ciated 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-1980's 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 m (32 to 64 ft) 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). Clean-up actions would also contribute to the minimization of impacts to water quality.

4.6 BIOLOGICAL RESOURCES

4.6.1 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 EIS.

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). Boulder and cobble beaches are patchily distributed within this same area (Dames and Moore, 1983; Woodward and Clyde, 1982). 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). 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). 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). 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). 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). 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 Sanctuary contains among the most diverse and species-rich invertebrate fauna in the world (NOAA, 1992), 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). 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, Monterey Bay Sanctuary, 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). 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 1990's during El Nino 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). Tenera Environmental identified other withered animals at Diablo Canyon in the late 1980's. 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). The current population of abalone at the MMS-funded sites north of Point Conception is estimated at 5-10% of levels identified in 1991 (pers. comm., M. Wilson, U.C. Santa Cruz, 2000). The National Park Service estimates that population levels on the islands are less than 5% of their original level (pers. comm., D. Richards, NPS, 2001).

Sandy Beach Habitat. Sandy beach habitat along the California coast has been characterized in several previous documents (URS, 1987; ADL, 1985; ADL 1984; MMS; 1983, See Table 4.6.1-1). Sandy intertidal beaches have also been recently characterized by MMS to better understand shorebird abundance in Santa Barbara County (Dugan et. al., 1998 unpublished) and Ventura County (Pierson and McCrary, 1999). 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% (pers. comm., J. Dugan, U.C. Santa Barbara, 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). Pismo clams (*tivela stultorum*) are patchily distributed on intertidal beaches north

of Point Conception (pers. comm., J. Dugan, U.C. Santa Barbara, 2001). Island beaches are inhabited by similar assemblages including sand crabs and beach hoppers (Chambers, 1991).

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 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) 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). However, during the drilling, part of the bluff collapsed due to oversaturation 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). Sandy and intertidal beaches were studied shortly following the spill (Straughan, 1971) and again a few years after the spill (URS, 1974). 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 declines may have been influenced by other factors

Table 4.6.1-1. Table of studies relevant to sandy and rocky habitat.

Author and Publication Date	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

(Nicholson and Cimberg, 1971). The surfgrass community, *Phyllospadix*, was also heavily hit at Santa Barbara Harbor (Foster, 1969). URS (1974) 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). 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).

4.6.2 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 4.6.4. Biological resources living in tidally influenced areas along the shoreline are discussed in the Sandy and Rocky Beach Habitat section.

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).

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). 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). Common species include cup corals and anenomes. Refer to these references for species lists.

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 1700 ft 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 anenome, *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 (<1-10%) 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). The presence of large vase sponges, such as *Actinostola callosa*, 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 20-30 years old (Dames and Moore, 1982). 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). The endangered coral, *Allopora California,* has been found in a couple of 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). 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).

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 fourteen-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)

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), (Hyland et al., 1990.) Peracarid crustaceans (34%), polychaetes (31%), and molluscs (18%) 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). 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).

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). 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). Species lists from analyzed samples compare favorably with historical survey data from earlier investigators (Dames and Moore, 1983). Chambers (1982) 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 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.

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.

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).

Bonito Unit. The primary area of biological interest in this unit are the deep canyons. One small and four large canyons traverse the Bonito Unit. Shallow hazards review confirms the presence of very steep slopes and potential outcrop areas in each canyon, particularly on the southern wall. In general, outcrop areas are more likely to be located along the steepest portions of the canyon wall, and along the crest of the canyon. However, longline fishermen records indicate that hard bottom resources exist in the canyon bottoms as well (pers. comm., S. Timoschuk, 2001).

Isolated outcrops sprinkled through the area, however, were not found to have sufficient relief to suspect hard substrate communities. One feature mapped on OCS-P 0446 was previously surveyed in 1982 by Dames and Moore and found to consist of two very small pinnacles. The pinnacles did not contain sensitive resources.

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: A total of 328 exploration wells and 886 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 1970's. In the late 1970's and early 80's, 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 1500 feet from features identified by the agency during the intense drilling phase in the early 1980's. 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.

Four important studies have been conducted in the California OCS which 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). 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). The fourth study was con-

Table 4.6.2-1. Table of studies relevant to seafloor resources.

Author and Publication Date	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

ducted in the late 1970's during the drilling of an exploratory well near a shallow reef in the Tanner-Cortes Bank.

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). Conclusions from this study are:

1) 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 is defined as the area around the wellsite inclusive of circumference made by the eight anchors.

2) The width of anchor scars ranged from 1.1 m (3.6 ft) to 7.7 m (25.3 ft); the length from 67 m (221 ft) to 503 m (1,650 ft). 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 you assume 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, 0.16 km^2 (.06 mi^2), or less than one (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). It is estimated that roughly 2,000 anchoring events occurred during the installation of the three platforms and three interplatform pipelines. In this area, 12 scars were observed to impact hard bottom habitat. Scar widths varied from 1.1 m (3.5 ft) to 4 m (12 ft). Based on the post-installation survey (Hardin et al, 1993), 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 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 operations 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.

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. 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.

4.6.3 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.) 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). 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 attach 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). 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).

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 sheephead. 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).

In response to cooler waters for the past three years, 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) 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)

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.

4.6.4 FISH RESOURCES

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 documents (e.g., ADL, 1984; MBC, 1986; CalCOFI, 1996; Dailey et al., 1993; Love et al., 1999; Horn and Allen, 1978; Miller and Lea, 1972). 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). 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). 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).

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.

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 200m), mesopelagic (depths between approximately 200 to 1000 m) and bathypelagic (depths gretaer than 1000 m). 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 realm 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 150 to 200 m 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). 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 de-

crease its 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 bight. 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). The largest schools occur within 40 km (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 110-183 meters (360-600 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 1-2 years and generally live 3-4 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). Bathypelagic species of the area include dragonfish, hatchetfish, and bristlemouth (Cross and Allen, 1993).

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). Depth distributions for common demersal fishes of the bight are summarized in table 4.6.4-1.

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). 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 1960's (Bloeser, 1999). One rockfish species, *Sebastes pausispinis* or bocaccio, is presently a candidate species for listing under the Endangered Species Act (ESA). Presently it has no protection status under the ESA.

Threatened and Endangered Species. 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, 2000). That information is incorporated by reference in this document (section 5.2.9.9,

Table 4.6.4-1. 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*			

Threatened and Endangered Fish) and is summarized below.

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). 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). Early summer1999, the U.S. Fish and Wildlife Service proposed to delist that population, while maintaining the endangered designation for the southern population.

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 abbreviated consultation process the Minerals Management Service (MMS) is following for the proposed project described in Section 2.0. 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.

The Pacific Fishery Management Council (PFMC) manages 90 species of fish under three Fishery Management Plans: 1) Coastal Pelagics Fishery Management Plan; 2) Pacific Salmon Fishery Management Plan; and 3) Pacific Groundfish Fishery Management Plan (table 4.6.4-2).

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 HAPC's 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), 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 4 percent slope (Montgomery and Buffington 1997, Montgomery et al., In prep.). 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.). 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. 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.) 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). Section 4.0 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). Furthermore, several studies have examined the effects of OCS activities on fish resources of the study area (Imamura et al., 1993; Love et al., 1999).

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 (table 4.0.1-2), 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). 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). The studies indicate that direct damage to adult fishes is mainly to the swimbladder 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 airgun arrays—within 5-20 ft 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). Ebeling et al. (1971) also found no noticeable effects on fish in the SBC after the spill. The NAS (1985) 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 4.0). 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 100 m 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

Table 4.6.4-2. Species managed by the PFMC.

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
- China rockfish

Groundfish cont.
- Copper rockfish
- 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

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. MMS is currently funding 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) 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.

4.6.5 MARINE AND COASTAL BIRDS

The marine and coastal bird population of the eastern Pacific Ocean off southern California, where the proposed delineation drilling activities would be located, is both diverse and complex, being composed of as many as 195 species (Baird, 1993). 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 4.6.7.

The marine and coastal birds of the project 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 documents (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). 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 1975-1978 (Briggs et al., 1981), while surveys of the northern portion (north of Point Conception) of the project area were conducted from 1980-1983 (Briggs et al., 1983). Both of these studies are summarized in Briggs et al. (1987). The data from these studies have been computerized, standardized, and compiled in the Marine Mammal and Seabird Computer Database Analysis System (ECI, 1992). 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 1979-1980 (Sowls et al., 1980), while the second and most recent was conducted from 1989-1991 (Carter et al., 1992). Information on shorebirds is from Garrett and Dunn (1981), Baird (1993), Lehman (1994), and McCrary and Pierson (in prep.).

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 non-breeding gulls.

1) 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 (red-throated - *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), 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.

2) 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*), phaloropes (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), 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.

3) 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). 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 auritus*, 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 4.6.5-1 for a complete list of all breeding seabirds). Location, number of nests, and at-sea densities vary greatly from species to species (table 4.6.5-1). 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).

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 ni–o 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.). 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.). Although the effects of El ni–o 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 ni–o periods (H. Carter, pers. comm.). 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). Another species, the tufted puffin, which has not nested in southern California for many years, has now returned (Carter et al., 1992).

4) 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 caspia*), and elegant tern (*Sterna elegans*). Based on information in the Marine Mammal and Seabird Computer Database Analysis System (ECI, 1992), the density of non-breeding 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 non-breeding gulls 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); 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 4.6.7 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, in prep.).

Marshbirds and Waterfowl. These birds, which include herons, egrets, duck, 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). 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). 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 1800's (Lima, 1994). Section 5.1 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).

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 and disturbance from

Table 4.6.5-1. Breeding seabirds of central and southern California, 1989 - 1991 (from Carter et al, 1992).

Species	Location	Number of birds	Mean At-Sea Density (km^2) (range)
Leach's Storm-petrel	San Miguel and Santa Barbara Is.	318	0.04 (0-2.6)
Ashy Storm-petrel	San Miguel, Santa Cruz, and Santa Barbara Is.	3,135	0.02 (0-4.8)
Black Storm-petrel	Santa Barbara Is.	274	0.01 (0-0.6)
Brown Pelican	Anacapa and Santa Barbara Is.	11,916	0.6 (0-35)
Double-crested Cormorant	San Miguel, Anacapa, and Santa Barbara Is.	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 Is.	31,069	0.2 (0-5.5)
Pelagic Cormorant	Mainland; San Miguel, Santa Rosa, Santa Cruz, Anacapa, and Santa Barbara Is.	3,322	0.04 (0-4.4)
Western Gull	Mainland; San Miguel, Santa Rosa, Santa Cruz, Anacapa, Santa Barbara, San Nicolas, and Santa Catalina Is.	27,960	5.8 (0-625)
Least Tern	Mainland	839[1]	NA (NA)
Pigeon Guillemot	Mainland; San Miguel, Santa Rosa, Santa Cruz, Anacapa, and Santa Barbara Is.	5,813	0.02 (0-1.2)
Xantus' Murrelet	San Miguel, Santa Cruz, and Santa Barbara Is.	1,760	(0-1.1)
Cassin's Auklet	San Miguel, Santa Cruz, and Santa Barbara Is.	12,566	0.5 (0-86)
Rhinoceros Auklet	San Miguel Is.	19	0.2 (0-9.3)[2]
Tufted Puffin	San Miguel Is.	10	0.01 (0-0.4)

[1]1998 nesting season (from Keane, 2000)

[2]Includes large population of wintering birds

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). 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). 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 (less than of total spills) 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. Although information on the exact number and species of birds that were observed with some oiling or that were rescued and/or died from oiling in the Torch spill is not available due to pending litigation, several species were involved, including loons, grebes, cormorants, and shorebirds (McCrary, MMS, pers. obs.).

The level of helicopter traffic related to offshore oil and gas activities in the project area is described in section 5.1. Helicopter traffic can cause disturbances to birds, especially in largely unpopulated areas (e.g., Alaska). 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.

4.6.6 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.

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). The Bight itself is a complex combination of islands, ridges, and basins that exhibits wide ranges in water temperature (see section 4.4, Physical Oceanography).

Most of the marine mammal species in central and southern California were heavily exploited during the last two centuries 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).

However, it is known that the populations of many marine mammals were much larger in the past. Recognition of this has led to the passage of several laws regulating human activities where marine mammals might be adversely affected. In the U.S., 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 4.6.7, 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). 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, in prep.). 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). Koski et al. (1998) provide a recent synthesis of much of the information generated by these studies for central and southern California waters. An on-going study of marine mammals and seabirds off southern California 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). In addition, a number of MMS environmental documents summarize existing data on marine mammals in the area (USGS, 1984; ADL, 1984, 1985; MMS, 1984, 1992, 1996; SAI, 1984; URS, 1986). 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 (delineation drilling) and the larger area that potentially could be affected by oil spills resulting from the development of the 36 undeveloped leases.

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 4.6.7.

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). The mating season generally begins during the southbound migration and lasts through winter. These seasonal migrations limit the lengths of their pregnancy and nursing periods. Pregnancy lasts 11-12 months for most of the rorquals, and calves are usually weaned on the feeding grounds at 6-9 months of age (Bonnell and Dailey, 1993; Würsig, 1990). Females of most species calve every 2-3 years (Bonnell and Dailey, 1993; Würsig, 1990).

Most baleen whales feed fairly low on the food chain, eating a variety of swarming, shrimp-like invertebrates (mainly euphausiid and copepod crustaceans) (Bonnell and Dailey, 1993; Würsig, 1990). 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 somewhat of an exception to this pattern, feeding mainly on bottom-dwelling amphipod crustaceans (Nerini, 1984).

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). At the end of the season, the population begins an 8,000-km coastal migration to summer feeding grounds in the Bering and Chukchi seas, where they remain until fall.

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). 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). 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 23,000 animals in 1993-1994 (Small and DeMaster, 1995; Koski et al., 1998).

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). Minke whales are found yearround off California, and there may be a resident population with home ranges (Bonnell and Dailey, 1993; Koski et al., 1998). Southern California waters appear to be relatively central to the North Pacific distribution of minke whales (Bonnell and Dailey, 1993). 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, in prep; Bonnell and Dailey, 1993). A recent estimate of the minke whale

population for California-Washington waters is about 630 animals (Forney et al., 2000).

The cycle of abundance in the SCB shows small, but distinct peaks in June and November, suggesting that a few whales probably migrate into and through the area in the spring and return in the fall. Bonnell and Dailey (1993) 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) 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).

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 4.6.7.

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). 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). These species generally have inter-calf intervals of greater than 3 years. Nursing generally lasts more than 1 year (Würsig, 1990).

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). 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). They range from the equator to at least central California in eastern North Pacific. Common dolphins are very 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). Its relative abundance changes both seasonally and interannually, with the highest densities observed during warm water events (Heyning and Perrin, 1994). A recent population estimate for this species is about 32,000 animals (Forney et al., 2000).

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). A recent population estimate for the California-Washington population of this species is approximately 375,000 animals (Forney et al., 2000).

Data from the MMS pelagic marine mammal database (ECI, 1992, in prep.), 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) 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). In the eastern North Pacific, they range from the Bering Sea south to Baja California (Leatherwood et al., 1982). A recent abundance estimate for the California-Washington population of this species (including the inland Washington waters) is about 117,500 animals (Forney et al., 2000).

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). Sighting patterns suggest north-south movement as oceanographic conditions change (Forney et al., 2000). Koski et al. (1998) 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, in prep.) 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). The California-Washington population was recently estimated at approximately 26,000 animals (Forney et al., 2000).

Although there is conflicting information on seasonal shifts in numbers and distribution (Bonnell and Dailey, 1993; Koski et al., 1998), 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). Koski et al. (1998) 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, in prep.) 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). 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). The California-Washington population of the species was recently estimated at about 14,000 animals (Forney et al., 2000).

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). Koski et al. (1998) 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, in prep.) 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). 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). A recent estimate of the California-Washington population is about 16,500 animals (Forney et al., 2000).

Risso's dolphins are present off central and southern California year-round (Dohl et al., 1981, 1983; Bonnell and Dailey, 1993). 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). Although Koski et al. (1998) 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). Project-area data from the MMS pelagic marine mammal database (ECI, 1992, in prep.) 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). Off the American coastline, they range from equator north into central California (Leatherwood and Reeves, 1986; Bonnell and Dailey, 1993).

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). 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). Forney et al. (2000) estimated the coastal population at about 170 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). Although no seasonality in their distribution is apparent from the sighting data (Forney and Barlow, 1998), the offshore population is believed to have a more-or-less continuous distribution off California (Mangels and Gerrodette, 1994). In the SCB, this population appears to be centered around Santa Catalina Island, with possible dispersion in the winter (Dohl et al., 1981). Project-area data from the MMS pelagic marine mammal database (ECI, 1992, in prep.), 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 slightly less than 1,000 animals (Forney et al., 2000).

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). 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). Off California, two stocks have been identified: an eastern North Pacific transient stock, and an eastern North Pacific offshore stock (Forney et al., 2000).

Movements of transient killer whales between Southeast Alaska and central California have been documented (Goley and Straley, 1994; Forney et al., 2000). These animals appear to belong to a 'transboundary' stock that includes whales from British Columbia waters (Forney et al., 2000). 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.

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). 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). The best available estimate of the offshore population component is 285 animals (Forney et al., 2000).

Koski et al. (1998) 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, in prep.) 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.

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 1980's (Dohl et al., 1983), but disappeared from area waters following the 1982-83 El Niño (Bonnell and Dailey, 1993; Forney et al., 2000). 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). 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).

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. These species are described in section 4.6.7. Two of the Channel Islands, San Miguel and San Nicolas, are the largest pinniped rookeries on the west coast south of Alaska.

All pinnipeds must come ashore at least once a year to breed and pup. The 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. 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).

The true seals, or phocids, show different reproductive patterns (Riedman, 1990). Elephant seals are winter breeders (Le Boeuf, 1981). 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 is beginning.

Less is known about harbor seal breeding (Bigg, 1981; Riedman, 1990). 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 3-4 weeks (Stewart and Yochem, 1994).

Like the toothed whales, pinnipeds feed mainly on schooling fishes and squid (Bonnell and Dailey, 1993). All pinnipeds in California feed on some of the same prey—northern anchovies and market squid, for example, are important prey for many species of 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 Colum-

bia 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). The current U.S. population size is estimated at 204,000-214,000 animals (Forney et al., 2000). 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). 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).

Off southern California, California sea lions are the most abundant pinnipeds on land and in waters over the continental shelf. Koski et al. (1998) estimated that about 72,000 California sea lions are present at sea in the PMSR during the summer, when numbers are lowest, and 130,000-160,000 at other times of the year. Project-area data from the MMS pelagic marine mammal database (ECI, 1992, in prep.) 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). 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). 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). Some animals move southward into continental slope and shelf waters, with maximum numbers offshore of the slope between 34-42°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). Most of these animals are gone by early June (Bonnell and Dailey, 1993; Koski et al., 1998). Project-area data from the MMS pelagic marine mammal database (ECI, 1992, in prep.) 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 1960's (Peterson et al., 1968). Since that time, the colony has increased steadily, except for steep declines in 1983 and 1998 associated with El Niño events in1982-1983 and 1997-98 (DeLong and Antonelis, 1991; Forney et al., 2000). The most recent estimate of the San Miguel Island stock is approximately 4,500 fur seals (Forney et al., 2000), which is down sharply from the (pre-El Niño) 1997 estimate of 12,000 (DeLong and Melin, 2000). 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), 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).

Northern Elephant Seal. Northern elephant seals (*Mirounga angustirostris*) now breed along the coast from Baja California north to Point Reyes. Stewart et al. (1994) estimated the 1991 U.S./Mexican population at 127,000 animals. The U.S. population is currently estimated at about 84,000 (Forney et al., 2000). 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).

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). Data for the project area from the MMS pelagic marine mammal database (ECI, 1992, in prep.) 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 30,000 harbor seals are found in California (Forney et al., 2000). 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). They haul out on all the Channel Islands and on beaches along the mainland shore, particularly from Ventura County northward (Hanan et al., 1992).

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). At-sea distribution data for the project area from the MMS pelagic marine mammal database (ECI, 1992, in prep.) 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) 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 1960's (Galloway, 1997). Section 5.0 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).

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) 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), 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 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).

Pinnipeds are very 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) 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 5.0). 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.).

4.6.7 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. In order to evaluate the potential effect of the proposed delineation drilling activities on threatened and endangered species, the Regional Director of the MMS Pacific OCS Region contacted the Regional Administrator of the National Marine Fisheries Service (NMFS) Southwest Regional Office and the Field Supervisor of the Fish and Wildlife Service (FWS) Ventura Field Office via letters dated November 24, 1999 for a list of threatened or endangered species and designated or proposed critical habitat that may occur in or adjacent to the project area and which may be affected by OCS activities. Lists from each agency were received in January 2000. Copies of all correspondence are contained in Appendix 4.1.

Species Excluded from This Analysis: Appendix 4.1includes the lists of federally threatened and endangered species that may occur in the project area provided by the NMFS and FWS, respectively. The list provided by the FWS is a comprehensive one, which lists all the federally threatened and endangered species that may occur in coastal Ventura, Santa Barbara, and San Luis Obispo counties. A number of these species are unlikely to be affected by any of the activi-

ties associated with the proposed projects. Therefore, after reviewing the relevant literature and consulting with area experts, the following federally listed species have been identified for exclusion from this analysis:

Wildlife. 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.).

California coastal gnatcatcher (*Polioptila californica californica*). 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 (P. Bloom, pers. comm.).

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.).

Unarmored threespine stickleback (*Gasterosteus aculeatus williamsoni*). This species' current range is not within the project area.

Santa Ana sucker (*Catostomus santaanae*). The Santa Ana sucker was listed as threatened under the Endangered Species Act on April 12, 2000 and was not included on the original 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.).

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.).

White abalone (*Haliotis sorenseni*). The proposed rule to list the white abalone as endangered was published on May 5, 2000 (65 FR 26167). Final determination on the listing is scheduled for April 29, 2001. However, given its range and depth distribution, this species is not likely to be subject to either direct or indirect effects from the proposed projects (G. Davis, NPS, pers, comm.).

Plants. The habitats of the following Channel Islands endemic plants would not be subject to either direct or indirect effects from the proposed projects (S. Chaney, NPS, pers. comm.):

Hoffmann's rock-cress (*Arabis hoffmannii*).

Santa Rosa Island manzanita (*Arctostaphylos confertiflora*).

Island barberry (*Berberis pinnata* ssp. *insularis*).

Soft-leaved paintbrush (*Castilleja mollis*).

Santa Cruz Island dudleya (*Dudleya nesiotica*).

Island bedstraw (*Galium buxifolium*).

Hoffmann's slender-flowered gilia (*Gilia tenuiflora* ssp. *hoffmannii*).

Island rush-rose (*Helianthemum greenei*).

Santa Cruz Island bushmallow (*Malacothamnus fasciculatus* ssp. *nesioticus*).

Santa Cruz Island malacothrix (*Malacothrix indecora*).

Island malacothrix (*Malacothrix squalida*).

Island phacelia (*Phacelia insularis* ssp. *insularis*).

Santa Cruz Island fringepod (*Thysanocarpus conchuliferus*).

Santa Barbara Island liveforever (*Dudleya traskiae*).

The following mainland plants are being excluded from this analysis because no onshore facilities are proposed within the ranges of these species, and their current habitats would not be subject to either direct or indirect effects from the proposed projects (T. Thomas, FWS, pers. comm.):

La Graciosa thistle (*Cirsium loncholepis*).

Morro manzanita (*Arctostaphylos morroensis*).

Marsh sandwort (*Arenaria paludicola*).

Nipomo Mesa lupine (*Lupinus nipomensis*).

Pismo Clarkia (*Clarkia speciosa* ssp. *immaculata*).

The remaining species are described in the following sections.

4.6.7.1 THREATENED AND ENDANGERED MARINE MAMMALS

General information on the biology of marine mammals in the project area is presented in section 4.6.6, 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).

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). 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). Rice (1992) 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).

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). Based on sighting data collected off southern California from 1992 through 1999 (Cascadia Research, unpubl. data), 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). More than 700 individual blue whales had been photo-identified in California and Mexican coastal waters through 1993 (Calambokidis, 1995); the most recent estimate for this stock is approximately 1,950 blue whales (Forney et al., 2000). 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).

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). According to Rice (1974), 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). 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). Since fin whale abundance decreases in winter/spring off California (Dohl et al., 1981, 1983; Forney et al., 1995) and Oregon (Green et al., 1992), 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), with approximately 60 percent occurring in the eastern half of the North Pacific (Ohsumi and Wada, 1974). Current estimates place the California-Washington population at about 1,200 animals (Forney et al., 2000). There is some evidence that recent increases in fin whale abundance have occurred in California waters (Barlow, 1994; Barlow and Gerodette, 1996), but these have not been significant (Barlow et al., 1997).

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). There are believed to be three stocks in the North Pacific (Mizroch et al., 1984b). 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). Evidence from tag recoveries indicates movement between central California and Vancouver Island (Rice, 1977; Reeves et al., 1998b). Unlike fin whales, sei whales seldom enter the Bering Sea (Leatherwood et al., 1982). 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), but may be centered between 20° and 23°N (Mizroch et al., 1984b). Some individuals apparently approach the equator (Leatherwood et al., 1982).

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., 1997). 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).

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). 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). Humpback whales winter in three areas: waters off Mexico (Rice, 1974); Hawaii (Baker et al., 1986); and the Marianas, Bonin, and Ryukyu Islands and Taiwan (Nishiwaki, 1959). Whales from all three wintering grounds apparently intermingle during the summer months in Alaskan waters (Baker et al., 1986).

Based on photo-identification work, Calambokidis et al. (1996) 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). Based on sighting data collected off southern California from 1992 through 1999 (Cascadia Research, unpubl. data), 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 3,000 animals (Barlow, 1994; Barlow et al., 1997). The best current estimate for the west coast population is about 900 animals (Forney et al., 2000), and there are indications that this population has increased during the past two decades (Barlow, 1994; Barlow and Gerodette, 1996; Barlow et al., 1997).

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). 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). 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). 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).

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), although the location of seasonal migration routes is unknown (Scarff, 1986). Reeves and Brownell (1982) 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). However, Scarff (1986) 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).

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).

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). 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). During the winter, most of the population is distributed south of 40°N (Gosho et al., 1984). 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).

Sperm whales are primarily a pelagic species and are generally found in waters with depths of greater than 1,000 m (Watkins, 1977), although their distribution does suggest a preference for continental shelf margins and seamounts, areas of upwelling and high productivity (Leatherwood and Reeves, 1986). The majority of sightings by Dohl et al. (1983) 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). Using acoustic methods, Barlow and Taylor (1998) 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) and appears to be relatively stable (Barlow et al., 1997).

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). 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). 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). Female and immature Steller sea lions may not disperse as widely following the breeding season (Green et al., 1989).

Steller sea lions are presently uncommon in southern California waters (Bonnell and Dailey, 1993). 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). 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). 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).

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), Steller sea lion distribution appears to have shifted northward (Hill et al., 1997). 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). Between 1990 and 1993, pup counts at Año Nuevo dropped from about 310 to 230 (Westlake et al., 1997). Smaller rookeries also exist at Cape Mendocino, the Farallon Islands, and the Point St. George Reef (Bonnell et al., 1983).

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). 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). At present, the species breeds only on Isla de Guadalupe off the coast of Baja California, Mexico, although individual animals appear regularly in the California Channel Islands (Stewart et al., 1987; Bonnell and Dailey, 1993), and a single pup was born on San Miguel Island in 1997 (DeLong and Melin, 2000).

Little is known about the distribution of Guadalupe fur seals at sea (Gallo, 1994), 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).

The Guadalupe fur seal population is still small, but is growing; Gallo (1994) 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). 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).

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). 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).

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). Northward expansion had more or less stopped at Año Nuevo by the mid-1990's (FWS, 2000). Recently, however, 20 otters were sighted between Point Año Nuevo and a point 30 miles north (CDFG, 1998). 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). Some of these animals are thought to have come from the San Nicolas Island translocation population (FWS, 2000).

In spring 1998, about 100 sea otters were sighted south of Point Conception (FWS, 2000). 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 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).

Sea otters typically inhabit shallow nearshore waters with rocky or sandy bottoms supporting large populations of benthic invertebrates (Riedman, 1987). In California, otters live in waters less than 18 m deep and rarely move more than 2 km offshore (Riedman, 1987).

The remnant California population began recovering from a low of about 50 animals around 1914 (Bryant, 1915; Riedman, 1987). The California sea otter population grew steadily at a rate of about 5 percent per year until the mid-1970's, when it was estimated to contain nearly 1,800 animals (Riedman, 1987; Riedman and Estes, 1990). The population then began declining, due to increased mortality from entanglement in set nets (Wendell et al., 1985), 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). 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). 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).

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). 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. Approximately 12-16 sea otters are currently present at San Nicolas Island. Bimonthly counts have indicated no significant change in the population (range 6-17) since July 1990. The presumed causes for this include poor recruitment (failure of pups to reach maturity), immigration, and mortality (FWS, 1995, 2000). 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).

4.6.7.2 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).

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). 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). 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.). 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).

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). 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). 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).

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). 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). 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).

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). 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).

Based on Jaques and Anderson's research (1987), 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.). 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). In 1991, Carter et al. (1992) working jointly with Gress (1992) 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.), 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.).

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). 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.).

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). 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.).

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), 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). 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 35 sites were used in 1996 (Caffrey, 1998). Furthermore, the number of nesting pairs is concentrated at only a few locations. In 1996, 7 of the 35 sites used that year accounted for 58% of the breeding pairs (Caffrey, 1998). These seven sites were NAS Alameda, Venice Beach, Huntington Beach, Santa Margarita River/North Beach, Mission Bay/FAA Island and Mariner's Point, and Delta Beach/North.

Least terns usually begin arriving in southern California in April. Early arrival dates include April 8, 1978 for San Diego (Garrett and Dunn, 1981) and April 27, 1976 for Santa Barbara (Lehman, 1994). 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 3-5 km (2-3 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 20-28 days, and young fledge in about 20 days (FWS, 1980b). 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). For a detailed account of least tern reproductive biology, see Thompson et al. (1997).

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). 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-1980's, 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), long-term trends have shown steady population growth. Recent population estimates range from 3,330-3,392 pairs in 1996 (Caffrey, 1998) to 4,141-4,182 pairs in 1998 (Keane, 2000). However, the estimate for 1999 was only 3,493-3,711 pairs, a decline of more than 10 percent from

the 1998 estimate (K. Keane, pers. comm.). The decline may be attributable to high levels of predation and low prey availability (K. Keane, pers. comm.).

In the project area from 1994 to 1998, 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; Keane, 1998, 2000). However, only 7-9 of these sites were used in any one year, 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 383 pairs in 1998 (Keane, 2000). Also, Point Mugu had 266 pairs in 1998.

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). 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).

Historically, the bald eagle was found throughout the Channel Islands (Grinnell and Miller, 1944). 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). The bald eagle disappeared as a breeding bird from the Channel Islands in the late 1950's (Garrett and Dunn, 1981). However, bald eagles have now been reintroduced to Santa Catalina Island. Currently, the Santa Catalina Island population consists of three nesting pairs and one group of three birds that have not yet begun to nest (P. Sharpe, pers. comm.); there are also 2-4 immature eagles on the island. Although the eagles are actively nesting on the island, they still suffer from the effects DDE, which remains in the waters off the island (Garcelon, 1994b; Sharpe and Garcelon, 1999).

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). 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.).

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). The main reasons for listing this population are loss of habitat and disturbance.

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); 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). The majority of birds winter south of Bodega Bay, California (Page et al., 1986).

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). 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). 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 4.6.7-1.

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). 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). Coastal plovers lay usually three eggs (range = 2-6, 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).

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). 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), 1,180 in 1991, and 967 in 1995 (G. Page, Point Reyes Bird Observatory, Stinson Beach, California, unpublished data). 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).

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 2 miles of beach. In 1997, the breeding population on the base was estimated at 240 birds, but counts in 1999 found only 78. A less severe 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.).

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). 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). 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). 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). 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). 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), although this estimate is believed to be somewhat high (FWS, 1979). Since 1980, the California population has ranged from a low of 284 birds in 1985 to a high of 650 in 1996 (Zembal and Hoffman, 1999). 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). 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.).

In the project area, two marshes are currently occupied by clapper rails, Carpinteria Marsh and Mugu Lagoon (Zembal and Hoffman, 1999). Although as many as 26 pairs have been known to occur at

Table 4.6.7-1. 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

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). Surveys of Carpinteria Marsh conducted in 1999 found two pairs and one unmated female (R. Zembal, pers. comm.). Mugu Lagoon has been consistently occupied by 3-6 nesting pairs and a few unpaired birds (Zembal and Hoffman, 1999). Surveys conducted at Mugu in 1999 found 4 pairs and 5 unmated males (R. Zembal, pers. comm.).

4.6.7.3 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). Sea turtle populations have been greatly reduced by overharvesting and, to a lesser extent, coastal development of nesting beaches in developed countries (Ross, 1982).

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). 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). 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).

Leatherback Sea Turtle. Leatherback sea turtles, the largest of the sea turtles, occur in the Atlantic, Indian, and Pacific Oceans (Mager, 1984). 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), and they have been sighted in the eastern north Pacific as far north as Alaska (Mager, 1984). Leatherback sea turtles in the eastern Pacific are probably part of the western Mexico, Central America, and northern Peru breeding population (Mager, 1984). Pritchard (1971) 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).

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). On aerial surveys of Washington and Oregon waters conducted in 1989 and 1990, Green et al. (1992) 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) 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).

Female leatherbacks apparently migrate between foraging and breeding grounds at 2 to 3-year intervals (NMFS and FWS, 1998a). 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).

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). There are reports of surface feeding on jellyfish off the U.S. west coast (Eisenberg and Frazier, 1983). Leatherbacks also may forage nocturnally at depth on siphonophores and salps in the deep scattering layer (Eckert et al., 1989; NMFS and FWS, 1998a).

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). 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). 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). Green turtles have stranded in northern Cali-

fornia and on the Washington and Oregon coasts in recent decades (Smith and Houck, 1984; Green et al., 1992).

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), where they seem to be year-round residents (NMFS and FWS, 1998b). Regular sightings of small juveniles suggest that turtles are continuing to migrate into the bay (NMFS and FWS, 1998b).

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). There are also smaller nesting grounds along the Central American Pacific coastline (NMFS and FWS, 1998b).

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). Identified animal food items include molluscs, crustaceans, bryozoans, sponges, jellyfish, polychaetes, echinoderms, fish and fish eggs (NMFS and FWS, 1998b).

Pacific Ridley Sea Turtle. Pacific, or olive, ridley sea turtles are the smallest of the sea turtles (Mager, 1984). 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). 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). Currently, as many as 200,000 females are estimated to nest in Mexico each year (Márquez, 1990; NMFS and FWS, 1998c).

These sea turtles are infrequent visitors to waters north of Mexico. According to Green et al. (1992), 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) 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).

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

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). 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). There are no reliable population estimates for the loggerhead sea turtle in the Pacific (Mager, 1984).

Stebbins (1966) 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). Although Smith and Houck (1984) reported no sightings of this species for northern California, Green et al. (1992) 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).

4.6.7.4 AMPHIBIANS

California Red-legged Frog (Threatened). The California red-legged frog (*Rana aurora draytonii*) was listed as threatened on May 23, 1996 (61 FR 25813). A recovery plan for the species has not been published, and no critical habitat has been designated. 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). 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) 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*), repre-

sented over half of the prey mass eaten by larger frogs (Hayes and Tennant, 1985). Hayes and Tennant (1985) 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).

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.

4.6.7.5 FISH

Tidewater Goby (Endangered). The tidewater goby (*Eucyclogobius newberryi*) was listed as endangered on February 4, 1994 (59 FR 5498). A recovery plan and critical habitat have not been approved, due to a proposed delisting of the northern population (64 FR 33816).

The tidewater goby ranges from San Diego County north to Del Norte County. Most are found very close to the coast, though a few have been found as much as 8 km (5 mi) inland. Gobies are mostly coastal lagoon fishes that prefer shallow, usually brackish water (Love, 1996). Primary tidewater goby habitat is found in small, shallow coastal lagoons that are separated from the ocean most of the year by beach barriers. This includes shallow areas of bays and areas near stream mouths in uppermost brackish portions of larger bays. Tidewater gobies can tolerate full seawater, but are most common in waters with salinities ranging from fresh to one-third seawater. Adults are benthic, and larvae are briefly pelagic (Love, 1996).

At all sizes examined, tidewater gobies feed on small invertebrates, usually mysids, amphipods, ostracods, snails, and aquatic insect larvae, particularly dipterans. The food items of the smallest tidewater gobies (4-8 mm) have not been examined, but these gobies, like many other early stage larval fishes, probably feed on unicellular phytoplankton or zooplankton (64 FR 33816).

Tidewater goby populations may fluctuate seasonally. In Aliso Creek Lagoon in Orange County, the winter-early spring population was estimated at 1,000-1,500 fish; after the summer-fall spawning, the population rose to 10,000-15,000 individuals. They are found in small groups or in aggregations of hundreds. Tidewaters seem to live for only one year. Some low-level spawning occurs throughout the year, but most occurs from late April through the fall (Love, 1996).

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 USFWS News Release June 24, 1999). Since 1994, the northern population of tidewater gobies has rebounded sharply. In 1999, the FWS proposed to delist that population, while maintaining the endangered designation for the southern population.

The Service created a draft recovery plan for the entire goby population, but the plan was voided when earlier this year the northern population was proposed for delisting. The Service is now in the process of developing a new recovery plan for the southern population (Pacific Region USFWS News Release August 3, 1999).

Steelhead Trout (Endangered). The effective date for listing the Southern California Evolutionarily Significant Unit (ESU) of west coast steelhead (*Oncorhynchus mykiss*) as endangered and the South-Central California Coast ESU as threatened is October 17, 1997 (63 FR 32996). Steelhead from the Southern California ESU have already been extirpated from much of their historical range.

Southern California—This coastal steelhead ESU occupies rivers from the Santa Maria River to the southern extent of the species range. Historically, *O. mykiss* occurred at least as far south as Rio del Presidio in Mexico (Behnke, 1992; Burgner et al., 1992). The present southernmost stream used by steelhead for spawning is generally thought to be Malibu Creek (Behnke, 1992; Burgner et al., 1992); however, in years of substantial rainfall, spawning steelhead can be found as far south as the Santa Margarita River in San Diego County (Barnhart, 1986).

South-Central California Coast--This coastal steelhead ESU occupies rivers from the Pajaro River, Santa Cruz County, to, but not including, the Santa Maria River. Most rivers of this region drain the Santa Lucia Range, the southernmost unit of the California Coast Ranges. The climate is drier and warmer than in the north, which is reflected in the vegetational change from coniferous forest to chaparral and coastal scrub. The mouths of many rivers and streams in this area are seasonally closed by sand berms that form during periods of low flow in the summer.

Migration and life history patterns of southern California steelhead depend more strongly on rainfall and streamflow than is the case for steelhead populations farther north (Moore, 1980; Titus et al., in press). Average rainfall is substantially lower and more variable in southern California than in regions to the north, resulting in increased duration of sand berms across the mouths of streams and rivers and, in some cases, complete dewatering of the lower reaches of these streams from late spring through fall. Young steelhead remain in fresh water anywhere from less than 1 year to 3 years. Juveniles migrate to sea usu-

ally in spring, but throughout their range steelhead are entering the ocean during every month, where they spend 1-4 years before maturing and ascending streams for the first time. Only winter steelhead are found in southern and south-central California. Winter steelhead enter their home streams from about November to April. Spawning takes place from March to early May. Some steelhead, primarily females, do not die after spawning, and may spawn as many as four times throughout their lives. Females produce 200-12,000 eggs, which hatch in about 50 days (Love, 1996).

Steelhead, like all salmon, need clean, cool water with plenty of oxygen and low amounts of suspended solids and contaminants. They also need gravel and rocks to spawn. Steelhead also require large, woody debris and deep pools in the river, which provide refuge from predators and resting places during storms. Deep pools give steelhead cool water when shallow areas warm up in the summer.

Critical habitat is designated to include all river reaches and estuarine areas accessible to listed steelhead in coastal river basins from the Santa Maria River to Malibu Creek (inclusive). Also included are adjacent riparian zones. Excluded are tribal lands and areas above specific dams or above longstanding, naturally impassable barriers (i.e., natural waterfalls in existence for at least several hundred years). Major river basins containing spawning and rearing habitat for this ESU comprise approximately 3,967 square miles in California. The following counties lie partially or wholly within these basins (or contain migration habitat for the species): Los Angeles, San Luis Obispo, Santa Barbara, and Ventura.

4.6.7.6 PLANTS

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 plants 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).

Salt Marsh Bird's-Beak. 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). 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* ssp. *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), 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).

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 connections with other plant species such as salt grass (*Distichlis* sp.), pickleweed (*Salicornia* sp.), and cattail (*Typha latifolia*), which may be especially important for plants growing on drier sites (FWS, 1984b).

Population data are not available for most of the salt marsh bird's-beak sites.

California Sea-Blite. 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) described the range as extending from San Francisco Bay south to southern Baja California, Mexico. However, Ferren and Whitmore (1983) 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 1990's (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 *Salicornia* sp. (pickleweed), *Distichlis spicata* (saltgrass), *Juncus acutus* (rush), *Jaumea carnosa* (Jaumea), and *Frankenia salina* (Frankenia) and the federally endangered *Cordylanthus maritimus* ssp. *maritimus*

(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).

Impacts of Past and Present OCS Activities: Offshore oil and gas activities began off southern California in the 1800's (Lima, 1994). Section 5.0 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).

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) 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), 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).

The same is true for southern sea otters.

Pinnipeds are very 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 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) 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 Chapter 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.).

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

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 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. Although information on the exact number and species of birds that were observed with some oiling or that were rescued and/or died from oiling in the Torch spill is not available due to pending litigation, several species were involved, some of which could have been endangered birds that occur in the area. Based on where and when the spill occurred, the only endangered birds that might have been involved were brown pelicans and snowy plovers. The estimated level of impact of the Torch spill on these two species is not available at this time.

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.

Reptiles, Amphibians, Fish, and Plants. No impacts on sea turtles, red-legged frogs, fish, or plants from past and present offshore oil and gas activities in the Pacific Region have been identified.

4.6.8 ESTUARINE AND WETLAND HABITATS

Estuaries are bodies of water, ranging in size from streams to large bays, which 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 (ADL, 1984). 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). 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). Endangered plant, fish and bird species are also discussed in the Biological Evaluation (See Appendix). 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). Invertebrates were lacking at all wetland sites except those with regular tidal flushing. Ambrose (1995) 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).

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); 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 (ADL, 1984).

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). 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 documents including previous Lease Sale EIS's, and development EIS's (table 4.6.8-1).

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 their 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). Residual impacts from the pipeline installation relate to terrestrial vegetation recovery and not impacts to the wetland resources. UNOCAL satisfied all of their 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). 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).

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

Table 4.6.8-1. Pertinent 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	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.

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). 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).

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.

4.6.9 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). 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, which 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: Protected areas within the project 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.

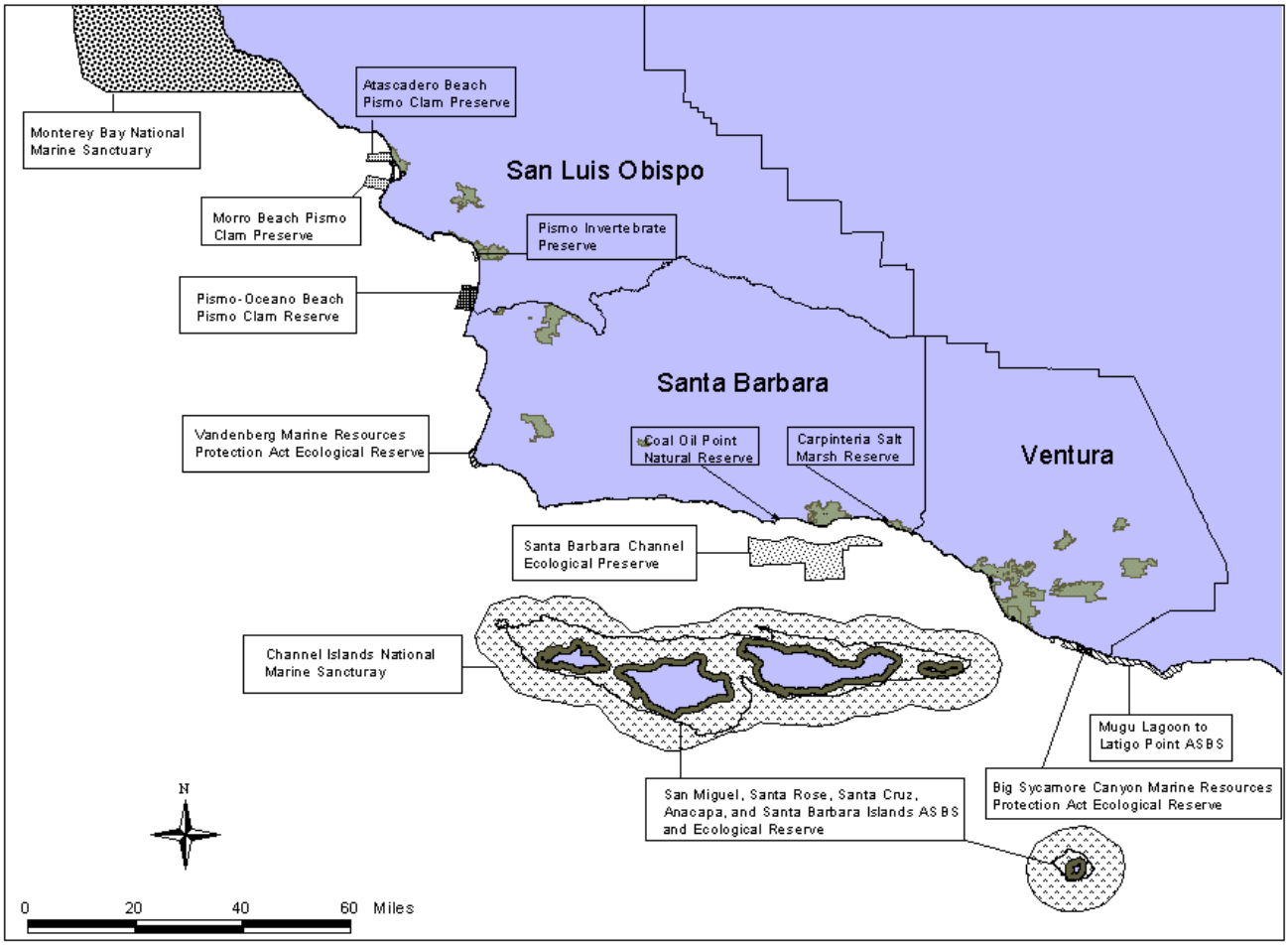

Figure 4.6.9-1. Location of refuges, preserves and marine sanctuaries in the project area.

Preserves and Ecological Reserves. While nomenclature and regulations are not standard among the State's marine reserves, the underlying intent of protecting biologically important habitats and marine life is universal. 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 304.8 m (1,000 ft) 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, four preserves and eight ecological reserves occur within the project area (table 4.6.9-1, figure 4.6.9-1).

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, 5 occur within the project area (table 4.6.9-1, figure 4.6.9-1).

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, 3 of which occur along the coast within the project area (table 4.6.9-1, figure 4.6.9-1).

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 (Figure 4.6.9-1). 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. 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, 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). 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). 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).

Table 4.6.9-1. State and federal areas of defined biological significance in the project area.

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

[1]Area of Special Biological Significance

Within the CINMS, kelp forest rocky-bottom and shallow sandy-bottom communities are the predominant nearshore subtidal habitats (CINMS, 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). 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). Both these species are listed as threatened under the U.S. Endangered Species Act (ESA).

At least 27 species of cetaceans have been sighted in CINMS waters (CINMS, 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, an/or migratory or staging areas (CINMS, 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). 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 1 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 ecological reserves and ASBS's.

Located to the north of the project area (Figure 4.6.9-1), the Monterey Bay National Marine Sanctuary (MBNMS) was created in 1992. The MBNMS, which extends from Point Reyes-Farallon Island Nation 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 subtital 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), 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). 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). 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).

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). 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.

Another federally protected area, the Santa Barbara Channel Ecological Preserve (Figure 4.6.9-1), 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 of ten 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.

4.6.10 ONSHORE BIOLOGICAL RESOURCES

The following discussion provides a brief overview of the terrestrial biology of northern Santa Barbara County, where future activities may occur as a result of the proposed projects. The project 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 (figure 4.0-2). 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), the San Miguel Project Environmental Impact Report/Statement (URS, 1986), the Vandenberg Air Force Base Integrated Natural Resources Management Plan (Tetra Tech, 1996), and the Draft North County Siting Study (County of Santa Barbara , 2000).

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). 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), about 40 of which are endemic to the project area or nearby surrounding areas (A.D. Little, 1985).

Plant Communities and Habitats. The terrestrial vegetation within the project area generally fall into seven major plant communities, which are described below. For a more thorough discussion of the plant communities, habitats, and plant species in the project area and vicinity, see A.D. Little (1985) and URS (1986).

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 4.6.8. Freshwater marshes in the area are typically dominated by herbaceous species including cattails, tules, and bulrushes 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 play a 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 (*Salvia* spp.), 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 (*Arctostaphylos* spp.), ceanothus species (*Ceanothus* spp.), bush poppy, mountain mahogany, yerba santa, toyon, holly-leaf cherry, scrub oaks (*Quercus* spp.) 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 (*Salix* spp.), 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 widlife supprted by this community; 3) the number of sensitive species known to use it; and 4) the degree to which man has altered it and reduced its areal extent. Riparian woodlands are critical to wildlife because they provide: 1) sources of water; 2) a broad diversity of microhabitats for nesting and feeding due to their rich structural diversity; 3) food and protective cover; and 4) corridors for movement and dispersal of wildlife.

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 Santa Barbara, 2000).

Wildlife. To a large extent, the distribution and 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 a 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), followed by oak woodlands. Birds are the most abundant 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 in the vicinity of the project area, see A.D. Little (1985) and URS (1986).

Over 400 birds have been recorded in Santa Barbara County (Lehman, 1994), 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 Santa 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 reported for Santa Barbara County. Common reptiles in the project area include: western pond turtle, western fence lizard, side-blotched lizard, gopher snake, western rattlesnake, and striped racer.

Effects of Past Oil and Gas Activities: Several oil fields (e.g., Guadalupe, Casmalia, Lompoc) within the onshore project area, which 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. Development and production of these fields, which is still occurring in some cases, dates back to the early 1900's. The impacts of these oil fields include habitat loss and pollution, such as the diluent contamination associated with the Guadalupe oil field. Past construction activities associated with OCS-related oil and gas projects are limited to the construction of the Point Pedernales pipeline and the associated Lompoc Oil and Gas Plant. Impacts of construction include vegetation removal, with associated changes in erosion, sediment deposition, and invasive weeds, and disturbance to wildlife. Within the onshore project area, these activities may have affected an estimated 225-245 acres of vegetation and wildlife habitat (A.D. Little, 1985), the vast majority of which was related to pipeline construction. Most of this area has probably recovered, since revegetation efforts were carried out along the pipeline corridor and natural recovery would have occurred during the approximately15-year period since the pipeline was completed.

4.7. CULTURAL RESOURCES

4.7.1 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).

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 (Minerals Management Service1998).

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.

Table 4.7.2-1. Archaeology studies in the area.

Area of the Study	Title	Citation
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.