Chapter 2. Background

<u>Description of the Stocks</u>

The Nearshore Fisheries Management Act, which was chaptered at the same time as the Marine Life Management Act (MLMA), identified nine species of nearshore fish, and noted that nearshore fish "may include other species of finfish found primarily in rocky reef or kelp habitat in nearshore waters" [Fish and Game Code (FGC) §8586(A)]. The Act also provided an initial definition of nearshore waters as those waters within 1 nautical mile of land [FGC §8586]. In December 2000, the Fish and Game Commission used its authority under the Act and redefined nearshore waters to mean waters from the shoreline to a depth of 20 fm (120 ft) [California Code of Regulations (CCR), Title 14, §1.90(d)]. On the recommendation of the Department of Fish and Game, the Commission also added additional species to the list of nearshore fish, making 19 in all. Commercial and recreational fishermen take these 19 species in all water depths in which they occur.

The Department based its selection of the 19 species on an evaluation of 124 species that occur in coastal waters less than 40 fm deep. The evaluation of the species was based, in turn, on a set of criteria (Table 1.2-1) designed to indicate species most in need of management. Each criterion was evaluated on a scale of 0 to 3, with greater points demonstrating species in greater need of immediate attention. If no data were available for life history criterion (5, 6, and 7a-7e in Table 1.2-1), the species in question was given a rank of 1 for that criterion. A complete review of the evaluation is found in Appendix C.

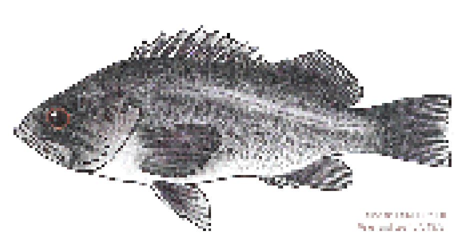
The MLMA requires that fishery management plans include information about the species of fish under management, their natural history, habitats, and other matters (FGC §7080). The following descriptions summarize information on the 19 species of finfish that are the subject of the plan, with distribution maps for cabezon, California sheephead, monkeyface prickleback, and greenlings. More detailed descriptions are found in Appendix D .

Table 1.2-1. Nearshore species matrix showing ranking and criteria used to determine level of concern.

Fishery Criteria Life History Criteria Other Factors	brown rockfish	grass rockfish	gopher rockfish	China rockfish	olive rockfish	black-and-yellow rockfish	black rockfish	copper rockfish	California scorpionfish	blue rockfish	kelp greenling	quillback rockfish	California Sheephead	kelp rockfish	cabezon	monkey face eel (pricklebback)	treefish rockfish	calico rockfish	rock greenling
1a – Changes in ex-vessel prices in the commercial fishery	3	3	2	3	3	3	1	2	1	2	3	1	2	2	3	2	0	0	0
1b – Rank in the sport fishery	3	2	3	3	3	2	3	3	3	3	3	2	2	2	3	1	2	2	2
2a – Increases in commercial landings	1	2	3	2	1	2	2	2	1	1	2	2	3	2	2	2	1	0	0
2b – Increases in sport landings	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	3	0	0
3a – Decreases in commercial landings	3	0	1	1	1	0	1	0	2	1	0	0	0	1	0	0	0	0	0
3b – Decreases in sport landings	2	3	2	2	2	2	3	2	0	1	3	3	1	1	1	1	0	1	2
4 – Live fish take in the commercial fishery	2	2	2	2	1	2	1	1	3	1	3	1	1	2	3	2	1	0	0
5 – Special habitat need	3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1	1	1
6 – Migrational vulnerability	3	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0
7a – Susceptible to barotrauma on capture (no-0/yes-3)	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
7b – Removing larger, older individuals changes sex ratio of population (no-0/yes-3)	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0
7c – Low fecundity as defined by having less than 100 embryos per spawning event (no-0/yes-3)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7d – Late maturation	1	1	1	1	2	1	2	2	0	2	1	2	1	1	1	1	1	1	1
7e – Longevity	3	3	3	3	3	3	3	3	3	3	2	3	3	3	2	2	1	2	1
8a – Special commercial harvest limitations	3	3	3	3	3	3	3	3	0	3	0	3	0	3	0	0	3	3	0
8b – Special sport harvest limitations	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9 – Additive take	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1
TOTAL SCORE	30	23	24	24	23	22	23	22	22	21	21	21	20	21	19	16	16	12	9

Ranking was 0 to 3 with 0= lower ranking and 3 = higher ranking. For a more detailed analysis, see Appendix (D)

Black Rockfish, *Sebastes melanops*



Black rockfish are a minor to moderate component of nearshore commercial and recreational fisheries, with increasing importance from the San Francisco area northward.

<u>Distribution, Stock Structure and Migration</u>

Black rockfish range from Amchitka Island, Alaska to Santa Monica Bay in southern California, but are uncommon south of Santa Cruz. They frequently occur in loose schools 10-20 ft above shallow, rocky reefs (to 120ft), but individuals may also be observed resting on rocky bottoms, or schooling in mid-water over deeper reefs (to 240 ft) down to 1200 ft. Records for black rockfish show a range of movement/migratory patterns varying from residential (no movement) to transient (movement to 345 mi).

Age and Growth

In California, this species may attain a maximum length of 25.5 in., although individuals over 20 in. are rarely observed today. Average size observed in northern California commercial and recreational fisheries now is 14 to 15 in., while in central California average size is 11 to 13 in. Black rockfish have a relatively fast growth rate. First-year growth is usually 3.5 to 4.0 in. Most individuals become available to the fishery by the time they have reached 3 to 4 years of age and are approximately 10 to 11.5 in.

Reproduction, Fecundity and Seasonality

In California, age at first maturity for males is 3 yr, or 9.8 in. in total length (TL). For females, age at first maturity is 5 yr or, 11.8 in. At 6 yr, or about 14 in., half of all males are sexually mature. At 6 to 7 yr, or about 16 in., half of all females are sexually mature. As with all members of the genus *Sebastes*, fertilization and development of embryos is internal. Black rockfish mating generally occurs between September and November. Females store the sperm internally until their eggs mature in December or January, at which time the eggs are fertilized. The larvae develop within 30 days. Larvae are spawned from late January to May, peaking in February off California. Larvae are planktonic for 3-6 months, and are dispersed by currents, advection, and upwelling. They begin to reappear as young-of-the-year fish in shallow, nearshore waters by May, but the major recruitment event usually occurs from July to August.

Natural Mortality

Mortality estimates have been calculated for black rockfish along the Pacific coast. The instantaneous rate of natural mortality has been found to vary between 0.2 and 0.4 for unsexed fish along the Pacific coast.

Diseases

No information is available on diseases in black rockfish.

Predator/Prey Relationships

As larvae, black rockfish feed on nauplii, invertebrate eggs and copepods. As adults, they remain primarily plankton-eaters, also feeding on small fishes (including juvenile blue and other rockfishes) as well as crustaceans, polychaetes, cephalopods, chaetognaths and jellyfish.

Competition

Black rockfish co-occur with blue and olive rockfishes in the water column and with black-and-yellow rockfish near and on the bottom. Black rockfish are commonly associated with other nearshore fish species, particularly other rockfishes. No other schooling rockfish is closely associated statistically with black rockfish, but three bottom-dwelling species, gopher, China, and brown rockfishes, showed an affinity to the same habitat and depth range as black rockfish. It is commonly known among fishermen that localized areas of relatively high abundance in the nearshore area characterize black rockfish distribution in central California.

Critical Habitat

Larval black rockfish are pelagic. Young-of-the-year (approximately 1.5 in.) settle nearshore, generally in the shallower portions of kelp beds (15 to 40 ft) where they frequent the sand-rock interface, seagrass beds, kelp canopy, mid-water column and high-relief rock. They have also been found on artificial reefs, and in bays, estuaries and tide pools. Adults inhabit the mid-water and pelagic areas over high-relief rocky reefs. They are found in and around kelp beds, boulder fields and artificial reefs.

Status of the Stocks

In California, no fishery-independent population estimates have been made of black rockfish stocks. Marine Recreational Fisheries Statistical Survey (MRFSS) showed that in Humboldt and Del Norte Counties (northern California), black rockfish comprised from 15 to 31 percent annually of the estimated total marine recreational catch for all fishing modes combined. South of the Eureka area, black rockfish gradually decrease in importance in the recreational catch and are infrequently observed south of Santa Cruz.

Black-and-Yellow Rockfish, *Sebastes chrysomelas*

*Chrysomela*s, which is Latin for "black and yellow", describes the coloration of this species. They are black or dark brown with yellow blotches. Gopher rockfish, *Sebastes carnatus*, resemble them very closely, but gopher rockfish are brown or dark brown with large pink or whitish blotches. Both species are deep-bodied with large head spines.

Distribution, Stock Structure, and Migration

Black-and-yellow rockfish are distributed from Eureka, northern California to Isla San Natividad, central Baja California, but they are less common south of San Diego, California. They are bottom-dwelling, usually in water less than 60 ft, although they have also been found at depths up to 120 ft. They are a residential species with homing ability, and they inhabit kelp beds and rocky reefs. After establishing residence, the adults are highly territorial and travel no more than 2 km from their home range.

Age and Growth

Whole otoliths have been used to age this species to a maximum of 20 to 22 yr. Based on a calculated age-length relationship, an 8-in. TL black-and-yellow rockfish is approximately 3-4 yr old, a 10-in. fish is approximately 6 yr old, and a 12-in. fish is 10-11 yr old. The maximum recorded total length of this species is 15.4 in.

Reproduction, Fecundity, and Seasonality

In central and northern California waters, males and females reach first maturity at 3 yr old, possibly as old as 4 yr for males and 6 yr for females. Corresponding total lengths range from 5.1 to 9.4 in. for males, and 5.3 to 9.6 in. for females. Fifty percent of the male population will reach maturity at 3 yr old, between 5.1 and 6.5 in TL, while half of the female population will reach first maturity between 5.3 and 6.3 in. TL, at 3 or 4 yr old. Spawning occurs off California from February through the end of July, with a peak spawning in February and March. Female black-and-yellow rockfish may be carrying fertilized eggs anytime between October and the end of February. In central California, June is the primary month of first appearance of young-of-the-year in kelp bed areas, and they are usually first observed in the kelp canopy.

Natural Mortality

Estimates of natural mortality are not available for black-and-yellow rockfish.

Diseases

No information is available regarding diseases in this species.

Predator/Prey Relationships

Adult black-and-yellow rockfish are nocturnal feeders, ambushing their prey between dusk and dawn. Predators of the adults include sharks, dolphins, and seals, while juveniles are prey of birds, porpoises, and fishes, including rockfishes, lingcod, cabezon, and salmon.

Competition

Black-and-yellow rockfish probably compete for food and space with gopher rockfish. When both species are present, the more aggressive black-and-yellow rockfish exclude gopher rockfish from shallower depths.

Critical Habitat

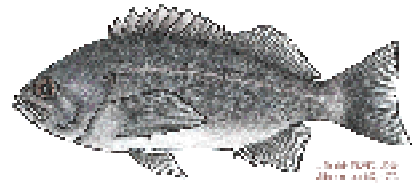
Larvae and young juveniles are pelagic, but the juveniles will eventually become demersal and settle on nearshore rocky areas or in kelp forests. Among the nearshore rockfishes, this species and grass rockfish have the most shallow depth distributions.

Status of the Stocks

No formal stock assessments have been made for this species.

Blue Rockfish, *Sebastes mystinus*

The blue rockfish is a medium-sized, midwater rockfish important in both the recreational and commercial catches in California, and it is the most abundant rockfish in central California kelp beds.



Distribution, Stock Structure, and Migration

Blue rockfish range from the Bering Sea to Punta Banda, Baja California, and from surface waters to a maximum depth of 1,800 ft. They are less common south of the northern Channel Islands and north of Eureka, California. It is believed that the last exceptionally strong year class of blue rockfish in central California occurred in 1988. No information is available regarding genetically-discernable sub-stocks of blue rockfish. Movement and migration studies of blue rockfish have determined them to be residential. Most authors report movement of less than 6 mi. In addition, tagging studies of adult blue rockfish indicate they do not migrate laterally along the coast. While studies show adult blue rockfish populations are more or less discreet at each fishing port, it is not known how much larval drift occurs between fishing areas.

Age and Growth

Blue rockfish, sex unspecified, have been aged to a maximum of 24 yr using scales or otoliths. Rockfish in general are considered to be slow-growing fishes, but blue rockfish are among the faster growing rockfish species. First year growth may vary from 3.0 to 4.5 in., and after 2 yr blue rockfish may reach 6 in. Anglers may catch an occasional 2- or 3-yr old blue rockfish, but most do not recruit to the sport and commercial fisheries until 4 to 7 yr of age when they range from 8 to 10 in. Females grow at a slightly faster rate than males.

Reproduction, Fecundity and Seasonality

Age at first maturity for males has been found to vary between 3 yr (7.5 in. TL) and 4 yr (9.0 in. TL). For females, age at first maturity has been found to vary between 2 yr and 5 yr. Fifty percent of males become mature between 3 yr and 7 yr (10.2 in. TL). For 50% of females, age at maturity has varied from 4 yr to 6 yr (11.4 in. TL). Studies in central California have shown that male gonads increase in size from May to July, but female eggs begin maturing from July to October. Mating takes place in October, but embryos do not begin to develop until December when the eggs are fertilized by the stored sperm. Embryos develop within the female, and the larvae release usually peaks in mid-January. Blue rockfish are thought to spawn once a year. Larvae are planktonic for 4-5 months, where they may be carried many miles by ocean currents. Young-of-the-year blue rockfish begin to appear in the kelp canopy and shallow rocky areas by late April or early May when they are about 1.2 to 1.4 in. long.

Natural Mortality

The instantaneous rate of natural mortality has been reported as averaging 0.006, with a range of 0.001 to 0.008, using catch curve analysis.

Predator/Prey Relationships

Feeding habits vary considerably depending upon life history stage, depth, and locality. As larvae, blue rockfish eat plankton and are known to feed on nauplii and invertebrate eggs as well as copepods. As adults they remain primarily plankton-eaters. They feed on jellyfish, tunicates, thaliaceans, algae, small crustaceans, and small fish. Adults are subject to predation by other rockfish, lingcod, sharks, dolphins, seals, sea lions, and possibly river otters. Juveniles fall prey to other rockfishes, lingcod, cabezon, salmon, marine birds and porpoises.

Competition

Blue rockfish are commonly associated with other nearshore fish species, particularly other rockfishes. In a broad area along the entire Monterey Peninsula extending out to 240 feet deep, blue rockfish were the predominant species and were in close association with olive, yellowtail, starry, and rosy rockfishes.

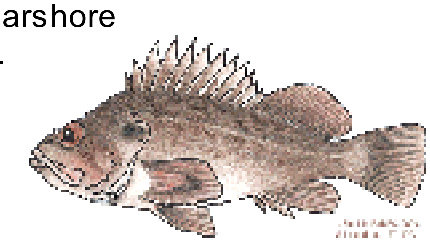
Critical Habitat

Larval blue rockfish are free-swimming. In the spring, young-of-the-year blue rockfish begin to appear in the kelp canopy, shallow rocky areas and nearshore sand-rock interfaces. Adults inhabit the mid-water and pelagic areas around high-relief rocky reefs, within and around the kelp canopy and around artificial reefs. They are common in kelp beds, where food is plentiful and protection from predators is provided. In the kelp beds, they form both loose and compact aggregations.

Status of Stocks

Commercial and recreational fishery sampling seem to suggest that while blue rockfish have withstood considerable fishing pressure over the last four decades, the stock continues to be healthy. They are one of the most important recreational species in California for anglers fishing from skiffs and Commercial Passenger Fishing Vessels, and are usually the most frequently-caught rockfish north of Point Conception. This species truly has been the bread and butter of the nearshore recreational angler in northern and central California.

Brown Rockfish, *Sebastes auriculatus*



Brown rockfish are a common nearshore rockfish species in California. As their name implies, they are brown in color with darker brown mottling.

<u>Distribution, Stock Structure, and Migration</u>

Brown rockfish are found along the Pacific coast of North America from southeast Alaska to Hipolito Bay, central Baja California. They live in shallow waters and bays, and have been found as deep as 420 ft, although they are primarily found in waters less than 175 ft. Both young and adult brown rockfish are residential, although they may migrate into deeper water in the winter. Brown rockfish have a home range and tagging studies generally show no movement, or movement of less than 2 km, although one tagging study showed a brown rockfish moving more than 50 km.

<u>Age and Growth</u>

Brown rockfish live less than 25 yr, which is a relatively short life span compared to other members of the genus. The maximum size for an adult is 22 in. There does not appear to be sexual dimorphism between male and female brown rockfish in relation to length, weight, or age.

<u>Reproduction, Fecundity, and Seasonality</u>

Male and female brown rockfish mature from 3 to 10 yr of age, measuring 7.5 in. and 15 in., respectively. Half of the population is mature at 5 yr of age, measuring about 10 in. As with all members of the genus *Sebastes*, brown rockfish give birth to live young. Larvae are released from the female in December and January, and may also be released in May and June. Larvae live in the upper zooplankton layer for a month and then metamorphose into free-swimming juveniles. These open ocean juveniles spend 3-6 months in the water column. As they grow older, they settle in shallow water nearshore and then migrate to deeper water. Young-of-the-year fish commonly migrate into bays and estuaries which they use as a nursery habitat. The use of the bay as a nursery is an uncommon practice for rockfish species. They may remain in the bay around rocks, piers and other structures in areas of higher salinity for 1-2 years before returning to the open coast. San Francisco Bay appears to be an important habitat for juvenile brown rockfish.

<u>Natural Mortality</u>

A natural mortality rate was calculated at 0.112 for brown rockfish from Puget Sound, Washington.

<u>Disease</u>

No information on disease in brown rockfish was found.

<u>Predator/Prey Relationships</u>

As brown rockfish grow, they feed on increasingly larger prey. As juveniles they feed on small crustaceans, amphipods, and copepods, but at approximately 5 in. they shift to eating crabs and small fish. Birds, dolphins, seals, sharks, lingcod, cabezon, and salmon have been observed to feed on juvenile and adult brown rockfish.

Competition

There is no information available on brown rockfish competitors.

Critical Habitat

Brown rockfish are typically found in association with sand-rock interfaces and rocky bottoms of artificial and natural reefs over a fairly wide depth range, and in eelgrass beds. In shallow waters, they are associated with rocky areas and kelp beds, while in deeper waters they stay near the rocky bottom. Juveniles migrate into both high- and low-relief reefs and are strongly attached to their home sites.

Status of Stocks

Brown rockfish have long been an important component of the marine recreational fishery and a relatively minor but important component of the nearshore commercial fishery in California, especially north of Point Conception. While there have been studies of local abundance in certain coastal areas and within bays, the population size and structure of this species has not been comprehensively assessed. The brown rockfish has been identified as a species vulnerable to severe localized depletions in other areas; in Washington state, the Puget Sound stock of brown rockfish was recommended for listing as a threatened species in 1999.

Cabezon, *Scorpaenichthys marmoratus*

The cabezon is the largest member of the Cottid family. In Spanish *cabezon* means big-headed or stubborn, and proportionally, the massive head is the largest feature of this fish. The specific name *marmoratus* refers to the marbled or mottled appearance of the body, which can be reddish, greenish, or bronze.

Distribution, Stock Structure, and Migration

Populations range along the eastern Pacific coast from Point Abreojos, Baja California to Sitka, Alaska (Figure 1.2-1). Cabezon normally occur nearshore and their depth range extends from the intertidal to 335 ft. As fish get older and larger they tend to migrate into deeper water. In shallower water they migrate with the tide to feed.

Age and Growth

Cabezon have been aged to a maximum age of 17 yr for males and 16 yr for females. Total lengths corresponding to these ages were 25.5 in. and 28.5 in., respectively. The largest recorded size is 39 in. in length and over 25 lb.

Reproduction, Fecundity, and Seasonality

Limited information available on age at sexual maturity suggests that in central California males begin to mature in their third year and all are mature by their fourth year. The smallest mature male cabezon observed measured from 13.3 to 13.5 in. TL, and the smallest mature female cabezon observed measured 17.5 in. TL. Some females begin to mature in their fourth year between 15 and 20 in. in length, and by the sixth year all females are sexually mature. In California, spawning commences in late October, peaks in January

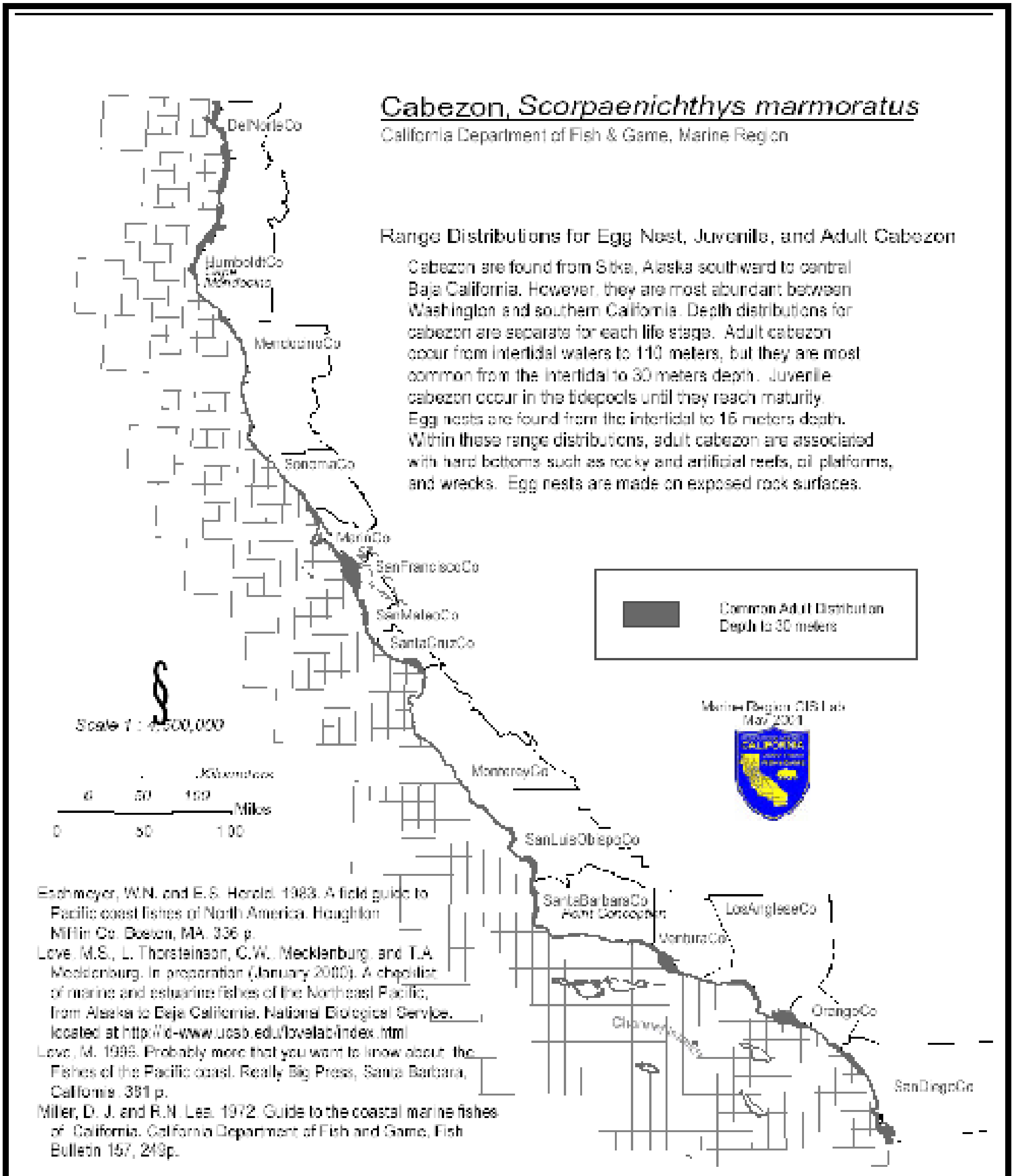


Figure 1.2-1. Range distributions for egg nest, juvenile, and adult cabezon

and continues until March. Females lay or spawn eggs on intertidal and subtidal, algae-free rocky surfaces, primarily in crevices and under rocks. Masses of the pale green or reddish eggs are up to18 in. in diameter and as much as 2-4 in. thick. Males fertilize the eggs after spawning, and the male guards the nest during the 2-3 week maturation period. Fish are very protective of the nests for the 2-3 weeks it takes the eggs to develop and hatch. Larvae are approximately 0.1 to 0.2 in. long at hatching and begin to settle out of the plankton at 0.6 to 0.9 in.

Natural Mortality

Estimates of natural mortality are not available for cabezon.

Diseases

No information is available concerning diseases in cabezon.

Predator/Prey Relationships

Cabezon can be aptly described as “sit and wait” predators. Their mottled coloration lets them blend in with their surroundings as they sit motionless to wait for their next meal. With large, robust pectoral fins set low on the body and a powerful tail, they quickly lunge after unwary prey, engulfing it in their large mouths. Adult fish eat crabs, small lobsters, mollusks (abalone, squid, octopi), small fish (including rockfishes), and fish eggs. Juveniles are taken by rockfishes and larger cabezon, as well as by lingcod and other sculpins.

Competition

Based on co-occurrence with adult and juvenile cabezon, demersal fishes associated with kelp beds and reef structure likely to compete with cabezon for food and space include lingcod, greenlings, and rockfish species such as grass, gopher, black-and-yellow, China, quillback, copper, and vermilion.

Critical Habitat

Cabezon frequent subtidal habitats in or around rocky reef areas and under kelp beds. Usually solitary, juveniles and adults both are common on any rocky bottom area with dense algal growth. They are often in the vicinity of kelp beds, jetties, isolated rocky reefs or pinnacles, and in shallow tide pools. Most of their time is spent sitting in holes, on reefs, in pools, or on kelp blades beneath the canopy, but not actively swimming.

Status of the Stocks

Limited information is available on population biology or changes in biomass over time.

Calico Rockfish, *Sebastes dallii*

The calico rockfish is a small, colorful rockfish species that does not exceed 10 in. in length or 2 lb in weight.

Distribution, Stock Structure, and Migration

Calico rockfish range from Sebastian Viscaino Bay, Baja California to San Francisco. They inhabit a depth range of 60 to 840 ft.

Age and Growth

Calico rockfish have been aged to a maximum of 11-12 yr.

Reproduction, Fecundity, and Seasonality

Male calico rockfish first become sexually mature at age 7. Female calico rockfish become sexually mature at age 9. Spawning occurs in southern California between January and May, with peak spawning occurring in February. Fertilized eggs are present in November and December. The larval stage lasts from less than 4 weeks to 2 months.

Natural Mortality

Estimates for natural mortality were not available for calico rockfish.

Diseases

No information is available on diseases in calico rockfish.

Predator/Prey Relationships

Juvenile calico rockfish feed on zooplankton such as copepods, barnacle cyprids, and larval fish. Adults feed on larger crustaceans such as euphausiids, fishes, and cephalopods. Larger rockfish species, lingcod, cabezon, and salmon prey upon adult calico rockfish. Sea birds and dolphins have also been known to feed on calico rockfish.

Competition

Calico rockfish probably compete with other foraging rockfish species and other finfishes with similar food habits.

Critical Habitat

Juvenile calico rockfish are found in areas of soft sand-silt sediment, and on artificial reefs. Adult calico rockfish inhabit rocky shelf areas where there is a mud-rock or sand-mud interface with fine sediments. They are associated with areas of high and low relief, including artificial reefs.

Status of the Stocks

There are currently no estimates of abundance for calico rockfish in California. Because of the relatively small size of adult calico rockfish, they are not usually targeted by either sport or commercial fishermen, but are caught incidentally when other finfish species are targeted. Calico rockfish frequently appear as bycatch in ridgeback prawn trawls in southern California, and are caught by sport anglers on Commercial Passenger Fishing Vessels (CPFVs) and private boats as anglers fish for other, larger bottom-dwelling species.

China Rockfish, *Sebastes nebulosus*

The China rockfish is almost entirely black except for a yellow, or yellow-white stripe that runs from the anterior portion of the dorsal fin, along the lateral line, to the tail.

Distribution, Stock Structure, and Migration

China rockfish occur from Kachemak Bay, northern Gulf of Alaska to Redondo Beach and San Miguel Island in southern California, but they are most abundant from southeastern Alaska to Sonoma County, California. They are found at depths of up to 420 ft, but are most common between 30 and 300 ft. The juveniles travel freely, but the adults are sedentary, associated with rocky reefs or cobble. They are residential, staying within a home range, and are generally found resting on the bottom or hiding in crevices.

Age and Growth

China rockfish have been aged to a maximum age of 26 yr. Based on a calculated age-length relationship, a 10-in. TL China rockfish is approximately 6-7 yr old and a 12-in. TL fish is approximately 9-10 yr old. A maximum length of 17.9 in. has been recorded for this species.

Reproduction, Fecundity, and Seasonality

Off central and northern California, male China rockfish reach reproductive maturity at a total length of 10.2 in. and 3 yr of age, while the females reach maturity at 11.0 in. TL and 4 yr of age. Fifty percent of the population of males and females will reach first maturity at 10.6 in. TL and 4 yr of age, and 11.0 in. TL and at 4 yr of age, respectively. Spawning occurs off central and northern California between January and July, with peak spawning in January. Individual China rockfish spawn once a year. Larvae settle out of the plankton 1-2 months after release.

Natural Mortality

Estimates for natural mortality are not available for China rockfish.

Diseases

No information is available on diseases in China rockfish.

Predator/Prey Relationships

Like grass and kelp rockfish larvae, China rockfish larvae feed on plankton. Juveniles eat crustaceans, while the adults eat crustaceans as well as ophiuroids, mollusks, and fish. Juveniles are prey of birds, porpoises, and fishes, including rockfishes, lingcod, cabezon, and salmon. Predators of adult China rockfish include sharks, dolphins, seals, lingcod, and possibly river otters.

Competition

China rockfish are likely to compete with other demersal species like kelp greenling, cabezon, lingcod, and other rockfishes such as grass, quillback, copper, and vermilion, all of which also inhabit rocky areas.

Critical Habitat

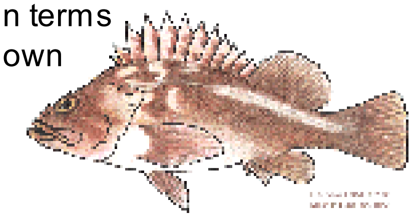
Larvae and early juveniles are pelagic but larger juveniles and adults settle on rocky reefs or cobble substrate, most commonly in depths between 30 and 300 ft. Once they settle, individuals may stay on the same reef for years.

Status of the Stocks

No formal stock assessment has been completed for this species.

Copper Rockfish, *Sebastes caurinus*

The copper rockfish is a highly variable species in terms of coloration, and due to this characteristic has been known by several names, depending to some degree upon locality.



Distribution, Stock Structure, and Migration

The copper rockfish is broadly distributed, known from the northern Gulf of Alaska to off central Baja California. It also has a broad bathymetric distribution, and is known to occur from the shallow subtidal to 600 ft. Tagging studies indicate that copper rockfish, for the most part, show little movement once they have settled to the bottom. Movement of up to one mile has been noted but the majority of tagged and recaptured copper rockfish are recaptured at the locality where they were originally taken. This life-history characteristic of high site fidelity makes this species susceptible to local depletion.

Age and Growth

Copper rockfish have been aged to 41 yr. Off central California, copper rockfish have been aged to 28 yr (a 22.1-in. individual). Size at age for copper rockfish, based on aging whole otoliths, from central California for the first 5 yr is as follows: age 0, to 3.6 in. TL; age 1, 3.7 to 5.9 in. TL; age 2, 4.2 to 9.4 in. TL; age 3, 7.0 to 11.5 in. TL; and age 4, 8.9 to 13.2 in. TL. There appears to be no significant difference in the growth rates between sexes. The maximum-recorded length for copper rockfish is 22.8 in.

Reproduction, Fecundity, and Seasonality

Length at first maturity for males has been found to vary from 11.6 to 14.6 in. TL (3 to 8 yr, respectively), and for females 11.6 to 12.2 in. TL (approximately 5 yr). Length at 50% maturity for males has been documented at 12.6 in. (4 yr), and for females at 13.4 in. (6 yr). As with all rockfishes, this species gives birth to live young. Copper rockfish produce prodigious amounts of young. Mating occurs in the fall, and in California larvae are released during the winter months (Jan.-Apr.) with a peak in February. Larval duration was found to be one to two months. Young-of-the-year copper rockfish recruit into the nearshore environment at about 0.8 to 1.0 in. during April and May off central California.

Natural Mortality

Calculations of natural mortality have been made from populations in Puget Sound, Washington at 0.1127 using tag/recapture method on fish 5 to 34 yr old.

Diseases

No information is available on diseases in copper rockfish.

Predator/Prey Relationships

Copper rockfish feed on a wide variety of prey items. Juvenile copper rockfish feed primarily on planktonic crustaceans. Larger crustaceans form a major part of their diet as they grow; these include *Cancer* sp. crabs, kelp crabs, and shrimps. Squid of the genus *Loligo* and octopi are also important food items. Fishes, which include young-of-the-year rockfishes, cusk-eels, eelpouts, and sculpins, are important forage for larger individuals. As juveniles and adults, copper rockfish are preyed upon by a variety of fishes including other rockfishes, lingcod, cabezon and salmon as well as several species of birds and mammals.

Competition

No information on competition for copper rockfish was found. Due to their co-occurrence with other large bottom-dwelling fish species such as cabezon, lingcod, greenlings, and rockfishes such as vermilion, brown, China, and gopher, it is likely that some degree of competition for food and space may occur.

Critical Habitat

Newly-recruited copper rockfish initially associate with surface-forming kelp. After several months, and at about 1.6 in., the juveniles settle to the bottom on rocky reefs as well as sandy areas and are referred to as benthic juveniles. Adults are commonly found in kelp bed areas but also frequent deeper rocky reefs. As adults, this species is considered to normally occur slightly above the substrate, which is often high-relief rocky shelf and rock-sand interface. Copper rockfish are an important component of the nearshore rocky reef system and are frequently encountered by scuba divers in this environment. Submersible observations of the biotic community off the Big Sur coast revealed copper rockfish between depths of 72 and 322 ft. The majority of sightings were of individual (solitary) fish occurring over rocky reefs or boulder fields and most frequently in areas of high relief. Occasionally an individual was observed over sand.

Status of the Stocks

There has been no stock assessment of this species in California. However, there is compelling evidence that copper rockfish populations have severely declined in many areas and large individuals are noticeably less common than in past decades. Copper rockfish is one of the species taken in the commercial live-fish fishery. Copper rockfish have been an important component of the recreational catch in both skiff and CPFV fisheries, especially off central and northern California. Due to its relatively large size, copper rockfish have been considered one of the premium species in the recreational angler's catch and a prime target for the sport diver. Due to their solitary nature, high habitat specificity, and the size they enter the fishery (as juveniles), the copper rockfish is a prime candidate for local depletion.

Gopher Rockfish, *Sebastes carnatus*

Carnatus, a Latin word for "flesh-colored", describes the coloring of gopher rockfish, which are brown or dark brown with large pink to whitish blotches.

Distribution, Stock Structure, and Migration

Gopher rockfish range from Eureka, California to San Roque, central Baja California, but they are most common from about Mendocino County, California to Santa Monica Bay. Larvae and young juveniles are pelagic, but as the juveniles mature, they settle on rocky reefs or into the kelp canopy. Adults are residential and bottom-dwelling, associated with kelp beds or rocky reefs, from the intertidal to about 264 ft, most commonly between 30 and 120 ft depths.

Age and Growth

Maximum age estimates from northern and central California range from 24 to 30 yr. Based on a calculated age-length relationship for aging, an 8-in. TL gopher rockfish is approximately 3-4 yr old, a 10-in. TL fish is approximately 5-6 yr old, and a 12-in. fish is approximately 9-10 yr old. Their greatest recorded size is 15.7 in. in length.

Reproduction, Fecundity, and Seasonality

In southern California waters, both males and females reach first maturity at 3 yr and 5.3 in. TL. Off central and northern California, half of the population of males, as well as females, will reach maturity at 4 yr, 6.7 in. TL. By 10 yr and 9 in. TL, the entire population of males will have reached reproductive maturity. Off California, spawning takes place between January and July, with peak spawning in February, March and May. It may take up to 90 days, at a range of 0.8 to 1.6 in. TL, before the larvae settle out of the plankton. In central California, June has been observed to be the primary month for recruitment of larvae to nearshore areas.

Natural Mortality

There are no estimates of natural mortality for gopher rockfish.

Diseases

No information is available on diseases in gopher rockfish.

Predator/Prey Relationships

Gopher rockfish larvae feed on plankton during daylight hours. Juveniles also feed during the day, and eat crustaceans. Their predators include fish, such as rockfishes, lingcod, cabezon, and salmon, as well as birds and porpoises. Adult gopher rockfish are nocturnal predators that ambush their prey. Some of their prey items include crustaceans (particularly *Cancer* sp. crabs, caridean shrimp, and anomurans), fish (including juvenile rockfish), and mollusks. Their predators include sharks, dolphins, and seals.

Competition

The territorial gopher rockfish excludes kelp rockfish from bottom territories and black-and-yellow rockfish from the deeper portions of its vertical distribution. Also, based on co-occurrence, gopher rockfish probably competes for food and space with cabezon, lingcod, greenlings, and other rockfish species including China, quillback, copper, and vermilion.

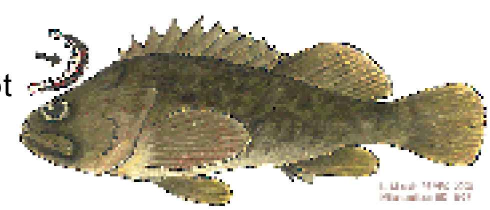
Critical Habitat

Small juveniles may inhabit the kelp canopy. Larger juveniles and adults are bottom dwellers and prefer shallow rocky substrate and kelp beds, as well as sandy areas near reefs, usually between 30 and 120 ft depths.

Status of the Stocks

No formal stock assessments have been completed for gopher rockfish. This species is a valuable component of recreational and commercial fisheries in California.

Grass Rockfish, *Sebastes rastrelliger*



Grass rockfish are green with black or gray mottling, somewhat resembling kelp rockfish except that kelp rockfish are usually brown or gray-brown.

Distribution, Stock Structure, and Migration

Grass rockfish are found from Yaquina Bay, Oregon to Bahia Playa Maria, central Baja California, although they are most common from northern California south. This is a shallow water species, commonly found from the intertidal to 20 ft, but they have also been found to depths of 150 ft. As juveniles they are pelagic, but as they mature and become adults, they become associated with kelp beds and reefs. This species is considered residential, and stays within a their home range.

Age and Growth

Grass rockfish have been aged to a maximum of 23 yr. Based on a calculated age-length relationship, an 11.5-in. TL grass rockfish is approximately 5 yr old, a 16-in. TL fish is approximately 10 yr old, and an 18-in. TL fish is approximately 14 yr old. Maximum length recorded for this species is 22 in.

Reproduction, Fecundity, and Seasonality

Male and female grass rockfish reach first maturity at different lengths and ages. First maturity in males is considered to be 8.7 in. TL at a corresponding age of 2 yr off the coast of southern California, whereas the smallest mature male observed measured 14.1 in. TL and was 8 yr of age off central California. First maturity in females is considered to be 8.7 in. TL (age undetermined) off the coast of southern California, whereas the smallest mature female observed measured 12.8 in. TL and was 5 yr of age off central California. It was also determined that fifty percent of the males reached maturity at 9.6 in. TL and 3.5 yr of age, and half of the females reached maturity at 9.4 in. TL and 3.7 yr of age. In California waters, spawning takes place between November and March with peak spawning in January and February. At birth, the larvae are between 0.17 and 0.18 in. SL and after 2 months, when they settle out of the plankton, they are about 1.1 in. in length. Young-of-the-year first appear in shallow waters between spring and summer.

Natural Mortality

Estimates of natural mortality are not available for this species.

Diseases

No information is available on diseases in grass rockfish.

Predator/Prey Relationships

Larval grass rockfish are daytime feeders, but as adults they feed at night. Juveniles and adults prey upon crustaceans, but the adults also eat other fish (such as juvenile surfperches and midshipmen). Predators of juveniles include birds, porpoises, and fishes, including rockfishes, lingcod, cabezon, and salmon. The adults are the prey of sharks, dolphins, and seals.

Competition

Grass rockfish, commonly occurring in kelp beds and reef structures, may compete for space and food with other bottom-dwelling fishes common to these habitats such as cabezon, lingcod, greenlings, and other rockfish such as gopher, black-and-yellow, China, quillback, copper, and vermilion. Among rockfishes, they share a fairly narrow depth distribution primarily with the black-and-yellow rockfish.

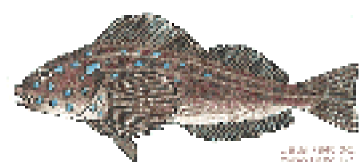
Critical Habitat

Grass rockfish are a shallow water species, most commonly found from the intertidal to 20 ft, but usually only the juveniles are found in tide pools. Among rockfishes, they have one of the shallowest and relatively narrow depth ranges. They are found in vegetated areas, particularly in kelp beds, and around reef structures where the adults may be found hiding in crevices.

Status of the Stocks

No formal stock assessment has been done for this species. Grass rockfish are taken in substantial numbers by finfish traps and commercial hook-and-line, particularly in central California. Grass rockfish are also taken in large numbers by spear fishermen and are also common for shore, pier, and small vessel recreational fishermen. Among recreational fishing modes, they are relatively more important to anglers fishing from shore than those fishing from boats.

Kelp Greenling, *Hexagrammos decagrammus*, and Rock Greenling, *Hexagrammos lagocephalus*



Kelp Greenling (male)

Rock Greenling

The kelp greenling is in the family of Hexagrammidae and shares this taxonomic relationship with lingcod. The kelp greenling is one of the most conspicuous fishes in rocky nearshore habitats, occurring often in and around kelp beds. The male and female look so different that they were first described as separate species. The body color is variable in both sexes, ranging from light gray to brown. Males, however, have large irregular blue patches anteriorly, while females are uniformly covered with smaller dark spots.

The rock greenling is in the family Hexagrammidae and is closely related to the kelp greenling, both taxonomically and morphologically. It is reddish-brown with darker mottling and often has large bright-red blotches on the sides. The inside of the mouth is bluish.

Distribution, Stock Structure, and Migration

Kelp greenling populations range along the eastern Pacific coast from La Jolla, California to the Aleutian Islands in Alaska (Figure 1.2-2). Kelp greenlings are not known to migrate; on the contrary, adults are often territorial, particularly during spawning season.

The rock greenling ranges from the Bering Sea to Point Conception, but also occurs in the western Pacific Ocean south to Japan. In California, this species is infrequently observed south of San Francisco (Figure 1.2-3). Little is known about their stock structure. Similar to kelp greenling, adults are territorial.

Age and Growth

Kelp greenlings grow faster than most nearshore fishes during their first 3 years. They have been aged to a maximum of 8 yr for males and 13 yr for females. Total lengths corresponding to the male and female ages were 15.0 in. and 17.4 in., respectively. The greatest recorded size is 21 in. TL.

No data on rock greenlings are available from California. Rock greenlings have been aged to a maximum of 8 yr for males and 11 yr for females. Total lengths corresponding to these male and female ages were 11.9 in. and 22.4 in., respectively.

Reproduction, Fecundity, and Seasonality

Approximately one third of all male kelp greenling are sexually mature at age 2, while half of all males are mature by age 3-4 at an average total length of 11.6 in. Approximately one-half to two-thirds of all female kelp greenling are sexually mature at age 3-4 at an average total length of 11.6 in. In California, the spawning season for kelp greenling occurs from September through December. Females spawn their eggs subtidally on rocks. Their egg nests have been observed at depths of 16 to 56 feet. An individual male kelp greenling may guard up to 11 egg masses simultaneously, although the average number is four. Hatching occurs from December through February in northern California. Larvae are approximately 0.3 to 0.4 in. long at hatching and remain as planktonic organisms up to a total length of 2.0 to 2.7 in.

No data are available from California on rock greenling. However, data from the western Pacific Ocean indicate that approximately one half of all male and female rock greenlings are sexually mature at age 3-4 and a length of 11.4 to 13.8 in. In the Aleutian Islands, the spawning season extends from June through August. Females lay eggs, and it is unknown whether rock greenling guard their nests.

Natural Mortality

Estimates of natural mortality are not available for kelp greenling or rock greenling.

Diseases

No information is available concerning diseases in kelp greenling or rock greenling.

Predator/Prey Relationships

Kelp greenling larvae prey on a wide variety of planktonic organisms, including fish larvae and eggs. During most of the year, juveniles and adults consume a variety of prey that is consistently available in the habitat, including crabs, shrimp, snails, chiton, abalones, octopi, fish, fish eggs, and algae. There are brief periods when organisms such as juvenile fishes or herring spawn become exceptionally abundant, and kelp greenling shift their food habits to take advantage of these opportunities. The primary predators of adult greenling are lingcod and harbor seals.

No information is available from California on prey of larval rock greenling. No information is available on predators of non-larval rock greenling.

Competition

Based on co-occurrence with adult and juvenile kelp greenling, bottom-dwelling fishes associated with kelp beds and reef structure likely to compete with kelp greenling for food and space include lingcod, cabezon, and rockfish species such as grass, gopher, black-and-yellow, China, quillback, copper, and vermilion.

On the same basis, bottom-dwelling fishes likely to compete with rock greenling for food and space include lingcod, cabezon, kelp greenling, and rockfish species such as grass, China, quillback, copper, and vermilion.

Critical Habitat

Kelp greenling range in depth from the intertidal to approximately 500 ft, but are more common at depths of 150 ft or less. Fish frequent subtidal habitats in or around rocky reef areas and under kelp beds. Juveniles and adults both are common on any rocky bottom area with dense algal growth.

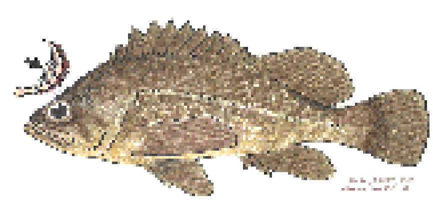
Juvenile and adult rock greenling frequent sub-tidal habitats in or around rocky reef areas and in kelp beds.

Status of the Stocks

There are no estimates of abundance for kelp greenling or rock greenling in California.

Kelp Rockfish, *Sebastes atrovirens*

The coloring of kelp rockfish varies in hue from tan to pinkish brown to red, with dark mottling.



Distribution, Stock Structure, and Migration

Kelp rockfish live in kelp beds and on rocky reefs, ranging from Timber Cove, northern California to Punta San Pablo, central Baja California. They are, however, most abundant between northern Baja and central California. This species is known to occur at depths up to 150 ft but are most common between 15 and 50 ft. Kelp rockfish are residential species, and make no migrations except possibly into deeper water during winter storms.

Age and Growth

Kelp rockfish have been aged to a maximum of 20 yr. Based on a calculated age-length relationship, an 8-in. TL kelp rockfish is approximately 3 yr old, an 11.6-in. fish is approximately 6 yr old, and a 13-in. fish is approximately 9 yr old. The greatest recorded length for this species is 16.7 in.

Reproduction, Fecundity, and Seasonality

Male and female kelp rockfish reach maturity at 4 and 5 yr of age, respectively. Corresponding total lengths at maturation are 9.9 in. and 9.6 in. Off central California, spawning takes place between December and June, with peak spawning in May, and fertilized eggs are present between December and January. Females give birth to live young, and the planktonic larvae are 0.16 to 0.17 in. in standard length (SL) at birth. Kelp rockfish larvae settle into the kelp canopy after 1 to 2 months. As juveniles, they will settle out of their pelagic phase and first appear in the kelp beds between April and August. Recruitment to the nearshore area in central California generally occurs during June and July.

Natural Mortality

Estimates of natural mortality are not available for this species.

Diseases

No information is available on diseases in kelp rockfish.

Predator/Prey Relationships

Juvenile and adult kelp rockfish are believed to search for their prey, although adults are also known to ambush their prey. Prominent prey items for adults and juveniles include crustaceans such as shrimp and amphipods, and small fish, particularly juvenile blue rockfish. The juveniles are prey for birds, pinnipeds, porpoises, lingcod, cabezon, salmon, and other rockfish. Predators of adult kelp rockfish include sharks, dolphins, and seals.

Competition

The kelp rockfish is excluded from bottom areas of kelp beds by the territorial gopher rockfish.

Critical Habitat

Kelp rockfish occur in rocky reef and artificial reef areas, but most commonly in kelp beds. They spend their days drifting within kelp blades, sometimes upside down or resting on them. They are more active at night, leaving the kelp beds to hunt prey.

Status of the Stocks

Local abundances have been studied for the kelp rockfish, however there is no comprehensive stock assessment throughout their range. This species is often taken in sport fisheries, such as spear fishing, but they are also taken in small numbers by commercial hook-and-line and traps. Their restricted habitat and limited movements make them highly exploitable. Therefore, local depressions probably occur in areas where diving, skiff fishing, or commercial fishing is concentrated.

Monkeyface Prickleback, *Cebidichthys violaceus*

The monkeyface prickleback is not a true eel, and in the late 1980s it was reclassified to the prickleback family. The coloration is a uniform light brown to black with two characteristic dark stripes below each eye. The coloration of both sexes is similar.

Distribution, Stock Structure, and Migration

Populations range along the eastern Pacific coast from San Quintin Bay, Baja California to southern Oregon. They normally occur nearshore and their depth range extends from the intertidal to 80 ft. They are considered to be a residential species and exhibit only small movements from under rocks to foraging sites.

Age and Growth

Monkeyface pricklebacks have relatively slower growth rates than most fishes. They have been aged to a maximum of 18 years. The largest recorded size is 30 in. TL.

Reproduction, Fecundity, and Seasonality

Information available on age at sexual maturity suggests that in California both sexes begin to mature in their third or fourth year at a total length of 11.0 to 14.2 in., while 50% maturity occurs at approximately 15.4 in. at five yr of age. Fertilized eggs are present in females and spawning activity occurs from January to May, while the peak spawning period is February to April. Females spawn their eggs on subtidal, rocky surfaces. Nest guarding behavior has been observed, but it is unclear if males, females or both sexes guard eggs.

Natural Mortality

Estimates of natural mortality are not available.

Diseases

No information is available on diseases in monkeyface pricklebacks.

Predator/Prey Relationships

The diet of monkeyface pricklebacks varies from carnivorous to omnivorous to herbivorous, depending on life history stage and time of year. Prey items of early juveniles are predominantly zooplankton. Adults prefer annual red and green algal species. Predators of monkeyface pricklebacks include piscivorous birds such as great egrets and red-breasted mergansers, and fishes such as cabezon and grass rockfish.

Competition

Other crevice-dwelling fishes such as the black prickleback, high cockscomb and gunnels, such as the rockweed gunnel, may compete with the monkeyface prickleback for space and resources.

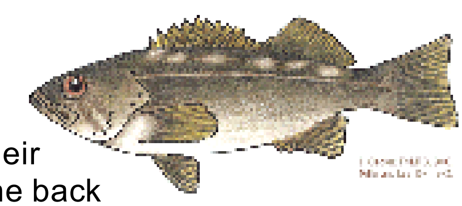
Critical Habitat

Typical habitat for monkeyface pricklebacks includes rocky areas with ample crevices, including high and low intertidal tide pools, jetties and breakwaters, and relatively shallow subtidal areas, particularly kelp beds. Juveniles are particularly adapted for the high intertidal area, and this species has air-breathing capabilities.

Status of the Stocks

No information is available on the status of stocks of monkeyface prickleback.

Olive Rockfish, *Sebastes serranoides*



Olive rockfish are one of several nearshore *Sebastes* associated primarily with the mid-water region of kelp forest of the California coast. They are streamlined fish with very few head spines. Their body color is dark brown or dark green-brown on the back and light brown or green-brown on the sides.

Distribution, Stock Structure, and Migration

Olive rockfish occur from southern Oregon to Islas San Benitos (central Baja California) from surface waters to 570 ft. They are common from about Cape Mendocino to Santa Barbara and around the northern Channel Islands from surface waters to about 396 ft. Tagging studies have found that olive rockfish move relatively little, ranging less than 1 mi. This species has been variously described as transient or residential.

Age and Growth

Ageing studies show olive rockfish maximum age is at least 25 yr. Females grow larger than males and, beginning at maturation, tend to be longer at a given age. The maximum reported length of olive rockfish is 24 in. This is one of the fastestgrowing nearshore rockfishes. Based on whole otoliths, a 10-in. TL fish is approximately 2-3 yr old, a 15-in. TL fish is approximately 10 yr old, and an 18-in. TL fish is approximately 10 yr old.

<u>Reproduction, Fecundity, and Seasonality</u>

Throughout California, males mature at a somewhat smaller size and a slightly greater age than females; however, the difference is not large. First maturity for males ranges from 10.6 in. (no age given) to 12.6 in. (4 yr). First maturity for females ranges from 11.2 in. (no age given) to 12.6 in. (4 yr). Fifty percent maturity for males occurs between 12.6 and 13.0 in. (both 5 yr), while 50% maturity for females occurs between 13.4 in.(4 yr) and 13.8 in. (5 yr). Mating occurs in the fall, and females release larvae once a year in the winter from December through March, peaking in January. Larvae are planktonic for 3 to 6 months, then from April to September young-of-the-year olive rockfish, around 1.2 -1.6 in. long, settle out of the plankton.

<u>Natural Mortality</u>

No information was found on natural (or fishing) mortality of olive rockfish.

<u>Diseases</u>

No information is available concerning diseases in olive rockfish.

<u>Predator/Prey Relationships</u>

Juvenile olive rockfish feed on crustaceans, juvenile fishes, polychaetes, octopi and squid. Juveniles become more active at night, but it is not clear whether adults are nocturnal: they do feed commonly on octopi, which are more available at night. Adult olive rockfish feed on fish (especially juvenile rockfishes), small crustaceans, polychaetes, cephalopods and tunicates. Adults are preyed upon by sharks, dolphins, and pinnipeds such as seals and sea lions. Juveniles fall prey to other rockfishes, lingcod, cabezon, salmon, albacore, birds, and porpoise.

<u>Competition</u>

Olive rockfish are known to compete with the kelp bass *Paralabrax clathratu*s for food and shelter in southern and central California where their ranges overlap. Though olive rockfish have been associated with surfperches and bocaccio, and are frequently observed among schooling blue rockfish, no information on competition among them was found.

<u>Critical Habitat</u>

As with all rockfishes, the larval stage of olive rockfish is planktonic. When young-of-the-year olive rockfish settle out of the plankton they are most commonly found in and around kelp beds, oil platforms, surfgrass and other structures at depths as shallow as 10 ft. Sub-adult and adults live over high-relief reefs, as well as in mid-water around oil platforms. In shallow waters, they are found throughout the water column in and around kelp beds, and are known to rest on the bottom as well.

The movement patterns of olive rockfish may be limited by the presence or absence of kelp beds. It has been shown that the abundance of olive rockfish decreases as beds of *Macrocystis* kelp are removed.

Status of the Stocks

There has been no stock assessment of this species. However, there is clear evidence from sport fish catch records that olive rockfish have declined in abundance south of Point Conception.

Quillback Rockfish, *Sebastes maliger*

The quillback rockfish is a component of central and northern California's nearshore sea floor assemblage. Quillback rockfish are stoutly built, a characteristic common among nearshore *Sebastes* found in close association with the bottom. They are usually orange-brown to black with a yellow or orange pale area between the eye and pectoral fin.

Distribution, Stock Structure, and Migration

Quillback rockfish are known from the Gulf of Alaska to San Miguel Island in southern California. They are considered common between southeast Alaska and northern California. They are considered a shallow- to moderate-depth species although they occur rarely at depths of 900 ft. No stock structure has been determined for quillback rockfish in California. Like other *Sebastes* that inhabit shallow, benthic habitat, individual quillback rockfish are not known to travel far. Tagging studies in central California and Washington have shown quillback to be residential (no movement other than diurnal) or show movement of less than 6 mi. They have also demonstrated homing ability and specific diurnal movement patterns.

Age and Growth

In California, quillback rockfish have been aged to 15 yr, but are known to live longer: they have been aged to 76 yr in Canada. Quillback rockfish can grow to 24 in.

Reproduction, Fecundity, and Seasonality

In California, size at first maturity as well as 50% maturity for males is 8.7 in. TL (4 yr.), and for females is 10.2 in. TL (6 yr). As with all *Sebastes*, quillback rockfish have internal fertilization and give birth to live young. In California, mating takes place in the late winter/early spring, and the young are born April through July; with a peak in May and June. After roughly 1 or 2 months in the plankton, they begin to settle near shore.

Natural Mortality

Natural mortality values have been calculated for quillback rockfish stocks in Washington. It has been calculated to be 0.1253 via tag and recapture methods, and 0.115 via survivorship/age frequency curve.

Diseases

No information on disease in quillback rockfish was found.

Predator/Prey Relationships

As planktonic larvae, quillback rockfish are known to consume nauplii, invertebrate eggs and copepods. After they settle in the shallow, nearshore areas they continue this feeding pattern and feed on crustaceans. As adults they are known to feed on a variety of bottom-dwelling prey such as crustaceans; small fish, including rockfishes and flatfishes; bivalves and fish eggs. As juveniles, they are preyed upon by fishes, including larger rockfishes (such as yelloweye), lingcod, cabezon and salmon. Various marine birds and pinnipeds take juvenile quillback as well. Adults are also subject to predation by larger fish-eating fishes including some sharks, as well as pinnipeds and possibly river otters.

Competition

Though quillback rockfish occur with a host of other nearshore bottom-dwelling species, no information on competition was found.

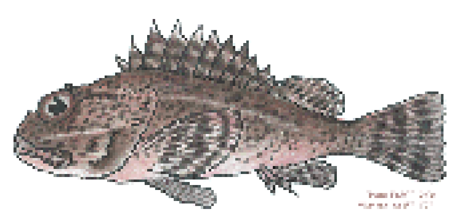
Critical Habitat

The larvae of quillback rockfish are planktonic. After about 1-2 months in the plankton, they begin to settle near shore. Young-of-the-year quillbacks are found among relatively shallow, low-relief rocky substrate and shallow, vegetated habitats such as kelp and eelgrass beds. Juveniles tend to inhabit the very nearshore sea floor as well, and are found over both low and high rocky substrate. Adults are most often found in deeper water and are solitary reef-dwellers living in close association with the bottom. They are often seen perched on rocks or taking shelter in crevices and holes. Adults have also been noted to retreat to eelgrass beds at night. Quillback are also associated with the rock-sand interface, but are rarely seen in the open away from suitable cover.

Status of the Stocks

No stock assessment has been done for this species. Quillback rockfish are a minor component of the nearshore recreational fishery with decreasing occurrence in central and southern California. They are also a component of the nearshore commercial fishery.

California Scorpionfish, *Scorpaena guttata*



California scorpionfish are easily distinguished from most other California fishes. They are a relatively heavy-bodied species, with strong head and fin spines, ranging in color from red to brown, often with purple blotches and always covered with dark spots. Scorpionfish are a nocturnal species. The sharp spines on the dorsal, anal and pelvic fins are poisonous.

<u>Distribution, Stock Structure, and Migration</u>

Scorpionfish are found from Santa Cruz, California south along the Pacific coast of Baja California and into the Gulf of California. Preferring warmer water, this species is common as far north as Santa Barbara. Scorpionfish live in tide pools and to depths of about 600 ft. Scorpionfish tagging studies have shown individuals to travel as far as 350 km. Some of these movements are related to annual spawning migrations, which are sometimes extensive.

<u>Age and Growth</u>

California scorpionfish grow to 17 in. and some live to at least 21 yr. After 4 yr of age, females grow faster than males and reach a larger size.

<u>Reproduction, Fecundity, and Seasonality</u>

Although a few scorpionfish mature at 6 in. (1 yr), over 50% are mature by 7 in. (2 yr) and all reproduce by 9 in. (4 yr). They have separate sexes, and females generally outnumber males. Spawning occurs from April to September, peaking in June and July. Scorpionfish are oviparous, have external fertilization, and females produce eggs imbedded in the gelatinous walls of hollow, pear-shaped “egg balloons”. The egg masses float near the surface and the eggs hatch within 5 days. California scorpionfish make extensive spawning migrations in late spring and early summer, when most adults move to 12-360 ft depths, forming large spawning aggregations on or near the bottom. During spawning, these aggregations rise up off the bottom, sometimes approaching the surface. Spawning occurs in the same areas year after year.

<u>Natural Mortality</u>

No natural mortality estimates are available for the scorpionfish.

<u>Diseases</u>

No information is available on diseases in this species.

<u>Predator/Prey Relationships</u>

Scorpionfish are a carnivorous, ambush predator. Small crabs are probably the most important food of the scorpionfish. They are primarily nocturnal and feed at night. Octopi prey on small individuals.

<u>Competition</u>

No information on competitors of adult or juvenile scorpionfish is available.

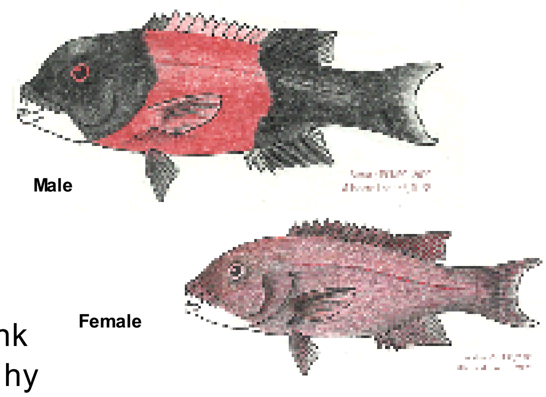
Critical Habitat

Very young scorpionfish live in shallow water, hidden away in habitats with dense algae and bottom-encrusting organisms. Juveniles and adults are most abundant on hard bottom (such as rocky reefs, sewer pipes and wrecks).

Status of the Stocks

No population estimates exist for California scorpionfish. However, data from trawl studies show that there are substantial short-term fluctuations in California scorpionfish abundance within the Southern California Bight.

California Sheephead, *Semicossyphus pulcher*



The California sheephead is easily distinguished by its color pattern, great body depth, and large size. Juvenile sheephead (less than 4 in. long) are orange with at least two white, horizontal stripes on the side and several black spots in the dorsal and anal fins. Adult males have a black head and tail, separated by a reddish middle section, while the females are uniformly pink or reddish. The males also have a prominent, fleshy bump on their foreheads.

Distribution, Stock Structure, and Migration

California sheephead range from Monterey Bay, California south into the Gulf of California (Figure 1.2-4). This species is not common north of Point Conception. Sheephead are found from intertidal areas to about 280 ft depths. They are considered a resident, solitary species and no systematic movements have been described.

Age and Growth

Male sheephead have been aged at around 50 yr, and can achieve a length of 3 ft and a weight exceeding 36 lb. Females have been aged to 30 years.

Reproduction, Fecundity, and Seasonality

All sheephead are protogynous hemaphrodites, beginning life as females, but then older, larger females developing into males. Female sexual maturity may occur at 3 to 6 yr and fishes may remain female for as long as 15 yr. The timing of the transformation to males involves the population sex ratio as well as the size of available males. Sheephead are sometimes seen in large schools, perhaps associated with spawning aggregations. Batch spawning occurs between July and September. Larval drift ranges from 34-78 days. Settlement size is between 0.5 and 0.6 in.

Natural Mortality

Estimates of natural mortality are not available.

Diseases

No information is available on diseases in sheephead.

Predator/Prey Relationships

Sheephead feed by crushing their prey with enlarged jaw teeth. They have a broad diet which includes crabs, barnacles, mollusks, and sea urchins. Once they reach their large adult size, sheephead have few known predators. Giant sea bass, moray eels, and harbor seals have been documented as predators of sheephead.

Competition

Smaller sheephead may compete with garibaldi, *Hypsypops rubicundus*, for food.

Critical Habitat

Sheephead inhabit nearshore rocky reefs, kelp beds, and surfgrass beds. They seem to prefer areas of high and low relief, but have also been observed foraging over sandy bottom habitat. Sheephead are resident on many artificial reefs in southern California. At night they often utilize rock crevices and holes to sleep.

Status of the Stocks

There has been no ongoing analysis of the status of the California sheephead. With the exception of 1982-1983, the population seems to increase during El Niño conditions and this is reflected in recruitment.

Treefish, *Sebastes serriceps*

The treefish is a nearshore rockfish species that inhabits shallow, rocky habitats. They are striking in appearance: yellowish with five to six vertical black bars on the side.

Distribution, Stock Structure, and Migration

Treefish range from Cedros Island, Baja California to San Francisco. The depth range they inhabit is shallow to 150 ft. Treefish are a residential species with a limited home range; they do not exhibit migrational activity.

Age and Growth

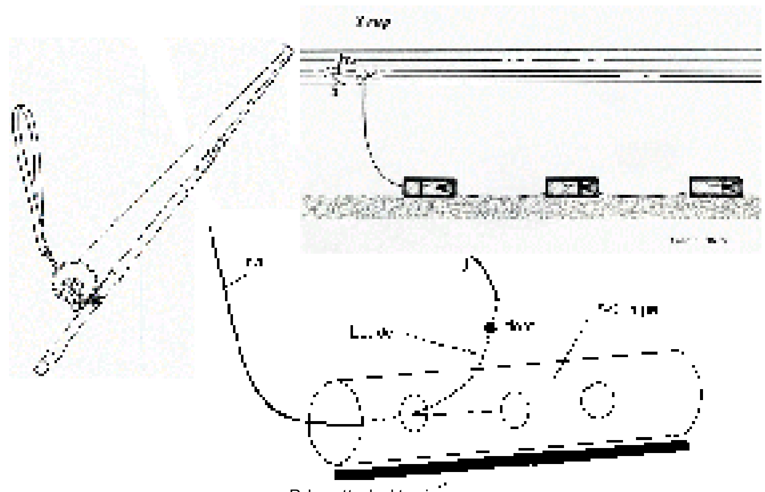
The maximum size for treefish is 16 in. TL.

Reproduction, Fecundity, and Seasonality

No data are available for size at maturity for this species. Treefish are thought to spawn annually in late winter.

Natural Mortality

There is no information on treefish natural mortality.



Each leader has to be attached directly to the line from the surface. In this example (only one leader is illustrated), the leader goes through a hole in the PVC pipe and is attached to the line that runs through the length of the inside of the pipe. Rebar can be attached either inside or outside of the PVC pipe to serve as an anchor

Diseases

No information is available on diseases in treefish.

Predator/Prey Relationships

Treefish are ambush predators that feed nocturnally on benthic invertebrates, including mollusks and crustaceans, and small fish. Juveniles are fed upon by rockfishes, lingcod, cabezon, salmon, birds, porpoises, and least terns. Adults are preyed upon by sharks, dolphins, and seals.

Competition

Treefish are solitary and highly territorial. They may compete with other treefish and nearshore rockfish species such as gopher, grass, and black-and-yellow rockfishes for food and shelter habitat.

Critical Habitat

Juvenile treefish are found in drifting mats of kelp, in areas of high rocky relief, and on artificial reefs. Adult treefish are found on shallow rocky reefs, frequently in caves and crevices. They are also found in similar habitats on artificial reefs in southern California.

Status of the Stocks

There are no estimates of abundance for treefish in California. In southern California, treefish are an important species in both the nearshore recreational fishery and in the commercial fishery for live fish.

History and Socio-economics of the Fishery

To one degree or another, the different activities that focus on one or more of the 19 nearshore finfish species occur along the entire California coast (Figures 1.2-5, 1.2-6 and 1.2-7). Some activities such as commercial and recreational fishing are widespread, while others, such as scientific research or diving for observation of nearshore ecosystems, are confined to relatively few areas. The Nearshore Fishery Management Plan (NFMP) focuses upon commercial and recreational fisheries due to their significant impact on nearshore finfish. These fisheries and other activities that are dependent on nearshore finfish in various ways are described below.

The nearshore finfish fishery encompasses all activities in the marine environment that utilize the 19 NFMP species. Extractive users remove fish, and include recreational anglers, spear fishermen, commercial fishermen, and scientific collectors. Non-extractive users interact with the NFMP species without harvesting them, and include divers observing or photographing nearshore finfish.

Extractive Users

Recreational anglers use hook-and-line to fish from man-made structures, beaches and banks, private and rental vessels launched from ramps, and party and charter vessels, as well as private vessels stored in boat slips or anchored in harbors.

Recreational divers generally use spear-guns to take fish from subtidal areas near man-made structures or near natural shores, or use private/rental vessels and party/charter vessels to gain access to more remote diving locations.

Commercial fishermen use a variety of gear to take the 19 species. The primary gears used in the nearshore area are **traps** and **hook-and-line**, including **rod-and-reel**, **vertical hook-and-line**, stick gear, and set longline. In areas outside state waters, commercial fishermen may catch nearshore species with trawls, gill nets, and trammel nets. Commercial fishermen operate from a variety of vessel types, including kayaks, skiffs, small boats, and trawlers.

Depending upon the specific research or education purpose, scientific collectors use types of gear used by commercial or recreational fishermen to take nearshore fish.

traps - generally, a wire basket or cage used for trapping fish.

hook-and-line - any type of fishing gear involving a fishing line with attached hooks (such as longline, rod-and-reel, troll and stick gear, among others).

vertical hook-and-line - a fishing line which is anchored to the bottom and attached at the surface to a vessel or a buoy so as to fish vertically.

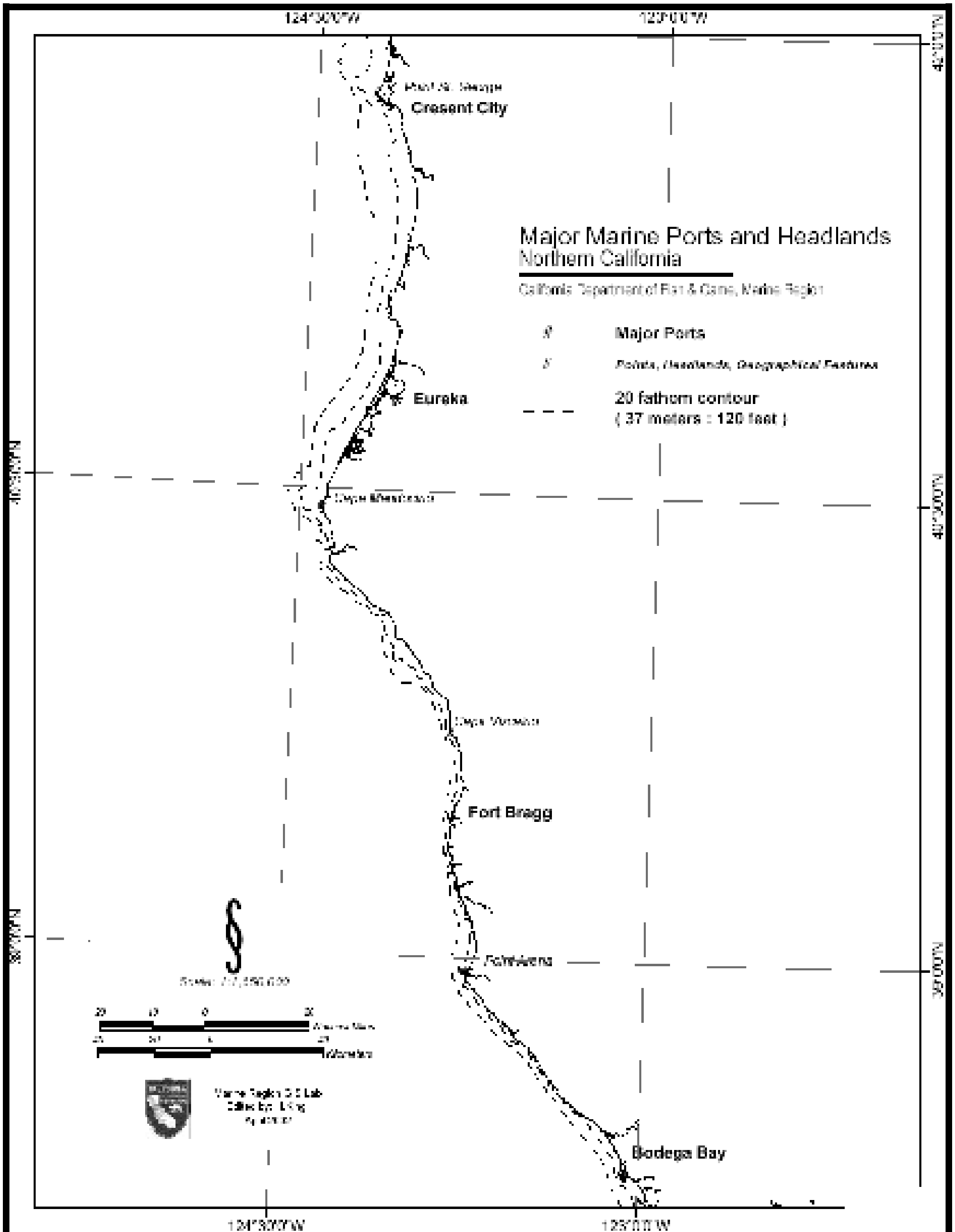


Figure 1.2-5. Major marine ports and headlands of northern California

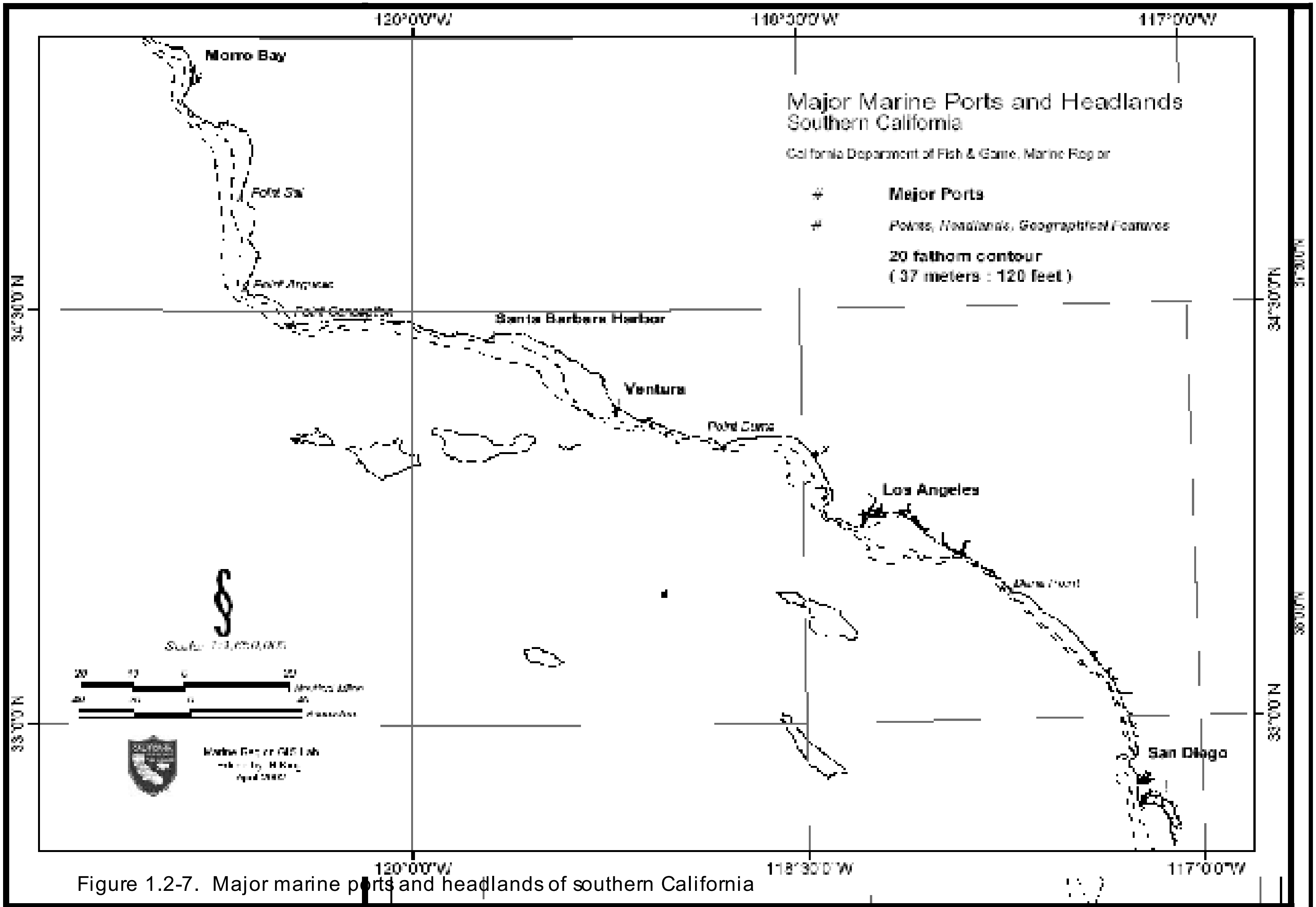


Figure 1.2-7. Major marine ports and headlands of southern California

Figure 1.2-6. Major marine ports and headlands of central California

Non-extractive Users

The 19 NFMP species are part of the nearshore reef and kelp bed ecosystem that is important to a number of non-extractive users, including non-extractive divers, passengers on sightseeing vessels, researchers, educators, and the conservation community. Divers enjoy viewing and photographing a number of different nearshore species. Passengers on sightseeing vessels with underwater viewing areas want to see an abundance of many types of fish. Researchers studying the natural history, ecology, and biology of these 19 species need thriving populations to observe and monitor. Educators and the conservation community share with other users a desire to have a healthy resource that can be studied and enjoyed by the people of California for generations to come.

<u>Summary</u>

These user groups have different preferences in their use of nearshore finfish. Spear fishermen may prefer to take fish of trophy size or a bag limit, while non-extractive divers may prefer both a large quantity and a high diversity of fish that they can observe or photograph. Some recreational anglers may enjoy catch-and-release fishing while others may prefer to land a full bag limit. Commercial fishermen and buyers want to maximize profit. Thus, they prefer to land as many fish as the markets can handle. Some of these preferences overlap and have the potential to create conflicts.

Fishing Effort and Landings Data Sources

Several sources of fishery-dependent data are used to describe the fishing activity of the nearshore fishery. Each of these sources has certain strengths and weaknesses, but as a group they represent the best available data for characterizing the nearshore fishery, and provide useful information for identifying trends.

The description of the nearshore commercial fishery is based upon data from two sources (The strengths and weaknesses of these data sources are listed in Table 1.2-2):

- Commercial Fisheries Information System (CFIS) for 1989-1999. This system contains all the commercial landings data in a database that is referred to as the CMASTR file. These data come directly from the dealer receipts that are completed at the time of landing for all commercial boats and they represent the best available data. Commercial data are presented in two forms: filtered and unfiltered. Filtered data represent those data subjected to certain criteria in order to obtain the following: bycatch estimates, number of boats and fishermen participating in the nearshore fishery, analyses by boat size and number of pounds landed by boat, and ex-vessel value estimates. Unfiltered data have not had any filters applied and thus represent the original (raw) CMASTR data. Data document the total pounds landed of nearshore market categories and the estimated ex-vessel values of those landings.
- Dockside sampling program. This program has been in place throughout this time period and is referred to as the California Cooperative Survey. One part of this program is CALCOM, the data entry and analysis segment. Results of these

analyses provide estimated landings by species and length/age analyses by species.

Table 1.2-2. Commercial databases used in NFMP data analyses, summaries, reports, etc.	
CFIS - CMASTR (Commercial Fisheries Information System - commercial landings database)	
Strengths	**Weaknesses**
Most recent record of commercial landings and activity (number of participants, boats, dealers, dates, etc.), and documents actual landings data	Recorded landings by “market categories” and not by actual species (though, in many cases market category designations and species are synonymous - therefore a major point of confusion and need for caution in interpreting data)
Only record of commercial landings (best available data)	Catch location and landing location may not be the same
Long-term database (1916 to the present)	Missing or incorrect information
Statewide, comprehensive by port	
Provides additional information on value of catch	
CALCOM (California Cooperative Survey - commercial landings sampling program)	
Strengths	**Weaknesses**
Species compositions of sampled market categories are estimated	Major target: groundfish (but not all groundfish)
Provides biological data: lengths, sex ratios, weights, ages of many species	Sampling logistics very difficult in certain ports
Provides a check link between sampling activity and commercial landings activity	Not enough samples and/or sampling due to personnel constraints
Provides landings estimates of species (known as “expanded” landings data)	Sampling concentrated in northern and central portions of the state with less data from southern portion

More detailed descriptions of CFIS and CMASTR are provided in the following box. Estimates of filtered and unfiltered CMASTR and CALCOM data are available in Appendix E.

Commercial Fisheries Information System (CFIS) and CMASTR

Commercial landings data are primarily obtained from market receipt information. Market receipts record the license number of the fisherman, registration number of the vessel making a landing, number of pounds landed for specific market categories, condition of the catch, port of landing, and the price per pound. By law a fish buyer must complete a market receipt (also commonly called a landing receipt, fish ticket, or pink ticket) at the time of delivery and submit these receipts to the Department on a semi-monthly basis. A single receipt may not represent a fisherman's entire daily catch, and a single day's catch can be sold to more than one buyer resulting in multiple landing receipts.

Buyers sort fish into different market categories and record weight on the receipt by those categories. Most market categories are not species-specific, and for most species there is no legal requirement to record species by any specific market category. Buyers often lump several species into one category based on price. Thus, landings recorded in a market category may contain one or several species.

Market category data are summarized three ways: statewide, by port complex, and by region. Ex-vessel values (price paid to fishermen) are presented for each summary. Because regulatory changes influence landings, tracking landings over time can, in part, document the affect of regulations on the fishery.

To describe the commercial nearshore fishery, Department staff selected market categories that would contain most of the landings of the 19 nearshore species. Three market categories, red rockfish, group small rockfish, and unspecified rockfish, are included in some descriptions and may provide an overestimation of total nearshore landings. For some descriptions these market categories are excluded and may provide an underestimation of total nearshore landings.

The description of the nearshore recreational fishery is based upon data from three sources (The strengths and weaknesses of these data sources are listed in Table 1.2-3.):

- The Marine Recreational Fisheries Statistics Survey (MRFSS) for 1980-1999. The MRFSS, which is the most comprehensive data set available for recreational landings, provides estimates by area and user-group of total effort (measured in angler days and angler-hours) and the total number of fish taken.
- Commercial Passenger Fishing Vessel (CPFV) logs for 1980-1998. CPFV operators record data for individual fishing trips in a log book that is then submitted to the Department and entered into a database.
- On-board CPFV surveys for central and northern California (data summarized for 1987-1998). Observers record information on the actual catch and effort for each trip, as well as more specific information on catch composition, the amount and size of landed fish, and bycatch.

Table 1.2-3. Recreational databases used in NFMP data analyses, summaries, reports, etc.

MRFSS (Marine Recreational Fisheries Statistics Survey- recreational landings by fishing mode)

Strengths	Weaknesses
Samples four fishing modes at all fishing access sites	Cost associated with two sampling efforts (field and phone surveys) higher than logbooks
All observed landings are by species	Low % sampling rate of angler trips
Information recorded by professional samplers	Effort derived from randomized digit phone survey of households in coastal counties, non-coastal effort estimated from ratios in the field survey
Provides historical record (1980 -present with break from 1990-1992)	In large sampling regions, difficult to sample fishing sites proportional to effort; this sometimes leads to rural areas having too few samples
Provides important source of socio-economic information	Allocation of field samples based upon past fishing information; recently new closed seasons are considered when allocating samples
Length, weight, and discard data available	Phone survey not designed to estimate effort for small geographic regions and depends on 2-month angler recollection of number of trips
Precise catch location recorded for party/charter vessels since 1999	Estimates of catch and effort only available by 2 month periods in southern or northern California
Estimates are made by weight as well as numbers	Sampling of party/charter vessels limited to cooperative vessels
Estimates are made of identified kept fishes, unidentified kept fishes, discarded fishes, and effort by region and by mode	For some sampled trips, discarded and filleted catch information depends on angler recollection
	The importance of a rare event catch (such as a marlin) is magnified in the estimates

Commercial Passenger Fishing Vessel Logbook (CPFV) (Logbook trip information)

Strengths	Weaknesses
Information available for entire State by port and Fish and Game block; can be summarized at multiple geographic scales	The species of catches are not always recorded
Provides historical landings and effort by trip for 1980 - present; summarized landings by block available since 1936	Catch data not recorded by professional sampler Accuracy varies by species and CPFV operator
Includes landings information for dive CPFVs	No biological data (lengths or weights) recorded
Costs less to collect data than sampling programs	Location recorded on a gross scale (10-by-10 nmi)

	Logbook reporting varies between ports and years and usually is less than 100% (17-100%)

Table 1.2-3 cont. Recreational databases used in NFMP data analyses, summaries, reports, etc.

CPFV Central/Northern CA Observer Program (Sports Fish Restoration Act - CPFV onboard sampling program)

Strengths	**Weaknesses**
Sampled vessels by port each month (as high as 5% sample rate)	Information only for central and northern CA
Catches identified to species level	Low sample size for area north of Cape Mendocino
Information recorded by professional samplers	Cost associated with sampling effort higher than logbooks
Includes location information (loran, latitude/longitude coordinates)	Sampling limited to cooperative vessels
Includes length and by-catch information	Uses adjusted CPFV logbooks to estimate effort
Catch estimates by port and month	
Rockfish species composition can be used with CPFV logbook data to generate estimates of rockfish catch by species	

A more detailed description of the MRFSS survey methodology is provided in the following box while information on CPFV logbooks and the on-board CPFV surveys is available in Appendix E.

MRFSS Data

The Marine Recreational Fisheries Statistics Survey consists of a randomized telephone survey of households in California counties that lie within 50 mi (80 km) of the coast, paired with a stratified random access point angler intercept field survey. The field survey is conducted through an on-site interview of recreational anglers by a fishery technician at the conclusion of angling for the day. The data collected through these two complementary surveys are mathematically expanded by strata, and provide estimates of many statistics for the marine recreational fishery for California as well as Oregon and Washington. These statistics include catch expressed as thousands of fish, and effort expressed as thousands of trips. A trip is defined as a single day of a fishing outing, or "angler day" regardless of the number of hours fished in the day. The MRFSS is a national program conducted by the National Marine Fisheries Service (NMFS). It was initiated on the Pacific coast in July 1979.

The MRFSS data are incorporated into the Recreational Fisheries Information Network (RecFIN) database, which is maintained by the Pacific States Marine Fisheries Service (PSMFC). RecFIN regularly prepares MRFSS estimates of catches and effort, which are available via the Internet at http;//www.recfin.org. In addition to each estimate, the Proportional Standard Error (PSE), which is expressed as a percent of the estimate, is provided on the Internet reports to indicate the accuracy of the estimate. Catch estimates for a fish species caught commonly over a wide geographic range will have a lower PSE value and will be more accurate than estimates for a species caught only occasionally. Catch estimates derived from larger geographical areas will also have a lower PSE value than those derived from smaller areas.

In conducting surveys and providing estimates of recreational fishing activity, MRFSS divides the state of California into two regions with a boundary at the border between San Luis Obispo and Santa Barbara Counties. With the exception of 1990-1992, MRFSS has conducted surveys continuously since 1980.

MRFSS collects information from anglers on the following topics:

- Area of fishing : To capture the total take, statistics for all ocean areas were used.
- Species of fish caught and retained or caught and discarded: Because there are over 50 species of rockfish in California waters, and the actual identity of some of the catch is generally not known, samplers record unidentified rockfish as either unspecified rockfish genus or unspecified Scorpionfish family.)
- Fishing mode: party or charter boat, private or rental boat, beach or bank, and man-made structures such as piers and jetties
- Type of catch: (catch for the nearshore finfish fishery combined the first two types.)
  1. fish that were kept, and identified, measured, and counted by a MRFSS sampler
  2. fish that have been caught but cannot be examined because, for instance, they have been filleted or thrown back
  3. fish that have been released alive

General Trends in Nearshore Commercial Fishing Activities in the 1980s and 1990s

Information from the commercial data sources were summarized to examine trends in the nearshore finfish landings and effort. The landings information provided below was summarized using the CALCOM database while effort information was summarized using the filtered CMASTR database.

Estimated statewide landings of cabezon, California sheephead, and greenlings were higher in 1999 than in 1989, but the trends over time varied among species

(Figure 1.2-8). Cabezon landings were relatively flat until 1994 then gradually increased through 1998. California sheephead landings increased steadily until 1993 then remained fairly level through 1998. Greenling landings in general increased since 1994. Nearshore rockfishes (including California scorpionfish and the four nearshore rockfish groups) peaked in 1992 then decreased so that by 1999 landings were similar to those observed in 1989.

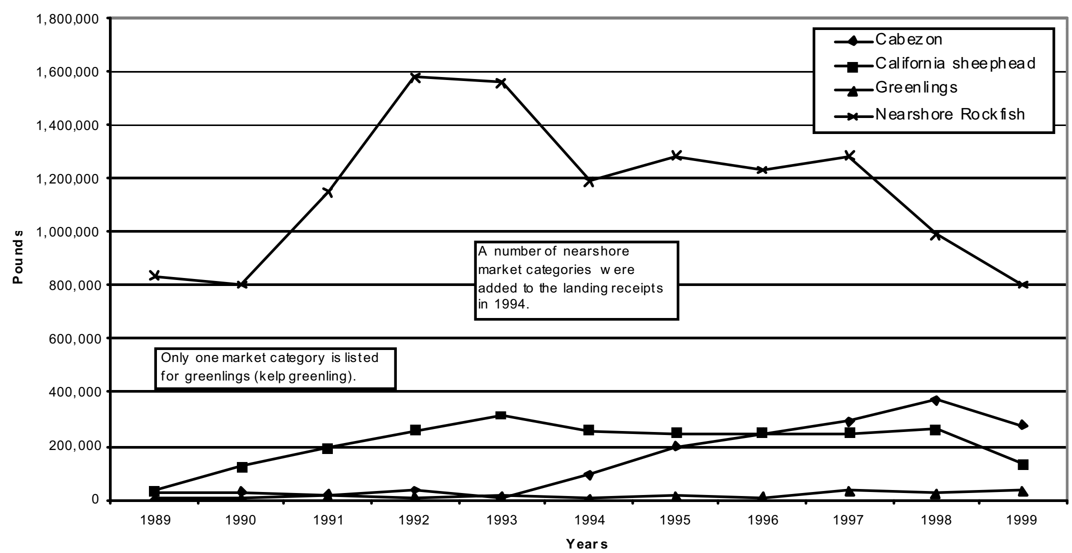


Figure 1.2-8. Estimated statewide commercial landings (Source: CALCOM) of cabezon, California sheephead, greenlings, and nearshore rockfish (includes California scorpionfish and the four nearshore rockfish groups) in pounds for all gears combined from 1989-1999.

A number of factors can impact how much of a species is landed in a given year. These factors include the biomass and age structure of the stock, the oceanographic environment, the socio-economic environment, and regulations. Some of the commercial regulations implemented over the past 11 years are shown in Figures 1.2-8, 1.2-10, 1.2-11, and 1.2-12. Other regulations, like the implementation of size limits for cabezon and California sheephead in 1999, are described later in this chapter under <u>Recent Management of the Nearshore Finfish Fishery</u>.

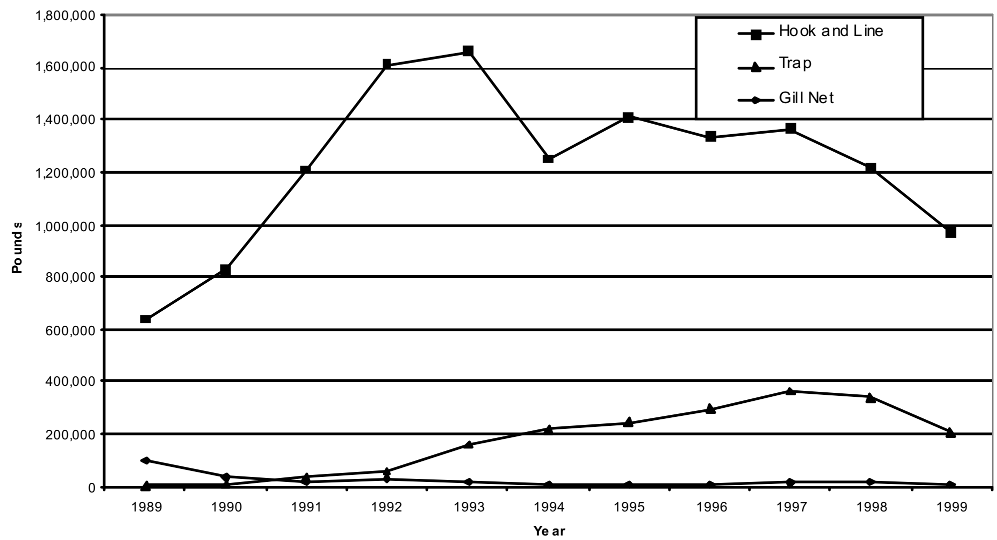


Figure 1.2-9. Estimated statewide commercial landings (Source:CALCOM) in pounds for hook-and-line, trap, and set gill and trammel net gear from 1989-1999.

Gill and Trammel Net Gear

By 1999 the number of boats landing nearshore fish caught by gill and trammel net gear decreased to about 23% of the 1989 level (Appendix E, Table E-32). This decrease was partly due to increased gear restrictions. Total landings of nearshore market categories from gill and trammel nets has decreased (Figure 1.2-9, Appendix E, Table E-32), with declines observed for nearshore rockfishes, California sheephead, cabezon, and greenlings (Figure 1.2-10).

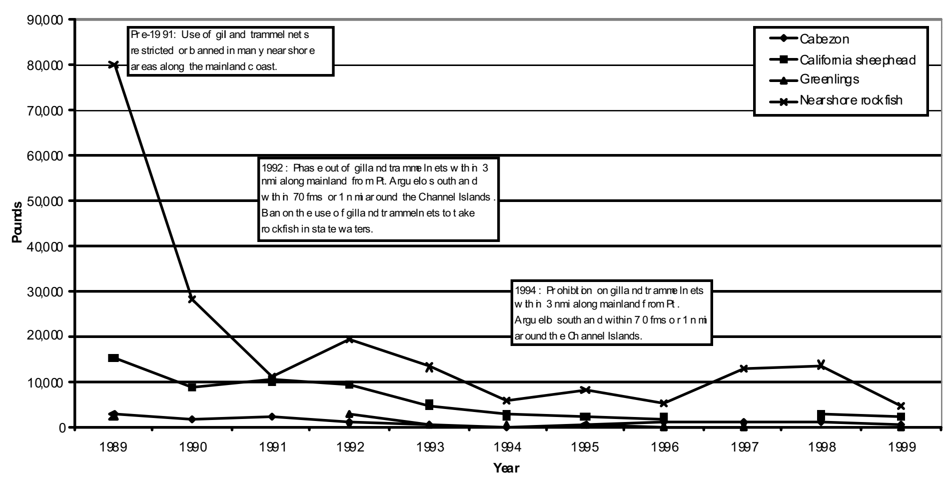


Figure 1.2-10. Estimated statewide commercial landings (Source:CALCOM) of cabezon, California sheephead, greenlings, and nearshore rockfish (includes California scorpionfish and the four nearshore rockfish groups) in pounds for set gill and trammel nets from 1989-1999.

Hook-and-Line Gear

The number of fishing boats using hook-and-line gear grew until the early-1990s then declined by 1999 to about 60% of its 1989 level (Appendix E, Table E-32). Total landings from hook-and-line gear peaked in 1992 and 1993, then decreased 40% by 1999 (Figure 1.2-9, Appendix E, Table E-426). The lower 1999 levels were due partly to stricter federal restrictions and some state restrictions for nearshore rockfishes. Hook-and-line catches of California sheephead peaked in 1992 also, while cabezon landings by hook-and-line gear increased sharply in 1995 and continued increasing through 1998 (Figure 1.2-11).

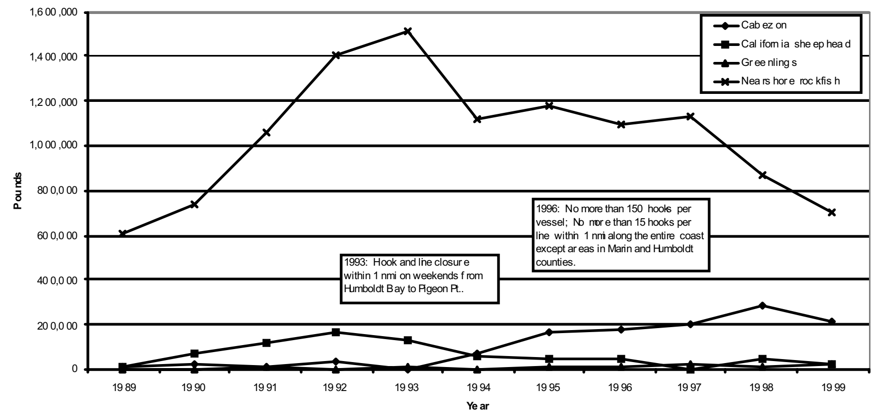


Figure 1.2-11. Estimated statewide commercial landings (Source:CALCOM) of cabezon, California sheephead, greenlings, and nearshore rockfish (includes California scorpionfish and the four nearshore rockfish groups) in pounds for hook-and-line gear from 1989-1999.

Trap Gear

The number of fishing boats using trap gear peaked in 1996, then declined to a 1999 level that was about twice as large as the 1989 level (Appendix E, Table E-32). Total landings of nearshore finfish caught with traps increased sharply in 1993 as the trap fishery for California sheephead expanded (Figure 1.2-9, Appendix E, Table E-427). Total landings peaked in 1997 then declined generally. By 1999, total trap gear landings stood at 43% of their 1997 level. Trap gear landings of California sheephead also peaked in 1997, then declined in 1999 to 60% of the 1997 level

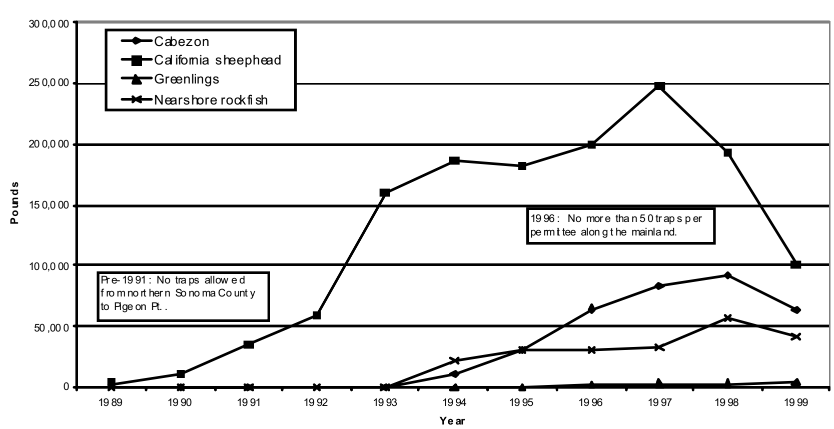


Figure 1.2-12. Estimated statewide commercial landings (Source:CALCOM) of cabezon, California sheephead, greenlings, and nearshore rockfish (includes California scorpionfish and the four nearshore rockfish groups) in pounds for trap gear from 1989-1999.

Figure 1.2-12). Landings of cabezon began rising in 1994 and continued to rise through 1998.

Group Red, Small, and Unspecified Rockfish Market Categories

The total rockfish catches presented in the previous graphics do not include the group red, group small, and group unspecified rockfish market categories. These categories contain variable amounts of nearshore rockfish although, generally, most of the poundage is from non-nearshore rockfish species. The poundage attributed to these categories decreased in the 1990s as more nearshore landings were reported by species, sampling effort increased, and, when more nearshore species were added to market receipts in 1994 (Figure1.2-13).

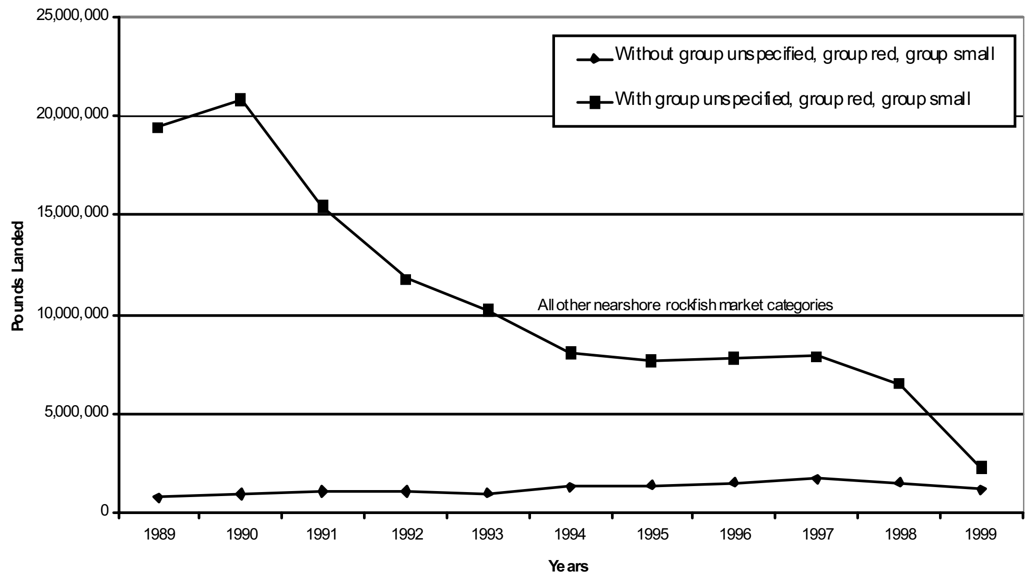


Figure 1.2-13. Comparison of the combined nearshore rockfish market category landings (Source: CMASTR) and the combined groups unspecified, red, and small rockfish (includes all gears).

General Trends in Nearshore Recreational Fishing Activities in the 1980s and 1990s

In general, recreational fishing effort for all modes in northern and southern California in the mid- to late-1990s was lower than in the early 1980s (Tables 1.2-4 and 1.2-5). Information from the recreational data sources were summarized to examine trends in the nearshore finfish effort and landings. The effort information was summarized using MRFSS data, while the landings information was summarized using a modified version of the MRFSS data. A description of the modifications (use of CPFV observer data to fill in missing data, etc.) is provided in Appendix E. Estimates of recreational landings for 1980-1982 were considered unreliable for nearshore species, so these years were not included.

Table 1.2-4. MRFSS estimated number of fishing trips in thousands by mode for northern California

Year	MODES					
	Party / charter	Private / rental	Man-made	Beach/ bank	Shore	Total
1980	453	992	944	1,159	No est.	3,548
1981	431	1,060	630	753	No est.	2,875
1982	426	777	529	819	No est.	2,551
1983	372	961	870	795	No est.	2,998
1984	239	991	711	773	No est.	2,715
1985	226	1,023	540	738	No est.	2,528
1986	197	1,285	No est.	No est.	1,276	2,757
1987	213	1,198	No est.	No est.	1,003	2,414
1988	340	1534	No est.	No est.	2066	3939
1989	217	823	No est.	No est.	1,368	2,408
1990	No est.	No est.	No est.	No est.	No est.	No est.
1991	No est.	No est.	No est.	No est.	No est.	No est.
1992	No est.	No est.	No est.	No est.	No est.	No est.
1993	No est.	1,055	514	582	No est.	2,152
1994	No est.	1,007	349	611	No est.	1,966
1995	No est.	1,074	608	662	No est.	2,345
1996	98	669	554	644	No est.	1,965
1997	154	670	661	580	No est.	2,065
1998	164	885	473	438	No est.	1,960
1999	165	945	404	248	No est.	1,762
2000	215	1,052	456	478	No est.	2,200

Table 1.2-5. MRFSS estimated number of fishing trips in thousands by mode for southern California

Year	MODES					
	Party /charter	Private / rental	Man-made	Beach/ bank	Shore	Total
1980	1,698	2,540	2,961	1,742	No est.	8,942
1981	991	1,705	1,287	1,075	No est.	5,058
1982	1,825	1,767	1,369	765	No est.	5,726
1983	1,257	1,932	1,156	792	No est.	5,137
1984	1,109	2,206	1,488	768	No est.	5,572
1985	1,152	1,966	1,415	741	No est.	5,273
1986	1,340	2,514	No est.	No est.	2,263	6,117
1987	860	2,495	No est.	No est.	1,832	5,187
1988	1195	2328	No est.	No est.	2474	5,996
1989	1,134	1,658	No est.	No est.	1,852	4,643
1990	No est.	No est.	No est.	No est.	No est.	No est.
1991	No est.	No est.	No est.	No est.	No est.	No est.
1992	No est.	No est.	No est.	No est.	No est.	No est.
1993	1,174	1,625	827	411	No est.	4,038
1994	1,201	1,932	1,210	406	No est.	4,748
1995	1,131	1,706	900	536	No est.	4,272
1996	982	1,266	835	328	No est.	3,410
1997	812	1,249	808	373	No est.	3,243
1998	676	1,356	675	298	No est.	3,005
1999	609	1,169	574	219	No est.	2,572
2000	876	1,760	720	352	No est.	3,708

On average, recreational landings of cabezon, California sheephead, greenlings, and nearshore rockfish were lower in the 1990s than in the 1980s (Figures 1.2-14, 1.2-15, 1.2-16 and 1.2-17).

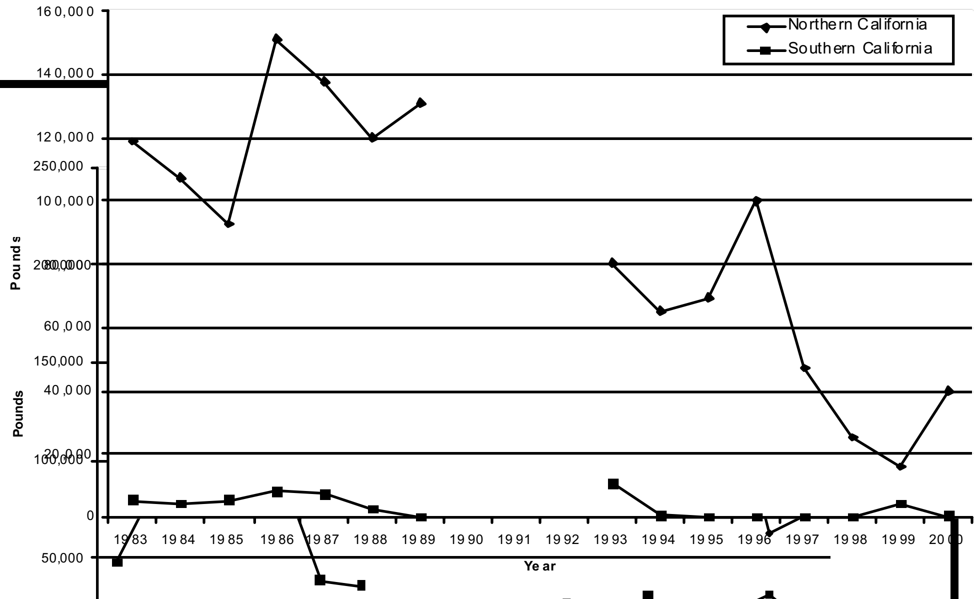


Figure 1.2-16. Northern and southern California recreational landings (Source: MRFSS) of greenlings (kelp greenling, rock greenling, and greenling genus) in pounds from 1983-2000. No recreational data available from 1990-1992.

Figure 1.2-14. Northern and southern California recreational landings (Source: MRFSS) of cabezon in pounds from 1983-2000. No recreational data available from 1990-1992.

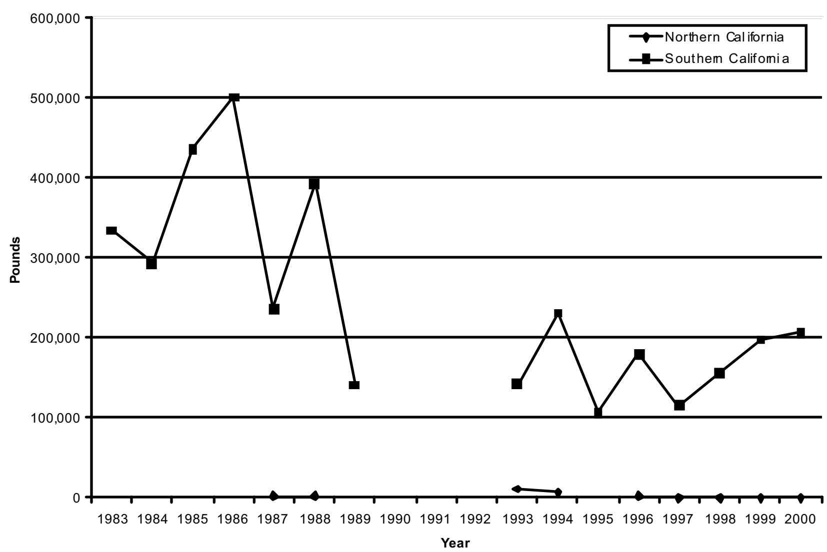


Figure 1.2-15. Northern and southern California recreational landings (Source: MRFSS) of California Sheephead in pounds from 1983-2000. No recreational data available from 1990-1992.

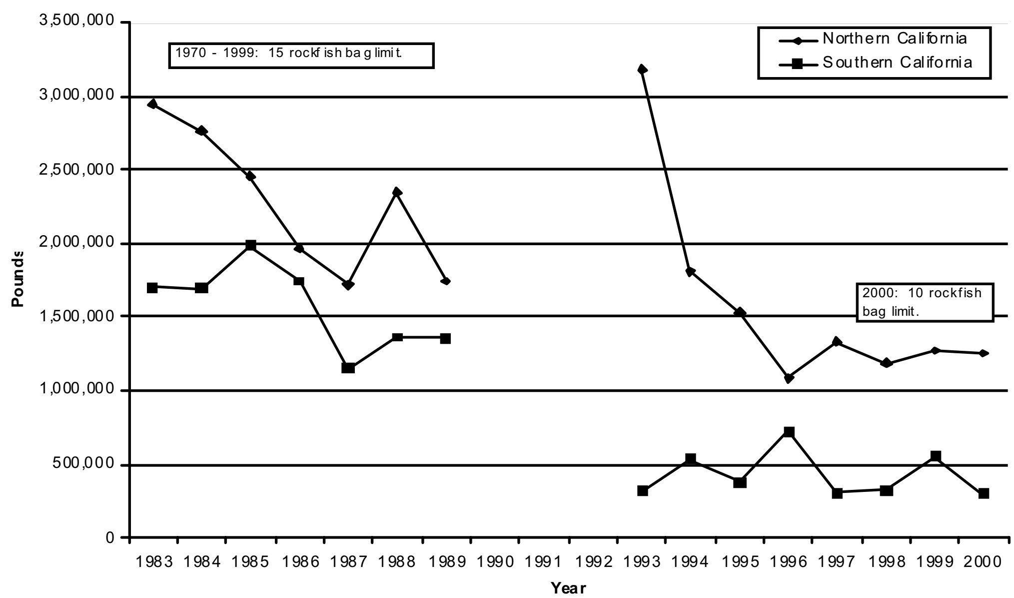


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Figure 1.2-17. Northern and southern California recreational landings (Source: MRFSS) of nearshore rockfishes (including California scorpionfish) in pounds from 1983-2000. No recreational data available from 1990-1992.

Commercial and Recreational Catches

Commercial and recreational fishermen take the 19 NFMP species in all water depths in which they occur. To examine the impacts of the combined recreational and commercial take, as well as to determine the proxies for total allowable take discussed in Chapter 3, an estimate of total catch (take from all areas) is required. For these determinations and for the purposes of analysis of impacts of management measures on the nearshore finfish fishery, the fishery is considered to occur along the entire California coast in those waters inhabited by the 19 species.

Data from recreational catch estimates (source: MRFSS data for all ocean areas) and from commercial landings (source: CALCOM) indicate the following patterns in recreational and commercial catches of nearshore finfish species in the two periods 1983-1989 and 1993-1999. Once again, MRFSS recreational fishery data from 1980-1982 are not used because it is considered unreliable. (Note that MRFSS data are not available for 1990-1992. Also, landings of monkeyface prickleback were not examined.)

Cabezon, California Sheephead, and Greenlings

The average landings of cabezon and California sheephead were higher in the later period, while landings of the greenlings were lower (Table 1.2-6). In terms of total landings during each period, recreational landings of these species were higher in the earlier period (Table 1.2-7, and Figures 1.2-18, 1.2-19, and 1.2-20). Commercial landings increased sharply for these species in the early 1990s. In the mid- to late-1990s commercial landings of cabezon and California sheephead overtook recreational landings. Recreational fishermen generally landed fewer cabezon, California sheephead, and greenlings in the 1990s.

Table 1.2-6. Averages in pounds for commercial and recreational landings combined, from two time periods, 1983-1989 and 1993-1999, for cabezon, California sheephead, greenlings, and nearshore rockfish

	Average combined landings	
Species	1983 - 1989	1993 - 1999
Cabezon	258,374	364,163
California sheephead	391,604	410,101
Kelp and rock greenling	129,231	77,666
Nearshore rockfish	4,397,541	3,158,299

Table 1.2-7. Total recreational, commercial and combined landings in pounds from two time periods, 1983-1989 and 1993-1999, for cabezon, California sheephead, greenlings, and nearshore rockfish				
	Cabezon	California sheephead	Kelp and rock greenling	Nearshore rockfish
Total recreational landings				
1983 - 1989	1,682,395	2,339,620	891,908	26,961,447
1993 - 1999	1,063,361	1,151,571	420,627	14,569,653
Total commercial landings				
1983 - 1989	126,220	401,608	12,707	3,821,339
1993 - 1999	1,485,779	1,719,134	123,033	7,538,439
Total combined landings				
1983 - 1989	1,808,615	2,741,228	904,615	30,782,786
1993 - 1999	2,549,140	2,870,705	543,660	22,108,092

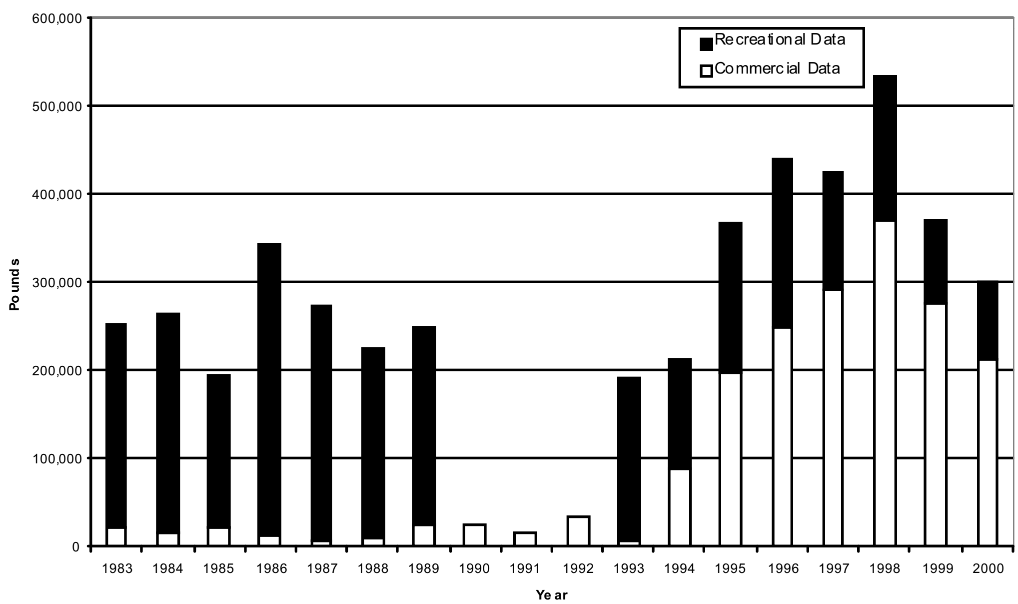

Figure 1.2-18. Statewide recreational (Source: MRFSS) and estimated commercial (Source: CALCOM) landings of cabezon in pounds from 1983-2000. No recreational data available from
1990-1992.

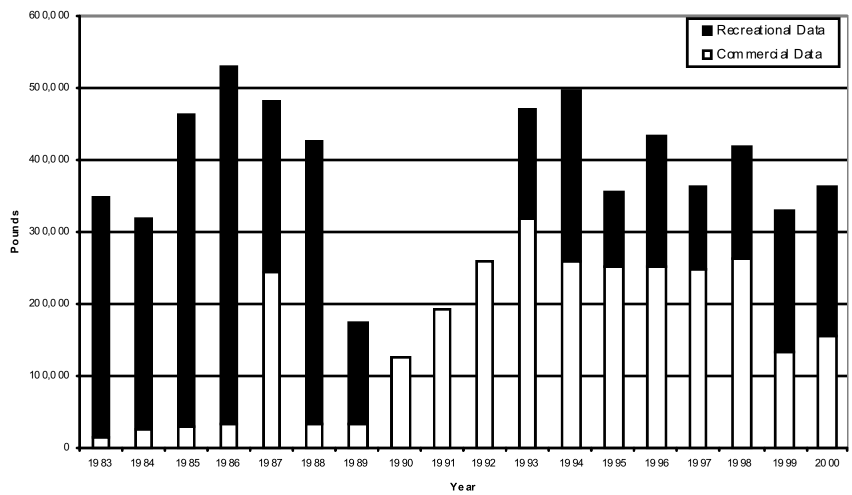

Figure 1.2-19. Statewide recreations (Source: MRFSS) and estimated commercial (Source: CALCOM) landings of California sheephead in pounds from 1983-2000. No recreational data available from 1990-1992.

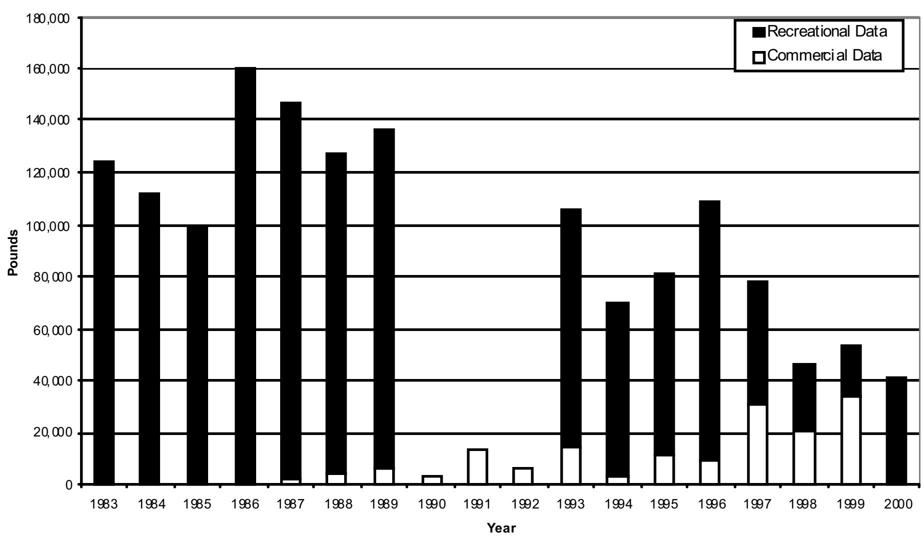

Figure 1.2-20. Statewide recreational (Source: MRFSS) and estimated commercial (source: CALCOM) landings of greenlings (kelp greenling, rock greenling, and greenling genus) in pounds from 1983-2000. No recreational data available from 1990-1992.

<u>Nearshore Rockfish including California Scorpionfish</u>

Nearshore rockfish landings had a dramatic decrease in numbers from the 1980s to the 1990s (Figure 1.2-21). Landings in the 1980s were primarily due to the recreational fishery with a small contribution by the commercial fishery. During the 1990s, recreational landings showed a marked decrease while commercial landings increased slightly. Despite this fluctuation, commercial landings remained lower than recreational landings. In 1983-1989, 3,851,635 lb (1,751 mt) of rockfish were landed on average by the recreational fishery per year, while the commercial fishery landed on average 545,906 lb (248 mt). For 1993 to 1999, average annual recreational landings decreased to 2,081,379 lb (946 mt), while average annual commercial landings increased to 1,076,920 lb (490 mt).

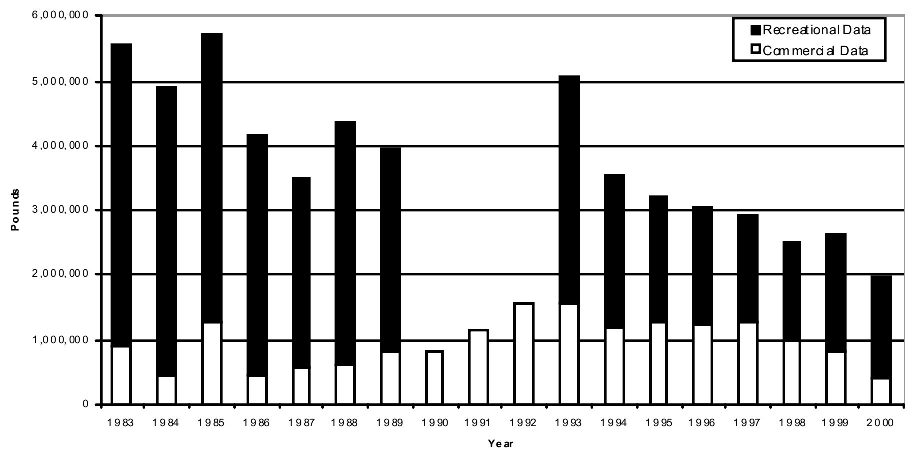

Figure 1.2-21. Estimated statewide recreational (Source: MRFSS) and commercial (Source: CALCOM) landings of nearshore rockfish (includes California scorpionfish and the four nearshore rockfish groups) in pounds from 1983-2000. No recreational data are available from 1990-1992.

Monkeyface Prickleback

Combined recreational and commercial landings of monkeyface prickleback were not examined. Monkeyface prickleback is taken by a small fishery primarily directed at this species; effort and landings are small. Consequently, minimal data are available for this species. However, monkeyface prickleback is of concern because it particularly vulnerable to depletion both on a local and coast-wide scale: not only does it occupy a very unique and limited habitat, but it also is a residential species with a small home range of several meters.

Summary of Commercial and Recreational Catches

Changes in commercial landings from the late 1980s to the mid-1990s were due to several factors. Increases in the landings of cabezon, California sheephead, and greenlings, and decreases in the overall rockfish landings resulted in part from new regulations. In 1994 the Council implemented limited entry for a portion of the groundfish fishery (about a dozen species comprise the groundfish complex) with Amendment 6 of the Pacific Coast Groundfish Fishery Management Plan (Pacific Fishery Management Council 1992). Amendment 6 established restricted access for a portion of the fishery while keeping a segment of the fishery open access. Optimum yields (OYs) were allocated to the two segments of the fishery. This allowed new entrants into the open access segment of the fishery; however, low annual quotas discouraged participants from making major investments in gear. In the mid-to-late 1990s the allowable harvest for groundfish, particularly the rockfish portion, was greatly reduced, initially due to the depressed status of lingcod and bocaccio, cowcod, and canary rockfish. These low quotas shifted effort to those species of the nearshore area that did not fall under the quotas, such as cabezon, greenlings, and California sheephead. The lower 1999 landings of cabezon (Figure 1.2-18) were to some degree the result of even stricter federally mandated harvest quotas and new state management measures for nearshore species.

At the state level, gear restrictions in the early 1990s led some gill and trammel net fishermen to change gears and move into the nearshore fishery where participants could make a living with much lower landings, smaller vessels, and lower investments in fishing gear.

The growth of markets for live and premium-quality finfish also contributed to the growth of the commercial fishery beginning in the late 1980s. The live and premium-quality finfish fishery first developed for Asian markets in the Los Angeles and San Francisco areas. As demand for live fish increased, buyers began paying considerably more for live fish than for dead fish. For instance, buyers paid fishermen, on average, $.50 per lb for dead cabezon in 1989, compared to $3.80 per lb for live cabezon in 1999. These substantially higher prices, coupled with lower capital and operating costs, attracted more fishermen to the fishery.

Stick gear - a type of hook-and-line gear fished on the bottom or at mid-depth that uses multiple short (3-6 ft) lengths of either rigid (PVC plastic pipe, rebar) or semi-rigid (metal cable) sections. A length of line is attached parallel to the stick, with short leaders and hooks attached. These sticks can serve as the weight or anchor. It can be rigged to work as either a horizontal or vertical set line gear, and generally has a surface buoy attached.

In the early years of this live and premium-quality finfish fishery (late 1980s and early 1990s), much of the effort occurred outside kelp beds. Fishing with rod and reel within the beds was difficult. Trapping for fish within kelp beds occurred, but for the most part trapping effort within kelp beds was low. Then in the mid 1990s, the live and premium-quality finfish fishermen developed a special gear, **stick gear**, that allowed efficient fishing within kelp forests. As the use of this stick gear expanded, the commercial harvest from within kelp beds increased, raising concerns over the continued productivity of the nearshore area and the need to assess the total harvest and the overall health of the fish stocks which live there.

Other factors have affected commercial and recreational catches of nearshore finfish also. For instance, nearshore finfish populations have been affected by both short-term oceanographic changes such as El Niño events, and the long-term shift from a cold to a warm water regime in the late 1970s (Hare and Mantua 2000; Hanawa 2000; Anonymous 2000). Changes in the oceanic environment alter the ecosystem, affecting the abundance and distribution of fish populations as well as reproductive success of individual fish. The shift to a warmer water regime has resulted in low recruitment and productivity for colder water species such as rockfish and salmon, while populations of Pacific sardine have returned to the very high abundance levels of the 1930s (Chavez et al. 2000; Klyashtorin 2000; MacCall 2000; Moser et al. 2000; Anonymous 2000; Rodriguez-Sanchez et al. 2000).

In addition, a number of other factors probably affected the commercial and recreational landings including local fish abundance, variations in recruitment into the fishery due to changes in year-class strength, changes in the strength of the national economy, shifts in effort to other more desirable species (such as salmon and albacore), and fluctuations in stock biomass.

Nearshore Bycatch

Bycatch "means fish or other marine life that are taken in a fishery but which are not the target of the fishery. Bycatch includes discards" (FGC § 90.5). Discards "means fish that are taken in a fishery but are not retained because they are of an undesirable species, size, sex, or quality, or because they are required by law not to be retained" (FGC § 91). Take "means hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill" (FGC § 86).

There are three principal types of bycatch in the nearshore fishery. The first type is a fishery whose target species is other than nearshore finfish, but nearshore finfish are inadvertently taken. For example, commercial and recreational fishermen may target salmon on a trip. However, they may encounter a school of black rockfish and land these rockfish as a bycatch of the trip.

The second type of bycatch occurs when the target species are nearshore finfish, but the species taken are nontarget finfish species, nearshore finfish below the minimum size limit, or the maximum daily bag limit for a nearshore species is exceeded. Nearshore species are discarded by fishermen because of minimum size or daily bag limits, and it is illegal to possess them.

The third type of bycatch is a fishery whose target species is nearshore finfish; however, there is a take of other marine life. For example, fishermen may use bait, such as northern anchovies, *Engraulis mordax,* or Pacific sardines, *Sardinops sagax,* to capture nearshore finfish. Unfortunately, brown pelicans, *Pelecanus occidentalis,* and gulls, *Laurus spp*., are hooked when diving for these bait fish.

Bycatch information and management measures must be included in any fishery management plan (FMP) in fisheries where bycatch occurs (FGC § 7085). Bycatch occurs in the nearshore fishery. Therefore, FGC § 7085 requires the following information and management measures.

While there are no statistical measures on the legality of nearshore finsish species, most of the observations have shown this bycatch is

Legality of the Bycatch Under Any Relevant Law [FGC §7085 (b)(1)]

While there are no statistical measures on the legality of nearshore finfish species, most of the observations have shown this bycatch is legal for both recreational and commercial fisheries.

One area of concern is the take and landing of nearshore species as a bycatch of other fisheries. For example, the commercial trawl net fishery within the Halibut Trawl Grounds (FGC §8495 through 8497) allow for a 500-pound fish bycatch. Nearshore species have minimum size limits. However, since the nearshore species captured in this fishery are dead when they are taken, they may be landed legally even if they are below the minimum size limit.

Brown pelicans and gulls are taken as a bycatch in the recreational fishery. This is not a legal bycatch.

Information on the Amount and Type of Bycatch

Recreational Bycatch

All recreational fisheries modes (i.e., boat, man-made structures, and shore) have a nearshore finfish bycatch. An example of this information is from the Department's CPFV central and northern California onboard sampling observer data. The findings of this study were as follows: kept fish represent the proportion of the total catch assumed to be taken home and consumed by an angler. Samplers categorized the ultimate fate of each observed fish as either kept, released (dead/alive), bait, or unknown. There are many factors that affect the rate at which fish are retained by anglers. All the nearshore species are retained 100% of the time. These species are considered highly prized. "High-grading" is a common practice on CPFVs which also has a significant effect on retention rates. "High-grading" means that an angler replaces less choice or smaller species with more larger and/or more desirable species caught later. Often smaller fish were observed placed in a communal bucket; to be used as bait, to complete bag limits for anglers who did not fill their bag limit, as limits for the crew, or to be discarded during the return trip. "High-grading" also affects retention rates of less desirable species. Lower retention rates can also reflect years of good recruitment to the fishery for a particular species. Species demonstrating good recruitment to the fishery is often reflected by higher numbers of small fish being caught by anglers. These smaller fish are retained by anglers at a low rate. Section 4a within Appendix E has the retained percent of all fish from observed CPFV trips by port from 1988-1998.

Commercial Bycatch

The Department has only a limited amount of information (and in some cases none at all) on the bycatch of nearshore species in other commercial fisheries. Information on the bycatch of nearshore fishes in the prawn and salmon fisheries is currently being analyzed.

During the analysis of the CMASTR data, the landings of nearshore market categories recorded with other fisheries were identified (Appendix E, Table E-560 through E-571). These landings are summarized in Table 1.2-8.

California scorpionfish taken in trawl gears accounted for 40 percent of the nearshore landings associated with other fisheries. Trawl gear is not considered a nearshore gear. Thus, the nearshore landings recorded on trips using trawl gears are most likely bycatch.

All the landings of nearshore market categories recorded with salmon, crab, spiny lobster, and prawns may not be bycatch. For this analysis, a trip (or landing) was defined as all receipts from one boat with the same date of landing. During a trip, several gear types may have been used. Consequently, it is not possible to distinguish between poundage that was bycatch and poundage that was taken with different gears on the same trip. For example, a boat landing spiny lobster (taken in lobster traps) on the same day as California sheephead (taken in finfish traps) would be considered as one landing. The averages provided in Table A for these fisheries should therefore be viewed as a summation of both bycatch and catch from multiple gears.

Table 1.2-8. Annual average landings (pounds) of nearshore market categories that appeared in other fisheries, 1994-1999.

Market Category	Salmon	Crab	Spiny lobster	Prawns	Trawl gears	Average total
Cabezon	73	894	373	1,788	1,461	4,588
California scorpionfish	10	296	352	100	31,428	32,187
California sheephead	17	2,149	5,717	3,686	1,112	12,681
Greenlings	4	61	5		1,492	1,562
Monkeyface prickleback		2			1	3
Rockfishes						
Black	199	758	1	16	6,647	7,621
Black-and-yellow		2				2
Blue	130	808		12	729	1,679
Brown	106	206			11,638	11,950
Calico						0
China	52	37	4	1	987	1,081
Copper	230	34	6	12	1,115	1,395
Gopher	164	226	44	432	1,673	2,539
Grass	8	52	64	182	71	378
Kelp	8	10			25	44
Olive	12				32	43
Quillback		4		2	37	43
Treefish			3		173	177
Total of average landings of nearshore market category in fishery	1,012	5,541	6,569	6,231	58,620	77,972

Note: A trip or landing is defined as all receipts from one boat with the same date of landing and may be the result of a fishing trip lasting from part of a day to several days in length. Several gear types may have been used on one trip.

Degree of threat to the Sustainability of the Bycatch Species

The effects of the NFMP Project on listed species, such as tidewater goby, salmon, and seabirds, are described in NFMP, Section 2, Chapter 4.1.9.3, Effects to Listed Fishes and Chapter 4.1.9.4, Effects to Marine and Coastal Birds.

The no project alternative would not change gear types from those that currently exists. In addition, bycatch would continue to affect the nearshore fishes, marine mammals, and marine and coastal birds. The potential for marine turtles and fishing gear interactions would remain unchanged in their utilization of pelagic habitats for migration and feeding (NFMP, Section 2, Chapter 5.1.7, Effects to Pelagic Habitats). There is no identified acceptable level of seabird bycatch from fisheries that have been established by the federal government that manages listed species (NFMP, Section 2, Chapter 5.1.9.4, Effects to Marine and Coastal Birds).

Ecosystem Impacts

Fishing activities associated with the NFMP Project that could have deleterious effects to coastal habitats include an increase of bycatch discards if fishing is relocated outside of MPAs (NFMP, Section 2, Chapter 4.1.5 and 4.1.7, Effects to Coastal Habitat and Effects on Pelagic Habitat).

The restricted access alternative will not have additional effects to the environment beyond the no project alternative as the same amount of fish would be taken (NFMP, Section 2, Chapter 5.13, Alternative 13 for Restricted Access: Managing Bycatch in Other Commercial Fisheries).

In the Case of Unacceptable amounts or Types of Bycatch, Conservation and Management Measures that, in the following priority, do the following:

<u>Minimize ByCatch</u>

Fishery management benefits of MPAs include full protection for some fraction of target and bycatch populations. Marine Protected Areas can reduce bycatch of non-targeted species and undersized individuals of target species (NFMP, Section 2, Chapter 2.1, Marine Protected Areas).

Elimination of traps would decrease the bycatch of invertebrates inadvertently caught in traps. Therefore, this alternative could decrease effects to habitats and species if gear restrictions are implemented to only allow hook and line fishing (NFMP, Section II, Chapter 5.9, Alternative 9 for Restricted Access: Restricted Access Program Based on Regional Management).

<u>Minimize Mortality of Discards that cannot be Avoided</u>

Some nearshore species are found offshore (farther than one nautical mile from the mainland coast) and are taken by trawl and gill net gears. In the restricted access alternative, vessels using gill net or trawl gear would not be issued a nearshore permit. They would be allowed to take the original nine nearshore fish species as long as the weight did not exceed a set weight or a percentage (5 to 15 percent) of the total landing weight of the participant’s catch. A set weight limit is easier for the fishermen and Department enforcement staff to monitor. A fixed percentage of the landing weight is more difficult to monitor because of the necessity to know total weight of the landing for all species. This allowance will be set during implementation of the Restricted Access program and may vary by region.

This alternative avoids wastage of the catch of nearshore species by allowing the landing of those species without requiring a nearshore permit. This allows fishermen to land nearshore fish without increasing the number of nearshore fishery permits. Allowing the landing of nearshore species would eliminate the need to discard these fish at sea and would provide a record of that take which could be monitored. An allowance from the commercial allocation for gill net and trawl gears would be needed (NFMP, Section 2, Chapter 2.14, Managing Bycatch in Other Commercial Fisheries).

Socio-economic Dimensions of the Nearshore Finfish Fishery

Eco-centric - values orientated toward the maintenance of an overall ecological balance.

The nearshore area provides opportunities for a broad variety of extractive and non-extractive uses and values. These include recreational and commercial fishing (extractive use), diving, sight-seeing, photography (non-extractive use), and passive values such as bio-diversity, resource preservation, or **eco-centric** values.

Extractive uses often involve an active market, such as a seafood market or charter fishing service, in which goods and services that cater to the end-user or consumer are traded. In such markets, the money spent on goods or services provides a convenient means of measuring the value of a particular resource activity. Some non-consumptive uses, on the other hand, do not involve such active markets, making it difficult to establish the value of such uses. Nonetheless, non-consumptive uses are important and do represent another value placed on the resource by the public. Estimating economic value should include these extractive and non-extractive values, as well as passive values, which are the unpriced attributes of the nearshore resource.

Commercial and recreational fishing produces goods and services that are bought and sold. This buying and selling generate revenues that cause a ripple effect in the California economy. Money or revenues resulting from these user-sectors stimulate further economic activity throughout California in the form of economic output, earnings, and employment.

Recreational Sector

California's nearshore recreational fishery is subject to variation depending on recent climatic conditions and availability of popular fish species. According to the USFWS 1996 survey of recreational activities, California ranks second in the nation for numbers of resident and nonresident saltwater anglers. Florida ranks first with an estimated 2,255,000 saltwater anglers, California ranks second with an estimated 1,049,000 saltwater anglers, and Texas ranks third with an estimated 862,000 saltwater anglers. This same survey suggested that California's sportfishermen spent approximately $3,648,532,000 on recreational fishing in salt and fresh water. Of this amount approximately $734,150,000 was related to all marine fishing activities, including expenditures for equipment and travel.

In addition, studies by DFG indicate shallow water rockfish make up as much as 44% (by number) of recreational catches in northern and central California (Karpov et al. 1995). The MRFSS also provides estimates of recreational expenditures. According to MRFSS, local expenditures for marine angling in northern California in 1998 averaged $34 a day for charter or rental boat fishing, and $9 per day for shore-based fishing (NMFS 1998). Local expenditures for marine angling in southern California in 1998 averaged $35 a day for charter or rental boat fishing, and $10 per day for shore-based fishing. While this expenditure information is based on all marine recreational fishing, we estimate that about half of these activities were conducted in the nearshore area (NMFS 2001).

Dollars spent on nearshore recreational fishing activities circulate in local economies through the purchase of fuel, bait, angling equipment, and other items associated with saltwater angling. Furthermore, nonresident expenditures for recreational fishing represent an important flow of **new (outside) dollars** into the local economy and circulate through local industry sectors. Estimates of new dollars entering local coastal economies from recreational angling appear in Table 1.2-9.

Table 1.2-9 Economic input of *new dollars* to local coastal economies from recreational angling in the nearshore area in 1998 and 1999 (adjusted for inflation and expressed in year 2000 dollars) *

	1998	1999
Northern California	$9,456,210	$8,905,540
Southern California	$9,919,565	$9,929,304
Totals	$19,375,775	$18,834,844

* Estimates are based on MRFSS 1998 and 1999 data for number of angler days in ocean waters less than 3 miles from shore, for all modes of fishing, multiplied by respective cost data for parking, boat, and bait expenses, for Northern and Southern California, and adjusted to year 2000 values.

Based on the estimate of new dollars coming into the local coastal economies in 1998 and 1999, we project the total contribution of nearshore recreational fishing to local **economic output**, earnings, and employment in Table 1.2-10 (US Department of Commerce, RIMS II 1997).

Surveys by the NMFS and the Federal Bureau of the Census estimate that the number of marine anglers will increase at a rate of about 1.96% annually, on average, from 2001 through the year 2025 (US Dept. of Commerce 2000). However, similar projections of growth in the past have not materialized, and in California, the number of recreational fishing licenses has declined.

In 1998, 73% of surveyed anglers worked full-time, 11% were retired, and 7% worked part-time. The average hourly wage for west coast anglers in 1998 was $20, and the average annual household income before taxes was $58,000 for surveyed anglers on the entire West Coast. The 1998 MRFSS data indicate that the majority of California's marine anglers are white males between the ages of 26 and 55.

New (outside) dollars - revenues that enter the local economy resulting from local goods or services that are sold outside the local economy (exported)

Economic output - represents deliveries of final goods and services by the sector to domestic households, investment, government and non-profit institutions, and net exports outside the local economy.

Ex-vessel - refers to the price paid to fishermen.

Commercial Sector

California ranks among the top five seafood producing states in the nation (California Seafood Council 2001). The total **ex-vessel** value of all 1999 California commercial landings amounted to $143,327,950. Of this amount approximately $3,721,838, or 2.8%, was derived from the 19 finfish species discussed in the NFMP. Growth or decline in even one segment of the commercial fishing industry can affect seafood production, trade, and employment throughout California's economy (McWilliams and Goldman 1994) because commercial fishing dollars spent on nearshore harvest activities contribute to local economies through the purchase of fuel, bait, fishing gear, equipment, and support services. In addition, sales of products exported out of the local economy represent an important influx of new dollars back into the local economy. Local revenues increase as these new dollars from outside the local economy launch a ripple effect through local business sectors and additional output is stimulated.

Table 1.2-10. Economic contribution of *new dollars* to local coastal economies from recreational angling in the nearshore area in 1998 and 1999 (adjusted for inflation and expressed in year 2000 dollars), in terms of economic output, earnings, and employment*

	1998	1999
Northern California		
Input of new dollars	$9,456,210	$8,905,540
Output	18,220,225	17,159,194
Earnings	$4,735,670	$4,459,894
Employment (# full-time jobs)	125	118
Southern California		
Input of new dollars	$9,919,565	$9,929,304
Output	19,113,018	19,131,783
Earnings	$4,967,718	$4,972,595
Employment (# full-time jobs)	132	132

* Multipliers used in the above are for the entire State, and not specific to northern or southern California. Local (regional) multipliers vary according to the nature and composition of industries in each area, and the degree of imports into each local economy (leakage).

As described in table 1.2-11, the average price per pound paid to fishermen for nearshore finfish increased dramatically in the 1990s as demand for live fish grew.

Table 1.2-11. Commercial nearshore finfish landings and ex-vessel value, by year, for 19 nearshore finfish species with all commercial gear types combined (excluding trawl)[1]

Year	Pounds landed	Value ($)	Value/pounds ratio ($/lb)	Value ($) adjusted for inflation and shown in 2000 values[2]	Value/pounds ratio ($/lb) in 2000 values
1989	631,220	487,270	0.77	660,255	1.05
1990	789,622	824,049	1.04	1,055,031	1.34
1991	935,124	1,084,113	1.16	1,333,393	1.43
1992	903,258	1,198,509	1.33	1,423,678	1.58
1993	754,943	1,366,840	1.81	1,583,454	2.10
1994	1,167,478	2,147,753	1.84	2,448,457	2.10
1995	1,228,918	2,683,633	2.18	3,014,475	2.45
1996	1,409,792	3,120,290	2.21	3,436,923	2.44
1997	1,499,501	3,120,291	2.08	3,373,528	2.25
1998	1,430,506	3,411,377	2.38	3,632,539	2.54
1999	1,061,450	3,313,842	3.12	3,436,142	3.24

1. Does not include values (or pounds) for nearshore species in commercial landings reported as Group Red, Group Small, or Group Unspecified.
2. 2000 Values are calculated using Consumer Price Indices (CPI) for California's primary Metropolitan Statistical Areas: San Francisco, Los Angeles, and San Diego, weighted by respective population numbers. CPI data come from the Federal Bureau of Labor Statistics, U.S. Department of Labor. Metropolitan Statistical Areas are defined as large population nuclei, together with adjacent communities which have a high degree of economic and social integration with that nucleus. These are defined by the Federal Office of Management and Budget as a standard for federal agencies in the preparation and publication of statistics relating to metropolitan areas.

The nearshore commercial finfish fishery is pursued at different levels of intensity around each of the nine major port complexes. The ports with the highest average value for nearshore species landed in 1989 through 1999 were Morro Bay and Santa Barbara, with 18.9% and 19.3%, respectively, of the average total value. The maximum pounds landed by nearshore fishermen at each port indicates the fishing potential or harvest capacity of the fleet. As shown in Table 1.2-12, the maximum pounds landed in a port in a single year may be two to three times the average pounds landed for that port during the entire period.

Table 1.2-12. Average annual commercial landings, pounds, and value, for NFMP species during 1989- 1999, all gears except trawl *					
	Average pounds	Average value ($)	Maximum pounds	Maximum value ($)	Average price/pound
Eureka	263,851	124,205	773,679	299,556	0.47
Fort Bragg	229,841	251,027	528,541	506,520	1.09
Bodega Bay	247,812	178,217	800,527	345,141	0.72
San Francisco	557,591	468,982	1,260,868	817,783	0.84
Monterey	599,343	405,807	1,781,818	893,376	0.68
Morro Bay	716,687	1,085,712	1,221,722	1,638,600	1.51
Santa Barbara	731,130	976,624	1,413,679	1,191,387	1.34
Los Angeles	248,119	388,657	570,436	638,254	1.57
San Diego	188,292	261,008	415,970	442,850	1.39
Totals	3,782,665	4,140,240	8,767,238	6,773,465	

* Does not include values (or pounds) for nearshore species in commercial landings reported as Group Red, Group Small, or Group Unspecified.

The commercial fishing sector stimulates local economies both directly and indirectly. By calculating the economic effect of landings we can project the changes in local economic output, individual earnings, and employment (full-time jobs), from nearshore commercial fishing (Table 1.2-13).

Table 1.2-13. Economic contribution of nearshore finfish commercial fishing to local port economies, based on average landings by all gears except trawl, during 1989-1999 inclusive*			
Port area	Local economic output ($)	Personal local income ($)	Local employment (# full-time jobs)
Eureka	172,111	43,124	1.1
Fort Bragg	336,352	83,793	2.1
Bodega Bay	276,789	70,663	1.9
San Francisco	641,473	75,272	1.7
Monterey	561,109	134,687	3.4
Morro Bay	1,572,003	339,068	8.7
Santa Barbara	1,471,382	343,381	8.8
Los Angeles	699,932	149,905	3.8
San Diego	420,327	110,798	2.9

* Does not include landings values for nearshore species in commercial landings reported as Group Red, Group Small, or Group Unspecified.

Each dollar of commercial fish landings that enters the local economy through transactions between nearshore fishermen and buyers may stimulate another $1.00 to $1.92 output in other local sectors. Various economic sectors benefit from this ripple effect, including non-fishery sectors and fish processing sectors: fish wholesalers, fish importer/exporters, seafood restaurants, seafood markets, and other food and kindred product businesses. In general, the degree to which these ripple effects increase local output depends on the size and nature of the local economy. Larger local economies tend to be more self-sufficient and include more businesses, and thus a given dollar will circulate more (Radtke 1987).

Non-Extractive Uses

Among many non-extractive activities in the nearshore area are wildlife observation, coastal cruises, sea kayaking, scuba diving, wind surfing, and beach and tidepool exploring. While some scuba and free diving involves consumptive activities like spearfishing and the harvest of abalone, many scuba and skin divers engage solely in underwater photography and wildlife viewing.

Ocean and coastal features play an important role in California recreation, both to individual recreation seekers and to recreation-dependent industries. In addition, the quality of the nearshore environment is an integral part of the recreational enjoyment, and includes the vitality and diversity of marine life. Based on the number of visitors in 1991, four out of the State's top 10 recreational attractions were ocean or coastal in nature. Partaking of coastal recreation usually entails a bundle of activities; for example, an underwater photographic trip may also involve kayaking or sailing, or include local lodging, restaurant, or other tourist services. The California Research Bureau estimated the value of tourism and recreation along the California coast in 1992 at $9.9 billion, making it the largest component of ocean-dependent industry (California Environmental Resources Evaluation System 1999). Adjusted for inflation, this would be the equivalent of $11.8 billion in year 2000 dollars.

According to the USFWS 1996 survey of recreational activities, California ranks first in the nation for participating in wildlife watching activities in California, with an estimated 2,362,000 participants. These participants averaged about 10.5 days each in non-extractive pursuits, for a total of 24,587,000 person-days during 1996. This survey indicates that 27%, or 637,740 of these individuals visited nearshore (or oceanside) areas in California, where about one-half engaged in some form of shorebird and marine mammal observation. Expenditures on all California wildlife related non-extractive recreation in 1996 amounted to $2,396,809,000, with an estimated $647,138,000 (or 27%) directed toward nearshore recreation. Of the estimated expenditures on nearshore non-extractive recreation, about $43,300,000 (or 7%) is from new dollars originating outside the local economies (arising from nonresident expenditures). Using this figure for new dollars coming into California's local coastal economies in 1996, we project the contribution to local economic output, earnings, and employment in Table 1.2-14.

Table 1.2-14. Economic contribution of *new dollars* to local coastal economies from non-extractive nearshore recreation in 1996 (adjusted for inflation and expressed in year 2000 dollars), in terms of output, earnings, and employment*	
	1996
California input of new dollars	$43,775,000
Output	84,345,670
Earnings	$21,922,520
Employment (# full-time jobs)	581

* Multipliers used are for the entire State. Local (regional) multipliers vary according to the nature and composition of industries in each area, and the degree of imports into each local economy (leakage).

Other, less tangible benefits derived from the nearshore area include conservation of natural resources, education, and research. While we recognize that recreational and tourist activities represent a bundle of values related to the nearshore, we cannot accurately project the direct contribution of the 19 NFMP species to these values. Thus inferences of the value of nearshore fish species as an integral component of nearshore recreation, based on recreation and tourism expenditures, will tend to be overstated. As **coastal communities** recognize and promote economic returns from tourism and recreation, there is growing awareness of the importance of quality environments. Individuals also gain increased environmental consciousness through meaningful encounters with nature.

History of Conservation and Management Measures

State Management

California can regulate fishermen licensed in California, wherever they fish. It can also regulate fishermen licensed in other states whenever they fish in California waters or land in a California port. If vessels from other states fish beyond three miles offshore and do not call at a California port, the state cannot control their activities. Similarly, the states of Oregon and Washington do not have jurisdiction over California vessels that fish in waters more than three miles off their shores and land their catches in California.

Within California state government, there are three principal “managers” of marine life and fisheries: the Legislature, and the California Fish and Game Commission and the California Department of Fish and Game, both of which reside within the Resources Agency. The California State Constitution established the Commission to carry out functions delegated by the Legislature. The Commission’s five members are appointed by the Governor to 6-year terms. The authority and responsibility of the Commission and the Department to make and enforce regulations governing recreational and commercial fishing is provided by the Legislature. Before 1998, when the Legislature enacted the MLMA, the authority of the Commission was restricted to managing sport fisheries, kelp harvesting, and some commercial fisheries; creating ecological reserves; and taking emergency actions.

The State has managed commercial and recreational fisheries through regulating gear, species, and participants. Unless mentioned by name in the regulations, any species may be taken without restriction for commercial purposes. If a species is mentioned in regulations, it may be taken only under the conditions described in those regulations. The FGC prohibits commercial fishing for several dozen species. Only those types of fishing gear listed in the FGC may be used. These gears include gill and trammel nets, round-haul nets, trawl nets, beach nets, dip nets, fishing lines, spears, traps, and shovels, among others. Use of each of these types of gear is subject to restrictions. Regulations also require that commercial fishermen, fishing vessel operators, crew members, and others obtain various licenses and permits. Commercial fishing regulations appear in FGC §7600-9101 and CCR, Title 14, Chapter 6.

Who Manages California's Finfish Fishery?

Responsibility for the management of the nearshore finfish fishery off California is shared by the state and federal government. Generally, living marine resources from the shoreline to 3 miles are under state jurisdiction, while living marine resources in waters from 3 miles to 200 miles offshore – the U.S. Exclusive Economic Zone (EEZ) – are under federal jurisdiction. The management of the 19 species of nearshore finfish that are the subject of this FMP is more complicated, however. Since most of these species have been caught in significant numbers by commercial and recreational fishermen in federal waters, through the NMFS and the Pacific Fishery Management Council (PFMC). As a result, the boundaries for state management of fishing for most nearshore finfish species have been set by the PFMC and NMFS **(Table 1.2-15)**.

The Commission considers commercial regulations when necessary throughout the year. The Commission takes up sport fishing regulations at its August, October, November, and December meetings in odd-numbered years. State marine sport fishing regulations include restrictions on catching and retaining some species, but not others, and specify open and closed seasons, permissible fishing gear, and other matters. General recreational fishing laws appear in FGC §7100-7400, while specific regulations adopted by the Commission appear in Chapter 4 of Title 14 of the CCR.

Table 1.2-15. Factors Related to the 19 Species Included in the California NFMP

Species	Included in CA MLMA?	Included in West Coast Groundfish FMP?[1]	Proposed for CA nearshore restricted access	Average annual recreational landings CA (1993-2000, mt)[2]	Average annual commercial landings, CA (1993-2000, mt)[2]
Monkeyface prickleback	Y	N		2.54	0.17
California sheephead	Y	N	Y	74.9	106.25
California scorpionfish	Y	other rockfish	Y	110.32	37.31
Black-and-yellow rockfish	Y	other rockfish	Y	9.37	12.89
Gopher rockfish	Y	other rockfish	Y	57.06	35.87
Kelp rockfish	Y	other rockfish	Y	14	4.2
Grass rockfish	Y	other rockfish	Y	7.96	33.01
Treefish rockfish		other rockfish		12.94	0.75
Calico rockfish		other rockfish		0.55	0.07
Olive rockfish		other rockfish		51.76	15.42
China rockfish		other rockfish	Y	17.95	19.29
Cabezon	Y	not actively managed	Y	63.45	96.33
Rock greenling	Y	N	Y	4.71	0.002
Kelp greenling	Y	not actively managed	Y	19.36	5.59
Copper rockfish		other rockfish		63.11	56.62
Quillback rockfish		other rockfish		7.99	11.31
Brown rockfish		other rockfish		49.86	38.33
Blue rockfish		other rockfish		238.14	58.71
Black rockfish		North-remaining South-other		164.82	107.37

Notes: 1. The species included in both the West Coast Groundfish FMP and the CA NFMP fall into three PFMC management categories. "Remaining rockfish" have been assessed by less rigorous methods than stock assessments. Black rockfish north of Cape Mendocino is the only species in this category. "Other rockfish" do not have quantifiable assessments. However, the remaining and other rockfish are assigned proxy OYs as a group. No OYs are calculated for the "not actively managed" species. 2. All recreational landing data from RecFin. (Notes continued on next page)

Table 1.2-15. Factors Related to the 19 Species Included in the California NFMP

Species	Commercial % caught in state waters off CA, 1993-2000[2,3]	% of total 3-state landings (and average annual metric tons) for each state, 1993-2000[2]: recreational & commercial landings CA	OR	WA	Common (and total) depth range, in feet[4]	Being considered for interim management in Oregon?
Monkeyface prickleback	100%	100% [2.71]	0	0	(<80)	
California sheephead	87%	100% [181.15]	0	0	(<300)	
California scorpionfish	50%	100% [147.63]	0	0	20-450 (<600)	
Black-and-yellow rockfish	99%	100% [22.26]	0	0	<60 (<120)	Y
Gopher rockfish	95%	>99% [92.93]	<1% [0.002]	0	<120 (<260)	Y
Kelp rockfish	98%	100% [18.2]	0	0	<50 (<150)	Y
Grass rockfish	99%	>99% [40.97]	<1% [0.54]	0	<20 (<150)	Y
Treefish rockfish	95%	100% [13.69]	0	0	<90 (<170)	Y
Calico rockfish		100 % [0.62]	0	0	<300 (<840)	Y
Olive rockfish	85%	100% [67.18]	0	0	<180 (<570)	Y
China rockfish	78%	64.8% [37.24]	32.8% [18.87]	2.4% [1.38]	<300 (<420)	Y
Cabezon	94%	74.2% [159.78]	21% [45.21]	4.8% [10.24]	<90 (<360)	Y
Rock greenling		100% [4.71]	0	0		Y
Kelp greenling	81%	36% [24.95]	35% [24.29]	29% [20.24]	<50 (<150)	Y
Copper rockfish	68%	76.4% [119.73]	6.2% [9.72]	17.4% [27.22]	<400 (<600)	Y
Quillback rockfish	75%	44.6% [19.3]	17.9% [7.77]	37.5% [46.22]	<250 (<900)	Y
Brown rockfish	83%	99.1% [88.19]	0.1% [0.07]	0.8% [0.73]	<175 (<440)	Y
Blue rockfish	61%	72.6% [296.85]	26.8% [109.7]	0.5% [2.18]	<130 (<1,800)	Y
Black rockfish	70%	23.5% [272.19]	54.7% [632.76]	21.7% [251.11]	<300 (<1,200)	Y

3. All commercial landing data are from the Pacific Fisheries Information Network (PacFIN), which was the nation's first regional fisheries data network. PacFIN includes information from fisheries occurring in waters off the coasts of Washington, Oregon, California, Alaska, and British Columbia. Fish-ticket and vessel registration data are provided to PacFIN by CDFG through the CalCOM commercial landings database. In addition, commercial data sources include catch-by-area proportions developed from CDFG port sampling and trawl logbook data systems. PacFIN landings are reported in metric tons, and include the calendar year 2000, which was not available for most of the other commercial landings data summaries presented in the NFMP.

In reviewing and adopting or rejecting regulations, the Commission must comply with procedural requirements of such laws as the Administrative Procedures Act (APA)and the California Environmental Quality Act (CEQA) (see gray box). Besides the APA (Government Code §11340-11359), the Commission must follow its own rulemaking process, which appears in FGC §200-221.

CEQA and Environmental Document General Overview

Both the State Legislature and the Fish and Game Code require that people conserve, maintain, and use California's living marine resources and environment in a way that promotes health and benefits its citizens. The California Environmental Quality Act, enacted in 1972, oversees all state-sponsored and permitted projects that may change the environment. Through the CEQA process, government officials and the public learn about a project's potential to adversely impact the environment, and identify ways to avoid significant negative impacts. Projects are reviewed following CEQA guidelines: their potential effects on the environment are evaluated, and ways to avoid significant negative impacts are identified. Based on this evaluation, the lead agency then adopts or prepares a Negative Declaration, a mitigated Negative Declaration, or an Environmental Impact Report.

State agencies such as the Department of Fish and Game that regulate and protect the environment may prepare a functional equivalent Environmental Document (ED) instead of an Environmental Impact Report. The ED, prepared by the lead agency with input from the public and interested organizations, is streamlined for CEQA inclusion in a more comprehensive regulatory package such as the NFMP, and fulfills all CEQA requirements. The final ED will be incorporated into the Commission's proposed regulatory program.

Before 1998, when the Legislature enacted the MLMA, management of other activities affecting marine life, including fisheries, was carried out through legislation. Two committees have principal jurisdiction over fisheries legislation in the Assembly: the Committee on Water, Parks, and Wildlife, and the Committee on Natural Resources. In the Senate, the Committee on Natural Resources and Wildlife has primary jurisdiction. The Senate and Assembly's Joint Committee on Fisheries and Aquaculture plays an important role as well. Most legislated measures concerning marine wildlife are assembled in the FGC, while others may be found in other codes such as the Public Resources Code.

The Department manages activities affecting marine wildlife, primarily fisheries, by implementing state and federal legislation and state regulations adopted by the Commission or the Department itself. The Department also provides expert advice to the Commission, carries out research, and enforces fisheries regulations and law. A chronological list of state and federal regulations can be found in Appendix F.

Federal Management

The federal agency with primary responsibility for the conservation of marine wildlife and the management of marine fisheries is the NMFS, an agency of the National Oceanic and Atmospheric Administration in the U.S. Department of Commerce.

Other Federal Law

Several other federal laws concern the management of activities affecting marine life off California. The National Marine Fisheries Service splits responsibility with the Interior Department's U.S. Fish and Wildlife Service for species under the Endangered Species Act and the Marine Mammal Protection Act (MMPA). For instance, while the U.S. Fish and Wildlife Service holds responsibility for the conservation of southern sea otters and birds, NMFS oversees the conservation of seals, sea lions, dolphins, and whales off California.

Several species of marine life have been listed under the Endangered Species Act of 1973. The Endangered Species Act prohibits "taking" an endangered species; taking means "to pursue, hunt, shoot, capture, collect, kill or attempt" to do so. Limited taking of an endangered species incidental to activities such as fishing may be permitted. These and other protections for endangered species do not apply to threatened species unless separate regulations are adopted. Under Section 7 of the Endangered Species Act, federal agencies must consult with NMFS or the U.S. Fish and Wildlife Service to ensure that their actions do not jeopardize the continued existence of listed species (see Section II, Chapter 4 for a discussion of endangered and threatened species.)

The Marine Mammal Protection Act of 1972 imposed a moratorium on "taking" marine mammals, with a few exceptions that include taking marine mammals incidental to commercial fishing. Under the MMPA, taking may include intentional or unintentional capture or harassment. Amendments to the MMPA adopted by Congress in 1994 established a new regime to govern incidental take in commercial fishing. This programs aims to reduce incidental serious injury and mortality of marine mammals to insignificant levels approaching zero.

One other federal wildlife law deserves special mention: the Migratory Bird Treaty Act. Under this legislation, which implements several international treaties, migratory birds may not be captured or killed unless permitted by regulations adopted by the Secretary of the Interior. Many species of seabird and shorebird fall under the protection of the Migratory Bird Treaty Act.

Finally, several federal laws apply to the conservation and use of coastal habitats and the prevention of water pollution, including the Coastal Zone Management Act, the Clean Water Act, and the Ocean Dumping Act. These laws are administered by other state and federal agencies, including the Environmental Protection Agency and the Army Corps of Engineers.

The principal federal fisheries management law is the Magnuson-Stevens Fishery Conservation and Management Act, which was last amended by the Sustainable Fisheries Act of 1996. Like the MLMA in many ways, the Magnuson Act calls for fishery management plans that meet certain standards, such as avoiding overfishing. In most cases, the federal fishery management process begins with the PFMC, which is composed of state and federal agency representatives as well as commercial and recreational fishermen from California, Oregon, Washington, and Idaho, and a representative of the Indian treaty tribes. Fisheries within the 200-mile EEZ may be managed under fishery management plans developed by the PFMC and approved by the Secretary of Commerce. In the absence of a federal fishery management plan, however, the State can manage fishing conducted by vessels registered in California to the limit of the EEZ.

Transfer of Authority

Of the 19 species proposed for management under the NFMP, 16 are among the 83 species of groundfish included in the Pacific Coast Groundfish Management Plan developed by the PFMC and approved by the U.S. Secretary of Commerce under the Magnusen-Stevens Fishery Conservation and Management Act. Of those 16 nearshore species, the Council actively manages 14 species through such measures as setting OY levels, commercial allocations, and trip limits for the open access fishery. The Council is considering closing access to the open access fishery, which is made up principally of California fishermen. Of the 14 actively managed species, five rockfishes and California scorpionfish are among the nearshore finfish identified in the MLMA. The Council does not actively manage the other two groundfish species in its plan (cabezon and kelp greenling); these two species also are identified in the MLMA.

Eight of the species under the federal fishery management plan are caught only in waters off California and for the most part in state rather than in federal waters (Table 1.2-14). Like other nearshore species, these eight species are not the target of the large-scale fishing fleets that are the principal focus of federal management and scientific attention. Other federally managed nearshore species are caught in Oregon and Washington as well as California, which dominates in the catches of some species and not in others.

For those species actively managed by the Council, the Commission may adopt management measures as long as these measures are consistent with the Council's management or are stricter. For the two species that are not actively managed by the Council, the Commission may adopt whatever management measures it thinks appropriate that are consistent with state law. Likewise, the Commission may adopt management measures for the two species that do not appear in the Council's plan: California sheephead and rock greenling.

These constraints will prevent the State from implementing key features of the NFMP, including restricted access and regional management, regional quotas and allocations, for most species. As a result, the NFMP proposes that the State request that the Council transfer to the State of California management authority for cabezon, kelp greenling, and some or all of the nearshore rockfish in the Pacific Coast Groundfish Management Plan. A transfer of management authority for some or all of these species will require that the Council develop and adopt an amendment to its fishery management plan. This process will require 12-24 months to complete. Any such amendment must meet the objectives of the federal fishery management plan and the standards of the National Environmental Policy Act. During this process, state and federal analyses of available information and Council discussions will determine which species should be transferred to state management.

Actively managing additional species will require additional monitoring and research, increasing the workload of the Department and Commission. However, state management of these species will reduce the complexity of current management under two jurisdictions and will allow for more timely management that reflects regional interests.

In 1982, the Secretary of Commerce approved a fishery management plan for Pacific coast groundfish. The Federal Pacific Coast Groundfish Fishery Management Plan guides the management of fisheries for 83 species, including 55 species of rockfish, 12 species of flatfish, sharks, skates, groundfish, and other species. In 2000, the PFMC divided rockfish into three groups based on the areas in which they are most common: slope, shelf, and nearshore. The 13 species of rockfish and California scorpionfish, which make up the federal nearshore group, occur in California state waters and are included in the state's NFMP. Because the PFMC has primary jurisdiction over these species, the State of California must ensure that its management of recreational and commercial fisheries for these species does not conflict with federal management.

The federal plan also includes cabezon and kelp greenling, but because the PFMC does not actively manage these species, the State has exercised management over them. Note that the Federal plan does not include the following species which are part of the state's NFMP: California sheephead, monkeyface prickleback, and rock greenling (Table 1.2-16).

Table 1.2-16. Nearshore Fish Stocks within the NFMP.

Common Name	Current Jurisdiction and Selected Management Measures				
	Federally Managed[1]	State Managed	CA Nearshore Commercial Permit Required[2]	Fish Added as "Nearshore Fish Stocks" by Commission (2001)	Sport Size Limit
Cabezon	X[3]		X		X
California scorpionfish	X		X		X
California sheephead		X	X		X
Monkeyface prickleback		X		X	
Greenlings					
Kelp greenling	X[3]		X		X
Rock greenling		X	X		X
Rockfishes					
Black	X			X	
Black-and-yellow	X		X		
Blue	X			X	
Brown	X			X	
Calico	X			X	
China	X		X		
Copper	X			X	
Gopher	X		X		
Grass	X		X		
Kelp	X		X		
Olive	X			X	
Quillback	X			X	
Treefish	X			X	

Note:
1. Species listed under the Pacific Coast Groundfish FMP of the Pacific Fishery Management Council (Council).
2. Species included in the State nearshore permit have minimum size limits that apply to commercial landings.
3. Although listed in the Pacific Coast Groundfish FMP, these two species are not actively managed by the Council.

The Federal groundfish plan establishes an optimum yield for all groundfish species and a procedure for setting limits on landings of individual species. Fishing is managed through permit requirements, gear restrictions, landings limits, and area and seasonal closures. Generally, the PFMC reviews any recent information on the status of groundfish, then determines which species to manage individually and which to manage as groups, and proposes target catch amounts as well as management measures. The PFMC reviews some measures annually and others at regular intervals through the year. After public review and discussion, the Council takes final action, generally in October or November.

The PFMC's decisions are recommendations to the NMFS, acting on behalf of the U.S. Secretary of Commerce. If NMFS finds that PFMC's recommendations meet the standards of the Magnuson-Stevens Act, the agency prepares and issues implementing regulations. These regulations take effect several months later, after further public and governmental review. A chronological list of state and federal regulations can be found in Appendix F.

Recent Management of the Nearshore Finfish Fishery

For decades, the state and federal governments have regulated commercial and recreational fishing for nearshore finfish species. Management measures have included permits, gear restrictions, size limits, time and area closures, quotas, trip limits, and bag limits. In recent years especially, the state and federal governments have had to coordinate management actions affecting most nearshore finfish as competition for nearshore finfish has increased.

As shown by Tables 1.2-17 and 1.2-18, which summarize recent regulatory history for the nearshore fishery, management became much more intensive in the late 1990s, including reductions in recreational bag limits, amounts of fishing gear, open areas and seasons. Allowable catches and open seasons also were reduced for the commercial fleet. This increased management arose from problems in the nearshore fishery itself and from problems in shelf groundfish fisheries, where several populations were declared overfished by the PFMC and allowable catches were reduced to very low levels. Because groundfish from overfished populations mix with other nearshore groundfish and may be captured incidentally to nearshore fishing, measures aimed at reducing overall catches of overfished populations necessarily led to restrictions on nearshore fishing adopted by the PFMC.

able 1.2-17. Individual species regulations for the recreational nearshore fishery from pre-1991 to 2001.

Nearshore rockfish	Cabezon and California scorpionfish	California sheephead	Rock and kelp greenling
Pre-1991			
Fillet size: Brown-skinned rockfishes filleted at sea, 7" minimum fillet length; blue-, black-, or red-skinned rockfishes, no fillet size limit (1981) Brown-skinned rockfishes filleted at sea, 6.5" minimum fillet length (1986) Fillet size limits lifted for all rockfishes (1990) Daily Bag Limits: Daily rockfish bag limit reduced from 10 to 15 fish, may all be the same species (1970)	Fillet size: Cabezon filleted at sea, 12" minimum fillet length (1982)	No size limits; no specific regulations	No size limits; no specific regulations
1991-1999			
No changes in regulations	No changes in regulations	No changes in regulations	No changes in regulations
2000			
Daily Bag Limit: Reduced from 15 to 10 fish Time/Area Closures: Fishery closed south of Lopez Pt. during January and February; closed north of Lopez Pt. during March and April Gear Restrictions: No spearfishing for rockfish during closures One fishing line with no more than three hooks per fisherman, when rockfish are aboard the vessel Time/Area Closures: Two Rockfish and Lingcod Management Areas (RLMA) established, one north of Lopez Pt., one south. Northern RLMA (to Cape Mendocino) closed March-April, southern RLMA (to Mexico border) closed Jan.-Feb. Management boundary changed from Lopez Pt. to Pt. Conception in May, 2000.	Cabezon may no longer be filleted at sea Minimum Size Limit: Cabezon: 14" minimum total length California scorpionfish filleted at sea, 5" minimum fillet length; 10" total (non-filleted) minimum length	No changes in regulations	Kelp greenling and rock greenling may no longer be filleted at sea Minimum Size Limit: 12" total length for both species

able 1.2-17 Cont. Individual species regulations for the recreational nearshore fishery from pre-1991 to 2001.

2001			
Gear Restrictions: One fishing line with no more than two hooks per fisherman Time/Area Closures: Northern RLMA closed March-June, southern RLMA closed Jan.-Feb	Minimum Size Limit: Cabezon: 15" minimum total length Time/Area Closures: Cabezon: season open all year, except fish cannot be taken or possessed in waters 10 fm (37 m) or deeper in Cowcod Conservation Areas California scorpionfish: season open all year, except fish cannot be taken or possessed in waters 20 fm (37 m) or deeper in Cowcod Conservation Areas, with further monthly restrictions by area	Daily Bag Limit: 5 fish bag limit established Minimum Size Limit: 12" minimum total length Time/Area Closure: Season open all year except fish cannot be taken or possessed in waters 20 fm (37 m) or greater in depth within Cowcod Conservation Areas	Time/Area Closure: Season open all year, except fish cannot be taken or possessed in waters 20 fm (37 m) or greater in depth within Cowcod Conservation Areas

Note: Monkeyface prickleback was not a state- or federally-managed species during this time frame.

Table 1.2-18. State regulations, gear restrictions, and Federal regulations affecting commercial fishing for nearshore fish.

State Regulations	State Gear Restrictions	Federal Regulations
Pre-1991		

Permits: Commercial fishing license Gill/trammel net permit (1980) Gill/trammel net permit moratorium (1985) General trap permit (1984)	Hook & Line: roll lines with more than two hooks banned in some areas (1984)	Permits: None
Species Management: None	Traps: Banned from North Sonoma County to Pigeon Pt. (1984)	Species Management: Nearshore rockfish managed as part of the *Sebastes* complex (1983); limits on landings per trip; overall quotas fro each gear type; coastwide trip limit of 40,000 lb
Time/Area Closures: None	Gill/Trammel Nets: Restricted or banned in many nearshore coastal areas Trawls: Banned within state waters except on halibut trawl grounds in southern California (1953)	Time/Area Closures: None
1991		
No changes from previous year	No changes from previous year	Species Management: Landings of groundfish limited to 25,000 lb/trip, and less than 5,000 lb bocaccio.
1992		
No changes from previous year	Gill/Trammel Nets: Phase out of gill and trammel nets within 3 nmi along mainland from Pt. Arguello south and within 70 fm or 1 nmi around the Channel Islands; ban on the use of gill and trammel nets to take rockfish.	Species Management: Landings of groundfish limited to 50,000 lb per 2 week period; other limits for some species
1993		
No changes from previous year	Hook & Line: Closure within 1 nm on weekends from Humboldt Bay to Pigeon Pt.	No changes from previous year
1994		
Permits: Federal limited entry groundfish permit required Species Management: None	Gill and Trammel Nets: Prohibition on gill and trammel nets within 3 nm along mainland from Pt. Arguello south and within 70fm or 1nm around the Channel Islands	Permits: Fishery divided into two groups: limited entry and open access (for those not in limited entry) Species Management: For the *Sebastes* complex, cumulative monthly limits north and south of Cape Mendocino for limited entry vessels, trip and monthly limits for open access fishery, and separate limits for several species

Table 1.2-18 Cont. State regulations, gear restrictions, and Federal regulations affecting commercial fishing for nearshore fish.

1995		
No changes from previous year	No changes from previous year	No changes from previous year

1996		
Permits: Southern California limited entry finfish trap permit	Hook and Line: No more than 150 hooks per vessel; no more than 15 hooks per line within 1 nmi of coast from Humboldt Co. to Mexican border except for two areas in Marin and Humboldt Counties	Permits: None
Species Management: None	Traps: No traps within 750 ft fo structures from Santa Barbara-Ventura County boundary to Mexico; no more than 50 traps per permittee along the mainland.	Species Management: For the *Sebastes* complex, cumulative 2-month limits north and south of Mendocino for limited entry vessels; monthly cumulative limits for open access vessels; and separate limits for several species
1997		
No changes from previous year	No changes from previous year	No changes from previous year.
1998		
No changes from previous year	Traps: Limit of 50 finfish traps in state waters extended from Pt. Arguello north to the CA-OR border; making entire coast, all state waters limited to 50 finfish traps.	No changes from previous year.
1999		
Permits: Nearshore permit developed for 10 nearshore species Species Management: MLMA sets minimum size limits for 10 nearshore species	No changes from previous year	Permits: None Species Management: For the *Sebastes* complex, three-phase cumulative limit periods north and south of Mendocino for limited entry and monthly limit for open access vessels; trip limits for trawlers fishing for pink shrimp, prawns, halibut, and sea cucumber
2000		
No changes from previous year.	No changes from previous year	Species Management: 13 rockfish species (and CA scorpionfish south of Cape Mendocino) were separated from the *Sebastes* complex and placed into the nearshore rockfish group; varying monthly/bi-monthly cumulative limits for limited entry or open access vessels north and south of Cape Mendocino

Table 1.2-18 Cont. State regulations, gear restrictions, and Federal regulations affecting commercial fishing for nearshore fish.

2001		

Species Management: Size limits for cabezon and CA sheephead increased; nearshore fish group expanded to include 19 species	Hook and Line: No more than 150 hooks per vessel and no more than 15 hooks per line within 1 nmi of coast for the entire coast of CA, no exceptions	Species Management: None
Time/Area Closures: No cabezon, greenling or CA sheephead may be taken in two Federal Cowcod Conservation Areas in Jan.-Feb., and the RLMAs during 2-mo closures; take of cabezon and greenlings prohibited Thurs.-Sun, inclusive; emergency closures issued for cabezon, CA sheephead, and greenlings at year's end		Time/Area Closures: In northern management area, no nearshore rockfish or CA scorpionfish may be taken in March/April and May/June except in less than 20 fm; in southern management area, no nearshore rockfish or CA scorpionfish may be taken in Jan/Feb except in less than 20 fm. Two Cowcod Conservation Areas established for southern California; fishing restricted to waters less than 20 fm for all species, throughout the year.

Please see Appendix F for details concerning fishing regulations for all species.

Recent Federal Actions Regarding Nearshore Finfish

The PFMC has management responsibility for nearshore rockfishes and California scorpionfish. In managing these species under the Magnuson-Stevens Fishery Conservation and Management Act, the Council develops estimates of MSY and OY, then allocates available catches to commercial and recreational fishing sectors.

The Council's management of these species begins with estimates made by the Groundfish Management Team (GMT). In the 1980s the GMT made the original MSY estimates for California rockfish as a single group, basing these estimates on an analysis of commercial landings from the 1960s and 1970s which indicated that landings for California were at or near MSY levels, except for the Eureka area where historic landings appeared to be about 75% of estimated MSY (PFMC 1982). Recreational landings were quite small compared with trawl landings throughout this period and were assumed to be fairly stable. Little effort was made to accurately estimate total recreational landings and consequently they were not explicitly accounted for in the earlier stock assessments.

In the early 1990s, when an assessment on bocaccio was conducted, recreational landings for bocaccio were estimated and were included in the bocaccio MSY estimate. Bocaccio were removed from the general rockfish MSY estimate, were assigned a quota, and were required to be landed as their own market group. As additional individual rockfish assessments were made, their MSYs were removed from the general rockfish group MSY as well. These assessments were made on the more abundant trawl-caught species.

In 2000, the Council divided the remaining general rockfish category into three separate groups based upon groundfish assemblages as identified from analysis of landings (Rogers and Pikitch 1992): slope, shelf, and nearshore. The overall MSY was divided between the three new groups based upon information from trawl surveys. In 1992, the PFMC established separate management areas north and south of Cape Mendocino, Humboldt County.

When the nearshore group was separated from the other groups, the commercial proportion was calculated by taking the nearshore rockfish OY and subtracting the estimated recreational catch which was based on the most recent year with complete MRFSS landing estimates. In 2000, the first year in which this method was used, the OY for the nearshore rockfish group was 1,499,400 lb (680 mt) (Table 1.2-17). The projected recreational harvest for 2000 was 835,695 lb (379 mt). This left 663,705 lb (301 mt) for the commercial sector in 2000 in the management area south of Cape Mendocino.

The management area north of Cape Mendocino includes Oregon and Washington. California's portion of the nearshore rockfish OY in this region for 2000 was approximately 220,500 lb (100 mt) (Table 1.2-19). The allotments for the recreational and commercial sectors were based upon historical catches from the recent fisheries of the 1980s and early 1990s.

Table 1.2-19. 2000-2001 Optimum yield and allocation for nearshore rockfishes (including California scorpionfish) in metric tons by area.

Area	Year	OY	Recreational allocation	Commercial allocation
Oregon border to Cape Mendocino*	2000	100	70	30
	2001	100	70	30
Cape Mendocino to Mexican border	200	680	379	301
	2001	652	550	102

* The OY and allocation for the area from the Oregon border to Cape Mendocino are estimates.

Recent State Actions Regarding Nearshore Finfish

At the same time that the Legislature was considering the MLMA, it was also considering legislation to bring the nearshore finfish fishery under management. Late in the 1998 legislative session, the two bills were combined and the Nearshore Fisheries Management Act became part of the MLMA.

Under the MLMA, the Commission must adopt an FMP for the nearshore finfish fishery [7072(d)]. In articulating its reasons for adopting these provisions, the Legislature noted increasing fishing pressure, the susceptibility of many species to overfishing, and the lack of information on many species [8585.5]. The Legislature also stated that "whenever feasible and practicable", the State aims to maintain commercial and recreational nearshore fisheries, and the employment that they provide. For these reasons, the Legislature granted authority to the Commission to regulate commercial and recreational nearshore fisheries "to assure the sustainable populations of nearshore stocks." (Figure 1.2-22 and 1.2-23).

The MLMA is quite specific about its scope in the nearshore fishery: fisheries for finfish that are found primarily within one nautical mile of land [FGC §8586(c)]. It then lists specific groups of fish as nearshore fish stocks, including certain species of rockfish, California sheephead, greenlings, cabezon, and scorpionfish. The Commission may also add "other species of finfish found primarily in rocky reef or kelp habitat in nearshore waters." In 2001, as recommended by the Department, the Commission added nine species of rockfish to the list of nearshore fish.

The MLMA gave the Commission broad authority to adopt regulations regarding nearshore fisheries prior to adoption of an FMP, based on the advice and recommendations of the Department [FGC §8587.1(a)]. Among possible management measures, the Legislature specifically cited requirements for landing information, logbooks, restricted access, limitations on time, area, type and amount of fishing gear, as well as catch quotas and size limits [FGC §8587.1(a)]. In developing and adopting such measures, the Department and Commission are to consult with fishermen and others interested in the fishery [FGC §8587.1(d)].

As a first step in bringing some controls to bear on the nearshore commercial fishery, the Legislature included size limits for nine species caught for sale. The MLMA also authorizes the Commission to change these size limits, set maximum size limits, or set size limits for additional species after at le ast one public hearing [FGC §8586(a); 8588(c) and (d)].

The MLMA requires commercial fishermen to obtain a nearshore fishery permit, which the Commission can suspend or revoke for violations (FGC §8587; 8589.5). Funds generated by the purchase of the $125 permit are to be deposited in the Fish and Game Preservation Fund and used for preparing the NFMP as well as other activities, including research on nearshore fish and their habitat, enforcement, direction of volunteer groups, presentations at conferences and educational institutions, and relevant publications [FGC §8589.7(a)].

Minimum size limits enacted for commercially-caught species, 1999

Black and yellow rockfish	10 inches
Gopher rockfish	10 inches
Kelp rockfish	10 inches
California scorpionfish or sculpin	10 inches
Greenlings (Genus Hexagrammos)	12 inches
China rockfish	12 inches
Grass rockfish	12 inches
California sheephead	12 inches
Cabezon	14 inches

Cabezon, California Sheephead, and Greenlings

Of the 19 NFMP species, cabezon, California sheephead, and greenlings have been managed by the Commission since 1999. In 2000, the Commission adopted several measures for these species.

Because information on these species was poor, the Commission adopted an approach recommended by the Department and based on Restrepo et al. (1998). Under this approach, target catch levels were based upon calculations that included a precautionary reduction to reflect uncertainty about the status of each stock. These calculations began with a proxy for traditional MSY, which was simply the average of catches over the period of 1993-1998. Several sources of data suggested that this was a period during which stocks were relatively stable. One source was surveys of larvae during the 1980s and 1990s conducted by the California Cooperative Fisheries Investigation, which showed no clear evidence that stocks of cabezon or California sheephead were either stable or unstable (Moser, personal communication). Nor did data on recreational and commercial catches show evidence of a decline. (Landings for 1999, the most recent year available at the time, were not used since they showed sharp decreases due probably to implementation of several management measures.)

In order to determine optimum yield for each stock, a precautionary reduction was applied to the proxy for MSY just described. Since the stocks were believed to be neither above their long-term levels of abundance nor overfished, the proxy for MSY was reduced by 50% in setting OY for each stock. If a stock had been thought to be above its long-term level of abundance, the OY would have been set at a level 25% below recent average catches. If a stock had been thought to be overfished, the OY would have been set at a level 75% below recent average catches. (No optimum yield could be set for monkeyface prickleback since data on commercial and recreational catches are very limited.)

The Commission then allocated the optimum yields for each stock between commercial and recreational fishing sectors. The share of OYs allocated to each sector was calculated by combining commercial and recreational landings from 1983-1989 and 1993-1999, then comparing the catches by each sector during these two periods with total catches. The two time periods were chosen because they contained the most recent information available for both the recreational and commercial fisheries and included a time period (1983-1989) when the recreational fishery was prominent and a time period (1993-1999) when the commercial fishery was prominent.

At the same time, the Commission adopted several measures to reduce effective fishing effort, including closing in 2001 the commercial fishery for cabezon and greenlings from Thursday through Sunday along the entire coast.

The Commission also adopted regulations to conform with decisions of the PFMC regarding commercial and recreational fisheries for rockfish under the management jurisdiction of the PFMC. In the Fall of 2001, the Commission adopted emergency regulations to close the commercial fishery for greenlings (September 1), cabezon (September 18) and sheephead (November 8), when landings records indicated that commercial quotas had been reached.