tivities in Federal and State waters and both Alaskan and foreign-import tankering. The greatest oil spill risk to marine mammals in the project area results from tankering operations. This risk is tempered by recently implemented or proposed mitigation (such as the rerouting of tankers farther offshore along the central California coast) and, as discussed in section 5.1.3, by modern oil spill response capabilities.

If an oil spill were to occur in the project area during the period 2002-2006, impacts to marine mammals could range from negligible to high, depending on spill size, location, season, and a number of other factors. Most at risk are pinniped pups. Seasonally, the most sensitive areas are rookeries on the northern Channel Islands (particularly San Miguel Island) and along the mainland coast north of Point Conception.

The probabilities that one or more oil spills will occur during the period 2002-2006 from existing and proposed offshore oil and gas activities are 94.9 percent for a spill of 200 bbl or less and 41.2 percent for a spill of 2,000 bbl. The probability of a 22,800-bbl tanker spill occurring during this period is 38.8 percent.

5.2.9 IMPACTS OF THE PROPOSED ACTION AND CUMULATIVE IMPACT ANALYSIS FOR THREATENED AND ENDANGERED SPECIES

This section analyzes the impacts of the Proposed Action on threatened and endangered species in the project area. Threatened and endangered species may be vulnerable to several potentially adverse impacts from operations associated with the Proposed Action. Operations assumed to occur as a result of this project include towing and anchoring the MODU, support vessel traffic, helicopter flights, drilling, various discharges, barge transit and anchoring, and well abandonment. These operations are described in section 2. As discussed in section 5.1.1, no oil spills are expected to occur from the proposed drilling activities associated with this project; therefore, no impacts to threatened and endangered species from oil spills are expected.

Impact level definitions used in this analysis are as follows:

HIGH

Impacts result in a population decline in the project area due to direct mortality, reduced survivorship, declines in reproduction, and/or a shift in distribution. The decline, which could involve more than 5 percent of the total population, would be at a level and over a large enough area that the continued existence or recovery of the species involved would be at risk.

MODERATE

Impacts result in a local (e.g., single colony) population decline due to direct mortality, reduced survivorship, declines in reproduction, and/or a shift in distribution. The decline, which could involve from 1 to 5 percent of the total population, could increase the length of time projected for full recovery and removal from the endangered species list, depending on the species involved. Effects are expected to continue for 1-5 years.

LOW

Impacts result mainly in local (e.g., a small area around a platform, a limited stretch of beach or, rocky shore), short-term (a few days to a few weeks) changes in behavior (e.g., disruption of foraging) and/or displacement from roosting or foraging habitats due to disturbance. Mortality, if any, would be limited to the loss of a few animals up to 1 percent of the total population of the species or stock. A small number of animals would also suffer from sublethal effects. Effects are expected to continue for less than 1 year. Projected recovery time and removal from the endangered species list would not be affected.

Impacts below these levels, involving no death or life-threatening injury of any threatened or endangered organism, no displacement from preferred habitat, and no more than minor disruption of behavioral patterns, are defined as negligible. For purposes of this document, high and moderate impacts are considered to be significant; low impacts are considered to be insignificant.

5.2.9.1 IMPACTS OF THE PROPOSED ACTION ON THREATENED AND ENDANGERED MARINE MAMMALS

Section 5.2.8.1 describes the potential impacts of the Proposed Action on marine mammals in the project area. The primary impact-producing activities associated with the Proposed Action include delineation drilling operations with associated support activities and are common to all the units. The major impact agents expected from these proposed activities are noise and disturbance and drilling discharges. The potential use of explosives in the abandonment of the delineation wells also raises the possibility of lethal impacts to marine mammals.

Blue Whale. Marine mammal responses to noise and disturbance are discussed in section 5.2.8.1. The minor and temporary increases in sound levels produced during the delineation drilling activities are unlikely to affect blue whale movements through the

project area waters. Blue whales are frequently sighted from area OCS platforms during the summer and fall months.

There have been few detailed studies of the reactions to vessels by rorqual species other than humpback whales (Richardson et al., 1995). Blue and fin whales summering in the St. Lawrence Estuary have been observed to react most strongly to rapid or erratic approaches by vessels (Edds and McFarlane, 1987). As discussed in section 5.2.8.1, blue whales would be likely to react to the close approach of crew or supply boats, and some temporary (less than 1-hour) displacement could occur under these circumstances. However, the level of surface traffic to and from the proposed project areas is unlikely to have a detectable effect on blue whales during their summer and fall presence in southern California waters.

Similarly, the level of helicopter traffic associated with the proposed delineation activities is expected to result in temporary (less than 1-hour), localized disturbances to blue whales (see section 5.2.8.1). These impacts are considered to be negligible.

Blue whales are unlikely to swim near enough to the delineation drilling rig to pass through effluent mixing zones. In addition, the zooplankton that form the blue whales' primary prey would be unlikely to remain in the vicinity of the rig long enough to bioaccumulate toxins. Based on limited data, the impacts of effluents, particularly muds, cuttings, and produced water, on plankton generally appear to be limited to the several hundred to several thousand meters extent of the discharge plume for the brief period (perhaps several hours) that the organisms are in the plume (Raimondi and Schmitt, 1992; MMS, 1996). This could result in some mortality of zooplankton in the immediate vicinity (tens of meters) of the discharge and perhaps some reduced productivity farther away, to the extent of the plume. However, given their short generation time, on the order of hours or days, populations of plankton over broader areas should remain unaffected. For these reasons, the EPA's biological assessment for Section 7 consultation on the reissuance of their general NPDES permit for OCS facilities (SAIC, 2000a) concluded that blue whales off southern California would not be impacted by OCS discharges. Thus, no impacts on blue whales are expected from the effluent discharges associated with the Proposed Action.

Section 5.2.8.1 describes the potential use of explosives in the delineation well abandonment process. As discussed, the low level of abandonment activities would make it unlikely that any marine mammal injury or mortality would occur as a result of well abandonment operations associated with the proposed delineation activities. However, an animal close to the detonation site potentially could be injured or killed, or suffer permanent or temporary hearing damage. If blue whales were present in the general vicinity of the detonation area, some disturbance also could occur, but this would be expected to minor and temporary (less than 1 hour in duration). Overall, impacts from this source are expected to be low. These impacts could be further reduced through the implementation of a wildlife mitigation plan designed to minimize impacts on marine mammals and other marine animals (see Mitigation MM1, section 5.2.8.1.2).

In conclusion, impacts to blue whales in the project area from routine activities associated with the proposed delineation activities are expected to be negligible to low. These impacts would be common to all units and would remain the same for all units combined. Implementation of the wildlife mitigation plan described in Mitigation MM1 would reduce overall impacts to negligible.

Fin Whale. As discussed in section 4.6.7, fin whales are present in greatest numbers off southern California in summer and fall (Dohl et al., 1981, 1983; Barlow, 1995; Forney et al., 1995). Fins are sighted in the Santa Barbara Channel, although they generally occur farther offshore and in waters south of the northern Channel Island chain (Leatherwood et al. 1987; Bonnell and Dailey, 1993; MMS, unpubl. data). They are less common than blue or humpback whales in the project area. In general, impacts to fin whales in the project area are expected to be similar to those described for blue whales. Routine activities associated with the proposed delineation activities are expected to cause negligible to low impacts. These impacts would be common to all units and would remain the same for all units combined. Implementation of the wildlife mitigation plan described in Mitigation MM1 would reduce overall impacts to negligible.

Sei Whale. Due to the low numbers of sei whales estimated to frequent California waters—possibly tens to a few hundreds of animals (Bonnell and Dailey, 1993; Barlow et al., 1997; Reeves et al., 1998b)—routine activities associated with the Proposed Action are not expected to affect this species. No impacts to sei whales are expected.

Humpback Whale. Like blue whales, humpbacks are frequently sighted from area platforms during the summer and fall. The minor and temporary increases in sound levels produced during the delineation drilling activities are not expected to affect humpback whales in the project area.

The reactions of humpback whales to vessels vary considerably. Humpbacks often move away when vessels are within several kilometers, (Baker and Herman, 1989; Baker et al., 1992), but may show little or no reaction when much closer (Richardson et al., 1995). They appear less likely to react overtly when feeding. As discussed for blue whales, humpbacks would be likely to react to the close approach of crew or supply boats, resulting in some temporary (less than 1-hour)

displacement and, possibly, disruption of feeding activity. However, the level of surface traffic to and from the proposed project areas is unlikely to have a detectable effect on humpback whales during their summer and fall presence in southern California waters.

Similarly, the level of helicopter traffic associated with the proposed delineation activities is expected to result in temporary (less than 1-hour), localized disturbances to humpback whales. These impacts are considered to be negligible.

Humpback whales are unlikely to swim near enough to the delineation drilling rig to pass through platform effluent mixing zones. In addition, as was discussed for blue whales, the zooplankton and small schooling fishes that form their primary prey would be unlikely to remain in the vicinity of the platforms long enough to bioaccumulate toxins. For these reasons, the EPA's biological assessment for Section 7 consultation on the reissuance of their general NPDES permit for OCS facilities (SAIC, 2000a) concluded that humpback whales off southern California would not be impacted by OCS platform discharges. Thus, no impacts on humpback whales are expected from the effluent discharges associated with the Proposed Action.

As discussed for the blue whale, impacts to humpback whales from delineation well abandonment operations are likely to involve minor, temporary disturbance. Overall, impacts from this source are expected to be low.

In conclusion, impacts to humpback whales in the project area from routine activities associated with the proposed delineation activities are expected to be negligible to low. These impacts would be common to all units and would remain the same for all units combined. Implementation of the wildlife mitigation plan described in Mitigation MM1 would reduce overall impacts to negligible.

Northern Right Whale. As discussed in section 4.6.7, the right whale population in the North Pacific is very small (NMFS, 1991), and right whales are rarely seen off southern California (Carretta et al., 1994). The probability that a northern right whale would be affected by routine activities associated with the Proposed Action is extremely low. No impacts on the northern right whale from the Proposed Action are expected.

Sperm Whale. As discussed in section 4.6.7, sperm whales are a pelagic species with a preference for deep waters (Watkins, 1977; Gosho et al., 1984). Although they are occasionally sighted in the Southern California Bight, they are generally found farther offshore (Dohl et al., 1981, 1983; Bonnell and Dailey, 1993). Thus, sperm whales are unlikely to be present near enough to the proposed delineation well drilling activities or traffic corridors to be disturbed by routine activities from these sources.

They also are unlikely to approach near enough to the drilling rig to be directly affected by effluent discharge plumes. No impacts on sperm whales from the Proposed Action are expected.

Steller Sea Lion. As discussed in section 4.6.7, Steller sea lions are now uncommon in southern California waters; their southernmost active rookery, Año Nuevo Island, is approximately 400 km north of the project area. They would not be affected by routine activities or discharges associated with the Proposed Action. No impacts on Steller sea lions from the Proposed Action are expected.

Guadalupe Fur Seal. Although a few Guadalupe fur seals appear on the Channel Islands each year (Bonnell and Dailey, 1993; DeLong and Melin, 2000), the Mexico-based population is still quite small (Gallo, 1994). They are almost never sighted at sea off California (Bonnell and Dailey, 1993). As was the case with the Steller sea lion, it is extremely unlikely that any routine activities associated with Proposed Action would affect more than one or two individuals. No impacts on Guadalupe fur seals from the Proposed Action are expected.

Southern Sea Otter. Direct measurements of sea otter hearing sensitivity are lacking (Richardson et al., 1995). Although no direct information is available on the potential impacts of delineation and development drilling operations on sea otters, Riedman (1983; 1984) did observe sea otter behavior during underwater playbacks of drillship, semi-submersible, and production platform sounds and reported no changes in behavior or use of the area. Most of the otters observed by Riedman (1983) were at least 400 m from the projector; all observed by Riedman (1984) were at least 1.2 km away. Although sea otters at the surface were probably receiving little or no underwater noise, some otters continued to dive and feed below the surface during the playbacks. At 1.2 km, the received sound levels of the strongest sounds were usually at least 10 dB above the ambient noise level (Malme et al., 1983; 1984). Drilling activities associated with the Proposed Action would occur at least 7 km (4.5 mi) offshore. California sea otters, except for juvenile males, rarely move more than 2 km offshore (Ralls et al., 1988; Riedman and Estes, 1990), and thus could be expected to be at least 5 km away from the nearest drilling activity. Because of this distance and the evidence from the playback experiments described above, no effects on sea otters from these activities are expected.

Although sea otters will often allow close approaches by boats, they will sometimes avoid heavily disturbed areas (Richardson et al, 1995). Garshelis and Garshelis (1984) reported that sea otters in southern Alaska tend to avoid areas with frequent boat traffic, but will reoccupy those areas in seasons with less traffic. The vessel traffic corridors between the support base at Port Hueneme and the proposed delinea-

tion well locations pass 4 km or more offshore. No effects on sea otters from service vessel traffic are expected.

No systematic studies have been made of the reaction of sea otters to aircraft and helicopters (Richardson et al., 1995). During aerial surveys of the California sea otter range conducted at an altitude of about 90 m (300 ft) (Bonnell et al., 1983), no reactions to the two-engine survey aircraft were observed. The helicopter trips supporting the proposed delineation activities will be out of the Santa Barbara and Santa Maria airports and are expected to pass to the south of the main sea otter range. Helicopter traffic is not expected to affect sea otters.

Because of their distance from the proposed delineation well locations, no effects to sea otters are expected from well abandonment activities associated with the Proposed Action.

Similarly, no effects to sea otters are expected from effluent discharges associated with the proposed delineation well drilling operations.

In conclusion, no impacts to sea otters in the project area are expected from routine activities associated with the proposed delineation activities. These impacts would be common to all units and would remain the same for all units combined.

5.2.9.2 CUMULATIVE IMPACT ANALYSIS FOR THREATENED AND ENDANGERED MARINE MAMMALS (2002-2006)

Cumulative Impacts without the Proposed Action (2002-2006): Section 5.1.2 describes the projects considered in the cumulative analysis for the proposed delineation activities. Possible sources of cumulative impacts in the project area include on-going and proposed oil and gas activities in Federal and State waters, Alaskan and foreign-import tankering, and military operations. Cumulative impacts to threatened and endangered marine mammals may also occur from commercial fishing operations, shipping activities, and other anthropogenic and non-anthropogenic sources. These impacts would be common to all the units.

The projects discussed in this section include past, present, and foreseeable actions that may produce impacts during 2002-2006, the expected duration of the proposed delineation activities. Potential cumulative impacts are discussed below.

Offshore Oil and Gas Activities. Section 4.0 describes the routine offshore oil and gas activities that may result in impacts to marine mammals. These include geophysical surveys, construction, drilling and production activities with associated support activities, and the abandonment, or decommissioning, of wells and offshore facilities. As discussed in section 5.2.8.1, the major impact agents expected from these proposed activities are noise and disturbance. The potential use of explosives in the abandonment of wells and offshore platforms also raises the possibility of lethal impacts to marine mammals.

Section 5.2.8.1 discusses the potential impacts to marine mammals from routine offshore oil and gas activities including well drilling, support vessel and helicopter traffic, and well abandonment. Section 5.2.8.2 discusses the potential impacts from geophysical surveys, construction, and platform-based development and production operations.

Geophysical Surveys. As discussed in section 5.2.8.2, no seismic surveys have been proposed for the Pacific OCS or State waters in the near future, and none are currently foreseen for the period 2002-2006.

Construction. As described in section 5.2.8.2, marine mammal reactions to construction activities would likely involve temporary avoidance behavior at distances of 2 km (1 nm) or less from the operations.

Development and Production. As discussed in section 5.2.8.2, the predicted radius of response to the noise produced by development and production activities for baleen whales, including endangered species, would also be less than 100 m. Richardson et al. (1995) predicted similar radii of response for odontocetes and pinnipeds.

Vessel Traffic. As discussed in section 5.2.8.2, the continued levels of support vessel traffic associated with offshore oil and gas activities in the project area are expected to result in temporary (less than 1-hour), localized disturbances to some marine mammals, primarily endangered baleen whales. Collisions between support vessels and marine mammals, while possible, are considered to be highly unlikely events.

Aircraft. As discussed in section 5.2.8.2, the levels of helicopter traffic associated with offshore oil and gas activities in the project area are expected to result in temporary (less than 1-hour), localized disturbances to some marine mammals, including threatened and endangered species.

Offshore Facility Decommissioning. As discussed in section 5.2.8.2, no offshore decommissioning activities are expected to occur in either Federal or State waters during the 2002-2006 duration of the proposed delineation activities.

Oil Spills. Section 5.1.3 discusses the cumulative oil spill risk for the project area, which results from several sources: ongoing and projected oil and gas production from existing OCS facilities in the Santa Barbara Channel and Santa Maria Basin, several proposed development projects on the Federal OCS, ongoing production from one facility in State waters in the Santa Barbara Channel, two likely oil and gas projects in State waters, and the tankering of Alaskan and foreign-import oil through area waters. As discussed in section 5.2.8.2, the most likely oil spill scenario is that

one or more oil spills in the 50-1,000-bbl range would occur from offshore oil and gas activities over the period 2002-2006, and that such a spill would be 200 bbl or less in volume. The probability that one or more spills of this size will occur this period is 75.9 percent (table 5.1.3.1-2). The maximum reasonably foreseeable oil spill volume from offshore oil and gas activities is 2,000 bbl, assumed for purposes of analysis to be a pipeline spill. The probability of a spill of this size occurring during the period 2002-2006 is 23.3 percent (table 5.1.3.1-3). Based on data from tanker spills in U.S. waters, the mean size for a tanker spill is assumed to be 22,800 bbl (with a probability of occurrence of 99 percent for this period; table 5.1.3.1-3). The potential impacts to threatened and endangered cetaceans and pinnipeds in the project area from spills of each of these three sizes are discussed below. Sea otters are addressed separately.

The level of impacts from such spills will depend on many factors, including the type, rate, and volume of oil spilled and the weather and oceanographic conditions at the time of the spill. These parameters would determine the quantity of oil that is dispersed into the water column; the degree of weathering, evaporation, and dispersion of the oil before it contacts a shoreline; the actual amount, concentration, and composition of the oil at the time of shoreline or habitat contact; and a measure of the toxicity of the oil.

A generic discussion of the effects of oil spills on cetaceans and pinnipeds is presented in section 5.2.8.2. Sea otters, which rely almost entirely on maintaining a layer of warm, dry air in their dense underfur as insulation against the cold, are among the most sensitive marine mammals to the effects of oil contamination (Kooyman et al., 1977; Geraci and St. Aubin, 1980; Geraci and Williams, 1990; Williams and Davis, 1995). Even a partial fouling of an otter's fur, equivalent to about 30 percent of the total body surface, can result in death (Kooyman and Costa, 1979). This was clearly demonstrated by the *Exxon Valdez* oil spill (Davis, 1990; Ballachey et al., 1994; Lipscomb et al., 1994). Earlier experimental studies had indicated that sea otters would not avoid oil (Barabash-Nikiforov, 1947; Kenyon, 1969; Williams, 1978; Siniff et al., 1982), and many otters were fouled by oil during the Alaskan spill; approximately 360 oiled otters were captured and taken to treatment centers over a 4-month period, and more than 1,000 dead sea otters were recovered (Geraci and Williams, 1990; Zimmerman et al., 1994). Ballachey et al. (1994) concluded that several thousand otters died within months of the spill, and that there was evidence of chronic effects occurring for at least 3 years.

As stated above, it is assumed that the most likely size for a spill occurring from offshore oil and gas activities in the Pacific OCS Region is 200 bbl or less. If a spill of this size were to occur in the Santa Barbara Channel or Santa Maria Basin, it could contact the mainland shoreline or one of the northern Channel Islands, which are part of the Channel Islands National Marine Sanctuary and National Park. However, a 200-bbl spill would be unlikely to reach San Miguel Island, which is approximately 40 km (20 nm) from Platform Heritage, the nearest offshore facility.

Data from moored current meters and surface-drifter trajectory observations (section 5.1.3) indicate that north of Point Conception a spill could move northward along the mainland coast, typically during relaxation current events when the wind is low. Individual drifters made landfall along the coast as far north as Point Lobos within 10 days. However, when averaged over all flow regimes, the most likely northern limit of shoreline spill contact is Ragged Point, near the southern end of the Big Sur coast and within the Monterey Bay National Marine Sanctuary (section 4.6.9).

As discussed in section 5.2.8.2, it is unlikely that a 200-bbl spill would have more than a negligible impact on cetacean or pinniped populations at sea in the project area, including threatened and endangered species. As discussed in the 1984 EIR/EIS for development of the Point Arguello Unit (ADL, 1984), likely impacts could involve the oiling of a few individuals and/or temporary displacement from small areas of the Santa Barbara Channel or Santa Maria Basin.

As stated above, the most likely maximum size of a major oil spill from future oil and gas development—the maximum reasonably foreseeable oil spill volume—is 2,000 bbl. A 2,000-bbl oil spill in this area could have more serious impacts on marine mammals, including longer-term displacement and some mortality.

If a 2,000-bbl spill were to occur during the summer or fall, it could contact part of the area used for feeding by blue and humpback whales in the Santa Barbara Channel and Santa Maria Basin (see section 5.1.3). Based on experiences from past spills, it is unlikely that any direct mortality would result from such a spill, and there is no evidence that blue or humpback whales would avoid oiled areas. In Prince William Sound following the 1989 *Exxon Valdez* oil spill, humpbacks were observed feeding in areas that had been heavily oiled, although none were observed feeding in oil (von Ziegesar et al., 1994). The whales did not appear to favor areas that had not been oiled. However, blue and humpback whales could be temporarily displaced from a portion of their foraging area by the cleanup activities associated with the response to a spill of this size. Impacts to blue and humpback whales from a spill of this size would range from negligible to low.

Although fin whales are seen in the Santa Barbara Channel, they generally occur farther offshore and in waters south of the northern Channel Island

chain (Leatherwood et al. 1987; Bonnell and Dailey, 1993; MMS, unpubl. data); they are less likely than blue or humpback whales to be affected by an accidental oil spill.

The remaining endangered whale species are even less common in the project area. Low numbers of sei whales are estimated to frequent California waters—possibly tens to a few hundreds of animals (Bonnell and Dailey, 1993; Barlow et al., 1997; Reeves et al., 1998b). The right whale population in the North Pacific is very small (NMFS, 1991), and right whales are rarely seen off southern California (Carretta et al., 1994). Sperm whales are a pelagic species with a preference for deep waters (Watkins, 1977; Gosho et al., 1984). Although they are occasionally sighted in the Southern California Bight, they are generally found farther offshore (Dohl et al., 1981, 1983; Bonnell and Dailey, 1993). Thus, these species are unlikely to be present in the project area in sufficient numbers to be affected by a 2,000-bbl spill.

Similarly, as discussed in section 5.2.8.2, the very low numbers of Steller sea lions and Guadalupe fur seals in southern California waters make it unlikely that either species would come in contact with an oil spill in the project area. No impacts are expected from a 2,000-bbl oil spill.

Marine Tankers. As discussed in section 5.1.3, none of the oil produced on the Pacific OCS is transported by tanker. However, the transport of foreign and Alaskan oil along the U.S. west coast does present an oil spill risk. The effects of a 22,800-bbl tanker spill on marine mammals in the project area potentially could be much more serious. Although, as discussed in section 5.2.8.2, cetaceans are considered to be less vulnerable to the effects of oiling than pinnipeds (Geraci, 1990; Würsig, 1990), a 22,800-bbl tanker spill would probably have some effect on cetaceans in the project area. It is unlikely that mortality would occur, but blue, humpback, and, to a lesser extent, fin whales could be subject to disturbance and displacement over a greater area and for a longer duration. These impacts would be expected to be low overall.

Given their low densities in the project area, effects of a tanker spill on the remaining threatened and endangered marine mammal species would be expected to be negligible.

As discussed in section 5.2.8.2, there is a chance that even a 200-bbl spill could contact the mainland shoreline within the present southern sea otter range. For this EIS, R.G. Ford Consulting conducted an analysis of the risk of oil spills to the southern sea otter from ongoing and projected production from existing federal OCS facilities, from hypothetical development of the 36 undeveloped leases, and from tankering for the periods 2002-2006 (through 2005) and 2006-2030 (appendix 5.5). This analysis provides the basis for the discussion presented here and in section 6.2.9.1. As described in appendix 5.5, the analysis used sea otter numbers and distribution as recorded during the spring 1999 survey of the southern sea otter range. For an upper bound for platform and pipeline spills, the model used the estimated maximum reasonably foreseeable spill size of 2,000 bbl (section 5.1.3). For tanker spills, the size distribution was truncated at 350,000 bbl, which represents the maximum capacity of tankers transiting this portion of the California coast (Ford and Bonnell, 1995); a run was also conducted using the mean tanker spill size of 22,800 bbl (section 5.1.3). Using output from MMS's OSRA Model to estimate the likelihood of shoreline contact, the model simulated the effects of a potential spill from each of the potential sources of risk 100,000 times. To maintain consistency with the oil spill risk analysis presented in section 5.1.3, contacts for platform and pipeline spills were calculated for 10-day periods; for tanker spills, with their much greater potential volumes, 30-day runs were used. The results, presented as worst-case percentiles, are shown in appendix table 5.5-3.

The results of the model runs are ranked in ascending order based on the numbers of otter contacts. For example, the 0.01 worst case is the maximum number of otters that the model predicts would be contacted in 99 out of 100 trials. For ongoing and projected production from existing federal OCS facilities during the period 2002-2006, the model predicts that there is a 1 in 100 chance that 4-5 sea otters would be contacted by a spill. Likewise, for the period 2002-2006 the model predicts that there is only a 1 in 1,000 chance that 38 otters would be contacted by an oil spill resulting from existing federal OCS activities, and an extremely slight (1 in 10,000) chance that as many as 86 otters would be contacted. Five (5) otters represent about 0.2 percent of the current estimated southern sea otter population (2,317; section 4.6.7); 38 otters would represent 1.6 percent. Thus, the model analysis indicates that there is a very low probability of sea otter contacts occurring as a result of spill associated with existing federal OCS facilities during this period.

This is basically consistent with the conclusion reached by Ford and Bonnell (1995), in their analysis of the potential impacts of an *Exxon Valdez*-sized spill on the southern sea otter, that oil spills occurring at the southern end of the otter range present the smallest risk to the population. However, as discussed above, data from moored current meters and surface-drifter trajectory observations (section 5.1.3) indicate that north of Point Conception a spill could move northward along the mainland coast under certain conditions.

If a spill were to occur, the magnitude of expected sea otter mortality would vary with a number of factors, including the time of year, volume of oil spilled, wind speed and direction, current speed and direction,

distance of the spill from shore, volume of oil contacting the shoreline, condition of the oil contacting the shoreline, the success of containment operations, number of animals contacted, and the effectiveness of otter cleaning and rehabilitation.

In its draft Revised Recovery Plan for the Southern Sea Otter (FWS, 2000), the FWS makes the assumption that, lacking reliable data on the survivability of oiled sea otters in the wild, all sea otters coming into contact with oil within 21 days of a spill will die. The FWS recognizes that activation of the California Department of Fish and Game's wildlife care facilities and oil spill response protocols would mitigate these impacts to some extent and that this assumption is probably conservative. Rapid and effective oil spill cleanup response (as discussed in section 5.1.3) would also lessen impacts on otters in the spill area. As indicated by Brody et al. (1996), sea otter contact with an oil spill does not necessarily equate to mortality.

The oil spill risk analysis for the southern sea otter conducted by R.G. Ford Consulting indicates that non-OCS tanker oil spills during the period 2002-2006 would have a 1 in 1,000 chance of contacting 550 sea otters, and a 1 in 10,000 chance of contacting as many as 1,413 otters (appendix 5.5). The former number represents nearly 24 percent of the current estimated southern sea otter population (2,317; section 4.6.7). Although an unlikely occurrence, this would be a high impact as defined by the impact level criteria presented in section 5.2.9.

Another 30-day run of the Ford model was made for the mean tanker spill size of 22,800 bbl, assuming shoreline contact along the mainland north of Point Conception (appendix 5.5). The results indicate that such a spill would be a very serious threat to the otter population. It was estimated that a spill of this size would oil a mean stretch of 192 km (104 nm) of coastline, with a 95-percent probability of at least 26 km (14 nm) and a 5-percent probability of up to 922 km (498 nm) being contacted. The model calculated a 10-percent chance that 699 sea otters would be contacted and a 1-percent that up to 1,505 would be. The former number represents 30 percent of the current estimated sea otter population (2,317; section 4.6.7).

In summary, model runs for oil spills associated with ongoing and projected production from existing federal OCS facilities for the period 2002-2006 indicate that there is a 1-percent chance of contact to 4-5 sea otters within 10 days. If all contacts resulted in mortality (a conservative assumption—see above), the impacts to the southern sea otter would be considered low as defined by the impact level criteria presented in section 5.2.9. Although an unlikely event, a non-OCS tanker spill along the sea otter range would present a serious threat to the population.

Military Activities. As discussed in section 5.2.8.2, military operations in the project area are expected to have temporary hearing and disturbance effects on marine mammals, primarily pinnipeds on land. It is unlikely that more than one or two individuals of either of the threatened pinniped species found in the project area, the Steller sea lion and Guadalupe fur seal, would ever be present in the vicinity of military operations. Thus, they are not expected to be affected by these activities. If deployed in project area waters, operation of the U.S. Navy's SURTASS LFA sonar system potentially could have noise-related impacts on marine mammals at sea. No information exists on the potential impacts of military operations on sea otters.

Commercial Fisheries. Section 5.2.8.2 discusses the incidental take of marine mammals in commercial fisheries along the U.S. west coast. Based on data from 1990 to 1998, 16 or more Steller sea lions are taken each year, but most of these animals are taken intentionally in the British Columbia aquaculture predation control program (Ferraro et al., 2000). The estimated annual take of Stellers in the California-Oregon drift gillnet fishery is very low (1.2 animals).

There is no information on fisheries-related mortality for Guadalupe fur seals, although drift and gillnet fisheries exist along the length of Baja California, as well as in U.S. waters (Forney et al., 2000). Fur seals have stranded in central and northern California with net abrasions around the neck, fish hooks, and monofilament line (Hanni et al., 1997; Forney et al., 2000).

As discussed in section 5.2.8.2, large whales, particularly rorquals such as blue and fin whales, are reported to be capable of swimming through nets without entangling, although some mortality may go unobserved (Forney et al., 2000). Two sperm whales were observed taken in the drift gillnet fishery in 1996 and 1998. Based on 1994-1998 data, the mean annual fisheries take of sperm whales is 2.5 animals, which is above the calculated Potential Biological Removal (PBR) for this stock (Forney et al., 2000). Some humpback whale mortality in gillnets may also be occurring—two strandings in the Southern California Bight have been attributed to entanglement (Heyning and Lewis, 1990), and incidents of entanglement (predominantly of calves) have been reported from waters off Hawaii and New England (Mazzuca et al., 1998; Weinrich, 1999). The mean annual fisheries take of humpbacks, based on the 1994-1998 data, is less than 0.2 animals. No fisheries take of blue, fin, sei, or northern right whales was reported for the 1994-1998 period (Ferraro et al, 2000; Forney et al., 2000).

Coastal set net fisheries have intensified within the southern sea otter range in recent years (FWS, 2000). Forney et al. (2001) estimated that set gillnets in Monterey Bay may have killed 17-125 sea otters during the 4-year period from 1995 to 1998, averaging about 4-26 sea otters per year. During 1999, one sea otter was observed taken with a 23-percent observer coverage of the halibut gillnet fishery, yielding a mor-

tality estimate of 5 otters for that calendar year (Cameron and Forney, 2000). This recent incidental take is due to an increased use of set nets in southern Monterey Bay and an increased use of deeper waters in that area by sea otters (FWS, 1999). An emergency closure in waters less than 60 fathoms was implemented for this fishery north of Yankee Point in Monterey County on September 14, 2000, to protect sea otters and seabirds.

Other Anthropogenic Sources of Impacts. As discussed in section 5.2.8.2, fin whales are the whale species most frequently struck by ships (Laist et al., 2001). Off the U.S. west coast, ship strikes accounted for single fin whale mortalities in 1991, 1996, and 1997; the average observed annual mortality for 1994-1998 was 0.4 animals (Forney et al., 2000). Ship strikes accounted for 2 humpback whale mortalities in 1993, 1 in 1995, and possibly 1 in 1997; the 1994-1998 average was at least 0.2 whales per year (Forney et al., 2000). No ship strikes of other endangered whale species were reported for the 1994-1998 period (Forney et al., 2000). Ship strikes are not a significant source of cetacean mortality in California waters.

Section 5.2.8.2 discusses the potential impacts of whale-watching activities on cetaceans. In the Santa Barbara Channel, whale-watching activities in the summer and early fall have focused on blue and humpback whales in recent years, and these trips appear to be growing in popularity. In 1999, eight operators conducted whale-watching trips from Channel harbors (NOAA, unpubl. data).

Although a subsistence hunt for Steller sea lions does exist in Southeast Alaska, Stellers from the eastern U.S. stock compose a very small percentage of the total take (12 were recorded in 1992-1997; Ferraro et al., 2000). Subsistence hunters in Canada harvest an unknown number. The estimated annual mortality for the eastern U.S. stock from illegal shooting is 2.8 sea lions, but these are reported from Oregon, Washington, and Alaska (Ferraro et al., 2000). There is no information on other sources of human-related mortality for the Guadalupe fur seal.

Illegal shooting is apparently the major non-fisheries source of human-related mortality for sea otters. A review of sea otter mortality from 1968 to 1989 indicated that shooting accounted for 4.6 percent of the recorded deaths (FWS, 1999).

Section 5.2.8.2 discusses the potential health hazards presented by marine pollutants for marine mammals. The planktivorous diet of blue, right, and, to a lesser extent, sei whales apparently makes them less susceptible to the accumulation of organochlorine and metal contaminants than species such as fin or humpback whales, which seem to feed more regularly on fish (O'Shea and Brownell, 1995; Reeves et al., 1998a, b). Concentrations of organochlorine pesticides, PCBs, and heavy metals have been reported for humpback whale tissues from Atlantic and Caribbean waters (Taruski et al., 1975; NMFS, 1991a). Although there is no evidence that levels of these substances in any baleen whales are presently high enough to cause toxic or other effects, very little is known about the possible long-term effects of exposure to pollutants (O'Shea and Brownell, 1995; Reeves et al., 1998a, b).

Sydeman and Allen (1999) theorized that contaminants might be a contributing factor to the continued decrease of the Steller sea lion population on the Farallon Islands off San Francisco in recent years, possibly through reproductive effects. From 1973-1983, premature births accounted for 20-65 percent of pup mortality (Hastings and Sydeman, 1998). Although organochlorine and trace metal contaminants have decreased in central California Steller sea lion pups during the past decade, measured levels are still elevated (Jarman et al., 1996a). Currently, no information is available on the potential impacts of marine pollutants on Guadalupe fur seals.

Sea otters' high metabolic demands and consequent daily foraging rate make them vulnerable to contaminant loading (FWS, 1999). Among the trace metals, mercury is of particular concern. There are abundant geologic sources of mercury in the Coast Range and a long history of mining and associated groundwater contamination (FWS, 1999). Several watercourses in the sea otter range, including Elkhorn Slough and San Simeon Creek, have elevated mercury levels (FWS and NMFS, 1998). Livers of otter carcasses collected at Elkhorn Slough contained high levels of mercury—up to 60 mg/kg, compared to the 4 mg/kg considered "normal" for river otters (Wren, 1986). Acute mercury poisoning affects the central nervous system and is associated with sensory and behavioral symptoms. Currently, however, the level of sea otter exposure to mercury and the impacts on the population are unknown.

Although no specific research has been conducted on the effects of organochlorines on sea otters, terrestrial mustelids (*Mustela* spp.) have been shown to be very sensitive to effects (FWS, 1999). Risebrough (1989) measured PCB levels in sea otters that were higher than those known to cause reproductive failure in mink. Jarman et al. (1996b) suggested a connection between PCBs and the high rate of pre-weaning mortality in southern sea otters.

Current measured levels of DDT, DDE, and other organochlorine pesticides in sea otters do not seem to be toxicologically significant (FWS, 1999). However, Nakata et al. (1998) reported that southern sea otters that died from infectious disease and other causes, such as neoplasia, emaciation, and esophageal impaction, did contain elevated concentrations of PCBs and DDTs. Also, a recent review of contaminants in sea otters that compared animals from California, Southeast Alaska, and the Aleutians found comparatively high levels of DDT, DDE, and PCBs in southern sea otters

(Bacon et al., 1999; FWS, 2000). Since higher PCB levels were found in otters from the Aleutians, where populations are healthy, the authors thought it unlikely that PCBs alone were having a detrimental effect on the southern sea otter population, although they felt the impacts of high levels of DDT and DDE were less clear.

The anti-fouling agent tributyltin and its degradation products (BTs) have been found in the tissues of dead otters (Kannan et al., 1998). Although their use was limited in the 1980's, BTs persist in the marine environment for several years and are found in areas frequented by large ships, such as Monterey Harbor. BTs are known to suppress the immune potential in mammals. Southern sea otters that died of disease were found to contain higher concentrations of BTs than those that died of trauma (Kannan et al., 1998).

Non-anthropogenic Sources of Impacts. Section 5.2.8.2 discusses the potential impacts of disease on wild marine mammal populations. Little is known of the role played by disease in the natural mortality of large cetaceans, such as the endangered baleen species and the sperm whale (NMFS, 1991a, b; Bonnell and Dailey, 1993; Reeves et al., 1998a, b).

Viral and bacterial diseases, such as the San Miguel sea lion virus and leptospirosis, are found in Steller sea lions (Dierauf, 1990; Sydeman and Allen, 1999). Sydeman and Allen (1999) reported that these diseases were found in debilitated animals at the Farallon Islands and hypothesized that these factors may be contributing to the continued decline of that population. Currently, no information is available on the potential impacts of diseases on Guadalupe fur seals.

The rate of infectious disease in the southern sea otter population may have been high throughout the century, although, except for parasites, the rate has not increased since 1992 (BRD, 1998; FWS, 1999). Thomas and Cole (1996) reported that the rate of infection in the southern sea otter was higher than expected in a wild population. This included infection, primarily of juveniles and pups, by larvae of the acanthocephalan parasite *Polymorphus* spp. Since otters apparently are not suitable hosts for the parasite, the larvae aberrantly migrate through the intestinal wall, which can lead to fatal cases of peritonitis or contribute to decreased resistance to disease.

Thomas and Cole (1996) also found fatal cases of protozoal encephalitis (caused by *Toxoplasma gondii*) and San Joaquin Valley fever (caused by the fungus *Coccidioides immitis*) in subadult and adult otters. Additional deaths were attributed to various bacterial infections (FWS, 1999).

As discussed in section 5.2.8.2, naturally occurring marine toxins are known to have killed marine mammals, including humpback whales (Geraci et al., 1989; Geraci and Lounsbury, 1993).

Incremental Impacts of the Proposed Action (2002-2006): As discussed in section 5.2.9.1, routine activities associated with the proposed delineation activities are expected to result in temporary (less than 1-hour), localized disturbances to blue, fin, and humpback whales in the project area. These impacts are considered to be negligible to low. No impacts to sei, right or sperm whales, Steller sea lions, Guadalupe fur seals, or southern sea otters are expected from these activities. No impacts threatened or endangered marine mammals are expected from effluent discharges.

Summary and Conclusions (2002-2006): The North Pacific stocks of most of the great whales, including the blue, humpback, fin, sei, northern right, and sperm whale, were reduced to a fraction of their estimated pre-whaling abundance by commercial whaling (Forney et al., 2000). Currently, the eastern North Pacific populations of three endangered whale species, the blue, fin, and humpback whales, appear to be increasing. The status of the eastern North Pacific stocks of the remaining species is uncertain. Although sperm whale populations in the North Pacific as a whole are quite large, abundance off the U.S. west coast is variable (Forney et al., 2000). Sei whales are rare in California waters. The northern right whale population in the North Pacific is believed to be very small, consisting of no more than 100-200 animals. Although incidental take in commercial fisheries and ship strikes do occur, these and other identified anthropogenic and non-anthropogenic factors do not appear to have significant impacts on endangered cetacean populations in the project area.

The eastern U.S. stock of Steller sea lions is stable or increasing in the northern portion of the range (particularly in British Columbia), but continues to decline at the southern end in central California (Ferraro et al., 2000). The reasons for this decline are unknown, although possible factors may include reduced prey availability (due to ocean temperature changes), competition with other pinniped species, and the effects of contaminants and disease (Sydeman and Allen, 1999). The Guadalupe fur seal population, in contrast, is growing, although the species remains rare in project area waters.

The status of the southern sea otter population is also somewhat uncertain at present. Following a number of years of uninterrupted growth, the population apparently declined in the late 1990's, when the number of otters seen during the annual spring surveys decreased steadily over a four-year period. Numbers increased again in 2000, when nearly as many were counted as during the peak census in 1995. Major impacts to this population currently result from incidental take in commercial fisheries, shooting, and disease, with possible contribution from environmental contaminants.

As discussed in section 5.2.8.2, the effects of noise and disturbance generated by the proposed project are not expected to be significant in themselves, but will add to the cumulative noise and disturbance levels that threatened and endangered marine mammals are exposed to in the Santa Barbara Channel and Santa Maria Basin. However, there is no evidence that the noise and disturbance created by offshore oil and gas activities in both Federal and State waters and by increasing vessel traffic (of which oil and gas support vessels are a small part) have resulted in adverse impacts on threatened and endangered marine mammal populations. By the impact level criteria adopted for this document (section 5.2), these impacts are considered to be low. The very minor effects in space and time projected to occur as a result of the proposed delineation activities are not expected to add measurably to cumulative impacts to threatened and endangered marine mammals in the area.

No oil spills are expected to result from the Proposed Action. However, accidental oil spills do present an ongoing source of potential impacts to marine mammals. The cumulative risk of oil spills arises from multiple sources, including offshore oil and gas activities in Federal and State waters and both Alaskan and foreign-import tankering. The greatest oil spill risk to marine mammals in the project area results from tankering operations. This risk is tempered by recently implemented or proposed mitigation (such as the rerouting of tankers farther offshore along the central California coast) and, as discussed in section 5.1.3, by modern oil spill response capabilities.

If an oil spill were to occur in the project area during the period 2002-2006, impacts to threatened and endangered cetaceans and pinnipeds could range from negligible to low, depending on spill size, location, season, and a number of other factors. Oil spills associated with ongoing and projected production from existing federal OCS facilities in the project area would be expected to result in no more than low impacts to the southern sea otter during this period. Non-OCS tankers represent the greatest oil spill risk to sea otters.

The probabilities that one or more oil spills will occur during the period 2002-2006 from existing and proposed offshore oil and gas activities are 94.9 percent for a spill of 200 bbl or less and 41.2 percent for a spill of 2,000 bbl. The probability of a 22,800-bbl tanker spill occurring during this period is 38.8 percent.

5.2.9.3 IMPACTS OF THE PROPOSED ACTION ON THREATENED AND ENDANGERED BIRDS

This section analyzes the impacts of the proposed projects on threatened and endangered birds. Threatened and endangered birds may be vulnerable to several potentially adverse impacts from routine operations associated with the proposed project. Routine operations assumed to occur as a result of the proposed projects include: towing and anchoring the MODU, support vessel traffic, helicopter flights, drilling, various discharges, barge transit and anchoring, and well abandonment. These operations are described in section 2. As discussed in section 1.0, no oil spills are expected to occur from the proposed drilling activities that make up these projects, and therefore, no impacts to threatened and endangered birds from oil spills are expected.

Five threatened or endangered bird species that both occur in the project area and that could be vulnerable to project-related impacts are considered in this analysis. These are: California brown pelican, California least tern, bald eagle, western snowy plover, and light-footed clapper rail. Routine operations associated with the proposed projects described in section 2 that could have an effect on threatened and endangered birds are: towing the MODU, support vessel traffic, helicopter flights, barging, and well abandonment. Other potential sources of disturbance, including the noise and activity associated with drilling operations, are not expected to have an effect. Platform discharges are not expected to have a measurable effect due to the high degree of dilution that would occur and the fact that bioaccumulation of associated pollutants is not expected (SAIC, 2000).

California Brown Pelican. Nesting and roosting brown pelicans are probably the most sensitive to disturbance. The activities associated with moving and positioning the MODU, support vessel traffic, and barging will be conducted well away from pelican breeding colonies on Anacapa and Santa Barbara Islands, and impacts on nesting pelicans are not expected from the proposed projects. Although pelicans frequently use jetties and breakwaters associated with ports (e.g., Port Hueneme) for roosting, the pelicans using these areas are exposed to high levels of vessel traffic and have become habituated to this source of disturbance; no impacts on roosting pelicans from the MODU, support vessels, or barge activities are expected. These activities can also disturb pelicans at sea, but these effects would be limited to the immediate vicinity of the disturbance and would be very short in duration (e.g., a few minutes or hours). Vessel traffic of various types is common throughout the project area, and pelicans have most likely become habituated to this activity.

Helicopter flights can have a negative impact on pelicans, although their reaction to helicopters and other aircraft is complex, depending on the activity of the pelicans being exposed (e.g., feeding, roosting, nesting); previous exposure levels; and the location, altitude, and number of flights (Hunt, 1985). Seabirds, including pelicans, may also habituate to air traffic over time (Hunt, 1985). Nesting and roosting pelicans are probably the most sensitive to helicopter traffic. The number of helicopter flights planned for each unit for the proposed projects is shown in table 4.0.1-7. Low-flying aircraft, especially helicopters, can disturb nesting pelicans, causing them to leave their nests unattended. However, pelican colonies are far removed from any activities associated with the proposed projects and no helicopter flights over pelican colonies are expected. Roosting pelicans can also be disturbed by helicopter flights. Due to the high background level of aircraft flight activity that occurs throughout much of the project area, pelicans may be somewhat habituated to this type of disturbance. However, flights at low altitudes may still cause pelicans to flush from roost sites. These impacts would be very temporary (a few minutes to a few hours) and would be limited to helicopter flight paths across the mainland coast; helicopter flights over the Channel Islands, where large numbers of pelicans roost, are not expected. Because flights for the proposed projects will only originate from the Santa Barbara and Santa Maria Airports (see section 2), only pelican roosts along the coast between these airports are likely to be exposed to helicopters. Most of the pelican roosts in this region are on Vandenberg AFB, where they are afforded some protection because the base restricts flights across many of them to no less than 1,000 ft. Because of the low number of flights associated with these projects, the small area that might be affected, and the protection afforded by Vandenberg AFB flight restrictions, no impacts to roosting pelicans from helicopter flights associated with these projects are expected.

Another activity associated with these projects, well abandonment, could harm pelicans under certain circumstances. Each of the delineation wells will be permanently plugged and abandoned (section 2). As part of the abandonment process, the casings for these wells may be cut either mechanically or with explosives. Although no injuries to pelicans from well abandonment with explosives have been reported, pelicans, cormorants, gulls, and phalaropes have been killed or injured due to other sources of underwater explosions (Fitch and Young, 1948). To be killed or injured during well abandonment with explosives, a pelican would have to be submerged at the exact moment of the explosion and in relatively close proximity to the well (e.g., directly under the MODU). Pelicans capture submerged fish near the surface by plunge diving; pelicans remain submerged or partially submerged for only an instant during this process. Also, explosive charges will be set off 5 m (15 ft) below the sea floor, which would tend to dampen the effect of the blast. Therefore, it is highly unlikely that pelicans would be at risk of injury or death from this process.

In conclusion, no impacts to California brown pelicans from routine operations associated with these projects, including helicopter flights and well abandonment, are expected either for all units combined or any individual unit.

California Least Tern. Since least terns nest along the mainland coast and feed within a few miles of the shore, they will not be exposed to most routine operations associated with the proposed projects. The only activity that might have an impact on terns is helicopter flights, if they cross over colonies at low (<1,000 ft) altitudes. Helicopter flights can have a negative impact on least terns, although their reaction to helicopters and other aircraft is complex, depending on colony size; previous exposure levels; and the location, altitude, and number of flights (Hunt, 1985). Seabirds, including least terns, may also habituate to air traffic over time (Hunt, 1985). The number of helicopter flights planned for each unit for these projects is shown in table 4.0.1-7. Low-flying aircraft, especially helicopters, can disturb nesting terns, causing them to leave their nests unattended. Although the adult(s) may be absent from the nest for only a short period of time, eggs and nestlings may be lost either due to exposure or predators. Due to the high background level of aircraft flight activity that occurs throughout much of the project area, terns may be somewhat habituated to this type of disturbance. Based on the location of least tern colonies in the project area (see section 4.6.7) and the origination of flights from the Santa Barbara and Santa Maria Airports (see section 2), only those tern colonies that occur along the coast of Santa Barbara County between these airports could be exposed to helicopter flights. Helicopter flights from the Santa Barbara Airport cross the coast at one location (T. Marr, Petroleum Helicopters, Inc., pers. comm.), which is well to the east of any tern colony. Two of the three small colonies that occur in this area are on Vandenberg AFB, where flights across tern colonies are restricted to no less than 2,000 ft. This should be sufficient to protect nesting terns on the base from this source of disturbance. Although most flights should be south of the small Mussel Rock/Guadalupe Dunes colony, which is to the north of Vandenberg, it is possible that a few flights may cross this area. This would only be a problem if the flights are below 1,000 ft, but pilots maintain an altitude of 1,000 ft or more in the Santa Maria River area where this colony is located (see section 5.2.1.1 for marine mammals). Based on the prob-

ability that no low-level flights over tern colonies during the breeding season are expected to occur as a result of these projects, no impacts to least terns from helicopter flights are expected.

In conclusion, no impacts to California least terns from routine operations associated with these projects, including helicopter flights, are expected either for all units combined or any individual unit.

Bald Eagle. Because most bald eagles in coastal southern California are found on Santa Catalina Island, which is well away from the proposed projects, no impacts to bald eagles from routine operations are expected either for all units combined or any individual unit.

Western Snowy Plover. Since snowy plovers nest and forage on beaches, they will not be exposed to most routine operations associated with the proposed projects. The only activity that might have an impact on plovers is helicopter flights, if they cross over nesting beaches at low (<1,000 ft) altitudes. The number of helicopter flights planned for each unit for the proposed projects is shown in table 4.0.1-7. Low-flying aircraft, especially helicopters, can disturb nesting plovers, causing them to leave their nests unattended. Although the adult(s) may be absent from the nest for only a short period of time, eggs and nestlings may be lost either due to exposure or predators. Due to the high background level of aircraft flight activity that occurs throughout much of the project area, plovers may be somewhat habituated to this type of disturbance. Based on the origination of flights from only the Santa Barbara and Santa Maria Airports (see section 2), only those plover nesting beaches that occur along the coast of Santa Barbara County between these two airports, most of which are on Vandenberg AFB, could be exposed to helicopter flights. Helicopter flights from the Santa Barbara Airport cross the coast at one location (T. Marr, Petroleum Helicopters, Inc., pers. comm.), which is not a snowy plover nesting area. Vandenberg AFB flight restrictions over plover nesting beaches vary from 1,000 ft or more in some locations to 2,000 ft or more in others, which should not be a problem. Off the base, helicopters also maintain an altitude of 1,000 ft or more (see section 5.2.1.1 for marine mammals). Based on the relatively low number of flights associated with these projects, helicopter flight paths, and altitude restrictions, no impacts to snowy plovers from helicopter flights are expected.

In conclusion, no impacts to western snowy plovers from routine operations associated with the proposed projects, including helicopter flights, are expected either for all units combined or any individual unit.

Light-footed Clapper Rail. Because light-footed clapper rails are restricted to saltwater marshes along the mainland coast and project-related activities, including helicopter flights, are not planned for these areas, no impacts on rails are expected from the proposed projects either for all units combined or any individual unit.

5.2.9.4 CUMULATIVE IMPACT ANALYSIS FOR THREATENED AND ENDANGERED BIRDS (2002-2006)

Since there are no impacts from the Proposed Action to threatened and endangered birds, no analysis of cumulative impacts is appropriate here. However, impacts to threatened and endangered birds could occur if development of the 36 undeveloped leases occurs. These impacts are discussed in section 6.2.9.2.

5.2.9.5 IMPACTS OF THE PROPOSED ACTION ON SEA TURTLES

This section provides a general discussion of the potential effects of the identified impact factors, including noise and disturbance and effluent discharges on sea turtles in the project area. The potential use of explosives in the abandonment of the delineation wells also raises the possibility of lethal impacts to sea turtles. These potential impacts are common to all the units.

Noise and Disturbance. The primary sources of noise and disturbance from the Proposed Action are the delineation well drilling operations and support vessel barge, and helicopter. These activities are described in section 2. Section 5.2.8.1 provides a discussion of the sound sources levels and frequencies associated with these sources.

Relatively little is known about the hearing ability of sea turtles (Davis et al., 1998). Only two species, loggerhead and green sea turtles, have been studied. Ridgway et al. (1969) determined that juvenile green sea turtles detected sound frequencies in the range of 200-700 Hz and displayed a high level of sensitivity at about 400 Hz. A recent study by Bartol et al. (1999) indicated that the hearing of juvenile loggerheads was most sensitive at 250-1,000 Hz. Sensitivity declined rapidly above 1,000 Hz and was highest at 250 Hz. While these studies cannot be used to calculate hearing thresholds, they do suggest that sea turtles can hear low-frequency sounds such as those produced by the routine activities associated with the Proposed Action.

No systematic studies have been conducted on the effects of man-made noise on sea turtles, although it is assumed that noise from offshore sources such as support vessel traffic could elicit a startle reaction from sea turtles and produce a temporary, sublethal stress (MMS, 1996). In the Gulf of Mexico, sea turtles are known to be attracted to and feed around offshore platforms, indicating some tolerance for low-frequency,

man-made noise (MMS, 1996). Given the low densities of sea turtles in southern California waters, no impacts to sea turtles from these sources are expected in the proposed project area.

Section 5.2.8.1 describes the potential use of explosives in the delineation well abandonment process. Underwater explosions can cause injury or death to sea turtles at close range. Since 1986, three sea turtles, all loggerheads, are known to have been injured during the use of explosives for platform removal in the Gulf of Mexico (Twachtman, Snyder & Byrd, 2000). One turtle was killed; the other two were rehabilitated and released.

Young (1991) calculated safe distances for several marine animals from underwater explosions of various sizes. These calculations were for open-water blasts and did not take into account the dampening effects of the type of subterranean blasting used for platform removal. For an approximately 23-kg (50-lb) charge, the estimated safety distance for sea turtles was 640 m (2,100 ft).

As discussed in section 5.2.8.1, the low level of abandonment activities would make it unlikely that injury or mortality would occur to marine animals such as sea turtles as a result of well abandonment operations associated with the proposed delineation activities. Sea turtles are unlikely to be present in the general vicinity of the detonation area during abandonment operations, and impacts from this source are expected to be negligible. The potential for impacts to sea turtles could be reduced even further through implementation of a wildlife mitigation plan designed to minimize impacts on marine mammals and other marine animals (see Mitigation MM1, section 5.2.8.1.2).

Effluent Discharges. The potential effects of OCS discharges on sea turtles include 1) direct toxicity (acute or sublethal), through exposure in the waters or ingestion of prey that have bioaccumulated pollutants; and 2) a reduction in prey through direct or indirect mortality or habitat alteration caused by the deposition of muds and cuttings (SAIC, 2000a, b). However, there is no toxicity information on the effects of muds and cuttings and produced-water discharges on sea turtles. Comprehensive reviews by the National Academy of Sciences (1983), the U.S. Environmental Protection Agency (1985), and Neff (1987) do not address the potential effects of routine OCS discharges on this group of animals (MMS, 1996).

No significant impacts have been associated with these animals, in part, because they are highly mobile and their range far exceeds the extent of a platform discharge plume. An indirect effect related to the displacement or reduction of food/prey species is more likely (MMS, 1996).

Leatherback Sea Turtle. Although leatherbacks are the most common sea turtles off the U.S. west coast (Dohl et al., 1983; Green et al., 1989; NMFS and FWS, 1998a), densities in southern California waters are still very low. It is very unlikely that routine activities associated with the proposed delineation activities would have a detectable effect on this species. Impacts on leatherback sea turtles from the Proposed Action are expected to be negligible. These impacts would be common to all units and would remain the same for all units combined.

Green Sea Turtle. Off southern California, green sea turtles are uncommon in waters north of the San Diego area (NMFS and FWS, 1998b) and are rarely seen in the vicinity of the project area (Dohl et al., 1983). No impacts on green sea turtles from the Proposed Action are expected.

Pacific Ridley Sea Turtle. As discussed in section 4.6.7, Pacific ridley sea turtles are infrequent visitors to waters north of Mexico and are unlikely to occur in the vicinity of the proposed delineation activities. No impacts on Pacific ridleys from the Proposed Action are expected.

Loggerhead Sea Turtle. Like Pacific ridleys, loggerhead sea turtles are near the northern limit of their range off southern California and are likely to be infrequent visitors to the project area (Stebbins, 1966; NMFS and FWS, 1998d). Impacts on loggerhead sea turtles from the Proposed Action are expected to be negligible. These impacts would be common to all units and would remain the same for all units combined.

5.2.9.6 CUMULATIVE IMPACT ANALYSIS FOR THREATENED AND ENDANGERED SEA TURTLES (2002-2006)

Cumulative Impacts without the Proposed Action (2002-2006): Section 5.1.2 describes the projects considered in the cumulative analysis for the proposed delineation activities. Possible sources of cumulative impacts in the project area include on-going and proposed oil and gas activities in Federal and State waters, Alaskan and foreign-import tankering, and military operations. Cumulative impacts to sea turtles may also occur from direct take on the nesting beaches and at sea, commercial fishing operations, and other anthropogenic and non-anthropogenic sources.

The projects discussed in this section include past, present, and foreseeable actions that may produce impacts during 2002-2006, the expected duration of the proposed delineation activities. Potential cumulative impacts are discussed below.

Oil and Gas Activities. Section 4.0 describes the routine offshore oil and gas activities that may result in impacts to sea turtles. These include geophysical surveys, construction, drilling and production activities with associated support activities, and the aban-

donment, or decommissioning, of wells and offshore facilities. As discussed in section 5.2.9.5, the major impact agents expected from these proposed activities are noise and disturbance. The potential use of explosives in the abandonment of wells and offshore platforms also raises the possibility of lethal impacts to sea turtles.

Noise and Disturbance. Section 5.2.9.5 discusses the potential impacts to sea turtles from routine offshore oil and gas activities, including well drilling and other development and production activities, support vessel and helicopter traffic, and well abandonment. As discussed in section 5.2.9.5, no systematic studies have been conducted on the effects of man-made noise on sea turtles, but it is assumed that noise from offshore sources could result in temporary disturbance to individual animals.

As discussed in section 5.2.8.1.2 (Mitigation MM1), implementation of mitigation similar to that employed for platform removal in the Gulf of Mexico would make it unlikely that any sea turtle injury or mortality would occur as a result of the use of explosives in decommissioning operations.

Oil Spills. No oil spills are expected to result from the Proposed Action. Section 5.1.3 discusses the cumulative oil spill risk for the project area, which results from several sources: ongoing and projected oil and gas production from existing OCS facilities in the Santa Barbara Channel and Santa Maria Basin, several proposed development projects on the Federal OCS, ongoing production from one facility in State waters in the Santa Barbara Channel, two likely oil and gas projects in State waters, and the tankering of Alaskan and foreign-import oil through area waters. As discussed in section 5.2.8.2.1, the most likely oil spill scenario is that one or more oil spills in the 50-1,000-bbl range would occur from offshore oil and gas activities over the period 2002-2006, and that such a spill would be 200 bbl or less in volume. The probability that one or more spills of this size will occur this period is 75.9 percent (table 5.1.3.1-2). The maximum reasonably foreseeable oil spill volume from offshore oil and gas activities is 2,000 bbl, assumed for purposes of analysis to be a pipeline spill. The probability of a spill of this size occurring during the period 2002-2006 is 23.3 percent (table 5.1.3.1-3). Based on data from tanker spills in U.S. waters, the mean size for a tanker spill is assumed to be 22,800 bbl (with a probability of occurrence of 99 percent for this period; table 5.1.3.1-3). The potential impacts to sea turtles in the project area from spills of each of these three sizes are discussed below.

If a sea turtle comes into direct contact with oil, a number of physiological effects may occur (Lutz, 1985; MMS, 1996). Oil spills can adversely affect sea turtles by toxic external contact, toxic ingestion or blockage of the digestive tract, disruption of salt gland function, asphyxiation, and displacement from preferred habitats (Lutz and Lutcavage, 1989; Vargo et al., 1986). Sea turtles are known to ingest oil (Gramanetz, 1988); this may occur during feeding (tar balls may be confused with food) or while attempting to clean oil from flippers. Oil ingestion frequently results in blockage of the respiratory system or digestive tract (Vargo et al., 1986). Some fractions of ingested oil may also be retained in the animal's tissues, as was detected in turtles collected after the *Ixtoc* spill in the Gulf of Mexico (Hall et al., 1983).

It is unclear whether adult sea turtles actively avoid spilled oil (MMS, 1996). In some instances, turtles have appeared to avoid oil by increasing dive times and swimming away (Maxwell, 1979; Vargo et al., 1986). Other observers have suggested that sea turtles actually may be attracted to some of the components found in crude oil (Kleerekoper and Bennett, 1976).

The low densities of sea turtles in the project area make it unlikely that any turtle would come in contact with an oil spill of 200-2,000 bbl. A 22,800-bbl tanker spill would have a greater probability of contacting sea turtles at sea, but no more than one or two animals would likely be affected. Impacts on sea turtle populations would be expected to be negligible.

Military Activities. As discussed in section 5.2.8.2, military operations that may have offshore impacts in the project area include those conducted from NAS Point Mugu and Vandenberg AFB, and the U.S. Navy's proposed deployment of the SURTASS LFA sonar system. A recent draft EIS (U.S. Navy, 2000) analyzes the potential impacts of ongoing and proposed military activities in the U.S. Navy's Point Mugu Sea Range, which occupies a broad expanse of offshore waters in the Southern California Bight and Santa Maria Basin. Navy activities in the Sea Range include vessel, aircraft, and missile operations. The EIS concludes that, given their low densities in the project area, the probability of interaction between Naval activities and sea turtles would be very low and any impacts would be less than significant. The same would likely be true of the U.S. Air Force's missile operations from Vandenberg AFB. In its final EIS for the SURTASS LFA sonar system (U.S. Navy, 2001), the U.S. Navy concludes that, given proposed mitigation and the small number of systems to be deployed worldwide, LFA operations would be unlikely to result in significant impacts to sea turtle populations at sea.

Commercial Fisheries. All four species of sea turtles are taken incidentally in commercial fisheries in both pelagic and coastal areas in the North Pacific (NMFS and FWS, 1998a-d). Leatherback sea turtles are caught in gillnets off Washington, Oregon, and California (Stick and Hreha, 1989) and have long been taken in longlines and drift nets in the central North

Pacific (NMFS, 1995; NMFS and FWS, 1998a). There is concern that the increasing numbers of Asian longline tuna vessels operating in the Pacific may have devastating cumulative impacts on this species (NMFS and FWS, 1998a).

Green, Pacific ridley, and loggerhead sea turtles are also taken in several commercial and recreational fisheries, including shrimp bottom trawls in the Gulf of California, gillnets, traps, and haul and beach seines (NMFS and FWS, 1998b-d). In other parts of the Pacific, trawls, purse seines, hook and line, longlines, and driftnets all take an unknown number of these species (NMFS and FWS, 1998b-d). Although largely undocumented, take by shrimp trawlers is probably a major mortality factor for green turtles in Mexico (Groombridge, 1982); similar take also occurs off Central America (NMFS and FWS, 1998b). Loggerhead sea turtles apparently are one of the most commonly caught sea turtles in the pelagic squid driftnet fishery (Gjernes et al., 1990; NMFS and FWS, 1998d).

Other Anthropogenic Sources of Impacts. As discussed in section 4.6.7.3, sea turtle populations have been greatly reduced by over-harvesting and, to a lesser extent, coastal development of nesting beaches in developed countries (Ross, 1982). In the Pacific, all four species continue to be subject to a number of human-related threats on their nesting grounds, including the direct take of adults and eggs, coastal construction and other beach activities, and artificial lighting (NMFS and FWS, 1998a-d; NMFS, 1999). These factors can result in direct mortality, disturbance, and loss of habitat.

Although there is no known directed take of sea turtles in U.S. waters, the harvest of sea turtles at sea in other areas is considered a widespread threat to these species that could accelerate the extinction of local and regional stocks (NMFS and FWS, 1998a-d). It is known that leatherbacks are occasionally taken off coasts of Mexico, Peru, and Chile (NMFS and FWS, 1998a) and that green sea turtles are taken illegally in Mexican waters (NMFS and FWS, 1998b).

Collisions with boats (including jetskis) are a potential threat to sea turtles, particularly in heavily populated, nearshore waters (NMFS and FWS, 1998a-d; NMFS, 1999). McDonald and Dutton (1992) reported that boat collisions were implicated in 80 percent of green sea turtle deaths recorded in San Diego and Mission Bays.

Entanglement in or ingestion of marine debris is a serious problem for sea turtles in the eastern Pacific (NMFS and FWS, 1998a-d). Sea turtles entangle in abandoned fishing gear, lines, ropes, and nets and, as a consequence, may be unable to submerge to feed or surface to breathe. Apparently mistaking them for prey, leatherbacks, greens, and the other sea turtles commonly ingest debris such as plastic bags, plastic sheets, balloons, latex products, styrofoam, six-pack rings, tarballs, and other refuse. The resulting mortalities may be due to poisoning or obstruction of the esophagus.

Construction activities such as marina and dock development projects and dredging have direct impacts on coastal green, Pacific ridley, and loggerhead sea turtle habitat in Baja and southern California (NMFS and FWS, 1998b-d). In San Diego Bay, green sea turtles may be directly killed by dredging machinery (Stinson, 1984; McDonald and Dutton, 1992). The indirect effects of these activities result from increased levels of ship traffic, pollution, and general activity.

The impacts of environmental contaminants on sea turtles are unknown, although contamination of coastal waters where species such as green and loggerhead sea turtles are likely to be found is widespread (NMFS and FWS, 1998b-d). San Diego Bay, the only identified foraging area for green sea turtles in the western U.S. (Stinson, 1984; Dutton and McDonald, 1990a, b), is heavily polluted with heavy metals and PCBs (NMFS and FWS, 1998b). PCBs are known to cause lesions and mortality in fish and invertebrates, and small lesions have been observed in green sea turtles (McDonald and Dutton, 1990). Coastal pollution may also contribute to declining productivity in algal and seagrass communities (NMFS and FWS, 1998b).

Other known anthropogenic sources of impacts to sea turtles at sea include construction blasting, dynamite "fishing," and power plant entrapment (NMFS and FWS, 1998a-d).

Non-anthropogenic Sources of Impacts. There are few data on the extent to which disease and parasites affect sea turtle populations in the wild (NMFS and FWS, 1998a-d). Fibropapilloma tumor disease is known to be widespread in the Hawaiian green sea turtle population and may be fatal (NMFS and FWS, 1998b). The disease has not been reported in the Mexican nesting population, but there are some observations of turtles with what has been described as early stages of the disease in San Diego Bay (McDonald and Dutton, 1990).

Only a few predators, including sharks and killer whales, are big enough to consume full-sized sea turtles (NMFS and FWS, 1998a-d). Off Mexico, killer whales have been observed feeding on leatherback and ridley sea turtles (NMFS and FWS, 1998a, c). Billfish attacks on green sea turtles also have been documented (Frazier et al., 1994). Predation on leatherback hatchlings by sharks is thought to be relatively high (NMFS and FWS, 1998a).

Natural phenomena may also have impacts on sea turtle populations. Storms at sea can blow migrating sea turtles off course. El Niño events may cause green, Pacific ridley, and loggerhead sea turtles to migrate northward into colder water, where they can experience cold stunning, and may also reduce food availability (NMFS and FWS, 1998a-d).

Incremental Impacts of the Proposed Action (2002-2006): As discussed in section 5.2.9.5, routine activities associated with the proposed delineation activities are expected to result in negligible impacts to sea turtles in the project area.

SUMMARY AND CONCLUSIONS (2002-2006):

Sea turtle populations in the North Pacific are under continued threat from human activities, both on their nesting beaches and at sea. Harvest of adults and eggs on the beaches, destruction of nesting habitat, and both directed and incidental take of turtles at sea appear to be the major sources of mortality.

As discussed in section 5.2.9.5, the effects of noise and disturbance generated by the Proposed Action are not expected to be significant in themselves, but will add to the cumulative noise and disturbance levels that sea turtles are exposed to in the Santa Barbara Channel and Santa Maria Basin during the period 2002-2006. However, sea turtles densities are very low in project area waters. There is no evidence that the noise and disturbance created by offshore oil and gas activities in both Federal and State waters and by increasing vessel traffic (of which oil and gas support vessels are a small part) have resulted in adverse impacts on sea turtle populations. By the impact level criteria adopted for this document (section 5.2.9), these impacts are considered to be negligible. The very minor effects in space and time projected to occur as a result of the proposed delineation activities are not expected to add measurably to cumulative impacts to sea turtles in the area.

No oil spills are expected to result from the Proposed Action. However, accidental oil spills do present an ongoing source of potential impacts to sea turtles. The cumulative risk of oil spills arises from multiple sources, including offshore oil and gas activities in Federal and State waters and both Alaskan and foreign-import tankering. The greatest oil spill risk in the project area results from tankering operations. This risk is tempered by recently implemented or proposed mitigation (such as the rerouting of tankers farther offshore along the central California coast) and, as discussed in section 5.1.3, by modern oil spill response capabilities. If an oil spill were to occur in the project area during the period 2002-2006, impacts to sea turtles would be negligible.

5.2.9.7 IMPACTS OF THE PROPOSED ACTION ON THREATENED AND ENDANGERED AMPHIBIANS

California Red-legged Frog. Since no oil spill associated with the proposed delineation activities is expected, and the proposed activities are not expected to contact land, no adverse impacts to the California red-legged frog would be expected to result from the Proposed Action.

5.2.9.8 CUMULATIVE IMPACT ANALYSIS FOR THREATENED AND ENDANGERED AMPHIBIANS (2002-2006)

Since there are no impacts from the proposed delineation drilling activities on threatened and endangered amphibians, no analysis of cumulative impacts is appropriate for the period 2002-2006. However, impacts may occur if development of the 36 undeveloped leases occurs. These impacts are discussed below in the cumulative section for 2002-2030.

5.2.9.9 IMPACTS OF THE PROPOSED ACTION ON THREATENED AND ENDANGERED FISH

Section 5.2.6.1 describes the potential impacts of the proposed action on marine fish resources in the project area. The primary impact-producing activities associated with the proposed project include delineation drilling operations with associated support activities and are common to all the units. The major impact agents expected from these proposed activities are drilling discharges, anchoring activities, and explosive abandonment of the delineation wells, if this option is used.

Tidewater goby. No adverse impacts to tidewater gobies are expected from the proposed delineation project. Tidewater gobies, which are found in shallow coastal lagoons, stream mouths and shallow areas of bays will not be impacted by effluent discharges, anchoring events, or the potential explosive removal of the delineation wells.

Steelhead Trout. No adverse impacts to steelhead trout are expected from the proposed delineation project. While steelhead trout migrate widely along the Pacific Coast, and may pass through the vicinity of the proposed delineation drilling activities, no impacts from effluent discharges, anchoring, or explosive removal of wellheads would be expected.

5.2.9.10 CUMULATIVE IMPACT ANALYSIS FOR THREATENED AND ENDANGERED FISH (2002-2006)

Since there are no impacts from the proposed delineation drilling activities on threatened and endangered fish, no analysis of cumulative impacts is appropriate for the period 2002-2006. However, impacts may occur if development of the 36 undeveloped leases occurs. These impacts are discussed below in the cumulative section for 2002-2030.

5.2.9.11 IMPACTS OF THE PROPOSED ACTION ON THREATENED AND ENDANGERED PLANTS

Because the Proposed Action does not include any onshore activities, no impacts to threatened and endangered plants are expected either for all units combined or any individual unit.

5.2.9.12 CUMULATIVE IMPACT ANALYSIS FOR THREATENED AND ENDANGERED PLANTS (2002-2006)

Since there are no impacts from the Proposed Action on threatened and endangered plants, no analysis of cumulative impacts is appropriate here. However, impacts to threatened and endangered plants could occur if development of the 36 undeveloped leases occurs. These impacts are discussed in section 6.2.9.6.

5.2.10 IMPACTS ON ESTUARINE AND WETLAND HABITATS

This section discusses impacts from the proposed project on biological resources found in estuarine and wetland habitat.

5.2.10.1 IMPACT OF THE PROPOSED ACTION ON ESTUARINE AND WETLAND HABITAT

Criteria used to assess impacts to these resources here, and in chapter 6 are:

HIGH

Impacts that result in a measurable decline in a population beyond that which can be explained by normal variability, result in a measurable change regionally in species composition, ecological function or community structure, or result in a measurable reduction in regionally important habitat are considered to be **high impacts**. These changes would be at a level, areal extent, and duration that it would be expected to place an individual species at risk, or alter the community structure or habitat on a regional scale for many years. Irreversible alteration of regionally important habitat or reduction of protected habitat would be considered high impacts.

MODERATE

Impacts that result in a measurable decline in species composition, species abundance, ecological function or community structure over several localized areas or result in alteration of locally important habitat are considered **moderate impacts**. These changes, while individually may persist for many years, are localized and cannot be detected on a population or regional level.

LOW

Impacts that result in a short-term change in species abundance or composition, a temporary loss in ecological function or community structure, a short-term disturbance or temporary loss of access to locally important habitat are considered to be **low impacts**.

In this document, high and moderate impacts are considered significant; low impacts are considered to be insignificant. Irreversible alteration of wetland habitat, because of the protection afforded it by local and State laws, is considered a high impact. The threshold for significance is determined by scientific judgement, and takes into consideration the relative importance of individual species and/or habitat.

5.2.10.1.1 IMPACTS COMMON TO ALL UNITS

There are no identified impacts to wetlands from the Proposed Action.

5.2.10.2 CUMULATIVE IMPACT ANALYSIS FOR ESTUARINE AND WETLAND RESOURCES

The following cumulative impact analysis section contains two separate analyses: 1) An analysis of cumulative impacts which would be additive to the impacts described as occurring for the proposed projects which occur between 2002-2006, and 2) An analysis of all of the cumulative impacts associated with the potential future development of the 36 Undeveloped OCS leases, with a total project life estimated as being 2002-2030.

5.2.10.2.1CUMULATIVE IMPACTS (2002-2006)

Since there are no impacts from the Proposed Action on this resource, no analysis of cumulative impacts is appropriate here. However, impacts to this resource could occur if development of the 36 undeveloped leases occurs. These impacts are discussed later in the cumulative section for 2002-2030.

5.2.11 IMPACTS ON REFUGES, PRESERVES, AND MARINE SANCTUARIES

Impacts to refuges, preserves, and marine sanctuaries occur when their resources are affected. Impacts to these resources may be found in section 5.2.1 through section 5.2.23, where appropriate. The impacts to the biological resources of the Channel Islands and Monterey Bay National Marine Sanctuary and the Channel Islands National Park are summarized in table 5.2.11-1.

Table 5.2.11-1. Summary of impacts of the Proposed Action to the biological resources of Channel Islands and Monterey Bay National Marine Sanctuaries and the Channel Islands National Park.

Resource	Impacts
Rocky and Sandy Beach Habitats	No impacts are expected to occur to these resources from the proposed action. See section 5.2.3.
Seafloor Resources	No impacts are expected to these resources because activities associated with the proposed action will not occur within sanctuary or park boundaries. See section 5.2.4.
Kelp Beds	No impacts are expected to these resources because activities associated with the proposed action will not occur within sanctuary or park boundaries. See section 5.2.5.
Fish Resources	Although activities associated with the proposed action will not occur within sanctuary or park boundaries, fish can be highly mobile and may move in and out of these areas. Impacts to fish resources are expected to range from negligible to low. See section 5.2.5.
Marine and Coastal Birds	No impacts are expected to occur to these resources from the proposed action. See section 5.2.7.
Marine Mammals	Although activities associated with the proposed action will not occur within sanctuary or park boundaries, marine mammals are highly mobile and may move in and out of these areas. Impacts to marine mammals are expected to range from negligible to low. See section 5.2.8.
Threatened and Endangered Species	Although activities associated with the proposed action will not occur within sanctuary or park boundaries, many of these species are highly mobile and may move in and out of these areas. Impacts to threatened and endangered species range from none to low. See section 5.2.9.
Estuaries and Wetlands	No impacts are expected to occur to these resources from the proposed action. See section 5.2.10.
Onshore Biological Resources	No impacts are expected to occur to these resources from the proposed action. See section 5.2.12.

5.2.12 IMPACTS ON ONSHORE BIOLOGICAL RESOURCES

This section analyzes the impacts of the proposed project on onshore biological resources. The biological resources of the onshore project area are described in section 4.6.10. Information used in preparing this section includes the Point Pedernales Project Environmental Impact Report/Statement (A.D. Little, 1985), the San Miguel Project Environmental Impact Report/ Statement (URS, 1986), and the Draft North County Siting Study (County Santa Barbara, 2000). Onshore biological resources may be vulnerable to several impacts associated with offshore oil and gas development including onshore pipeline and processing facility construction and accidental onshore oil spills. Although there are no onshore activities planned for these proposed projects, the development of the 36 undeveloped leases, if it occurs, would involve onshore activities. These potential onshore activities are described in section 5.1.2.

In preparation for this analysis, the following impact level definitions were developed:

HIGH

Impacts that result in a measurable decline in a population beyond that which can be explained by normal variability, result in a measurable change regionally in species composition, ecological function or community structure, or result in a measurable reduction in regionally important habitat are considered to be high impacts. These changes would be at a level, areal extent and duration that it would be expected to place an individual species at risk, or alter the community structure or habitat on a regional scale for many years. Irreversible alteration of regionally important habitat or reduction of protected habitat would be considered high impacts.

MODERATE

Impacts that result in a measurable decline in species composition, species abundance, ecological function or community structure over several localized areas or result in alteration of locally important habitat are considered moderate impacts. These changes, while individually may persist for many years, are localized and cannot be detected on a population or regional level.

LOW

Impacts that result in a short-term change in species abundance or composition, a temporary loss in ecological function or community structure, a short-term disturbance or temporary loss of access to locally important habitat are considered to be low impacts.

For the purposes of this document, high and moderate impacts are considered to be significant, while low impacts are insignificant.

5.2.12.1 IMPACTS OF THE PROPOSED ACTION TO ONSHORE BIOLOGICAL RESOURCES

The proposed projects do not entail any onshore activities, and therefore, no impacts to onshore biological resources are expected.

5.2.12.1.1 SUMMARY OF IMPACTS AND CONCLUSION

No impacts to onshore biological resources are expected as a result of operations associated with these projects, either for all units combined or any individual unit.

5.2.12.2 CUMULATIVE IMPACT ANALYSIS FOR ONSHORE BIOLOGICAL RESOURCES (2002-2006)

Since there are no impacts from the Proposed Action to onshore biological resources, no analysis of cumulative impacts is appropriate here. However, impacts to this resource could occur if development of the 36 undeveloped leases occurs. These impacts are discussed in section 6.2.12.

5.2.13 IMPACTS ON CULTURAL RESOURCES

This section explains what actions may constitute a significant level of impact to cultural resources (archaeological and Native American concerns regarding traditional cultural resources) under various laws and regulations discussed in section 4.7. It also analyzes project-related and cumulative impacts from the Proposed Action in the time period from 2002 to 2006. For cumulative impacts related to the hypothetical development scenario in the period 2002 to 2030, please see section 6.2.13.

What is a significant level of impact?

A significant archaeological resource is one that meets the published criteria of

- the National Register of Historic Places
- California Environmental Quality Act, Appendix K

- Shipwreck and Historic Maritime Resources Program administered by the State Lands Commission

Any impact to a significant archaeological resource is considered a high level of impact. In other words, although a bit of a tautology, any impact to a significant archaeological resource is a significant impact, there is no moderate or low impact to a significant resource. This relationship between resource significance and impact significance is explained by the matrix, table 5.2.13-1.

Therefore, significant impacts to archaeological resources occur when the integrity of a significant or potentially significant site is eliminated or reduced.

How is an archaeological resource's significance determined?

A resource's significance is determined with reference to the following criteria that establish its eligibility for the National Register of Historic Places.

- Associated with events that have made a significant contribution to the broad patterns of our history.
- Associated with lives of persons significant in our past.
- Embody the distinctive characteristics of a type, period or method of construction, or that represent work of a master, or possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.
- Have yielded, or may be likely to yield, information important in prehistory or history.

Under the California Environment Quality Act guidelines (Appendix K), an archaeological resource is important if it is "unique" or "important" by meeting one of the following criteria:

- Associated with an event or person of recognized significance in California or American History or recognized scientific importance in prehistory.
- Can provide information that is both of demonstrable public interest and is useful in addressing scientifically consequential and reasonable or archaeological research questions.
- Has special or particular quality such as oldest, best example, largest, or last surviving example of its kind.
- Is at least 100 years old and possesses substantial stratigraphic integrity.
- Involves important research questions that historical research has shown can be answered only with archaeological methods.

The Shipwreck and Historic Maritime Resources Program administered by the California State Lands Commission defines "submerged archaeological site" and "submerged historic resource." The definition includes any

- submerged object, structure, building, watercraft or vessel and any associated cargo, armament, tackle, fixture, human remains or remnant, or
- Any site, area, person, or place, which is historically or archaeologically significant in prehistory or history or exploration, settlement, engineering, commerce, militarism, recreation or culture of California and which is partially or wholly embedded in or resting on State submerged or tidal lands.

The archaeological or historic significance of a site is determined by reference to its eligibility for the National Register of Historic Places. Any submerged archaeological site or submerged historic resource remaining in State waters more than 50 years is presumed to be archaeologically or historically significant. Hence, table 4.7.4.2-2 lists wrecks that have only occurred in the more than 40 years ago (to allow for project timing through 2006).

Table 5.2.13-1. Definition of significance and impact for cultural resources.

		Is the site or resource "significant"?	
		Yes	No
Is there impact to the site or resource?	Yes	Significant Impact	Insignificant Impact
	No	No impact	No impact

5.2.13.1 IMPACTS OF THE PROPOSED ACTION ON ARCHAEOLOGICAL RESOURCES

Impacts to archaeological resources may occur in an "area of operations" defined as the geographic area within which direct effects and indirect effects take place. (The "area of operations" is the same as the "area of potential effects.) Direct effects include those operations and activities, such as anchor placement, that may affect the physical integrity of bottom-founded archaeological resources. Indirect effects include long-term disturbances that interfere with the detection of the resource by remote sensing instruments, such as deposition of ferromagnetic materials that could "mask" detection of an archaeological resource by a magnetometer. Impacts may result from accidents including oil spills and oil spill cleanup.

Two conditions must be present to have a direct impact to an archaeological resource. First, an operation must physically disturb the bottom. Second, the resource must be present in the area disturbed.

The following operations may cause physical disturbance to the bottom:

- **Anchoring**. The most likely potential source of disturbance comes from anchor deployment and recovery operations for the MODU, barge, and support vessels. The MODU typically deploys eight, 45,000-pound anchors, two from each corner of the rig, placed at predetermined locations varying distances from the rig based on water depth. Anchor scope, the ratio distance at which the anchors are set from the rig to the depth of the exploration well location, varies from unit to unit. In anchoring the MODU, an anchor tender boat motors away from the rig running the anchor chain out to the required length. Approximately half way to the anchor location, the tender begins to lower the anchor on a work wire while continuing toward the final anchor location. Finally, the anchor is lowered to the seafloor and the appropriate tension is placed on the chain. Support vessel and barge anchoring may also act as the source of impacts.
- **Delineation Drilling**. Another potential source of disturbance results from delineation drilling operations, including setting down the guide base, setting casing, and drilling; and from abandonment operations including cutting the casing and removing guide base. These disturbances occur in the immediate vicinity of the MODU, well within the area of direct effects from MODU anchoring.
- **Pilferage.** Finally, a potential, although rare, source of direct disturbance is the unauthorized recovery of objects by divers or other personnel.

Impacts Common to All Units: Since archaeological impacts are site specific, no impacts common to all units are anticipated.

IMPACTS UNIQUE TO EACH UNIT:

Bonito Unit. According to data furnished by the operator, the MODU anchors will be deployed in a 3,000-foot radius around the vessel. Delineation drilling operations described above will take place at one or two locations on the Unit. As noted by table 4.7.4.1-1, no vessels have been reported as lost on the leases nor has any resource site been detected on the lease by analysis of geophysical hazard survey data. A Fisherman's Contingency Fund Claim for gear loss due to unknown causes (which may indicate a potential cultural resource site) was reported on OCS-P-0500, at a location well outside the area of operations.

Point Sal Unit. According to data furnished by the operator, the MODU anchors will be deployed between 1,100 to1,900 feet around the vessel. Delineation drilling operations described above will take place on the Unit at a single location. As noted by table 4.7.4.1-1, a prior remote sensing survey and report for lease OCS-P-0416 revealed indication of potential archaeological resource sites. Additional data analysis and survey have been ordered for the area of operations to identify any sites that need to be avoided. The southeast portion of lease OCS-P-0422 may contain a relict lagoon, estuary, or embayment and potential prehistoric resource sites. This area would be unaffected by operations. No vessel is listed as being lost on the leases. As noted by table 4.7.4.1-1, no vessels have been reported as lost within the Unit.

Purisima Point Unit. According to data furnished by the operator, the MODU anchors will be deployed between 1,100 to 1,900 feet around the vessel. Delineation drilling operations described above will take place on the Unit at a single location. As noted by table 4.7.4.1-1, a prior remote sensing survey and report for lease OCS-P-0432 revealed indication of potential archaeological resource sites. Additional data analysis and survey have been ordered for the area of operations to identify any sites that need to be avoided. As noted by table 4.7.4.1-1, no vessels have been reported as lost within the Unit.

Gato Canyon Unit. According to data furnished by the operator, the MODU anchors will be deployed between 2,500 to 3,500 feet around the vessel. Delineation drilling operations described above will take place on the Unit at a single location. As noted by table 4.7.4.1-1, no vessels have been reported as lost

within the Unit. A Fisherman's Contingency Fund Claim for gear loss due to unknown causes (which may indicate a potential cultural resource site) was reported on OCS-P-0462 and -0464, at a location well outside the area of operations. Additional data analysis and survey have been ordered for the area of operations to identify any sites that need to be avoided.

Impact Analysis from Accidents: Indirect impacts may result by the accidental deposition of ferro-magnetic debris on the seafloor that would mask the detection of potential archaeological resources by remote sensing instruments. Accidents are not anticipated to cause unique impact to cultural resources on any unit.

5.2.13.1.2 SUMMARY OF IMPACTS AND CONCLUSIONS

No known or suspected cultural resources are within the area that could be affected by proposed operations from the project, including anchoring and drilling. Therefore, there is no impact to any single unit or all units.

5.2.13.1.3 MITIGATION MEASURES FOR IMPACTS FROM THE PROPOSED ACTION

Federal regulations require certain actions on the part of operators to protect archaeological resources. Prior to start of operations, the preferred mitigation is to move or modify operations so there is no effect to known significant archaeological resources or to anomalies or geomorphic features that may represent areas containing archaeological resources. Alternatively, the operator may conduct additional investigations and submit a report to establish to the satisfaction of the MMS, the State Historic Preservation Office (SHPO), and others that an archaeological resource is or is not present or will not be adversely affected by operations. The investigation is conducted by an archeologist and geophysicist using survey equipment and techniques identified by the MMS. MMS will inform the operator of any mitigating measures necessary to alleviate or minimize the potential effects on significant archaeological resources, such as data recovery and artifact curation. After start up, if any archeological resource is discovered, the operator must immediately halt operations in the area of the discovery and inform the MMS POCS Regional Director. If further investigation determines that the resource is significant, MMS will inform the operator on how to protect the resource.

Cultural Resources 1. Operator Briefing. Prior to start of operations, brief the operator of the requirement to avoid known resource sites and the provisions regarding discovery of a site after operations commence.

5.2.13.2 CUMULATIVE IMPACT ANALYSIS FOR CULTURAL RESOURCES

5.2.13.2.1 CUMULATIVE IMPACTS (2002 TO 2006)

Cumulative Impacts Without the Proposed Action (2002 to 2006): Without the proposal, physical disturbance caused by non-OCS development activities will be the source of cumulative impacts to submerged sites and upland sites. These sources include installation of seafloor cables, construction of sewage treatment infrastructure, commercial trawl fishing, anchoring, dredging, and unauthorized removal of artifacts by recreational scuba divers. Onshore, cumulative impacts may occur from a full range of construction activities and pilferage. Natural processes, such as shoreline erosion, also contribute to the destruction of cultural resources. Because of stringent monitoring and mitigation of local, State, and Federal agencies for actions that may affect cultural resources, permitted actions are likely to cause little cumulative impact.

Because of the nature of clean-up operations, oil spill related impacts are not expected offshore. Onshore, archaeological sites could be affected by oil spills from OCS production or non-OCS tankering and associated containment and cleanup activities. Oil spills could alter the chemical composition of archaeological materials and render them useless for carbon-14 dating. Oil-soaked soils would also be difficult to excavate and process. Oil spill containment and cleanup activities could result in extensive impacts to site deposits from the excavation of containment barriers (dams, berms, and trenches) and the mechanized removal of oil-soaked earth.

Since there are no impact from the Proposed Action on cultural resources, no analysis of cumulative impacts is appropriate here.

5.2.13.3 NATIVE AMERICAN CONCERNS

Native Americans are concerned with any project or alteration to the area, which may cause a change to their way of life, with any condition, which may be considered as an intrusion into the spiritual nature of the area, or with any project which may impact prehistoric archaeological sites. The main impacting agents to Native American concerns in regards to the Proposed Action are offshore structures, onshore facilities, and oil spills. Please see the more extensive discussion of Native American concerns in the Cultural Resources Affected Environment Section.

Impact level definitions used in this analysis are as follows, with significant impacts being moderate and high.

HIGH

Religious or ceremonial sites unusable for more than a year, or gathering sites contaminated with one or two important subsistence or traditional use resources becoming locally unavailable for 1 to 2 years.

MODERATE

Religious or ceremonial sites are disturbed, or a gathering site disturbed with one or more important subsistence or traditional resources becoming locally unavailable for less than a year.

LOW

Structures are located within the viewshed of major religious or ceremonial sites, or gathering sites disturbed with subsistence resources being affected for a period of less than one year, but no resource would become unavailable.

5.2.13.3.1 IMPACTS OF THE PROPOSED ACTION ON NATIVE AMERICAN CONCERNS

Project impacts occur from the MODU being located within the viewshed of major religious or ceremonial sites, such as the site at Point Conception—a site that consulting archaeologists have identified as being eligible for inclusion in the National Register as a traditional cultural property. This section analyzes project-related and cumulative impacts from the Proposed Action in the time period from 2002 to 2006. For cumulative impacts related to the hypothetical development scenario in the period 2002 to 2030, please see section 6.2.13.

IMPACTS COMMON TO ALL UNITS:

No impacts have been identified as being common to all units.

IMPACTS UNIQUE TO EACH UNIT:

Bonito Unit. The MODU is anticipated to be on the Unit for between 90 and 180 days from the end of March through October of 2002. The wells will be sited at up to two of locations. (The MODU would be at each of the two sites for up to 90 days.) The result is a low level of impact.

Significance criteria for this resource area are broader than for general visual resource impact. For Native American concerns, the impact occurs if the structure is within the viewshed of the site. The MODU will be within the viewshed of Point Conception, However, as discussed in the Visual Resources section, since the MODU visual impact resource area does not cross the coastline, there will be no impact to visual resources.

Under the above impact criteria, for the MODU to create a moderate or high impact to the site, the drilling unit would have to create a "disturbance" or render the site "unusable" for a year. These effects may be analyzed with reference to National Register Bulletin 38, Guidelines for Evaluating and Documenting Traditional Cultural Properties (Parker and King, 2001). Does presence of the MODU make the site ineligible? At the time the evaluation was made as to the site's potential eligibility, offshore oil and gas structures from the Point Arguello field were (and still are) visible from Point Conception. As such, their presence did not affect the integrity of relationship or integrity of condition that must be present for a site to be considered eligible.

Bulletin 36 notes "in order to be eligible for inclusion in the Register, a property must have 'integrity of location, design, setting, materials, workmanship, feeling, and association'. In the case of a traditional cultural property, there are two fundamental questions to ask about integrity. First, does the property have an integral relationship to traditional cultural practices or beliefs; and second, is the condition of the property such that the relevant relationships survive? "

"Assessing the integrity of the relationship between a property and the beliefs or practices that may give it significance involves developing some understanding about how the group that holds the beliefs or carries out the practices is likely to view the property. If the property is known or likely to be regarded by a traditional cultural group as important in the retention or transmittal of a belief, or to the performance of a practice, the property can be taken to have an integral relationship with the belief or practice, and vice-versa" (Parker and King, 2001).

The proposed project does not appear to alter this integral relationship to cultural practices or beliefs.

For the second criterion, the bulletin notes, "like any other kind of historic property, a property that once had traditional cultural significance can lose such significance through physical alteration of its location, setting, design, or materials. In some cases a traditional cultural property can also lose its significance through alteration of its setting or environment . . . . A property may retain its traditional cultural significance even though it has been substantially modified, however. Cultural values are dynamic, and can sometimes accommodate a good deal of change…. The integrity of a possible traditional cultural property must be considered with reference to the views of traditional

practitioners; if its integrity has not been lost in their eyes, it probably has sufficient integrity to justify further evaluation" (Parker and King, 2001).

Concern over the past, current, and potential development on Point Conception and the effect that development may have on the qualities of the site have been expressed and are of an ongoing concern to some Chumash people (Khus-Zarate 1998). This project will have a temporary, low impact and it does not appear to affect the integrity required by the second criterion.

5.2.13.1.2 SUMMARY OF IMPACTS AND CONCLUSIONS

The MODU will have a temporary, low impact to the traditional cultural properties value of the Point Conception site.

5.2.13.3.1.3 MITIGATION MEASURES FOR IMPACTS FROM THE PROPOSED ACTION

No project-related mitigation measures have been identified.

5.2.13.3.2 CUMULATIVE IMPACT ANALYSIS FOR NATIVE AMERICAN CONCERNS

Cumulative impacts discussed below are in addition to those listed above for archaeological resources. Impacts to pre-historic archaeological sites, even those not considered significant, are a particularly acute concern to Native Americans.

5.2.13.3.2.1 CUMULATIVE IMPACTS (2002 TO 2006)

Cumulative Impacts Without the Proposed Action (2002 to 2006): Without the proposal, impacts will come from further non-OCS related development in the Point Conception area. Expanded commercial space launch activity has been cited as an activity of concern.

The impact of an OCS production oil spill or non-OCS tanker spill would be site specific. However, if traditional use resources were affected by the oil spill, the impact could be of moderate to high significance if the resources are present and become locally unavailable for a period of time. The effect of a spill on the values ascribed by the Chumash to Point Conception have not been evaluated at this time, but will be addressed in on-going consultation. These impacts are in addition to those described above for archaeological resources, which are also of great concern to Native Americans. Native American monitoring of clean up activities is also an issue of concern. These issues were apparent during the Avila Beach spill in 1992 when access to areas by clean-up crews could have impacted sensitive archaeological areas including burials (MMS 1993).

Incremental Impacts of the Proposed Action (2002 to 2006): For the period of time the MODU is on the Bonito Unit, it is within the viewshed with existing offshore oil and gas platforms of Point Conception. The result is a low level of impact.

Summary and Conclusion (2002 to 2006): Non-OCS cumulative impacts include effects of potential expansion of commercial launches at Vandenberg AFB and an oil spill from any sources. For the period of time the MODU is on the Bonito Unit, it is within the viewshed with existing offshore oil and gas platforms of Point Conception. The result is a low level of impact.

Potential Mitigation Measures for Cumulative Impacts: In past projects, moderate to high impacts have been successfully mitigated by local, State, and Federal regulations and mitigation measures. These measures are presumed to be part of the project. No additional measures have been identified.

5.2.14 IMPACTS ON VISUAL RESOURCES

Impacts to visual resources result from the presence of the MODU within an area that is in view of the public. Based on a similar project in State waters (Continental Shelf Associates, 1995), the issue is to what extent the project might affect visual receptors. Generally, the analysis assumes that the area of impact, the visual resource impact area, extends 8 kilometers (5 miles) from the MODU location. This radius of the VRIA defines the limit of the visual resources impact area because at this distance

(1) it is generally said that details of large objects, such as the MODU, are too small to be distinguished;

(2) such large objects tend to become silhouettes; and

(3) at this distance such objects tend to become part of the background and appear to the observer to be less obtrusive.

This definition is subjective and individual perceptions differ. However, there is general agreement that increased industrial development in a scenic natural environment results in the degradation of the relatively undeveloped seascapes. Also, it applies to only mobile units. The size and longevity or OCS production platforms and other infrastructure requires a more sophisticated methodology for examining project-related effects of these structures compared to the MODU. Please refer to the visual resources section of previous offshore development environmental impact statements for a description of this methodology that examines effects using the dimensions of visual character, visual sensitivity, and visual quality. These reports, whose geographic scope for visual resources overlap, include the northern Santa Maria Basin (URS 1986); the central Santa Maria Basin (Arthur D. Little 1985); the southern Santa Maria Basin (Arthur D. Little 1986); and the western Santa Barbara Channel (U.S. Geological Survey 1974, Science Application Inc. 1984, SLC 1992).

While the VRIA is used to assess direct project impacts from the MODU, evaluation of the cumulative effects of the MODU emplacement requires a slightly modified methodology. The cumulative effect of the MODU must be considered in light of a possible existing significant-but-mitigated impacts from existing production facilities.

This section analyzes project-related and cumulative impacts from the Proposed Action in the time period from 2002 to 2006. For cumulative impacts related to the hypothetical development scenario in the period 2002 to 2030, please see section 6.2.14

5.2.14.1 IMPACTS OF THE PROPOSED ACTION ON VISUAL RESOURCES

The visual impacts from delineation drilling will be dependent on the level of public access to area, the length of time the MODU is on the unit, and the degree to which the MODU presents a degree of change inconsistent with the existing viewshed. The following criteria classify the visual impacts from the MODU.

HIGH

For project impacts, the VRIA encompasses major public viewing areas during the highest use period (Memorial Day through Labor Day). For cumulative impacts, the MODU expands the area of existing visual impacts from major public viewing areas due to offshore development during the highest use period (Memorial Day through Labor Day).

MEDIUM

For project impacts, the VRIA encompasses major public viewing areas during moderate use period (generally, April through Memorial Day and Labor Day through October). For cumulative impacts, the MODU expands the area of existing visual impacts from major public viewing areas due to offshore development viewing areas during the moderate use period (generally, April through Memorial Day and Labor Day through October).

LOW

For project level impacts, the VRIA encompasses areas of public viewing during the non-peak season (November, December, January, February, March). For cumulative impacts, the MODU expands the area of existing visual impacts from major public viewing areas due to offshore development during the viewing during the non-peak season (November, December, January, February, March).

NEGLIGIBLE

For project level impacts, the VRIA does not encompass major public viewing areas. For cumulative impacts, the MODU does not expand the area of existing visual effects from offshore development.

Impacts classified as medium or high are considered significant impacts. Impacts classified as low are considered adverse, but not significant. Since the MODU is on a particular site for a short period of time, direct project impacts and cumulative effects from MODU operations are considered local.

IMPACTS COMMON TO ALL UNITS

Since the visual impacts of the MODU are location specific, no impacts common to all units have been identified.

IMPACTS UNIQUE TO EACH UNIT:

Bonito Unit. The MODU is anticipated to be on the Unit for between 90 and 180 days starting in the third quarter of 2002. The wells will be sited at up to two of four locations indicated on figure 5.2.14.1-1. (The MODU would be at each of the two sites for up to 90 days.) As illustrated in figure 5.2.14.1-1, an 8 km (5 mi) arc from each potential drill location defines the visual resources impact area, VRIA.

Visual resource impact is negligible since the VRIA does not cross the coastline (at its closest point, the VRIA boundary is approximately 6 km from Point Arguello). The MODU will be visible for a short period of time in an area not readily accessible to the public. The offers limited public access. Visibility is often reduced because of meteorological conditions.

Point Sal Unit. The MODU is anticipated to be on the Unit for approximately 68 days starting in the fourth quarter 2002. The single well will be sited at one of three locations indicated on figure 5.2.14.1-2, with the preferred location at the northwest corner of the unit. As illustrated in figure 5.2.14.1-2, an 8 km (5 mi) arc from each potential drill location defines the VRIA.

Visual resource impact is negligible since the VRIA does not cross the coastline (at its closest point, the VRIA boundary is approximately 2.5 km from Pt. Sal). The MODU will be visible for a short period of time during the off-peak tourism season. (In 2000, Point Sal State Park was closed to visitors.) The area offers limited public access. Visibility is often reduced because of meteorological conditions.

Purisima Point Unit. The MODU is expected to be on the Unit for approximately 68 days starting in the first quarter of 2003. The single well will be sited at the location indicated on figure 5.2.14.1-2. As illustrated in figure 5.2.14.1-2, an 8 km (5 mi) arc from the drilling location defines the VRIA.

Visual resource impact is negligible since the VRIA does not cross the coastline (at its closest point, the VRIA boundary is approximately 3.5 km seaward of Purisima Point), there is limited public access to the area at Jalama Beach County Park and the Southern Pacific Railroad line, the MODU will only be on station for a short period during the off-peak tourism season.

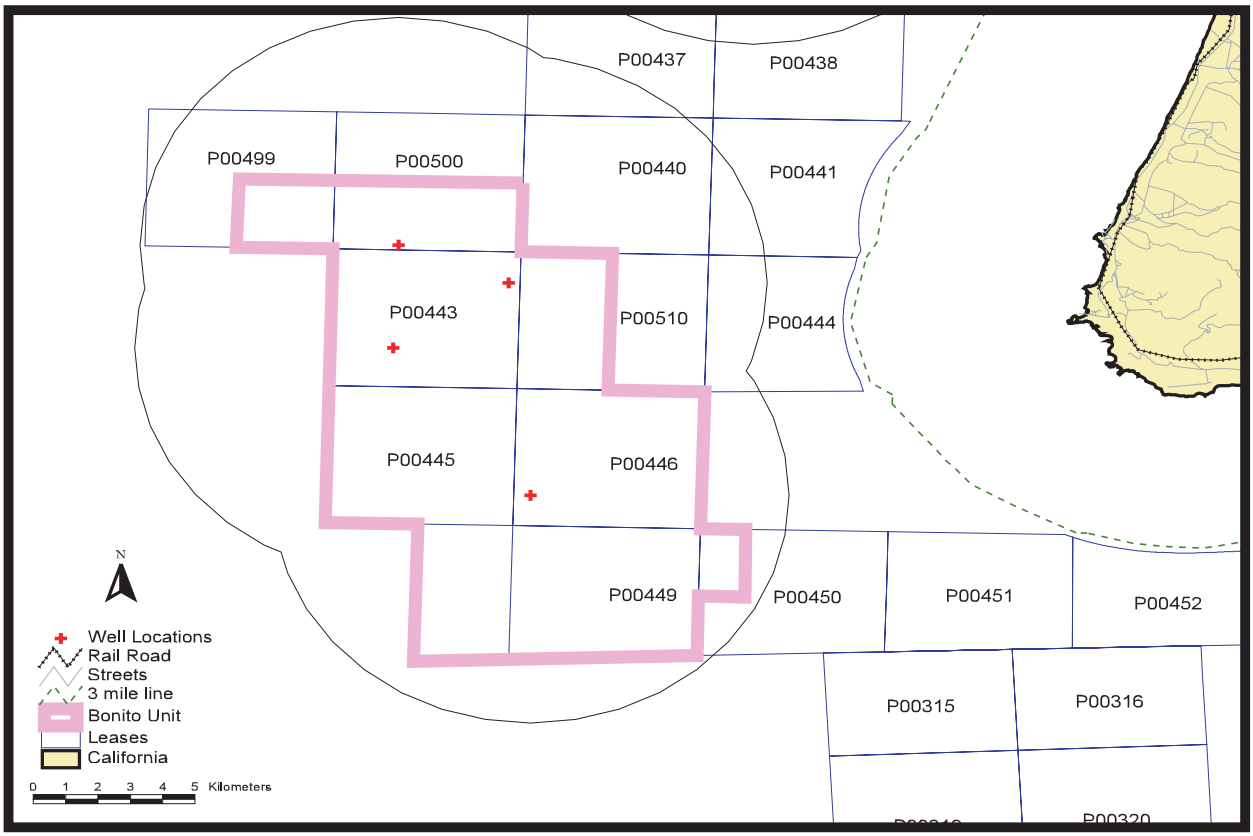

Figure 5.2.14.1-1. Bonito Unit visual resources impact area.

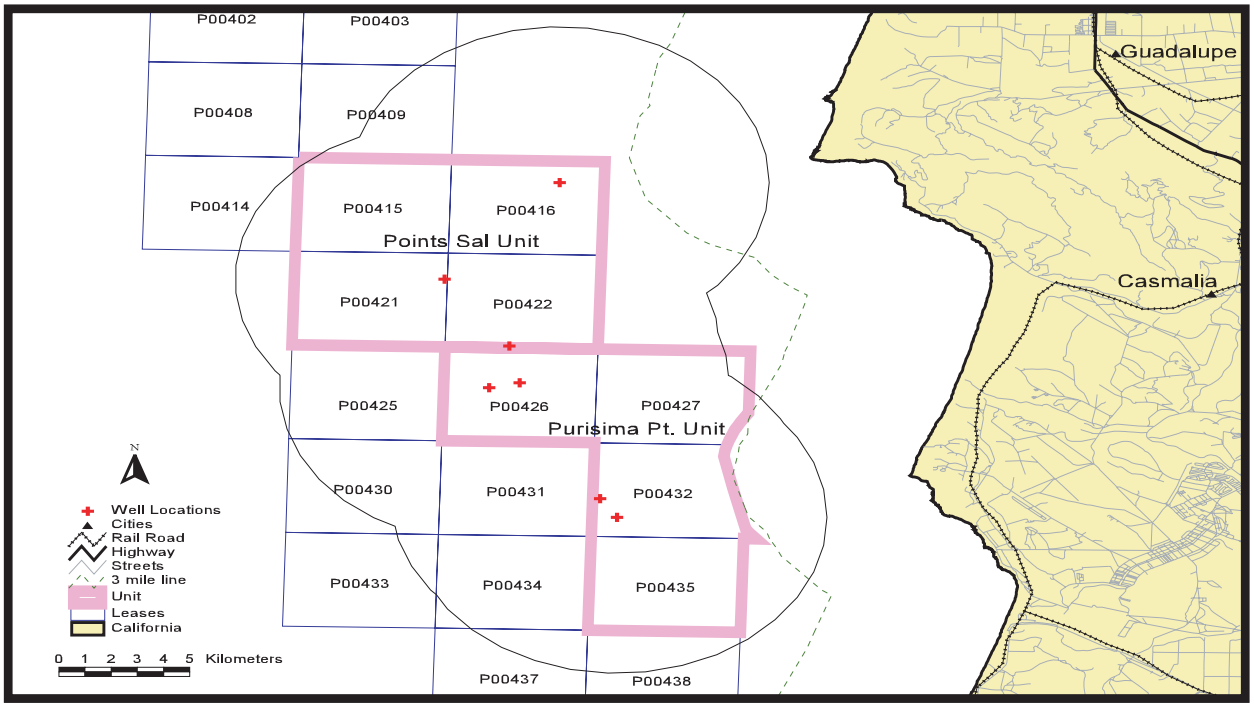

Figure 5.2.14.1-2. Purisima Point and Point Sal Unit visual resource impact area.

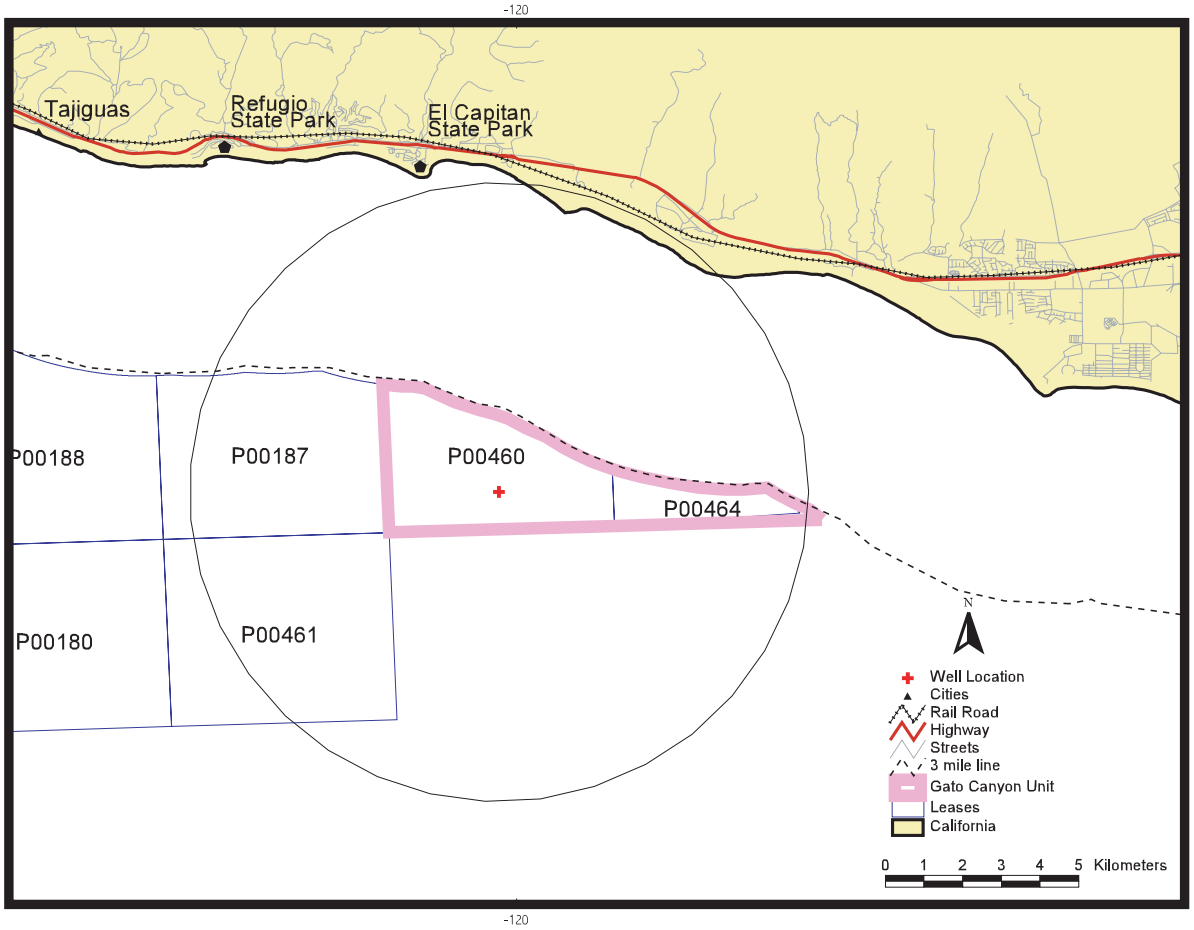

Figure 5.2.14.1-3. Gato Canyon Unit visual resource impact area

Gato Canyon Unit. The MODU is expected to be on the Unit for approximately 92 days starting in the second quarter of 2003. The single well will be sited at the location indicated on figure 5.2.14.1-3. As illustrated in figure 5.2.14.1-3, an 8 km (5 mi) arc from the drill location defines the VRIA.

Visual resource impact is negligible. The VRIA boundary extends less than 0.5 km inland from the coastline in the area east of El Capitan State Beach, and Highway 101 and the Southern Pacific Railroad tracks. The VRIA does not, however, encompass these areas, which offers the only public access in the area. While the MODU will be on station for a short period of time during the peak recreation and tourism use, possibly during the period of most intense use, the prevalent public view areas will be outside the VRIA. In general, the area has a history of intensive onshore and offshore development. As such, the MODU, while it adds a visual element to the seascape, is not inconsistent with other elements in the viewshed..

5.2.14.1.1 SUMMARY AND CONCLUSION

The effect of the Proposed Action on visual resources is negligible on each of the four Units. The VRIA either does not cross the shoreline on three of the four units (Pt. Sal, Purisima Point, and Bonito). Furthermore, on these units, meteorological conditions will generally obscure the MODU visibility from a shoreline that offers little public access. The VRIA from the Gato Canyon Unit drill site does cross the shoreline for a short distance in the vicinity of El Capitan State Beach, but does not encompass public viewing areas. Although, present during a potion of the peak tourism and recreation season (the time of most intense viewing), no direct project impact results since the public viewing area is outside the VRIA.

5.2.14.1.2 MITIGATION MEASURES FOR IMPACT FROM THE PROPOSED ACTION.

None identified.

5.2.14.2 CUMULATIVE IMPACTS FOR VISUAL RESOURCES

The visual impact of offshore production structures and onshore processing facilities has been a major concern of the public since the inception of offshore oil development more than a century ago (Lima1994; MMS 1996). A number of strategies developed to address visual impacts from drilling on state offshore leases including restrictions on where development would be permitted, technology that would be used for development (platforms, subsea completions, slant drilling from upland locations), and the location of onshore facilities. In 1967, to minimize the number of onshore processing plants, Santa Barbara County developed criteria for the siting of consolidated onshore processing facilities. These criteria were eventually crafted into zoning ordinances requiring the use of consolidated facilities for the processing of offshore oil and gas (Lima, 1997).

5.2.14.2.1 CUMULATIVE IMPACTS (2002 TO 2006)

This section examines the cumulative impacts to visual resources from the Proposed Action using the criteria specified above, which are different than the criteria for project-related impacts.

Cumulative Impacts Without the Proposed Action (2002 to 2006): Cumulative impacts are unchanged from current conditions without the proposal. No additional new offshore structures will be placed in the area from other projects and no change is anticipated to existing offshore infrastructure.

INCREMENTAL IMPACTS OF THE PROPOSED ACTION (2002 TO 2006):

Gato Canyon Unit. While not resulting in any direct project impacts, MODU placement on the Unit expands an already significant-but-currently mitigated visual impact from the Santa Ynez Unit platforms by placing an additional offshore structure into the viewshed. (See discussion under cumulative effect below.) The placement of the MODU will expand the "cluster" of offshore structure eastward in closer proximity to El Capitan State Park, the major public use viewing point in the area. Placement of the MODU will also result from the infrastructure being viewed along a greater distance of the transportation corridor of Highway 101 and the Southern Pacific Rail Road. As a result, for the time that the MODU is on the Unit, it will result in a moderate to high cumulative visual impact even though it does not result in a project impact.

Bonito, Purisima Point, Point Sal and Combined Units. As noted above, the effect on visual resources of the MODU on all but one Unit is insignificant. The VRIA for the MODU does not overlap with any existing offshore infrastructure seen from a public viewing area. As a result, the project results in no new cumulative impacts to visual resources for any single Unit.

Summary and Conclusion (2002 to 2006): The MODU on the Gato Canyon Unit results in a moderate to high cumulative impact to visual resources. This impact will last as long as the MODU is

on the Unit. The MODU on the Bonito, Purisima Point, or Point Sal Unit will not result in a cumulative impact to visual resources.

Potential Mitigation Measures for Cumulative Impacts: Since the 1980s, operators of the Santa Ynez Unit, the Point Arguello Unit, and the Point Pedernales Unit have made payments to the Coastal Resources Enhancement Fund, which provides enhancement projects that will compensate for residual impacts to coastal resources that are not otherwise mitigated. Santa Barbara County Findings of Approval for past offshore oil and gas projects in Santa Barbara County have found adverse project and cumulative impacts to recreation, tourism, and aesthetics, from construction and operation of the project. To mitigate general, diffused, project and cumulative impacts in these and other areas, Santa Barbara County created a Coastal Resources Enhancement Fund which receives annual payments over the life of the project to be used for projects that enhance coastal recreation, aesthetic, tourism, or other environmentally sensitive resources (SBC, 1993).

Visual Resources-1. Placement During Non-Peak Use Time. Conducting delineation drilling operations from the MODU on Gato Canyon during non-peak times will reduce the level of impact.

5.2.15 IMPACTS ON RECREATION

Generally, impacts to coastal and beach recreation and associated tourism from offshore development that may result from the following:

1. temporary effects from offshore development activity such as use of campground facilities by construction crews, change in use patterns from the activity, or beach or campground closures due to offshore to onshore pipeline construction.

2. long-term effects from the presence of onshore infrastructure such as processing facilities and offshore oil platforms that may change use patterns.

3. temporary and long-term effects of an oil spill that may change use patterns.

As explained below, project impacts from the MODU will fall into the first category, while cumulative effects will fall into all three categories.

While related to recreation, separate sections analyze effects from the project on recreational fishing, visual resources, and community resources and tourism.

Significance criteria and mitigation to analyze the impact to recreation have been developed for coastal energy projects in the region (Arthur D. Little, 1996). For recreation, an impact is considered significant when it causes

- Permanent or long-term preemption of a recreational use or temporary preemption or conflicts during peak season use;

- Long-term use or degradation (extending beyond the construction period) of the recreational value of a major recreational use.

While these criteria are most applicable to routine operations, they have also been applied to analyze the impacts from oil spills. (See, for example, Aspen Environmental Group, 1992.)

For further specification, these impacts can be classified as:

HIGH

Complete closure of water-oriented recreational facilities for a short period during the peak season for recreation or a partial closure for most or all of the peak season, or a 15 percent or greater economic loss to the industry over a comparable time period of previous years.

MODERATE

Complete closure of water-oriented recreational facilities for a period during the low use season, or a partial closure for an extended period during other than peak season for recreation and tourism, or a 5 percent or greater economic loss to the industry over a comparable time period of previous years.

LOW

Partial closure of water-oriented recreational facilities for a short period at any time of year, or a less than 5 percent economic loss to the industry over a comparable time period of previous years.

These categories explicitly recognize that a water-oriented facility does not have to be closed or completely inaccessible in order for significant impacts to occur. A facility may remain opened, but the recreation quality diminished to the point that a significant impact (moderate or high) has occurred. However, three other factors, which enter into the assessment of impact, are implicit in the determination. The first factor accounts for location, the degree to which substitutes for the activity or site exist or do not exist nearby and remain accessible and unaffected. The second factor recognizes that some activities which require additional training, skill, or special equipment (surfing, scuba diving, kayaking) often have a higher associated value than other activities. The third fac-

tor recognizes that water-oriented recreation is separable from other types of recreation and locations. The determination of impact examines the value of water-oriented recreation as opposed to the entire recreation sector. Moreover, water-oriented activity does not necessarily occur on the water or at or near the water's edge. By definition, all recreation activity that occurs on an island is water-oriented.

5.2.15.1 IMPACTS OF THE PROPOSED ACTION ON RECREATION

This section analyzes project-related and cumulative impacts from the Proposed Action in the time period from 2002 to 2006. For cumulative impacts related to the most likely development scenario in the period 2002 to 2030, please see section 6.2.14.

IMPACTS COMMON TO ALL UNITS

The delineation drilling project requires no new onshore facility construction. No significant demand from project-related employment in-migration (crew of the MODU and support vessels and other supporting operations) for campground facilities is expected from the delineation drilling project. As such, temporary effects from offshore development activity are nonexistent to insignificant.

IMPACTS UNIQUE TO EACH UNIT

There are no recreational impacts unique to each unit. Visual impacts, which may affect some recreation activities, are discussed in a separate section.

5.2.15.1.1 SUMMARY OF IMPACTS AND CONCLUSIONS.

No impacts to recreation have been identified as a result of delineation drilling on the Gato Canyon, Bonito, Purisima Point, or Point Sal Unit. The visual impacts to recreation areas are discussed in a separate section.

5.2.15.1.2 MITIGATION MEASURES FOR IMPACTS FROM THE PROPOSAL

No impacts to recreation have been identified as a result of delineation drilling on the Gato Canyon, Bonito, Purisima Point, or Point Sal Unit. Therefore, no mitigation measures are proposed.

5.2.15.2 CUMULATIVE IMPACT ANALYSIS FOR RECREATION

This section examines the

- factors that affect cumulative impacts to recreational resources from offshore oil and gas development;
- the cumulative impacts to recreational resources from the proposal—delineation drilling on Gato Canyon, Bonito, Purisima Point and Point Sal Units;

For cumulative impacts related to the most likely development scenario in the period 2002 to 2030, please see section 6.2.15.

While not precisely defined, communities in the region often cite sustainable coastal recreation as a public policy and planning goal. Essentially, sustainable tourism derives from full appreciation of the unique qualities and resources of a particular coastal region. Once a region's natural and cultural amenities, and the threats to them, are thoroughly characterized, public and private investments can be directed toward their sustainable management.

Achieving this goal requires meeting a number of difficult objectives. To varying degrees, elements contributing to cumulative effects to recreation include:

- continued sprawl development,
- restricted public access,
- non-point pollution problems caused by urban and other runoff,
- resolving conflicts among coastal recreation activities,
- other forms of environmental degradation caused by intensifying development and multiplying recreational activities, and,
- cumulative effects of environmental and socio-economic trends.

Many factors affect recreational resources including supply, demand, site quality and accessibility, and site closures and restrictions, as well as diversification and expansion of activities (Pollock 1997). Communities recognize recreation opportunities, especially coastal-dependent and coastal-enhanced recreation, as a defining characteristic of the community for both resident and visitor (King 1997, MMS 1996a, b, and c, MMS 2000). Population growth is a robust predictor of demand for recreation (Science Applications Inc, 1984). By 2040, population is projected to grow 145 percent for San Luis Obispo County, 110 percent for Santa Barbara County, and 90 percent for Ventura County.

Routine offshore energy development impacts recreational resources through construction activity which may impact recreation facilities, use of campground facilities as temporary housing sites for inmigrant workers engaged in the construction of onshore and offshore facilities, and use conflicts created by the presence of offshore and onshore infrastructure. Impacts from upsets and accidents include restriction on access to sites and preclusion of certain activities at sites.

From 1985 through 1995, a socioeconomic monitoring and mitigation program evaluated impacts from offshore oil, gas, and pipeline projects to Santa Barbara and Ventura County. While impacts varied from project to project, the impacts from construction worker use of campgrounds were of sufficient magnitude to trigger mitigation payments to Santa Barbara County. Campground use accounted for approximately $99,000 or 1 percent of the total socioeconomic impact mitigation payment. No mitigation payment for campground impacts was made to Ventura County (MMS 2000).

Santa Barbara County Findings of Approval for past offshore oil and gas projects in Santa Barbara County have found adverse project and cumulative impacts to recreation, tourism, and aesthetics, from construction and operation of the project. To mitigate general, diffused, project and cumulative impacts in these and other areas, Santa Barbara County created a Coastal Resources Enhancement Fund which receives annual payments over the life of the project to be used for projects that enhance coastal recreation, aesthetic, tourism, or other environmentally sensitive resources (SBC, 1993).

Restriction of ocean water contact activities, through water quality advisories or beach closings, have occurred and are expected to occur in the area. Also, some areas have been closed to public access to protect the nesting of shorebirds.

For the purposes of accidents, researchers suggest that there are three periods of time that need to be evaluated in determining impact (Deacon and Kolstadt 2000).

1. Closure period when the beach is officially closed for clean up.

2. Physically degraded period when the beach is open but the experience is degraded because there is still evidence of pollution.

3. Perceptually degraded period when the beach is physically clean yet the memory of the accident is fresh enough that the quality of the experience may be somewhat degraded.

As such, the duration of impact may exceed the time that the beach is closed or physically degraded. While estimated value of the consumer surplus for recreation varies, the practice in California enforcement actions values general beach use at $13.19 per participant day ($ CY 1990). A 25% premium is added to this base for activities that require additional skill or training, such as surfing. Value for diminished use, rather than total loss of use, reduces this base value. These enforcement actions occur independent of significance.

5.2.15.2.1 CUMULATIVE IMPACTS (2002 TO 2006)

Cumulative impacts during this period will consist of those impacts that will occur without delineation drilling and those that will occur as a result of delineation drilling.

Cumulative Impacts Without the Proposed Action (2002 to 2006): Other large-scale construction projects in the area that result in an in-migration of temporary workers would similarly contribute to the demand for campsites at public recreational facilities. No other large-scale projects have been identified in the timeframe anticipated for offshore and onshore facility construction. Seasonal closure of beach areas north of Point Conception for the protection of nesting shorebirds is expected to continue. As noted above, payments to the Santa Barbara County Coastal Resources Enhancement Fund mitigate impacts from existing OCS development over the life of the project.

Advisories and beach closures from degraded water quality attributable to non-point sources are expected to continue. Depending on the duration of these notices, locally significant impacts could result. Other factors, such as closure of access at Point Sal State Beach or restrictions on access due to seasonal beach erosion, could be locally significant.

Coastal access points for recreation along the coast from Point Sur in Monterey County to Point Fermin in Los Angeles County tend to be fairly concentrated. Generally, 4 to 10 formally identified access points cluster in 5 to 7 mile segments, with the higher concentrations in shorter segments in highly developed areas. Access ranges from high use recreational beaches offering a range of amenities and activities to stairways to pocket beaches. In less-developed areas, formally identified access is fairly isolated. These units tend to be State and county parks that feature a mix of day and overnight uses and provide the only recreational access in the area (California, 1997).

Table 5.2.15.2.1-1 presents data on the length of shoreline that may be affected for various sized oil spills. Cleanup of a smaller spill (200 barrels or less) may take one to two weeks to clean up whereas a larger spill may take up to 30 days or more (Pers Comm, Tarpley 2001). Effects to recreation would be very location specific and may vary seasonally.

Table 5.2.15.2-1. Oil spills for cumulative impact analysis.

Source	Size of Spill (bbl)	95% probability that spill reaching shore will contact length of coastline greater than x km (mi.).	5% probability that spill reaching shore will contact length of coastline greater than x km (mi).
OCS production	200	1.04 (0.65)	18.9 (11.7)
OCS production	2,000	2.84 (1.76)	52.5 (36.2)
Tankering	22,800	8.87 (5.52)	161.4 (100.3)

A spill of 200 barrels from OCS production would probably not be regionally significant. However, closing a remote beach that provides the area's only access for one week to two weeks during a period of high use could be locally significant. Cumulative impacts could result if attendance had been affected by advisories and closings due to runoff from contamination from runoff or sewage spills.

Increasing the spill size to 2,000 barrels from OCS production or to 22,000 barrels from non-OCS tankering, increases the likelihood of regionally significant impacts. The wider the area oiled the more locations that may be impacted, affecting greater numbers of participants. As the area increases, substitution, the ability to do the same activity at a different location, becomes more difficult. In addition to the closure of mainland access points, a spill that results in the closure of the area's small craft harbors from deployment of containment booms at harbor entrance's means that vessels will not be able to enter or leave the harbor.

For example, the level of water-oriented recreational activity that occurs at Channel Islands National Park and the Channel Islands National Marine Sanctuary. Closing small craft harbors at Santa Barbara, Ventura, or Channel Islands (Oxnard) would preclude much of this activity for the duration of the closure. Similarly, on-island activity would be affected, with greatest reduction in visitor days occurring to Anacapa or Santa Cruz Island. (During the peak season, inter-island substitution may not be possible since the islands have restriction on the maximum number of visitors at any given time and the hauling capacity of park concessionaires is limited by boat occupancy restrictions. The peak season for island visitation occurs March through October with the greatest use occurring May through June.)

A spill affecting a community's "beach area" described in section 4 could have a variety of consequences. Since beach areas are geographically compact and concentrate water-oriented activities, impacts from a spill could be significant, despite the relatively small area affected.

Incremental Impacts of the Proposed Action (2002 to 2006): No significant new demand on the area's recreation facilities results from the crew of the MODU and support vessels. Because of the typical nature of MODU operations and crew scheduling (extended periods on the rig with workers returning home during their time off) delineation activities are not expected to contribute significantly to this demand. No significant long-term impact results from the placement of the MODU on the Units to existing or anticipated recreational uses of those areas.

Summary and Conclusion (2002 to 2006): Several factors singly or in combination may have a significant cumulative effect on recreation resources depending on the duration of restricted or degraded use. Most of these impacts will be local, but an oil spill of 2,000 or 22,000 barrels could have regionally significant impacts. However, MODU operations will not contribute to the cumulative impacts.

Potential Mitigation Measures for Cumulative Impacts: CREF payments to mitigate cumulative effects of OCS development continue over the life of the project. No additional mitigation measures are identified.

5.2.16 IMPACTS ON COMMUNITY CHARACTERISTICS AND TOURISM RESOURCES

The development of a community's conditions and resources, including its sense of place, develop over a long period of time and is the product of many interaction, of continuity and change. Tourism is one roust indicator of a community's characteristics. At any point in time, a community may be the sum of past, existing, and emerging social, cultural, and economic forces. A community's development is not static; it is the product of continuity and change. This section addresses the impacts of the Proposed Action and cumulative effects from production on Ventura, Santa Barbara, and Ventura County, the areas most proximate to the offshore activity evaluated in this document.

The following categories classify community characteristics impacts in general and tourism resources impacts in particular.

HIGH

- Impacts to the affected activity or community are unavoidable.
- Proper mitigation would reduce impacts somewhat during the life of the project.
- The affected activity or community would experience unavoidable disruptions to a degree beyond what is normally acceptable.
- Once the impacting agent is eliminated, the affected activity or community may retain measurable effects of the Proposed Action indefinitely, even if remedial action is taken.

MODERATE

- Impacts to the affected activity or community are unavoidable.
- Proper mitigation would reduce impacts substantially during the life of the project.
- The affected activity or community would have to adjust somewhat to account for disruptions due to impacts of the project.
- Once the impacting agent is eliminated, the affected activity or community will return to a condition with no measurable effects from the Proposed Action if proper remedial action is taken.

LOW

- Adverse impacts to the affected activity or community could be avoided with proper mitigation.
- Impacts would not disrupt the normal or routine functions of the affected activity or community.
- Once the impacting agent is eliminated, the affected activity or community will return to a condition with no measurable effects from the Proposed Action without any mitigation.

NEGLIGIBLE

No measurable impacts.

The analysis to support each conclusion must analyze and describe the intensity, duration, and geographic extent (or size) of the impacts to the affected resource. An impact is significant if it is in the moderate or high category.

5.2.16.1 IMPACTS OF THE PROPOSED ACTION ON COMMUNITY RESOURCES AND TOURISM.

Impacts Common to All Units: The delineation drilling project requires no new onshore facility construction. No sizeable demand from project-related employment in-migration (crew of the MODU and support vessels and other supporting operations) for lodging is expected. The drilling operations will take place proximate to areas that have in the recent past or presently experience some degree of offshore and onshore petroleum extraction. Direct delineation activities on the Units take place outside the urban boundaries of any nearby community. Support activities for development will originate primarily in Ventura County's Port Hueneme that has community characteristics compatible with offshore development activity. While the project may cause an increase in activism within the community during the decision making process, as do many coastal development projects in Santa Barbara and San Luis Obispo counties and its constituents communities, the status quo should return to the community after the projects are complete. Santa Barbara County government has well established administrative routines and bureaus with the organizational capacity to address issues related to the projects. As such, no change to governance is expected. The intensity of the MODU operations is low compared to existing levels of development. Duration of the projects is short. The geographic extent of

the impact is limited to areas outside developed communities. As such, the impact to the community characteristics and tourism from the Proposed Action will be negligible. Also, no other projects have been identified which in combination with MODU activities are likely to affect community characteristics or tourism.

Impacts Unique to Each Unit: There are no community characteristics and tourism resources impacts unique to each unit. Visual and recreation impacts, which may affect tourism, are discussed in a separate section.

5.2.16.1.1 SUMMARY AND CONCLUSIONS

Community characteristics and tourism resources impacts from the Proposed Action are negligible for the Point Sal, Purisima Point, Bonito, and Gato Canyon Units because of the short duration, remote location near areas already experiencing energy development, and low intensity of the action.

5.2.16.1.2 MITIGATION MEASURES FOR IMPACTS FROM THE PROPOSED ACTION

No mitigation measures have been identified. Please see the visual resources and recreation resources sections for analysis and mitigation measures for these related resources.

5.2.16.2 CUMULATIVE IMPACT ANALYSIS FOR COMMUNITY RESOURCES AND TOURISM

This section examines the cumulative impacts to community characteristics and tourism resources from the Proposed Action—delineation drilling on Gato Canyon, Bonito, Purisima Point and Point Sal Units in the time period from 2002 to 2006. For cumulative impacts related to the most likely development scenario in the time period from 2002 to 2030, please see section 6.2.16.

5.2.16.2.1 CUMULATIVE IMPACTS (2002 TO 2006)

Cumulative Impacts Without the Proposed Action (2002 to 2006): Since community characteristics and tourism resources analyzed in this section are evolutionary and slow to change, that process that will continue as it currently exists for the four year period.

Incremental Impact of the Proposed Action (2002 to 2006): Since project impacts of the Proposed Action are negligible and of short duration, the Proposed Action is not expected to contribute to a change in community characteristics or tourism resources.

SUMMARY AND CONCLUSIONS (2002 TO 2006):

Since community characteristics and tourism resources analyzed in this section are evolutionary and slow to change, that process that will continue as it currently exists for the four year period.

POTENTIAL MITIGATION MEASURES FOR CUMULATIVE IMPACTS:

None identified.

5.2.17 IMPACTS ON EMPLOYMENT AND POPULATION

The following significance criteria levels were used in the impact analysis for social and economics to determine whether the proposed delineation projects activities could result in social and economic impacts.

HIGH

The Proposed Action is likely to result in a long-term (more than two years) regional change in population or employment by at least ½% or a change in the population or employment is equal to or greater than 75% of the annual change in population or employment. A short term (less than two years) change in employment or population by at least ¾% or a change in the employment or population of 40% to 74% of the average annual change for the study area.

MODERATE

The Proposed Action is likely to result in a long-term (more than two years) regional change in population or employment by at least ¼% or a change in the population or employment is between 40% to 75% of the annual change in population or employment. A short term (less than two years) change in employment or population by at least ½% or a change in the employment or population of 10% to 39% of the average annual change for the study area.

LOW

The Proposed Action is likely to result in a long-term (more than two years) regional change in population or employment of less than ¼% or a change in the population or employment is less than 40% of the annual change in population or employment. A short term (less than two years) change in employment or population off less than ½% or a change in the employment or population of less than 10% of the average annual change for the study area. This level of change from the baseline is insignificant.

5.2.17.1 IMPACTS OF THE PROPOSED ACTION ON EMPLOYMENT AND POPULATION

Delineation activities use offshore and onshore support services. If delineation activity is increased beyond the existing threshold for support services; changes in employment and population could occur. Change in employment result from both of direct and indirect component effects. If warranted, increased employment would draw from the local labor force and could induce immigration for new jobs.

The proposed delineation activities will be common for all proposed delineation wells. Thus, there are no impacts unique to any unit.

One Mobile Drilling Unit (MODU) is proposed to drill 4 to 5 wells over a 14-month period. The Proposed Action is expected to employ 110 people directly on the MODU. Employment on the MODU is expected to use workers who live on the MODU while working and return to their home base during their off times. In addition to the 110 employees directly connected to the MODU 35 other workers are expected to support the drilling activities. The additional support workers are expected to be current employees of service providers to the offshore industry and no new employees are anticipated as a result of this Proposed Action. Over the 14-month period routine supplies will be supplied by onshore services. The required services from one MODU over a short period of time will stimulate business for support services, but is insufficient to require any measurable changes to employment. Population increases result from increased employment and in-migration associated with employment opportunities. With no anticipated increase in local employment it is unlikely that any measurable in-migration will occur.

5.2.17.1.1 SUMMARY AND CONCLUSION

No impacts on employment and population are anticipated from the Proposed Action. Given there will be only a small demand for local workers, no change in employment from the proposed project is expected. With no change in employment, the Proposed Action will have no effect on the population.

5.2.17.1.2 MITIGATION MEASURES FOR IMPACTS FROM THE PROPOSED ACTION

None identified. No impacts are anticipated from the Proposed Action.

5.2.17.2 CUMULATIVE IMPACT ANALYSIS FOR EMPLOYMENT AND POPULATION

5.2.17.2.1 CUMULATIVE IMPACTS (2002-2006)

CUMULATIVE IMPACTS WITHOUT THE PROPOSED ACTION (2002-2006)

Depending on economic conditions, general employment is expected to stay steady or slightly increase during the period. However, for some time oil and gas sector employment has declined in the study area, a trend that is expected to continue. Therefore, population impacts related to offshore oil and gas development are expected to remain less than 0.32% of the total population.

INCREMENTAL IMPACTS OF THE PROPOSED ACTION (2002-2006)

Given the level of proposed activity, no expansion of existing services is anticipated. The proposed delineation activity may slow the rate of decline in the local oil and gas sector or services or provided from local service centers in the Los Angeles or Bakersfield.

SUMMARY AND CONCLUSION (2002-2006)

The proposed activity is not expected to have an incremental increase on population or employment.

POTENTIAL MITIGATION MEASURES FOR CUMULATIVE IMPACTS

None identified because of lack of impact.

5.2.18 IMPACTS ON HOUSING

The following significance criteria levels were used in the impact analysis for social and economics to determine whether the proposed delineation projects activities could result in housing impacts.

HIGH

The Proposed Action is likely to result in a long-term (more than two years) local or regional increase or decrease in the rate of change in demand for housing at least 20%. Or the Proposed Action is likely to result in a short-term (less than two years) local or regional increase or decrease in the rate of change in demand for housing at least 35%.

MODERATE

The Proposed Action is likely to result in a long-term (more than two years) local or regional increase or decrease in the rate of change in demand for housing between 10% and 19%. Or the Proposed Action is likely to result in a short-term (less than two years) local or regional increase or decrease in the rate of change in demand for housing between 25% and 35%.

LOW

The Proposed Action is likely to result in a long-term (more than two years) local or regional increase or decrease in the rate of change in demand for housing of less than 10%. Or the Proposed Action is likely to result in a short-term (less than two years) local or regional increase or decrease in the rate of change in demand for housing less than 25%. This change from the base level is insignificant.

5.2.18.1 IMPACTS OF THE PROPOSED ACTION ON HOUSING

No change in population is expected from the Proposed Action. Therefore, no change in the demand for housing is expected from the Proposed Action.

5.2.18.2 CUMULATIVE IMPACT ANALYSIS FOR HOUSING

5.2.18.2.1 CUMULATIVE IMPACTS (2002-2006)

CUMULATIVE IMPACTS WITHOUT THE PROPOSED ACTION (2002-2006)

Without the Proposed Action, demand for housing will continue to grow as a function of projected population growth. No other projects have been identified that would cause greater than expected growth.

INCREMENTAL IMPACTS OF THE PROPOSED ACTION (2002-2006)

No change in population is expected from the Proposed Action. Therefore, no incremental change in the demand for housing is expected from the Proposed Action.

SUMMARY AND CONCLUSION (2002-2006

Population growth is expected to increase over the period due to demographic and other factors not related to offshore oil and gas or other identifiable projects. No cumulative impact in the demand for housing is expected from the Proposed Action.

5.2.19 IMPACTS ON INFRASTRUCTURE

The following significance criteria levels were used in the impact analysis for social and economics to determine whether the proposed delineation projects activities could result in infrastructure impacts.

HIGH

The Proposed Action is likely to result in a long-term (more than two years) local or regional increase or decrease in the rate of change in demand on public or private infrastructure or services by at least 20%. Or the Proposed Action is likely to result in a short-term (less than two years) local or regional increase or decrease in the rate of change in demand on public or private infrastructure or services by at least 35%.

MODERATE

The Proposed Action is likely to result in a long-term (more than two years) local or regional increase or decrease in the rate of change in demand on public or private infrastructure or services by between 10% and 19%. Or the Proposed Action is likely to result in a short-term (less than two years) local or regional increase or decrease in the rate of change in demand on public or private infrastructure or services by between 25% and 34%.

LOW

The Proposed Action is likely to result in a long-term (more than two years) local or regional increase or decrease in the rate of change in demand on public or private infrastructure or services of less than 10%. Or the Proposed Action is likely to result in a short-term (less than two years) local or regional increase or decrease in the rate of change in demand on public or private infrastructure or services of less than 25%. This change from the base level is insignificant.

5.2.19.1 IMPACTS OF THE PROPOSED ACTION ON INFRASTRUCTURE

As discussed in section 4, the Proposed Action is expected to increase crew and supply vessel traffic and the onshore support of the vessels by less than 3 percent. The Proposed Action will result in a short-term increase in truck traffic at the Ports of Hueneme and Long Beach, only the Bonito Unit is expected to impact the Port of Hueneme. The increase in truck traffic results from barging of drill stem test fluids. It is likely that the fluids will be transported to the test facility in 140 bbl tanker trucks. The number of trucks required by unit and the increase in truck traffic at the Ports of Hueneme and Long Beach are shown in table 5.2.19.1-1.

All units are expected to share the same level of impacts, which are low. The proposed delineation activities will be common for all proposed delineation wells. Thus, there are no impacts unique to any unit.

5.2.19.1.1 SUMMARY OF IMPACTS AND CONCLUSION

Crew and supply vessels trips are anticipated to increase as a result from the Proposed Action. The changes from each unit are shown in table 5.2.19.1.1-1. The maximum change from the Proposed Action results in a short-term increase in supply vessel trips is 9.09%. The maximum increase in truck traffic as a result of the Proposed Action is a short-term increase of 72 trucks at the Port of Hueneme. The increase in truck traffic at the Port of Hueneme would be for less than 3 days. The extremely short-term nature of the increase in truck traffic reduces an otherwise moderate impact to low. The maximum change at the Port of Long Beach is less than one percent of daily truck traffic for any unit. Table 5.2.19.1-1. shows the relative change by unit for the Ports of Hueneme and Long Beach.

Table 5.2.19.1-1. Trucks for Drill Stem Test Program.

	Total Trucks	Daily Trucks	Percent of Port of Hueneme Daily Truck Traffic	Percent of Truck Traffic in Vicinity of the Port of Long Beach
Bonito[1]	286	72	36%	0.3%
Point Sal	375	72	N/A	0.3%
Purisima Point	375	72	N/A	0.3%
Gato Canyon	50	50	N/A	0.2%
Total Trucks	1086		N/A	N/A

Table 5.2.19.1.1-1. Vessel Traffic Impacts.

	Weekly Boat Trips		Percent Increase
	Crew Boats	Supply Boats	
Total Trips	84	33	N/A
Bonito	2	3	4.27%
Gato Canyon	1	3	3.41%
Purisima Point	1	3	3.41%
Point Sal	1	3	3.41%
Peak from proposal	2	3	4.27%

5.2.19.1.2 MITIGATION MEASURES FOR IMPACTS OF THE PROPOSED ACTION

No mitigation measures are identified since the change in boat and truck trips are not significant.

5.2.19.2 CUMULATIVE IMPACT ANALYSIS FOR INFRASTRUCTURE

5.2.19.2.1 CUMULATIVE IMPACTS (2002-2006)

CUMULATIVE IMPACTS WITHOUT THE PROPOSED ACTION (2002-2006)

Crew and supply boats will continue to service the offshore oil and gas industry and existing onshore development will continue at the present levels of activity. No other activities that would impact infrastructure other than expected variation in port operations have been identified.

INCREMENTAL IMPACTS OF THE PROPOSED ACTION (2002-2006)

A greater number of trips from the supply and crew bases will result from the Proposed Action but this will not significantly impact infrastructure requirements. A short-term increase in truck trips from the Ports of Hueneme and Long Beach will likely occur but this change will not significantly impact infrastructure requirements.

SUMMARY AND CONCLUSION (2002-2006)

The greater number of trips from the supply and crew bases resulting from the Proposed Action will not significantly impact infrastructure requirements. Additionally, the short-term increase in truck traffic from the Proposed Action will not significantly impact infrastructure demand.

POTENTIAL MITIGATION MEASURES FOR CUMULATIVE IMPACTS (2002-2006)

No mitigation measures are identified since the change in boat or truck trips are not significant

5.2.20 IMPACTS ON PUBLIC FINANCE AND SERVICES

The following significance criteria levels were used in the impact analysis for the social environment and economics to determine whether the proposed delineation projects activities could result in public finance and services impacts.

HIGH

The Proposed Action is likely to result in a long-term (more than two years) local or regional increase or decrease in the rate of change in demand for public or private services by at least 20%. Or the Proposed Action is likely to result in a short-term (less than two years) local or regional increase or decrease in the rate of change in demand for public and private services by at least 35%.

MODERATE

The Proposed Action is likely to result in a long-term (more than two years) local or regional increase or decrease in the rate of change in demand on public or private or services by between 10% and 19%. Or the Proposed Action is likely to result in a short-term (less than two years) local or regional increase or decrease in the rate of change in demand on public or private services by between 25% and 34%.

LOW

The Proposed Action is likely to result in a long-term (more than two years) local or regional increase or decrease in the rate of change in demand on public or private services of less than 10%. Or the Proposed Action is likely to result in a short-term (less than two years) local or regional increase or decrease in the rate of change in demand on public or private services of less than 25%. This change from the base level is insignificant.

5.2.20.1 IMPACTS OF THE PROPOSED ACTION ON PUBLIC FINANCE AND SERVICES

In general, the primary causes in change in demand for public and private services is a substantial change demographic, economic, or social conditions of an area in a short period of time. Furthermore, local government land-use and air quality permitting and regulation of offshore oil and gas development is based on a fee-for-service charge to project applicants. The Proposed Action in not expected to result in a measurable change in the demand for public or private services.

5.2.20.1.1.1 SUMMARY AND CONCLUSION

No new public or private services are anticipated as a result of the Proposed Action.

5.2.20.1.1.2 MITIGATION MEASURES FOR IMPACTS FROM THE PROPOSED ACTION

No potential mitigation measures are identified because of lack of impacts. Past practice by Santa Barbara County required participation by offshore oil and gas operators in the Socioeconomic Monitoring and Mitigation Program. The lack of impacts from the delineation projects does not appear to warrant re-establishing this program.

5.2.20.2 CUMULATIVE IMPACT ANALYSIS FOR PUBLIC FINANCE AND SERVICES

5.2.20.2.1 CUMULATIVE IMPACTS (2002-2006)

Cumulative impacts Without the Proposed Action (2002-2006)

The existing demand for public and private services will continue. Property taxes in Santa Barbara will continue to be enhanced by revenue generated by offshore-related onshore development. Table 5.2.20.2-1 shows the property tax contribution in Ventura and Santa Barbara.

INCREMENTAL IMPACTS OF THE PROPOSED ACTION (2002-2006):

The Proposed Action will not generate impacts to result in a noticeable change in demand for public and private services.

SUMMARY AND CONCLUSION (2002-2006)

Demand for public and private services will continue during the period in variation with demographic and other factors not related to offshore oil and gas or other identifiable projects. No cumulative impact in the demand for public and private services is expected from the Proposed Action.

POTENTIAL MITIGATION MEASURES FOR CUMULATIVE IMPACTS (2002-2006)

No potential mitigation measures are identified because of lack of impacts. Past practice by Santa Barbara County required participation by offshore oil and gas operators in the Socioeconomic Monitoring and Mitigation Program. The lack of impacts from the delineation projects does not appear to warrant re-establishing this or a similar program.

Table 5.2.20.2-1. County Revenue and Expenditures ($1,000).

	1998 Total Revenue	1998 Total Expenditures	Excess Revenue	1998 Property Tax Offshore Oil and Gas Related	Percent of Revenue from Offshore Oil Related Property Taxes
San Luis	$224,426	$210,907	$13,519	0	0
Santa Barbara	$410,068	$408,715	$1,353	$12,945	3.2%
Ventura	$627,133	$633,648	-$6,515	$442	0.07%

5.2.21 IMPACTS ON NON-RESIDENTIAL LAND USE

The following significance criteria levels were used in the impact analysis for social and economics to determine whether the proposed delineation projects activities could result in non-residential land use impacts.

HIGH

New onshore facilities are required to meet the demands of the Proposed Action and conversions from other non-industrial land uses are required. Land uses vary from those anticipated in local, State, or Federal plans and projections and result in displacement of competing uses and Proposed Actions.

MODERATE

Existing onshore facilities can be modified to meet the demands from the Proposed Action, but modifications may require a change in the plant footprint and permitted capacities or new facilities are required. Land use may vary from those anticipated in local, State, or Federal plans and projections.

LOW

Existing onshore facilities can accommodate change in demand from the Proposed Action without expansion beyond current plant footprint and permitted capacities. Any changes in land use are consistent with local, State, of Federal plans and projections. The change from the baseline is insignificant.

5.2.21.1 IMPACTS OF THE PROPOSED ACTION ON NON-RESIDENTIAL LAND USE

The Proposed Action is expected to have a no impact on non-residential land uses since no new facilities will be needed for the project.

5.2.21.1.1 SUMMARY OF IMPACTS AND CONCLUSION

There are no anticipated impacts from the Proposed Action on non-residential land uses.

5.2.21.1.2 MITIGATION MEASURES FOR IMPACTS OF THE PROPOSED ACTION

No mitigation measures are identified since the Proposed Action requires no land use changes.

5.2.21.2 CUMULATIVE IMPACT ANALYSIS FOR NON-RESIDENTIAL LAND USE

5.2.21.2.1 CUMULATIVE IMPACTS (2002-2006)

Cumulative impacts Without the Proposed Action (2002-2006): Existing onshore facilities are expected to continue substantially as they are. No changes in the onshore support facilities are expected. Land uses supporting offshore oil and gas will continue as long as oil production is possible.

Incremental Impacts of the Proposed Action (2002-2006): The Proposed Action will not generate land use impacts.

Summary and Conclusion (2002-2006): Existing use of onshore facilities is expected continue without any effect from the Proposed Action. . No cumulative impact to land use is expected from the Proposed Action.

Potential Mitigation Measures for Cumulative Impacts (2002-2006): No potential mitigation measures are identified because of lack of impacts.

5.2.22 IMPACTS ON COMMERCIAL FISHING AND KELP HARVEST

Commercial fishing has been an integral part of California economics since the turn of the century (MBC, 1989). Conflicts with offshore oil and gas operations surfaced as early as the 1940's. Many of the conflicts have been mitigated through oil and gas industry funding of programs, direct payment to fishermen for lost fishing opportunity and damaged or lost gear, better communication, and the avoidance of major oil spills as production increased on the Pacific OCS from 80,000-bbl per day to 220,000-bbl per day since 1985.

The following measures are included in the Proposed Action and have been proposed by the oil industry as a means of reducing conflicts and improving communication between commercial fishermen and the operators during the proposed project:

- Industry will consult with the Joint Oil/Fisheries Liaison Office to identify and contact potentially affected fishers and fleets.

- Industry will hold meetings with representatives of the potentially affected fishing fleets to provide information to all potentially affected fishermen describing the location of the proposed drilling program, the area to be traversed, the planned dates of initiation and completion, and to obtain feedback.
- Industry will prepare a Notice to Fishermen and Claim Form to be sent to all potentially affected fishermen who would likely be precluded from fishing during the proposed operations explaining the procedures for submitting a claim for lost revenue. This process will include meeting with individual fishermen to discuss each claim submitted, and the determination of a fair and reasonable mitigation/remuneration based on historic fish catch records using the appropriate mitigation/remuneration methodology.
- a local fisherman will captain a scout boat to survey the proposed well site area prior to the MODU arriving onsite. The scout boat captain will attempt to contact the owner of any gear found at the site and arrange for relocation of the gear.
- Industry will notify fishermen in writing 30 days prior and verbally 3 days prior to the commencement of operations. Notifications will be sent to the U.S. Coast Guard, Santa Barbara County Planning and Development Department, Energy Division, the Joint Oil/Fisheries Liaison Office, and the Marine Advisory Newsletter in Goleta. Notices will also be distributed to and posted at area fuel docks, ice supply houses, wholesale fish buyers, and Harbor Master's offices in the area harbors.
- Industry will notify the Joint Oil/Fisheries Liaison Office immediately following the completion of the drilling program.
- Industry will immediately notify MMS of any conflict with commercial fishermen before, during, and after the drilling operations.
- Industry will ensure that all vessels and work boats associated with the proposed project will comply with the traffic corridors established by the Joint Oil/Fisheries Liaison Committee.
- Industry and boat captains associated with the proposed project will keep logs documenting equipment lost overboard. Industry will notify MMS of all lost items.
- Industry will require all offshore personnel involved in the proposed project to attend the Western States Petroleum Association's Fisheries Training Program, appropriately abridged.
- Industry will hold at least two pre-survey coordination meetings with MMS and and other interested agencies to review the status of the implementation of these mitigation measures.

Impact Level Definitions. Changes or impacts to commercial fishing resulting from the proposed project will be analyzed according to the following criteria:

HIGH

- Fishermen are precluded from 10 percent or more of the fishing grounds during the proposed project;
- 10 percent or more of the fishermen are precluded from a fishing area for all or most of a fishing season; or
- a decrease in catchability of target species exceeds 10 percent of the average annual landing.

MODERATE

- Fishermen are precluded from 1 to 10 percent of the fishing grounds during the proposed project;
- 1 to 10 percent of the fishermen are precluded from a fishing area for all or most of a fishing season; or
- a decrease in catch of target species between 1 to 10 percent of the average annual landing.

LOW

- Fishermen are precluded from 1 percent or less of the fishing grounds during the proposed project;
- 1 percent or less of the fishermen are precluded from a fishing area for all or most of a fishing season; or
- a decrease in catch of target species less than 1 percent of the average annual landing.

For the purposes of this document, high and medium level impacts are considered significant, while low level impacts are considered insignificant.

5.2.22.1 IMPACTS OF THE PROPOSED ACTION ON COMMERCIAL FISHING

The operators propose drilling 4-5 delineation wells from a semi-submersible type Mobile Offshore Drilling Unit (MODU) into the four different units: 1 on the Point Sal Unit, 1 on the Purisima Point Unit, 1 to 2 on the Bonito Unit, and 1 on the Gato Canyon Unit. The delineation activities proposed are of temporary duration. The spud date for the first and last wells are the 2nd quarter of 2002 (Bonito Unit) and the fourth quarter of 2003 (Gato Canyon), respectively. Each well could take anywhere from 23 to 52 days to drill and 21 to 28 days to test. The drilling and associated activities should take 68 to 90 days to complete at each of the well sites. See section 2.0 (Project Description).

Several actions associated with the proposed project have the potential to impact commercial fishermen and fisheries. These activities include towing the MODU between well sites, anchoring activities, support vessel traffic, and barging activities. Discharge of drilling muds and cuttings, discharge of produced water, and the potential explosive removal of the wellheads are analyzed in section 5.2.6 (Fish Resources).

IMPACTS COMMON TO ALL UNITS:

Vessel Traffic. Commercial fishermen are found throughout the SBC/SMB and conflicts could occur as the MODU is towed to each of the 4-5 well sites. Also, crewboats and supply boats will travel to and from the drill site on a regular basis. The conflicts could include preclusion from the area, lost fishing time, and damage to equipment. Any traps or gillnets in the traffic corridor of the project areas could become entangled and damaged or lost when the MODU and support vessels pass through the area. Trawlers, purse seiners, trollers, and hook and line fishers could be forced to move from the area or change course, resulting in lost fishing time.

As described in section 5.0, support vessel traffic for the proposed delineation drilling operations will operate out of Port Hueneme, with some possible crew boat trips originating from the Carpinteria Pier. Crew boats will average 2-8 trips per month throughout the 14 months of delineation drilling activities; a total of about 90 trips will occur. Supply boat trips will average 8-12 per month, for a total of approximately 148 trips over the 14 month period. As the location of the delineation drilling activities shifts from units in the Santa Maria Basin eastward into the western Santa Barbara Channel, overall support vessel traffic will peak during the first 6 months at about 20 trips per month, then decrease to about 10 trips per month during the final 3 months of activity.

Additionally, fluid produced during the drill stem test of each delineation well will be barged to Long Beach (possibly Port Hueneme for the Bonito Unit) at the end of the testing period. Transportation of the barges will comply with established vessel traffic corridors. A total of 4-10 such trips are estimated to occur over the 14 month duration of the proposed delineation drilling activities.

The Santa Barbara Channel/Santa Maria Basin Oil Service Vessel Traffic Corridor Program is intended to minimize interactions between oil industry operations and commercial fishing operations. It was developed cooperatively by the two industries through the Joint Oil/Fisheries Liaison Office. In addition to providing transit corridors in and out of area ports, the program routes support traffic along the Channel seaward of an outer boundary line. East of Gaviota, the outer boundary is defined by the 30-fathom line; west of Gaviota, and north of Point Conception as far as Pedernales Point, it follows the 50-fathom line. In the area west of Gaviota, the 50-fathom line is 4 km (2 nm) or more offshore.

Transit to and from drilling sites will occur within vessel corridors established for oil and gas service vessels in the SBC. Although vessel traffic will increase during the proposed project activities, the oil industry would minimize conflicts with commercial fishermen by traveling within the established corridors. Conflicts are more likely to occur in the SMB where traffic corridors have not been established due to minimal oil and gas activity in the area. Conflicts can be mitigated by negotiating traffic corridors to the proposed well sites on the Purisima Point and Point Sal Units.

Low impacts to commercial fishing are estimated from vessel traffic associated with the proposed project. Proposed mitigation measures would further minimize the impacts, if adopted.

Siting/Anchoring of the MODU. The proposed delineation drilling activities would occur from a MODU. The MODU would be moored with eight anchors, which will extend 5 to 7 times the water depth from the MODU. The proposed drilling sites range in water depth from 71 – 352 m (233 – 1156 ft). On average, this could amount to approximately 0.4 - 19 km^2 (0.16 – 7.4 mi^2) of ocean area that will be precluded from commercial fishing while the MODU is onsite (approximately 90 days at each site). Approximately 2,435 km^2 (940 mi^2) of trawl grounds are available in the SBC/SMB. Thus, each well site could take up to 0.01 percent of available trawl grounds. This does not take into account the tendency of trawlers to fish along specific depth contours, for debris that may be lost, or for the differences in productivity within trawl grounds. For these reasons, the actual area precluded could be somewhat higher than estimated and the economic losses associated with preclusion more variable.

Some degree of lateral flexibility in anchor placement allows avoidance of potential sea floor hard bottom resources. A site-specific mooring analysis and ocean bottom surveys will be conducted to ensure correct anchor placement. The mooring analysis will factor in any subsea obstructions, obstacles, and hard bottom habitat. The anchors will be set to avoid these areas, and ensure that the anchors are placed in adequate soils to provide the required holding capacity. By using an anchor of sufficient holding power, drag related scarring could be minimized to the 3 – 30 m necessary to properly set the anchor. MEC Analytical Systems (1995) evaluated the area of anchor impacts on hard bottom from exploratory operations occurring between 1968 and 1989. The study showed that the width of anchor scars ranged from 1 – 8 m (3 – 25 ft) and the length averaged 250 m (820 ft).

The proposed delineation drilling operations will take place within an area corresponding to CDF&G Fish Blocks 644 (Bonito Unit), 632 (Point Sal Unit), 638 (Purisima Point Unit), and 654 and 655 (Gato Canyon Unit). Some types of fishing could be potentially affected by the proposed project more than others, and depending on the time of year certain fisheries could be affected. Commercial fishermen including trawl, troll, hook and line, drift and set gillnet, purse seine, and trap fishermen will be precluded from fishing within the proposed drilling areas for up to 90 days at each site. Fishermen precluded from the drilling area would target alternate grounds resulting in crowding and potentially decreased profits for the primary fishermen of those grounds.

Trawl fishing is a mobile fishery. The net is on the bottom and in fairly deep water can be a mile behind the vessel. Trawlers often work on the top edges of steep drop-off slopes; to turn into deeper water would force the net to drop off these slopes. This causes loss of fishing time since the net has to be picked up and reset. Similarly, rocky outcrops, wrecks, or other debris are located randomly with respect to the trawl grounds. These features are hazards to the trawler because of their potential to snag and hang up the net. Through trial and error, trawlers become aware of most of the snags to avoid in favored grounds. Knowledge of these snags also limits the potential maneuverability of the trawler when towing a net(s). Turning into such a snag may mean loss or damage to the net(s), and potential hazard to the vessel itself if the hang is significant and/or weather/sea conditions are unfavorable. Since turning into such obstructions would be hazardous, most trawlers would have to stop towing and pull their gear in rather than turn. If the proposed MODU is on site while trawl fishing activity is taking place, it could potentially interfere with trawl fishing. Trawlers typically give about 400 m (1300 ft) berth to platforms. The MODU will have an anchor spread of up 2.5 km (1.5 mi) from the drilling unit. However, the mooring buoys of the anchor spread are not as easily seen as a drilling rig, so trawlers would likely give even more berth to the mooring buoys. Conservatively, trawl fishermen should give approximately 460 m (1500 ft) berth to the mooring buoys of the MODU unit when it is onsite and the anchor spread is set. For the proposed drilling sites ranging in water depth from 71 – 352 m (233 – 1156 ft), this would amount to from 886 – 2924 m (0.5 – 1.8 mi) berth from the MODU. After the MODU has left the site, trawlers may experience conflicts due to anchor scars for up to 4 years depending on the sediment type and bottom currents of the area.

Drift gillnets may be a mile to mile and half in length and have restricted ability to maneuver. A drift gillnet up to 2000 m (6,000 ft) long and 20-30 m (60-100 ft) deep can be fished anywhere from right at the surface to 10-15 m (30-40 ft) below the surface and may drift for up to 30 km (18 mi). The end of the gillnet not attached to the fishing vessel usually has a radar reflector/lighted buoy attached to it, but may not be immediately obvious because it is so far from the vessel. Since drift gillnetting is usually done at night, and often during the darker phases of the moon, it would be difficult for the boat operator to be aware of the anchor mooring buoys for the MODU. As a result, drift gillnet fishers would be precluded from a significant area up-current of the MODU site. The preclusion zone would be a triangular-shaped area up-current from the MODU. The apex of the triangle would lie at the MODU.

Set gillnets are found in the same general fishing grounds as crab and lobster pots, from shore to 30 to 50 fm, except in certain areas where deepwater rockfish nets are set. The set gillnet is attached to an anchor and buoy line at both ends. Set gillnets range in length from 300 – 2,500 ft in length. North of Point Arguello, rockfish fishermen are currently setting deepwater gillnets along rock outcrops areas in water as deep as 50 – 130 fm, where the hook and line fishery has traditionally worked their gear. Set gillnets would be precluded from within the anchor spread.

The commercial crab fishery seeks rock crab throughout the project area and, in some years, Dungeness crab from Point Arguello north through the SMB. North of Point Conception, gear can found out to 50 fm. Between Santa Barbara and Gaviota, most gear is found inside 30 fm. Crab fishermen set and move their “strings” of 5-25 individual traps on an unpredictable time schedule dictated by crab population movements. From a practical standpoint in locating and avoiding a string(s) of pots, it is important to consider the effects of tide and current strength on the line and buoy, and windage on the buoy. During conditions of high tide, strong currents, or high winds, buoys may be below sea surface and invisible. Traps could potentially be placed within the anchor spread

of the MODU, however this would result in a significant risk of vessel conflicts as work and crew vessels travel to the MODU.

The numbers of purse seiners and their location within the Santa Barbara Channel are highly variable and uncertain (table 5.2.22-1). The species fished are primarily pelagic, such as anchovy, mackerel, squid, and bonito. Because purse seiners follow schools of these pelagic fish, it is difficult, if not impossible, to predict how large or where the fleet will be at a given time. When working an area, the purse seine fleet is made up of a group of vessels. While searching, the vessels often move on erratic or zig-zag courses, trying to spot schools visually or on their sonar. Although the season for pelagic fishes is open all year, the CDF&G sets catch quotas. When quotas are filled, the fishery is over for that year unless an extended quota is subsequently issued. Purse seining would be precluded from within the anchor spread and from a cone-shaped area up-current of the MODU and anchor spread.

Table 5.2.22-1. Commercial Fishing Vessels within the Santa Barbara Channel Harbors (1990-1999).*

Harbor	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Annual Average
Line Gear											
Port Hueneme	6	5	1	4	4	9	7	4	7	5	5
Oxnard	47	41	24	35	46	59	54	59	49	61	48
Santa Barbara	57	64	73	77	94	90	91	109	71	83	81
Ventura	88	94	78	103	77	75	54	47	40	33	69
Gill Net or Purse Seine											
Port Hueneme	24	27	15	24	34	48	63	50	34	90	41
Oxnard	26	16	6	17	28	10	20	13	20	20	18
Santa Barbara	62	59	40	42	27	21	33	20	24	27	36
Ventura	80	68	50	55	49	53	56	40	38	61	55
Pot or Trap											
Port Hueneme	4	4	3	2	3	5	2	6	2	4	4
Oxnard	53	27	20	25	34	56	64	60	55	48	44
Santa Barbara	98	87	87	78	100	99	102	96	98	85	93
Ventura	38	35	39	33	34	42	57	36	42	29	39
Troll											
Port Hueneme	0	0	0	0	1	1	0	2	0	1	<1
Oxnard	1	0	0	0	0	12	4	7	13	2	4
Santa Barbara	1	5	0	5	8	56	23	22	34	20	17
Ventura	4	0	2	3	2	14	9	6	16	5	6
Other Gear											
Port Hueneme	36	62	45	4	16	22	2	2	2	3	19
Oxnard	126	116	116	119	111	118	90	84	74	72	103
Santa Barbara	287	308	319	297	280	215	176	144	130	134	229
Ventura	156	142	155	101	83	61	38	38	26	21	82

*Information taken from the HESS-1 Form.

The hook-and-line fishery targets primarily rock cod over relatively deep rocky outcrops. This is mostly a fall and winter month "fallback" fishery for fishers who use other methods during other times of the year. Typically a buoyed vertical longline with groups of baited hooks is placed in the water upcurrent of a rocky outcrop showing fish on a fathometer. The set drifts through the target area while another set or sets are baited and deployed. The sets are then retrieved downcurrent and the process is repeated. Hook-and-line rock cod fishing areas are limited, small areas, and are often separated by many miles (Kronman 1995). Hook and line fishing would be precluded from within the anchor spread and from a cone-shaped area upcurrent of the MODU and anchor spread.

Trolling for salmon, albacore, and occasionally bonito is done primarily in the Santa Maria Basin, and to a lesser extent in the Santa Barbara Channel, depending on the year and ocean conditions. As in the hook-and-line fishery, trollers are often in another fishery, and enter the troll fishery in the off-season of their principal fishery. Trollers work in highly variable areas, since this fleet targets highly migratory and widely ranging fish. Trolling would be precluded from within the anchor spread of the MODU.

Preclusion from the proposed drilling areas could cause low impacts on certain commercial fisheries during the proposed delineation activities, depending on the time of year. Also, anchor scars may cause short- to long-term trawling difficulties resulting in low impacts, depending on the bottom soils where the anchors are placed. These are essentially space-use conflicts, which is a common occurrence in all sectors of high-use areas with multiple user groups such as the Santa Barbara Channel and Santa Maria Basin.

IMPACTS UNIQUE TO EACH UNIT:

GATO CANYON.

Disruption of Fishing Operations. Gear damage and/or loss of fishing time would cause a potential short-term impact on commercial fishermen of the Gato Canyon Unit area. Fishermen in areas unaffected by the delineation drilling might experience short-term crowding and reduced catch as fishermen precluded from the Gato Canyon area fish alternate grounds. Drift and set netting and trawling are the most common gear types within the project area. Occasional purse seining operations for wetfish contribute relatively large catches. Similarly, irregular large catches of salmon and albacore in the troll fishery occur in the area. Hook and line fish occurs along hard bottom areas inshore from the proposed site. Generally, the following fisheries are active every year in the Gato Canyon Unit area out to Point Conception dependent on the time of year (Mike McCorkle, Pers. com.):

- From August through January the drift gillnet shark fishery occurs outside the 3 mile line from shore.
- From Oct. 1 thru May 30, ridgeback shrimp are fished in water depths of 90 fm and shallower.
- From Feb. 1 thru Nov. 1, spot prawns are trawled between 85 and 140 fm.
- During the winter, sea cucumbers are trawled between 60 and 90 fm.
- During the summer, sea cucumbers are trawled from the 1 mi line out to 40 fm.

In order to analyze the economic losses due to a decrease in catch of the target species and determine if these values exceed 10 percent of the annual value, landings must be estimated. Using CDF&G commercial fishing data, a determination of annual and average annual landings for Fish Blocks 654 and 655 was made (tables 5.2.22-2 and 5.2.22-3).

The ensuing analysis is based on the following assumptions:

- commercial trawl fishing effort would be precluded between the 45 fm isobath and the 200 fm isobath throughout CDF&G Fish Block 654 and 655;
- an average catch of the target species would have been taken in 2002 from CDF&G Fish Block 654 655.

The trawl fishery and the drift gill net fishery are the most likely to be impacted by the proposed project on the Gato Canyon Unit. The hook and line fishery would also be precluded from within the MODU anchor spread. It is not possible to predict whether the troll and purse seine fisheries would be active in the area due to the wide-ranging movements of the fish involved in these fisheries. The peak swordfish and thresher shark drift net season is October to December. The peak activity in the spot prawn and ridgeback shrimp trawl fishery is in the spring (March to June). The sea cucumber trawl fishery is most active from June thru September.

The thresher shark fishery in this part of the SBC has been impacted by the platforms on the Santa Ynez Unit. The area encompassed by the Gato Canyon Unit represents prime thresher shark drift net

Table 5.2.22-2. Primary Commercial Fish Catch (lbs) from CDFG Fish Block 654 (1989-1999).*

		1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Average
Purse Seine	Bonito				42,899	43,211							7,828
	Squid						29,982	189,609					19,963
	Total				42,899	43,211	29,982	189,609					27,791
Set Net	Rockfish (all spp.)		1,347										122
	Shark (all spp.)	307			5,410	6,402							1,074
	Halibut	655	4,427	5,430	11,976	8,192						2,957	3,058
	Total	962	5,774	5,430	17,386	14,594						2,957	4,282
Drift Net	Thresher shark						4,402		2,084	468			632
	Total						4,402		2,084	468			632
Troll	Salmon							72,352					6,578
	Total							72,352					6,578
Dive	Urchins	47,038	45,573	90,648	145,633	82,182	83,341	134,739	123,546	155,537	67,717	35,437	89,016
	Total	47,038	45,573	90,648	145,633	82,182	83,341	134,739	123,546	155,537	67,717	35,437	89,016
Trap	Rock Crab	2,213		18,828	22,068	9,375	11,327	17,050	14,322	26,753	9,023		11,905
	Lobster		1,543	4,103	4,392		10,677	15,695	12,784	21,494	15,441	6,764	8,445
	Total	2,213	1,543	22,931	26,460	9,375	22,004	32,745	27,106	48,247	24,464	6,764	20,350
Trawl	Sea cucumber		1,500		550	48,835	13,550	14,744	1,000	6,720	9,720	45,779	12,945
	Halibut						3,041			1,375			401
	Ridgeback Shrimp			11,218	1,153	5,797	12,884	9,810	17,103	20,309	21,584	130,779	20,967
	Spot Prawn					979	5,681	2,648	2,976	2,043			1,302
	Total		1,500	11,218	1,703	55,611	35,156	27202	21,079	30,447	31,304	176,558	35,616
Total catch (all spp.)		55,000	60,000	141,000	238,466	214,994	179,140	473,928	188,257	246,113	132,350	233,000	196,568

* CDFG data

Table 5.2.22-3. Primary Commercial Fish Catch (lbs) from CDFG Fish Block 655 (1989-1999).*

		1992	1993	1994	1995	1996	1997	Average
Purse Seine	Bonito	203,234		8,935			57,291	44,910
	Tuna	94,041						15,674
	Mackerel	200,500		395,000		5,074		100,096
	Sardine	80,500						13,417
	Squid				4,950	132,870	6,081	23,984
	Total	578,275		403,935	4,950	137,944	63,372	198,079
Set Net	Rockfish (all spp.)				2,938			490
	White seabass		2,002				4,935	1,156
	Halibut	5,079	1,675					1,126
	Total	5,079	3,677		2,938		4,935	2,772
Drift Net	Shark (all spp.)	6,805	26,274	6,124				6,534
	Total	6,805	26,274	6,124				6,534
Hook and Line	Rockfish (all spp.)				2,903	19,837	8,091	5,139
	White seabass				3,375	10,759	1,966	2,683
	Shark (all spp.)				1,618	4,989	4,881	1,915
	Total				7,896	35,585	14,938	9,737
Dive	Urchins	147,341	92,298	107,205	130,640	80,060	67,842	104,231
	Total	147,341	92,298	107,205	130,640	80,060	67,842	104,231
Trap	Rock Crab	12,133	5,164		6,627	39,022	19,790	13,789
	Lobster	1,757	1,253		2,032	6,547	11,514	3,851
	Total	13,890	6,417		8,659	45,569	31,304	17,640
Trawl	Sea cucumber	15,200	29,800	13,102	22,300		34,050	19,075
	Halibut			3,014		2,849	1,320	1,197
	Ridgeback Shrimp	1,655			34,711	141,981	216,139	65,748
	Spot Prawn			5,295	811		12,030	3,023
	Total	16,855	29,800	21,411	57,822	144,830	263,539	89,043
Total catch (all spp.)		774,082	163,683	546,929	225,305	468,090	462,290	440,063

* CDFG data

grounds (Fishermen scoping meeting, April 2001). Activity on the Gato Canyon Unit between August and January could affect this fishery and would likely cause moderate impacts if the rig were on site for 45-90 days of this season.

The hook and line rock cod fishery occurs along hardbottom areas inshore of the proposed drilling site and possibly within the anchor pattern of the MODU. This fishery is mostly a fall-back fishery for hook and line fishermen when weather precludes fishing the Point Arguello area. If the anchor spread of the MODU precludes hook and line fishing along the hardbottom inshore of the drilling site, these fishermen would experience low impacts.

If approved, drilling on the Gato Canyon Unit is scheduled to commence in the second quarter of 2003. This timing coincides with the peak months for spot prawn trawl in the area. These fishermen could experience moderate impacts due to preclusion from the spot prawn trawl grounds during the peak fishing months for this species. It would be difficult to schedule the proposed operations at a time that would avoid impacts to commercial fishing because the area is fished year-round for various species.

Anchor scars. One delineation well is proposed on the Gato Canyon Unit. The well site identified by the operator is in close proximity (2,100 ft) to a well site approved in the original Exploration Plan. The water depth at the site is approximately 230 m (755 ft). The proposed eight-point anchor spread predicted for the Gato Canyon Unit project is 760 – 1070 m (2500 – 3500 ft). As a general rule, it is estimated that the length of chain laying on the seafloor is about one quarter to one third of the anchor radius. Thus approximately 250 – 350 m (825 – 1155 ft) of chain is expected to rest on the seafloor for each of 8 anchors.

Some degree of lateral flexibility in anchor placement allows avoidance of potential sea floor hard bottom resources. A site-specific mooring analysis and ocean bottom surveys will be conducted to ensure correct anchor placement. The mooring analysis will factor in any subsea obstructions, obstacles, and hard bottom habitat. The anchors will be set to avoid these areas, and ensure that the anchors are placed in adequate soils to provide the required holding capacity. By using an anchor of sufficient holding power, drag related scarring could be minimized to the 3 – 30 m necessary to properly set the anchor. MEC Analytical Systems (1995) evaluated the area of anchor impacts on hard bottom from exploratory operations occurring between 1968 and 1989. The study showed that the width of anchor scars ranged from 1 – 8 m (3 – 25 ft) and the length averaged 250 m (820 ft).

The anchor scars would likely persist for 3 – 4 years in the soft sediments of the area. Impacts to commercial trawl fishers should be low due to the limited number of anchoring events.

BONITO UNIT

Disruption of Fishing Operations. Gear damage and/or loss of fishing time would cause a potential short-term impact on commercial fishermen of the Bonito Unit area. Set netting, trolling, and trawling are the most common gear types within the project area. Occasional purse seining operations for wetfish contribute relatively large catches. A drift gillnet fishery for thresher shark is occasionally active around the most southerly proposed well site. Generally, the following fisheries are active every year in the Bonito Unit area dependent on the time of year (Timoschuk, Pers. com.):

- The flatfish trawl fishery.
- The spot prawn trawl fishery.
- Rockfish trawl, hook-and-line, and set net fisheries.
- Salmon and albacore troll fishery.
- Drift gillnet for thresher shark at southern portion of the Bonito Unit

In order to analyze the economic losses due to a decrease in catch of the target species and determine if these values exceed 10 percent of the annual value, landings must be estimated. Using CDF&G commercial fishing data, a determination of annual and average annual landings for Fish Blocks 644 was made (table 5.2.22-4).

The ensuing analysis is based on the following assumptions:

- commercial trawl fishing effort would be precluded throughout CDF&G Fish Block 644;
- an average catch of the target species would have been taken in 2002 from CDF&G Fish Block 644.

The trawl fishery, set gillnet fishery, hook and line, and the troll fishery are the most likely to be impacted by the proposed project on the Bonito Unit. It is not possible to predict whether the purse seine fisheries would be active in the area due to the wide-ranging and sporadic movements of the fish involved in these fisheries into the area. The peak swordfish and thresher shark drift net season is October to December. The peak activity in the spot prawn trawl fishery is in the spring (April to June). The troll fishery for salmon is most active from May to August. Hook and line fishing for blackgill (sable fish) and rock cod also is common in the area.

Table 5.2.22-4. Primary Commercial Fish Catch (lbs) from CDFG Fish Block 644 (1989-1999).*

		1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Average
Purse Seine	Sardine							42,355					3,850
	Squid							172,848					15,713
	Anchovy							6580	19,780			4,407	2,797
	Total							221,783	19,780			4,407	22,361
Set Net	Rockfish (all spp.)		1,049	18,680	6,991	35,104	11,993	18,861		19,736			10,219
	Lingcod			417									38
	Sablefish									3,287			299
	Total		1,049	19,097	6,991	35,104	11,993	18,861		23,023			10,556
Drift Net	Swordfish	2182											198
	Total	2182											198
Troll	Salmon							3,200	1,094		7,308		1,055
	Albacore											112,394	10,218
	Total							3,200	1,094		7,308	112,394	11,272
Dive	Urchins			540			3,386						357
	Total			540			3,386						357
Trap	Spot Prawn										5,083		462
	Total										5,083		462
Trawl	Sole (all spp.)									11,060			1,005
	Halibut											1,114	101
	Rockfish (all spp.)						15,408			6,096			1,955
	Spot Prawn						18,025		2,411			1,566	2,000
	Total						33,433		2,411	17,156		2680	5,062
Total catch (all spp.)		2,210	1,509	19,935	7,149	36,019	56,171	249,443	24,565	61,834	13,689	120,927	53,950

* CDFG data

The Bonito Unit area is highly productive and heavily fished when weather permits. The canyons and hardbottom common to the area support a wide range of commercially sought species. About 6-12 trawlers fish this area regularly for spot prawn and for flat fish (rex and Dover sole) from April to August. Up to 9 hook and line fishermen seek black cod and rock cod in the area mostly heavily from June to February. The troll and gillnet fishery in the area is highly variable and may include from 5-50 fishermen depending on the year. From a commercial fishery standpoint, the lightest fishing in this area is from March to May when windy conditions often preclude fishing from the area.

If approved, drilling on the Bonito Unit is scheduled to commence in the second or third quarter of 2002. This timing coincides with the peak months for spot prawn and flatfish trawl, hook and line, and troll fishermen in the area. These fishermen could experience low to moderate impacts due to preclusion from the fishing grounds during the peak fishing months for these species. Other fisheries that could be impacted if the proposed delineation project were to occur at other times, include: pink shrimp trawl and salmon troll from April to August; drift gillnetting and rockfish set nets and set longlines from October to December.

Anchor scars. One to two delineation wells are proposed on the Bonito Unit. The well sites identified by the operator were approved in the original Exploration Plan. The water depth at the sites is approximately 1,000 ft. The proposed eight-point anchor spread predicted for the Bonito Unit project is about 915 m (3.000 ft), but could extend as far as 2,135 m (7,000 ft) representing approximately 5.5 mi^2.

Some degree of lateral flexibility in anchor placement allows avoidance of potential sea floor hard bottom resources. A site-specific mooring analysis and ocean bottom surveys will be conducted to ensure correct anchor placement. The mooring analysis will factor in any subsea obstructions, obstacles, and hard bottom habitat. The anchors will be set to avoid these areas, and ensure that the anchors are placed in adequate soils to provide the required holding capacity. By using an anchor of sufficient holding power, drag related scarring should be minimized to the 3 – 30 m necessary to properly set the anchor. The anchor scars would likely persist for 3 – 4 years in the soft sedi-

ments of the area. Impacts to commercial trawl fishers should be low due to the limited number of anchoring events.

The proposed drilling program and associated activities on the Bonito Unit are expected to take 88-90 days.

POINT SAL UNIT AND PURISIMA POINT UNIT.

Disruption of Fishing Operations. Gear damage and/or loss of fishing time would cause a potential short-term impact on commercial fishermen of the Point Sal and Purisima Point Unit areas. Set netting, trolling, crab trap, trawling, and purse seining are the most common gear types within the project area. Generally, the following fisheries are active every year in the area dependent on the time of year (Timoschuk, Pers. com.):

- The flatfish trawl fishery.
- The pink shrimp and spot prawn trawl fishery.
- Rockfish trawl, hook-and-line, and set net fisheries.
- Salmon troll fishery.
- Halibut trawl fishery inside the 45 fm isobath to the 3-mi State boundary.
- Purse seining for wetfish.
- Rock crab (shore to 50 fm) and Dungeness crab (shore to 70 fm) trap fishery.

In order to analyze the economic losses due to a decrease in catch of the target species and determine if these values exceed 10 percent of the annual value, landings must be estimated. Using CDF&G commercial fishing data, a determination of annual and average annual landings for Fish Blocks 632 and 638 was made (tables 5.2.22-5 and 5.2.22-6).

The ensuing analysis is based on the following assumptions:

- commercial trawl fishing effort would be precluded throughout CDF&G Fish Blocks 632 and 638;
- an average catch of the target species would have been taken in 2002 from CDF&G Fish Blocks 632 and 638.The trawl fishery, set gill net fishery, wetfish purse seine fishery, crab trap fishery, and the troll fishery are the most likely to be impacted by the proposed project

Table 5.2.22-5. Primary Commercial Fish Catch (lbs) from CDFG Fish Block 632 (1989-1999).*

		1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Average
Purse Seine	Sardine							146,144					13,286
	Squid						1,454,179						132,198
	Total						1,454,179	146,144					145,484
Set Net	Rockfish (all spp.)						6,500						591
	Total						6,500						591
Drift Net	Thresher shark								5,335	5,938			1,441
	Total								5,335	5,938			1,441
Troll	Salmon						1,408	12,899		3,344			1,605
	Albacore									11,985			1,090
	Total						1,408	12,899		15,329			29,636
Hook & line	Rockfish (all species)						9,898	8,965	30,630	8,102	4,717	9,203	6,501
	Total						9,898	8,965	30,630	8,102	4,717	9,203	6,501
Trap	Rock Crab	50,378		137,411	199,850	166,086	121,832	40,196	25,719	13,792	18,250		70,319
	Dungeness Crab			25,322	32,192	59,306	101,302	18,809	2,438				21,761
	Total			162,733	232,042	225,392	223,134	59,005	28,157	13,792	18,250		87,500
Trawl	Sole (all spp.)									25,237	7,227	19,865	4,757
	Halibut									4,256			387
	Pink Shrimp						11,052			48,091		30,459	8,146
	Spot Prawn					6,803	12,363	1,803	3,276	3,184			2,494
	Total					6,803	23,415	1,803	3,276	80,768			10,551
Total catch (all spp.)		50,525	0	165,379	235,379	234,230	1,734,465	239,870	76,225	129,831	70,540	91,616	275,278

* CDFG data

Table 5.2.22-6. Primary Commercial Fish Catch (lbs) from CDFG Fish Block 638 (1989-1999).*

		1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	Average
Purse Seine	Sardine							580,511	957,289	4,413,250	49,112		545,469
	Anchovy								26,200	688,730			64,994
	Squid						4,033,695	3,937,098	4,967,027	9,220,909	149,373	42,663	2,031,888
	Mackerel						500	499,602	146,821	350,256	486,323		134,864
	Bonito					47,150		3,618	14,429				5,927
	Total					47,150	4,034,195	5,020,829	6,111,766	14,673,145	684,808	42,663	2,783,141
Set Net	Rockfish (all spp.)						26,028			9,484			3,228
	Shark (all spp.)								2,908				264
	Halibut											3,749	341
	Total						26,028		2,908	9,484		3,749	3,834
Troll	Salmon					364		13,472	8,770	9,500			2,919
	Albacore											44,782	4,071
	Total					364		13,472	8,770	9,500		44,782	6,990
Hook & Line	Rockfish (all species)			701	640				6,707	4,366			1,129
	Total			701	640				6,707	4,366			1,129
Trap	Rock Crab	3,336	1,980		675								545
	Dungeness Crab					1,017	999						183
	Total	3,336	1,980		675	1,017	999						728
Trawl	Pink Shrimp						500						45
	Spot Prawn					6,803	10,823		5,699				2,120
	Total					6,803	11,323		5,699				2,166
Total catch (all spp.)		3,949	1,980	1,480	2,121	234,230	4,077,727	5,035,360	6,140,692	14,697,823	686,329	96,850	2,816,231

* CDFG data

on the Point Sal and Purisima Point Units. A drift gillnet fishery for swordfish and thresher shark occasionally produces high catches. However, it is not possible to predict whether the drift net fisheries would be active in the area due to the wide-ranging and sporadic movements of the fish involved in these fisheries into the area. The peak swordfish and thresher shark drift net season is October to December. The peak activity in the spot prawn and pink shrimp trawl fishery is in the spring (April to September), though this fishery generally occurs just outside the proposed drilling sites (Fisherman scoping meeting, April 2001). The troll fishery for salmon is most active from May to August. Rock crab traps are found year-round, while peak Dungeness crab activity is from December to April. Peak activity in the flatfish trawl fishery occurs from October to May. The rockfish trawl can occur year-round, but is governed by quotas and trip limits.

About 6 trawlers regularly fish the area for halibut during all months of the year. The anchor spread of the MODU would likely preclude halibut trawlers from a portion of the halibut fishing grounds in the area. Low to moderate impacts could be expected depending on the placement of the anchors.

About 12 to 15 trap fishermen from Avila and Morro Bay fish for Dungeness crab in the Point Sal and Purisima Point area from November to June. Rock crab fishermen fish the area during all months of the year. These fisheries would be precluded from within the anchor spread of the MODU and conflicts with support vessels would be expected. Low to moderate impacts to the trap fishery would be expected from the proposed activities.

The troll fishery for salmon is highly variable in the area. From 5 to several hundred fishermen may participate depending on the year and stock abundance. The peak season is from May to August. Low to moderate impacts would be expected depending on the level of fishing activity.

If approved, drilling on the Point Sal and Purisima Point Units is scheduled to commence in the fourth quarter of 2002. This timing coincides with the peak months for the flatfish (including snad dabs, English sole, and halibut) and rockfish trawl fisheries in the area. Crabs traps will likely be set during this time also. These fishermen could experience moderate impacts due to preclusion from their fishing grounds during the peak fishing months for these species.

Anchor scars. One delineation well is proposed on the Point Sal Unit. The potential well sites identified by the operator were approved in the original Exploration Plan. The water depths at the site are approximately 90 m (300 ft). The proposed eight-point anchor spread predicted for the Point Sal Unit project is 335 – 580 m (1,100-1,900 ft), but could extend out to 630 m (2100 ft).

Some degree of lateral flexibility in anchor placement allows avoidance of potential sea floor hard bottom resources. A site-specific mooring analysis and ocean bottom surveys will be conducted to ensure correct anchor placement. The mooring analysis will factor in any subsea obstructions, obstacles, and hard bottom habitat. The anchors will be set to avoid these areas, and ensure that the anchors are placed in adequate soils to provide the required holding capacity. By using an anchor of sufficient holding power, drag related scarring should be minimized to the 3 – 30 m necessary to properly set the anchor. The anchor scars would likely persist for 3 – 4 years in the soft sediments of the area. Impacts to commercial trawl fishers should be low due to the limited number of anchoring events..

The proposed drilling program and associated activities are expected to take 68 days at each site.

5.2.22.1.1 SUMMARY OF IMPACTS AND CONCLUSION.

The proposed well sites are all located within established commercial fishing grounds for all the major gear types of the region. Fishermen of all gear types will be precluded from fishing in the vicinity of the MODU for up to 90 days at each well site. This represents over half the open season for some target species and will likely impact the peak fishing season of one or more species regardless of the timing of the proposed project. The trawl fishery may also experience long-term impacts due to artificial obstructions, such as drill muds and cuttings, anchor scars, and lost debris. Because of these conflicts, fishermen may lose valuable fishing time and space during the project, and in the case of trawlers, perhaps even after the completion of the project. Furthermore, fishermen who are precluded from the MODU site will likely fish alternate areas during the proposed project. This may result in overcrowding of alternate fishing grounds and could impact the income of the primary fishers of those grounds.

The measures the operators have proposed to reduce conflicts and encourage communication with the commercial fishing industry during the proposed project have been shown to be effective during past OCS activities. If the measures are incorporated, the impacts to the commercial fishing industry should be addressed and minimized to the maximum extent feasible. The impacts would be expected to be low.

5.2.22.1.2 PROPOSED MITIGATION.

Mitigation CF1: MMS will consult with both industries to verify that conflicts have been discussed and negotiated to the satisfaction of both industries. If negotiations between the operators and commercial fishermen fail to resolve conflicts to the satisfaction of MMS, MMS will meet with both industries to identify space-use conflicts and feasible mitigation measures.

5.2.22.2 CUMULATIVE IMPACT ANALYSIS FOR COMMERCIAL FISHING (2002-2006)

Section 5.0 describes the projects considered in the cumulative analysis for the proposed delineation activities. Possible sources of cumulative impacts in the project area include on-going and proposed oil and gas activities in Federal and State waters that may cause space-use or preclusion conflicts, and accidental or upset conditions (oil spills or hydrogen sulfide gas releases). Alaskan and foreign-import tankering, dredging and discharge of dredged material, aquaculture, coastal development, agriculture runoff, and commercial and recreational fishing also add to the cumulative impacts on commercial fishing.

Damage to the fish resources from activities including dredging and discharge of dredged material, aquaculture, coastal development, offshore oil and gas development, agriculture runoff, and commercial and recreational fishing add to the cumulative impacts on commercial fishing. These impacts are analyzed in section 5.2.6 Impacts on Fish Resources.

The projects discussed in this section include past, present, and foreseeable actions that may produce impacts during 2002-2006, the expected duration of the proposed delineation activities. Potential cumulative impacts are discussed below.

CUMULATIVE IMPACTS WITHOUT THE PROPOSED ACTION (2002-2006):

Oil and Gas Activities. Section 5.0 describes the offshore oil and gas activities that may result in impacts to the commercial fishing industry. These include geophysical surveys, construction, drilling and production activities with associated support activities, and the abandonment, or decommissioning, of wells and offshore facilities. As discussed in section 5.2.22.1, the major impact agents expected from these proposed activities are space-use and preclusion conflicts. There is an oil spill risk associated with ongoing OCS and State oil and gas development activities, and with the tankering of Alaskan and foreign-import oil through the area. The potential lethal and sub-lethal impacts to fish resources resulting from offshore oil and gas activities may also impact the commercial fishing industry and are discussed in section 5.2.6 Impacts on Fish Resources.

Space-use and Preclusion conflicts. Section 5.2.22.1 discusses the potential impacts to the commercial fishing industry from support vessel and helicopter traffic, and anchoring. The potential impacts from geophysical surveys, construction, oil spills, and platform-based development and production operations including pipelines are discussed below.

Geophysical Surveys. Section 5.0 describes past geological and geophysical survey activities in the Pacific OCS Region. Since 1963, more than 400 geological and geophysical surveys, including both 2-D and 3-D seismic surveys, have been conducted in the Santa Barbara Channel and Santa Maria Basin (table 4.0.1-1), and many others have occurred in state waters. Most of these surveys occurred during the 1970s and 1980s; the most recent seismic survey offshore southern California was the Exxon 3-D seismic survey conducted in the western Santa Barbara Channel in 1995 (MMS, 1995). Additional 3-D seismic surveys may occur during the next few years. However, no Pacific OCS operators have approached MMS with proposals to conduct such surveys to date.

The direct effects of air gun acoustic energy on fish resources were analyzed in section 5.2.6 Impacts on Fish Resources. This section will discuss the behavioral effects of airgun acoustic energy on fishery resources, and the space-use conflicts commercial fishermen will experience during a seismic survey.

High energy seismic surveys are conducted from a large support vessel that tows an energy source (airguns) and hydrophone receivers. A computer onboard the support vessel collects and processes the data received from the hydrophones. The energy source towed behind the support vessel consists of linear subarrays (at least seven airguns/array) of 28-64 airguns. The hydrophones towed behind the airgun array consists of 1 – 12 cables in parallel, with up to 100 sensors/streamer cable, and may be up to 8000 m long and covers an area 780 m across. Maneuverability of the support vessel during seismic operations is limited and other activities within the survey area are generally precluded.

Some commercial and recreational fishermen will experience short-term preclusion from the area during a seismic survey. This is essentially a space-use conflict, which is a common occurrence in all sectors of high-use areas with multiple user groups such as the Santa Barbara Channel. A seismic vessel with about 3 km (2 mi) of towed cables will be in the operations area 24 hrs a day for up to 30 days, and will traverse the area continuously during this time. Some types of fishing could be potentially affected by the proposed project more than others. Fixed gear fisheries (i.e. crab and lobster traps, set gillnets, set longlines) are the most vulnerable because they cannot move, and it is difficult to see the marking buoys in high seas. The close lane spacing and non-stop nature of the survey makes it nearly impossible to avoid interference with any commercial fishing operation that would happen to be within the survey area. Commercial fishermen including trawl, drift and set gillnet, purse seine, troll, hook and line, and trap fishermen will be precluded from fishing within the survey area for the duration of the survey.

Trawl fishing is a mobile fishery. But with nets deployed, a trawling vessel is not readily maneuverable relative to a nearby working seismic survey vessel (including up to 3-km of hydrophone streamer being towed behind the survey vessel). The net is on the bottom and in fairly deep water can be a mile behind the vessel. Trawlers often work on the top edges of steep drop-off slopes; to turn into deeper water would force the net to drop off these slopes. This causes loss of fishing time since the net has to be picked up and reset. Similarly, rocky outcrops, wrecks, or other debris are located randomly with respect to the trawl grounds. These features are hazards to the trawler because of their potential to snag and hang up the net. Through trial and error, trawlers become aware of most of the snags to avoid in favored grounds. Knowledge of these snags also limits the potential maneuverability of the trawler when towing a net(s). Turning into such a snag may mean loss or damage to the net(s), and potential hazard to the vessel itself if the hang is significant and/or weather/sea conditions are unfavorable. Since turning into such obstructions would be hazardous, most trawlers would have to stop towing and pull their gear in rather than turn.

Drift gillnets may be a mile or mile and half in length and have restricted ability to maneuver, as do seismic survey vessels with 3 km of towed cables. The end of the gillnet not attached to the fishing vessel usually has a radar reflector/lighted buoy attached to it, but may not be immediately obvious because it is so far from the vessel. Since drift gillnetting is usually done at night, and often during the darker phases of the moon, it is difficult for other vessels to be aware of the configuration of drift gillnet operations. A drift gillnet up to 2000 m (6,000 ft) long and 20-30 m (60-100 ft) deep can be fished anywhere from right at the surface to 10-15 m (30-40 ft) below the surface.

Purse seining for wet fish (i.e. mackerel, anchovies, squid) may also be impacted seismic surveys. The vessels, in the 35 to 70 feet size range, are distinguishable by the extra pursing skiff usually carried astern, and the tall boom and winch for pursing and hauling in the seine. When a school of fish is spotted, the vessel maneuvers into position near the school and launches the skiff, which drags the seine around the school of fish and back to the mother vessel. The purse line of the seine is rapidly winched in to close the bottom of the net, and the entire net is then brought in with a power block and winch. A successful set and haul usually takes from 30 to 90 minutes, depending on the size of the fish school, weather, and other factors. During the pursing process, the purse seine vessel is not maneuverable, and can be considered dead in the water.

Trolling is done primarily in the SMB, and to a lesser extent in the SBC, depending on where the fish are from year to year. A troller is most often a relatively small vessel (from 20 to 40 feet long). Trolling gear can trail the vessel by 100 to 300 feet. Trollers work in highly variable areas, since this fleet targets highly migratory and widely ranging fish. As in the hook and line fishery, trollers are often in another fishery, and enter the troll fishery in the off-season of their principal fishery.

Gear loss or damage is a common complaint during seismic operations, especially for fixed gear fisheries. Nets or buoys and hydrophone streamers can become entangled, or traps can be dragged off. For fishermen, the cost of replacing the equipment is coupled with the loss of income while the equipment is being replaced. For the seismic survey contractor, the cost of repairs and downtime incurred with untangling the fishing equipment from the streamers can be substabtial.

Gear damage and/or loss of fishing time would cause a potential seasonal impact on commercial fishermen. Some fisheries, such as salmon and tuna troll, are seasonal and of short duration. These fisheries are typically highly profitable to the fishermen who target them successfully and serve as a major source of income. A seismic survey that conflicts with one of these short seasons can cause serious monetary impacts to the fishermen.

Airgun energy appears to have behavioral effects on fish. Generally, pelagic schooling fishes seem to swim away and leave the area, while demersal fishes appear to respond by flattening to the bottom. Pearson et al. (1987) exposed several species of rockfish to acoustic energy in a controlled test. Three behavior patterns were noted: (1) the school dove to the bottom and remained motionless; (2) the school dove to midwater and swam rapidly in changing directions; and (3) the school broke into smaller schools and fled in different directions. These patterns were not always maintained throughout the exposure, indicating that fish may habituate to the sound. The fish returned to their pre-exposure behavioral patterns within minutes after the end of the sound presentations eliciting responses. Rockfish aggregations, as measured by fathometer, showed no significant areal difference between control and seismic sound emission trials, although a decrease in aggregation height was detected (Pearson et al., 1987). Perhaps more importantly, this study showed a decrease in CPUE (catch per unit effort) of 52.4 percent during air gun exposure. However, the study did not conclude how long this decrease in CPUE would be expected to last or over how great a distance this reduction might occur.

Studies by Engas et al. (1993) and Lokkeborg and Soldal (1993) have attempted to look at the areal extent of seismic survey effects on behavior and catchrates of cod and haddock during air gun operations and on catchability after cessation of all seismic activity. Although the species in question are not found in

the Santa Barbara Channel, they have swimbladders and form aggregations. Significant catch reductions were found to occur at least 10 km (6 mi) in extent from the seismic survey area (Lokkeborg and Soldal, 1993). Engas et al. (1993) found that distribution of both species had not returned to all pre-survey levels (as seen by hydroacoustics, trawl and hook-and-line sampling) during the 5 days after air gun shooting had ceased. There was some indication of a return to normality in longline catches of cod, but not haddock, within the 5 days, but no recovery was found by either trawling or acoustic methods. Both studies concluded that the fish would not have continued to actively avoid the survey area after the cessation of airgun shooting. The studies cited above demonstrate that it is difficult to support statements that attempt to measure the magnitude of behavior effects and to translate them into a decrease in catchability.

A number of experiments have exposed adult invertebrates to high level sounds and the intense shock waves generated by high velocity explosives with apparently little effect. The effects from airgun seismic arrays would be far less than those seen from high explosives. McCauley (1994) reports one of the few instances where pre- and post-seismic survey effects on the prawn fishery have been monitored. No changes were observed in the catch rate of prawn before and after a seismic survey in summer 1991 off the southwest coast of Australia. The study monitored cooperative fish data, which is believed to reflect a true test of the catchability of prawn by trawl fishing in that area. It is unlikely that an airgun seismic survey would have a residual effect on the catchability of prawn, crabs, or lobster.

There appear to be no experiments specific to effects of noise from seismic activity on shark behavior. The diving and avoidance responses to intense sound reported for many fish species is in some part due to the presence of a swimbladder (Turnpenny and Nedwell, 1994). Since all sharks lack a swimbladder, the magnitude of avoidance response is expected to be limited. There is no doubt that sharks exhibit a rapid, direct approach to a variety of underwater sound sources. Certain observations suggest that under specific circumstances sharks may also withdraw from such a source as quickly as they are attracted to it. Myberg et al. (1978) elicited a limited rapid withdrawal response from two species of pelagic sharks and discussed a similar pattern observed from one species of inshore shark. After initial attraction to within 3 m (10 ft) of a sound source, both pelagic and coastal sharks would immediately and rapidly veer away from the source if there was an abrupt and large increase in sound transmission. The sharks would withdraw beyond 30m (100 ft) of the sound source for 20 to 60 minutes. Habituation (no withdrawal) of all species to changes in sound transmission was apparent during successive tests and occurred within 2 to 40 minutes. It is unlikely that an airgun seismic survey would have a residual effect on the catchability of sharks.

In conclusion, seismic surveys preclude commercial fishermen from the area of the survey for the duration of the survey. Furthermore, fishing success may be adversely affected for up to 10 days following the survey. This decline in fishing success due to behavioral response may be experienced as far as 10 km (6 miles) from the survey area.

Construction and Operations. As described in section 5.0, construction activities include the installation of platform jackets and topsides, the laying of pipelines, platform hook-up and commissioning, and the initiation of drilling. Operations include the daily traffic between bases and installations, and maintenance of the platforms and pipelines on the Pacific OCS. From 1967 to 1992, 19 OCS platforms and associated pipelines were installed in the Santa Barbara Channel and Santa Maria Basin (table 4.0.1-6). All of these platforms are still in place. Seven offshore platforms were installed in State waters in this area between 1958 and 1966, but only one, Platform Holly near Goleta, remains. No new offshore construction is expected to occur during the 2002-2006 duration of the proposed exploration activities.

The primary impacts to commercial fishermen from construction and operations of the offshore oil and gas industry include: conflicts with vessel traffic; loss of harbor space; loss of commercial fishing grounds due to debris littering the seafloor, anchor scars from exploration and development activities and pipelines, and platforms and pipelines placed on traditional fishing grounds. In fact, several local associations including the Central Coast Hook and Line Association and the Southern California Trawlers Association, were formed to defend its constituents against the impacts of offshore development (Kronman, 1995).

Development and Production. Section 5.0 describes offshore development and production activities in the Pacific OCS Region. There currently are 23 offshore platforms in the Pacific OCS Region. Of these, 4 are in the Santa Maria Basin, 15 are in the Santa Barbara Channel, and 4 are in San Pedro Bay. As of April 2000, more than 1,200 wells had been drilled in the Pacific OCS Region. This number includes 881 oil and gas development wells drilled from platforms and 326 exploratory wells drilled from a variety of rigs, including mobile offshore drilling units (MODUs), jack-ups, barges, and drill ships. Currently, based on data from 1996 through 1999, slightly less than 2 development wells per month are begun from Region platforms. No exploratory wells have been drilled in the Pacific Region since 1989.

Commercial trawlers have experienced the greatest impacts, and claim to have lost 40% of historic trawl grounds due to mobile drill rigs, platforms, processing ships, pipelines, mud mounds, anchor scars,

and debris (Mike McCorkle, pers.com.). Generally, a trawler will give a wide berth to obstructions if there is no particular reason to go closer. One-quarter mile is the expected buffer, however some fishermen of southern California may trawl within 200 – 300 feet of a fixed oil platform (without anchoring systems) if the fishing is good. Based on experience in southern California, fishermen do not avoid pipelines except for specific locations, which may cause a severe snag (Centaur, 1981).

Gear loss and damage problems have been documented in the Santa Barbara Channel since the late 1960's (Richards, 1990). The problems were believed to be caused by obstructions such as exposed well heads, snags on pipelines, and debris left around completed exploratory wells and platforms. In the early 1970's, commercial fishermen worked with California Sea Grant and the USGS to open lines of communication with the oil companies to find a solution to the gear loss problem. An informal communications system was set up between the trawl fishermen and the oil industry with USGS and Sea Grant as intermediaries. Some of the results included the translation of wellhead positions on Lambert grid maps (used by the oil industry) into Loran C positions (used by fishermen). The USGS also requested that oil companies abandon any wells left in the SBC of which there were no plans to re-open at a later date. In 1978, trawl fleet representatives were invited to review plans for a pipeline to be constructed between Platforms Hope and Grace in the SBC. The fishermen felt the pipeline would cause no particular problems if joints and flanges were covered and no other obstruction such as anodes or buoys were left exposed on the pipe to snag nets and otter doors. However, after completion of the pipeline, the trawl fishermen found they could no longer work in the 9-mile long area adjacent to the pipeline due to mudding of their nets, later found to be the result of anchor scars in the viscous mud sediment left by the pipe-laying barge. The problem was eventually ameliorated by natural processes when major storms in 1983 filled in many of the trenches.

Fishing vessels that drift with the currents while working are precluded from the upwind or upcurrent side of surface structures such as platforms or drill rigs. The buffer distance for purse seines and hook and line (buoyed vertical longlines) fishers from a surface structure is approximately 1 mi. This applies to the altitude of a triangle upwind or upcurrent from the structure. The base of this triangle is taken as one half mile (2640 ft). Drift longlines and gillnets may be precluded up to 10 – 20 miles upcurrent of a surface structure (Centaur, 1981). The minimum buffer zone for these vessels is taken as 200 ft for the maneuvering distance needed for vessels to place their gear.

Hook and line (rod and reel and set longlines), and pot and trap fishermen can fish virtually next to the surface structure in areas of rich catch. In the case of dense supply boat traffic associated with operating platforms, and in the case of hydrogen sulfide gas handling on the platform, the buffer zone is taken as 800 ft. In the case of mobile drilling rigs with anchor spreads, hook-and line fishermen would be precluded within the radius of the anchor spread.

At some platforms on the Pacific OCS, fishermen are precluded from an area up to 840 feet downwind from the platform due to the dangers of a hydrogen sulfide gas release. There is no regulation requiring fishermen to avoid this hazard zone, however fishermen should be aware of the dangers and have an exit strategy crosswind from these platforms should they decide to work in this hazard zone.

Since 1984, fishermen have been invited, via the Joint Oil/Fisheries Liaison Office (JOFLO) to comment upon or help plan offshore oil and gas projects such as pipelines and anchor patterns for exploratory rigs in order to help avoid future impacts.

Vessel Traffic. Section 5.0 discusses crew and supply boat operations in the Pacific OCS Region. Current levels of support vessel traffic for offshore platforms in both Federal and State waters are presented in table 4.0.1-6. Support of development and production activities in the eastern and central Santa Barbara Channel primarily involves crew and supply boats. Crew changes for platforms in the Santa Maria Basin are conducted by helicopter (see discussion in next section), resulting in lower levels of support boat traffic. In the Channel and Basin, approximately 90-140 crew boat and 10-12 supply boat trips are made each week. An additional 25 crew boat trips are made each week to State Platform Holly. Support vessels operate out of Port Hueneme, Ventura Harbor, Carpinteria Pier, or Ellwood Pier. It should be noted that many of these trips, particularly to the platforms off Carpinteria, are relatively short and that many trips may service more than one platform.

Vessel traffic has the potential to conflict with commercial fishing operations through right-of-way interactions, and gear damage if vessels travel through crab and lobster grounds. These conflicts have been effectively mitigated through the Joint Oil/Fisheries Liaison Office (JOFLO). JOFLO helped draft guidelines that established voluntary, ¼-mile-wide corridors in which crew and supply boats could remain when traveling between offshore platforms and supply bases. The Santa Barbara Channel/Santa Maria Basin Oil Service Vessel Traffic Corridor Program is intended to minimize interactions between oil industry operations and commercial fishing operations. It was developed cooperatively by the two industries through the Joint Committee. In addition to providing transit corridors in and out of area ports, the program routes

support traffic along the Channel seaward of an outer boundary line. East of Gaviota, the outer boundary is defined by the 30-fathom line; west of Gaviota, and north of Point Conception as far as Pedernales Point, it follows the 50-fathom line. In the area west of Gaviota, the 50-fathom line is 4 km (2 nm) or more offshore.

Transit to and from drilling sites occurs within vessel corridors established for oil and gas service vessels in the SBC. Although vessel traffic increases during exploration and development activities, the oil industry would minimize conflicts with commercial fishermen by traveling within the established corridors. Conflicts are more likely to occur in the SMB where traffic corridors have not been established due to minimal oil and gas activity in the area. Conflicts can be mitigated by negotiating traffic corridors to the proposed well sites on the Purisima Point and Point Sal Units.

As discussed in section 5.0, the highest levels of support vessel traffic to a platform may be expected during the construction phase. During this phase, crew boat trips may occur as often as three times per day and supply boat trips twice per day for brief periods (table 4.0.1-7).

Aircraft. Section 5.0 discusses support helicopter operations in the Pacific OCS Region. Current levels of support helicopter traffic for offshore platforms in both Federal and State waters are presented in table 4.0.1-6. As discussed in section 5.0, the highest levels of support helicopter traffic to a platform may be expected during the construction phase. During this phase, helicopter trips to a single platform may occur as often as 7 times per day for brief periods (table 4.0.1-7). Support helicopter traffic is confined to platforms in the western Santa Barbara Channel and Santa Maria Basin, where 6-8 helicopter trips occur per day. These flights originate from the Santa Barbara and Santa Maria airports.

Some fisheries use spotter planes to track fish movements in the SMB and SBC. Based on past experience and the volume of air traffic, negligible impacts have occurred to the commercial fishing industry from helicopter traffic to oil and gas platforms.

Offshore Facility Decommissioning. Section 5.2.6 Impacts to Fish Resources discusses the process of exploratory well abandonment and the associated potential impacts to marine fish resources. Section 5.0 describes the processes involved in decommissioning offshore facilities. For purposes of analysis, it is assumed that decommissioning would encompass the complete removal of a platform and associated pipelines, with none of the leg structure left in place to form an artificial reef, and any shell mounds removed to make the area trawlable again. To date, only one OCS facility in the Pacific Region has been decommissioned—the Offshore Storage and Treatment (OS&T) vessel that formerly served the Santa Ynez Unit platforms in the Santa Barbara Channel. In addition, six offshore platforms in State waters in the Channel have been removed—two in 1988 and four in 1996 (table 4.0.1-6). No offshore decommissioning activities are expected to occur in either Federal or State waters during the 2002-2006 duration of the proposed exploration activities.

Commercial fishermen would be precluded from approximately 7 mi^2 around the platform during the decommissioning process.

Oil Spills. As discussed in section 5.0, the cumulative oil spill risk for the project area results from several sources: ongoing and projected oil and gas production from existing OCS facilities in the Santa Barbara Channel and Santa Maria Basin, several proposed exploration and development projects on the Federal OCS, ongoing production from one facility in State waters in the Santa Barbara Channel, two likely oil and gas projects in State waters, and the tankering of Alaskan and foreign-import oil through area waters. Table 5.1-1 presents the estimated mean number of spills of various sizes and the probability of their occurrence as a result of the described activities.

The most likely scenario for the proposed project is that one or more oil spills in the 50-1,000-bbl range would occur from offshore oil and gas activities over the life of the period (2002-2006), and that such a spill would be 200 bbl or less in volume. There is a 73.9 percent probability that one or more spills in this range will occur over this period (table 5.1-1). The maximum reasonably foreseeable oil spill volume from offshore oil and gas activities is 2,000 bbl, assumed for purposes of analysis to be a pipeline spill. The probability of a spill this size occurring over the period 2002-2006 is 23. 3 percent (table 5.1-1). Based on data from tanker spills in U.S. waters, the mean size for a tanker spill is assumed to be 22,800 bbl (with a probability of occurrence of 38.8 percent for this period; table 5.1-1). The rationale for these estimated spill sizes is presented in section 5.0. The potential impacts to the commercial fishing industry in the project area from spills of each of these three sizes are discussed below.

The level of impacts from such spills will depend on many factors, including the type, rate, and volume of oil spilled and the weather and oceanographic conditions at the time of the spill. These parameters would determine the quantity of oil that is dispersed into the water column; the degree of weathering, evaporation, and dispersion of the oil before it contacts a shoreline; the actual amount, concentration, and composition of the oil at the time of shoreline or habitat contact; and a measure of the toxicity of the oil.

The impacts of oil on marine fish resources are analyzed in section 5.2.6.2. An oil spill in the range of 200-23,000 bbl offshore California would result in low impacts to marine fish resources of the region. Any

direct mortalities to fish would probably occur only in the egg and larval stages found in the surface waters in the immediate vicinity of the spill. Elevated hydrocarbon levels in nearshore invertebrates would be likely, leading to increased stress and potential decreases in growth and reproduction in fish feeding upon the invertebrates. These effects are expected to be short-term under normal conditions; however, oil may become sequestered in the sediments of low-energy embayments and persist for years.

The primary impacts to commercial fishermen would likely be space-use and preclusion conflicts associated with oil spill clean-up. If an oil spill were to occur near a harbor, the harbor would likely be closed and fishermen would not be able to leave the harbor to work. Fishermen would also be precluded from fishing in the area of the spill due to fouling of their boats and equipment, and potential closures of some fisheries due to tainting by the oil. This could result in crowding of fishing grounds when fishermen are forced to leave the closed areas. The closing of the area near an oil spill would likely last from 5 to 15 days depending on the size of the spill and ocean conditions.

Closure of a Harbor. If a large spill contacts a port, oil containment booms could be placed across the mouth of the port. The Coast Guard might also close a port temporarily to avoid contamination of the area from vessels returning form the oil spill site. If fishing vessels are prevented from leaving port, as occurred during the 1969 Santa Barbara oil spill, economic losses could be high depending on the season and the length of time the port is closed. A 2,000 to 23,000-bbl oil spill that contacts a port and results in the closure of the port for 15 or more days would cause moderate impacts to commercial fishermen, and might even force a few fishermen out of business if it occured during a peak fishing season.

Tainting of Fish. Fish can accumulate hydrocarbons from contaminated food, although this is a temporary effect since fish metabolize hydrocarbons, and can excrete both metabolites and parent hydrocarbons from the gills and the liver (NRC, 1985). Nevertheless, certain fisheries within an oil spill zone are usually closed and public perception also impacts the marketability of fish caught near an oil spill. Commercial fishermen would likely sustain low impacts for approximately one month after a spill and would need to fish another area temporarily. This could lead to crowding of the alternate fishing grounds and lead to low impacts to the fishermen who use these grounds as their primary fishing area.

Fouling of Fishing Gear and Vessels. Oil spills can potentially cause economic losses to commercial fishermen by contaminating fishing gear and vessels. Oiled vessels would need to be cleaned, and oiled gear either cleaned or replaced. This would result in lost fishing opportunity while fishermen wait for vessels and gear to be cleaned or replaced. Fishermen would be expected to fish alternate areas to avoid fouling their gear and vessels, leading to crowded alternate fishing grounds for approximately one month. Low impacts would be expected.

As stated above, it is assumed that the most likely size for a spill occurring from offshore oil and gas activities in the Pacific Region is 200 bbl or less. The probability that one or more spills of this size will occur as a result of existing OCS activities during the period 2002-2006 is 73.9 percent (table 5.1-1). If a spill of this size were to occur in the Santa Barbara Channel, it could contact the mainland shoreline or one of the northern Channel Islands. Depending on the location, One or more harbors from Port Hueneme to Santa Barbara could be closed for a few days.

Data from moored current meters and surface-drifter trajectory observations (section 5.1.3) indicate that north of Point Conception, a spill would move northward along the mainland coast nearly 30 percent of the time. Individual drifters made landfall along the coast as far north as Monterey Bay. However, when averaged over all flow regimes, 80 percent of the shoreline contacts occurred south of Ragged Point, near the southern end of the Big Sur coast.

It is unlikely that a 200-bbl spill would have more than a low impact on commercial fishing in the project area.

As stated above, the most likely maximum size of a major oil spill from future oil and gas development—the maximum reasonably foreseeable oil spill volume—is 2,000 bbl. The probability that one or more spills of this size will occur as a result of existing OCS activities during the period 2002-2006 is 22.3 percent (table 5.1-1). A 2,000-bbl oil spill in this area would have similar impacts to commercial fishing in the project area. Based on the Ford model, a 2,000-bbl spill would be expected to oil a mean stretch of about 12 km (6 nm) of shoreline (Ford, 1985). The model further predicts a 95-percent probability that a 2,000-bbl spill reaching shore would contact a length of coastline greater than 3 km (1.5 nm) and a 5-percent probability that it would contact a length of shoreline greater than about 52 km (28 nm). Overall, impacts to commercial fishing from a spill of this volume would be expected to be low.

The probability that one or more major tanker spills will occur in the project area during the period 2002-2006 is 38.8 percent (table 5.1-1). The effects of a 22,800-bbl tanker spill on commercial fishing in the project area potentially could be more serious. Based on the Ford model, a 22,800-bbl spill would be expected to oil a mean stretch of about 39 km (21 nm) of shoreline (Ford, 1985). The model further predicts a 95-percent probability that a 22,800-bbl spill reaching shore would contact a length of coastline greater than 9 km (5 nm) and a 5-percent probability that it would

contact a length of shoreline greater than about 161 km (87 nm). This may be somewhat of an overestimate, since oil tankers are now voluntarily transiting the coast north of Point Conception at distances of 90 km (50 nm) or more offshore, and a tanker spill in this area would likely occur relatively far from shore.

The effects of a tanker spill of this size on commercial fishing would be most serious if the spill were to occur near a harbor. As discussed above, harbors could be closed during a spill. If the harbor was closed for 15 or more days, commercial fishermen would likely experience moderate economic impacts and a few might even be forced out of business.

Summary. The oil industry has achieved peaceful co-existence with the fishing industry during the past 15 years by funding mitigation programs, providing fishing gear, paying fishermen to avoid operations, and avoiding major spills as oil production increased from 80,000 barrels/day to 220,000 barrels/day between 1985 and 1995 (Kronman, 1995). The programs, however, have failed to prevent loss of access to fishing grounds. It will be decades before the current facilities on the Pacific OCS are removed and fishermen can access these areas again. Pipelines may be abandoned in place and could continue to pose an obstruction to trawl fishermen after all platforms offshore California have been decommissioned.

Although relations between oil companies and commercial fishermen have improved, part of this trend can be attributed to a low level of new development on the Pacific OCS since the mid-1980's. The lack of development stems from the fact that no offshore leases have been offered for sale in the SBC or SMB. Thus, there has only been one high energy seismic survey (Exxon, 1995), no exploratory drilling from mobile rigs, and no new platforms on the Pacific OCS since Platforms Harmony and Heritage in 1989. Any future development on Federal leases could test the effectiveness of mitigation and communication programs such as the Joint Committee and Liaison Office, Santa Barbara County's Fisheries Enhancement Fund and Local Fishermen's Contingency Fund, and the Local Marine Fisheries Impact Program. In conclusion, fishermen have experienced moderate impacts from past and present oil and gas activities on the Pacific OCS. However, the mitigation programs have helped to minimize these impacts to the maximum extent feasible. These programs have not prevented the loss of important fishing grounds to development and exploratory activities. Even with effective mitigation, the oil and gas industry has added a significant increment to the impacts on commercial fishing in the project area due to preclusion from productive fishing grounds.

Other Activities. As fisheries stocks offshore California have declined over the past two decades, Federal and State regulators have imposed quotas and restricted seasons for commercial fishermen. The natural and man-induced reasons for the stock declines have been analyzed in section 5.2.6. As more fisheries are closed, and seasons are shortened, commercial fishermen of southern and central California will experience economic hardship.

The Channel Islands National Marine Sanctuary (CINMS) is currently involved in a management plan revision which will likely include "no take areas", which will be off limits to commercial and recreational fishermen. Four preliminary scenarios are being discussed that could close from 10 to 50 percent of the Channel Islands to commercial and recreational fishing.

INCREMENTAL IMPACTS OF THE PROPOSED ACTION (2002-2006):

As discussed in section 5.2 22.1.1, activities associated with the proposed delineation activities are expected to result in temporary, localized preclusion to some commercial fishermen in the project area. If the proposed mitigation measures are enacted, these impacts are considered to be negligible to low. No impacts are expected from accidents or upsets.

SUMMARY AND CONCLUSION (2002-2006):

The modern fishing industry, which has benefited from improved mechanization, echo-sounders, and GPS among other innovations, has drawn closer scrutiny from academia and regulators due to decreased fish stocks. Unfortunately, it is difficult to apportion the reasons for a fishery's demise among overfishing, habitat degradation, pollution, and natural variability of the population.

Management of the commercial and recreational fishery is handled by the federal Pacific Fishery Management Council and the state Fish and Game Commission. Declines in the stocks of some fish species have resulted in gear restrictions, fish size and bag limits, and fishery closures. Unfortunately, many of the species take years to rebound once the decline is noted and the fishery management agencies impose restrictions on the fishery. Species that grow slowly, mature late, and have long life spans, such as many of the rockfish species found in the SCB, are not resilient to heavy fishing pressure. These species depend on a long reproductive life to sustain the population during years of depressed recruitment due to environmental and oceanographic conditions. Once the mature, productive population is depressed, it may take decades for the population to recover.

Fisheries managers need more detailed knowledge about fish life histories, including potential linkages between fish recruitment and long-term changes in ocean climate to help prevent the overexploitation and resulting population crashes of one fish species

after another. Many of these fish stocks have been monitored for less than the span of one of their generations. It may take decades of monitoring to fully ascertain the long-term feasibility of fishery restrictions, marine protected areas, and other fishery management options.

Although the effects of past and present oil and gas development offshore California have not adversely affected the fish resources of the region and their recruitment (section 5.2.6), the operations and structures associated with exploration and development have caused user conflicts with commercial fishermen. During periods of intense activity, such as the early 1980's, the conflicts are greatest. The two industries have worked together to establish communication and mitigation programs that have ameliorated the conflicts. Although some OCS activities off southern California, such as construction and seismic surveys, have declined over the past decade, fishermen stand to lose more fishing opportunities as regulatory agencies restrict gear, close fisheries and perhaps even establish no-take zones.

No oil spills are expected to result from the proposed activity. However, accidental oil spills do present an on-going source of potential impacts to commercial fishermen. The cumulative risk of oil spills arises from multiple sources, including offshore oil and gas activities in Federal and State waters and both Alaskan and foreign-import tankering. The greatest oil spill risk to the commercial fishing industry in the project area results from tankering operations. This risk is tempered by recently implemented or proposed mitigation (such as the rerouting of tankers farther offshore along the central California coast) and, as discussed in section 5.0, by modern oil spill response capabilities.

If an oil spill were to occur in the project area during the period 2002-2006, impacts to the commercial fishing industry could range from low to moderate, depending on spill size, location, season, and a number of other factors.

The probabilities that one or more oil spills will occur during the period 2002-2006 from existing and proposed offshore oil and gas activities are 73.9 percent for a spill of 200 bbl or less and 22.3 percent for a spill of 2,000 bbl. The probability of a 22,800-bbl tanker spill occurring during this period is 38.8 percent.

Any future development on Federal leases could test the effectiveness of mitigation and communication programs such as the Joint Committee and Liaison Office, Santa Barbara County's Fisheries Enhancement Fund and Local Fishermen's Contingency Fund, and the Local Marine Fisheries Impact Program. However, the low impacts projected to occur as a result of the proposed delineation activities are not expected to add measurably to cumulative impacts to commercial fishermen in the area.

5.2.23 IMPACTS ON MARINE RECREATIONAL FISHING

Impact Level Definitions. Changes or impacts to marine recreational fishing resulting from the proposed project will be analyzed according to the following criteria:

HIGH

- Fishermen are precluded from 10 percent or more of the fishing grounds during the proposed project;
- 10 percent or more of the fishermen are precluded from a fishing area for all or most of a fishing season; or
- a decrease in catchability of target species exceeds 10 percent of the average annual landing.

MODERATE

- Fishermen are precluded from 1 to 10 percent of the fishing grounds during the proposed project;
- 1 to 10 percent of the fishermen are precluded from a fishing area for all or most of a fishing season; or
- a decrease in catch of target species between 1 to 10 percent of the average annual landing.

LOW

- Fishermen are precluded from 1 percent or less of the fishing grounds during the proposed project;
- 1 percent or less of the fishermen are precluded from a fishing area for all or most of a fishing season; or
- a decrease in catch of target species less than 1 percent of the average annual landing.

For the purposes of this document, high and medium level impacts are considered significant, while low level impacts are considered insignificant.

5.2.23.1 IMPACTS OF THE PROPOSED ACTION ON FISH RESOURCES

The operators propose drilling 4-5 delineation wells from a semi-submersible type Mobile Offshore Drilling Unit (MODU) into the four different units: 1 on the Point Sal

Unit, 1 on the Purisima Point Unit, 1 to 2 on the Bonito Unit, and 1 on the Gato Canyon Unit. The delineation activities proposed are of temporary duration. The spud date for the first and last wells are the 2nd quarter of 2002 (Bonito Unit) and the fourth quarter of 2003 (Gato Canyon), respectively. Each well could take anywhere from 23 to 52 days to drill and 21 to 28 days to test. The drilling and associated activities should take 68 to 90 days to complete at each of the well sites. See section 2.0 (Project Description).

Several actions associated with the proposed project have the potential to impact marine recreational fishermen and fisheries primarily through space-use and preclusion. These activities include towing the MODU between well sites, support vessel traffic, and barging activities. Discharge of drilling muds and cuttings, discharge of produced water, and the potential explosive removal of the wellheads have the potential to harm marine fisheries resources and are analyzed in section 5.2.6 (Fish Resources).

IMPACTS COMMON TO ALL UNITS:

Vessel Traffic. Marine recreational fishermen are found throughout the SBC/SMB and conflicts will occur as the MODU is towed to each of the 4-5 well sites. Also, crewboats and supply boats will travel to and from the drill site on a regular basis. The conflicts will include preclusion from the area, lost fishing time, and damage to equipment.

As described in section 5.0, support vessel traffic for the proposed delineation drilling operations will operate out of Port Hueneme, with some possible crew boat trips originating from the Carpinteria Pier. Crew boats will average 2-8 trips per month throughout the approximately 1 year of exploratory drilling activities; a total of about 90 trips will occur. Supply boat trips will average 8-12 per month, for a total of approximately 148 trips over the 1-year period. As the location of the exploratory drilling activities shifts from units in the Santa Maria Basin eastward into the western Santa Barbara Channel, overall support vessel traffic will peak during the first 6 months at about 20 trips per month, then decrease to about 10 trips per month during the final 3 months of activity.

Additionally, fluid produced during the drill stem test of each delineation well will be barged to Long Beach (possibly Port Hueneme for the Bonito Unit) at the end of the testing period. Transportation of the barges will comply with established vessel traffic corridors. A total of 4-10 such trips is estimated to occur over the 1-year duration of the proposed delineation drilling activities.

Transit to and from drilling sites will occur within ¼-mile wide vessel traffic corridors established for oil and gas service vessels in the SBC. In addition to providing transit corridors in and out of area ports, the program routes support traffic along the Channel seaward of an outer boundary line. East of Gaviota, the outer boundary is defined by the 30-fathom line; west of Gaviota, and north of Point Conception as far as Pedernales Point, it follows the 50-fathom line. In the area west of Gaviota, the 50-fathom line is 4 km (2 nm) or more offshore. Due to the large number of trips to and from the proposed work sites, recreational fishermen would sustain a small increase in the potential for vessel conflicts and navigational hazards. Losses of fishing gear would be negligible.

Low impacts to marine recreational fishing are expected from vessel traffic associated with the proposed projects.

Siting/Anchoring of the MODU. The proposed delineation drilling activities would occur from a MODU. The MODU would be moored with eight anchors, which will extend 5 to 7 times the water depth from the MODU. Assuming an average of 300 meters (1,000 feet) water depth, this could amount to approximately 1,525 meters (5,000 feet) around the well sites that would be lost to fishing while the MODU is onsite (approximately 90 days at each site). Most marine recreational fishing occurs inside the State boundary 3 nm from shore. However, some trolling for albacore and salmon can occur during the peak season in both the SMB and SBC. Given the maneuverability of trolling vessels and the small area that would be precluded at each proposed site, conflicts are expected to be negligible.

Preclusion from the proposed drilling areas would cause low impacts on marine recreational fisheries during the proposed delineation activities.

SUMMARY OF IMPACTS AND CONCLUSION.

The proposed well sites are all located outside the major marine recreational fishing areas of the region. Depending on oceanographic conditions and seasons, trolling for pelagic species can occur throughout the SMB and SBC. Trolling vessels would be expected to avoid an area up to 1,525 m (5,000 ft) around the proposed well sites while the MODU is on site. An increase in navigational hazards to marine recreational fishermen would be expected due to increased vessel traffic associated with the proposed project. Since the total area lost to recreational fishing is small and of short duration, low impacts would be expected to marine recreational fishermen in the project area.

5.2.23.2 CUMULATIVE IMPACT ANALYSIS FOR MARINE RECREATIONAL FISHING (2002-2006)

Section 5.0 describes the projects considered in the cumulative analysis for the proposed exploration activities. Possible sources of cumulative impacts in the project area include on-going and proposed oil and gas activities in Federal and State waters that may cause space-use or preclusion conflicts, and accidental or upset conditions (oil spills or hydrogen sulfide gas releases). Alaskan and foreign-import tankering, dredging and discharge of dredged material, aquaculture, coastal development, agriculture runoff, and commercial and recreational fishing also add to the cumulative impacts on commercial fishing.

Damage to the fish resources from activities including dredging and discharge of dredged material, aquaculture, coastal development, offshore oil and gas development, agriculture runoff, and commercial and recreational fishing add to the cumulative impacts on commercial fishing. These impacts are analyzed in section 5.2.6.2.

CUMULATIVE IMPACTS WITHOUT THE PROPOSED ACTION (2002-2006):

The projects discussed in this section include past, present, and foreseeable actions that may produce impacts during 2002-2006, the expected duration of the proposed delineation activities. Potential cumulative impacts are discussed below.

Oil and Gas Activities. Section 5.0 describes the offshore oil and gas activities that may result in impacts to the marine recreational fishing industry. These include geophysical surveys, construction, drilling and production activities with associated support activities, and the abandonment, or decommissioning, of wells and offshore facilities. As discussed in section 5.2.23.1, the major impact agents expected from these proposed activities are space-use and preclusion conflicts. The potential lethal and sub-lethal impacts to fish resources resulting from offshore oil and gas activities may also impact the marine recreational fishing industry and are discussed in section 5.2.6.

Space-use and Preclusion conflicts. Section 5.2.23.1 discusses the potential impacts to the marine recreational fishing industry from support and crew vessel traffic and platform and rig emplacement. The potential impacts from geophysical surveys, construction, and platform-based development and production operations are discussed below.

Geophysical Surveys. Section 5.0 describes geological and geophysical survey activities in the Pacific OCS Region. Since 1963, more than 400 geological and geophysical surveys, including both 2-D and 3-D seismic surveys, have been conducted in the Santa Barbara Channel and Santa Maria Basin (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). Additional 3-D seismic surveys may occur during the next few years. However, no Pacific OCS operators have approached MMS with proposals to conduct such surveys to date.

The direct effects of air gun acoustic energy on fish resources were analyzed in section 5.2.6. This section will discuss the behavioral effects of airgun acoustic energy on fishery resources, and the space-use conflicts marine recreational fishermen will experience during a seismic survey.

High energy seismic surveys are conducted from a large support vessel that tows an energy source (airguns) and hydrophone receivers. A computer onboard the support vessel collects and processes the data received from the hydrophones. The energy source towed behind the support vessel consists of linear subarrays (at least seven airguns/array) of 28-64 airguns. The hydrophones towed behind the airgun array consists of 1 – 12 cables in parallel, with up to 100 sensors/streamer cable, and may be up to 8000 m long and covers an area 780 m across. Maneuverability of the support vessel during seismic operations is limited and other activities within the survey area are generally precluded.

Some commercial and recreational fishermen will experience short-term preclusion from the area during a seismic survey. This is essentially a space-use conflict, which is a common occurrence in all sectors of high-use areas with multiple user groups such as the Santa Barbara Channel. A seismic vessel with about 3 km (2 mi) of towed cables will be in the operations area 24 hrs a day for up to 30 days, and will traverse the area continuously during this time. The close lane spacing and non-stop nature of the survey makes it nearly impossible to avoid interference with any recreational fishing operation that would happen to be within the survey area. Recreational fishermen including private vessels and charter boat vessels will be precluded from fishing within the survey area for the duration of the survey.

Recreational fishing from boats in the open waters of the SBC and SMB is relatively uncommon. One would expect these vessels to either be anchored or drifting over rockfish and lingcod grounds, or trolling for pelagic species such as salmon or albacore. Since the profits of the recreational fishing industry are not governed by the numbers of fish caught, recreational fishing vessels can fish alternate areas away from the survey without suffering an economic loss.

Airgun energy appears to have behavioral effects on fish. Generally, pelagic schooling fishes seem to swim away and leave the area, while demersal fishes appear to respond by flattening to the bottom. Pearson et al. (1987) exposed several species of rockfish to acoustic energy in a controlled test. Three behavior patterns were noted: (1) the school dove to the bottom and remained motionless; (2) the school dove to midwater and swam rapidly in changing directions; and (3) the school broke into smaller schools and fled in different directions. These patterns were not always maintained throughout the exposure, indicating that fish may habituate to the sound. The fish returned to their pre-exposure behavioral patterns within minutes after the end of the sound presentations eliciting responses. Rockfish aggregations, as measured by fathometer, showed no significant areal difference between control and seismic sound emission trials, although a decrease in aggregation height was detected (Pearson et al., 1987). Perhaps more importantly, this study showed a decrease in CPUE (catch per unit effort) of 52.4 percent during air gun exposure. However, the study did not conclude how long this decrease in CPUE would be expected to last or over how great a distance this reduction might occur.

Studies by Engas et al. (1993) and Lokkeborg and Soldal (1993) have attempted to look at the areal extent of seismic survey effects on behavior and catch-rates of cod and haddock during air gun operations and on catchability after cessation of all seismic activity. Although the species in question are not found in the Santa Barbara Channel, they have swimbladders and form aggregations. Significant catch reductions were found to occur at least 10 km (6 mi) in extent from the seismic survey area (Lokkeborg and Soldal, 1993). Engas et al. (1993) found that distribution of both species had not returned to all pre-survey levels (as seen by hydroacoustics, trawl and hook-and-line sampling) during the 5 days after air gun shooting had ceased. There was some indication of a return to normality in longline catches of cod, but not haddock, within the 5 days, but no recovery was found by either trawling or acoustic methods. Both studies concluded that the fish would not have continued to actively avoid the survey area after the cessation of airgun shooting. The studies cited above demonstrate that it is difficult to support statements that attempt to measure the magnitude of behavior effects and to translate them into a decrease in catchability.

In conclusion, seismic surveys preclude recreational fishermen from the area of the survey for the duration of the survey. Furthermore, fishing success may be adversely affected for up to 10 days following the survey. This decline in fishing success due to behavioral response may be experienced as far as 10 km (6 miles) from the survey area. Low impacts to the marine recreational fishing industry would be expected since fishermen would be able to fish alternate areas during the survey and suffer no economic loss.

Construction and Operations. As described in section 5.0, construction activities include the installation of platform jackets and topsides, the laying of pipelines, platform hook-up and commissioning, and the initiation of drilling. Operations include the daily traffic between bases and installations, and maintenance of the platforms and pipelines on the Pacific OCS. From 1967 to 1992, 19 OCS platforms and associated pipelines were installed in the Santa Barbara Channel and Santa Maria Basin (table 4.0.1-6). All of these platforms are still in place. Seven offshore platforms were installed in State waters in this area between 1958 and 1966, but only one, Platform Holly near Goleta, remains. There currently are 23 offshore platforms in the Pacific OCS Region. Of these, 4 are in the Santa Maria Basin, 15 are in the Santa Barbara Channel, and 4 are in San Pedro Bay. No new offshore construction is expected to occur during the 2002-2006 duration of the proposed exploration activities.

At some platforms on the Pacific OCS, fishermen are precluded from an area up to 840 feet downwind from the platform due to the dangers of a hydrogen sulfide gas release. There is no regulation requiring fishermen to avoid this hazard zone, however fishermen should be aware of the dangers and have an exit strategy crosswind from these platforms should they decide to work in this hazard zone.

The primary impacts to recreational fishermen from construction and operations of the offshore oil and gas industry include conflicts with vessel traffic and loss of harbor space. Recreational fishing has probably benefited from emplacement of platforms and pipelines, which serve as hard substrate and attracts several species of fish and invertebrates. Private fishing vessels and charter boats often target platforms as potential fishing areas due to the fact that platforms attract and serve as habitat for many species of desirable fish and invertebrates. Low impacts have occurred to recreational fishermen due to oil and gas activities.

Vessel Traffic. Section 5.0 discusses crew and supply boat operations in the Pacific OCS Region. Current levels of support vessel traffic for offshore platforms in both Federal and State waters are presented in table 4.0.1-6. Support of development and production activities in the eastern and central Santa Barbara Channel primarily involves crew and supply boats. Crew changes for platforms in the Santa Maria Basin are conducted by helicopter (see discussion in next section), resulting in lower levels of support boat traffic. In the Channel and Basin, approximately 90-140 crew boat and 10-12 supply boat trips are made each week. An additional 25 crew boat trips are made each week to State Platform Holly. Support vessels operate out of Port Hueneme, Ventura Harbor,

Carpinteria Pier, or Ellwood Pier. It should be noted that many of these trips, particularly to the platforms off Carpinteria, are relatively short and that many trips may service more than one platform.

Vessel traffic has the potential to conflict with marine recreational fishing operations through right-of-way interactions, and navigational safety. The Joint Oil/Fisheries Liaison Office (JOFLO) helped draft guidelines that established voluntary, ¼-mile-wide corridors in which crew and supply boats could remain when traveling between offshore platforms and supply bases. The Santa Barbara Channel/Santa Maria Basin Oil Service Vessel Traffic Corridor Program is intended to minimize interactions between oil industry operations and commercial fishing operations. It was developed cooperatively by the two industries through the Joint Committee. In addition to providing transit corridors in and out of area ports, the program routes support traffic along the Channel seaward of an outer boundary line. East of Gaviota, the outer boundary is defined by the 30-fathom line; west of Gaviota, and north of Point Conception as far as Pedernales Point, it follows the 50-fathom line. In the area west of Gaviota, the 50-fathom line is 4 km (2 nm) or more offshore. This also helps to minimize interactions with recreational fishing vessels since most are found within 2 km (1 nm) of shore along the kelp beds.

Transit to and from drilling sites occurs within vessel corridors established for oil and gas service vessels in the SBC. Although vessel traffic increases during exploration and development activities, the oil industry would minimize conflicts with recreational fishermen by traveling within the established corridors. Conflicts are more likely to occur in the SMB where traffic corridors have not been established due to minimal oil and gas activity in the area, and recreational vessels troll in the open ocean more frequently in this area.

As discussed in section 5.0, the highest levels of support vessel traffic to a platform may be expected during the construction phase. During this phase, crew boat trips may occur as often as three times per day and supply boat trips twice per day for brief periods (table 4.0.1-7). Low impacts to recreational fishermen have occurred from oil and gas support and crew vessel traffic.

Offshore Facility Decommissioning. Section 5.2.6 discusses the process of exploratory well abandonment and the associated potential impacts to marine fish resources. Section 5.0 describes the processes involved in decommissioning offshore facilities. For purposes of analysis, it is assumed that decommissioning would encompass the complete removal of a platform and associated pipelines, with none of the leg structure left in place to form an artificial reef, and any shell mounds removed to make the area trawlable again. To date, only one OCS facility in the Pacific Region has been decommissioned—the Offshore Storage and Treatment (OS&T) vessel that formerly served the Santa Ynez Unit platforms in the Santa Barbara Channel. In addition, six offshore platforms in State waters in the Channel have been removed—two in 1988 and four in 1996 (table 4.0.1-6). No offshore decommissioning activities are expected to occur in either Federal or State waters during the 2002-2006 duration of the proposed exploration activities.

Recreational fishermen would be precluded from the area during the decommissioning process. Recreational fishermen would suffer a negative impact from the complete removal of offshore platforms since many recreational fishermen find them to be desirable fishing habitat. However, very low economic impacts would be expected since recreational fishermen have many other areas available, and their profits are not dependent on the numbers of fish caught.

Past and present offshore oil and gas activities have had very negligible impacts to the marine recreational fishing industry. Offshore structures have perhaps removed a small area from sportsfishing trolling grounds. However, many recreational fishermen would argue that the platforms and pipelines enhance recreational fishing by serving as artificial reefs that provide suitable substrate to fish in an area that is devoid of these essentials. Some minor inconvenience due to vessel traffic interactions and dock space have also occurred. In conclusion, marine recreational fishermen have experienced low impacts from past and present oil and gas activities on the Pacific OCS.

Oil Spills. While no oil spills are expected from the proposed delineation drilling activities, there is an oil spill risk in the project area that could effect recreational fishing. As discussed in section 5.0, the cumulative oil spill risk for the project area results from several sources: ongoing and projected oil and gas production from existing OCS facilities in the Santa Barbara Channel and Santa Maria Basin, several proposed exploration and development projects on the Federal OCS, ongoing production from one facility in State waters in the Santa Barbara Channel, two likely oil and gas projects in State waters, and the tankering of Alaskan and foreign-import oil through area waters. Table 5.1-1 presents the estimated mean number of spills of various sizes and the probability of their occurrence as a result of the described activities.

The most likely scenario is that one or more oil spills in the 50-1,000-bbl range would occur from offshore oil and gas activities over the period 2002-2006, and that such a spill would be 200 bbl or less in volume. The probability that one or more spills this size would occur during this period is 73.9 percent (table 5.1-1). The maximum reasonably foreseeable oil spill volume from offshore oil and gas activities is 2,000 bbl, assumed for purposes of analysis to be a pipeline

spill. The probability of a spill this size occurring between 2002-2006 is 22.3 percent (table 5.1-1). Based on data from tanker spills in U.S. waters, the mean size for a tanker spill is assumed to be 22,800 bbl (probability of occurrence is 38.8 percent). The rationale for these estimated spill sizes is presented in section 5.0. The potential impacts to the marine recreational fishing industry in the project area from spills of each of these three sizes are discussed below.

The level of impacts from such spills will depend on many factors, including the type, rate, and volume of oil spilled and the weather and oceanographic conditions at the time of the spill. These parameters would determine the quantity of oil that is dispersed into the water column; the degree of weathering, evaporation, and dispersion of the oil before it contacts a shoreline; the actual amount, concentration, and composition of the oil at the time of shoreline or habitat contact; and a measure of the toxicity of the oil.

The impacts of oil on marine fish resources are analyzed in section 5.2.6. An oil spill in the range of 200-23,000 bbl offshore California would result in low adverse impacts to marine fish resources of the region. Any direct mortalities to fish would probably occur only in the egg and larval stages found in the surface waters in the immediate vicinity of the spill. Elevated hydrocarbon levels in nearshore invertebrates would be likely, leading to increased stress and potential decreases in growth and reproduction in fish feeding upon the invertebrates. These effects are expected to be short-term under normal conditions; however, oil may become sequestered in the sediments of low-energy embayments and persist for years.

The primary impacts to recreational fishermen would likely be space-use and preclusion conflicts associated with oil spill clean-up. If an oil spill were to occur near a harbor, the harbor would likely be closed and fishing vessels would not be able to leave the harbor to work. Fishermen would also be precluded from fishing in the area of the spill due to fouling of their boats and equipment. The closing of the area near an oil spill would likely last from 5 to 15 days depending on the size of the spill and ocean conditions. Recreational fishermen might avoid the spill area for much longer times due to the drop in the quality of the fishing experience and public perception.

Closure of a Harbor. If a large spill contacts a port, oil containment booms could be placed across the mouth of the port. The Coast Guard might also close a port temporarily to avoid contamination of the area from vessels returning from the oil spill site. If fishing vessels are prevented from leaving port, as occurred during the 1969 Santa Barbara oil spill, economic losses could be high depending on the time of year and the length of time the port is closed. A 2,000 to 23,000-bbl oil spill that contacts a port and results in the closure of the port for 15 or more days would cause low to moderate impacts to charter boat and party boat operators.

Tainting of Fish. Fish can accumulate hydrocarbons from contaminated food, although this is a temporary effect since fish metabolize hydrocarbons, and can excrete both metabolites and parent hydrocarbons from the gills and the liver (NRC, 1985). Nevertheless, certain fisheries within an oil spill zone are usually closed and public perception also impacts the fishing experience. Recreational fishermen would likely target alternate fishing grounds until the quality of the fishing experience in the spill area returns to previous conditions.

Fouling of Fishing Gear and Vessels. Oil spills can potentially cause economic losses to boat owners and fishermen by contaminating fishing gear and vessels. Oiled vessels would need to be cleaned, and oiled gear either cleaned or replaced. Fishermen would be expected to fish alternate areas to avoid fouling their gear and vessels. Low impacts would be expected.

It is unlikely that a 200-bbl spill would have more than a negligible impact on recreational fishing in the project area.

As stated above, the most likely maximum size of a major oil spill from future oil and gas development—the maximum reasonably foreseeable oil spill volume—is 2,000 bbl. The probability that one or more spills of this size will occur as a result of existing OCS activities during the period 2002-2006 is 22.3 percent (table 5.1-1). Based on the Ford model, a 2,000-bbl spill would be expected to oil a mean stretch of about 12 km (6 nm) of shoreline (Ford, 1985). The model further predicts a 95-percent probability that a 2,000-bbl spill reaching shore would contact a length of coastline greater than 3 km (1.5 nm) and a 5-percent probability that it would contact a length of shoreline greater than about 52 km (28 nm). Overall, impacts to recreational fishing from a spill of this volume would be expected to be low.

The probability that one or more major tanker spills will occur in the project area during the period 2002-2006 is 38.8 percent (table 5.1-1). The effects of a 22,800-bbl tanker spill on recreational fishing in the project area potentially could be significant. Based on the Ford model, a 22,800-bbl spill would be expected to oil a mean stretch of about 39 km (21 nm) of shoreline (Ford, 1985). The model further predicts a 95-percent probability that a 22,800-bbl spill reaching shore would contact a length of coastline greater than 9 km (5 nm) and a 5-percent probability that it would contact a length of shoreline greater than about 161 km (87 nm). This may be somewhat of an overestimate, since oil tankers are now voluntarily transiting the coast north of Point Conception at distances of 90 km (50 nm) or more offshore, and a tanker spill in this area would likely occur relatively far from shore.

The effects of a tanker spill of this size on recreational fishing would be most serious if the spill were to occur near a harbor. As discussed above, harbors could be closed during a spill. If the harbor was closed for 15 or more days, charter and party boat operators would likely experience low to moderate economic impacts.

Other Activities. As fisheries stocks offshore California have declined over the past two decades, Federal and State regulators have imposed quotas and restricted seasons for sport fishermen. The natural and man-induced reasons for the stock declines have been analyzed in section 5.2.6. As more fisheries are closed, and seasons are shortened, charter and party boat owners of southern and central California will experience economic hardship.

The Channel Islands National Marine Sanctuary (CINMS) is currently involved in a management plan revision which will likely include "no take areas", which will be off limits to commercial and recreational fishermen. Four preliminary scenarios are being discussed that could close from 10 to 50 percent of the Channel Islands to commercial and recreational fishing.

To a certain degree, sportfishing success is not dependent on the number of fish caught, but on the quality of the experience. However, as fisheries are closed or seasons shortened, some segments of the industry will be impacted on the economic level. For instance, the rockfish season was closed from January through February in 2001. Charter and party boat operators and their crew experienced serious financial impacts during this time, but private boat owners only suffered the inconvenience of not being able to fish. They were still able enjoy outings during this time including whale watching and sight-seeing to the Channel Islands. Marinas and bait shops likely also experienced economic hardship during the rockfish closure. As the quality of the fishing experience decreases, whether it be from fewer landings to closing of quality fishing grounds, the fewer people will charter or rent boats at the harbors. Thus, fisheries closures and decreased landings due to stock declines would likely have low to moderate economic impacts on charter and party boat operators, crews, marinas and bait shop owners in the project area. Private boat owners and shore and pier fisherman would experience low impacts.

INCREMENTAL IMPACTS OF THE PROPOSED ACTION (2002-2006)

As discussed in section 5.2.23.1, activities associated with the proposed delineation activities are expected to result in temporary, localized preclusion to some recreational fishermen in the project area. These impacts are considered to be low. No oil spill is expected from the proposed delineation activities.

SUMMARY AND CONCLUSION (2002-2006):

Some fish resources of the project area have experienced drastic declines over the past two decades. Unfortunately, it is difficult to apportion the reasons for a fishery's demise among overfishing, habitat degradation, pollution, and natural variability of the population.

Management of the commercial and recreational fishery is handled by the Federal Pacific Fishery Management Council and the state Fish and Game Commission. Declines in the stocks of some fish species have resulted in gear restrictions, fish size and bag limits, and fishery closures. Unfortunately, many of the species take years to rebound once the decline is noted and the fishery management agencies impose restrictions on the fishery. Species that grow slowly, mature late, and have long life spans, such as many of the rockfish species found in the SCB, are not resilient to heavy fishing pressure. These species depend on a long reproductive life to sustain the population during years of depressed recruitment due to environmental and oceanographic conditions. Once the mature, productive population is depressed, it may take decades for the population to recover.

Fisheries managers need more detailed knowledge about fish life histories, including potential linkages between fish recruitment and long-term changes in ocean climate to help prevent the overexploitation and resulting population crashes of one fish species after another. Many of these fish stocks have been monitored for less than the span of one of their generations. It may take decades of monitoring to fully ascertain the long-term feasibility of fishery restrictions, marine protected areas, and other fishery management options.

The effects of past and present oil and gas activities offshore California have not adversely affected the fish resources of the region and their recruitment. Vessel interactions between oil and gas vessels and recreational fishing vessels have represented only a minor inconvenience to the industries.

The very minor effects in space and time projected to occur as a result of the proposed delineation activities are not expected to add measurably to cumulative impacts to recreational fishermen in the area.

5.2.24 IMPACTS ON MILITARY OPERATIONS

Significance Criteria and Methodology: The impact analysis for military operations in this document adopts the impact level criteria described below. For the purposes of this document, high and moderate impacts are considered to be significant; low impacts are considered to be insignificant.

HIGH

The level and location of offshore oil and gas activity cause frequent and major involuntary modifications of military operations and commercial launch activities, reductions in the level of activity, or long term delays. There would be a major, long-term shift of military operations within the Point Mugu Sea Range.

MODERATE

The level and location of offshore oil and gas activity cause occasional and modest modification of military operations and commercial launch activities, a modest reduction in the overall level of activity, and short-term delays. There would be a modest, short-term shift of military operations in the Point Mugu Sea Range.

LOW

The level and location of offshore oil and gas activity will cause very infrequent and minor modification of military operations and commercial launch activities. There would be a very minor reduction in the level of activity, and slight delays in the activity. There would be no shift of military operations in the Point Mugu Sea Range.

A multi-step process was followed in analyzing the potential for conflicts between oil and gas operations and military operations. The first step involved reviewing the number and scope of military operations conducted in the project area. The second step involved examining the potential for conflict between oil and gas and military activities. This was accomplished by comparing the geographic and temporal scope of proposed MODU operations with those of military operations. The existing regulatory setting was then reviewed to determine whether existing mitigation measures have been effective in eliminating, reducing, or minimizing potential conflicts with military operations and hazards to offshore personnel.

Temporal and Geographic Scope of the Projects: The temporal scope of MODU drilling activities for analyzing impacts of oil and gas activities on military operations is restricted to the 2002-2003 period when the MODU drilling is planned. In contrast to other affected resources, there will be no residual effects on military operations beyond the drilling period because the potential for space-use conflicts will end when drilling is completed and the MODU leaves the area. The MODU drilling operations are expected to occur during 2002-2003 in the Point Sal, Purisima Point, Bonito, and Gato Canyon Units. With the exception of the Gato Canyon Unit, which is located in the Santa Barbara Channel, all of the drilling will occur in Military Warning Area W-532 of the Point Mugu Sea Range (see Figure 4.14-1). AERA Energy LLC and Nuevo Energy Company are planning to drill up to four wells in the Point Sal, Purisima Point, and Bonito Units. It is estimated that a total of 70-90 days will be required to drill each well. Based on this estimate, the MODU will be conducting drilling operations for a period ranging between 280-360 days in Military Warning Area W-532.

Existing Regulatory Setting: As discussed in Section 2.0, MODU drilling activity is proposed to be conducted on leases in the Point Sal, Purisima Point, Bonito, and Gato Canyon Units. All of the active undeveloped OCS leases included within these units were contractually leased to oil companies during the following OCS lease sales: OCS Sale 48 in 1979, OCS Sale 53 in 1981, OCS Sale 68 in 1982, and OCS Sale RS2 in 1982. Military stipulations were attached to all of the leases. The stipulations: (1) require that all vessel and aircraft traffic within designated Military Warning Areas be coordinated with the USAF and the Navy, (2) authorize the U.S. Government to temporarily suspend offshore oil and gas operations and require evacuation of personnel in the interests of national security, (3) require lessees to control electromagnetic emissions so as not to interfere with military operations, and (4) limit the liability and hold the U.S. Government harmless from any damage or injury resulting from the programs and operations of the military.

The MMS has instructed Pacific OCS Region operators of leases bearing military stipulations to prepare Evacuation and Sheltering Plans for oil and gas personnel. The plans describe procedures for sheltering and evacuation using vessels and aircraft, and provide a list of equipment and operations that would be shut down. Operators are also required to submit "shelter worthiness" information on their drilling vessels, describing the level of protection sheltering areas provide against impact, flammables, and blast overpressure.

5.2.24.1 IMPACTS OF THE PROPOSED ACTION ON MILITARY OPERATIONS

The activities associated with the proposed MODU projects having the potential to impact mili-

tary operations were identified by reviewing previous environmental documents and conducting scoping meetings with the Navy and USAF. The MMS conducted scoping meetings with NAWCWPNS Point Mugu on February 1, 2001, and VAFB on January 4, 2001. The following impact producing agents were identified: (1) space-use conflicts with military operations, and (2) hazards to project personnel from missile and target debris. The impact producing activities are common to all units. Space-use conflicts could cause military operations to be delayed or interrupted if offshore personnel did not evacuate or shelter on the MODU in conformance with military lease stipulations. The following sections describe the sources and types of potential impacts in greater detail and the mitigation measures that have been adopted to eliminate or minimize these impacts.

Space Use Conflicts and Hazards to Personnel: The primary impact producing activities associated with the proposed project are MODU drilling operations and associated vessel and aircraft traffic. These activities create the potential for space-use conflicts with military operations and hazards to personnel.

Support vessel associated with MODU drilling operations will operate out of Port Hueneme, with some possible crew boat trips originating from Carpinteria Pier. Due to the rough sea conditions north of Point Conception and distances involved, crew will be transferred to and from the MODU primarily by helicopter. Supply boat trips are projected to number 8-12 per month, which averages about 1 every 3 days. Currently, about 12-13 supply boat trips per month (1 every 2 to 3 days) are made to the four existing OCS platforms (Irene, Harvest, Hermosa, Hidalgo) in the Santa Maria Basin.

Additionally, fluid produced during drill-stem tests for each exploratory well will be barged to Long Beach or Port Hueneme at the end of each testing period. A total of 4-10 such trips are estimated to occur over the drilling period. The crew boats, support vessels, and barges typically stay within the Santa Barbara Channel/Santa Maria Basin Oil Service Vessel Traffic Corridor that has been established by the Joint Oil/Fisheries Liaison Office. East of Gaviota, the outer boundary of the corridor is defined by the 30-fathom line; west of Gaviota, and north of Point Conception as far as Pedernales Point, it follows the 50-fathom line. In the area of Gaviota, the 50-fathom line is 4 km (2 nm) or more offshore.

Offshore southern California, helicopters are a primary means of transporting crew to and from the platforms. Helicopter traffic on the OCS operates primarily out of Santa Maria, Lompoc, and Santa Barbara airports. Most of the traffic is to and from platforms in the western Santa Barbara Channel and Santa Maria Basin. In addition, several international and numerous smaller airports, along with several military airfields, exist along the southern California coast, and air traffic is a daily occurrence in the region.

Helicopter trips in support of MODU drilling activities are expected to average 20-30 month (up to 1 per day). In comparison, about 150 helicopter trips (5 per day) are made monthly to the four Santa Maria Basin platforms. This will result in a temporary 13-20 percent increase in helicopter trips in Military Warning Area W-532 during the 2002-2003 MODU drilling period.

Military missiles and space vehicles launched from VAFB fly over portions of the Sea Range where MODU drilling activities are planned. During such over-flights, the area beneath the flight path may be subject to hazards resulting from falling debris and jettisoned components. Launch vehicles on polar azimuths customarily jettison booster rockets into or near the project area, but the probability of any of these elements hitting offshore facilities is extremely rare. Such events were considered in the System Safety and Reliability Analysis of the Environmental Impact Report/Environmental Impact Statement (EIS/EIR) prepared for the Point Arguello Field and Gaviota Processing Facility Area Study Development Plan (A.D. Little, 1984). The EIS/EIR reported the results of a study conducted by J.H Wiggins Company that estimated the probability of a variety of potential launch vehicles striking a Liquified Natural Gas (LNG) import terminal and bulk storage facility at Point Conception (J.H. Wiggins Company, 1977). The probabilities ranged from 1.6×10^{-6} per launch to less than 10^{-10} per launch that a critical LNG vessel or pipeline might be breached under essentially worst case permissible launch conditions.

To define risks more precisely, Chevron sponsored a study by Omnitek Engineering Inc. entitled "Platform and Mobile Offshore Drilling Unit Evacuation Risks" (Omnitek, 1985). The study reported the casualty rates per person for VAFB launch hazard exposure periods of 1-minute and 20 minutes. The 1-minute period was the estimated average exposure period for a single launch. The 20-minute period assumed an average of 20 launches per year. The casualty rates for offshore workers conducting mobile drilling operations ranged from 0.74×10^{-6} for the 1- minute exposure period to 15.0×10^{-6} for the 20-minute exposure period. The casualty rates for production workers on platforms ranged from 0.15×10^{-6} to 3.0×10^{-6} respectively for the 1-minute and 20-minute exposure periods.

The Omnitek study also compared vessel and helicopter evacuation risks with missile launch overflight risks. The study concluded that it is considerably more risky for offshore personnel to be evacuated rather than sheltered. It also recommended that sheltering be the primary safety option except in those

cases where special launch conditions necessitate evacuation. Consequently, sheltering of personnel has increased over time relative to evacuation of personnel. However, it is still common for the military to require a combination of sheltering and evacuation procedures to be followed for many launches.

In recognition of the potential over-flight hazards associated with launch operations, hazard zones have been established downrange from several VAFB space launch complexes. A hazard corridor encompassing the flight path and a contiguous caution zone are also in effect for each launch. By order of the Commander, 30th Space Wing, all hazard corridors must be cleared of non-essential personnel, and all essential personnel must be sheltered in facilities capable of providing safety from potential fragment or blast impacts. A launch corridor may be closed for as long as 72 hours for any individual launch; postponements and rescheduling of launches may result in several closures a month.

As previously noted, military lease stipulations are attached to all of the leases where MODU drilling is planned. The suspensions require that all vessel and aircraft traffic be coordinated with the USAF and Navy, authorize the U.S. Government to temporarily suspend offshore operations, require evacuation and/or sheltering of personnel, control electromagnetic emissions, and limit liability of the U.S. Government. To further reduce potential hazards to offshore personnel, the MMS Pacific OCS Region has required offshore operators conducting operations in Military Warning Areas to develop Evacuation and Sheltering Plans for each offshore facility, including platforms, semi-submersibles, jack-ups, and ships. The plans describe specific procedures that must be followed to ensure proper notification, communication, and coordination between VAFB, Navy, MMS, and offshore oil and gas personnel.

Of the 23 platforms on the OCS, only the four northernmost platforms in the Santa Maria Basin are operationally affected by VAFB activities. The platforms are Irene, Harvest, Hermosa, and Hidalgo, all of which are located north of Point Conception in Military Warning Area W-532. Evacuation and Sheltering Plans have been prepared for each of these facilities. The four platforms were installed during the mid-1980's. From 1987 through the year 2000, approximately 55 military and commercial launches were made from VAFB that required evacuation and/or sheltering of personnel at one or more of the platforms (Clingan, R., personal communication). All of the evacuation and sheltering activities were conducted in conformance with the Evacuation and Sheltering Plans and without incident.

During the 15-year operational history of the platforms, no military operations have been delayed, canceled, or relocated due to offshore oil and gas activity. In addition, there have been no accidents (vessel/aircraft collisions, deaths, or serious injuries) involving oil and gas activities and military operations on the Sea Range since the initiation of OCS exploration and development activities more than 30 years ago. According to MMS records, the only military operation that had an indirect adverse effect on a platform was an USAF Titan booster explosion in April of 1986. The explosion occurred over the launch site on VAFB. Several Platform Harvest personnel were treated for eye and throat irritations several hours after the explosion when a toxic cloud from the explosion drifted over the platform.

5.2.24.1. SUMMARY AND CONCLUSION

The following conclusion applies to all units where MODU drilling is proposed. The potential impact of MODU drilling operations on military operations is considered low based upon the significance criteria used in this analysis. The analysis shows there will be a modest increase in supply boat traffic and a small increase in helicopter traffic in Military Warning Area W-532 during the 2002-2003 MODU drilling period. The analysis also demonstrates that the existing military lease stipulations have been very effective in avoiding conflicts between oil and gas and military operations. The only possible effect the proposed MODU drilling project could have on military operations in the area would be the inability of operations personnel to comply with the lease stipulations during a launch countdown. The likelihood of such a situation over the short duration of the project is considered extraordinary and is therefore classified as insignificant. This conclusion is consistent with the military impact analysis conducted in the 1984 Point Arguello EIS/EIR, which considered the impacts associated with the construction of three platforms, pipelines, and the Gaviota onshore processing facility, as well as the construction of up to eight platforms in the area-wide build-out scenario.

5.2.24.2 CUMULATIVE IMPACT ANALYSIS FOR MILITARY OPERATIONS

5.2.24.2.1 CUMULATIVE IMPACTS (2002-2006)

Cumulative Impacts Without the Proposed Action (2002-2006): As discussed in Section 5.2.24 (Temporal and Geographic Scope of the Proposed Projects), the analysis of cumulative impacts of oil and gas activities on military operations is restricted to the 2002-2003 MODU drilling period. For accidents (e.g. oil spills), the temporal scope for cumulative impact analy-

sis is the period 2002-2006. Section 5.0 describes the projects considered in the cumulative analysis for the proposed MODU drilling activities. Commercial fishing, shipping, and other non-oil and gas related activities occurring within the Point Mugu Sea Range were addressed in the draft EIS/OEIS for the Point Mugu Sea Range (U.S. Navy, 2000). The EIS/OEIS concluded that no cumulative impacts would occur from military operations and these activities. The projects discussed in this section therefore include past, present, and reasonably foreseeable oil and gas activities that may produce cumulative impacts on military operations during 2002-2003. In addition, the potential cumulative impacts of oil spills on military operations are discussed for the period 2002-2006.

Offshore oil and gas activities that could have a cumulative impact on military operations include geological and geophysical surveys, exploration drilling, platform construction, development and production, decommissioning, and oil spills. The following text describes past, present, and reasonably foreseeable oil and gas activities and the potential sources oil spills and their probabilities.

Geological and Geophysical Surveys: Section 4.0 describes past geological and geophysical surveys conducted in the Pacific OCS Region. Since 1963, more than 400 geological and geophysical surveys, including both 2-D and 3-D seismic surveys, have been conducted in the Santa Barbara Channel and the Santa Maria Basin, and many others have occurred in State waters. Most of the surveys occurred during the 1970's and 1980's; the most recent seismic survey was a 3-D seismic survey conducted by Exxon Company USA in the Santa Barbara Channel in 1995. Additional seismic surveys may occur in the future. However, no Pacific OCS operators have approached MMS with proposals to conduct such surveys during the proposed 2002-2003 MODU drilling period.

Exploration Drilling: Section 4.0 provides a historical overview of exploration drilling activity in the Pacific OCS Region. A total of 329 exploration wells have been drilled in the Pacific OCS Region. The wells were drilled using MODU's, drill ships, and jack-up rigs. Approximately 60 of the wells were drilled in the Santa Maria Basin. The majority of the wells in the Santa Maria Basin were drilled between 1982-1986. No exploratory wells have been drilled on the Pacific OCS since 1989. The operators of the Cavern Point Unit, which is located in the Santa Barbara Channel, are proposing to drill one to two exploration wells from Platform Gail in 2002. Other than Cavern Point Unit and the proposed MODU drilling project, no new exploration drilling activities have been proposed or are expected on the 36 undeveloped leases during the proposed 2002-2003 MODU drilling period.

Platform Construction: As described in Section 4.0, construction activities include the installation of platform jackets and topsides, the installation of pipelines, platform hook-up, and commissioning. Section 5.1.2 includes information on the installation dates of the platforms. A total of 23 OCS platforms were installed on the OCS between 1967 and 1989. Of these, 4 are in the Santa Maria Basin, 15 are in the Santa Barbara Channel, and 4 are in San Pedro Bay. The four OCS platforms (Harvest, Hermosa, Hidalgo, and Irene) located in Military Warning Area W-532 were installed in 1985 and 1986. All of the OCS platforms are still in place. Seven offshore platforms were installed in State waters in the project area (Santa Barbara Channel and Santa Maria Basin) between 1958 and 1966, but only one, Platform Holly, remains. No new offshore construction is expected to occur during the proposed 2002-2003 MODU drilling period.

Development and Production: Production activities include development drilling, oil and gas production, shipment of oil and gas to shore by pipeline, and associated vessel, aircraft and helicopter support operations. As of April 2000, 881 development wells had been drilled from Pacific OCS platforms. Approximately 90 development wells have been drilled from platforms located in the Santa Maria Basin. From 1996 through 1999, approximately 2 development wells per month were drilled from OCS platforms. Section 5.0 of this document describes new oil and gas development projects that are considered reasonably foreseeable. The projects that have the potential to impact military operations include: (1) Arguello Inc.'s proposal to develop OCS leases in the Rocky Point Unit by extended reach drilling from Platforms Harvest, Hermosa, and Hidalgo, and (2) Nuevo Energy Company's proposal to develop the Tranquillon Ridge (State Tidelands) by extended reach drilling from Platform Irene. The Rocky Point Unit and Tranquillon Ridge projects are located in Military Warning Area W-532. Arguello Inc. is proposing to drill up to 20 wells to develop the Rocky Point Unit. Nuevo Energy Company is proposing to drill up to 30 wells to fully develop the Tranquillon Ridge Field. If these projects are approved, development and production activities could occur during the 2002-2003 MODU drilling period.

In 1999, OCS platforms produced approximately 40 million barrels of oil (mmbbl) of oil and 80 billion cubic feet (bcf) of gas. The four OCS platforms located in Military Warning Area W-532 produced about 10 mmbbl of oil and 8 bcf of gas; this constitutes about 25 percent of the oil and 10 percent of the gas produced from the Pacific OCS. All of the oil and gas produced on the Pacific OCS is shipped by pipeline to onshore processing facilities. Platforms Harvest, Hermosa, and Hidalgo are projected to continue producing oil and gas until 2015. Oil and gas production at Platform Irene is projected to continue to 2020, but operations could be extended until 2030 if development of the Tranquillon Ridge Field by extended reach drill-

ing is successful. Development and production operations and associated vessel, aircraft, and helicopter operations at the four platforms will therefore overlap the proposed 2002-2003 MODU drilling period.

Decommissioning: Section 4.0 describes how oil and gas platforms are decommissioned. For the purposes of this analysis, it is assumed the platform topsides and jacket would be completely removed, and that the pipelines would be abandoned in place. Section 4.0 also presents information on decommissioning projects that have occurred to date and projects the estimated decommissioning schedule for oil and gas facilities located on the OCS and in State waters. To date, the only facility decommissioned on the OCS has been Exxon Company USA's Offshore Storage and Treatment (OS&T) Vessel. This facility, which was located near Platform Hondo in the Santa Barbara Channel, was decommissioned in 1994. In addition, a total of seven platforms have been removed from State waters. All of these were located in the Santa Barbara Channel. Two of the platforms were removed in 1988 and four in 1996. No decommissioning activities are expected to occur in either Federal or State waters during the proposed 2002-2003 MODU drilling period.

Oil Spills: The MODU drilling activities are not expected to result in an oil spill. As discussed in Section 5.0, the cumulative oil spill risk for the project area results from several sources: (1) ongoing and projected oil and gas production from existing OCS facilities in the Santa Barbara Channel and Santa Maria Basin; (2) several proposed exploration and development projects on the Federal OCS; (3) ongoing production from one facility (Holly) in State waters in the Santa Barbara Channel; (4) two reasonably foreseeable oil and gas projects in State waters, and; (5) the transport of Alaskan and foreign oil by tanker along the coast of California. Section 5.1.3 describes the estimated mean number of spills of various sizes and the probability of their occurrence as a result of the described activities.

The most likely oil spill scenario for existing and proposed offshore oil and gas activities is that one or more spills in the 50-1,000-bbl range would occur over the period 2002-2006, and that such a spill would most likely be 200 bbl or less in volume. The probability that one or more spills of this size will occur during this period is 73.9 percent. The maximum reasonably foreseeable oil spill volume from offshore oil and gas activities is 2,000 bbl, assumed for purposes of analysis to be a pipeline spill. The probability of a spill of this size occurring during the period 2002-2006 is 23.3 percent. Based on data from tanker spills in U.S. waters, the mean size for a tanker spill is assumed to be 22,800 bbl (with a probability of occurrence of 38.8 percent for this period). The rationale for these estimated spill sizes is presented in Section 5.1. The potential impacts to military operations from spills of each of these sizes are discussed below.

The activities determined to have a potential cumulative impact on military activities during the proposed 2002-2003 MODU drilling period are oil and gas development and production activities and associated vessel, aircraft, and helicopter traffic at Platforms Harvest, Hermosa, Hidalgo, and Irene, and oil spills. These activities create the potential for space-use conflicts with military operations and hazards to personnel. The potential cumulative impacts of oil and gas activities and oil spills on military operations are discussed below.

Space-Use Conflicts and Hazards to Personnel: As discussed in section 5.2.24.1, oil and gas operations and associated vessel and aircraft traffic create the potential for space-use conflicts with military operations and hazards to personnel. To reduce potential conflicts between oil and gas and military operations, military stipulations have been attached to all of the leases where MODU drilling is planned. The stipulations control vessel and aircraft traffic in designated areas, include hold harmless conditions and requirements, and reserve the right of the U.S. Government to suspend offshore operations temporarily for national security reasons. To further reduce potential hazards to offshore personnel, the MMS Pacific OCS Region has required offshore operators conducting operations in Military Warning Areas to develop Evacuation and Sheltering Plans for each offshore facility, including platforms, semi-submersibles, jack-ups, and ships.

During the 15-year operational history of the platforms, no military operations have been delayed, canceled, or relocated due to offshore oil and gas activity. In addition, there have been no accidents (vessel/aircraft collisions, deaths, or serious injuries) involving oil and gas activities and military operations on the Sea Range since the initiation of OCS exploration and development activities more than 30 years ago.

The effect of oil spills on military operations will depend on many factors, including the type, rate, and volume of oil spilled, and the weather and oceanographic conditions at the time of the spill. These parameters would determine the quantity of oil that is dispersed into the water column, the degree of weathering, evaporation, and dispersion of oil before it contacts a shoreline. As discussed above, the most likely scenario for existing and proposed oil and gas activities is that one or more spills in the 50-1,000-bbl range would occur over the 2002-2006 period, and that such a spill would most likely be 200 bbl or less in volume. The probability that one or more spills of this size will occur as a result of existing OCS activities during the period 2002-2030 is 73.9 percent.

Based upon the significance criteria used in this analysis, a spill of 200 bbl, if it were to occur in Military Warning Area W-532, would have a low impact on military operations. In the case of the September 1997 Platform Irene pipeline rupture, 167 bbl of oil were spilled approximately 4.8 km (3 mi) offshore Surf Beach. The offshore cleanup operations were completed within one week. About two weeks were required to remove oil residues on the beach and shoreline. The spill did not result in any disruption of military operations.

The probability that one or more spills in the 2,000-bbl range will occur from existing and proposed offshore oil and gas activities over the period 2002-2006 is 22.3 percent. Based upon the significance criteria used in this analysis, a spill of this size, if it were to occur in Military Warning Area W-532, would have low to moderate impacts on military operations depending on the timing and location of the spill. If oil spill cleanup operations did not coincide with previously scheduled military operations in the area the impacts on military operations would be low. If they coincided, impacts to military operations would be moderate. The time required to cleanup a 2,000-bbl spill is estimated to range from 4-6 weeks.

As discussed earlier, all of the oil and gas produced on the Pacific OCS is transported to shore by pipeline. However, foreign and Alaskan oil is transported by tanker along the west coast of the U.S. The probability of one or more major tanker spills (22,800 bbl) occurring in the project area over the period 2002-2006 is 38.8 percent. Based upon the significance criteria used in this analysis, a spill of this size could have a moderate impact on military operations if it occurred in the Military Warning Area W-532, or was driven into the area by wind and current conditions. The time required to cleanup a spill of this size is estimated to range from 30 to 120 days depending on the location of the spill, weather and sea conditions, and whether the spill results in shoreline impacts. As previously discussed, many tankers are now voluntarily transiting the coast north of Point Conception at distances of 90 km (50 nm) or more offshore. Spills occurring at such distances from shore would have reduced shoreline impacts.

Incremental Impacts of the Proposed Action (2002-2006): As discussed in Section 5.2.24.1, activities associated with the proposed MODU drilling operations are expected to have a low impact on military operations. No impacts are expected from oil spills or other accidents and upsets.

SUMMARY AND CONCLUSION (2002-2006)

The following conclusion applies to all units where MODU drilling is proposed. The potential cumulative impact of oil and gas development and production activities on military operations is considered low based upon the significance criteria used in this analysis. The analysis shows there will be a modest but temporary increase in supply boat traffic and a small increase in helicopter traffic in Military Warning Area W-532 during the 2002-2003 MODU drilling period. The analysis also demonstrates that the existing military lease stipulations have been very effective in avoiding conflicts between oil and gas and military operations. The only possible effect oil and gas activities could have on military operations in the area would be the inability of operations personnel to comply with the lease stipulations during a launch countdown. The likelihood of such a situation is considered extraordinary and is therefore classified as insignificant.

The MODU drilling activities are not expected to result in an oil spill. However, oil spills do present an ongoing source of potential impacts to military operations. The cumulative risk of oil spills arises from multiple sources, including offshore oil and gas activities in Federal and State waters, and tankers carrying both Alaskan and foreign oil. If an oil spill were to occur in the project area during the period 2002-2006, oil spill clean-up activities could disrupt military operations. As described above, small spills of 200 barrels or less are expected to have a low impact on military operations. Moderate spills (2,000 bbl), depending on their location and timing, would have a low to moderate impact on military operations. Large tanker spills (22,800 bbl), particularly if they were to occur in Point Mugu Sea Range, would have a moderate impact on military operations. Overall, the cumulative impact on military operations from all of these sources is expected to be moderate.