spill scenario for platform Hidalgo (depicted by "+"), located offshore of Point Arguello, during a relaxation flow regime and a 4 m/s SW wind. GNOME model output indicates that of 2000 bbl released: 296 bbl beach, 942 bbl evaporate or are dispersed, 220 bbl are still floating, and 542 bbl have moved out of the model domain heading north in the Santa Maria Basin.

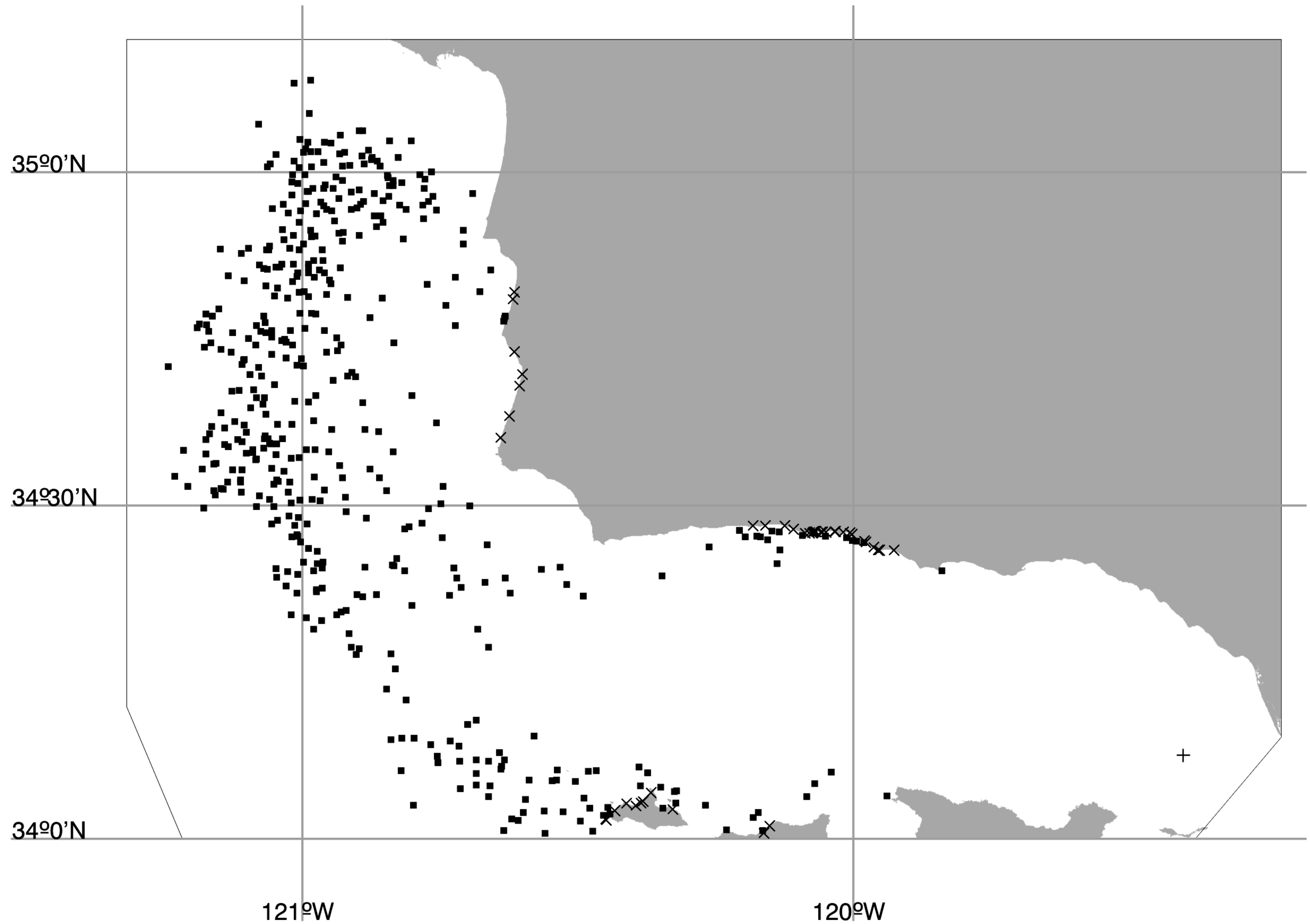


Source: MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 5.1.3.2-9)

Figure J-7. GNOME Modeled 10 day, 2000 bbl oil spill scenario for platform Hidalgo (depicted by "+"), located offshore of Point Arguello, during a convergent flow regime and a 7m/s NW wind. GNOME model output indicates that of 2000 bbl released: 2 bbl beach, 946 bbl evaporate or are dispersed, 446 bbl are still floating, and 606 bbl have moved out of the model domain heading west out of the Santa Maria Basin.

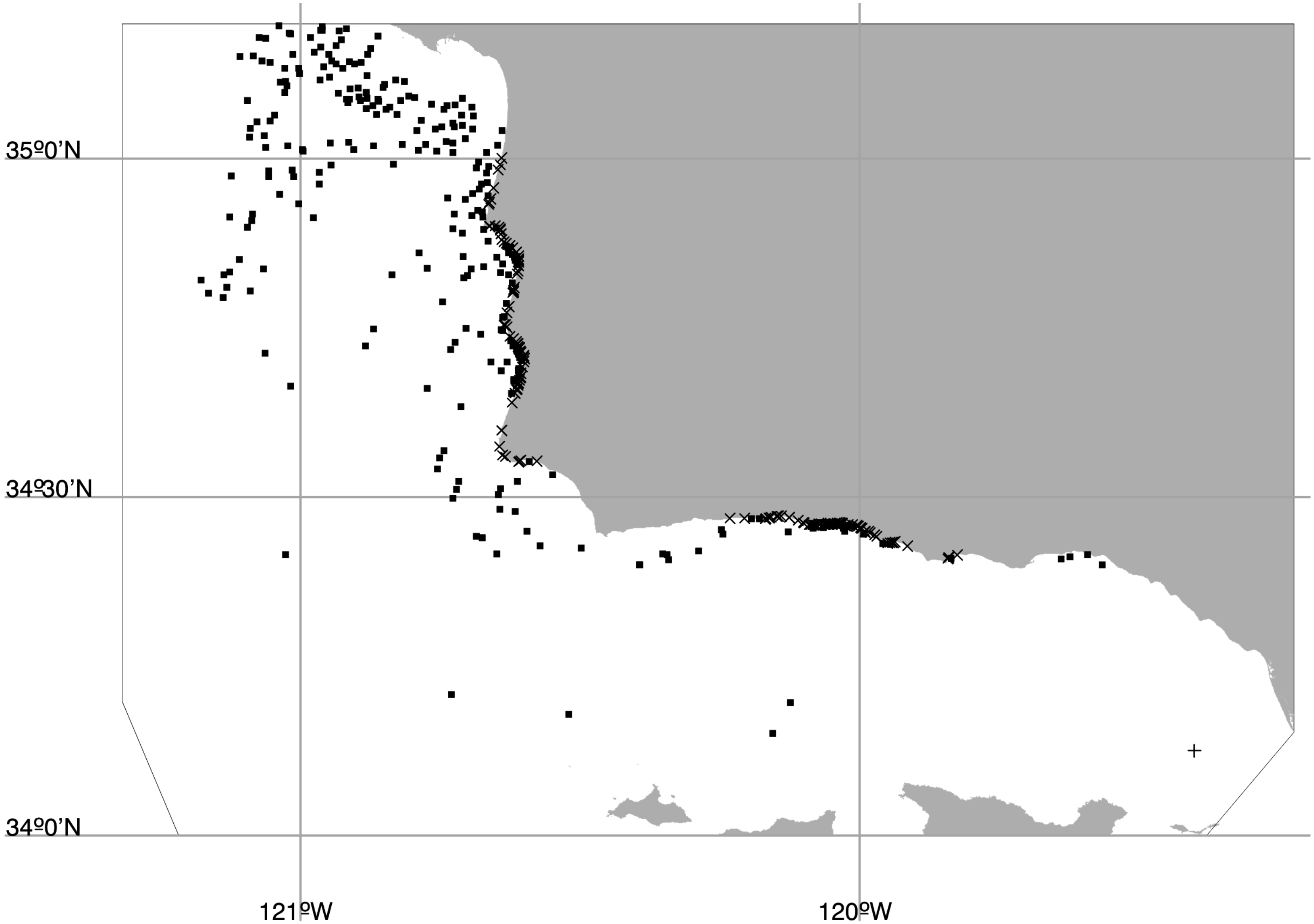
Source: MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 5.1.3.2-10)

Figure J-8. GNOME Modeled 10 day, 2000 bbl oil spill scenario for platform Hidalgo (depicted by "+"), located offshore of Point Arguello, during an upwelling flow regime and a 8m/s NW wind. GNOME model output indicates that of 2000 bbl released: 596 bbl beach, 974 bbl evaporate or are dispersed, 128 bbl are still floating, and 302 bbl have moved out of the model domain heading south to southeast offshore of the Southern California Bight.



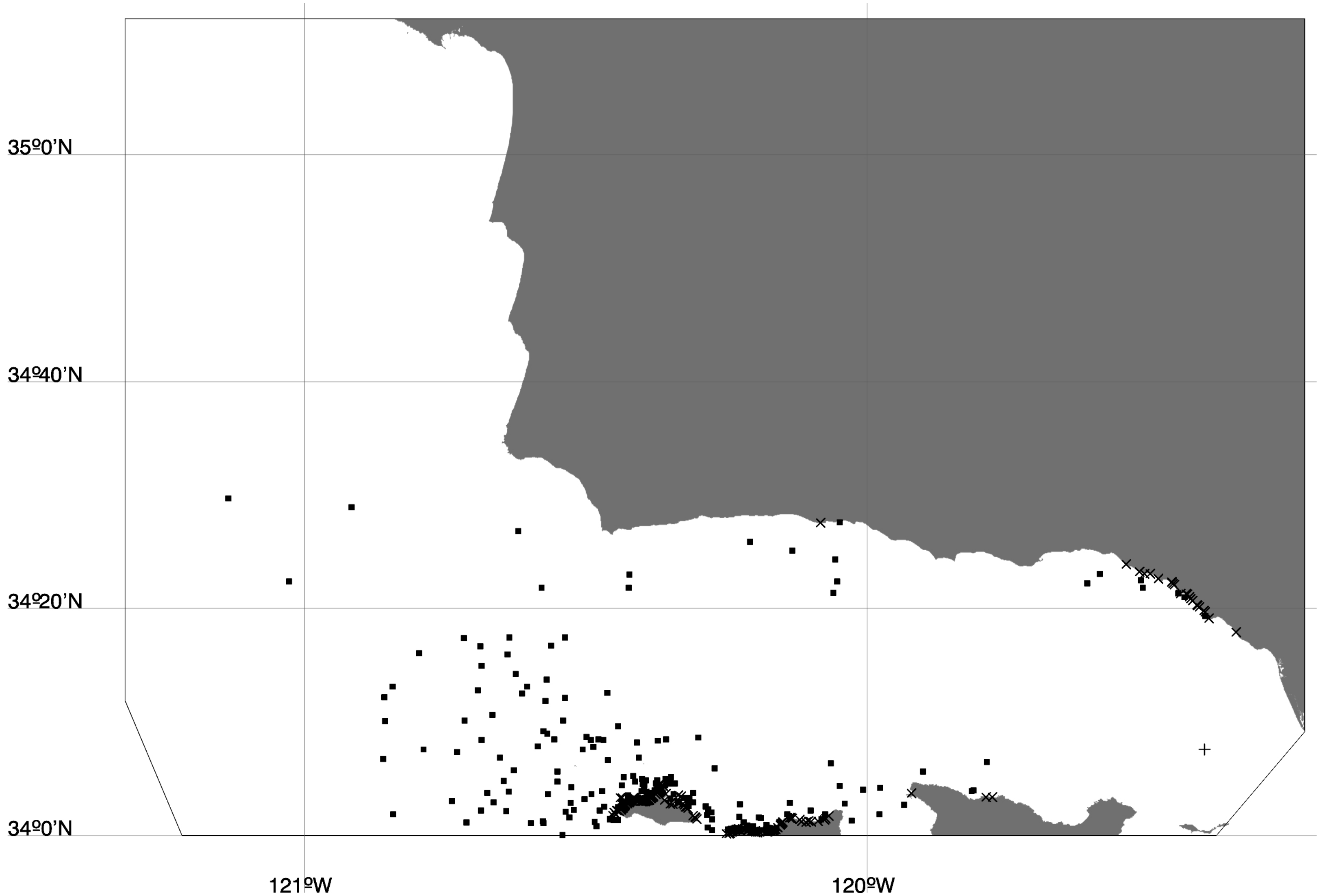
Source: MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 5.1.3.2-15)

Figure J-9. GNOME Modeled 10 day, 2000 bbl oil spill scenario for platform Gail (depicted by "+"), located in the center of the Channel near its eastern entrance, during a relaxation flow regime and a 4 m/s NW wind. GNOME model output indicates that of 2000 bbl released: 94 bbl beach, 974 bbl evaporate or are dispersed, 924 bbl are still floating, and 8 bbl have moved out of the model domain heading west out of the Santa Maria Basin and south to southeast offshore of the Southern California Bight.



Source: MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 5.1.3.2-16)

Figure J-10. GNOME Modeled 10 day, 2000 bbl oil spill scenario for platform Gail (depicted by "+"), located in the center of the Channel near its eastern entrance, during a relaxation flow regime and a 4 m/s SW wind. GNOME model output indicates that of 2000 bbl released: 316 bbl beach, 978 bbl evaporate or are dispersed, 534 bbl are still floating, and 172 bbl have moved out of the model domain heading north out of the Santa Maria Basin.

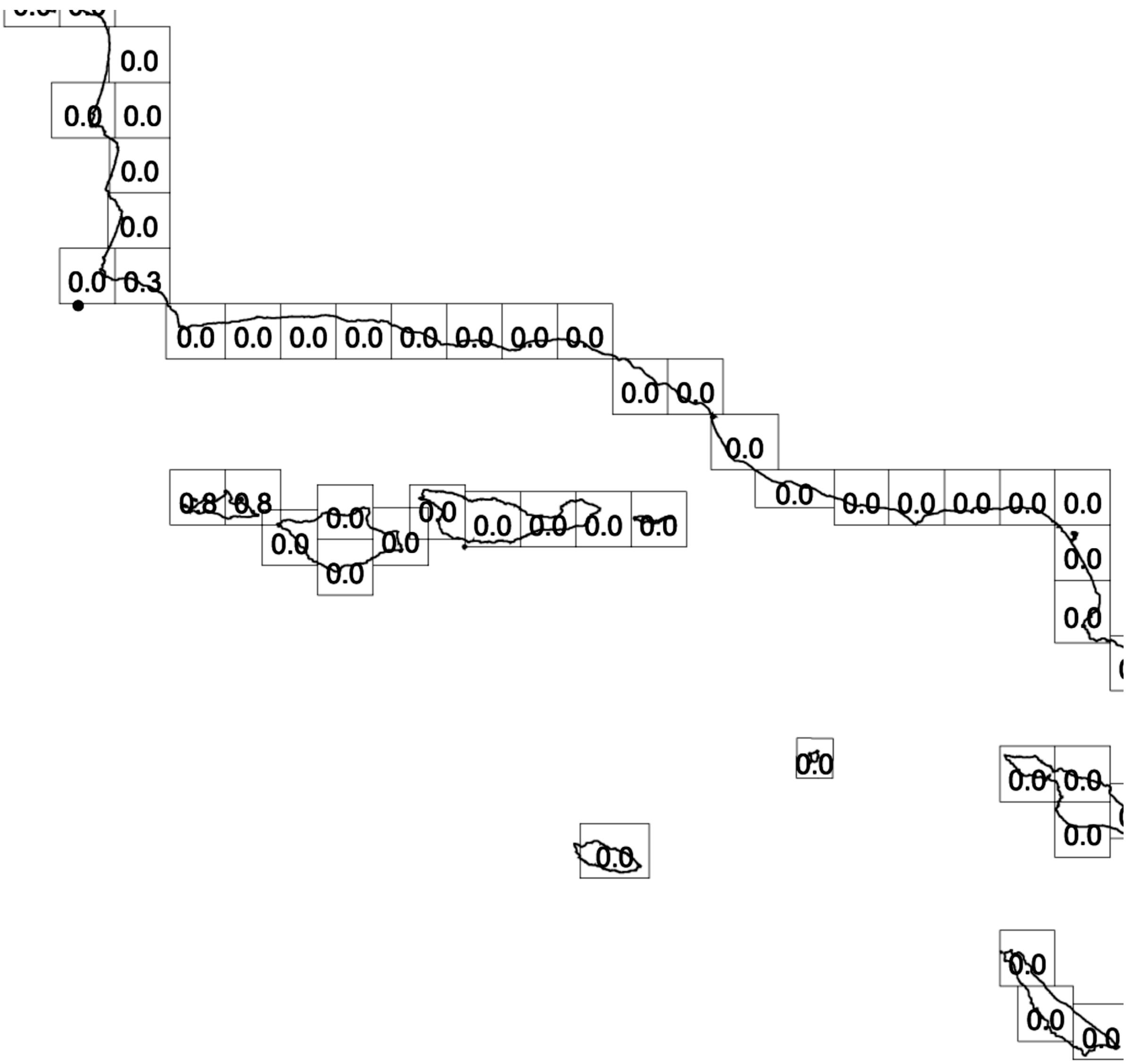


Source: MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 5.1.3.2-17)

Figure J-11. GNOME Modeled 10 day, 2000 bbl oil spill scenario for platform Gail (depicted by "+"), located in the center of the Channel near its eastern entrance, during a convergent flow regime and a 7 m/s NW wind. GNOME model output indicates that of 2000 bbl released: 410 bbl beach, 964 bbl evaporate or are dispersed, 366 bbl are still floating, and 260 bbl have moved out of the model domain heading south to southeast offshore of the Southern California Bight.

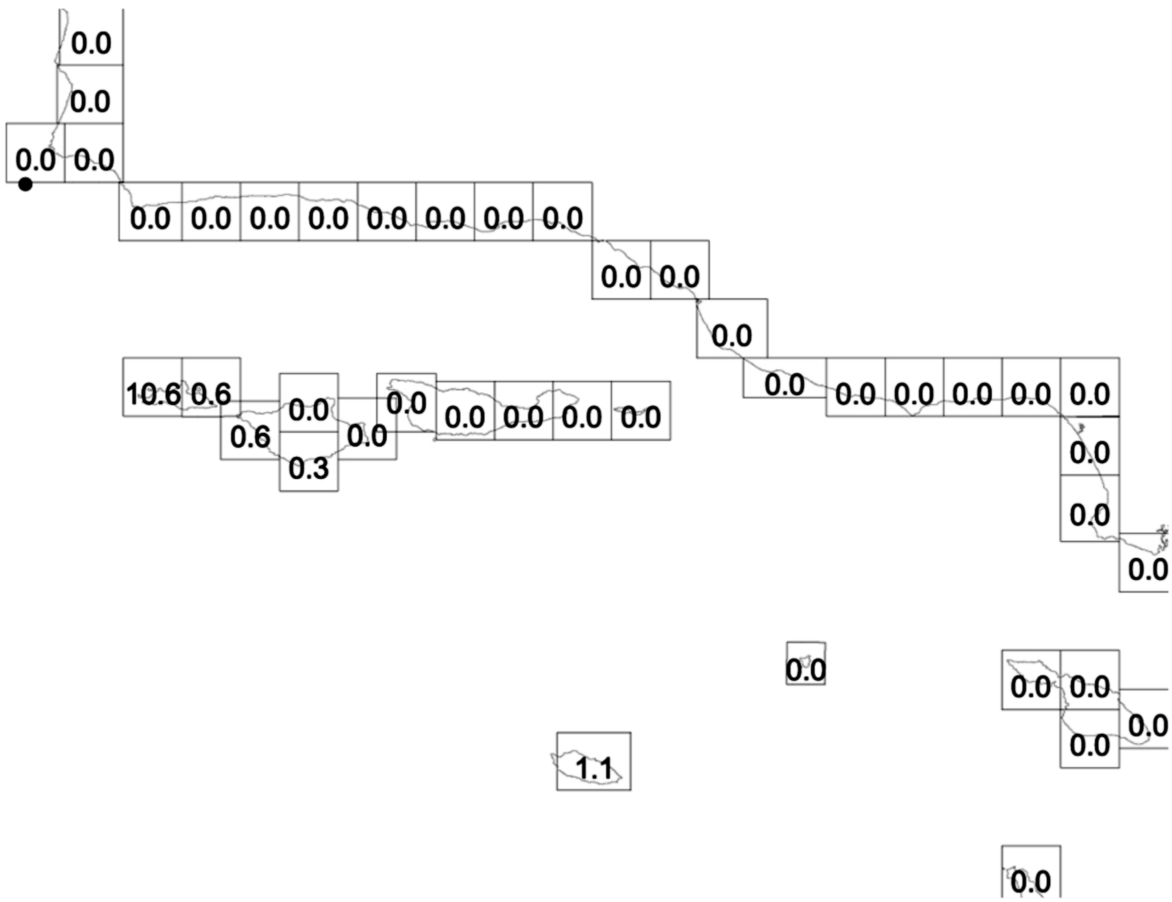
Source: MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 5.1.3.2-18)

Figure J-12. GNOME Modeled 7 hour, 2000 bbl oil spill scenario for platform Gail (depicted by "+"), located in the center of the Channel near its eastern entrance, during an upwelling flow regime and a 1.5 m/s NW wind. GNOME model output indicates that of 2000 bbl released: 0 bbl beach, 148 bbl evaporate or are dispersed, 160 bbl are still floating, and 1692 bbl have moved out of the model domain heading southeast out of the eastern Santa Barbara Channel entrance and along the southern California coastline. After 3 and 10 days, the GNOME model gives the same output of 150 bbl of oil evaporated and dispersed and 1850 bbl out of the model domain heading southeast out of the Santa Barbara Channel by way of its eastern entrance and along the southern California coastline.



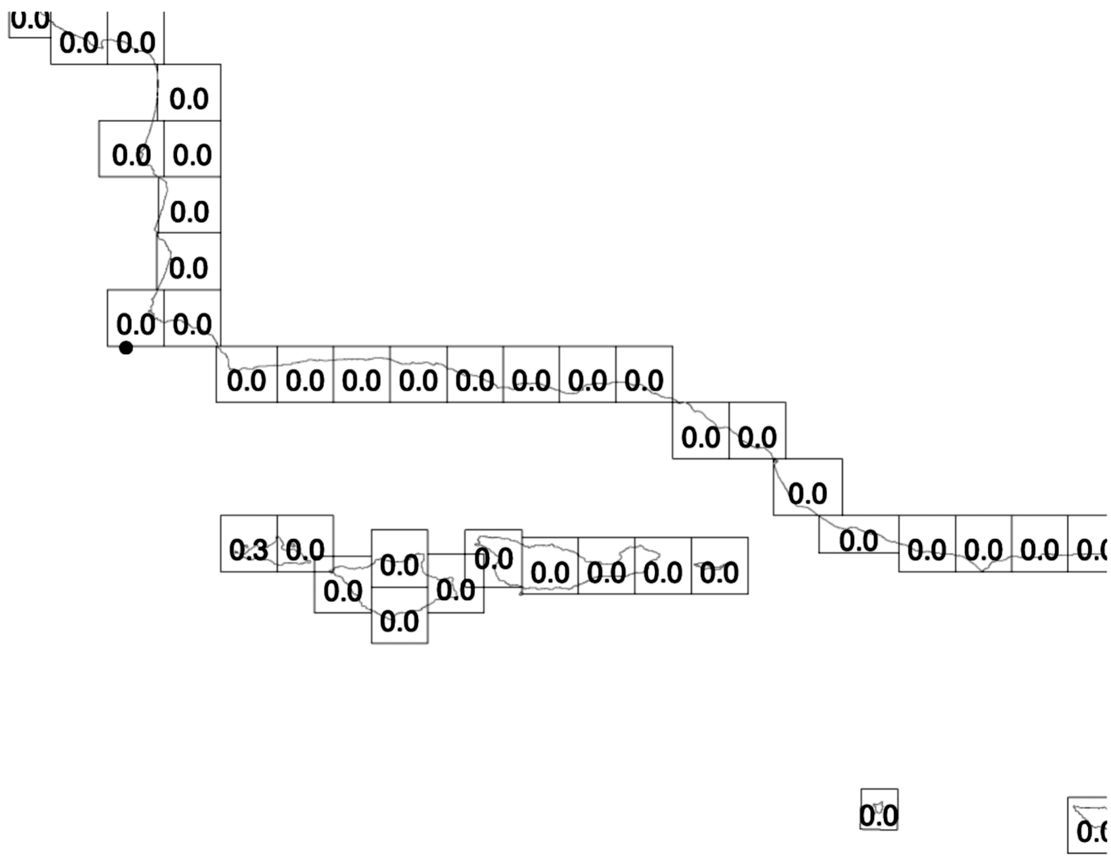
Source: MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 5.1.3.2-11)

Figure J-13. MMS OSRA Model output for a 10 day event at platform Hidalgo during the winter season. The boxes are U. S. Geological Survey 7.5 Minute Quad series maps presenting the calculated probabilities (in percentages) of oil contact with the shoreline contained within each map.



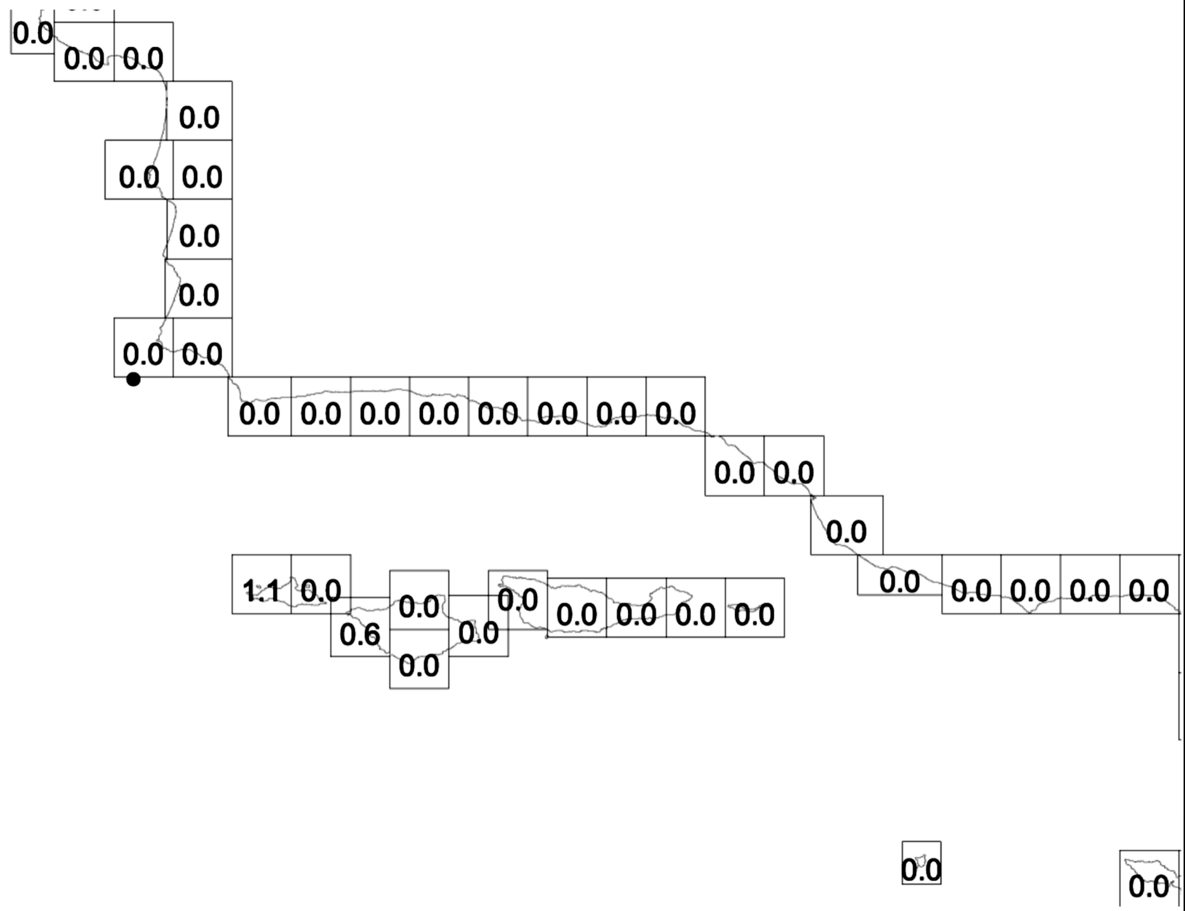
Source: MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 5.1.3.2-12)

Figure J-14. MMS OSRA Model output for a 10 day event at platform Hidalgo during the spring season. The boxes are U. S. Geological Survey 7.5 Minute Quad series maps presenting the calculated probabilities (in percentages) of oil contact with the shoreline contained within each map.



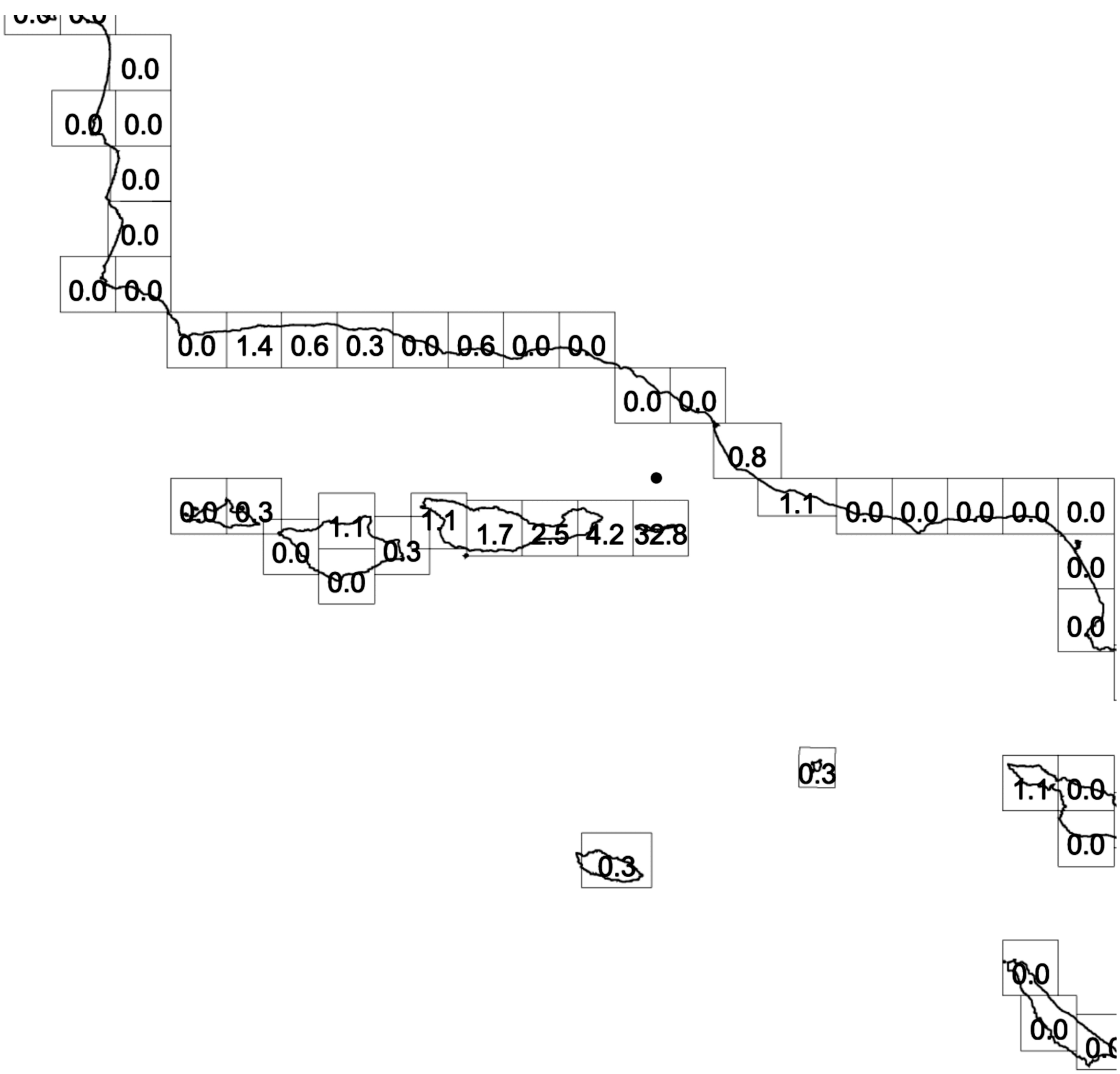
Source: MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 5.1.3.2-13)

Figure J-15. MMS OSRA Model output for a 10 day event at platform Hidalgo during the summer season. The boxes are U. S. Geological Survey 7.5 Minute Quad series maps presenting the calculated probabilities (in percentages) of oil contact with the shoreline contained within each map.



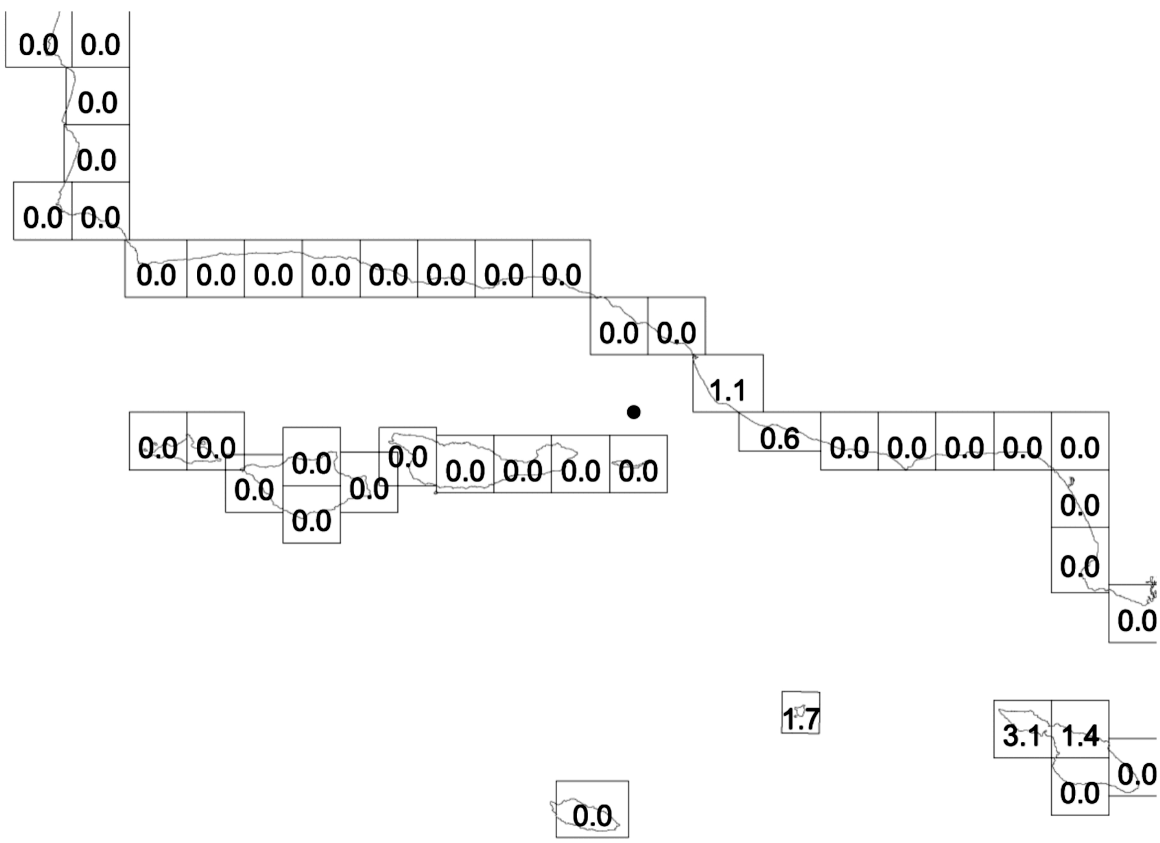
Source: MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 5.1.3.2-14)

Figure J-16. MMS OSRA Model output for a 10 day event at platform Hidalgo during the fall season. The boxes are U. S. Geological Survey 7.5 Minute Quad series maps presenting the calculated probabilities (in percentages) of oil contact with the shoreline contained within each map.



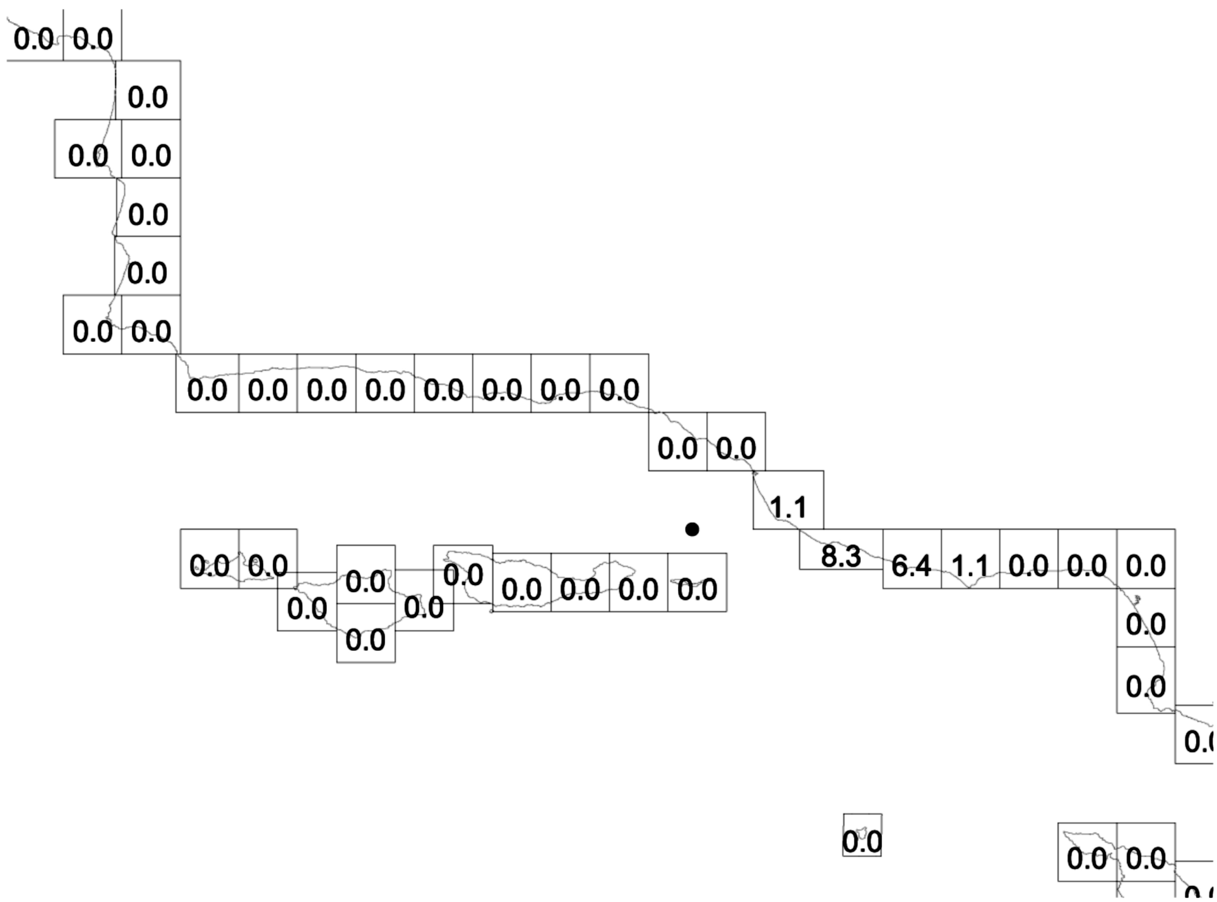
Source: MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 5.1.3.2-19)

Figure J-17. MMS OSRA Model output for a 10 day event at platform Gail during the winter season. The boxes are U. S. Geological Survey 7.5 Minute Quad series maps presenting the calculated probabilities (in percentages) of oil contact with the shoreline contained within each map.



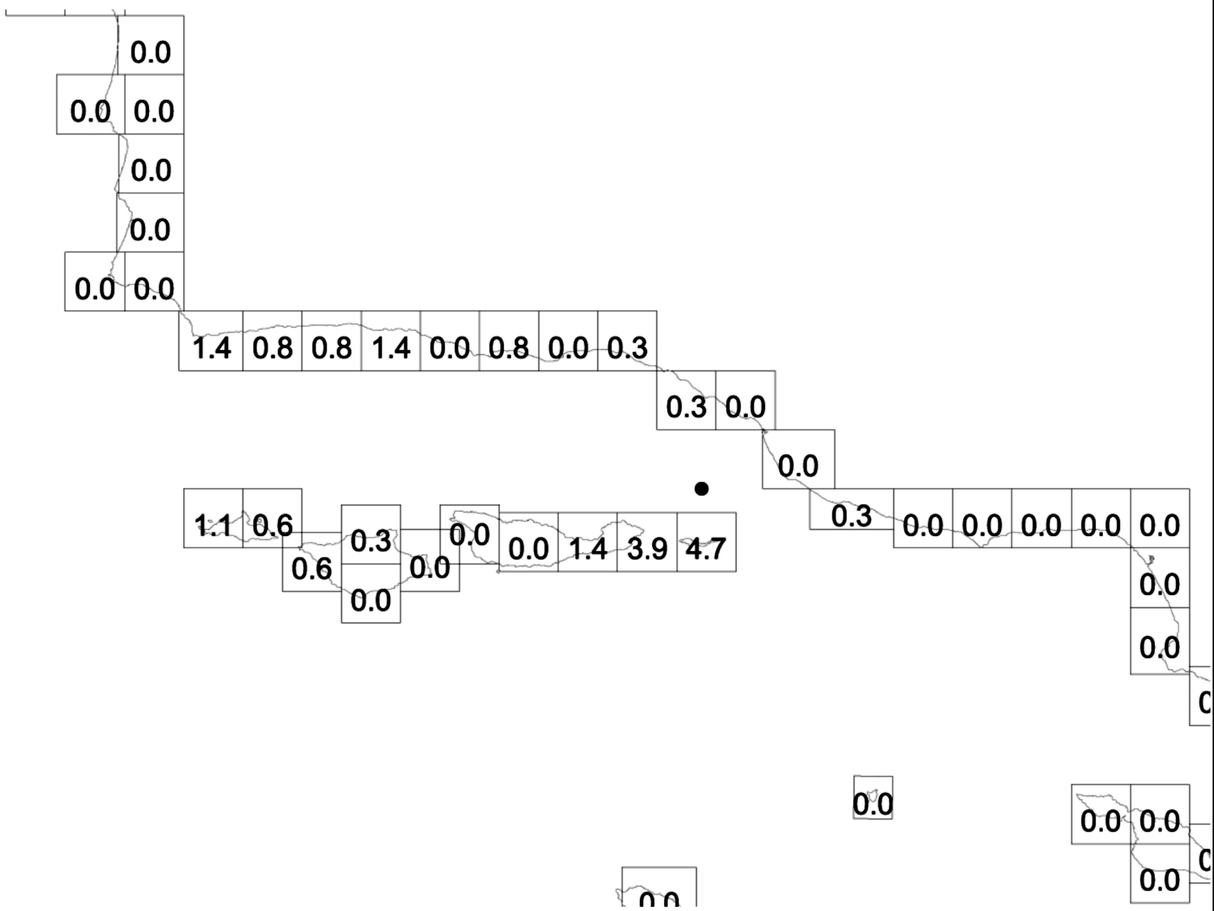
Source: MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 5.1.3.2-20)

Figure J-18. MMS OSRA Model output for a 10 day event at platform Gail during the spring season. The boxes are U. S. Geological Survey 7.5 Minute Quad series maps presenting the calculated probabilities (in percentages) of oil contact with the shoreline contained within each map.



Source: MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 5.1.3.2-21)

Figure J-19. MMS OSRA Model output for a 10 day event at platform Gail during the summer season. The boxes are U. S. Geological Survey 7.5 Minute Quad series maps presenting the calculated probabilities (in percentages) of oil contact with the shoreline contained within each map.



Source: MMS DEIS on Delineation Drilling Activities in Federal Waters Offshore Santa Barbara County, CA., 2001 (Figure 5.1.3.2-22)

Figure J-20. MMS OSRA Model output for a 10 day event at platform Gail during the fall season. The boxes are U. S. Geological Survey 7.5 Minute Quad series maps presenting the calculated probabilities (in percentages) of oil contact with the shoreline contained within each map.

APPENDIX K.

DESCRIPTION OF DELINEATION DRILLING USING A MOBILE OFFSHORE DRILLING UNIT (MODU)

APPENDIX K: DESCRIPTION OF DELINEATION DRILLING USING A MOBILE OFFSHORE DRILLING UNIT (MODU)

This appendix provides a description of activities associated with delineation drilling using a semi-submersible drilling vessel commonly referred to as a Mobile Offshore Drilling Unit (MODU). Delineation drilling is anticipated to occur in the future as part of the exploratory efforts associated with the undeveloped leases. Potential impacts associated with these activities have been considered in the cumulative analysis of this document. The following description is from the MMS's 2001 Draft EIS for delineation drilling activities in Federal waters offshore Santa Barbara County.

Between 2006 and 2009, the operators (Aera Energy LLC and Samedan Oil Corporation) of three Pacific OCS units (Point Sal, Purisima Point, and Gato Canyon), may propose to drill three delineation wells on those units. These efforts will be proposed in Exploration Plans (EPs) for MMS review and approval.

The MODU would move from one unit to another, sequentially drilling a total of three wells on the three units noted above. Each of the three units has been previously explored under EPs approved by the MMS. These EPs were found consistent with the California Coastal Management Plan by the California Coastal Commission. The operators of these units propose to drill delineation wells to complete their data on reservoir configuration and characteristics.

It would take 68 to 92 days to drill and test each well. The data received from these wells would assist the operators in determining how to develop and produce the underlying oil and gas reserves. Table Ap.K-1 provides a summary of impact-producing factors associated with delineation drilling.

Table Ap.K-1. Summary of Impact-Producing Factors Associated with Delineation Drilling.

Wells Proposed to be Drilled on Each Unit	Time on Location (days)	Mud and Cuttings Volume Per Well (bbl)	Anchor Spread (ft)	Crew and Supply Boat Trips Per Month (Total)	Helicopter Trips/Month (Total)
Point Sal (1 Well)	68	12,250	1,100-1,900	14 (31)	20 (44)
Purisima Point (1 Well)	68	12,250	1,100-1,900	14 (31)	20 (44)
Gato Canyon (1 Well)	92	2000 to 3000	2,500-3,500	11 (33)	28 (84)

Impact-Producing Factors of Delineation Drilling

Exploring for hydrocarbon resources as a result of delineation drilling requires a complex and interrelated series of activities that began with pre-lease geological and geophysical exploration under MMS permits, continued through leasing of offshore blocks, post-lease seismic surveying operations, exploration drilling, and, finally, the proposed drilling of delineation wells on the three units. Most of these operations have already occurred; only operations related to delineation drilling are left. Transportation of the personnel and supplies needed to maintain these operations are also part of the process. These diverse activities have associated potential impacts to offshore and onshore biological, physical, and socioeconomic resources. This section describes the various kinds of offshore activities that could affect the environmental and socioeconomic resources.

Personnel

It is expected that approximately 140 to 145 individuals would be directly involved in the drilling activities at each well site. Most of the employees would be working on the drilling rig and would stay with the rig. The offshore personnel would typically work shifts of seven days on and seven days off. Service personnel would move to and from the rig as needed. Other than employees of the drilling contractor, the personnel associated with these operations are generally already living and located in Santa Barbara and Ventura Counties.

Infrastructure and Operations

Delineation Wells. Delineation of petroleum-bearing formations is carried out from mobile drilling rigs or drillships. It is anticipated that a single semi-submersible type, or MODU, would be used to drill all of the delineation wells to minimize potential cumulative impacts. The analog rig to be used for the representative analysis would be the SEDCO 712. This drill rig is similar to rigs used in previously-approved EP's and has been used to drill seven wells in the Pacific OCS Region in the past. The time required to drill and test each well is 68 to 92 days. A delineation well would be drilled on each of the Point Sal, Gato Canyon, and Purisima Point Units (one well per unit).

Offshore Transport-Service Vessels. Support vessels associated with MODU drilling operations would operate out of Port Hueneme, with some possible crew boat trips originating from the Carpinteria Pier. Due to the rough sea conditions north of Point Conception and the distances involved, crews would be transferred to and from the MODU primarily by helicopter. Supply boat trips are projected to number 8 to12 per month, which averages about 1 every 3 days. Currently, about 12 to 13 supply boat trips per month (1 every 2 to 3 days) are made to the four existing Pacific OCS platforms (Irene, Harvest, Hermosa, Hidalgo) in the Santa Maria Basin. An additional 12 supply boat trips per month (1 every 2 to 3 days) are made to existing Pacific OCS platforms (Hondo, Heritage, and Harmony) in the western Santa Barbara Channel.

Delineation drilling would be anticipated to include the following list of service-vessel activities:

- **Crew boats.** It is expected that one 110-foot class crew boat would be used to support the delineation drilling operations. It is likely that the boat would be stationed in, and operate out of, Port Hueneme or the Carpinteria Pier and would travel through established corridors. Although crew boats may service other area platforms on the same trip, it is assumed that crew boats serve the drilling rig exclusively. Approximately two (Gato Canyon) to eight (Purisima Point and Point Sal) trips per month would be required. Based on a two to three month program per well, the following miles would be traveled to each unit: Gato Canyon - 350 miles; Purisima Point - 2,640 miles; and Point Sal - 3,360 miles.

- **Standby boat.** A standby boat would be stationed near the delineation rig at all times during operations. It is anticipated that this boat would be a 110-foot class vessel with a two-man crew. The primary purpose of this vessel is emergency response in the unlikely event of an oil spill. This vessel would not normally leave the drill site, except for emergency situations, and only when another vessel can act as standby. No trips for the standby vessel would be expected other than initial mobilization and demobilization.

- **Supply boats.** It is expected that one 180-foot class supply boat would be used to support the delineation drilling operations. It is likely that the boat would be stationed in, and operate out of, Port Hueneme and would travel through predetermined corridors. Approximately 8 trips per month would be required. Based on a two to three month program per well, the following miles would be traveled to each unit assuming they would originate from Point Hueneme: Gato Canyon - 2,500 miles; Purisima Point - 3,960 miles; and, Point Sal - 5,280.

- **Anchor handling boats.** An anchor handling boat would deploy the anchors. The boats would run the anchor and anchor chain out to the required length, and lower the anchor onto the seafloor using a work wire.

Offshore Transport-Helicopters. Offshore California, helicopters are a primary means of transporting crew to and from the platforms. Helicopter traffic on the Pacific OCS operates primarily out of the Santa Maria, Lompoc, and Santa Barbara airports. Most of the traffic is to and from platforms in the western Santa Barbara Channel and Santa Maria Basin. In addition, several international and numerous smaller airports, along with several military airfields, exist along the southern California coast, and air traffic is a daily occurrence in the region.

Helicopter trips in support of MODU drilling activities are expected to average 20 to 30 month (up to one per day). In comparison, about 150 helicopter trips (five per day) are made monthly to the three Santa Maria Basin platforms. The Sea King, a two-engine helicopter, is expected to best represent the type of helicopters that would be used.

Because of noise and safety concerns, the Federal Aviation Administration (FAA) regulates flight patterns. FAA Circular 91-36C encourages pilots to maintain higher than minimum altitudes near noise-sensitive areas. Corporate policy (all helicopter companies) states that helicopters should maintain a minimum altitude of 700 feet while in transit offshore and 500 feet while working between platforms and drilling rigs. When flying over land, the specified minimum altitude is 1,000 feet over unpopulated areas and coastlines, and 2,000 feet over populated areas and sensitive areas including national parks, recreational seashores, and wildlife refuges. In addition, the guidelines and regulations promulgated by National Marine Fisheries Service require helicopter pilots to maintain 1,000 feet of airspace over marine mammals.

Offshore Disturbances-Anchoring. The emplacement and anchoring/mooring of the MODU used for the exploration of oil and gas is known to impact the seafloor. Furthermore, the use of anchors are known to cause seafloor disturbances within the area surrounding a given structure. Impacts on the seafloor potentially caused by the anchoring of rigs are of concern near sensitive areas within the delineation drilling area.

The Sedco 712 rig has a mooring system designed for a maximum of 1,600 feet of water. The rig has eight Nippon model 4500LP 45,000 pound anchors. The generic rig has eight 4,300 feet lengths of 3 inch chain on board and has access to an additional eight 1,000 feet segments of spare chain. A 3 inch regular die-locked and "oil rig" welded chain weighs 89.3 pounds per foot in air and 77.6 pounds per foot in water.

The semi-submersible rig has two hulls upon which it floats while being towed to the designated location. At the designated location, the hulls are flooded with seawater to submerge them to a depth a little below the water's surface to its drilling position. Anchors would be deployed in their predetermined locations and then tested for proper tension. Typically, the anchor is loaded onto the boat, which then motors away from the rig. As the boat travels toward the anchor location, chain is released to the required length. At a position roughly half way from the rig, the workboat begins to lower the anchor on a work wire while continuing towards the final anchor location. Finally, the anchor is lowered to the seafloor and the appropriate amount of tension is placed on the chain. Surveyors would take the final location fix.

If the anchors do not hold a pretension determined by mooring calculations, tandem or "piggyback" anchors can be used. This is done by attaching the pendant line to the anchor shackle of another anchor and deploying it in a manner similar to the original anchor.

Offshore Disturbances - Space-use Conflicts. During delineation drilling the area occupied by the MODU, anchor cables, and safety zones is unavailable to commercial fishermen. The exploratory drilling rig would spend approximately 68 to 92 days on site.

Offshore Disturbances - Aesthetic Interference. Drilling rigs placed within sight of coastal beaches, parks, residences, and vacation lodging could cause some disruption of an unencumbered view of the marine seascape seaward of the coastline. Impacts to visual resources result from the presence of the MODU within an area that is in view of the public.

Offshore Disturbances – Abandoned Bottom Debris. Bottom debris is herein defined as material resting on the seabed (such as cable, tools, pipe, drums, and structural parts of platforms, as well as objects made of plastic, aluminum, wood, etc.) that is accidentally lost by workers from drillships. Varying quantities of ferromagnetic bottom debris may be lost per operation.

Operation Discharges Offshore

The major operational wastes generated during offshore oil and gas activities include drilling fluids and cuttings. Other major wastes generated by the offshore oil and gas industry include the following: from drilling - waste chemicals, fracturing and acidifying fluids, and well completion fluids; deck drainage, and miscellaneous well fluids (cement, BOP fluid); and from other sources - sanitary and domestic wastes, gas and oil processing wastes, ballast water, storage displacement water, and miscellaneous minor discharges. All the effluents would be regulated by the new General National Pollutant Discharge Elimination System (NPDES) permit. The limitations under this permit cover a wide range of parameters including, toxicity, metals, oil and grease, chlorine, and sheens, foam and floating solids.

Drilling Muds and Cuttings. Drilling mud is essentially water with a few basic components added to it to increase the fluid density. Drilling mud is used in the well bore to move drill cuttings to the surface, control formation pressure, maintain borehole stability, prevent formation damage, and cool and lubricate the drill bit and drill pipe.

Generic drilling fluid composition will be in accordance with the EPA's recently issued NPDES General Permit. The NPDES permit limitations do not allow for discharge of free oil, oil-based muds, or diesel oil. At this time, it is not possible to describe the precise characteristics of the drilling muds to be used. However, it appears that the drilling mud would most likely be water based. Drilling mud may be discharged intermittently during drilling and disposed of in bulk upon completion of the drilling program. If oil or synthetic based muds are used they would not be permitted to be discharged.

Drill cuttings are fragmented rock material ranging from clay to pebbles in size and are composed of shale, siltstone, sand, limestone/dolomite and approximately one percent drilling mud. Oil contaminated drill cuttings are proposed be transported to shore via supply boat for disposal at a state approved disposal site. Oil-free and cleaned drill cuttings would be disposed of in accordance with the NPDES permit requirements. Cuttings discharge volumes would be monitored and reported to the EPA.

Air Emissions. The major impact agents for air emissions expected from delineation drilling are emissions from equipment associated with exploratory drilling operations (main and crane engines) and emissions from crew/supply vessels and helicopter support for the drilling operations.

Emissions resulting from the proposed projects may have a potential to increase concentrations of air pollutants onshore. The primary regulated pollutants of concern in Santa Barbara County are oxides of nitrogen (NOx) and reactive organic compounds (ROC). Both NOx and ROC are considered precursors to ozone (O_3) formation, for which Santa Barbara County is presently in nonattainment. The major pollutant of concern associated with projects of this type and duration are NOx emissions due to the extensive use of propulsion and stationary combustion equipment.

Noise. Noise associated with delineation drilling could result from operations related to the offshore drilling rig and service-vessel traffic (e.g., support boats and helicopters). Noise generated from these activities can be transmitted through both air and water, and may be continuous or transient. Offshore drilling involves various activities that produce a composite underwater noise field. The intensity level and frequency of the noise emissions are highly variable, both between and among the various sources. Noise from delineation drilling may affect nearby resources. The level of underwater sound depends on receiver depth and altitude, aspect, and strength of the noise source. The time during which a passing airborne or surface sound source can be received underwater is increased in shallow water by multiple reflections.

Drilling operations often produce noise that includes strong tonal components at low frequencies, including infrasonic frequencies in at least some cases. Drilling noise from conventional metal-legged structures and semisubmersibles is not particularly intense and is strongest at low frequencies, averaging 5 Hz and 10500 Hz, respectively. Drillships are apparently noisier than semisubmersibles. Sound and vibration paths to the water are through the hull of a drillship.

Aircraft and vessel support may further ensonify broad areas. Noise generated from helicopter and service-vessel traffic is transient in nature and extremely variable in intensity. Helicopter sounds contain dominant tones (resulting from rotors) generally below 500 Hz. Helicopters often radiate more sound forward than backward; thus, underwater noise is generally brief in duration, compared with the duration of audibility in the air. Water depth and bottom conditions strongly influence propagation and levels of underwater noise from passing aircraft. Lateral propagation of sound is greater in shallow than in deep water. Helicopters, while flying offshore, generally maintain altitudes above 700 feet during transit to and from the working area. A total of 264 helicopter trips are projected to occur as a result of delineation drilling.

Service vessels transmit noise through both air and water. The primary sources of vessel noise are propeller cavitation, propeller singing, and propulsion; other sources include auxiliaries, flow noise from water dragging along the hull, and bubbles breaking in the wake. Propeller cavitation is usually the dominant noise source. The intensity of noise from service vessels is roughly related to ship size, laden or not, and speed. Sounds from support boats range from 400 to 7,000 Hz at 120 to160 dB. Large ships tend to be noisier than small ones, and ships underway with a full load (or towing or pushing a load) produce more noise than unladen vessels. Noise increases with ship speed, which would usually be greater offshore. A total of 840 (approximately two per day) service-vessel trips are projected to occur as a result of delineation drilling.

Test Fluids. Fluids from delineation well testing operations would be stored in a barge brought to the site by tug and moored with the semi-submersible drilling unit. The objective is to transfer, safely and efficiently, the test fluids to a barge that is equipped, capable, and of the appropriate size and draft for safely entering ports along the California coast.

A tug and barge system would be used to transport oil produced when testing the delineation wells. Under the Oil Pollution Act of 1990 requirements, barges are required to be double hulled. The barge design and systems would be in compliance with Coast Guard regulations. Test fluids would be transported by barge to the Long Beach/Los Angeles Harbor Complex or Point Hueneme where they would be transferred to an approved refinery, used oil-handling facility, or permitted hazardous waste handling and disposal contractor.

The offloading system would offload approximately 200 to 7,500 barrels per day (depending on the unit) to a barge moored to the semi-submersible. The maximum capacity of the barge would be 40,000 to 50,000 bbls.