

**REVIEW OF SOME CALIFORNIA FISHERIES FOR 2006:  
COASTAL PELAGIC FINFISH, MARKET SQUID, DUNGENESS CRAB, SPOT PRAWN,  
HIGHLY MIGRATORY SPECIES, OCEAN SALMON, CALIFORNIA HALIBUT, NEARSHORE  
LIVE-FISHES, CABEZON, SURFPERCHES, AND LEOPARD SHARK**

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## SUMMARY

In 2006, commercial fisheries landed an estimated 152,088 metric tons (t) of fishes and invertebrates from California ocean waters (fig. 1). This represents an increase of nearly 15% from the 132,600 t landed in 2005, and a 40% decline from the peak landings of 252,568 t in 2000. The preliminary ex-vessel economic value of commercial landings in 2006 was nearly \$130 million, an increase of 19% from the \$109 million in 2005. This is mainly the result of a delay in the start of the 2005–06 Dungeness crab season until 2006.

Market squid was once again the largest fishery in the state by volume, at over 49,000 metric tons (t), and second in ex-vessel value at \$26.9 million. The other top five were: Pacific sardine at nearly 46,600 t, northern anchovy at over 12,800 t, Dungeness crab at 11,900 t, and Pacific whiting at 5,400 t. Dungeness crab was the highest valued fishery in the state at \$45 million. The ex-vessel value of market squid dropped to second in 2006 at \$26.9 million, a decline of 14% from 2005. Other top five valued fisheries include California spiny lobster at over \$8.1 million, Chinook salmon at nearly \$5.2 million, and red sea urchin at \$5.1 million.

The start of the 2005–06 Dungeness crab season was delayed by the California Department of Fish and Game (CDFG) until the last day of 2005 due to poor crab condition. This delay, however, did not result in decreased landings, as the season was the third largest since records began in 1915, and the largest in economic value.

In 2006, California salmon fisheries were nearly eliminated due to the low ocean abundance of the Klamath River Fall Chinook stock. The National Marine Fisheries Service (NMFS) took emergency action in March to allow ocean fishing and advised the Pacific Fisheries Management Council (PFMC) to regulate the commercial and recreational fisheries so that no less than 21,000 natural adults returned to spawn. Thus salmon fishing seasons in California were significantly constrained in 2006, resulting in an 80% reduction in commercial landings and a 70% reduction in recreational landings compared to 2005.

California's commercial groundfish harvest for 2006 was over 12,000 t, an 8% decrease from 2005 landings.

The groundfish harvest consisted mainly of Pacific whiting, Dover sole, sablefish, and rockfishes. The ex-vessel value of groundfish landings for 2006 was \$14.7 million, 6% higher than in 2005 (\$13.8 million).

For highly migratory species, commercial and recreational landings of albacore decreased by 57% and 79%, respectively, from 2005. Landings of all other tuna species also declined. However, landings of swordfish increased 83% over 2005. In 2006, the PFMC adopted bag limits for both albacore (10, south of Point Conception; 25, north of Point Conception) and Pacific bluefin tuna (10).

In this review, an effort was made to highlight some of the lesser reported fisheries that have been the focus of recent conservation measures or management decisions. For California halibut, new regulations closed portions of the traditional halibut trawl grounds and implemented a restricted access program. Cabezon recently underwent a stock assessment which found that the southern stock was slightly above an overfished condition. In order to ensure that landings do not exceed the total allowable catch of 69.0 t, reductions in monthly allotments were imposed. For surfperches, better sampling, identification, and reporting methods have led to better insights into management of the major species in the surfperch family caught in California. And finally, for leopard sharks, a multi-agency investigation led to the curtailment of an illegal poaching ring that took over 50,000 leopard shark pups for the marine aquarium trade.

In 2006, the California Fish and Game Commission (Commission) undertook 12 rule-making actions that address marine and anadromous species. The Commission adopted changes to salmon, groundfish, sea urchin, lobster, herring, and rock crab regulations and added a non-transferable light boat permit to the market squid restricted access fishery. The Commission also received a large amount of public testimony on the creation of marine protected areas in central California, from Pigeon Point in San Mateo County south to Point Conception in Santa Barbara County, under the Marine Life Protection Act. In addition, the Commission instituted emergency regulations to protect green and white sturgeon.

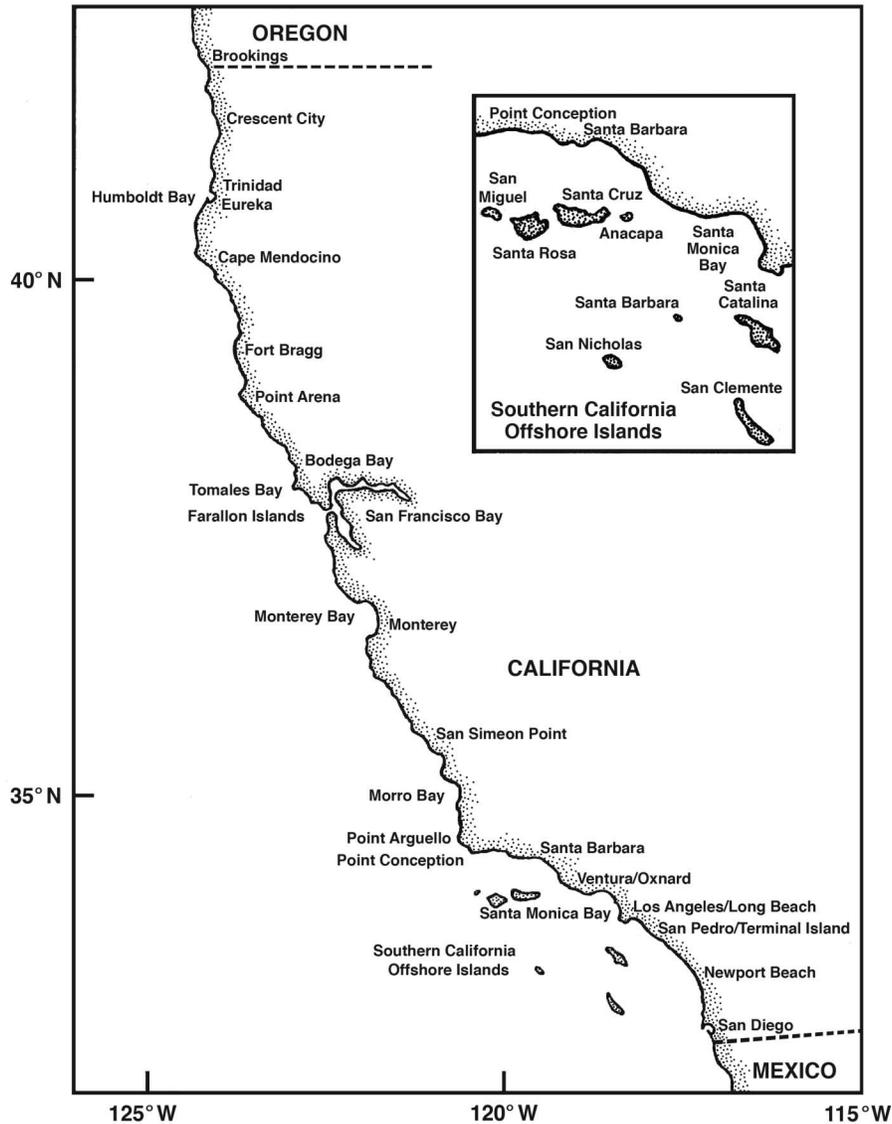


Figure 1. California ports and fishing areas.

### Coastal Pelagic Finfish

Pacific sardine (*Sardinops sagax*), Pacific mackerel (*Scomber japonicus*), jack mackerel (*Trachurus symmetricus*), and northern anchovy (*Engraulis mordax*) form a finfish complex known as coastal pelagic species (CPS). These species are jointly managed by the PFMC and NMFS. In 2006, the combined commercial landings of CPS finfish totaled 66,560 t (tab. 1), and the ex-vessel value exceeded \$7.4 million. The Pacific sardine fishery continues to be the most valuable fishery among these four species, contributing 70% of the total tonnage. For the four CPS finfish, Pacific sardine represented 68.8%, northern anchovy 17.5%, Pacific mackerel 11.1%, and jack mackerel 2.7% of the total ex-vessel revenues.

**Pacific Sardine.** The Pacific sardine fishery extends from British Columbia, Canada, southward into Baja

California, México (BCM). Although the bulk of the catch is landed in southern California and Ensenada, BCM, landings in the Pacific Northwest have been increasing. The Pacific sardine harvest guideline (HG) for each calendar year is determined from the previous year's stock biomass estimate (of  $\geq 1$ -year-old fish on 1 July) in U.S. and Mexican waters. The 1 July 2006 stock biomass estimate for Pacific sardine was 1.1 million metric tons (t). The recommended U.S. HG for the 2006 season was 118,937 t. Given that there are inherent uncertainties in both the fishery and the Pacific sardine population that can affect long-term projections, a formal review of the new allocation structure will occur in 2008.

Following the new allocation scheme for the U.S. West Coast, decided by PFMC for the 2006–07 season, 35% (41,628 t) of the total U.S. HG was allocated coastwide

TABLE 1  
 Landings of Coastal Pelagic Species in California (metric tons).

| Year | Pacific sardine | Northern anchovy | Pacific mackerel | Jack mackerel | Pacific herring | Market squid | Total   |
|------|-----------------|------------------|------------------|---------------|-----------------|--------------|---------|
| 1977 | 5               | 99,504           | 5,333            | 44,775        | 5,200           | 12,811       | 167,628 |
| 1978 | 4               | 11,253           | 11,193           | 30,755        | 4,401           | 17,145       | 74,751  |
| 1979 | 16              | 48,094           | 27,198           | 16,335        | 4,189           | 19,690       | 115,542 |
| 1980 | 34              | 42,255           | 29,139           | 20,019        | 7,932           | 15,385       | 114,764 |
| 1981 | 28              | 51,466           | 38,304           | 13,990        | 5,865           | 23,510       | 133,163 |
| 1982 | 129             | 41,385           | 27,916           | 25,984        | 10,106          | 16,308       | 121,828 |
| 1983 | 346             | 4,231            | 32,028           | 18,095        | 7,881           | 1,824        | 64,405  |
| 1984 | 231             | 2,908            | 41,534           | 10,504        | 3,786           | 564          | 59,527  |
| 1985 | 583             | 1,600            | 34,053           | 9,210         | 7,856           | 10,275       | 63,577  |
| 1986 | 1,145           | 1,879            | 40,616           | 10,898        | 7,502           | 21,278       | 83,318  |
| 1987 | 2,061           | 1,424            | 40,961           | 11,653        | 8,264           | 19,984       | 84,347  |
| 1988 | 3,724           | 1,444            | 42,200           | 10,157        | 8,677           | 36,641       | 102,843 |
| 1989 | 3,845           | 2,410            | 35,548           | 19,477        | 9,046           | 40,893       | 111,219 |
| 1990 | 2,770           | 3,156            | 36,716           | 4,874         | 7,978           | 28,447       | 83,941  |
| 1991 | 7,625           | 4,184            | 30,459           | 1,667         | 7,345           | 37,388       | 88,668  |
| 1992 | 17,946          | 1,124            | 18,570           | 5,878         | 6,318           | 13,110       | 62,946  |
| 1993 | 13,843          | 1,954            | 12,391           | 1,614         | 3,882           | 42,708       | 76,392  |
| 1994 | 13,420          | 3,680            | 10,040           | 2,153         | 2,668           | 55,395       | 85,929  |
| 1995 | 43,450          | 1,881            | 8,667            | 2,640         | 4,475           | 70,278       | 131,391 |
| 1996 | 32,553          | 4,419            | 10,286           | 1,985         | 5,518           | 80,360       | 135,121 |
| 1997 | 46,196          | 5,718            | 20,615           | 1,161         | 11,541          | 70,257       | 155,488 |
| 1998 | 41,056          | 1,457            | 20,073           | 970           | 2,432           | 2,895        | 68,646  |
| 1999 | 56,747          | 5,179            | 9,527            | 963           | 2,207           | 91,950       | 164,945 |
| 2000 | 53,586          | 11,504           | 21,222           | 1,135         | 3,736           | 118,827      | 209,144 |
| 2001 | 51,811          | 19,187           | 6,924            | 3,615         | 2,715           | 86,203       | 170,080 |
| 2002 | 58,353          | 4,643            | 3,367            | 1,006         | 3,339           | 72,878       | 143,586 |
| 2003 | 34,292          | 1,547            | 3,999            | 155           | 1,780           | 44,965       | 88,741  |
| 2004 | 44,293          | 6,793            | 3,569            | 1,027         | 1,596           | 40,324       | 99,606  |
| 2005 | 34,331          | 11,091           | 3,243            | 199           | 217             | 54,976       | 104,057 |
| 2006 | 46,672          | 12,815           | 5,904            | 1,169         | 732             | 49,248       | 115,845 |

on 1 January 2006. On 1 July, 40% (47,575 t) of the HG, plus the uncaught remainder of the previous allocation (20,207 t) was allocated coastwide. The remaining 25% (29,734 t) of the HG, plus the unharvested remainder of the previous allocations (50,828 t), was allocated coastwide on 15 September. By 31 December 2006, 69% (82,323 t) of the HG had been caught coastwide.

In 2006, 46,672 t of Pacific sardine, with an ex-vessel value of more than \$5 million, was landed in California. This represents a 26.1% increase in commercial sardine landings over 2005 (34,479 t). In California, commercial sardine landings averaged 45,471 t over the ten-year period from 1996–2006 (fig. 2). Similar to previous years, the majority (95.5%) of California's 2006 catch was landed in Los Angeles (57.5%; 26,836.1 t) and Monterey (38.0%; 17,748.1 t) port areas (tab. 2).

California exported a total of 38,543 t of sardine product to 22 countries in 2006. Most of this product was exported to Australia (21,335 t), Japan (6,023 t), Croatia (3,213 t), and Thailand (2,331 t). These amounts represent over 81% of the total export value of over \$21.6 million.

A total of 35,648 t of Pacific sardines, with an ex-vessel value exceeding \$3.5 million, was landed in Oregon during 2006. Although Oregon's sardine landings have been increasing steadily over the past few years (fig. 3),

TABLE 2  
 Landings of Pacific sardine (*Sardinops sagax*) and Pacific mackerel (*Scomber japonicus*) at California port areas.

| Area          | Pacific Sardine |           | Pacific mackerel |           |
|---------------|-----------------|-----------|------------------|-----------|
|               | Landings t      | % Total t | Landings t       | % Total t |
| Eureka        | 0.0             | 0.0       | 0.0              | 0.00      |
| San Francisco | 131.0           | 0.3       | 0.4              | 0.01      |
| Monterey      | 17,748.1        | 38.0      | 31.2             | 0.53      |
| Santa Barbara | 1,938.4         | 4.2       | 146.4            | 2.48      |
| Los Angeles   | 26,836.1        | 57.5      | 5,724.8          | 96.98     |
| San Diego     | 17.7            | 0.0       | 0.5              | 0.01      |
| Total         | 46,671.3        | 100.0     | 5,903.3          | 100.00    |

the landings for 2006 were down 21.0% from 2005 (45,110 t). Washington landed 4,362 t in 2006 with an ex-vessel value of \$437,424.

**Pacific Mackerel.** The U.S. fishing season for Pacific mackerel is from 1 July through 30 June of the following year. The majority of Pacific mackerel are landed in southern California and Ensenada, BCM, and occasionally in Oregon and Washington. At the beginning of the 2006–07 season (1 July 2006), the biomass estimate was 112,700 t and the HG was set at 19,845 t. Since Pacific mackerel are often landed incidentally to other CPS, the HG was divided into a directed fishery and an incidental fishery. The directed fishery was allo-

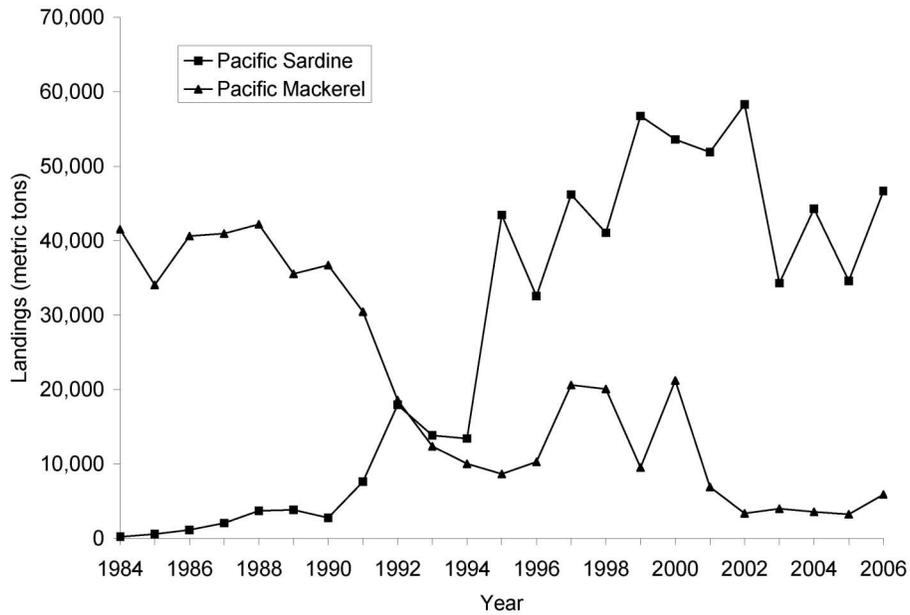


Figure 2. California commercial landings of Pacific sardine (*Sardinops sagax*) and Pacific mackerel (*Scomber japonicus*), 1984–2006.

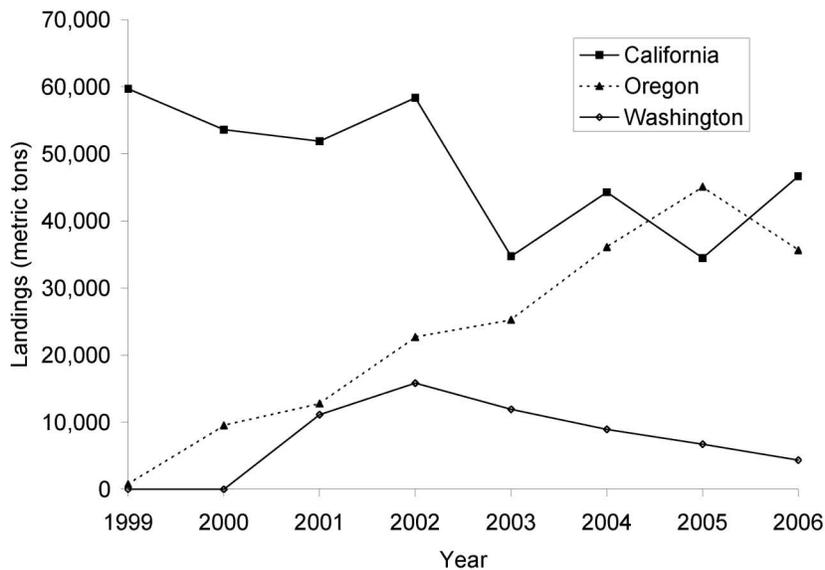


Figure 3. Commercial landings of Pacific sardine (*Sardinops sagax*) in California, Oregon, and Washington, 1999–2006.

cated 13,845 t and the remaining 6,000 t were set aside for an incidental catch rate of 40% when landed as a mixed load.

Although California landings of Pacific mackerel have been declining since the early 1990s (fig. 2), 5,904 t were landed during 2006 representing a 5-year high and a 45.1% increase over 2005 (3,243 t). The 2006 Pacific mackerel landings in California had an ex-vessel value of \$819,594, with 97% (5,725 t) landed in the Los Angeles port area (tab. 2).

California exported 2,377 t of mackerel product to sixteen countries worldwide. The majority (67%) of this product was exported to Australia (834 t), Indonesia (386 t), and China (381 t). Mackerel exporters generated over \$1.8 million in export revenue in 2006.

Since 1999, an average of 202 t of Pacific mackerel has been landed in Oregon, and 655 t were landed during 2006. In Washington, annual landings of unspecified mackerel averaged 144 t over the five-year period from 2001–2005; with no reported landings for 2006.

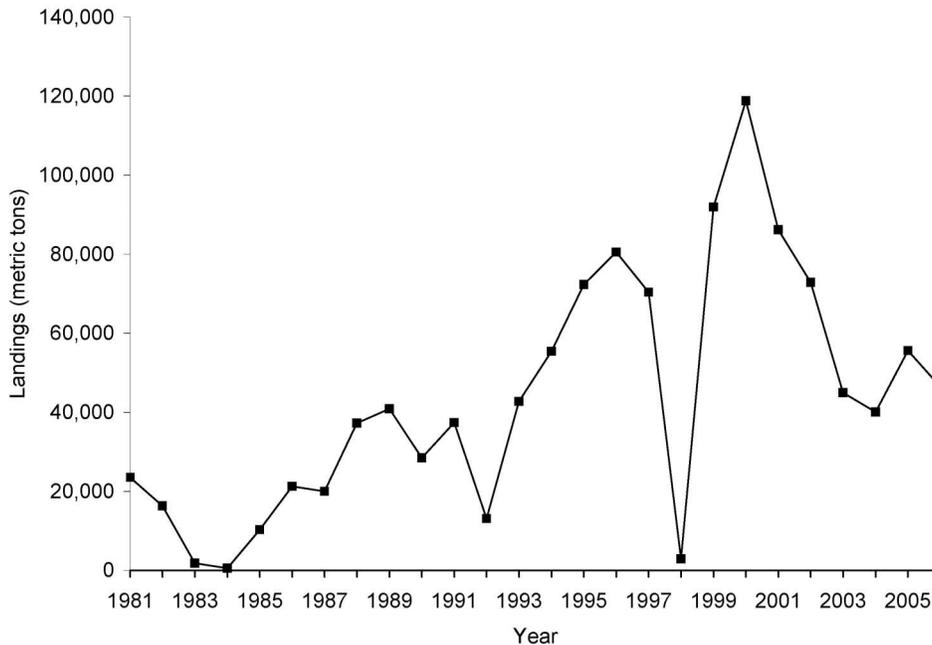


Figure 4. California commercial market squid (*Loligo opalescens*) landings, 1981–2006.

**Jack Mackerel.** In 2006 jack mackerel landings in California were 1,169 t. This represents an 83.0% increase over 2005 (199 t). Ex-vessel revenues in 2006 totaled \$196,361, a 25.9% increase over 2005 revenues. In Oregon, landings of jack mackerel totaled 5.3 t with an ex-vessel value of \$2,598. This represents a 95.6% decrease in landings from 2005 and a 92.1% decrease from 2004. There were no reported landings of jack mackerel in Washington during 2006.

**Northern Anchovy.** Over the past decade, landings of northern anchovy in California have varied widely. Anchovy landings in 2006 (12,815 t) increased 12.8% over the previous year (11,178 t). Ex-vessel revenues for northern anchovy totaled \$1.3 million, making this species the second most valuable CPS finfish in 2006 after Pacific sardine. In 2006, there were no landings of northern anchovy in Washington. Oregon landed 8.6 t valued at \$24.

California exported 1,083 t of anchovy product, valued at \$792,120, to three countries in 2006. This was an increase in weight of 85.3% and almost one and a half times the export value of 2005. Ninety-one percent of California's anchovy export product was shipped to Australia (986.9 t; \$597,182).

**Pacific Bonito.** Landings of the Pacific bonito (*Sarda chiliensis lineolata*) in California waters have been minimal since the late 1980s. From the 1960s to the 1980s, bonito was a major component of the recreational fishery because it is easy to catch and is a strong fighter when hooked. In late 2005 and 2006, large schools of bonito were observed migrating northward from México

into the Southern California Bight and were targeted by coastal pelagic fishermen. A total of 2,500 t were taken in 2006 with an ex-vessel value of \$1.5 million. This is a sharp increase from the 10.4 t taken in 2005 (ex-vessel value \$6,000) and represents the largest landings of bonito since 1990 (4,500 t). Recreational fishermen on Commercial Passenger Fishing Vessels (CPFVs) caught a total of 201,703 bonito in 2006, with 14% (27,259) of that total coming from trips in Mexican waters. This represents nearly 7% of all fishes caught on CPFVs in 2006. In contrast, a total of 75,353 were taken by CPFVs in 2005, representing only 2.8% of the total catch.

**Krill.** Primarily euphausiids, krill are small shrimp-like crustaceans that serve as the basis of the food web for many commercially fished species, as well as marine mammals and birds. In 2005, the PFMC recommended that krill be managed under the Coastal Pelagic Species Fishery Management Plan (CPS FMP). In March 2006, the PFMC adopted a complete ban on commercial krill fishing and specified essential fish habitat for krill. The PFMC initiated the prohibition which took the form of Amendment 12 to the CPS FMP adding krill as a prohibited species. These actions followed a request from NOAA National Marine Sanctuaries to prohibit krill fishing in the exclusive economic zone (EEZ) around the three marine sanctuaries off central California. Washington, Oregon, and California had previously adopted state laws prohibiting fishing for krill in state waters and the landing of krill. However, commercial fishing of krill continues to exist in other parts of the world such as Antarctica, Japan, and off the west coast

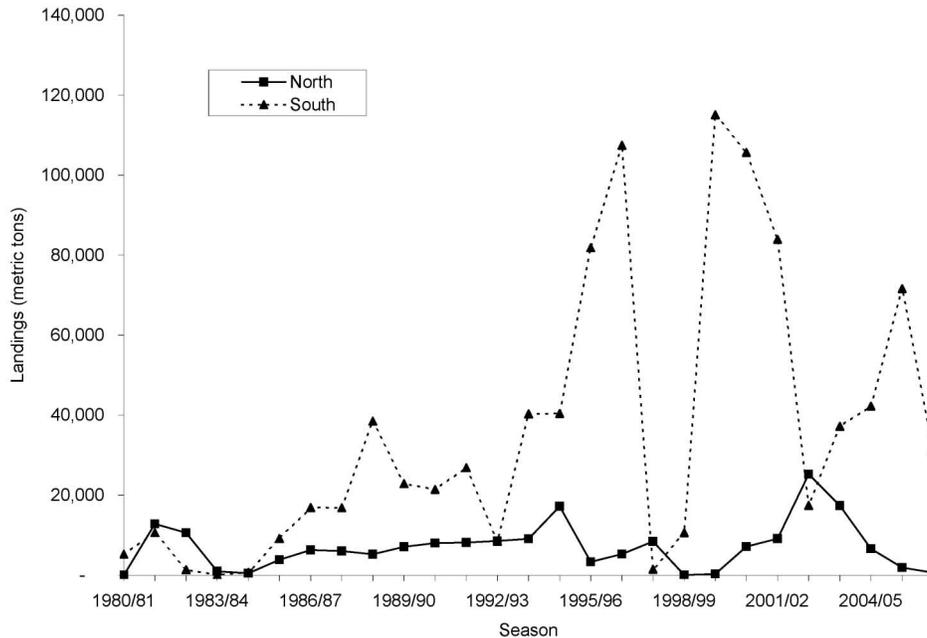


Figure 5. Comparison of market squid landings for northern and southern fisheries by fishing season (1 April–31 March), from 1980–81 to 2006–07 seasons.

of Canada, where it is primarily used for fish bait, pet food, cultured fish, and livestock.

### California Market Squid

In 2006, market squid (*Loligo opalescens*) was the state’s largest fishery in terms of quantity but dropped to second in ex-vessel value. Total landings in the market squid fishery were 12% less than in 2005, decreasing from 55,606 t to 49,145 t (fig. 4). The ex-vessel price averaged \$554/t (a decrease from the 2005 average of \$569/t). The 2006 ex-vessel value was approximately \$27.2 million, a 14% decrease from 2005 (\$31.6 million). Market squid is used domestically for food and as bait by the recreational fishery, and remains an important international commodity. Approximately 22,562 t of market squid were exported for a value of \$28.8 million in 2006. Asian countries were the main export market with about 49% of the trade going to China (8,894 t) and Japan (2,148 t). Switzerland was the second largest export market (4,200 t), accounting for 19% of the trade. This sharp decline in exports compared to 2005 (43,131 t of market squid exported at a value of \$54.6 million) is probably due to the drop in international demand for California market squid since the resurgence of the Falkland Islands squid fishery.

The fishery uses either seine or brail gear that is usually combined with attracting lights to capture aggregations of adult squid spawning in shallow water in areas over sandy substrate. While most fishing effort occurs at night, spawning in some areas has been observed during the day. And, with advances in sonar technology, the

fishery has been able to target market squid aggregations during daylight hours without using attraction lights. Spawning may occur year-round, however, the fishery is most active from April to September in central California and from October to March in southern California. This seasonal shift in location has produced two distinct northern and southern fisheries. The fishing permit season for market squid extends from 1 April through 31 March of the following year. During the 2006–07 season (as opposed to the 2006 calendar year), 31,786 t were landed, a 55% decrease from the 2005–06 season (70,972 t). There was a 70% decline in catch from the northern fishery near Monterey in the 2006–07 season with only 628 t landed (fig. 5). As in previous seasons, total catch was greater in southern California, with 31,158 t landed (98% of the catch) during the 2006–07 season (fig. 5). In 2006–07, market squid fishing was predominantly centered in areas around the northern Channel Islands near Santa Cruz and Santa Rosa Islands, and also along the coast of Los Angeles and Orange Counties. This varies from the 2005–06 season where market squid fishing took place primarily around Catalina Island.

Market squid are sensitive to changes in their environment, particularly to shifts to water that is warm and poor in nutrients. As a result, the fishery fluctuates with fishing patterns and landings reflecting the changing oceanic conditions and temperature variances. In 2006, a regional warm-water event similar to an El Niño, but without the characteristic equatorial warming, started in September and lasted until early 2007. A similar phenomenon occurred in 2005. In April 2006, when up-

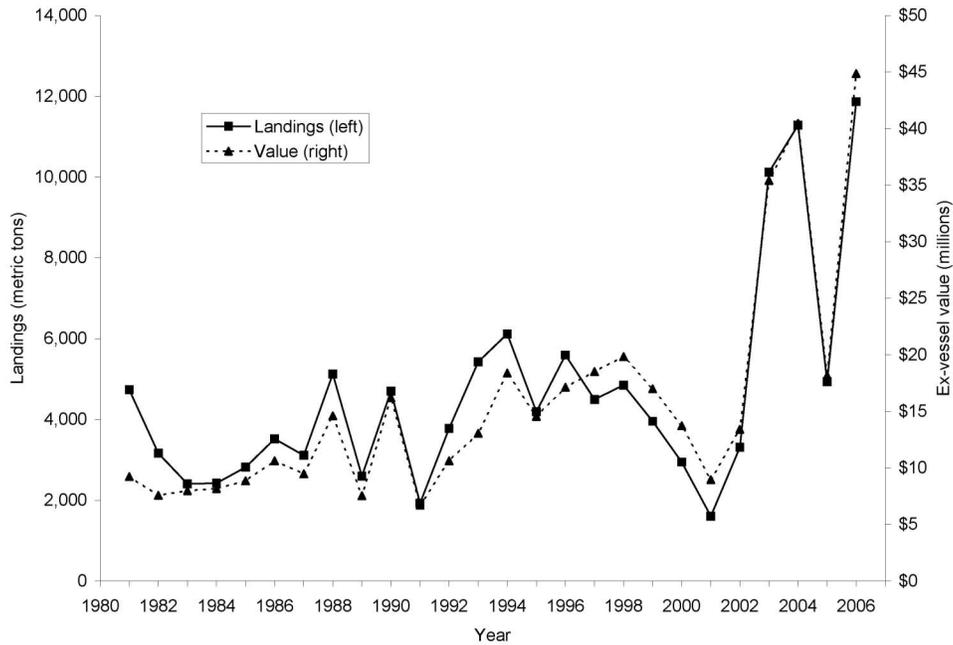


Figure 6. California commercial Dungeness crab (*Cancer magister*) landings, 1981–2006.

welling has usually started in central California, spawning market squid in Monterey were not found in great numbers and body size was small. By July, when upwelling had finally strengthened, a lack of market orders caused most market squid fishermen to shift their focus to sardine and salmon in Oregon and Alaska. The northern fishery in central California ended in August. In southern California, vessels began targeting market squid in June and July. Landings dropped off in August as market squid became less available and fishermen switched their fishing efforts to a local summer run of bonito. Landings decreased during September as the warm-water event developed with a rapid warming of the upper-ocean water. At the end of November, squid were found around the Channel Islands, but they were deep and hard to find. The regional warm-water event began to show signs of weakening in early 2007. In January and February, market squid were caught in abundance along the coast which attracted more permitted vessels from out of town, and increased the fishing pressure. Bad weather hampered fishing efforts for the rest of the season. By the end of March, market squid size and landings had decreased.

To protect and manage the squid resource, a market squid fishery management plan (MSFMP) was adopted by the Commission in 2004. The measures implemented in the MSFMP include: a seasonal catch limit of 107,047 t (118,000 short tons) to prevent the fishery from over-expanding; monitoring programs designed to evaluate the impact of the fishery on the resource; weekend closures that provide for periods of uninterrupted spawn-

ing; gear regulations regarding light shields and wattage used to attract squid; a restricted access program that includes provisions for initial entry into the fleet, permit types, permit fees, and permit transferability that produces a moderately productive and specialized fleet; and a seabird closure restricting the use of attracting lights for commercial purposes in any waters of the Gulf of the Farallones National Marine Sanctuary. In 2006, a total of 169 restricted access permits were issued: 76 transferable vessel permits, 12 non-transferable vessel permits, 14 transferable bait permits, 64 light boat permits, and 3 experimental non-transferable vessel permits.

### Dungeness Crab

Landings of Dungeness crab (*Cancer magister*) totaled 11,867 t in 2006, a 140% increase from the 4,933 t landed in 2005 (fig. 6). However, the 2005 catch total is misleading in that it is an artifact of the statutory postponement of the northern California 2005–06 season opening, due to poor crab condition. The 2005–06 northern California season opener was delayed by CDFG (for the first time since given that authority in 1995), until the last day of 2005 to allow ample time for crab condition to improve. The central California fishery opens in mid-November and is not subject to the statutory postponement provision. When examined on a seasonal basis, the 2005–06 crab season actually went on to become the third highest season since records began in 1915, with 10,784 t landed, mostly in 2006. Ex-vessel revenues for 2006 were \$44.9 million, the highest on record. The average price per kilogram paid to fisher-

men increased to \$3.78 (\$1.71/lb), up 3% from \$3.68 (1.66/lb) in 2005.

Mature male Dungeness crabs go through their annual molt in the summer and then begin putting on weight in their new shells. While the timing of this process can vary from year to year, the 1 December fishery opening on most of the West Coast usually results in adequately filled-out crabs reaching the markets. However, commencing with the 1995–96 season, the California legislature authorized industry-funded pre-season crab condition testing to help ensure that crabs were ready for harvest by season's start. The states of Oregon, Washington, and California, the member states of the Pacific States Marine Fisheries Commission Tri-State Crab Committee, have agreed that the crab meat-to-whole crab drained weight recovery rate must be 25% by 1 December for the fishery to open on time. The assessment of crab condition is initiated each year around 1 November; if the crab meat recovery is less than 25%, another test is mandated. Approximately two weeks later the second test is conducted, and if the pick-out is still below 25%, the season opening is delayed 15 days. This procedure can continue until 1 January, when no more tests can be made and the season must be opened on 15 January in northern California (north of the Mendocino County southern border). In 2006, northern California crabbers asked CDFG to conduct the tests earlier than in previous years so that results would be available prior to the central California opening day in mid-November. A decision to delay the northern opening day would adversely affect northern crabbers who chose to fish the central California opener because of a penalty clause in the statutes. Tests were conducted on 26 October and 8 November, 2006, prior to the 2006–07 season. The second test yielded an average recovery of greater than 25%, leading to a consensus opinion by the Departments of the three states and the industry that the crab would be ready to harvest on 1 December.

The Dungeness crab fishery in California is managed using a combination of technical measures: a suite of size, sex, and season restrictions. Only male Dungeness crabs are harvested commercially, and the minimum commercial harvest size is 159 mm (6.25 in) carapace width. The minimum size limit is designed to protect sexually mature male crabs from harvest for several seasons, and the timing of the season is designed to provide some measure of protection to crabs when molting is most prevalent. The commercial season runs from 1 December to 15 July in northern California and from 15 November to 30 June in the remainder of the state (central area). In addition to these technical measures, fishery participation is managed by restricted access. While large fluctuations in catches occur on a cyclical basis, they are apparently due to stochastic factors independent of stock

size. Studies have shown that despite the presumption that most males of legal size are taken each season, almost all of the sexually mature females are fertilized.

Landings in northern California in the 2005–06 season totaled 8,074 t or 75% of the statewide catch. A catch comparison between the 2005–06 season and the previous season shows only a 9 t difference despite the one month seasonal delay. About 77% of the near record northern California catch was taken in the first two months of the abbreviated season, an increasing trend and indication that there is an abundance of fishing power and gear available in this fishery. A total of 416 vessels made landings during the 2005–06 season, up from the 30-year low of 385 vessels in the 2001–02 season.

Limited entry for the Dungeness crab fishery was established by the California legislature in 1995, with most permits transferable. There were 537 resident permits and 85 non-resident permits as of 2006. Central California fishermen have in the past several years unsuccessfully tried to legislate a limit on the number of traps allowed in their area. Northern crabbers have generally been opposed to this measure, particularly those larger boats that fish central California during the 2 weeks prior to the northern opener. Industry leaders estimate that there were about 150,000 traps in the fishery in 2006. There is renewed interest state-wide to pursue some type of trap limit program, following on the recent programs adopted by Washington and Oregon.

A California law passed in 2006, effective 1 January 2007, requires all vessels commercially fishing Dungeness crab in the EEZ off California to possess a California Dungeness crab permit. The other two states in the Tri-State Committee enacted reciprocal regulations. These laws, known as LE200 (limited entry 200 miles), complement trap limit programs enacted by Oregon and Washington with the goal of eliminating un-permitted out-of-state vessels who would not be subject to their trap limits, from their respective EEZs.

### Spot Prawn

Preliminary 2006 spot prawn (*Pandalus platycerosus*) landings were 148.9 t, a 47% increase from 2005 (101 t) (fig. 7). Until 2002, spot prawn were harvested by trawl and trap gear. In 2003, the use of trawl gear for the take of spot prawn was eliminated because of the bycatch of rockfish, particularly the overfished bocaccio (*Sebastes paucispinus*). Consequently, 2003 spot prawn landings were the lowest since 1987 when trapping was just getting underway in southern California. Current harvest levels are well below those of the mid- to late-1990s and appear to be sustainable.

Spot prawns are currently caught only with trap gear, although a small amount occurs as bycatch in the ridge-back (*Eusicyonia igentis*) trawl fishery (<0.5 t). Spot prawn

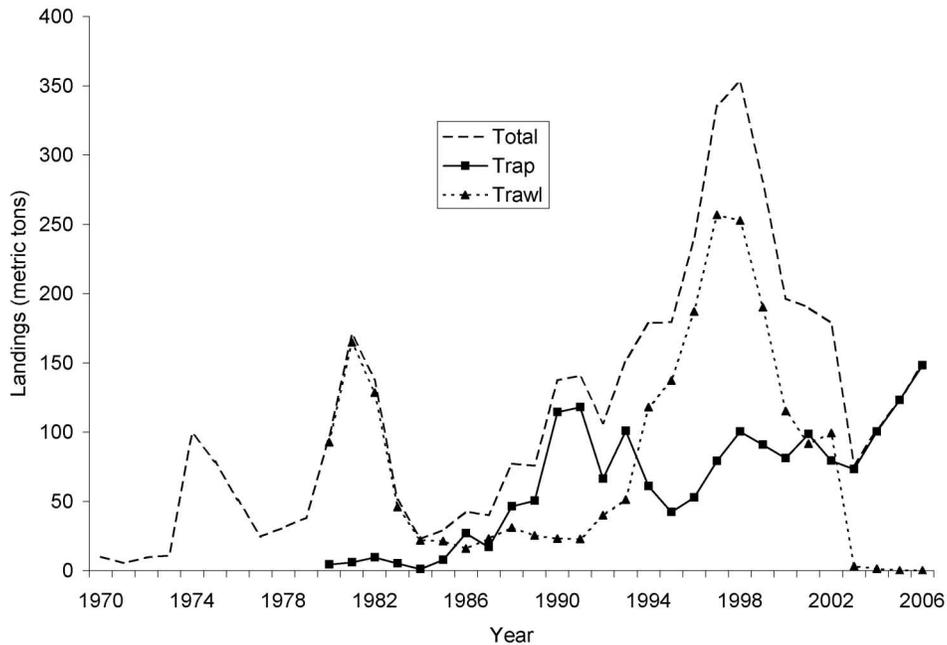


Figure 7. California landings of spot prawn (*Pandalus platycerous*) by gear type, 1970–2006.

traps were required to be made of plastic or wire mesh with an inside measurement of at least  $2.22 \times 2.22$  cm ( $7/8 \times 7/8$  in.). The traps may not exceed 1.8 m in any dimension. In December 2005, the regulatory language requiring that prawn traps be made of plastic or wire webbing was amended so that other materials could be used as webbing. The baited traps are fished in strings at depths of 180–305 m (100–167 fathoms) along submarine canyons or shelf breaks. Each string consists of a groundline with anchors and a buoy at one or both ends, and 10 to 30 traps attached. No other species may be taken in a prawn trap, and all bycatch must be returned to the water immediately.

A two-tiered restricted access trap vessel permit program was initiated in 2002 based on participation in the fishery. Tier 1 permittees may use no more than 500 traps, unless fishing in state waters north of Point Arguello where they are only allowed the use of 300 traps. Eighteen trap vessel owners originally qualified and purchased these permits, and 17 remained when they became transferable on 1 April 2005. Two permits have been sold on the open market for approximately \$200,000. The CDFG receives a transfer fee of \$50.00 when a permit is sold.

Tier 2 vessel permittees are limited to an annual harvest quota of just over 2 t. Permittees may use no more than 150 traps and the permits are non-transferable. Initially there were six permittees, but only three Tier 2 permittees remain.

When the use of trawl gear for the take of spot prawn was prohibited, the Commission directed the CDFG to

develop a conversion program for the trawl fleet. A conversion program went into effect in 2005, which allowed the owners of 11 former spot prawn trawl vessels to purchase Tier 3 spot prawn trap vessel permits in 2005. Tier 3 permittees may use no more than 500 traps, unless fishing in state waters north of Point Arguello where they are only allowed the use of 300 traps. Ten Tier 3 permittees remain. The fee for the Tier 3 permit was \$1,066.25 in 2006, and the permits are non-transferable. Whereas, both Tier 1 and Tier 2 vessel permits were \$266.50 in 2006.

In 2006, 22 trap permittees landed spot prawn. Fifteen of the 17 Tier 1 trappers landed 84% of the catch with each vessel landing an average of 8.3 t. All three Tier 2 fishermen fished, landing an average of 1.4 t. Only four of the Tier 3 permittees fished, landing almost 13% of the catch. Over half of the Tier 3 permittees have not had the financing necessary to purchase traps.

Almost all spot prawn harvested is sold live, with ex-vessel prices ranging from \$2.22 to 30.00/kg (\$10.00 to \$13.50/lb). Fresh dead spot prawn generally sells for half the price of live. Most trap permittees have invested in live tanks and chillers on their vessels to keep the prawns in top condition for the live market.

The trap fishery in southern California (south of Point Arguello) is closed from 1 November to 31 January to provide protection for gravid females. North of Point Arguello, the spot prawn trap season is closed from 1 May to 31 July, an accommodation to prevent serious fishing gear conflicts in the Monterey Bay area. A 0.023 t allowance of spot prawn while trawling for

ridgeback prawn is still legal, but spot prawn may not be landed as bycatch when trawling for pink shrimp (*Penaenus duorarum*).

### Highly Migratory Species

**Albacore.** Albacore (*Thunnus alalunga*) is the most abundant tuna caught in both commercial and recreational fisheries in California. In 2006, 98% of the commercial caught albacore came from hook and line gear (jig/bait/troll). A total of 207 t were commercially landed in California ports in 2006, a decrease of over 200% compared to 483 t landed in 2005. This total is but a fraction of the North Pacific landings estimated at over 12,000 t for 2006. Ex-vessel value was \$535,638 and price-per-kilogram remained constant at an average of \$3.46/kg (\$1.57/lb) in 2005 and 2006. Although some high-grade fresh caught albacore was sold for the restaurant trade, most of this catch was exported for processing and canning.

Historically, there have been no bag or size limits on sport-caught albacore in California. In late 2006, the PFMC adopted bag limit conservation measures for albacore (10 fish south of Point Conception, 25 fish north of Point Conception). These regulations, along with comparable state regulations, are currently being promulgated. Most of the recreational take of albacore comes from sportfishing in Mexican waters, which has a 5-fish daily bag limit. The 2006 sport fishing season started off early but the fish moved through and northward quickly. As a result, only 20,925 albacore were reported taken by California's CPFV fleet in 2006, one quarter of the 98,611 landed in 2005.

**Yellowfin Tuna.** Commercial landings of yellowfin (*Thunnus albacares*) totaled 75 t in 2006, far less than the 286 t landed in 2005. Purse seine vessels caught 75% of the total yellowfin landed, while hook and line gear caught the remaining 25%. Ex-vessel value totaled \$175,642 and price-per-kilogram was far better for the 2006 catch at an average \$4.93/kg (\$2.24/lb) compared to the \$2.78/kg (\$1.25/lb) paid in 2005. Some yellowfin is sold to the restaurant trade, however, most of the catch is processed into canned consumer product. Exports of fresh frozen yellowfin tuna from California went to México for processing. Currently there are no canneries operating in California. CPFV logbook data indicate recreational anglers landing 46,411 yellowfin, some 10,000 less than that reported in 2005.

**Skipjack Tuna.** Commercial landings of skipjack (*Katsuwonus pelamis*) totaled 48 t in 2006, a dramatic decline from 533 t in 2005. The variable catch success is likely due to seasonal fluctuation in abundance of fish within range of southern California vessels. The total ex-vessel value increased to an average \$1.22/kg (\$0.55/lb) in 2006 from the \$0.93/kg (\$0.42/lb) aver-

age paid in 2005. Purse seine vessels catch almost all of the skipjack landed in California. Frozen skipjack are exported for processing into canned product. CPFV logbook data indicate that recreational anglers landed 4,541 fish in 2006, a decrease of 23% from 2005 (5,906 fish).

**Bluefin Tuna.** Commercial landings of bluefin (*Thunnus thynnus*) totaled just 0.8 t in 2006, far less than the 207 t landed in 2005. Ex-vessel value was \$3,790, and price-per-kilogram was greater in 2006 with an average \$4.84/kg (\$2.18/lb) paid for the few fish landed. In contrast, \$3.33/kg (\$1.51/lb) was the average paid for bluefin in 2005. Purse seine vessels caught 97% of the bluefin landed in 2005, while the drift gillnet fleet accounted for 65% of the 2006 landings.

CPFV logbook data indicate that recreational anglers landed 7,356 bluefin, up 28% from the 5,748 fish landed in 2005. Currently in California, there are no bag or size limits on sport-caught bluefin tuna. In late 2006, the PFMC adopted a 10-fish bag limit conservation measure for bluefin tuna. These regulations, along with comparable state regulations, are currently being promulgated.

**Swordfish.** Swordfish (*Xiphias gladius*) is the most valuable fish taken in the California highly migratory species (HMS) fishery. In 2006, the commercial catch was valued at \$2.7 million. In 2006, 82% of the commercial catch came from drift gill net gear; harpoon fishermen landed the remainder. In 2006, commercial landings totaled 371 t, up 83% from the 203 t landed in 2005. The price-per-kilogram decreased in 2006; an average of \$8.93/kg (\$4.02/lb) compared to \$12.93/kg (\$5.82/lb) in 2005. Swordfish caught by harpoon is considered more valuable than gill net caught fish. Ex-vessel price-per-kilogram can exceed \$11.11/kg (\$5.00/lb) for harpooned fish. The recreational catch of swordfish is unknown but is considered to be very few in number.

**Common Thresher Shark.** Common thresher shark (*Alopias vulpinus*) is the most common and most valuable shark taken in the California HMS fishery. In 2006, 99% of the commercial catch of common thresher shark came from gill net vessels. Commercial landings decreased in 2006 to 93 t, compared to 105 t landed in 2005, an 11% decline. The ex-vessel value totaled \$298,843, and price-per-kilogram increased from an average of \$3.02/kg (\$1.36/lb) in 2005 to \$3.16/kg (\$1.42/lb) in 2006. CPFV logbook data indicate that 27 fish were landed recreationally in 2006 and 23 reported for 2005, indicating that this mode of fishing is a minor component of the fishery.

**Shortfin Mako Shark.** Shortfin mako shark (*Isurus oxyrinchus*) is the second most common shark landed in the California HMS fishery. In 2006, 67% of the commercial catch of mako shark came from drift gill net gear and 12% from set gill nets. Commercial landings increased in 2006 to 32 t, compared to 23 t in 2005, a

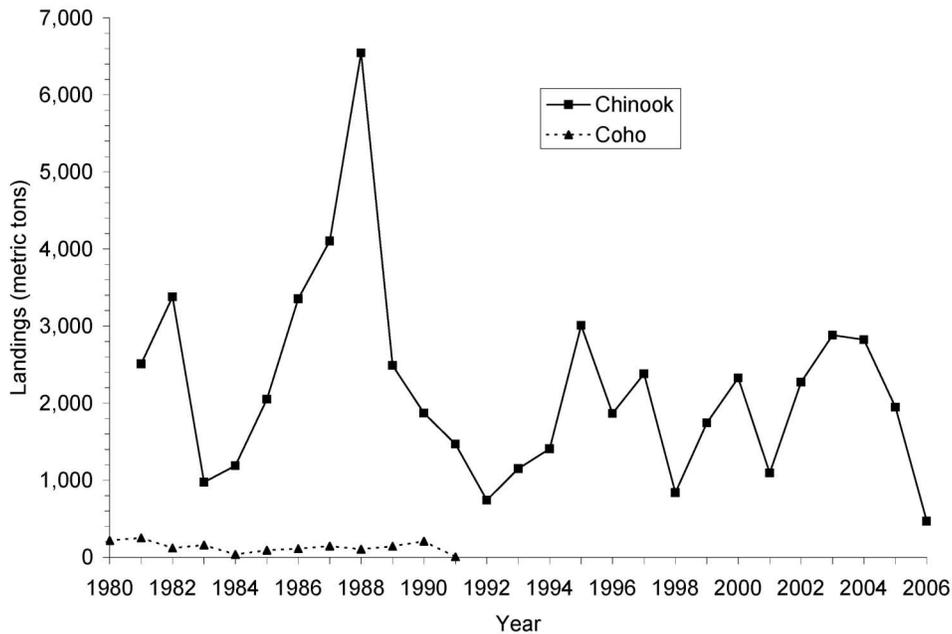


Figure 8. California commercial landings of ocean salmon, 1980–2006. Note: Commercial fishery landings of coho salmon were prohibited since 1992 to protect California coho salmon stocks.

39% increase. The ex-vessel value was \$79,144, and price-per-kilogram remained constant at an average of \$2.44/kg (\$1.10/lb). According to CPFV logbook data, 238 mako sharks were taken in 2006, a 47% increase compared to 162 in 2005.

**Dorado (dolphinfish).** Commercial landings of dorado (*Coryphaena hippurus*) totaled 2.8 t in 2006, an increase from the 0.2 t landed in 2005. The ex-vessel value was \$17,945, and the price-per-kilogram remained constant at \$6.98/kg (\$3.10/lb). Historically, dorado landings have been a relatively small component of the HMS fishery and vary from year to year, primarily depending on cyclic intrusions of warm water into the southern California waters. Local seafood restaurants purchase dorado when available. CPFV logbook data indicate that recreational anglers landed 45,569 dorado in 2006, a seven-fold increase from the 6,654 fish landed in 2005.

**2006 HMS Fishery Management Highlights.** The PFMC’s highly migratory species fishery management plan (HMS FMP) was approved by NMFS in March of 2004. Adoption of the HMS FMP provided for implementation of new management and conservation measures, consolidation of existing state and federal regulations, and international agreements for HMS. In 2006, PFMC activity was focused on implementing the HMS FMP.

The PFMC took action in response to NMFS declarations that bigeye (*Thunnus obesus*) and yellowfin tuna are being overfished in the Eastern Pacific Ocean. An HMS FMP amendment was adopted that calls for a Pacific-wide response to overfishing of bigeye tuna with emphasis on reductions to high seas longline and purse

seine fisheries. In addition, the PFMC moved to amend the FMP to address Eastern Pacific Ocean overfishing of yellowfin tuna. The amendment process will be coordinated with activities of the Western Pacific Fishery Management Council and the Inter-American Tropical Tuna Commission. The PFMC also adopted bag limit conservation measures for the recreational harvest of albacore and bluefin tunas. These measures, which affect only California sport anglers, will be implemented in the 1 April 2007–31 March 2009 management cycle.

### Ocean Salmon

Ocean salmon fisheries in California primarily target Chinook salmon (*Oncorhynchus tshawytscha*). The retention of coho salmon (*O. kisutch*) has been prohibited in the commercial and recreational fisheries since 1993 and 1996, respectively. Pink salmon (*O. gorbuscha*) are taken occasionally in the fisheries, usually in odd years.

Each season, the PFMC and Commission regulate California ocean fisheries so that the conservation objectives of the Salmon Fishery Management Plan (Salmon FMP) are met for Klamath River fall Chinook (KRFC) and Sacramento fall Chinook stocks. In addition, the fisheries must meet the NMFS ESA consultation standards for listed stocks, including Sacramento winter Chinook (endangered), Central Valley spring Chinook (threatened), California coastal Chinook (threatened), and Central/Northern California coho stocks (threatened).

In 2006, California salmon fisheries were significantly constrained by low ocean abundance of KRFC. The Salmon FMP requires that ocean fisheries be regulated

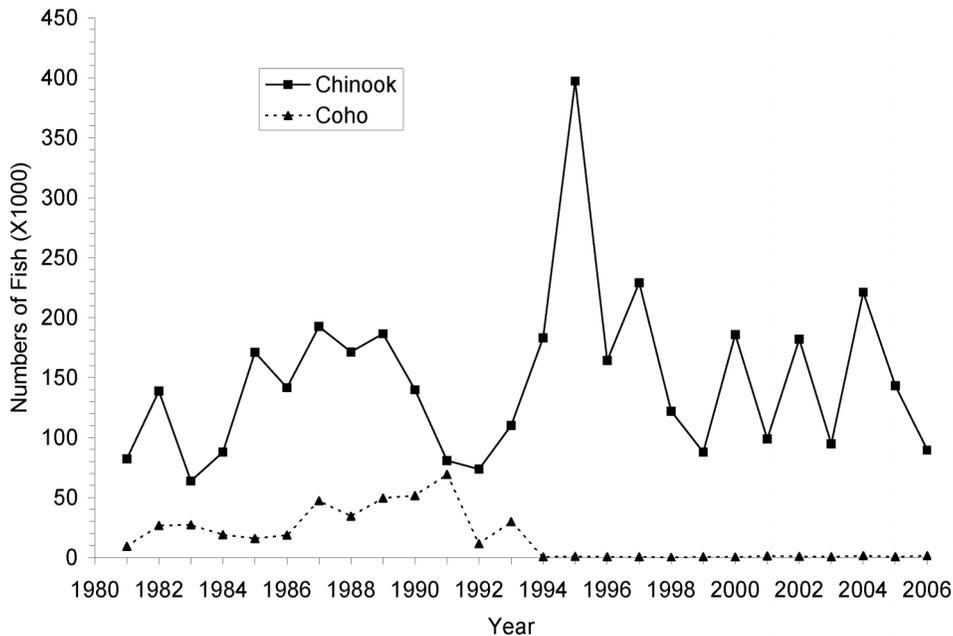


Figure 9. California recreational landings of ocean salmon, 1981–2006. Note: Landings of coho salmon were prohibited after 1996 to protect California coho salmon stocks. Numbers reported since 1996 are illegal harvest.

to allow a minimum of 35,000 natural adult spawners return to the Klamath Basin; however, even without any fisheries in 2006, the Klamath Ocean Harvest Model predicted that this goal couldn't be attained. As a result, NMFS took emergency action in March to allow ocean fishing and advised PFMC to regulate the commercial and recreational fisheries so that no less than 21,000 KRFC natural adults returned to spawn. Thus, commercial and recreational salmon fishing seasons in California were much shorter in 2006 than in 2005.

The commercial fishing season was reduced by 25 days in the Fort Bragg area (Horse Mountain to Point Arena), 20 days in the San Francisco area (Point Arena to Pigeon Point), 20 days in the Monterey area (Pigeon Point to Point Sur), and completely closed in the Klamath Management Zone (KMZ; Horse Mountain to the California-Oregon border). The season south of Point Sur remained the same because KRFC impacts are non-existent.

An estimated 68,800 Chinook salmon (467 t) were landed during the 2006 commercial season (fig. 8), which was approximately 20% of total commercial landings in 2005. The average weight per fish was 6.8 kg (15.0 lbs), the highest observed since the PFMC began reporting these data in 1976. Almost 70% of all salmon were landed in the San Francisco port area. Commercial effort was estimated to be almost 8,200 boat-days fished and the average price was \$11.36/kg (\$5.11/lb), a 72% increase over the \$6.60/kg (\$2.97/lb) paid in 2005. The total ex-vessel value of the fishery in 2006 was estimated to be \$5.3 million, approximately 40% of the \$12.9 million made by the salmon fleet in 2005.

The 2006 recreational fishing season was reduced by 17 days in the KMZ, 17 days in the Fort Bragg area, 4 days in the San Francisco area, and 9 days in the Monterey area compared to the 2005 season. Anglers were allowed two salmon per day of any species except coho. Single-point, single-shank barbless hooks were required north of Point Conception and anglers fishing with bait and by any means other than trolling were required to use circle hooks. The minimum size limit was 20 in. total length (TL), except in the KMZ where the minimum size limit was 24 in. TL.

An estimated 89,500 Chinook were caught by 120,400 sport anglers in 2006 (fig. 9). This represents a 38% decrease from total landings in 2005 while total effort also decreased to approximately 70% of 2005 levels. Sport anglers also reported contacting numerous coho salmon during the season, especially during June and July.

Approximately 1,400 coho were landed illegally during 2006, primarily by anglers who improperly identified their salmon as Chinook. This is twice the number of coho landed in 2005. It's assumed that the majority of these fish were part of the mass-marking production of coho currently occurring in Oregon and Washington; most were missing their adipose fin and many did not contain a coded-wire tag (only a small percentage of mass-marked coho contain coded-wire tags).

### California Halibut

California halibut (*Paralichthys californicus*) is an important flatfish species in both the commercial and recreational fisheries of central and southern California. It is

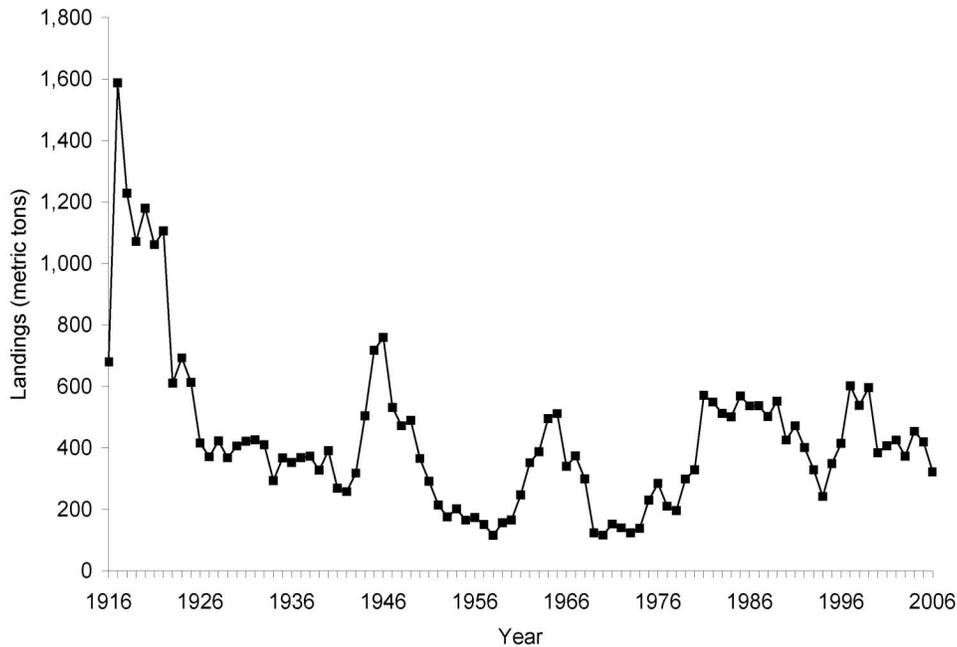


Figure 10. California commercial California halibut (*Paralichthys californicus*) landings, 1916–2006.

TABLE 3  
**Annual commercial landings (metric tons) of California halibut (*Paralichthys californicus*)  
 by major port complex for 2005 and 2006 and ten-year average (1997–2006).**

| Area                  | 2005         |                    | 2006         |                    | Ten-Year Average (1997–2006) |                    |
|-----------------------|--------------|--------------------|--------------|--------------------|------------------------------|--------------------|
|                       | Landings (t) | Ex-vessel (\$)     | Landings (t) | Ex-vessel (\$)     | Landings (t)                 | Ex-vessel (\$)     |
| Eureka                | 0.2          | \$ 1,482           | 0            | \$ 456             | 4                            | \$ 12,469          |
| Fort Bragg            | 0            | \$ 0               | 0            | \$ 703             | 0                            | \$ 5,745           |
| Bodega Bay            | 8            | \$ 50,602          | 2            | \$ 18,951          | 8                            | \$ 43,916          |
| San Francisco         | 279          | \$1,587,465        | 180          | \$1,231,769        | 199                          | \$ 959,829         |
| Monterey              | 31           | \$ 221,253         | 31           | \$ 222,136         | 46                           | \$ 318,435         |
| Morro Bay             | 4            | \$ 30,786          | 8            | \$ 61,334          | 19                           | \$ 135,465         |
| Santa Barbara         | 54           | \$ 556,751         | 66           | \$ 782,822         | 102                          | \$ 729,783         |
| Los Angeles           | 30           | \$ 314,318         | 27           | \$ 286,351         | 58                           | \$ 483,134         |
| San Diego             | 14           | \$ 107,088         | 9            | \$ 83,750          | 16                           | \$ 131,602         |
| <b>Total Landings</b> | <b>420</b>   | <b>\$2,869,745</b> | <b>322</b>   | <b>\$2,688,272</b> | <b>452</b>                   | <b>\$2,540,812</b> |

found in nearshore waters from Almejas Bay, Baja California Sur, to the Quillayute River, Washington. However, it is most common south of Bodega Bay, with distribution centered off northern Baja California. California halibut can grow to 1.5 m (5 ft) TL and weigh as much as 33 kg (72 lb).

California halibut is the target of three principle commercial fishing gears: trawl, gill net, and hook and line. While historical landings were estimated at nearly 1,600 t in 1917, recent landings have decreased from a peak of 602 t in 1997 to a low of 322 t in 2006 (fig. 10 and tab. 3). During this same period, the annual ex-vessel value averaged \$2.5 million and totaled \$2.7 million in 2006 (tab. 3). While landings decreased 23% in 2006 compared to 2005, the ex-vessel value decreased just 6%. This reflects the demand for halibut in 2006, which kept

the price-per-kilogram at an average of \$8.36/kg (\$3.79/lb), compared to the \$6.38/kg (\$3.10/lb) in 2005. The live market fetched the highest average ex-vessel unit price of \$13.29/kg (\$6.03/lb). Trawl vessels operating out of ports in southern California supplied a majority (46%) of the live fish, followed by gill net (30%) and hook and line (23%) gears (fig. 11).

Since 1916, commercial landings follow a periodic shift between the central and southern California port complexes. Over the past decade, central California ports have received a majority of the landings, except for 2001 when landings were higher in southern California ports. In 2006, the San Francisco port complex received 56% of the total catch followed by the Santa Barbara (20%), the Monterey (10%), and the Los Angeles port complexes (8%) (tab. 3).

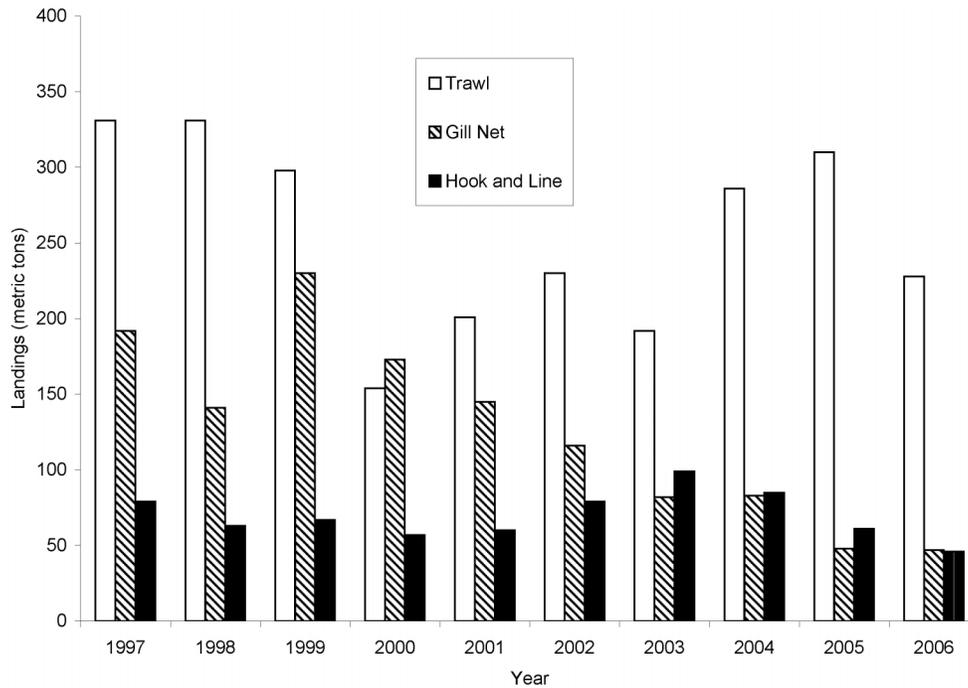


Figure 11. Commercial landings of California halibut, (*Paralichthys californicus*) by gear type, 1997–2006.

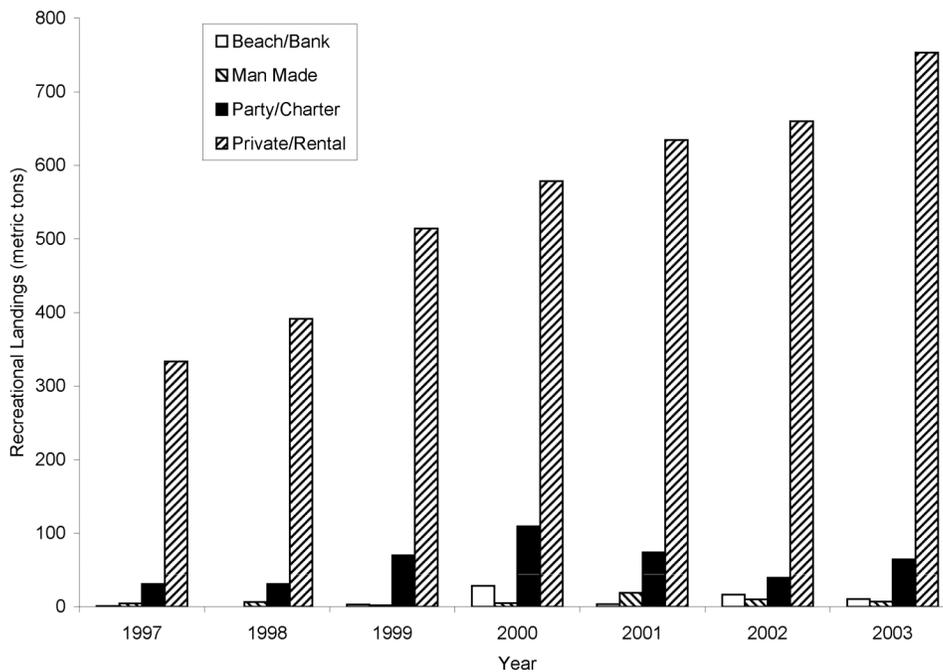


Figure 12. Recreational landings of California halibut, (*Paralichthys californicus*) as reported in the Marine Recreational Fisheries Statistical Survey (MRFSS), by four different fishing modes, 1997–2003.

The bottom trawl fleet has historically landed the majority of California halibut annually. Landings over the past decade have declined from 331 t in 1997 to a low of 154 t in 2000 (fig. 11). The volume and number of trawl landings varied throughout ports in California, however, the San Francisco port complex

received a majority (70%) of the landings in 2006, followed by the Santa Barbara (14%) and the Monterey port complexes (11%).

Annual landings of gill net caught fish have also declined (fig. 11). The gill net portion of the total annual catch decreased from 31% in 1997 to 15% in 2006.

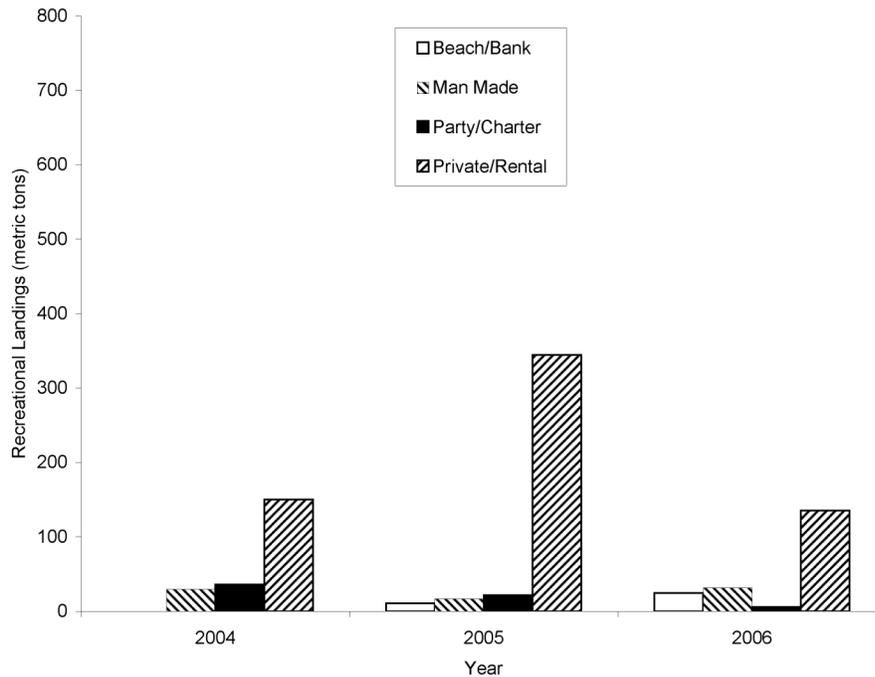


Figure 13. Recreational landings of California halibut (*Paralichthys californicus*) as reported in the California Recreational Fisheries Survey (CRFS), by four different fishing modes, 2004–06.

Southern California ports received almost 100% of the halibut caught in 2006. A series of depth restrictions in recent years along the central California coast has greatly affected the gill net fleet, which is evident by the lack of landings made north of Point Arguello since 2002.

Annual landings reported by the hook and line fleet have been relatively stable over the past decade (fig. 11). Hook and line landings by the top three port complexes were San Francisco (39%), Santa Barbara (27%), and Los Angeles (17%).

The recreational take of halibut, as reported in the Recreational Fisheries Information Network (RecFIN), from the Marine Recreational Fisheries Statistical Survey (MRFSS), showed a strong increase in fish landed from 1997 to 2003 (fig. 12). Anglers fishing from private and rental boats landed, on average, 84% of all the halibut during this time period. In 2004, the California Recreational Fisheries Survey (CRFS) replaced the MRFS. Recreational catch estimates obtained from RecFIN show that anglers fishing from the shore modes, party/charter modes, and private/rental modes caught 197 t of halibut statewide in 2006, a 50% decrease from 2005 (fig. 13). CRFS data also show private/rental vessels catch the majority of the recreationally caught halibut.

Since the MRFS and CRFS survey methods are not comparable, historical trends (spanning the last ten years) for the recreational catch of halibut can be determined by Commercial Passenger Fishing Vessel (CPFV) logbook data. CPFV logbook data provide a direct census of the recreational catch by anglers fishing from CPFVs

(party/charter mode). Reported landings from 1997 to 2003 were fairly stable with a peak of 21,000 fish (83 t) in 2001. However, in 2004 a 62% decrease from the previous year occurred and the catch remained low throughout the next two years. Estimated weights, provided by RecFIN, were applied to the logbook landings (numbers of fish) to obtain metric tons.

**2006 Halibut Fishery Management Highlights.**

Beginning in 2000, a series of gill net depth restrictions were implemented in state waters less than 60 fathoms, from Point Reyes (Marin County) to Yankee Point (Monterey County) and from Point Sal (Santa Barbara County) to Point Arguello (Santa Barbara County). By 2002, the gaps between these areas were also closed and gill nets were not allowed in waters less than 60 fathoms between Point Reyes to Point Argeullo. These regulations were implemented to protect sea otters, common murres, and other marine life. These closures complement the 1994 southern California prohibition on gill net gear, within state waters, from Point Arguello to the U.S./Mexican border.

A new bottom trawl regulation implemented in 2005 closed small portions of the California halibut trawl grounds located between Point Arguello (Santa Barbara County) and Point Mugu (Ventura County) in state waters. A limited entry halibut trawl permit was implemented in 2006. The permit is required for bottom trawling within the designated halibut trawl grounds in state waters. Additionally, the permit is required for landings of halibut in excess of 331 kg (150 lb) that were

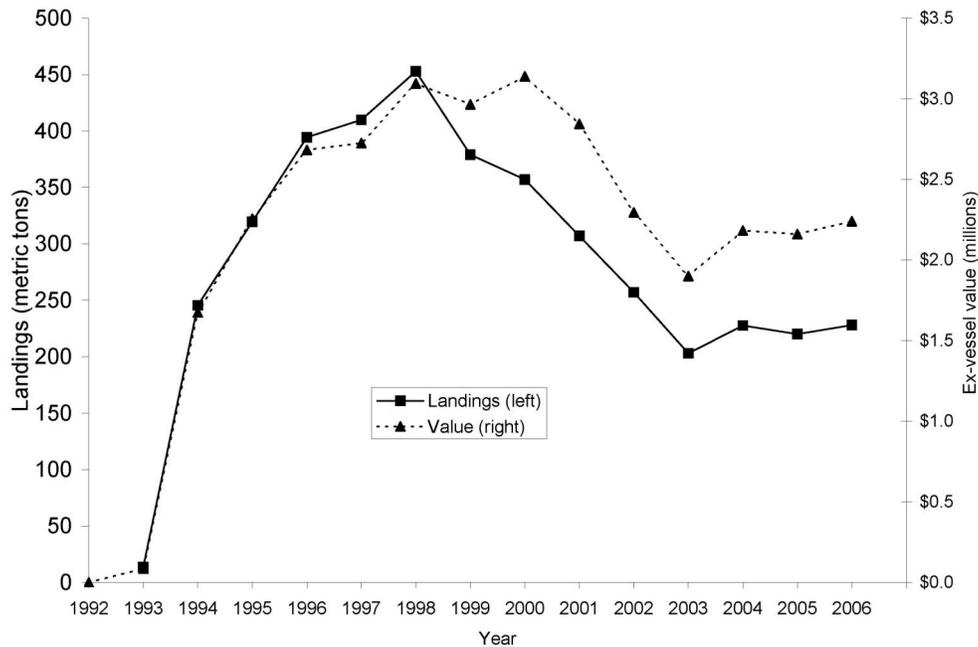


Figure 14. California nearshore live-fish landings in metric tons (left) and ex-vessel value (right), 1993–2006.

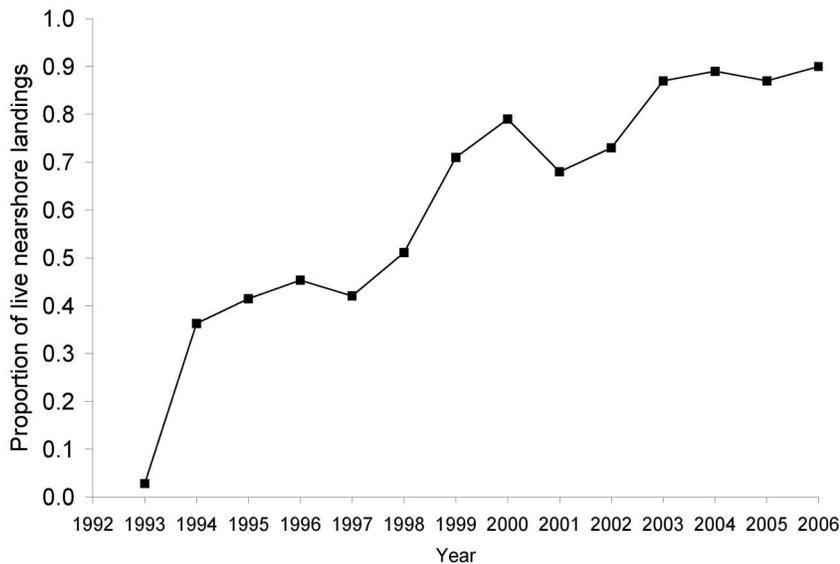


Figure 15. Proportion of fish landed live in the nearshore live fishery, 1993–2006.

caught in federal waters. A total of 60 permits were issued in 2006, and of these, 40 were active.

### Nearshore Live-Fishes

In 2006, statewide commercial landings of nearshore live finfish totaled approximately 228 t (fig. 14). Of that, a total of 206 t (90%) (fig. 15) were recorded as live landed fishes and 22 t or 10% were recorded as dead landed. The 2006 landings were 10% less than 2005 landings (254 t). The total ex-vessel value for the 2006 landings

was \$2.24 million, of which \$2.18 million was paid for live fish (fig. 14). This represents a slight decrease in the total 2005 ex-vessel value of \$2.26 million, but a slight increase in the amount paid for live fish (\$2.16 million).

The nearshore live fish fishery evolved from the demand for specialty foods in Asian restaurants and markets in southern California. What started out as an alternative fishery quickly expanded into a multimillion-dollar industry by the early 1990s, reaching its peak in 1998 (fig. 14). Part of the reason for this boom was the

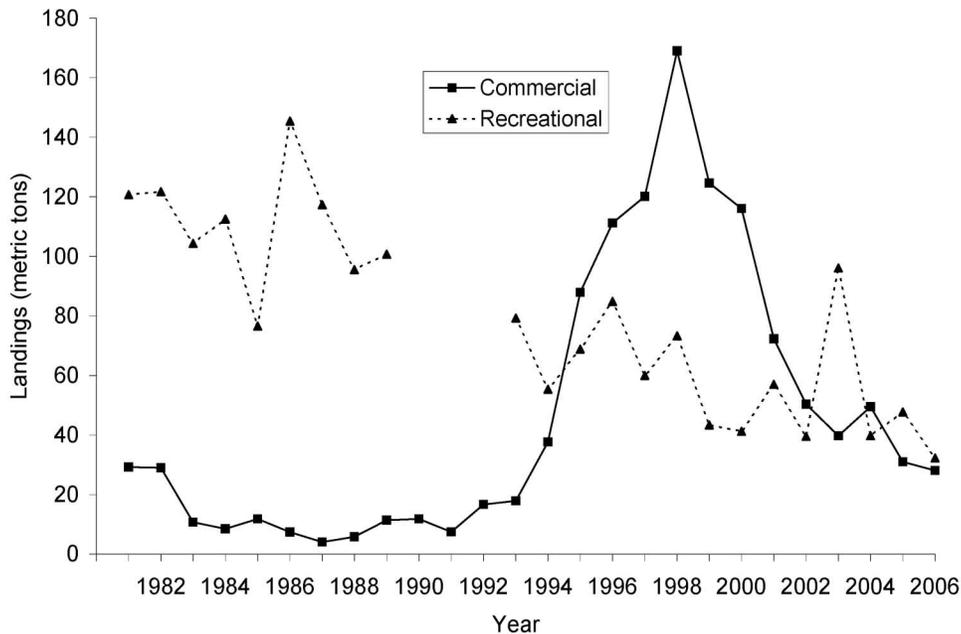


Figure 16. California commercial and recreational landings of cabezon (*Scorpaenichthys marmoratus*), 1981–2006. No recreational catch data are available for years 1990–92.

willingness of consumers to pay a much higher price for live fish than dead fish of certain species, particularly plate-sized fish. That premium was passed on to fishermen in the form of higher ex-vessel prices (price per unit of weight paid to fishermen upon landing of catch) for live fish. In 2006, grass rockfish demanded the highest average price paid for a pound of live fish (\$9.09 or \$20.20/kg); whereas the highest average price paid for a pound of dead fish was \$2.86 (\$6.36/kg) (brown rockfish *Sebastes auriculatus*).

Black rockfish (*Sebastes melanops*) were landed in the greatest quantity (52 t), representing 25% of the total statewide nearshore live fish landings, the bulk of which were landed in the northern region of the state. In dollars, the top three species landed in the statewide live fishery for 2006 were grass rockfish (\$0.38 million, 17.3%), California sheephead (\$0.36 million, 16.6%), and cabezon (\$0.34 million, 15.6%).

Hook and line and trap gear were the primary means to land nearshore fish species. Hook and line gear primarily consisted of rod and reel, vertical and horizontal longlines, and weighted stick gear. All hook and line gears combined landed 165 t of live nearshore fish. All trap gears combined landed 39 t of live nearshore fish. These two gear types accounted for 80% and 19% of the total nearshore live fish landed in 2006, respectively.

**2006 Nearshore Fishery Management Highlights.**

The nearshore fishery, as defined by California’s Nearshore Fishery Management Plan (NFMP, adopted by the Commission in 2002), includes a select group of finfish: cabezon (*Scorpaenichthys marmoratus*), California scorpion-

fish (*Scorpaena guttata*), California sheephead (*Semicossyphus pulcher*), kelp greenling (*Hexagrammos decagrammus*), rock greenling (*Hexagrammos lagocephalus*), monkeyface eel (*Cebidichthys violaceus*), and the following rockfishes (*Sebastes* spp.): black (*S. melanops*), black-and-yellow (*S. chrysomelas*), blue (*S. mystinus*), brown (*S. auriculatus*), calico (*S. dallii*), China (*S. nebulosus*), copper (*S. caurinus*), gopher (*S. carnatus*), grass (*S. rastrelliger*), kelp (*S. atrovirens*), olive (*S. serranoides*), quillback (*S. maliger*), and treefish (*S. serripes*). All except California sheephead, monkeyface prickleback, and rock greenling are designated as groundfish species under the PFMC’s fishery management plan for Pacific coast groundfish.

These 19 species represent the most commonly caught fish in the nearshore live fishery. Many are primarily found in shallow water of less than 20 fathoms and associated with structure, such as kelp beds or rocky reefs. They are slow-growing, long-lived, and territorial, making them vulnerable to overfishing even at low exploitation rates.

In 2005, the first-ever gopher rockfish stock assessment was completed and the assessment results indicated the stock was healthy. Because of these findings, the harvest target was increased for the shallower, nearshore rockfish species south of Cape Mendocino (40°10'). This addition begins in 2007 and 2008 and does not affect data presented for 2006.

The first California scorpionfish stock assessment was completed in May 2005. The assessment indicated the stock was healthy. In addition, the stock assessment indicated that the recent removal rates were near to or

TABLE 4  
**Annual commercial cabezon (*Scorpaenichthys marmoratus*)  
 landings, ex-vessel value, and average unit price  
 for years 1981–2006.**

| Average unit price for years 1981–2006 | Landings t | Ex-vessel value | Avg price/kg | Avg price/lb |
|--|------------|-----------------|--------------|--------------|
| 1981                                   | 29         | \$ 10,551       | \$ 0.34      | \$0.16       |
| 1982                                   | 29         | \$ 12,105       | \$ 0.33      | \$0.15       |
| 1983                                   | 11         | \$ 5,060        | \$ 0.33      | \$0.15       |
| 1984                                   | 8          | \$ 4,028        | \$ 0.43      | \$0.20       |
| 1985                                   | 12         | \$ 6,473        | \$ 0.46      | \$0.21       |
| 1986                                   | 7          | \$ 4,436        | \$ 0.53      | \$0.24       |
| 1987                                   | 4          | \$ 2,777        | \$ 0.72      | \$0.33       |
| 1988                                   | 6          | \$ 5,591        | \$ 0.79      | \$0.36       |
| 1989                                   | 11         | \$ 9,910        | \$ 0.84      | \$0.38       |
| 1990                                   | 12         | \$ 9,429        | \$ 0.86      | \$0.39       |
| 1991                                   | 7          | \$ 13,602       | \$ 1.23      | \$0.56       |
| 1992                                   | 17         | \$ 55,921       | \$ 3.71      | \$1.68       |
| 1993                                   | 18         | \$ 123,860      | \$ 6.40      | \$2.90       |
| 1994                                   | 38         | \$ 274,638      | \$ 6.70      | \$3.04       |
| 1995                                   | 88         | \$ 665,879      | \$ 6.75      | \$3.06       |
| 1996                                   | 111        | \$ 843,466      | \$ 6.96      | \$3.16       |
| 1997                                   | 120        | \$ 860,486      | \$ 6.48      | \$2.94       |
| 1998                                   | 169        | \$1,231,597     | \$ 6.42      | \$2.91       |
| 1999                                   | 125        | \$1,014,731     | \$ 7.40      | \$3.35       |
| 2000                                   | 116        | \$1,128,939     | \$ 8.63      | \$3.92       |
| 2001                                   | 72         | \$ 718,146      | \$ 8.97      | \$4.07       |
| 2002                                   | 50         | \$ 485,218      | \$ 8.86      | \$4.02       |
| 2003                                   | 40         | \$ 416,652      | \$ 9.13      | \$4.14       |
| 2004                                   | 49         | \$ 505,536      | \$ 9.06      | \$4.11       |
| 2005                                   | 31         | \$ 343,124      | \$10.04      | \$4.55       |
| 2006                                   | 28         | \$ 341,724      | \$11.10      | \$5.03       |
| Average                                | 46         | \$ 349,765      | \$ 4.75      | \$2.15       |

below the fishing mortality rate for maximizing catch biomass. In 2006, the Pacific Fisheries Management Council set a separate optimum yield for the California scorpionfish based on the 2005 assessment results.

### Cabezon

Cabezon (*Scorpaenichthys marmoratus*) is one of the 19 species of nearshore finfish as defined by California's NFMP discussed in the nearshore live fishery section. Historically, the vast majority of cabezon caught in California have been by recreational fishers. Recently, however, commercial landings increased, and by 1995 commercially-landed cabezon (88 t) exceeded the statewide catch by sport anglers (69 t) for the first time (fig. 16). The commercial fishery peaked over the period 1995 through 2002, reaching a high of 169 t in 1998 with an overall average of 106 t for those years. This sharp increase in commercial landings can be attributed to the advent of the nearshore live fishery beginning in the mid 1980s.

Accordingly, average unit price per pound for cabezon has increased from \$0.56 (1.24/kg) in 1991 to \$5.03 (11.10/kg) in 2006 (tab. 4), and unit prices have been recorded as high as \$10/lb (\$22.02/kg) to \$12/lb (\$26.67/kg) most recently. Cabezon are one of the top

four live-caught species groups in price per pound over the last five years, ranking only behind greenlings, rockfish, and flatfish.

Commercial cabezon catch has leveled off in the last few years, at least partially due to tighter regulations, but total catches have not dropped back to the lower catch amounts typical of the fishery prior to the emergence of the live fish market. However, commercial landings of cabezon have dropped below that of sport catch for the past three or four years. Preliminary 2006 commercial landings of cabezon totaled 28 t (ex-vessel value \$341,724). Of the total commercial catch taken in 2006, 24 t (87%) were brought to market in a live condition. The primary gear types used to land cabezon are hook and line and trap. From 2001 through 2006, 172 t of cabezon were landed using hook and line gear and 97 t were landed using trap gear. For 2006, hook and line gear produced 23 t with trap gear generating 5 t. Although other gear types, such as trawl and miscellaneous net gear, were used to land cabezon over this period, their contribution to the overall catch was negligible.

Recreational landings data are available from 1980 to 2006 for CPFV and private boat anglers as well as from shore (beach/bank) and pier/jetty (man-made) anglers. Over this period, recreational total landings for cabezon peaked in 1986 but generally declined since then, with the exception of a smaller peak in 2003 (fig. 16). State-wide landings for 2006 amounted to 32 t for cabezon, a decrease of 33% from 2005 (48 t). For both 2005 and 2006, approximately 90% of sport-caught cabezon came from northern California (north of Point Conception).

Private boat fishermen continually take the majority of sport-caught cabezon in California. Over the 25-year period 1981–2006, the average annual catch for the private boat fishery was 34,279 fish, compared to 20,145 and 5,230 fish for beach/bank and man-made modes of fishing, respectively. The number of cabezon landed by private boaters peaked in 1984 at 55,445 fish and the lowest annual catch for this group was 9,841 fish landed in 2006.

Cabezon are prized by sport divers for their edibility, size, and ease of capture. Their significant numbers in shallow, inshore waters make them a popular target for free divers, in addition to those using scuba. Data collected at central California free diving spearfish competitions from 1958 through 2003 indicate that 2,988 cabezon were taken, ranking it the eighth most frequently captured species out of 52 species landed total. Locations of competitions ranged from San Luis Obispo County in central California to Mendocino County in northern California.

At present, CPFVs generally do not target cabezon and thus take a small amount of them compared to the total sport catch. Estimates from RecFIN data show that

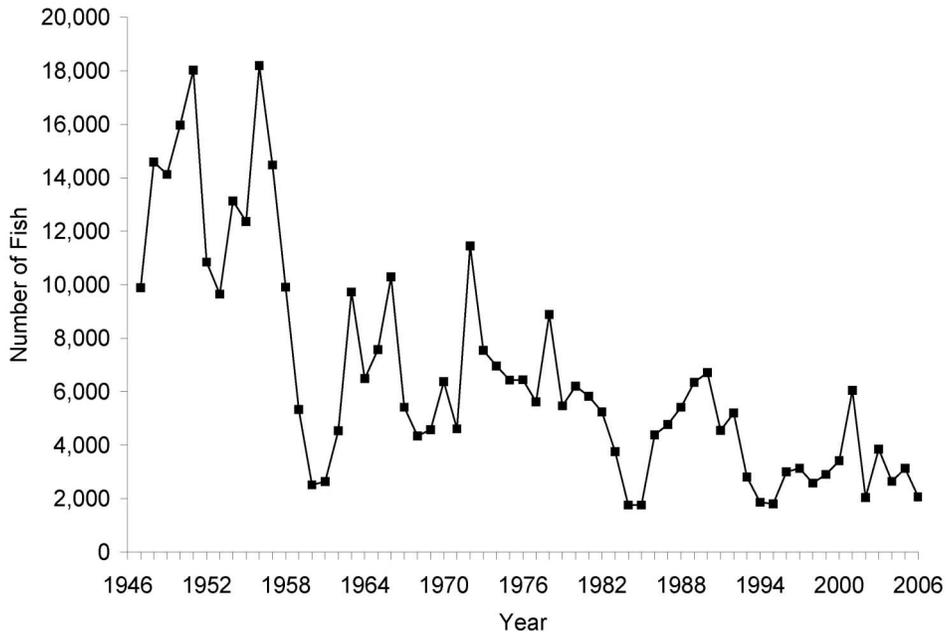


Figure 17. California commercial passenger fishing vessel (CPFV) cabezon (*Scorpaenichthys marmoratus*) catch (number of fish), 1947–2006.

in recent years the number of CPFV-landed cabezon have contributed less than 10% to the total annual sport catch for this species. With the exception of CPFVs, there is little statewide historical data for cabezon prior to 1980 available for other modes of fishing. Consistent CPFV data collected from logbooks are available starting from 1947 and show that landings of cabezon have, at times, been much more significant than they have been since the 1980s. Statewide CPFV landings of cabezon surpassed 10,000 annual fish eleven times prior to 1960, but only twice since then, and not once since 1972 (fig. 17). This trend, prior to significant sport take regulations enacted beginning in 1999, may reflect a fishery on the decline. A total of 2,069 cabezon were landed on CPFVs statewide in 2006, a 34% decrease from 2005.

**2006 Cabezon Fishery Management Highlights.** The most recent California stock assessment on cabezon was completed in 2005. For this assessment cabezon were treated as different northern and southern California substocks based on differences in total removals, ecology, and current management needs. Point Conception was used as the delineation line between the two regions. Reproductive output of the cabezon resource off northern California was estimated to be about 40% of the unfished stock indicating a healthy fishery. Southern California’s stock was estimated to be at about 28% of the unfished level, but due to greater uncertainty in the assessment for the southern population, no absolute conclusions could be drawn. Both estimates are above the estimated 25% unfished biomass level under which a fishery is defined as “overfished” by NMFS.

Under state management by the Commission, the cabezon is managed as a separate harvest group with specific regulations. The total allowable catch (TAC) for cabezon in 2006 was 69.0 t (152,100 lbs), of which the commercial fishery was allocated 26.9 t (59,300 lbs) and the recreational fishery was allocated 42.1 t (92,800 lbs). In past years the commercial cabezon fishery closed early due to projected catch exceeding the TAC. To avoid this, a mid-season reduction in trip limit amounts was adopted for September through October 2006. The change reduced the 2-month allotment from 408 to 90 kg (900 lbs to 200 lbs) total take per license holder. Accordingly, the commercial cabezon fishery was allowed to remain open through the end of the year. Recreational bottom-fishing seasons and/or depth restrictions were relaxed to some extent for all regions in California in 2006, allowing for increased fishing opportunity. There was no change in the 1-fish bag limit and 38.1 cm (15-in.) minimum size limit for cabezon for sport anglers.

### Surfperches

Historically, commercial landings of fish in the family Embiotocidae (surfperches) have been of minor importance compared to the recreational catch. In 2006, of the estimated 292 t of surfperch landed in California, 95% (276 t) was recreational and 5% (16 t) was commercial (fig. 18). Recreational landings are typically reported in numbers of fish and have been converted to weight (based on length-weight relationships and length-frequency distributions of sampled fish) for comparison.

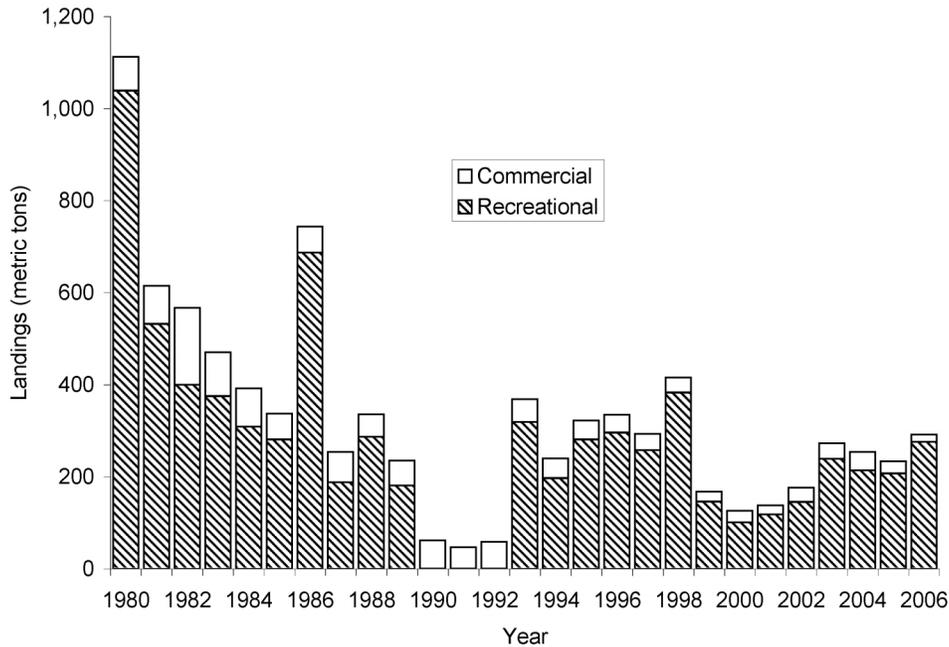


Figure 18. California commercial and recreational landings of surfperch in metric tons, 1980-2006. No recreational data were available for 1990-92.

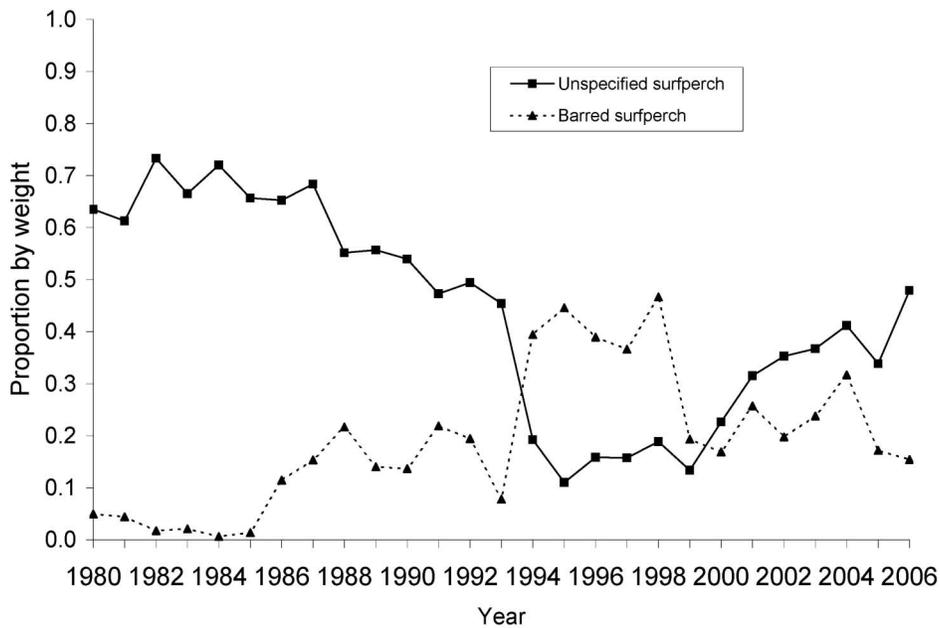


Figure 19. Historical commercial landings of unspecified surfperch compared to barred surfperch in California, 1980-2006.

In 2006, commercial surfperch fisheries accounted for only 0.01% of all commercial landings by weight. An estimated 16 t of surfperch were landed in 2006, a decrease of 38% from 2005. Barred surfperch and redbtail surfperch accounted for nearly all the landings in which species were identified. An “unspecified surfperch” market category is used occasionally by dealers, and species composition is unknown. Over 99% of the 2.5 t of barred surfperch caught during 2006 in California were landed

in the Santa Barbara and Morro Bay port areas. Barred surfperch landings statewide decreased by 50% from those in 2005. In 2006, 99% of the 6 t of redbtail surfperch were landed in the Eureka port area. Historically, redbtail surfperch landings have comprised more than 98% of all surfperch landings in Eureka. Landings of redbtail surfperch decreased by 47% in this area compared with 2005.

Unspecified surfperch comprised 48% of the commercial landings by weight in 2006 and 34% in 2005.

TABLE 5  
 Estimated number (in thousands) of surfperches caught in California marine recreational fisheries, 1996–2006.

|                    | North of Point Conception |     | South of Point Conception |     |
|--------------------|---------------------------|-----|---------------------------|-----|
|                    | No.                       | %   | No.                       | %   |
| Barred surfperch   | 1,653                     | 30  | 1,929                     | 47  |
| Black perch        | 273                       | 5   | 586                       | 14  |
| Calico surfperch   | 109                       | 2   | 20                        | —   |
| Pile perch         | 107                       | 2   | 51                        | 1   |
| Rainbow seaperch   | 86                        | 2   | 7                         | —   |
| Redtail surfperch  | 217                       | 4   | 0                         | —   |
| Rubberlip seaperch | 132                       | 2   | 61                        | 1   |
| Shiner perch       | 990                       | 18  | 315                       | 8   |
| Silver surfperch   | 303                       | 5   | 42                        | 1   |
| Striped seaperch   | 533                       | 10  | 8                         | —   |
| Walleye surfperch  | 626                       | 11  | 773                       | 19  |
| White seaperch     | 123                       | 2   | 123                       | 3   |
| Other surfperches  | 398                       | 7   | 199                       | 5   |
| All surfperches    | 5,550                     | 100 | 4,114                     | 100 |

The majority of the unspecified surfperch was landed in San Francisco and Santa Barbara area ports. The past few decades have shown fluctuations in unspecified surfperch landings which appear to be inversely proportional to reported barred surfperch landings (fig 19); this may be indicative of the species composition of the unspecified market category, although landings were not sampled. In 1994, new landing receipts, with more specific market categories listed, were issued to buyers in an attempt to reduce the amount of landings reported as unspecified. This seemed to be effective at first, although recent landings are again being reported as unspecified. The average ex-vessel price for surfperch over the past 10 years has increased by 39% from \$0.60/kg (\$0.27/lb) in 1996 to \$0.98/kg (0.44/lb) in 2006.

The primary gear used to catch surfperch is hook and line, which accounts for over 90% of the commercial landings. Much of the hook and line fishing occurs from shore. Other gears used include brail nets, fish traps, and longlines.

According to the 2006 commercial fishing statutes and regulations, the commercial surfperch fishery is closed from 1 May to 31 July, with the exception of the shiner perch fishery which is open year-round. It is illegal to take barred, redbtail, and calico surfperches south of Point Arguello for commercial purposes.

Based on estimates from CRFS, nearly 10%, by number, of finfish caught statewide by recreational anglers in 2005 and 2006 were surfperch. The total surfperch harvest was approximately 1.1 million fish in 2005 and 1.3 million fish in 2006. By weight, in 2006 the total recreational catch of surfperch increased nearly 8% from that in 2005. Surfperch composed nearly 6% of the total recreational catch of finfish by weight for 2006 as compared to 5% in 2005.

The top surfperch species caught recreationally differed in central/northern California from that caught in southern California (Point Conception south to Mexican border) (tab. 5). Barred surfperch (*Amphistichus argenteus*) catch was substantial in both regions, but more so in southern California where it made up, on average, 47% of all surfperch from 1996 to 2006. Walleye surfperch (*Hyperprosopon argenteum*) and black perch (*Embiotoca jacksoni*) also contributed significantly to the catch in southern California, averaging 19% and 14%, respectively, of the total. There were more species taken in significant numbers (i.e., at least 5% of the catch) in central/northern California; in addition to barred surfperch (30%) and walleye surfperch (11%), the catch included 18% shiner perch (*Cymatogaster aggregata*) and 10% striped seaperch (*Embiotoca lateralis*) by number. A significant improvement in estimating recreationally-caught finfishes in California occurred in 2004 with the establishment of the CRFS program. While the actual catch estimates from MRFSS are not comparable to CRFS, the species composition data are reliable.

### Leopard Shark

The leopard shark (*Triakis semifasciata*) is a member of the Triakidae (houndshark) family, distinguished by its grey body covered in black saddlebars and spots. This species occurs from Oregon to Mazatlan, México, including the Gulf of California. It is common in near-shore waters, bays, and estuaries throughout California. Sexual maturity is reached at 7 to 15 years, and development is viviparous, with litters of 7 to 36 pups. Leopard sharks are targeted by small-scale commercial hook and line fisheries, recreational anglers, and marine aquaria collectors.

Leopard sharks are one of six elasmobranch species under the management authority of the PFMC Groundfish Fishery Management Plan (Groundfish FMP). Although this species is defined as a groundfish, harvest of leopard shark is not actively managed under the Groundfish FMP. However, the State of California has management measures in place, such as size and bag limits, to protect the leopard shark resource.

From 1991 to 2006, California commercial landings ranged from a high of 24 t in 1993 to a low of 6 t in 1996, averaging 12 t annually over the past 15 years. Reported landings totaled 9 t in 2006, compared to 11 t in 2005. However, the ex-vessel value increased from \$1.74/kg (\$0.78/lb) in 2005 to \$2.27/kg (\$1.02/lb) in 2006. Gill net gear contributed the majority of landed catch at 56% in 2006; hook and line gear contributed 33% of landings; while trawl gear contributed 11%. Most of the 2006 catch south of San Francisco was taken by gill net gear targeting halibut, while much of the catch from San Francisco north occurred in hook and line

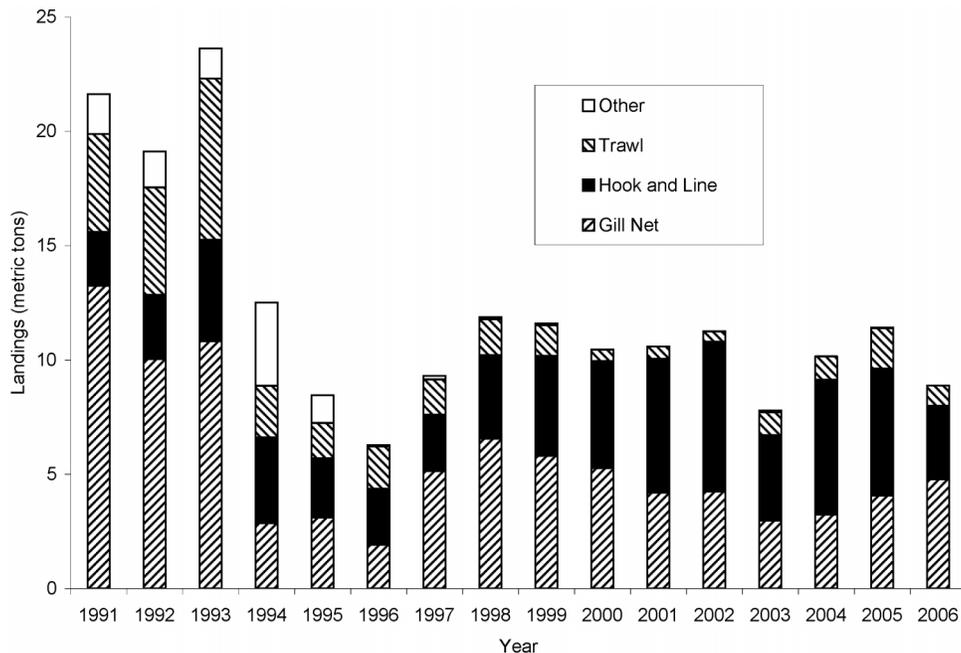


Figure 20. California commercial landings of leopard shark (*Triakis semifasciata*) by gear type, 1991–2006.

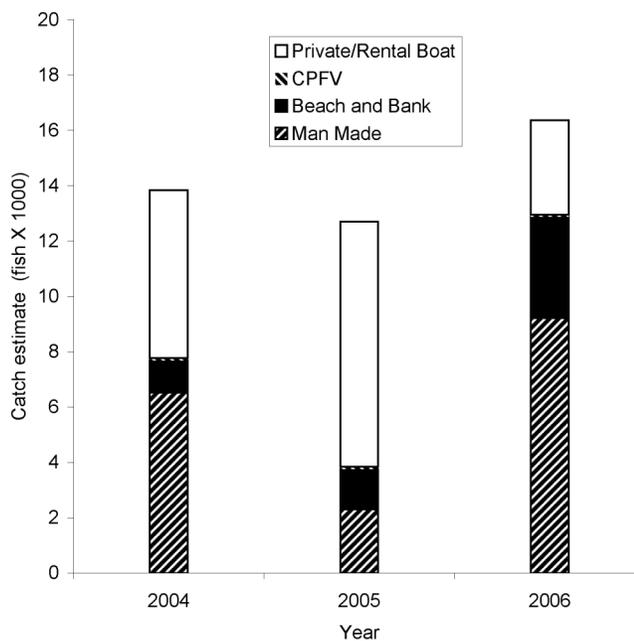


Figure 21. California recreational landings of leopard shark (*Triakis semifasciata*) as reported from CRFS, 2004–06.

fisheries targeting nearshore groundfish and flatfish trawl fisheries. It should be noted, however, that leopard shark landings are subject to reporting bias, since an unknown number are lumped with other shark species in the “shark, unspecified” market category on commercial landing receipts.

In 1994, the introduction of a minimum commercial size limit of 91 cm (36 in) TL and the exclusion of gill

net gear in State waters south of Point Arguello resulted in a dramatic drop in commercial landings (fig. 20), but landings have remained relatively stable since 1994. In 2002, the use of gill net gear was also prohibited from Point Reyes to Point Arguello in 110 m (60 fathoms) of water or less, which appears to have further stabilized gill net landings.

Recreational catches for leopard shark are greater than commercial landings. Most sport-caught leopard sharks are taken using baited hooks, although some are also taken by divers using spears and by fishers using bow and arrow. A recreational size limit of 91 cm (36 in) TL and a three-fish daily bag limit have been in effect since 1992. Beginning in 2005, recreational groundfish closures and depth restrictions were applied to all federally managed groundfish to allow overfished stocks to rebuild. However, exceptions were incorporated into the regulations that allowed the take of leopard sharks during groundfish closures within specified enclosed bays.

Catch estimates (CRFS) indicate that from 2004 to 2006 (fig. 21), an average of 14,300 fish (65 t) were taken annually. In 2006, an estimated 16,400 fish were taken. This is 15% above the three-year average, and 25% above the 2005 catch, estimated at 12,700 fish. The CRFS data also indicate that private boaters land the majority (53%) of leopard sharks in the recreational fishery, followed by shore-based anglers (46%) and CPFVs (1%). Catch estimates (MRFSS) from 1993 through 2003 show a similar pattern (fig. 22). These surveys indicate anglers fishing from San Francisco to Eureka catch a majority of the leopard sharks in bays, while anglers fishing

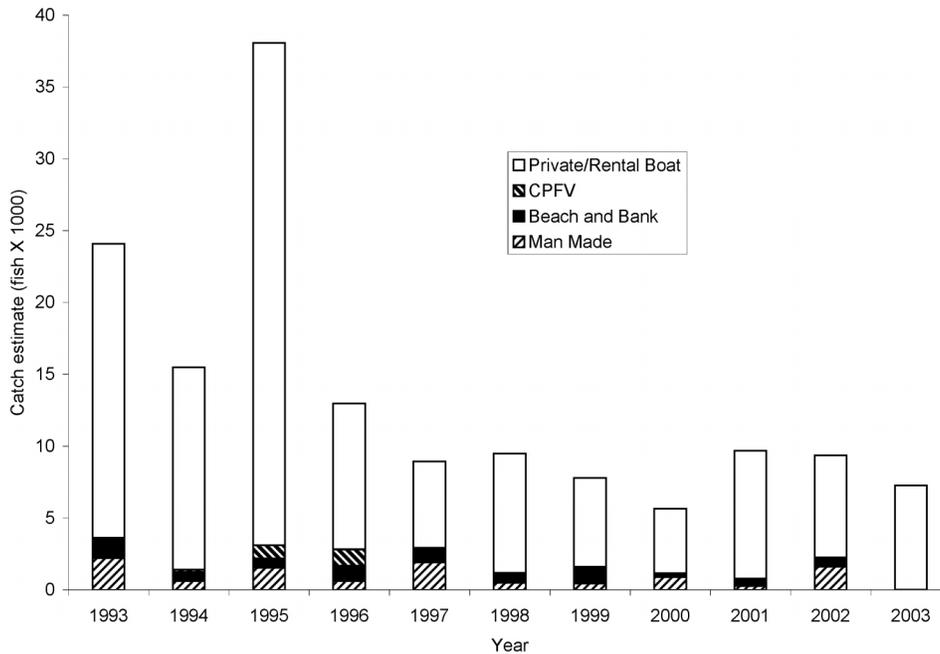


Figure 22. California recreational landings of leopard shark (*Triakis semifasciata*) as reported from MRFSS, 1993–2003.

south of San Francisco catch leopard sharks in nearshore coastal waters.

Marine aquaria collectors target leopard shark pups due to their desirability as aquarium fish. Collecting pups for marine aquaria display became illegal in 1994, when the size limit went into effect. However, a black market for pups continues today. In 2006, a three-year investigation involving the CDFG, NMFS, U.S. Fish and Wildlife Service, as well as investigators in the United Kingdom, Netherlands, and elsewhere resulted in the arrest and prosecution of six individuals charged with violating the Lacey Act. The Lacey Act is the Federal law that prohibits the possession, take, purchase, or sale of any wildlife taken in violation of any state or federal regulation. Investigators estimate that from 1992 to 2004, 20–25,000 leopard shark pups were poached from San Francisco Bay by the two groups investigated, and from 1992 to 2003, 30–33,000 pups were poached by various groups along the Los Angeles, Ventura, and Santa Barbara County coasts. These estimates are significant

when compared to recreational and commercial leopard shark landings. However, the recent convictions appear to have resulted in curtailment of most of the large-scale illegal take of leopard shark pups.

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