

## 5.7 Commercial and Recreational Fishing

### 5.7.1 Environmental Setting

Commercial and recreational fishing activities occur at various locations in the project area. In addition, there has been historic kelp harvesting in the area. This section describes the techniques and intensity of commercial and recreational fishing that occur in the proposed project area.

#### 5.7.1.1 Commercial Fishing

A wide variety of finfish and shellfish species are harvested commercially in the proposed project area. The majority of fish commercially harvested in this area are landed in the Ports of Morro Bay and Port San Luis/Avila to the north and Santa Barbara and Ventura to the south. Over 100 different species were harvested commercially in the four ports (i.e., Santa Barbara, Ventura, Morro Bay, and San Luis/Avila) for the four-year period from 2002 to 2005 (CDFG, 2003-2006). The top 20 species harvested commercially in the project area for the four-year period from 2002 to 2005 and landed at the four ports are listed in Table 5.7.1. The 20 species comprise 97.0 percent by weight and 93.2 percent in dollar value of the commercial fish harvested in the four ports. The top 20 species harvested commercially in the Santa Barbara Channel from 2001 to 2005 are listed in Table 5.7.2.

**Table 5.7.1 Rank Order of the Top Twenty Commercial Fish Species Harvested in the Project Area from 2002 to 2005**

Total Weight (Tons)			Dollar Value (M)		
Species	Weight	Percent	Species	Value	Percent
Squid, market	36183	63.7	Squid, market	15.06	26.4
Urchin, red	9747	17.2	Urchin, red	12.65	22.2
Shrimp, Pacific ocean	1312	2.3	Lobster, California spiny	7.10	12.5
Crab, rock unspec.	1232	2.2	Crab, rock unspec.	3.07	5.4
Sole, Dover	1184	2.1	Halibut, California	2.55	4.5
Tuna, albacore	884	1.5	Prawn, spot	1.81	3.2
Sea cucumber	652	1.2	Cabazon	1.57	2.7
Prawn, ridgeback	512	0.9	Prawn, ridgeback	1.52	2.7
Thornyhead longspine	487	0.9	Salmon, Chinook	1.32	2.3
Lobster, California spiny	478	0.8	Swordfish	1.27	2.2
Halibut, California	341	0.6	Seabass, white	1.26	2.2
Seabass, white	317	0.6	Tuna, albacore	1.22	2.1
Sablefish	316	0.6	Shrimp, Pacific Ocean	1.10	1.9
Sole, petrale	292	0.5	Sea Cucumber	1.08	1.9
Rockfish, bank	279	0.5	Rockfish, brown	0.88	1.5
Salmon, Chinook	231	0.4	Rockfish, grass	0.86	1.5
Sardine, Pacific	226	0.4	Sole, Dover	0.80	1.4
Rockfish, blackgill	167	0.3	Thornyhead, longspine	0.67	1.2
Thornyhead, shortspine	158	0.3	Sole, petrale	0.64	1.1
Swordfish	156	0.3	Sablefish	0.60	1.1

*Based on combined landings at Morro Bay, Port San Luis/Avila, Santa Barbara, and Ventura (CDFG, 2003-2006).*

**Table 5.7.2 Rank Order of the Top Twenty Commercial Fish Species Harvested in the Santa Barbara Area from 2001 to 2005**

Total Pounds (Tons)			Dollar Value (M)		
Species	Weight	Percent	Species	\$ Value	Percent
Squid, market	134,611	70.8 %	Squid, market	46.58	44.2 %
Sardine, Pacific	20,014	0.10 %	Urchin, red	21.22	20.1 %
Urchin, red	15,500	<0.08 %	Lobster, California spiny	10.9	10.4 %
Anchovy, northern	12,085	0.06 %	Crab, rock unspec.	4.17	4.0 %
Crab, rock unspec	1,654	0.01 %	Halibut, California	4.15	3.9 %
Sea cucumber	1,424	<0.01 %	Prawn, spot	2.81	2.7 %
Lobster, California spiny	752	<0.01 %	Sea cucumber	2.47	2.3 %
Prawn, ridgeback	670	<0.01 %	Prawn, ridgeback	1.99	1.9 %
Halibut, California	567	<0.01 %	Seabass, white	1.90	1.8 %
Tuna, albacore	428	<0.01 %	Sardine, Pacific	1.82	1.7 %
Seabass, white	364	<0.01 %	Anchovy, northern	1.67	1.6 %
Shark, thresher	155	<0.01 %	Swordfish	1.82	1.0 %
Prawn, spot	150	<0.01 %	Sheephead, California	0.80	0.8 %
Sheephead, California	119	<0.01 %	Thornyheads	0.64	0.6 %
Swordfish	110	<0.01 %	Tuna, albacore	0.51	0.5 %
Crab, spider	190	<0.01 %	Rockfish, grass	0.48	0.4 %
Whelk, Kelleet's	48	<0.01 %	Shark, thresher	0.37	0.3 %
Shark, Pacific angel	44	<0.01 %	Cabezon	0.36	0.3 %
Salmon, chinook	41	<0.01 %	Crab, spider	0.22	0.2 %
Cabezon	35	<0.01 %	Salmon, Chinook	0.18	0.2 %

Based on combined landings at Santa Barbara, Oxnard, Ventura, and Port Hueneme. 1 ton = 0.9 metric ton.

Source: CDFG, 2002-2006

Over the four-year period from 2002 to 2005, a total of 56,807 tons of fish were harvested at the four ports (Port San Luis/Avila, Morro Bay, Santa Barbara, and Ventura). The four-year catch was valued at \$61.17 million. The fish species that are landed at each of the four ports vary. This is largely due to differences in the fishing fleet at each port, area fished by fishers, and commercial facilities available at each of the ports. The top ten commercial species that were caught in the project area and landed at each of the ports for the four-year period from 2002 to 2005 and their value are provided in Table 5.7.3.

**Table 5.7.3 Top Ten Commercial Species for 2002-2005 Harvested in the Project Area and Landed at Port San Luis/Avila, Morro Bay, Santa Barbara, and Ventura**

Port San Luis/Avila		Morro Bay		Santa Barbara		Ventura	
Weight (tons)	Value (\$M)	Weight (tons)	Value (\$M)	Weight (tons)	Value (\$M)	Weight (tons)	Value (\$M)
Sole, Dover (863.0)	Rockfish, brown (0.65)	Squid, market (1250.9)	Prawn, spot (1.13)	Urchin, red (9604.5)	Urchin, red (12.44)	Squid, market (32149.0)	Squid, market (13.41)
Squid, market (825.4)	Cabezon (0.62)	Shrimp, Pacific Ocean (918.4)	Salmon, chinook (0.98)	Squid, market (1957.9)	Lobster, California spiny (5.73)	Tuna, albacore (356.7)	Lobster, California spiny (1.36)
Shrimp, Pacific Ocean (392.5)	Sole, Dover (0.60)	Tuna, albacore (364.2)	Shrimp, Pacific Ocean (0.82)	Crab, rock unspecified (950.8)	Crab, rock unspecified (2.39)	Prawn, ridgeback (190.9)	Halibut, california (1.32)

**Table 5.7.3 Top Ten Commercial Species for 2002-2005 Harvested in the Project Area and Landed at Port San Luis/Avila, Morro Bay, Santa Barbara, and Ventura**

Port San Luis/Avila		Morro Bay		Santa Barbara		Ventura	
Weight (tons)	Value (\$M)	Weight (tons)	Value (\$M)	Weight (tons)	Value (\$M)	Weight (tons)	Value (\$M)
Thornyhead longspine (333.4)	Thornyhead longspine (0.49)	Sole, Dover (320.4)	Cabezon (0.74)	Sea Cucumber (519.5)	Halibut, California (1.11)	Halibut, California (180.8)	Seabass, white (0.64)
Rockfish, bank (49.7)	Sablefish (0.36)	Sole, petrale (219.7)	Tuna, albacore (0.59)	Lobster, California spiny (387.5)	Prawn, ridgeback (0.88)	Crab, rock unspecified (169.2)	Prawn, ridgeback (0.63)
Sablefish (49.7)	Squid, market (0.29)	Salmon, chinook (156.7)	Squid, market (0.58)	Prawn, ridgeback (317.0)	Squid, market (0.78)	Seabass, white (156.8)	Swordfish (0.56)
Tuna, albacore (126.8)	Shrimp, Pacific Ocean (0.28)	Thornyhead longspine (153.6)	Swordfish (0.48)	Seabass, white (143.9)	Sea Cucumber (0.78)	Sea Cucumber (130.4)	Tuna, albacore (0.43)
Sardine, Pacific (112.4)	Rockfish, gopher (0.28)	Sablefish (129.9)	Sole, petrale (0.48)	Halibut, California (139.9)	Seabass, white (0.54)	Sardine, Pacific (113.8)	Crab, rock unspecified (0.38)
Thornyhead shortspine (104.1)	Crab, Dungeness (0.25)	Rockfish, blackgill (81.5)	Rockfish, grass (0.44)	Shark, thresher (95.9)	Prawn, spot (0.35)	Urchin, red (109.3)	Tuna, bigeye (0.29)
Crab, rock unspecified (82.6)	Rockfish, bank (0.24)	Swordfish (75.4)	Rockfish, gopher (0.27)	Salmon, chinook (37.5)	Rockfish, grass (0.26)	Lobster, California spiny (89.9)	Sea Cucumber (0.29)

Source: CDFG, 2003-2006.

The total volume and dollar value of the catch landed at each port for the five individual years between 2001 and 2005 are provided in Tables 5.7.4 and 5.7.5. Volumes and values for Port San Luis/Avila were not individually recorded in 2001 and are not included. Of the four ports, Ventura ranked first in volume of commercial catch. The ports of Santa Barbara, Morro Bay, and Port San Luis/Avila followed in that order. The volume of catch landed at Ventura was nearly double the combined landings for the other three ports. Santa Barbara ranked first in dollar value of commercial catch. Santa Barbara was followed by Ventura, Morro Bay, and Port San Luis/Avila. For the period of 2001 to 2005, the Santa Barbara catch totaled ~~190,209~~ 17,054 tons for a value of \$31.89 ~~405~~ million.

The high volume and dollar value of commercial catch landed at Santa Barbara are largely due to non-fish species. Urchin, lobster, prawn, and crab, which are of high commercial value, were the top five species landed, either by volume or dollar value, during the five-year period. A high percentage of these species is landed at nearby Santa Barbara. It should be noted that the commercial and recreational abalone fishery in southern and central California was closed to all fishing under emergency action by the California Fish and Game Commission in May 1997. By legislative action in January 1998, the closure was extended indefinitely. Under the new legislation, the Fish and Game Commission may lift all or part of the closure as specified in the Abalone Recovery and Management Plan that was adopted in December 2005.

**Table 5.7.4 Dollar Value (\$M) of Fish Harvested in the Project Area and Landed At Port San Luis/Avila, Morro Bay, Santa Barbara, and Ventura Over a Five-Year Period**

Port	2001	2002	2003	2004	2005	Total
Port San Luis/Avila	*	\$1.86	\$1.70	\$1.26	\$0.71	\$5.53
Morro Bay	\$3.44	\$2.49	\$1.76	\$2.20	\$2.18	\$12.07
Santa Barbara	\$5.36	\$6.73	\$6.57	\$6.51	\$6.72	\$31.89
Ventura	\$3.07	\$3.65	\$5.64	\$5.42	\$5.78	\$23.56
Total	\$11.87	\$14.73	\$15.67	\$15.39	\$15.39	\$73.05

\* No specific information available for Port San Luis/Avila for 2001.

Source: CDFG, 2003-2006

**Table 5.7.5 Volume (Tons) of Fish Harvested in the Project Area and Landed At Port San Luis/Avila, Morro Bay, Santa Barbara, and Ventura Over a Five-Year Period**

Port	2001	2002	2003	2004	2005	Total
Port San Luis/Avila	*	1570	1444	816	90	3,920
Morro Bay	1315	826	1112	1582	832	5,667
Santa Barbara	2631	3087	3486	3901	3949	17,054
Ventura	8181	7851	7993	8705	9565	42,295
Total	12,127	13,334	14,035	15,004	14,436	68,936

\* No specific information available for Port San Luis/Avila for 2001.

Source: CDFG, 2003-2006

Commercial fishers utilize several types of fishing gear in the project area. Gear categories include trawls, pots and traps, gillnets, diving, trolling and hook and line.

Bottom trawls are designed to maintain contact with the seafloor. Although there are several types of trawls depending on the species fished, in their most basic form they are funnel-shaped nets that are towed over the seafloor. As they are towed over the seafloor surface, the rope, chain, or line (e.g., tickler chain, bridles, etc.) that precedes the net opening scare prey up off the ocean bottom. As the trawl is towed forward, prey is captured in the netting that follows. The opening of the trawl is maintained by a headrope with floats on the top, a footrope with weights on the bottom, and doors to each side that spread the net horizontally on the seafloor. Bottom trawls are used throughout the proposed project area. Species caught by bottom trawls include flatfish (e.g., Dover sole and rex sole), rockfish, prawns, and sablefish.

Pots and traps come in a variety of shapes and sizes. In the project area, they are used primarily to capture crabs, lobsters, and to a lesser extent, prawns and certain fish species. Typically, several pots or traps are attached to a heavy groundline with an anchor or heavy weights attached at both ends. The ends of the line are connected to a surface buoy containing markers such as flags, radar reflectors, or even lights. Crab pots in particular are set in hard-bottom habitats. They can be set individually or in groups attached to a common groundline. During installation and retrieval of traps and pots, they can be dragged several meters along the bottom. Pots and traps are generally used at water depths <200 m near hard bottom habitat or along edges of canyons. However, pot fishing for sablefish can occur at depths up to 500 m along the edge of the continental shelf.

Gill nets consist of a vertical wall of netting. Weights and anchors on the bottom horizontal line anchor the bottom portion of the net to the seafloor while a series of floats on the top lead line lift the upper portion of the net towards the ocean surface. Gill nets are used for a wide variety of fish including halibut, yellowtail, and rockfish. Presently, however, set and drift gill nets for rockfish and lingcod are restricted from use in waters <70 fathoms (420 feet) south of Point Sal and in waters <40 fathoms (280 feet) from Point Sal north to Point Piedras Blancas.

Several fishing methods that use hooks attached to lines are utilized in the area for specific fisheries. Vertical longlines employ a series of hooks attached to a weighted line and are suspended vertically in the water column. Vertical longlining is commonly used to fish for rockfish over hard-bottom structures. Horizontal bottom longlines are similar to vertical longlines except that the hooks lay on the seafloor. Weighted ends keep the line on the seafloor. Horizontal longlines are used to catch bottom fish such as halibut.

Trolling consists of towing a baited hook or lure behind a boat. Pelagic fish such as salmon or albacore tuna are the primary target catch in the project area. Trolling commonly occurs in the water column high off the bottom, but in certain years, trolling for salmon can occur close to bottom.

Although there are several variations, seines are used to encircle schools of pelagic fish species. Seines generally fish from the surface and are essentially round haul nets. The webbing of the net is laid out to encircle the prey species. Floats along the upper lead line keep the top end of the net at the water surface. Metal rings are sewn along the bottom edge and a cable is passed through the rings. When the cable is drawn tight, the net “purse” (Fields, 1965). Seines are used in the project area to capture squid and other pelagic species such as mackerel and anchovy. Squid, which is an important commercial species in southern California, is landed exclusively by purse seines (Vojkovich, 1998). In prior years, high-intensity lamps were used to attract squid to the surface and a brail net was the only net used to scoop the squid onto the ship (Kato and Hardwick, 1975). Due to economics, however, brail vessels could not compete with the more efficient seiners (Vojkovich, 1998).

In the project area, sea urchins were the top-ranked species in both pounds harvested and dollar value of the harvest. Urchins are harvested along the mainland coast and around the Channel Islands in hard-bottom areas. They are harvested by divers to a depth of approximately 65 feet.

### **5.7.1.2 Recreational Fishing**

Recreational fishing activities in the project area occur from a variety of platforms. They include private or charter vessels, piers, or from the shoreline (e.g., beaches, jetties, breakwaters). Other than fishing logs maintained by the commercial passenger fishing vessel (CPFV) fleet, reliable recreation fish landing data for specific locations of the coast are not available. Estimates of total marine recreational fin fish landings are provided by the California Recreational Fisheries Survey (CRFS), developed by the California Department of Fish and Game and the Pacific States Marine Fisheries Commission, to produce data to manage fisheries sustainability. Fish landed (numbers of fish) by the CPFV fleet that fish in the project area and estimates from the CRFS are provided in Table 5.7.6. The numbers provided in the table are conservative estimates of CPFV catch landings because not all CPFV operators participate in the logbook program

(Thompson, 1999). Table 5.7.7 presents the recreational fishing rank for Santa Barbara Channel for the period of 1997 to 2003.

**Table 5.7.6 Annual Recreation Fish Landing by Species (number of fish) for the Commercial Passenger Fishing Vessel (CPFV) Fleet (2001) and Party Boats and Charter Boats (2004-2005)**

2001 <sup>1</sup>		2004 <sup>2,3</sup>		2005 <sup>2</sup>	
Hueneme, Oxnard, Ventura, S. Barbara	Avila, M. Bay	Santa Barbara/Ventura	San Luis Obispo/Santa Cruz	Santa Barbara/Ventura	San Luis Obispo/Santa Cruz
Rockfish (142,084)	Rockfish (102,888)	Rockfish (211,000)	Rockfish (183,000)	Rockfish (151,000)	Rockfish (149,000)
Barred Bass (50,219)	Albacore (8,902)	Barred Bass (59,000)	Kelp greenling (2,000)	Barred Bass (9,000)	Lingcod (9,000)
Whitefish (49,333)	Cabezon (743)	Kelp Bass (25,000)	Lingcod (1,000)	Kelp Bass (7,000)	Mackerel (8,000)
Kelp Bass (34,673)	Lingcod (729)	Whitefish (6,000)	Halibut (1,000)	Whitefish (4,000)	
Barracuda (20,444)	Unspecified Fishes (196)	Barracuda (5,000)	Mackerel (1,000)	Barracuda (3,000)	
Halfmoon (13,199)	Unspecified Flatfishes (114)	Blackfish (5,000)		Mackerel (3,000)	
Scorpionfish (8,738)	California Halibut (56)	Mackerel (3,000)		Sheephead (1,000)	
Sheephead (8,086)	Halfmoon (15)	Bonito (3,000)		Lingcod (1,000)	
White Seabass (4,336)	Pacific Mackerel (8)	Halfmoon (1,000)			
Albacore (3,509)	Whitefish (6)				

Source: CDFG, 2001, California Recreational Fisheries Survey Recreational Information Network

<sup>1</sup> 2001 was the last year the Annual Report of Statewide Landings by the CPFV Fleet separated the landings by port.

<sup>2</sup> CRFS provides estimates in thousands only.

<sup>3</sup> 2004 was the first year the CRFS divided the California coast into divisions.

**Table 5.7.7 Ranking of Fish Recreationally Harvested in the Santa Barbara Channel from 1997 to 2003**

Taxon	SB Channel Total <sup>1</sup>	Island Fraction <sup>2</sup>	Mainland/Open Fraction
Rockfish	724,782	64.3 %	35.7 %
Kelp Bass	251,840	40.9 %	59.1 %
Barred Sand Bass	249,997	8.5 %	91.5 %
Ocean Whitefish	168,015	84.6 %	15.4 %
Barracuda	119,611	48.6 %	51.4 %
Rock Scallop	67,804	98.3 %	1.3 %
Scorpionfish	53,964	70.4 %	29.6 %
Sheephead	30,157	87.2 %	12.8 %
Halfmoon	29,798	87.0 %	13.0 %
Mackerel	26,157	8.3 %	91.7 %
Yellowtail	24,397	86.1 %	13.9 %
Lobster	23,124	99.6 %	0.4 %
Other Fish	88,911	69.7 %	30.3 %
Taxa Total	1,858,557	56.8 %	43.2 %

<sup>1</sup> Total fish count over five years based on CPFV logs.

<sup>2</sup> Fraction of the Santa Barbara Channel fish caught in the seven blocks (684 though 690) that encompass the Channel Islands and cover 12.8 percent of the Channel area.

Source: CSLC, 2006.

As a group, rockfish dominate the CPFV catch and CRFS estimates for the Santa Barbara and San Luis Obispo areas. Rockfish landed at Port San Luis/Avila and Morro Bay accounted for over 80 percent of the catch for 2001, 2004, and 2005. Thompson (1999) has estimated that private boats and the CPFV fleet land an equal number of rockfish. Combined they account for 20 percent of the rockfish caught offshore California while commercial trawlers account for 54 percent and hook and line vessels 16 percent (Thompson, 1999).

Non-fish species are also harvested in the project area. Species and their numbers as reported by recreational charter boats to the CDFG for the 50 statistical fish blocks around Platform Irene are listed in Table 5.7.8 (CDFG, 2001b). The CDFG noted that the numbers provided in the table are conservative counts, as most recreational fishers do not report catch to local authorities. The data, however, provide valuable insights to target species and catch trends over the four-year period. The top-three species harvested were the rock scallop, spiny lobster, and abalone. These species were harvested by recreational divers at the western end of the Channel Islands and below Point Conception at subtidal water depths.

**Table 5.7.8 Non-Finfish Species Collected by Recreational Fishers in the Proposed Project Area**

Name		Year				
Common	Scientific	1995	1996	1997	1998	Total
Abalone	<i>Haliotis</i> spp.	1				1
Abalone, green	<i>Haliotis fulgens</i>	50	50			100
Abalone, pink	<i>Haliotis corrugata</i>	80				80
Abalone, red	<i>Haliotis rufescens</i>	2,321	3,156	1,029		6,506
Abalone, threaded	<i>Haliotis assimilis</i>		1			1
Clam, CA jackknife	<i>Tagelus californianus</i>	22				22
Cucumber, sea	Holothuroidea		540	294	22	856
Limpet	Archaeogastropoda			50		50
Lobster, CA spiny	<i>Panulirus interruptus</i>	2,615	1,935	2,606	2,204	9,370
Mussel	<i>Mytilus</i> spp.		15			15
Scallop, rock	<i>Crassadoma gigantea</i>	15,444	14,635	14,189	7,940	52,208
Snail, sea	Gastropoda		25			25
Urchin, red	<i>Strongylocentrotus franciscanus</i>	317	165	250	60	792

Source: CSLC, 2001b

### 5.7.1.3 Commercial Kelp Harvesting

#### *Kelp Species*

In southern California, kelp beds are primarily composed of the giant kelp *Macrocystis pyrifera*, while in the central California region (Point Montara south to Point Arguello), the kelp beds are a mix of the giant kelp and the bull kelp *Nereocystis luetkeana*.

The giant kelp *Macrocystis pyrifera* occurs from Baja California to Santa Cruz in central California (Druehl, 1970). Populations of the giant kelp commonly form dense patches that are referred to as kelp beds. Wave exposure and rocky substrates generally control their distribution. Except for a specialized population of giant kelp that grow on sand near Santa Barbara, the kelp holdfast attach to solid substrates or rock for attachment (North, 1971). Giant kelp can occur in

the intertidal zone in protected areas, but the shoreward boundary of giant kelp is largely determined by where the largest waves normally break (Seymore et al., 1989; Graham, 1997). The outer limit of giant kelp beds is largely determined by water clarity (Dean and Deysner, 1983). In turbid waters, the offshore edge of kelp beds occurs at depths of approximately 50 to 60 feet, while in clear waters around the Channel Islands, the offshore edge of kelp beds extend to more than 100 feet (North, 1971).

Giant kelp is very productive. Gerald (1976) reported that productivity varied between 0.4 wet kg/m<sup>2</sup> and 3.0 wet kg/m<sup>2</sup> with an average of 23 wet kg/m<sup>2</sup>/year or 102.4 tons/acre/year. Conversely, there are many factors that cause mortality to giant kelp. Storms and large swells that can dislodge plants cause the greatest mortality (Cowen et al., 1982; Dayton et al., 1984; Foster and Schiel, 1985; Dayton, 1985; North, 1986; Seymour et al., 1989). Storms can cause a gradient of damage from single plants and holdfasts to cleared areas several acres in size (Dayton et al., 1984).

The bull kelp *Nereocystis luetkeana* ranges from Alaska south to San Luis Obispo County, CA (Hawkes et al., 1978; Scagel et al., 1987). In central California south of Carmel, both giant and bull kelp occur together, forming very dense kelp beds. Like the giant kelp, bull kelp is associated with hard substrates for attachment and other environmental factors (McLean, 1962; Foreman, 1970). Bull kelp generally occurs at water depths of 13 to 72 feet (McLean, 1962; Nicholson, 1970; Vadas, 1972).

The productivity of bull kelp is also high. Gotshall et al. (1986) monitored bull kelp at Diablo Cove in San Luis Obispo County. Over a 12-year period, productivity of bull kelp averaged 9 kg/m<sup>2</sup> or 40.5 tons/acre. During the same period, productivity ranged from a high of 45 kg/m<sup>2</sup> (200 tons/acre) to a low of 1.09 kg/m<sup>2</sup> (4.8 tons/acre). The most influential factor for bull kelp survival is light availability (Vadas, 1972). Reduction of light caused by plankton blooms, storm turbulence, overcast or foggy conditions, or overshadowing by other algae can inhibit growth substantially (Vadas, 1972; Dayton et al., 1984; Miller and Estes, 1989). Nutrient levels and water temperature are also important to the survival of bull kelp (Dawson, 1966; Jackson, 1983).

Unlike the giant kelp, storms have varying effects on bull kelp. While spring storms cause mortality on young and juvenile plants, summer storms had little effect on this species (Foreman, 1970). Bull kelp, by nature, is more abundant in high disturbance areas with extremely large swells. Because of the resilience and strength of the stipe of this plant, it is able to survive under these extreme conditions. Koehl and Wainwright (1977) reported that bull kelp stipes can stretch approximately 38 percent. During winter storms, bull kelp canopies are removed by wave action. Because this plant is an annual species, this result is consistent with its life history. By late fall, photosynthetic activity has decreased resulting in weakened plants and holdfasts. The increase in wave energy during the winter months, in combination with the shortened day length, results in the death of this species as part of its life cycle.

### ***Kelp Harvesting***

Kelp has been harvested commercially along the coast of California since the early 1900s (Scofield, 1959). Beginning in 1911, many small companies began harvesting along the coast between Santa Barbara and San Diego. In the early years, kelp was harvested for the extraction of potash and acetone. These chemicals were used to manufacture explosives during World War

I (Scofield, 1959; McPeak and Glantz, 1984; Neushul, 1987; Tarpley and Glantz, 1992). In the 1920s, P.R. Park, Inc. of San Diego began harvesting kelp for use as an additive to livestock and poultry food and Kelco of San Diego began harvesting and processing giant kelp for the extraction of algin (Tarpley and Glantz, 1992).

Kelco, now known as ISP Alginates, had harvested and processed giant kelp since 1929. Over the years, they had developed many applications for the compound algin, which is found in the cells of the kelp (CDFG, 2000). Algin has many applications. It is mostly used as a thickening, stabilizing, suspending, and gelling agent and is used in a wide range of foods such as desserts, gels, dairy products, and salad dressings. It also has industrial applications and is used in paper coatings, textile printing and welding-rod coatings. Algin is also used in pharmaceutical, cosmetic, and dental products. In recent years, the annual sales of algin products manufactured in California was \$40 million (CDFG, 2000).

Initially, ISP Alginates only harvested kelp beds near San Diego. However, as production needs increased or kelp productivity near San Diego decreased, ISP Alginates extended their harvest area to include the project area (CDFG, 2000). However, since 2005, due to economic reasons, ISP Alginates moved to Scotland and is no longer operating off of California (MMS, 2006; NOAA 2006).

Mariculture companies also use giant kelp commercially as food for their abalone stock. Abalone aquaculture businesses range in size from large companies to small hobby operations. In 1999, the combined abalone aquaculture firms accounted for less than 1.7 percent of the annual kelp harvest (CDFG, 2000). However, their harvest is expected to increase in future years as the supply of wild abalone decreases worldwide. The Cultured Abalone of Santa Barbara leases bed 27 north of Santa Barbara, immediately off the Goleta coast. Since 1966, its kelp harvest has increased by 15 percent annually in response to a growing abalone market (CDFG, 2000). In 1999, the Cultured Abalone harvested 560 tons of kelp. Its kelp harvest is expected to increase by 15 percent annually (CDFG, 2000).

Kelp harvest data for 2000 to 2005 from five kelp beds located in the project area are provided in Table 5.7.9.

**Table 5.7.9 Kelp Harvest in Metric Tons for Beds in the Project Area**

Year	Kelp Bed Numbers				
	32	33	115	117	118
2000	0	0	0	0	0
2001	0	1,770	0	100	0
2002	0	0	0	400	0
2003	0	0	2,454	0	0
2004	2,767	0	580	250	0
2005	3,258	2,925	5,969	0	0
Total	6,025	4,695	9,003	750	0

Source: Data sets were provided by the Santa Barbara Coastal Ecosystem LTER, funded by the US National Science Foundation (OCE 9982105).

### ***Kelp Harvesting Vessels***

The vessels used for harvesting commercial kelp beds range in length from 140 to 180 feet. The majority of the length of the vessel comprises the bin for holding the cut kelp (CDFG, 2000). Kelp is cut by reciprocating blades mounted at the base of a conveyor system (drapers) located at the stern end of the ship. The draper system is lowered into the water to a depth of 3 feet, and the harvest ship moves stern-first through the kelp bed. As the kelp is cut, it is brought aboard on the conveyor system and deposited in the bin. The harvest vessels can carry as much as 600 tons of kelp which can be collected in a day (CDFG, 2000). The large harvest vessels have a draft of approximately 12 feet and work at water depths greater than 30 feet.

Kelp harvest vessels used by abalone aquaculturists are smaller than those used by the commercial harvesters. The smaller vessels are capable of working in shallower waters because of their shallow draft. They typically carry between 15 and 25 tons of kelp. Kelp is also harvested by hand from smaller boats to supply abalone farms. It is either cut at the surface using a knife attached to a pole, or cut beneath the water surface by a diver. The cut fronds are bundled together and pulled aboard the boat by hand.

#### **5.7.1.4 Recreational Kelp Harvesting**

Very little information is available on the quantity of kelp harvested for recreational purposes. However, several Native American Indian tribes and Asian groups do utilize kelp as a food source. The kelp that is collected can be drift kelp that has washed up onto the beach or fresh kelp that is harvested during low tides. In addition to kelp, local Asian groups harvest seaweeds such as *Porphyra* spp. and *Ulva* spp. in the project area during spring low tides. These algae are utilized as a food source.

Other recreational uses of kelp include its use as an ingredient in a form of ceramic art called Sagger firing and by gardeners for use as compost (CDFG, 2000). It has been estimated that less than 25 tons of kelp is collected annually by recreational users (CDFG, 2000).

### **5.7.2 Regulatory Framework**

#### **5.7.2.1 Federal Laws and Policies**

##### ***The Outer Continental Shelf Lands Act (OCSLA)***

Under the OCSLA, the Department of Interior (DOI) is required to:

- Manage the orderly leasing, exploration, development, and production of oil and gas resources on the Federal Outer Continental Shelf (OCS);
- Ensure the protection of the human, marine, and coastal environments;
- Ensure that the public receives a fair and equitable return for these resources; and
- Ensure that free-market competition is maintained.

Within the DOI, the Minerals Management Service (MMS) is charged with the responsibility of managing and regulating the development of the OCS oil and gas resources in accordance with the provisions of the OCSLA. The MMS operating regulations are presented in Chapter 30, CFR, Part 250.

### *National Environmental Policy Act (NEPA)*

NEPA requires all Federal agencies to use a systematic, interdisciplinary approach to protect the human environment. The approach ensures the integrated use of natural and social sciences in any planning and decision making that may have an impact on the environment. NEPA also requires the preparation of a detailed Environmental Impact Statement (EIS) on any major Federal action that may have a significant impact on the environment. The EIS must address any adverse environmental effects that cannot be avoided or mitigated, alternatives to the proposed action, the relationship between short-term resources and long-term productivity, and irreversible and irretrievable commitments of resources.

In 1979, the Federal Council on Environmental Quality (CEQ) established uniform procedures for implementing the procedural provisions of NEPA. These regulations provide for the use of the NEPA process to identify and assess reasonable alternatives to proposed actions that avoid or minimize adverse effects upon the quality of the human environment. “Scoping” is used to identify the scope and significance of important environmental issues associated with a proposed Federal action through coordination with Federal, State, and local agencies; the general public; and any interested individual or organization prior to the development of an impact statement. The process also identifies and eliminates from further detailed study, issues that are not significant or that have been covered by prior environmental review.

### *Magnuson-Stevens Act*

The Magnuson-Stevens Act of 1976 is the cornerstone legislation of fisheries management in US jurisdictional waters. Its purpose was to stop overfishing by foreign fleets and aid in the development of the domestic fishing industry. The Act gave the US sole management authority over all living resources within the 200-nautical mile exclusive economic zone of the US. The Act created eight regional Fishery Management Councils (FMCs) and mandated a continuing planning and management program for marine fisheries by the FMCs. The Act, as amended, requires that a Fishery Management Plan (FMP) based upon the best available scientific and economic data be prepared for each commercial species or group of related species of fish that is in need of conservation and management within each respective region. The regional council for the Pacific OCS is the Pacific Fishery Management Council. In accordance with the Act, the councils report directly to the US Secretary of Commerce whose job is to review, approve and prepare fishery management plans. In reality, this function is delegated to the Administrator of the National Oceanic and Atmospheric Administration (NOAA) and the National Marine Fisheries Service.

The Act has been amended several times. In 1996, federal law governing fisheries management underwent a major overhaul. The amendments, termed the Sustainable Fisheries Act (SFA) of 1996, identified fish habitat as critical to healthy fish stocks and sustainable fisheries. The SFA implemented a program to designate and conserve Essential Fish Habitat (EFH) for species managed under a FMP. EFH is defined as “those waters and substrate necessary for spawning, breeding, feeding, or growth to maturity.” The intention is to minimize any adverse effects on habitat caused by fishing or nonfishing activities and to identify other actions to encourage the conservation and enhancement of such habitat. A number of FMPs that apply to the west coast have been developed. These include the West Coast Groundfish FMP, the Coastal Pelagics FMP, and the Pacific Salmon FMP. The documents for West Coast groundfish EFH include all species of rockfish managed by the Council (Bloeser, 1999).

### ***Coastal Zone Management Act (CZMA)***

In accordance with the CZMA and the Coastal Zone Act Reauthorization Amendments of 1990, OCS oil and gas exploration and development activities affecting the coastal zone must be carried out consistent with the California Coastal Management Program (CCMP) (i.e., the policies of the California Coastal Act). The CCMP sets forth objectives, policies, and standards regarding coastal uses and resources.

### ***Coast Guard Regulatory Authority***

Primary responsibility for the enforcement of U.S. maritime laws and regulations falls upon the U.S. Coast Guard. The Coast Guard's responsibilities for regulating activities on the OCS, the continental shelf, and in ports and harbors, as applicable to the proposed action, are presented in Title 33 CFR, chapters 1-199; Title 43 USC section 1331; Title 46 USC, Parts A and B; and OPA 90. The Coast Guard is responsible for managing and regulating provisions for safe navigation of vessels in US waters, as well as the enforcement of environmental and pollution prevention regulations. As such, the Coast Guard provides for the regulation and enforcement of hazardous working conditions on the OCS, for the management and regulations of measures for pollution prevention in territorial waters, and for ensuring that the provisions of the Oil Pollution Act signed in August 1990 (OPA 90) and the Marine Plastic Pollution and Control Act are implemented.

### **5.7.2.2 State and Local Laws and Policies**

#### ***California Environmental Quality Act (CEQA)***

The goal of CEQA (Pub. Res. Code §21000 et seq.) is to develop and maintain a high-quality environment. It directs California's public agencies to identify the significant environmental effects of their actions and avoid or mitigate those significant environmental effects, where feasible. The California Resources Agency administers CEQA. CEQA requires that an EIR be prepared for any major project and states the likely environmental impacts of that project. If it is determined that a project has no significant environmental effects and is not exempt from CEQA, then the lead agency must adopt a negative declaration to that effect. The purpose of an EIR is to provide State and local agencies and the general public with detailed information on the potentially significant environmental effects which a proposed project is likely to have and to list ways which the significant environmental effects may be minimized and indicate alternatives to the project.

#### ***California State Lands Commission (CSLC)***

Pursuant to Public Resources Code section 6873.5(b), the CSLC shall (prior to the adoption of a form of lease for leasing offshore tide and submerged lands between the mean high tide line and the three-mile jurisdictional limit) consider the potential impacts of the proposed lease on the fisheries and marine habitat within the area being considered for leasing. This EIR provides information relevant to such consideration for the proposed project.

#### ***California Coastal Act of 1976, Public Resources Code Section 30000 et seq.***

The California Coastal Act (Division 20 of the Public Resources Code, Section 30000, et seq.) became law in 1976 as a means of providing a comprehensive framework for the protection and management of coastal resources. The main goals of the act are to protect and restore coastal

zone resources; assure balanced and orderly utilization of such resources; maximize public access to and along the coast; assure priority for coastal-dependent and coastal-related development; and encourage cooperation between State and local agencies toward achieving the Act's objectives.

The Coastal Act contains policies to guide local and State decision-makers in the management of coastal and marine resources. The policies are organized into chapters by topics relating to public access; recreation; marine environment; land resources; and development. The act also contains provisions for development controls and land-use entitlements for certain types of new development in the coastal zone.

The California Coastal Act, which is administered by the California Coastal Commission, also identifies protective measures for nearshore marine resources. For example:

Coastal Act section 30230 states:

*“Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.”*

Coastal Act section 30234 states:

*“Facilities serving the commercial fishing and recreational boating industries shall be protected and, where feasible, upgraded. Existing commercial fishing and recreational boating harbor space shall not be reduced unless the demand for those facilities no longer exists or adequate substitute space has been provided. Proposed recreational boating facilities shall, where feasible, be designed and located in such a fashion as not to interfere with the needs of the commercial fishing industry.”*

Coastal Act section 30234.5 states:

*The economic, commercial, and recreational importance of fishing activities shall be recognized and protected.*

### **California Regional Water Quality Control Board (RWQCB)**

The California RWQCB determines permit requirements on a case-by-case basis. A Water Discharge Permit is required if the action creates problems or if the action becomes permanent. The duration and size of a project are important factors and concerns may include the amount of water quality degradation.

The Water Quality Control Plan developed by the Central Coast RWQCB established water quality standards for the region. The plan incorporates the California Ocean Plan that establishes standards to protect the quality of ocean waters for use and enjoyment by the people of California. The Ocean Plan, which is administered by the State Water Resources Control Board, is reviewed periodically to guarantee that the current standards are adequate and are not allowing degradation to marine species or posing a threat to public health (State Water Resources Control

Board, 2001). In general, Chapters I, II, and III establish discharge standards for non-point discharges to marine waters. For example:

The California Ocean Plan, Chapter I, Beneficial Uses states:

*“The beneficial uses of the ocean waters of the State that shall be protected include industrial water supply, water contact and non-contact recreation, including aesthetic enjoyment, navigation, commercial and sport fishing, mariculture, preservation and enhancement of Areas of Special Biological Significance, rare and endangered species, marine habitat, fish migration, fish spawning and shellfish harvesting.”*

The California Ocean Plan, Chapter II, Water Quality Objectives states, in part, in Section E Biological Characteristics, that:

- 1) *Marine communities, including vertebrate, invertebrate, and plant species shall not be degraded.*
- 2) *The natural taste, odor, and color of fish, shellfish, or other marine resources used for human consumption shall not be altered.*
- 3) *The concentration of organic materials in fish, shellfish or other marine resources used for human consumption shall not bioaccumulate to levels that are harmful to human health.*

The Central Coast RWQCB’s Water Quality Control Plan (Basin Plan) applies to the coastal waters that include the Tranquillon Ridge Field (RWQCB, 1994). The standards of the RWQCB incorporate the applicable portions of the Ocean Plan and are more specific to the beneficial uses of marine waters adjacent to the project site. These water quality objectives and toxic material limitations are designed to protect the beneficial uses of ocean waters within specific drainage basins. The Basin Plan identifies the following existing beneficial uses for the coastal waters contained within the project area (RWQCB, 1994).

- **Water Contact Recreation:** Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water skiing, skin and scuba diving, surfing and fishing.
- **Marine Habitat:** Uses of water that support marine ecosystems including, but not limited to, preservation or enhancement of marine habitats, vegetation such as kelp, fish, shellfish, or wildlife such as marine mammals and shorebirds.
- **Shellfish Harvesting:** Uses of water that support habitats suitable for the collection of filter-feeding shellfish such as clams, oysters, and mussels, for human consumption, commercial, or sport purposes. This includes waters that have in the past, or may in the future, contain significant shell fisheries.
- **Ocean Commercial and Sport Fishing:** Uses of water for commercial or recreational collection of fish, shellfish, or other organisms including uses involving organisms intended for human consumption or bait purposes.

### ***Santa Barbara County (SBC)***

The coastal reaches adjacent to the Tranquillon Ridge Field fall under the jurisdiction of SBC. Consequently, SBC is one of the agencies responsible for reviewing project actions including integration of policies established by the California Coastal Act. An Energy Division was

established within the SBC’s Planning and Development (P&D) Department to participate in environmental reviews and permitting of major oil and gas development projects. The Division also ensures that oil and gas projects are developed and operated in compliance with the permit conditions imposed by the SBC decisionmakers, including the Board of Supervisors and the Planning Commission.

### 5.7.3 Significance Criteria

Changes or impacts to commercial and recreational fishing or kelp harvesting will be considered significant if:

- Loss of fishing grounds or kelp harvesting areas exceed 10 percent during the proposed project.
- More than 10 percent of fishers are precluded from fishing in a specific area for most or all of a fishing season.
- Kelp beds lessees are not able to harvest for most or all of a kelp season (e.g., one year).
- Fish or kelp resources of commercial importance have the potential to be reduced by more than 10 percent in a specific area.
- The project results in the loss or damage to any commercial or recreational fishing or kelp harvesting equipment.

### 5.7.4 Impact Analysis for the Proposed Project

Impact #	Impact Description	Phase	Residual Impact
CRF/KH.1	Oil spills may potentially impact commercial and recreational kelp harvests in the proposed project area.	<i>Increased Throughput Extension of Life</i>	<i>Class III</i>

The effects of oil spills on beds of *Macrocystis* have been examined several times along the Pacific coast. After the tanker *Tampico* spill in 1957 in Baja California, North et al. (1964) reported high mortality of invertebrates but no damage to *Macrocystis*. Within five months of the spill, they reported increased amounts of algal vegetation, including *Macrocystis*. North et al. (1964) reported that the oil had killed sea urchins that had been maintaining the bottom and once killed, *Macrocystis* and other algal species began to develop. The kelp had recruited and produced a canopy in the cove approximately 18 months following the spill.

The 1969 Santa Barbara crude oil spill impacted a large portion of the mainland coast and Channel islands (Foster et al., 1971a). There was little damage to the *Macrocystis* beds even though considerable quantities of crude oil fouled the surface canopies (Foster et al., 1971b). The partially weathered crude oil appeared to stay on the surface of the water and did not stick to the fronds of the giant kelp.

Also, there are extensive natural gas and oil seeps that occur near kelp beds in the Santa Barbara Channel (Mertz, 1959). The seeps often produce continuous oil slicks on the surface of the water and tar mounds on the ocean bottom within kelp bed communities (Spies and Davis, 1979). The natural seeps do not appear to cause visible damage to *Macrocystis* and extensive canopies regularly develop in these beds.

The literature indicates that an oil spill or its cleanup cause little damage to kelp beds. Should damage occur, such as from the *Tampico* spill, recruitment and recolonization occurs rapidly and within one year. Hence, impacts to kelp and commercial and recreational kelp harvesting operations are adverse but not significant.

### **Mitigation Measures**

Mitigation Measures MB-1a and MB-1b in Section 5.5, Marine Biology, would mitigate Impact CRF/KH.1 to the maximum extent feasible in accordance with County policies.

### **Residual Impact**

Because of the temporary nature of the disturbance, oil spill impacts to commercial and recreational kelp harvesting operations are *adverse but not significant (Class III)*.

<b>Impact #</b>	<b>Impact Description</b>	<b>Phase</b>	<b>Residual Impact</b>
CRF/KH.2	Oil spills may potentially impact commercial and recreational fishing in the proposed project area.	<i>Increased Throughput Extension of Life</i>	<i>Class I</i>

A wide variety of fish and shellfish species are commercially harvested in the project area. As described in Marine Biology Impact MB-1, biota residing in the intertidal and shallow subtidal habitat are vulnerable to oil spills. Several species are commercially and recreationally harvested in the intertidal zone. Sea urchins, for example, ranked first in pounds landed and dollar value over the five-year period from 1995 to 1999. Sea urchins alone accounted for almost half (46.5 percent) of the dollar value of the commercial catch during the five years. In pounds landed, it accounted for 41.6 percent of the total catch. Mass mortalities of invertebrates such as sea urchins, abalone, and lobsters were reported following the *Tampico* spill in Baja California (North et al. 1964). Although abalone is not presently harvested in the project area, both sea urchins and lobsters are high value species that are harvested both commercially and recreationally in the area. In the event of an oil spill, there could be impacts to abalone, sea urchins, and lobster. Smothering is the most common cause of mortality and would be limited to direct contact with weathered tar balls from the oil spill. Although not high value species, other intertidal or shallow subtidal organisms that are harvested include sea cucumbers and whelks. Results of the oil spill trajectory analyses (Figure 5.1-1) indicate that key areas for harvesting these species along the northern and western edge of San Miguel and Santa Rosa Islands (between 0.3 and 5.3 percent probability) and the coastline between Point Arguello and Point Conception (between 0.0 and 12.7 percent probability) may be impacted by oil spills. The degree of oiling and the oil spill impacts depend on several factors. They include location of spill, volume, type of oil, amount of weathering, evaporation, dispersion of oil into the water column or shoreline, and the amount of oil that is contained and cleaned immediately after a spill. For the spills that occurred on the Pacific and Gulf of Mexico OCS between 1971 and 1999, the mean volume of oil spills was 159 barrels (MMS, 2001). Large spills (e.g. >2000 barrels) are rare and unlikely to occur; however, the Santa Barbara oil spill of 1969 was estimated at 80,900 barrels (MMS, 2001). The spill from the 1997 rupture of the Torch Pedernales pipeline in the project area was estimated at 163 to 1,242+ barrels (SBC, 2001)<sup>1</sup>. While the probability for oil

<sup>1</sup> The CDFG official spill volume from the Torch Point Pedernales pipeline was 163 barrels (bbls) (CDFG, 1989). The 1,242 bbl estimate is from SBC and is based upon additional factors that were not taken into account with the CDFG official number. These include drainage from the landward side of the pipeline, oil between pigs 1 and 2, and oil behind pig 2.

contacting and fouling the shoreline or shallow subtidal areas where commercial or recreational species are harvested is low, it nevertheless can occur. While contaminated shorelines may be cleaned, in some instances, depending on substrate type, oil may persist in sediments for several years.

On rocky cobble beaches in Prince William Sound, oil was clearly visible in sediments eight years after the *Exxon Valdez* spill that occurred in 1989 (Hayes and Michel, 1998). A surface sheen in intertidal waters caused by the release of hydrocarbons from oiled sediments was noticeable eight years after the spill (Hayes and Michel, 1998). In addition to direct oiling effects, impacts caused by the cleanup method, or sublethal effects such as histological damage, altered physiological and metabolic patterns, decreased growth and reproduction, vulnerability to diseases, or even area closures can continue for several years (NRC, 1985; Coats et al., 1999). Oil spill impacts to commercial and recreational fisheries in the intertidal environment or shallow subtidal may be long lasting and can result in loss of areas for most if not all of a harvesting season. Hence, impacts to commercial or recreational fishing in intertidal or shallow subtidal areas are considered to be significant.

Damage to fish populations were documented from the *Exxon Valdez* oil spill (Spies, 1996). Juvenile pink and sockeye salmon were directly affected by the spill in 1989 and their eggs may have been affected through 1993 (Spies, 1996). Other indications of exposure to oil included the presence of oil in the stomachs of salmon fry, measurements of polynuclear aromatic hydrocarbons in salmon fry, and increases in P450<sup>2</sup> and bile hydrocarbon metabolites in Dolly Varden (Spies, 1996). Impacts to growth were also shown for pink salmon, Dolly Varden and cutthroat trout even though changes in food availability were not detected (Spies, 1996).

Brown et al. (1996) estimated that 40 to 50 percent of the egg biomass of Pacific herring in Prince William Sound was exposed to oil during developmental stages. The resulting 1989 year class showed sublethal effects such as premature hatch, low weights, reduced growth, and increased morphologic and genetic abnormalities (Brown et al., 1996). The 1989 year class recruiting as 4-year old adults in 1993 was one of the smallest to return to spawn in Prince William Sound with an adult population that had already been reduced by approximately 75 percent (Brown et al., 1996).

Adult fish, due to their mobility, may be able to avoid or minimize exposure to spilled oil. However, there is no conclusive evidence that fish will avoid spilled oil (NRC, 1985). Egg and larval stages would also not be able to avoid exposure to spilled oil. Because losses to commercial and recreational fish resources and losses due to closure of fishing areas for most or all of a fishing season can occur, impacts to commercial and recreational fishing from oil spills are considered to be significant. Fish harvested from contaminated areas may also be reduced in value and fishing gear can be damaged due to oil fouling, causing additional significant impacts. Further, response, cleanup and repair vessels that do not adhere to the Vessel Traffic Corridor restrictions can cause the loss or destruction of fishing gear.

---

<sup>2</sup> Cytochrome P450, a family of over 60 enzymes the body uses to break down toxins and make blood.

### **Mitigation Measures**

See Mitigation Measures MB-1a and MB-1b in Section 5.5, Marine Biology. Condition M-8 of the PXP FDP (see Appendix M), requires PXP to cooperate with the Santa Barbara Channel Vessel Traffic Corridor Program; no additional mitigation is required.

### **Residual Impact**

Because there are limitations to thorough containment and cleanup of an offshore oil spill, *significant impacts (Class I)* remain for commercial and recreational fisheries in the intertidal zone.

<b>Impact #</b>	<b>Impact Description</b>	<b>Phase</b>	<b>Residual Impact</b>
CRF/KH.3	The discharge of drilling muds and drill cuttings from Platform Irene may potentially impact kelp communities in the project area.	<i>Drilling</i>	<i>Class III</i>

The discharge of drilling muds and drill cuttings at Platform Irene would result in increased turbidity in ocean waters near the platform. However, the mud discharges would not affect the photosynthetic ability of kelp due to the great distance between the discharge point and the kelp beds along the shoreline. Because of the intermittent nature of the drilling mud discharges, the rapid descent of most mud solids to the ocean bottom, and the dispersion of suspended mud particles, these impacts are considered to be potentially adverse but not significant.

### **Mitigation Measures**

No mitigation measures have been identified.

### **Residual Impact**

Because of the temporary nature of the disturbance, drilling mud or drill cuttings impacts to commercial and recreational kelp harvesting operations are *adverse but not significant (Class III)*.

<b>Impact #</b>	<b>Impact Description</b>	<b>Phase</b>	<b>Residual Impact</b>
CRF/KH.4	Marine vessel traffic to and from Platform Irene could cause loss or damage to commercial fishing gear in the project area.	<i>Drilling Extension of Life</i>	<i>Class III</i>

Supply boats servicing Platform Irene use Port Hueneme as the shore based facility. The supply boat traffic from Port Hueneme crosses nearshore set gear fishing areas such as Hueneme Flats, and could cause damage to the fishing gear. If support vessels hit fishing gear, the gear can be damaged or lost. With the increase in the number of supply boat trips during the drilling phase, the likelihood of supply boats impacting commercial fishing gear would increase. In addition, with the Tranquillon Ridge project, supply boats would continue to service the platforms for a longer period of time due to the extension of its life.

In 1983 the Joint Oil/Fisheries Liaison Office, a private nonprofit service, was formed along with the Joint Oil/Fisheries Committee of South Central California to provide an inter-industry communications link and dispute resolution/mediation process between the offshore oil and gas

industry and the commercial fishing industry in the Santa Barbara Channel and Santa Maria Basin.

To reduce the conflict between support vessel traffic and the commercial fishing industry, a Vessel Traffic Corridor Program was developed by the Joint Oil/Fisheries Committee of South Central California, and went into effect in August 1984. These vessel traffic corridors are approximately 1,500 feet wide. Use of these corridors is voluntary. PXP has stated that the supply boats servicing Platform Irene currently use and will continue to use the defined corridors from Port Hueneme to the shipping lanes.

Use of mooring areas along the coast also poses a potential conflict with nearshore commercial fishing. One mooring location of particular concern is Cojo anchorage, which is in a prime set gear fishing area. Support vessels that service the oil platforms in the Southern and Central Santa Maria Basin use the Cojo anchorage as a safe anchoring spot during rough weather. As the vessels move in and out of Cojo Bay, it is possible that they could impact set fishing gear, resulting in damage or loss of the gear.

Given that the support vessels servicing Platform Irene use the vessel traffic corridors and the fact that there is a Joint Oil/Fisheries Liaison Office that provides dispute resolution/mediation, this impact is considered adverse but not significant.

**Mitigation Measures**

**CRF/KH-1** Disputes over damage to commercial fishing gear resulting from support vessel traffic to and from Platform Irene shall be submitted to the Joint Oil/Fisheries Committee for resolution.

**Residual Impact**

Given the use of the vessel traffic corridors and the dispute resolution/mediation process, this impact is considered *adverse but not significant (Class III)*.

Impact #	Impact Description	Phase	Residual Impact
CRF/KH.5	The deposition of shells, or shell mounds, could prevent commercial trawling activities beneath Platform Irene	<i>Drilling Extension of Life</i>	<i>Class III</i>

Epibiota such as mussels and barnacles fall from their attachment points on submerged portions of a platform and can accumulate on the seafloor. The accumulation or deposits of shells, referred to as shell mounds, also contain drilling related discharges such as drilling muds and drill cuttings (deWit, 2001). In 1996, Platforms Hazel, Hilda, Hope, and Heidi (collectively known as the 4H platforms), located in State Waters in the eastern portion of the Santa Barbara Channel were removed. The platforms were located in water depths ranging from 95 feet (29 m) to 150 feet (46 m). The shell mounds beneath the platforms ranged from 20 to 28 feet (6.7 to 8.5 m) in height and from 185 to 230 feet (56.9 to 70.1 m) in width. The estimated volume of material within the mounds ranged from 7,000 to 14,000 yd<sup>3</sup> (5,352 to 10,704 m<sup>3</sup>) (de Wit, 2001). Compared to samples collected at a reference site, chemical analyses of sediments collected within the shell mounds indicated elevated levels of metals, hydrocarbons, and PCB's. Elutriate bioassay testing also showed that shell mound sediments collected at Platform Hazel

were toxic enough at 48 percent concentration to kill 50 percent of mysid shrimp (*Mysidopsis bahia*) within 96 hours (deWit, 2001).

Several trawl tests were conducted after the platforms were removed. The purpose of the tests was to demonstrate that permit conditions requiring that the sites could be trawled had been satisfied. The tests were all unsuccessful and trawling could not be conducted in the shell-mound area beneath the former 4H platforms. Various alternatives regarding the fate of the shell mounds are being examined by the CSLC (CSLC, 2001). Alternatives range from mitigation for the loss of trawling grounds, modifications to the mounds, or complete removal of the mounds (CSLC, 2001).

Love et al. (1999) surveyed the mussel mounds beneath seven platforms in the Santa Barbara Channel and the Santa Maria Basin. The mound beneath Platform Irene was one of the seven mounds that were surveyed. Because the focus of the study conducted by Love et al. (1999) was to document fish assemblages associated with mussel mounds, the physical and chemical character of the mound is not provided. However, their survey confirms the presence of a mound beneath Platform Irene, but found that the shell mound was small in size.

In 2001 the MMS conducted multibeam hydrographic surveys around and under eight oil platforms in the Santa Barbara Channel and Santa Maria Basin. The study found that the size, height, or volume of the mounds under the platforms may be related to platform age. The oldest platform (Houchin) has the largest mound and the 3 youngest platforms (Gail, Hermosa, and Hidalgo) either have the smallest mounds or none. Other factors must influence the size, height, and volume of the mounds because three platforms (Gina, Henry, and Grace) were installed within a year of each other and have mounds with significantly different heights and volumes (MMS, 2001).

The study also found that the size and volume of the mounds under the offshore platforms may be related to the geographic location of the platforms. The largest mounds are under Platforms Henry and Houchin, which are located near one another in Central Santa Barbara Channel. Platforms Gina and Grace, located in the Southern Santa Barbara Channel, have mounds of similar size and volume. Although located far apart, Platforms Gail and Hondo are both located in deep water (740' and 835', respectively) and have similar-sized mounds. The two platforms surveyed in the Santa Maria Basin (Hermosa and Hidalgo) have very small or no mounds (MMS, 2001).

Recent data suggest that the shell mounds at Platform Irene cannot be removed using technology that is available today. Feasibility studies for the Chevron 4H shell mounds indicate that 135 feet of water is the practical limit for removal of shell mounds based upon currently available technology. The shell mound located at Platform Irene, which lies in 242 feet of water, could not be removed with technology that is available today. Although the "best available technology" may change in 15-25 years, removal of the mounds may be neither feasible nor environmentally preferred when Irene is abandoned. This would have to be determined as part of the environmental review that would be conducted for the abandonment of Platform Irene.

~~It is likely that with~~ The Tranquillon Ridge Project would extend the expected life of Platform Irene ~~will be extended~~. This extension of life could lead to an increase in the size and volume of the shell mound beneath the platform. However, the extent to which the shell mound may change

due to the extended life of Platform Irene is unknown. This potential increase in the size of the shell mound was found to be an adverse but not significant impact on commercial fishing since a shell mound already exists at the platform site.

### **Mitigation Measures**

**CRF/KH-2** At the time of platform abandonment, the applicant shall ensure that the environmental review of the abandonment activities pursuant to the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA), as appropriate, includes an analysis as to whether or not the shell mounds should be removed or modified so they do not interfere with commercial trawling activities. This subsequent NEPA/CEQA review shall evaluate the best available technologies for removal or modification of the shell mounds. The best available technology shall be determined by the applicant and the permitting agencies, in consultation with the Joint Oil/Fisheries Liaison Office and shall be implemented.

### **Residual Impact**

Because a shell mound already exists at the platform site, the residual impact due to an increase in the size of the shell mound due to extension of life is *adverse but not significant (Class III)*.

## **5.7.5 Impact Analysis for the Alternatives**

Detailed descriptions of the various alternatives have been provided in Chapter 3.0. This section provides a discussion of the commercial and recreational fishing/kelp harvesting impacts from the various alternatives.

### **5.7.5.1 No Project Alternative**

**Scenarios 2 and 3.** As discussed in Section 3.2, under the No Project Alternative Scenarios 2 and 3, production of the federal portion of the Tranquillon Ridge field would and would not occur, respectively. However, no extension of life of Point Pedernales facilities (Platform Irene, pipelines, and LOGP) is assumed under either scenario. Impacts CRF/KH.1 and CRF/KH.2, which address oil spills, would not apply to Scenarios 2 and 3 the No project Alternative because oil production would be the same as comparable to current operations (i.e., baseline).

**Impact CRF/KH.3 – Drilling Muds Discharge:** Impacts due to the discharge of drilling muds and drill cuttings into the ocean would be the same as current operations (baseline). ~~This alternative~~ Scenarios 2 and 3 would eliminate the drilling of 22 to 30 wells into the Tranquillon Ridge Field. Hence, the volume of drilling muds and drill cuttings that would be discharged into marine waters would be reduced substantially. Impacts caused by the release of muds and cuttings would occur over a shorter period of time and be reduced because of the smaller volume that would be discharged. This impact to commercial and recreational kelp harvesting would still be considered *adverse but not significant (Class III)*.

**Impact CRF/KH.4 – Marine Vessel Traffic Impacts to Fishing Gear:** Impacts to fishing gear due to the marine vessel traffic would be reduced compared to the proposed project. ~~This alternative~~ Scenarios 2 and 3 would reduce the number of marine vessel trips due to a shorter drilling period (2 years versus 15 years), and there would be no extension of life for the platform.

This impact to commercial fishing would still be considered *adverse but not significant* (Class III).

**Impact CRF/KH.5 – Shell Mounds:** Impacts associated with the deposition and accumulation of shells and drill cuttings beneath Platform Irene would be less than the proposed project. Because of the reduction in the number of production wells, the volume of drill cuttings that would be discharged into the marine environment would be substantially less. Also, because the period of production would be shortened, the volume of shell material that would fall to the seafloor from Platform Irene would be the same as for the current operations (i.e., baseline). Hence, impacts to trawling activities caused by the shell deposition or shell mounds would be less than for the proposed project. This impact would still be considered *adverse but not significant* (Class III).

**Options for Meeting California Fuel Demand.** The relative impacts to fisheries and kelp harvesting associated with the various options for meeting California fuel demand are summarized in Table 5.7.10.

**Table 5.7.10 No Project Alternative Comparison to Options for Meeting California Fuel Demand, Commercial & Recreational Fishing/Kelp Harvesting**

Source of Energy	Impacts
<b>Other Conventional Oil &amp; Gas</b>	
<u>Domestic onshore crude oil and gas</u>	<u>Would eliminate fisheries/kelp impacts.</u>
<u>Increased marine tanker imports of crude oil</u>	<u>Fisheries/kelp impacts would be increased.</u>
<u>Increased gasoline imports<sup>1</sup></u>	<u>Would eliminate fisheries/kelp impacts.</u>
<u>Increased natural gas imports (LNG)</u>	<u>Fisheries/kelp impacts would increase with LNG tankering and/or development of offshore ports.</u>
<b>Alternatives to Oil and Gas</b>	
<u>Fuel Demand Reduction: increased fuel efficiencies, conservation, electrification<sup>2</sup></u>	
<u>Alternative transportation modes</u>	<u>Proposed project impacts would be eliminated.</u>
<u>Implementation of regulatory measures</u>	<u>Proposed project impacts would be eliminated.</u>
<u>Coal, Nuclear, Hydroelectric</u>	<u>Proposed project impacts would be eliminated. Fisheries/kelp impacts unlikely for coal or hydroelectric. Coastal nuclear plants could result in fisheries/kelp impacts.</u>
<b>Alternative Transportation Fuels</b>	
<u>Ethanol/Biodiesel<sup>3</sup></u>	<u>Proposed project impacts would be reduced.</u>
<u>Hydrogen<sup>2</sup></u>	<u>Proposed project impacts would be eliminated.</u>
<b>Other Energy Resources<sup>2</sup></b>	
<u>Solar<sup>2,4</sup></u>	<u>Proposed project fisheries/kelp impacts would be eliminated.</u>
<u>Wind<sup>2,4</sup></u>	<u>Proposed project fisheries/kelp impacts would be eliminated. Development of offshore wind infrastructure could result in fisheries/kelp impacts.</u>

**Table 5.7.10 No Project Alternative Comparison to Options for Meeting California Fuel Demand, Commercial & Recreational Fishing/Kelp Harvesting**

Source of Energy		Impacts
	Wave <sup>2,4</sup>	Proposed project fisheries/kelp impacts would be eliminated. Development of wave energy extraction infrastructure could result in fisheries/kelp impacts.
<p>Footnotes:</p> <ol style="list-style-type: none"> <li>1. Pipeline and tanker truck import from out-of-State assumed.</li> <li>2. Assumes that Tranquillon Ridge production would not be replaced with other petroleum-based energy supply.</li> <li>3. Assumes ethanol and biodiesel used as blends only and therefore would reduce, but not eliminate Tranquillon Ridge or equivalent production.</li> <li>4. Assumes, large centralized facilities.</li> </ol>		

**5.7.5.2 VAFB Onshore Alternative**

Development of the Tranquillon Ridge Field from VAFB would reduce or eliminate impacts to commercial and recreational fishing and kelp harvesting from those for the proposed project. The only potential impacts to fishing and kelp harvesting from the VAFB Onshore Alternative would be if oil spilled from a pipeline rupture or due to upset conditions at the drilling/production site reaches ocean waters.

**Impact CRF/KH.1 – Spill Impacts to Kelp:** The VAFB Onshore Alternative would reduce the risk of oil spills compared to the proposed project. The risk of an oil spill from Platform Irene or associated offshore pipelines would be reduced to the baseline conditions. There is a small chance that an oil spill from the rupture of the new pipeline or due to upset conditions at the drilling/production site could reach ocean waters. The chances of oil from the onshore pipeline or drilling/production site reaching the ocean are nominal because the alternative facilities would be landward of the railroad tracks. The railroad tracks run along a berm that forms a partial barrier to flows. However, under high flow conditions, spilled oil might reach ocean waters via one of the drainages crossed by the pipeline. If spilled oil from the new onshore pipeline did reach the ocean, it could be more likely to reach kelp beds than a spill from Platform Irene because the oil would enter the ocean close to shore and the nearshore kelp beds. Mitigation Measure MB-1 would apply. In addition for the VAFB Onshore Alternative, the following mitigation measure would apply:

**Mitigation Measures**

**CRF/KH-3** The Oil Spill Response Plan shall be revised to specifically detail methods to keep oil spilled into creeks and drainages from reaching the ocean and ways to protect kelp beds and important nearshore fishing areas along the southern VAFB coast should spilled oil enter the ocean. The Plan shall be submitted to SBC for review and approval prior to land use clearance.

**Residual Impact**

Because of the temporary nature of the disturbance, oil spill impacts to commercial fishing and kelp harvesting operations are *adverse but not significant (Class III)*. However, to mitigate Impact CRF/KH.1 to the maximum extent feasible, Mitigation Measures CRF/KH-3 and MB-1 would be required.

**Impact CRF/KH.2 – Spill Impacts to Fishing:** As described above under Impact CRF/KH.1, the VAFB Onshore Alternative would reduce the risk of oil spills compared to the proposed project. The risk of an oil spill from Platform Irene or associated offshore pipelines would be reduced to the baseline conditions. There is a small potential that oil spilled from the alternative facilities could reach the ocean via creeks or other drainages. Oil entering the ocean from onshore might have a greater chance to impact nearshore areas frequented by fishermen than a spill from Platform Irene. Therefore, although the chance of a spill would be greatly reduced compared to the proposed project, if substantial oil did enter the ocean, impacts on nearshore fishing areas might be greater. Mitigation Measures MB-1 and CRF/KH-3 would apply. Because there are limitations for thorough containment and cleanup of an oil spill, *significant impacts (Class I)* remain for commercial and recreational fisheries in the intertidal zone.

**Impact CRF/KH.3 – Drilling Muds Discharges:** There would be no offshore discharge of drill muds and cuttings associated with the VAFB Onshore Alternative. Therefore, discharge of drilling muds would have no potential to impact fishing or kelp harvesting.

**Impact CRF/KH.4 – Marine Vessel Traffic Impacts to Fishing Gear:** No vessel traffic would be associated with the VAFB Onshore Alternative. Therefore, there would be no potential for impacts to fishing gear from vessel traffic associated with this alternative. Impacts to fishing gear from vessel traffic associated with Platform Irene would remain the same as the existing (baseline) condition. Impacts to fishing gear are considered *adverse but not significant (Class III)*.

**Impact CRF/KH.5 – Shell Mounds:** ~~Impacts associated with the deposition and accumulation of shells and drill cuttings beneath Platform Irene would be less than the proposed project.~~ No ocean discharge of drilling wastes is associated with the VAFB Onshore Alternative. Therefore, the VAFB Onshore Alternative would not result in any new drill cutting discharges from Platform Irene compared to the baseline condition. Also, because the period of production from the platform would not be extended, the volume of shell material that would fall to the seafloor from Platform Irene would be the same as for the current operations (i.e., baseline). Hence, impacts to trawling activities caused by the shell deposition or shell mounds would be less than the proposed project. This impact would still be considered *adverse but not significant (Class III)* but none of the impacts would be associated with the VAFB Onshore Alternative.

### **5.7.5.3 Casmalia Canyon/Oil Field Processing Location**

There are no additional impacts identified for this alternative. The proposed project's commercial and recreational fishing and kelp harvesting impacts remain unchanged under this alternative.

### **5.7.5.4 Alternative Power Line Routes to Valve Site #2**

There are no additional impacts identified for this alternative. The proposed project's commercial and recreational fishing and kelp harvesting impacts remain unchanged under this alternative.

### **5.7.5.5 Replacement of Oil Emulsion Pipeline from Platform Irene to LOGP**

**Impact CRF/KH.1 – Spill Impacts to Kelp:** Impacts to commercial and recreational kelp harvesting from oil spills remain the same as for the proposed project. However, due to the

newer pipe, the spill frequency would be reduced. This impact would still be considered *adverse but not significant (Class III)*.

**Impact CRF/KH.2 – Spill Impacts to Fishing:** Impacts to commercial and recreational fishing resulting from oil spills remain the same as for the proposed project. However, due to the newer pipe, the spill frequency would be reduced. This impact would still be considered *significant (Class I)*.

**Impact CRF/KH.3 – Drilling Muds Discharge:** Impacts resulting from the discharge of drilling muds and drill cuttings into the ocean remain the same as the proposed project (*Class III*).

**Impact CRF/KH.4 – Marine Vessel Traffic Impacts to Fishing Gear:** Impacts to fishing gear due to the marine vessel traffic would be increased over the proposed project due to the marine vessel traffic that would be needed to install the offshore pipeline. Fishing would be pre-empted in a 3 to 4 mile area for approximately 2 months. The pre-empted area would be approximately 2 percent of the available tow area between Point Conception and Oceano. Given the short duration of the installation activities and the limited area that would be pre-empted, this impact to commercial fishing would still be considered *adverse but not significant (Class III)*.

**Impact CRF/KH.5 – Shell Mounds:** Impacts resulting from the deposition and accumulation of shells and drill cuttings beneath Platform Irene remain the same as the proposed project (*Class III*).

#### **5.7.5.6 Alternative Drill Muds and Cuttings Disposal**

##### ***Inject Drill Muds and Cuttings into Reservoir***

**Impact CRF/KH.1 – Spill Impacts to Kelp:** Impacts to commercial and recreational kelp harvesting from oil spills remain the same as for the proposed project (*Class III*).

**Impact CRF/KH.2 – Spill Impacts to Fishing:** Impacts to commercial and recreational fishing resulting from oil spills remain the same as for the proposed project (*Class I*).

**Impact CRF/KH.3 – Drilling Muds Discharge:** Impacts due to the discharge of drilling muds and drill cuttings into the ocean would be eliminated.

**Impact CRF/KH.4 – Marine Vessel Traffic Impacts to Fishing Gear:** Impacts to commercial fishing gear from marine vessel traffic would be the same as for the proposed project (*Class III*).

**Impact CRF/KH.5 – Shell Mounds:** Impacts resulting from the deposition and accumulation of shells and drill cuttings beneath Platform Irene would be reduced because the cuttings would not be discharged into the ocean. The accumulation of shells would remain the same as the proposed project (*Class III*).

##### ***Transport Drill Muds and Cuttings to Shore for Disposal***

**Impact CRF/KH.1 – Spill Impacts to Kelp:** Impacts to commercial and recreational kelp harvesting from oil spills remain the same as for the proposed project (*Class III*).

**Impact CRF/KH.2 – Spill Impacts to Fishing:** Impacts to commercial and recreational fishing resulting from oil spills remain the same as for the proposed project (*Class I*).

**Impact CRF/KH.3 – Drilling Muds Discharge:** Impacts due to the discharge of drilling muds and drill cuttings into the ocean would be reduced because they would be shipped ashore for disposal. In the unlikely event that muds and cuttings are accidentally dropped in the ocean from a supply boat they could cause impacts to fishing and/or kelp harvesting. Therefore, this alternative would eliminate discharges of drilling mud and drill cuttings into the ocean except as a result of an accident during transit on the supply boat. Releases near shore could impact kelp beds or fishing areas. However, there is a low risk of a drill-mud release during transit to shore and if released, the volume would be small and impacts transitory. Because temporary impacts from an accidental release of drilling fluid are not likely to be any more significant than those that result from the long-term release under the proposed project, fishing and kelp harvesting impacts from this alternative are considered to be *adverse but not significant (Class III)*.

**Impact CRF/KH.4 – Marine Vessel Traffic Impacts to Fishing Gear:** Impacts to commercial fishing gear from marine vessel traffic would be the same as for the proposed project because the drill muds and cuttings would be transported to shore on the return trips of the scheduled supply boat trips. This alternative would not require any additional supply boat trips over the proposed project. This impact to commercial fishing would still be considered *adverse but not significant (Class III)*.

**Impact CRF/KH.5 – Shell Mounds:** Impacts resulting from the deposition and accumulation of shells and drill cuttings beneath Platform Irene would be reduced because the cuttings would not be discharged into the ocean. The accumulation of shells would remain the same as the proposed project (*Class III*).

### 5.7.6 Cumulative Impacts

The onshore development projects discussed in Section 4.4 would not impact commercial and recreational fishing, and kelp harvesting. Therefore, only the cumulative impacts associated with the potential offshore oil and gas projects discussed in Sections 4.2 and 4.3 are discussed below.

**Impact CRF/KH.1 – Spill Impacts to Kelp:** The potential future offshore energy projects outlined in Sections 4.2 and 4.3 would increase the probability for oil spills. However, the literature indicates that oil spills do not cause major impacts to kelp beds and, should damage occur, recruitment and recolonization occurs rapidly. Therefore, cumulative oil spills impacts to commercial and recreational kelp harvesting, including the proposed project's incremental contribution to them, would not be expected to be significant.

**Impact CRF/KH.2 – Spill Impacts to Fishing:** Oil spills may potentially impact commercial and recreational fishing in the proposed project area. The additional potential offshore oil and gas development projects described in Sections 4.2 and 4.3 would increase the probability for oil spills. Therefore, oil spill impacts to commercial and recreational fishing would likely increase. By increasing the cumulative probability of oil spills, cumulative impacts to commercial and recreational fishing, including the incremental contribution of the proposed project, would be expected to be significant.

**Impact CRF/KH.3 – Drilling Muds Discharges:** The discharge of drilling muds and drill cuttings from Platform Irene may potentially impact kelp communities in the project area. Each of the other potential offshore oil and gas development projects located within the project area

would also be expected to discharge drilling muds and cuttings. The impacts from the discharges of these other potential projects would be expected to be similar to the proposed project, provided that they are discharged in accordance with NPDES permit requirements. Because of the dilution and dispersion of each discharge, drilling muds or drill cutting depositions are not expected to compound or accumulate in any specific area. Transport of discharged materials to shoreline kelp communities is unlikely. Hence, the cumulative impacts, including the proposed project's incremental contribution to them, would not be expected to be significant with implementation of NPDES Permit requirements.

**Impact CRF/KH.4 – Marine Vessel Traffic Impacts to Fishing Gear:** Each of the potential offshore oil and gas development projects considered in the cumulative analysis would increase the number of marine vessels moving between ports and the platforms. These increases would increase the likelihood of impacts to fishing gear. Use of established vessel traffic corridors and the dispute resolution process through the Joint Oil/Fisheries Committee would serve to minimize these impacts. With implementation of these measures, cumulative impacts to commercial fishing, including the proposed project's incremental contribution to them, would not be expected to be significant

**Impact CRF/KH.5 – Shell mounds:** The deposition of shells and cuttings is a local area impact that is confined to the area surrounding a platform. The size of the accumulated shell mound surrounding a platform can affect trawling activities after platform decommissioning. As discussed in Section 5.7.4, the physical size of the shell mound associated with Platform Irene is anticipated to be, to some extent, a function of the Platform's age, although this cannot be predicted with absolute certainty. Similarly, the shell mounds associated with other existing platforms located in the northern and southern Santa Maria Basin would be anticipated to follow the same pattern. If all of the potential future offshore development projects located in the northern Santa Maria Basin were to occur, up to three new platforms could be constructed (see Section 4.3), each of which would eventually develop its own shell mound. However, the age and respective size of these shell mounds would be anticipated to be substantially less than the one associated with Platform Irene at the time of its decommissioning. Assuming that the other existing and potential future platforms within the southern and northern Santa Maria Basin are subject to the same types of mitigation measures as the proposed project, cumulative impacts, including the incremental contribution of the proposed project to this impact, would not be expected to be significant.

### 5.7.7 Mitigation Monitoring Plan

Mitigation Measure	Plan Requirements and Timing	Method of Verification	Timing of Verification	Party Responsible For Verification
CRF/KH-1	Disputes over damage to commercial fishing gear resulting from support vessel traffic to and from Platform Irene shall be submitted to the Joint Oil/Fisheries Committee for resolution.	Review of dispute resolution documentation	During Operations	CSLC SBC
CRF/KH-2	At the time of platform abandonment, the applicant shall ensure that the environmental review of the abandonment activities pursuant to the National Environmental Policy Act (NEPA) and California Environmental Quality Act	Abandonment EIR/EIS Process	During preparation of the abandonment EIR/EIS	MMS and all responsible agencies

Mitigation Measure	Plan Requirements and Timing	Method of Verification	Timing of Verification	Party Responsible For Verification
	(CEQA), as appropriate, includes an analysis as to whether or not the shell mounds should be removed or modified so they do not interfere with commercial trawling activities. This subsequent NEPA/CEQA review shall evaluate the best available technologies for removal or modification of the shell mounds. The best available technology shall be determined by the applicant and the permitting agencies, in consultation with the Joint Oil/Fisheries Liaison Office and shall be implemented.			
CRF/KH-3 (VAFB Onshore Alternative only)	The Oil Spill Response Plan shall be revised to specifically detail methods to keep oil spilled into creeks and drainages from reaching the ocean and ways to protect kelp beds and important nearshore fishing areas along the southern VAFB coast should spilled oil enter the ocean. The Plan shall be submitted to SBC for review and approval prior to land use clearance.	Plan review and approval	Prior to land use clearance	SBC

### 5.7.8 References

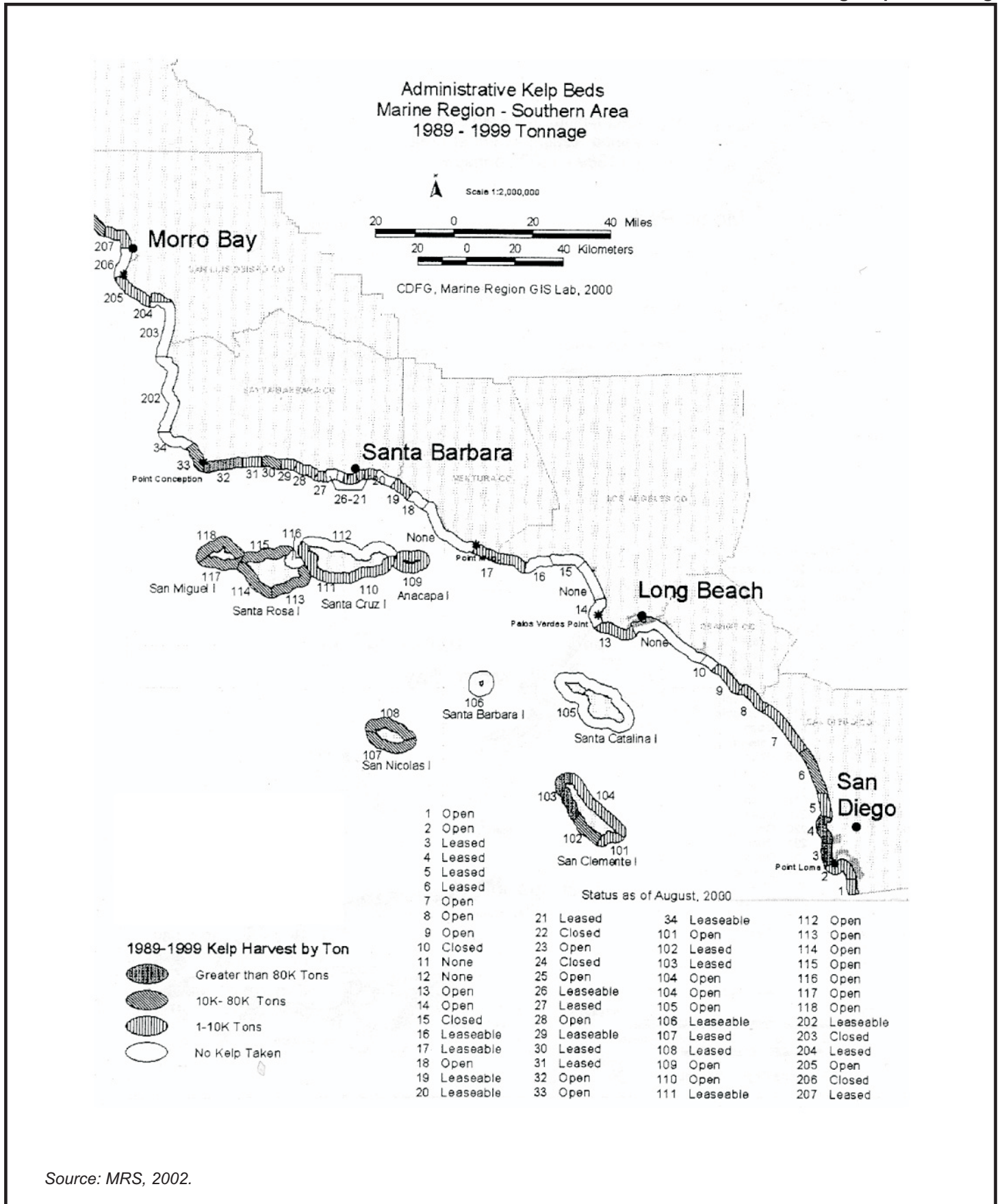
- Brown, E.D., et al. 1996. Injury to the early life history stages of Pacific herring in Prince William Sound after the *Exxon Valdez* oil spill. In: Rice, S.D., R.B. Spies, D.A. Wolfe, B.A. Wright (eds.). Proceedings of the *Exxon Valdez* oil spill symposium. Amer. Fish. Soc. Symposium 18, Bethesda, MD. Pp. 931.
- California Department of Fish and Game (CDFG). 1989. Letter to Warden Hector Orozco from Dave Blurton, CDFG. February 4.
- \_\_\_\_\_. 2001. Annual report of statewide fish landings by the commercial passenger fishing vessel (CPFV) fleet. Long Beach, CA. p. 1.
- \_\_\_\_\_. 2001. Kelp harvest in metric tons for select central California beds, 1994-1999. Data provided CDFG, Monterey, CA. p. 1.
- \_\_\_\_\_. 2002. Final California Commercial Landings for 2001.
- \_\_\_\_\_. 2003. Final California Commercial Landings for 2002.
- \_\_\_\_\_. 2004. Final California Commercial Landings for 2003.
- \_\_\_\_\_. 2004. Venoco Ellwood Marine Terminal Lease Renewal Project EIR, Appendix E, Table E-3.
- \_\_\_\_\_. 2005. Final California Commercial Landings for 2004.
- \_\_\_\_\_. 2006. Final California Commercial Landings for 2005.
- California Recreational Fisheries Survey. 2006. Website: <http://www.dfg.ca.gov/mrd/crfs.html>.

- California State Lands Commission (CSLC). July 26, 2001. Statements of interest, bid log no. 2001-08.
- \_\_\_\_\_. 2006. Venoco Ellwood Marine Terminal Lease Renewal Project EIR. March.
- Central Coast RWQCB Basin Plan, September 8, 1994.
- Coats, D.A., et al. 1999. Monitoring of biological recovery of Prince William Sound intertidal sites impacted by the Exxon Valdez oil spill. NOAA Tech. Memo. NOS OR&R 1. Seattle, WA.
- County of Santa Barbara. 2001. Torch Point Pedernales project final development plan 94-DP-027, 1998-2000 condition effectiveness review, revised final analysis. Santa Barbara County, Planning and Development Department, Energy Division, Santa Barbara, CA.
- Cowen, R.K., C.R. Agegian and M.S. Foster. 1982. The maintenance of community structure in a central California giant kelp forest. *Journal of Exp. Mar. Bio. Ecol.*, v. 64. Pp. 189-201.
- Dawson, E.Y. 1966. Marine botany, an introduction. *Holt, Rinehart and Winston, Inc.*: NY. p. 371.
- Dayton, P.K. 1985. Ecology of kelp communities. *Ann. Rev. Ecol. Systems*, v. 16. Pp. 215-245.
- Dayton, P.K., V. Currie, T. Gerrodette, B.D. Keller, R. Rosenthal and D. Ven Tresca. 1984. Patch dynamics and stability of some California kelp communities. *Ecol. Monog.*, v. 54(3). Pp. 253-289.
- Dean, T.A. and L.E. Deysher. 1983. The effects of suspended solids and thermal discharges on kelp. In: W. Bascom (ed.). The effects of waste disposal on kelp communities. Southern California Coastal Water Research Project. Long Beach, CA.
- DeWit, L.A. 2001. Shell mounds environmental review, final technical report, vols 1 and 2. Prepared for California State Lands Commission and California Coastal Commission. Bid Log No. RFP99-05.
- Druehl, L.D. 1970. The pattern of Laminariales distribution in the northeast Pacific. *Phycologia*, v. 9(3/4). Pp. 237-247.
- Fields, W.G. 1965. The structure, development, food relations, reproduction, and life history of the squid, *Loligo opalescens* Berry. CA Dept. Fish and Game, Fish Bull. 131. p. 108.
- Foreman, R.E. 1970. Physiology, ecology, and development of the brown alga *Nereocystis luetkeana* (Mertens). Ph.D. Dissertation, Univ. of California, Berkeley. p. 114.
- Foster, M.S., A.C. Charters, and M. Neushul. 1971a. The Santa Barbara oil spill. Part 1. Initial quantities and distribution of pollutant crude oil. *Environ. Poll.*, v. 2. Pp.97-113.
- Foster, M.S., M. Neushul, and R. Zingmark. 1971b. The Santa Barbara oil spill. Part 2. Initial effects on intertidal and kelp bed organisms. *Environ. Poll.*, v. 2. Pp. 115-134.
- Foster, M.S. and D.R. Schiel. 1985. The ecology of giant kelp forests in California: a community profile. Biol. Report No. 85 (7.2). US Fish and Wildlife Service. p. 152.
- Gerald, V.A. 1976. Some aspects of material dynamics and energy flow in a kelp forest in Monterey Bay, CA. Ph.D. Dissertation, Univ. of California, Santa Cruz. p. 179.

- Gotshall, D.W., et al. 1986. Pre-operational baseline studies of selected nearshore marine biota at the Diablo Canyon power plant site: 1979-1982. California Department of Fish and Game. Marine Resources Tech. Report No. 50. p. 370.
- Graham, M.H. 1997. Factors determining the upper limit of giant kelp, *Macrocystis pyrifera* (Agardh), along the Monterey Peninsula, central California, USA. *Journal of Exp. Mar. Bio. Ecol.*, v. 218(1). Pp. 127-149.
- Hawkes, M.W., C.E. Tanner and P.A. Lebednik. 1978. The benthic marine algae of northern British Columbia. *Syesis*, v. 11. Pp. 81-115.
- Hayes, M.O. and J. Michel. 1998. Evaluation of the condition of Prince William sound shoreline following the Exxon Valdez oil spill and subsequent shoreline treatment, 1997 geomorphology monitoring survey. NOAA Tech. Memo. NOS ORCA 126. Seattle, WA.
- Jackson, G.A. 1983. The physical and chemical environment of a kelp community. In: W. Bascom (ed.). The effects of waste disposal on kelp communities. Southern California Coastal Water Research Project, Long Beach, CA.
- Kato, S. and C. Hardwick. 1975. The California squid fishery. In: Expert consultation on fishing for squid. FAO Fish. Rep. 170, supplement 1. Pp. 170-127.
- Koehl, M.A.R. and S.A. Wainwright. 1977. Mechanical adaptations of a giant kelp. *Limn. Ocean.* 22(6). Pp. 1067-1071.
- Love, M., M. Nishimoto, D. Schroeder, and J. Caselle. 1999. The ecological role of natural reefs and oil and gas production platforms on rocky reef fishes in southern California. OCS Study MMS 99-0015. Prepared for the US Geological Survey, Biological Resources Division.
- McLean, J.G. 1962. Sublittoral ecology of kelp beds of the open coast area near Carmel, California. *Biol. Bulletin*, v. 122(1). Pp. 95-132.
- McPeak, R.H. and D.A. Glantz. 1984. Harvesting California's kelp forests. *Oceanus*, v. 27(1). Pp. 19-26.
- Mertz, R.C. 1959. Determination of the quantity of oily substances on beaches and in nearshore waters. California State Water Pollution Control Board, Sacramento. Pub. 21. p. 45.
- Miller, K.A. and J.A. Estes. 1989. Western range extension for *Nereocystis luetkeana* in the north Pacific Ocean. *Bot. Marina*, v. 32. Pp. 535-538.
- MMS. 2001. Delineation drilling activities in Federal Waters offshore Santa Barbara, CA, draft environmental impact statement. OCS EIS/EA MMS 2001-046. Minerals Management Service, Pacific OCS Region, Camarillo, CA.
- \_\_\_\_\_. 2001. Multibeam Hydrographic Survey Around and Under Oil Platforms in the Santa Barbara Channel and Santa Maria Basin, California. Minerals Management Service, Pacific OCS Region, Camarillo, CA.
- \_\_\_\_\_. 2006. Comments on Administrative Draft EIR for Tranquillon Ridge Development Project, October 12.

- NOAA National Marine Sanctuary Program. 2006. Channel Islands National Marine Sanctuary Draft Environmental Impact Statement for the Consideration of Marine Reserves and Marine Conservation Areas.
- Neushul, P. 1987. Energy from marine biomass: the historical record. In: K.T. Bird and P.H. Benson (eds.). *Seaweed cultivation for renewable resources*. Elsevier, NY. p. 37.
- Nicholson, N.L. 1970. Field studies of the giant kelp *Nereocystis*. *J. Phycol.*, v. 6. Pp. 177-182.
- North, W.J. 1971. Introduction and background. In: W.J. North (ed.). *The biology of giant kelp beds (Macrocystis) in California*. Beih. Zur Nova Hedwigia. 32. J. Cramer. Lehre.
- \_\_\_\_\_. 1986. *Biology of the Macrocystis resource in North America*. Fisheries Tech. Papers No. 281. FAO, United Nations.
- North, W.J., M. Neushul, and K.A. Clendenning. 1964. Successive biological changes observed in a marine cove exposed to a large spillage of mineral oil. In: Proc. Symposium on pollution of marine organisms. Prod. Petrol., Monaco. Pp. 335-354.
- NRC (National Research Council). 1985. Oil in the sea. Inputs, fates, and effects. *National Academy Press*: Washington, DC. p. 601.
- Plains Exploration and Production Company (PXP). 2004. Core Oil Spill Response Plan for Operations in the Point Arguello and Point Pedernales Fields Onshore Facilities and Associated Pipelines.
- \_\_\_\_\_. 2005. County Supplement to Core Oil Spill Response Plan for Operations on the Point Pedernales Onshore 20-Inch Wet Oil Pipeline.
- Santa Barbara Coastal Ecosystem LTER. 2006. Website:  
[http://sbcdata.lternet.edu/external/Reef/Data/Historical\\_Kelp/Data/Historical\\_Kelp\\_Data.csv](http://sbcdata.lternet.edu/external/Reef/Data/Historical_Kelp/Data/Historical_Kelp_Data.csv).
- Scagel, R.F., D.J. Garbary, L. Golden and M.W. Hawkes. 1987. A synopsis of the benthic marine algae of British Columbia, Northern Washington and Southeast Alaska. Phycological contribution number 1, Depart. of Botany, Univ. of British Columbia, Vancouver, British Columbia, Canada. p. 444.
- Scofield, W.L. 1959. History of kelp harvesting in California. *CA Fish and Game* 45(3). Pp. 135-157.
- Seymore, R.J., M.J. Tegner, P.K. Dayton and P.E. Parnell. 1989. Storm wave induced mortality of giant kelp, *Macrocystis pyrifera*, in southern California. *Estuarine, Coastal and Shelf Science* 28(6). Pp. 277-292.
- Spies, R.B. and P.H. Davis. 1979. The infaunal benthos of a natural oil seep in the Santa Barbara Channel. *Mar. Biol.* 50. Pp. 227-237.
- Spies, R.B., S.D. Rice, D.A. Wolfe, B.A. Wright. 1996. The effects of the *Exxon Valdez* oil spill on the Alaskan coastal environment. In: Rice, S.D., R.B. Spies, D.A. Wolfe, B.A. Wright (eds.). *Proceedings of the Exxon Valdez oil spill symposium*. Amer. Fish. Soc. Symposium 18, Bethesda, MD. p. 931.
- SWRCB, California Ocean Plan, 2001.

- Tarpley, J.A. and D.A. Glantz. 1992. Marine plant resources: giant kelp. In: W.S. Leet, C.M. DeWees and C.W. Haugen (eds.). California's living marine resources and their utilization. California Sea Grant Exten. Pub. UCSGEP-92-12.
- Thompson, C.J. 1999. Economic and management implications of no-take reserves: an application to *Sebastes* rockfish in California. CalCOFI Rep. 40. Pp. 107-117.
- Vadas, R.L. 1972. Ecological implications of culture studies on *Nereocystis luetkeana*. *J. Phycol.*, v. 8. Pp. 196-203.
- Vojkovich, M. 1998. The California fishery for market squid (*Loligo opalescens*). CalCOFI Rep. 38. Pp. 55-60.



Source: MRS, 2002.