

**REVIEW OF SOME CALIFORNIA FISHERIES FOR 2002:  
MARKET SQUID, SEA URCHIN, DUNGENESS CRAB, PRAWN,  
COASTAL PELAGIC FINFISH, ALBACORE, OCEAN SALMON, NEARSHORE LIVE-FISH,  
PACIFIC HERRING, AND RECREATIONAL**

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**SUMMARY**

In 2002, commercial fisheries landed an estimated 177,627 metric tons (t) of fishes and invertebrates from California ocean waters (fig. 1). This represents a decrease in landings of nearly 12% from the 200,996 t landed in 2001, and a 28% decrease from the 247,122 t landed in 2000. The preliminary ex-vessel economic value of commercial landings in 2002 was \$104 million, slightly higher than the \$103 million in 2001 and a decrease of 22% from the \$133 million in 2000.

The top three grossing fisheries in the state were invertebrate fisheries. Market squid was once again the top grossing fishery, with ex-vessel value of \$18.2 million, an 8% increase in value even though landings declined by 15%. Regional shifts in availability and landings due to El Niño conditions and strong international demand for California squid due to poor landings in other international squid fisheries were responsible for the reduced landings and higher revenues. Dungeness crab was the second highest grossing fishery, with \$13.4 million in revenue, an increase of 49% over 2001, which had the lowest landings in over 25 years. Sea urchin was the third highest grossing fishery, with \$10.1 million in revenue, a decrease of 13% from 2001 revenues, even though landings were 6% higher. Weakening prices due to expansion of new Japanese fisheries was not offset by increased domestic demand. Chinook salmon ranked fourth in value, with \$7.6 million in revenues, an increase of 60% from 2001 (\$4.8 million). And swordfish ranked fifth in value with \$6.3 million in revenues, a 28% decline from 2001 (\$8.7 million). The remaining top-ten grossing fisheries included Pacific sardine (\$5.8 million), California spiny lobster (\$4.5 million), albacore (\$3.9 million), sablefish (\$3.6 million), and spot prawn (\$3.3 million). Groundfish revenues (all groundfish species combined) in 2002 were \$16.1 million, slightly lower than in 2001 (\$16.2 million), although landings were 3% higher in 2002 (12,273 t) than in 2001 (11,862 t).

Spot prawn revenues decreased by 10% in 2002 (\$3.3 million) from 2001 (\$3.7 million), continuing a decline in landings for the past 4 years. Over three-quarters of spot prawn were landed live, with an average price of

\$8.22/lb. In recent years, there has been a shift from the use of traps to trawls in the fishery. However, concerns about bycatch of overfished rockfish species led to a ban of spot prawn trawling in 2003.

Landings of Pacific sardine ranked second in 2002 (58.3 t) and increased 11% from 2001 (51.8 t) despite a closure for domoic acid, export bans due to viral hemorrhagic septicemia, and a regional closure of northern California, Oregon, and Washington fisheries due to attainment of the harvest guideline. Pacific mackerel landings in 2002 (3,366 t) declined 51% from 2001 and 84% from 2000, prompting a reduction in the harvest guideline for 2003. Landings of jack mackerel and northern anchovy also decreased substantially in 2002 compared to 2001, with declines of 72% and 76%, respectively.

Commercial landings of albacore declined 13% in 2002, whereas recreational landings increased 30% compared to 2001. The majority (60%) of the recreational catch was landed in Mexico. Nearshore commercial finfish landings totaled 352t in 2002, with 73% identified as live landings. Ex-vessel value of nearshore landings was \$2.7 million, of which \$2.3 million was paid for live fish. This represents a slight decrease from 2001 in total nearshore landings and in value.

In 2002, nearly 700,000 recreational anglers aboard commercial passenger fishing vessels (CPFVs) landed nearly 3.17 million fishes, 6.5% more than in 2001 (2.97 million) and 2% less than in 2000 (3.23 million). Southern California anglers accounted for 81% of total landings. The ten top species landed in southern California were barred sand bass (27% of total), albacore tuna (12%), unspecified rockfishes (12%), kelp bass (10%), California barracuda (9%), sanddab (5%), ocean whitefish (4%), California scorpionfish (4%), halfmoon (3%), and yellowtail (3%). In central and northern California, a total of 1,164,767 fish were landed. The ten top species included unspecified rockfishes (37% of total), blue rockfish (23%), Chinook salmon (13%), gopher rockfish (6%), flatfishes (unspecified; 5%), lingcod (4%), albacore tuna (4%), California halibut (2%), striped bass (1%), and brown rockfish (1%).

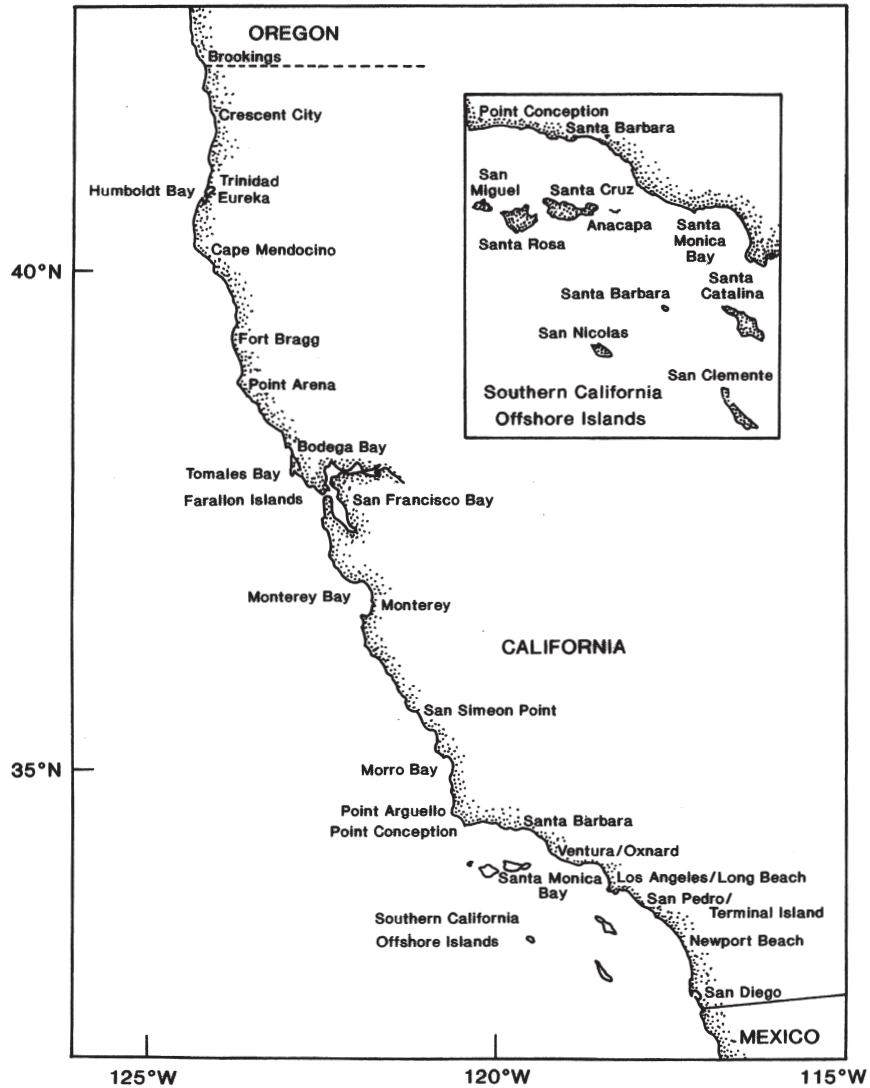


Figure 1. California ports and fishing areas.

In 2002, the California Fish and Game Commission undertook 28 rule-making actions that address marine and anadromous species. New regulations for offshore and nearshore rockfish and lingcod stocks were prompted by action taken by the Pacific Fishery Management Council (PFMC). PFMC voted to decrease the bag and possession limits of certain rockfish species found in federal waters to help rebuild overfished stocks of bocaccio, canary, cowcod, yelloweye rockfishes, and lingcod. Because many of these species are found in both state and federal waters, the Commission adopted similar state laws to comply with the federal regulations for these species. New management areas for rockfish and lingcod include:

- Northern Rockfish and Lingcod Management Area—waters from Cape Mendocino (40°10'00"N lat.) to the California-Oregon border.
- Central Rockfish and Lingcod Management Area—(formally known as the Northern Rockfish and Lingcod Management Area) waters from Cape Mendocino south to Point Conception.
- Southern Rockfish and Lingcod Management Area and Cowcod Closure Areas—remain the same; between Point Conception (34°27'00"N lat.) and the U.S.-Mexico border.

Rockfish, lingcod, and sculpin fisheries were closed for eight months (March–June and September–December, inclusive) in offshore waters (deeper than 20 fathoms) of the central management area, and closed for 4 months in offshore waters (January–February and November–December) in the southern management area. No closures occurred in the northern management area.

In October 2002, the Commission voted to adopt a series of marine protected areas (MPAs) within the

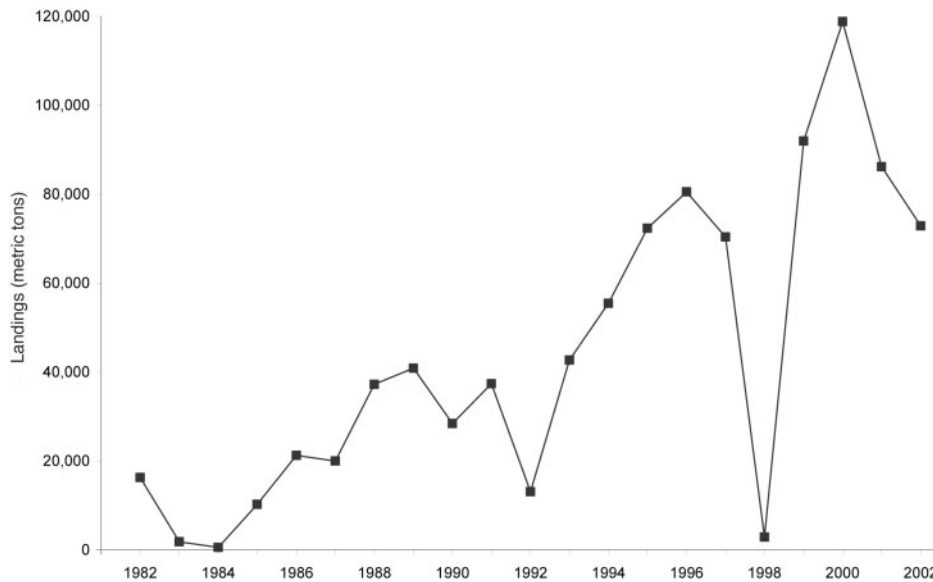


Figure 2. California commercial market squid landings, 1982–2002.

Channel Islands National Marine Sanctuary. The decision came after 4 years of public meetings and deliberations. The network of MPAs consists of 12 distinct areas around four of the northern Channel Islands covering 175 mi<sup>2</sup>. The Commission also adopted the Nearshore Fishery Management Plan, which provides a management strategy for 19 of the nearshore species targeted by the nearshore live-fish fishery. The plan integrates a framework of management measures intended to meet the goals and objectives of the Marine Life Management Act and provide for sustainable nearshore stocks and fisheries.

## INVERTEBRATE FISHERIES

### Market Squid

Market squid (*Loligo opalescens*) was the largest fishery in the state by volume and ex-vessel value in 2002. A total of 72,879 t of market squid was landed, 15% less than in 2001 (86,202 t) and 39% less than the record high set in 2000 (118,825 t) (fig. 2). The 2002 ex-vessel value was approximately \$18.2 million, an 8% increase over 2001 (\$16.9 million). The average ex-vessel price was \$250/t, a 40% increase from 2001. The fishery was poor due to El Niño weather conditions, and market demand was strong due to poor landings in other international squid fisheries.

The fishing season for market squid runs from 1 April through 31 March of the following year. A northern fishery occurs during the spring and summer and is centered on the southern bight of Monterey Bay. A southern fishery occurs during the fall and winter off the Channel Islands and coastal locations from Point

Conception south to San Diego. Both declines in total landings (fig. 2) and regional shifts in landings (fig. 3) highlight the impacts of the El Niño weather conditions on the squid fishery. During the 2002–2003 season, 42,596 t were landed, 54% less than the 2001–2002 season (92,573 t) and 63% less than the peak 1999–2000 season (115,437 t).

The northern fishery experienced a significant expansion and record-setting year. A total of 25,224 t was landed (fig. 3), a 58% increase over the previous record of 15,950 t set in the 1994–95 season. Squid were harvested from areas as far south as Morro Bay and as far north as Fort Bragg. The length of harvest time was also unusually long. Landings began in mid-February and continued through November. Typically, landings in the northern fishery occur around mid-April and end around September. Usually squid are concentrated and harvested at night with the use of high-powered lights. This year there was an increase in daytime activity. During the day, squid remained concentrated enough to allow for vessels using sonar to detect and capture them.

Contrary to most seasons (but prevalent in El Niño years), the southern fishery did not surpass the northern fishery in 2002–2003 (fig. 3), with 17,372 t landed (41% of the catch). Catches were light most of the season with boats working hard for very few tons landed per fishing day. These poor southern California landings were concurrent with the mild El Niño that occurred earlier in the summer. After the El Niño condition subsided, southern catches remained poor. With very high international demand, coupled with low availability, the ex-vessel price of squid increased from \$220/t to \$550/t.

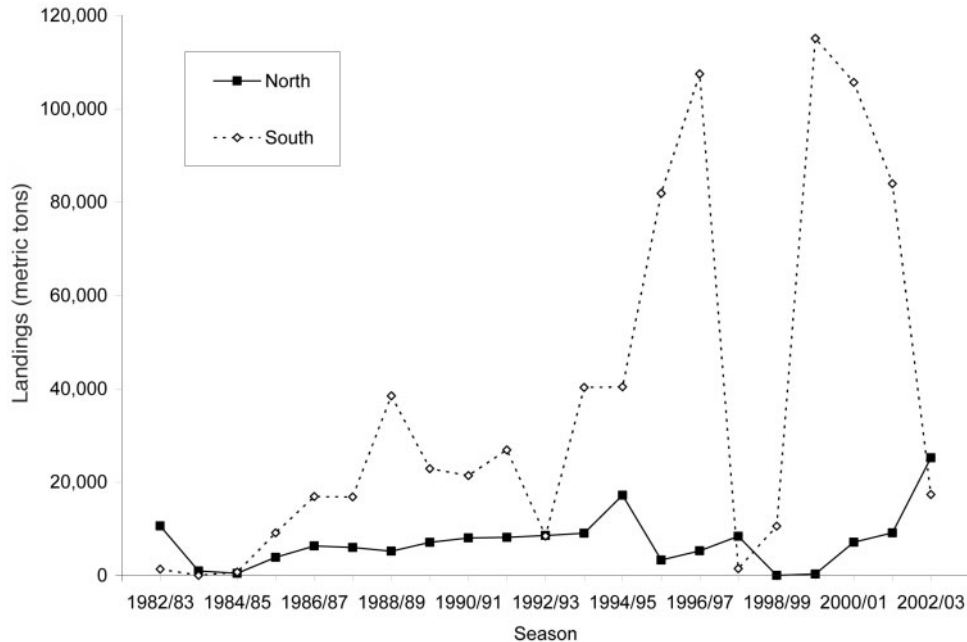


Figure 3. Comparison of market squid landings for northern and southern fisheries by fishing season (1 April to 31 March of the following year), from the 1982–83 season to the 2002–2003 season.

Market squid has become an important international commodity. While some squid are used domestically for consumption and bait, most are packed and processed for export. In 2002, 41,224 t were exported for a value of \$30.9 million. Export to China accounted for approximately 40% of this trade.

In May 2002, the preliminary draft of the Market Squid Fishery Management Plan was released for public review and comment. The goal of the plan is to provide a framework and set of procedures to ensure a sustainable fishery and to reduce the potential for overfishing. Due to other fishery issues and implementation of other fishery management regulations, the California Fish and Game Commission postponed adoption of the plan until the fall of 2003, with scheduled implementation in the 2004–2005 fishing season.

### Sea Urchin

Statewide landings in 2002 were estimated at 6,260 t with an ex-vessel value of \$10.1 million (fig. 4). This is a 6% increase from 2001 landings (5,930 t) and a 13% decrease from 2001 ex-vessel value (\$11.53 million). In recent years, a strengthening domestic market has helped offset a world market weakened by increased production from new overseas fishing grounds. Sea urchins from the recently exploited Kuril Islands off northern Japan have made an impact on the more lucrative sea urchin grades, taking some of the market share traditionally captured by California's product.

The majority of southern California sea urchin landings came from the northern Channel Islands off Santa Barbara, where large and accessible stocks supplied the fishery in its early growth years. From 1973 to 1977, 80–90% of red urchin landings originated from these islands. Since the late 1990s, landings have decreased from the northern Channel Islands as fishing effort shifted south to San Clemente Island, San Nicolas Island, and the San Diego area. More recently there has been a reported reversal of this trend as northern Channel Island kelp beds have rebounded from the 1997–98 El Niño. In 1990, the southern California sea urchin catch peaked at over 12,250 t and has declined steadily to 3,810 t in 2002 (preliminary totals). In the 1990s, the fishery was impacted by two El Niño events (1992–94 and 1997–98) and a weakening Japanese economy reflected in decreased demand and lower ex-vessel prices; both factors contributed to reduced fishing effort and catches.

The northern California fishery has been characterized by rapid growth to 13,850 t in 1988 and then a decline and apparent stabilization at about 1,360–2,270 t since the late 1990s (fig. 4). The 2002 catch was estimated at 2,440 t. The number of sea urchin permits issued has slowly but steadily declined during the last decade, dropping to 361 for 2002. The target number of permits remains at 300 for this limited-entry fishery.

Legislation authorizing the Sea Urchin Fishery Advisory Committee (SUFAC) went into effect in 2002. Several members of the Director's Sea Urchin Advisory Committee (DSUAC) have been appointed to the

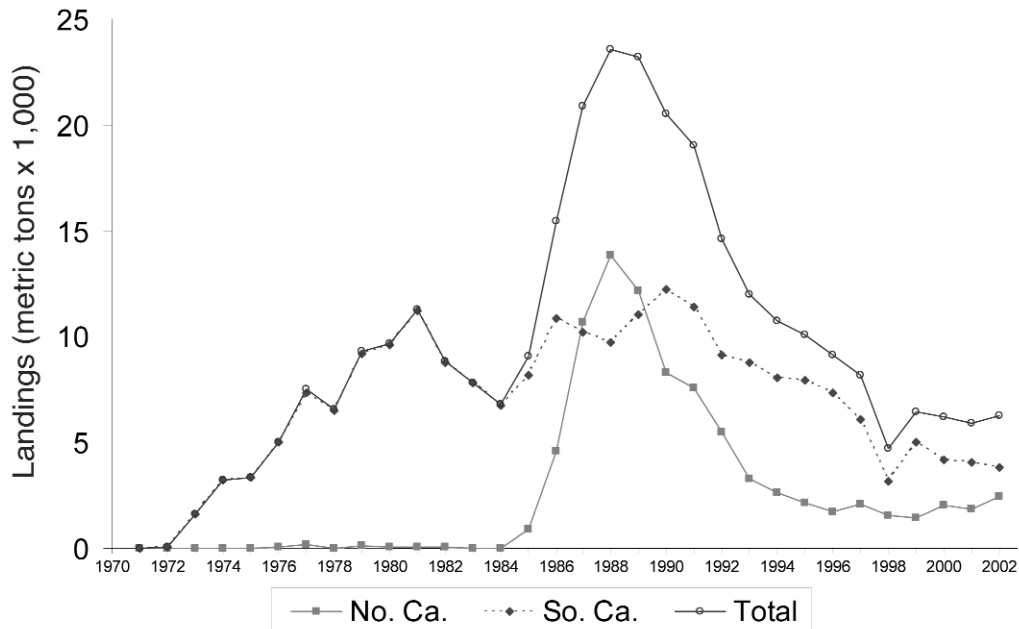


Figure 4. Comparison of red sea urchin landings for the northern and southern fisheries, 1971–2002.

restructured SUFAC. CDFG and the California Wildlife Foundation (CWF) completed a memorandum of understanding to allow the transfer to the CWF of remaining sea urchin enhancement funds that were collected from a self-imposed sea urchin landing fee during the DSUAC era. The transfer was for accounting purposes, and SUFAC retains control of fund distribution. Although the landing fee expired in 2001, the industry account has approximately \$250,000 remaining. The funds currently support a study of sea urchin settlement, and additional studies are actively being sought to support and augment CDFG's efforts to manage the resource and associated fishery.

SUFAC recently developed a proposal for using international consultants to write an industry-based monitoring plan. The industry and CDFG are working on interim regulatory changes for consideration by the California Fish and Game Commission. One proposed change could reduce overall catch by repealing the minimum landing requirement to maintain an urchin permit. Another proposal would increase fishing and product marketing opportunities during the summer months by reducing the number of days the fishery is closed.

### Dungeness Crab

Landings of Dungeness crab (*Cancer magister*) in 2002 are estimated at 3,286 t, a 105% increase in landings over 2001 (1,604 t) (fig. 5). This reverses the trend of decreasing landings since 1998. Landings in 2001 were the lowest in over 25 years. Ex-vessel revenues for 2002 were \$13.4 million, a 49% increase in value over 2001 (\$9

million), and slightly below 2000 revenues (\$13.7 million). The average price/lb dropped 28% from \$2.54 in 2001 to \$1.84 in 2002.

The Dungeness crab fishery in California is managed under a regimen of size, sex, and season. Only male Dungeness crabs are harvested commercially, and the minimum commercial harvest size is 6.25 in., measured by the shortest distance across the back immediately in front of the posterior lateral spines. The minimum size limit is designed to protect sexually mature crab from harvest for one or two seasons, and the timing of the season is designed to provide some measure of protection to crabs when molting is most prevalent. California implemented regulations prohibiting the sale of female Dungeness crabs in 1897. Minimum size regulations were first implemented by California in 1903 and have remained substantially unchanged since 1911. The commercial season runs from 1 December to 15 July from the Oregon border to the southern border of Mendocino County and from 15 November and 30 June in the remainder of the state. This basic management structure has been stable and very successful over time. Legislation to authorize a pre-season soft shell testing program in California was introduced during 1994, and industry-funded pre-season testing began prior to the 1995–96 season. The testing is monitored by the Pacific States Marine Fisheries Commission and a minimum meat recovery of 25% is required. Each year, around 1 November, the program is initiated; if the crab meat recovery is less than 25%, another test is mandated. Two weeks later the second

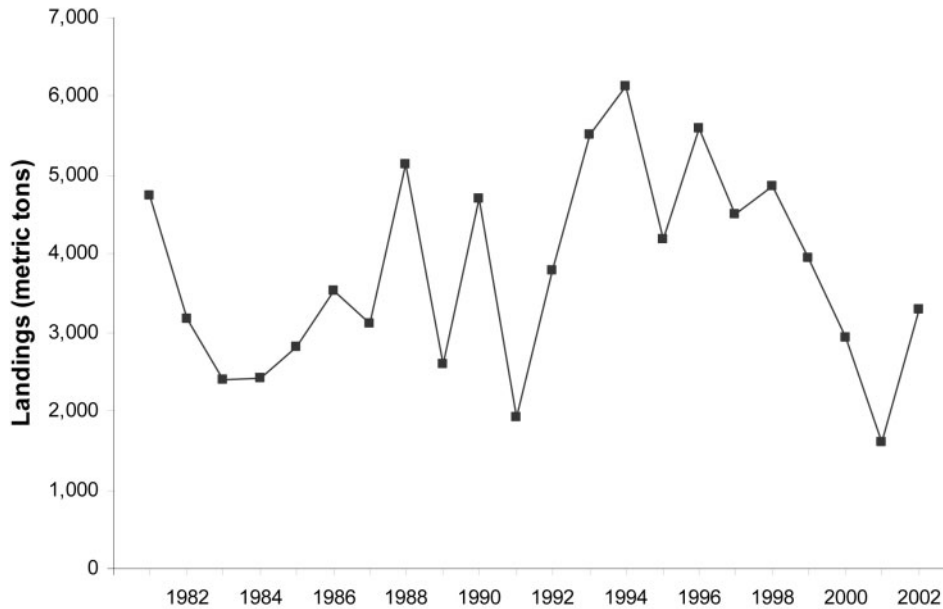


Figure 5. California commercial landings of Dungeness crab, 1981–2002.

test is made, 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. The first test produced a 27.3% pick out for the 2001–2002 season.

Summarizing 2001–2002 commercial season landings rather than the annual totals presented above results in much lower landings, since 79% of the 2002 landings occurred in November and December, the start of the 2002–2003 season. Landings for the 2001–2002 season totaled 1,634 t, a 36% decline from the 2000–2001 season and the lowest since the 1974–75 season. Southern Oregon suffered the same type of season, whereas northern Oregon and Washington reported their best catches in years. The average statewide price per pound was \$2.14, a decrease of \$0.09/lb over the 2000–2001 season. No one in central California went fishing on the 15 November 2001 opening date due to a strike over price. The fishers and processors finally settled for \$2.00/lb on 6 December, but the price jumped to 2.25/lb within two days. The northern California opening date of 1 December 2001 was also bypassed due to a strike over price. The strike ended after 12 days, and the crabbers brought in the first crabs at \$1.60–1.80/lb. The price jumped to \$2.10/lb within a few days due to poor catches. A total of 385 boats made landings during the 2001–2002 season, down from 424 the previous season and the smallest number of boats since the mid-1970s. Even with the coastwide strike, which lasted until mid-December, the majority of crab boats had quit fishing by February.

### Spot and Ridgeback Prawn

Preliminary 2002 spot prawn (*Pandalus platyceros*) landings were 178 t, a 7% decrease from 2001 (192 t). In the last two years, both trap and trawl landings have increased in the Monterey area but declined in the Santa Barbara area. Overall, this is the fourth consecutive year of decreasing landings.

Spot prawn are caught with both trawl and trap gear. Sixty-six boats fished for spot prawn in 2002 (37 trawl and 29 trap) with landings in seven port areas (tab. 1). Nearly 50% of landings were made in the Santa Barbara area. In the past, boats using trap gear were the major contributors to the fishery. Since the mid-1970s, however, boats using trawl gear have increased in number, and their landings now dominate the fishery. Since 1990, the number of spot prawn trawlers increased as vessels forced out of groundfish fisheries by new quotas, seasonal closures, and restrictions sought other sources of income. Many trawlers alternate between targeting spot prawn and ridgeback prawn, fishing for spot prawn during the closed season for ridgeback prawn, and conversely, targeting ridgeback prawn during the spot prawn closed season. In 2001, trap landings were greater than trawl landings for the first time since 1984; however, in 2002, trawl landings were once again greater by 19 t.

In 2002, trawlers harvested 99 t of spot prawn, while trap landings decreased to 80 t (tab. 1). The median ex-vessel price for spot prawn was \$8.22/lb, and 76% of all spot prawn landed were sold live. Live prawn had a median price of \$9.28/lb with a range of \$2.75–11.25/lb. Fresh dead spot prawn sold for a median price of \$3.81/lb with a range of \$0.10–7.00/lb.

TABLE 1  
**Landings of California Spot Prawn by Port Area and Gear Type, 2002**

Port Area	No. of fishing vessels		Landings (metric t)			
	Trap	Trawl	Trap	Trawl	Total	% of total
Eureka	1	2	<1	3	3	2
San Francisco	1	8	<1	24	24	13
Monterey	5	5	26	11	37	21
Morro Bay	2	10	5	<1	5	3
Santa Barbara	7	24	16	61	78	43
Los Angeles	11	1	19	<1	19	11
San Diego	9	0	14	0	14	8
Total			80	99	179	100

During 2002, the trap and trawl permit fisheries in southern California operated under concurrent closures from 1 November to 31 January. Up to 50 lb of incidentally trawled spot prawn could be retained during the closure. This southern California closure was enacted in 1997 to provide more protection for gravid females. North of Point Arguello, the spot prawn trap season was closed from 1 May to 31 July.

Bycatch concerns in the fishery led CDFG and the California Fish and Game Commission to mandate an on-board spot prawn observer program in 2000. Trawl and trap fishermen landing spot prawn were required to purchase an observer stamp; the stamp funds were used to hire, train, and deploy observers on spot prawn vessels to monitor the bycatch. Based on results from the observer bycatch study, an analysis of spot prawn logs by depth, and because of strict restrictions in landings of incidentally caught bocaccio rockfish (designated as an overfished species), the California Fish and Game Commission implemented a ban on all spot prawn trawling starting 1 April 1 2003. There is still a 50 lb allowance of spot prawn while trawling for ridgeback prawn, but spot prawn are now prohibited as bycatch to pink shrimp trawling. Provisions are being made to allow some spot prawn trawlers to convert their permits to the restricted-access trap fishery.

Preliminary ridgeback prawn (*Sicyonia ingentis*) landings totaled 200 t in 2002, a 22% increase from 2001 (165 t). However, this is only a slight recovery from the 77% decline in 2001 from record landings in 2000 (710 t).

Ridgeback prawn are taken entirely by trawl gear. Closed season is 31 May to 1 October, but 50 lb of incidentally caught prawn are allowed. Thirty boats landed prawn in 2002, a decrease of one from 2001. All landings were made in southern California ports, primarily in the Santa Barbara area, and caught mostly in the Santa Barbara Channel.

The median ex-vessel price for ridgeback prawn in 2002 was \$1.62/lb. Nearly half (48%) was landed live; however, most ridgeback prawn is frozen whole for export and domestic markets. Live prawn had a median

price of \$1.57/lb, and fresh dead prawn sold for a median price of \$1.35/lb.

Until recently, market demand and the number of dealers who could process large quantities of prawns limited ridgeback prawn landings. Within the last 6 years, several dealers were able to process up to 300,000 lb annually; however, following peak landings in 2000, the number of processors has dropped. In 2002, nine dealers purchased between 16,000 and 101,000 lb, with 22 dealers purchasing over 500 lb. Lack of market and lack of prawn availability have been given as reasons for the decline.

Ridgeback prawn trawl logs, required since 1986, also show that catch per unit of effort (CPUE) in pounds per tow hour increased from a low of 32 lb/tow hour in 1992, to a high of 213 lb/tow hour in 1999. During 2000, when record landings of ridgeback were made, CPUE had already begun decreasing with 160 lb/tow hour. CPUE further decreased to 70 lb/tow hour in 2001 and 68 lb/tow hour in 2002.

No biomass estimates or maximum sustainable yield calculations exist for ridgeback prawn. However, the potential for expansion of this fishery, the growing demand for ridgeback prawn, and this species' wide fluctuation in availability, warrants continued monitoring and analysis to keep harvest levels sustainable.

## FINFISH FISHERIES

### Coastal Pelagic Finfish

Pacific sardine (*Sardinops sagax*), Pacific mackerel (*Scomber japonicus*), jack mackerel (*Tiachurus symmetricus*), and northern anchovy (*Engraulis mordax*) are known as coastal pelagic species (CPS) finfishes. These species are jointly managed by the Pacific Fishery Management Council (PFMC) and the National Marine Fisheries Service (NMFS).

**Pacific Sardine.** The Pacific sardine fishery extends from British Columbia, Canada, southward to Baja California, Mexico; however, the bulk of the catch is landed in southern California and Ensenada, Baja

California, Mexico (BCM). The Pacific sardine harvest guideline (HG) for each calendar year is determined from the previous year's spawning biomass estimate. The 2002 Pacific sardine HG was set at 118,442 t using the 2001 spawning biomass estimate of 1.1 million t. Sixty-six percent (78,961 t) of this HG was allocated to the southern California fishery (south of Point Piedras Blancas, 35°40'00"N lat.), and the remaining 33% (39,481 t) was allocated to the northern California, Oregon, and Washington fisheries. The PFMC took emergency action to reallocate the remaining sardine resource in September after the northern fishery reached its HG in late August and the fishery was closed. The PFMC has planned a formal review of the reallocation process for 2003.

In southern California, Pacific sardine was the dominant CPS finfish until May 2002, when a domoic acid health advisory went into effect. Domoic acid is produced by a species of diatom and works its way up the food chain; it can cause disorientation, central nervous system damage, and death. Many vessels, except those that had orders for bait, stopped fishing. In addition, the expansion of the Australian sardine fishery and a temporary ban on U.S. imports due to concerns over viral hemorrhagic septicemia (VHS) reduced orders from Australian importers for sardines from California. Even so, California landings of Pacific sardine in 2002 totaled 58,296 t, an 11% increase from the previous year (tab. 2). Since 1995, the overall trend for California's sardine landings has been upward (fig 6). The ex-vessel value in 2002 exceeded \$5.8 million; a 7% decrease from 2001. Most (71%) of the catch was landed in southern California. Fifty-eight percent (33,661 t) of California's sardine catch was exported in 2002 with most (84%) of the fish going to Australia (50%) and Japan (34%). Although the tons exported increased by only 1%, the export value of sardine, which exceeded 20.5 million dollars, was 13% higher in 2002 than in 2001.

Oregon's Pacific sardine fishery landed 23,126 t in 2002, with an ex-vessel value of more than \$2.8 million dollars; and Washington's landings totaled 15,832 t with an ex-vessel value of more than \$1.9 million dollars (tab. 2). A significant portion of Oregon and Washington's sardine catch was exported to Japan in 2002. The commercial Pacific sardine fishery in Ensenada, BCM, had landings totaling 43,437 t in 2002; a 49% increase over 2001 (tab. 2).

**Pacific Mackerel.** Although Pacific mackerel are occasionally landed in Washington and Oregon, the majority of landings are made in southern California and Ensenada, BCM. During 2002, schools of Pacific mackerel were not abundant in southern California and were rare north of Point Conception. In addition, the domoic acid health advisory led to a ban on Pacific mack-

TABLE 2  
**Commercial Landings (metric tons) of  
 Pacific Sardine by Region and Ex-vessel Value**

Region	Landings (metric t)	% change from 2001	Ex-vessel value (US\$)	% change from 2001
Canada	703	-56	—	—
Washington <sup>a</sup>	15,832	30	1,936,900	36
Oregon <sup>b</sup>	23,129	45	2,839,110	44
California <sup>b</sup>	58,296	11	5,835,824	-7
Ensenada <sup>c</sup>	43,437	49	—	—

<sup>a</sup>Data from Pacific States Marine Fisheries Commission.

<sup>b</sup>Data from California Fishery Information System.

<sup>c</sup>Data from Nacional de la Pesca, Ensenada, Baja California, Mexico.

erel for human consumption during the spring and summer of 2002. California landings of Pacific mackerel in 2002 totaled 3,366 t; down 51% from 2001 and 84% from 2000 (fig. 6). The ex-vessel value of the 2002 catch in California was \$486,683. Export data on Pacific mackerel alone were not available; however, a comparison of exports of all mackerel species for the years 2001–2002 showed mackerel products exported from California decreased by 98% in 2002. Ensenada's commercial Pacific mackerel fishery had landings totaling 7,962 t in 2002; a 51% increase from 2001. Oregon's 2002 landings of Pacific mackerel totaled 127 t with an ex-vessel value of \$6,453. Figures for Washington's Pacific mackerel landings were not available.

The fishing season for Pacific mackerel runs from 1 July through 30 June. The HG for the July 2001–June 2002 season was set at 13,837 t, based on a biomass estimate of 90,418 t. The HG for the July 2002–June 2003 season was set at 12,456 t, based on a biomass estimate of 77,516 t.

**Jack Mackerel.** Landings of jack mackerel in California totaled 1,006 t, a decrease of 72% from 3,615 t in 2001. Ex-vessel revenues totaled \$202,000, a 64% decrease from \$560,000 in 2001. There were no reported landings of jack mackerel in Mexican waters in 2002.

**Northern Anchovy.** Landings of northern anchovy in California decreased substantially in 2002 to 4,643 t, down from 19,187 t in 2001. This represents a 76% decline from 2001 landings and a 60% decline from 2000 landings (11,504 t). Ex-vessel revenues were \$550,000 in 2002, a 62% decline from \$1.4 million in 2001. There were no reported landings of northern anchovy in Mexican waters in 2002.

**Albacore**

Commercial albacore (*Thunnus alalunga*) landings decreased in 2002 from the previous year, and recreational catches increased. Commercial landings decreased by 13% (2,596 t) from 2001 (2,968 t), and ex-vessel value decreased 27% (\$3.76 million) from 2001 (\$5.14 million). The average price per metric ton paid to fishers for



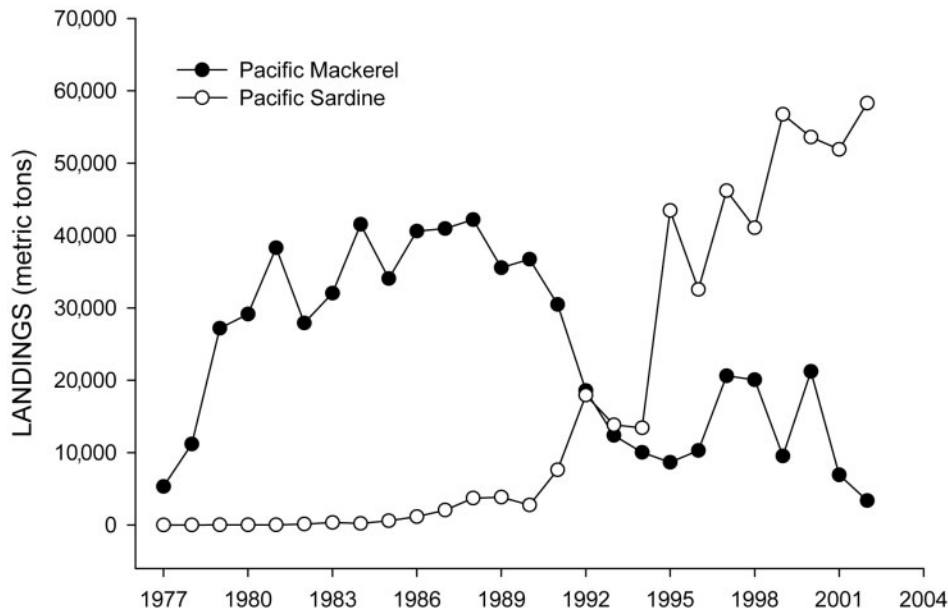


Figure 6. California commercial landings of Pacific sardine (*Sardinops sagax*) and Pacific mackerel (*Scomber japonicus*), 1977–2002.

albacore dropped 16% from \$1,580 in 2001 to \$1,320 in 2002. The decline in commercial harvest does not necessarily reflect a decline in the albacore population. However, it does reflect a down year for the market value. Commercial landings for albacore have varied dramatically over the last decade, ranging from a high of 5,590 t in 1999 to a low of 818 t in 1995. These landings are still significantly lower than the peak decades of the 1950s and 1960s when commercial landings were routinely over 27,000 t. During the 1950s there were over 3,000 vessels in the commercial fleet; now there are fewer than 500. Also, during those early years the fleet used pole-and-line gear, trolling gear, longlines, purse seines, and drift gillnets. Since the 1980s, trolling operations have dominated the fishery, taking 90% of the annual albacore catch.

Beginning in the 1980s, the albacore fisheries off California have typically operated within 900 miles of the U.S. Pacific coast. California commercial fishers concentrate on the North Pacific albacore stock during the summer and fall as the fish migrate through the northeastern Pacific Ocean. In recent years, during the winter months, some vessels have also targeted the western Pacific albacore stocks off the east coast of New Zealand.

Landing figures for CPFVs for 2002 were impressive. Logbook data indicate a total catch of 312,903 albacore, a 23% increase over the previous record high catch of 254,983 fish in 1999. This is also a 30% increase over 2001, in which CPFVs reported landing 240,181 albacore. In 2002, 151 CPFVs reported 5,351 trips in which at least one albacore was caught. It took a total

of 105,693 angler trips to land the 312,903 (catch per unit angler = 2.96) albacore.

In California there are no size or bag limits on albacore, but California CPFVs fishing in Mexican waters must adhere to Mexican regulations. Mexican law permits the take of only 5 albacore per day, and according to CPFV logbooks 60% of the 2002 catch was harvested from Mexican waters. Typically the majority of fish are landed in July and August when the bulk of the stock travels through the range of the southern California CPFV fleet. However, the arrival and departure times associated with albacore migration can vary from early spring arrivals to late winter departures.

The Marine Recreational Fisheries Statistics Survey (MRFSS) only includes fish taken in U.S. waters. Because of this, albacore landings for CPFV and private boat anglers decreased from the previous year. An estimated 99,000 albacore were landed by sport anglers in 2002, whereas the final 2001 estimate was 146,000 fish. The average weight of all albacore sampled by MRFSS field personnel showed a 6% increase (7.39 kg compared to 6.97 kg) from 2001. Using MRFSS average weight and landings data, recreational catches by weight (732 t) accounted for 22% of all landings in California. Using the CPFV logbook data for landings, the CPFV catch by weight (2,312 t) for 2002 amounted to approximately 47% of all albacore landed in California.

In October 2002, PFMC adopted the Highly Migratory Species Fishery Management Plan, which includes albacore as a managed species. According to PFMC's report, the North Pacific albacore stock is healthy

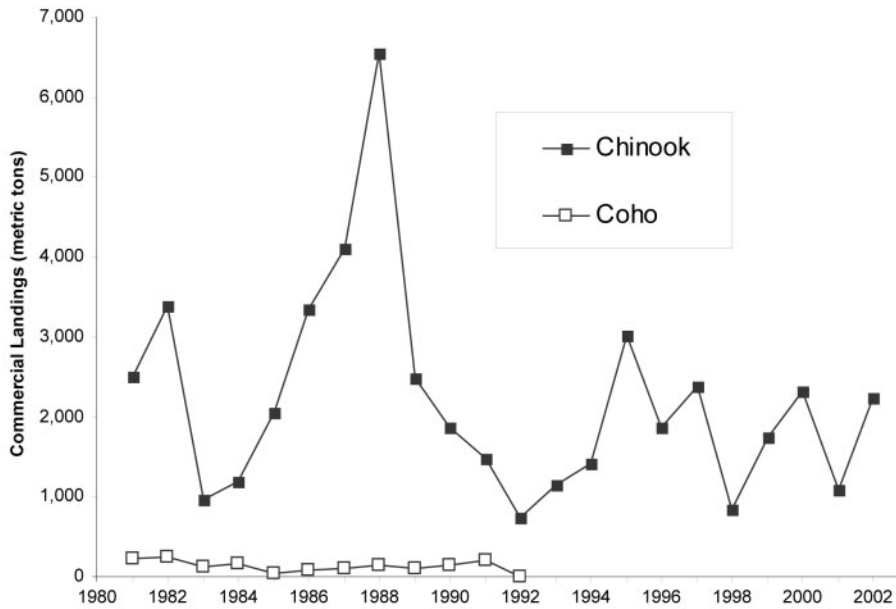


Figure 7. California commercial landings of ocean salmon, 1981–2002.

and not being overfished. Stock size and catches are increasing as the high, productivity oceanic regime, first noted 3 years ago, continues. The maximum sustainable yield for the North Pacific stock has been estimated at 80,000–110,000 t. Total catches are now over 100,000 t and the stock is still increasing. In recent years, West Coast catches have accounted for about 16% of the total North Pacific harvest. The PFMC is not considering implementing limited access or quota management at this time.

### Ocean Salmon

In 2002 the commercial troll fishery landed approximately 2,241 t (386,700 fish) of dressed chinook (fig. 7), and fished approximately 17,000 boat days. Ex-vessel prices for dressed salmon averaged \$1.55/lb, and the total ex-vessel value of the fishery exceeded \$7.6 million.

Statewide recreational landings totaled 179,300 chinook during 206,900 angler days (catch per angler day = 0.87) (fig. 8). Anglers were limited to two salmon per day (all species except coho). South of Horse Mountain (near Cape Mendocino) the minimum size limit was 20 in. total length (TL), through 30 April and 24 in. TL thereafter. Anglers fishing with bait and by any means other than trolling in the area between Point Conception and Horse Mountain were required to use barbless “circle” hooks. In the Klamath management zone (KMZ) the bag limit was two salmon per day with no more than six salmon in 7 consecutive days and a minimum size limit of 20 in. TL. In the California portion of the KMZ, anglers landed 16,100 chinook during 21,500 angler days.

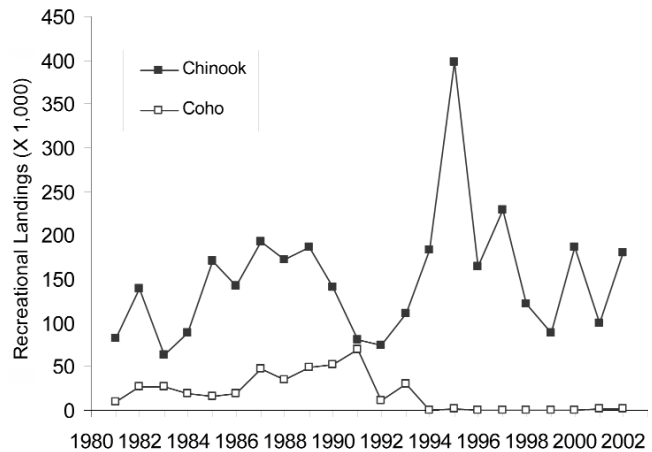


Figure 8. California recreational landings of ocean salmon, 1981–2002.

In 2002, the PFMC enacted commercial and recreational ocean salmon regulations in California to meet the following objectives:

- The NMFS Sacramento River winter chinook (*Oncorhynchus tshawytscha*) 2002 Biological Opinion requirement that the duration and timing of the 2002 commercial and recreational fisheries south of Point Arena not change substantially relative to the 2000 and 2001 seasons.
- The Oregon coast natural (OCN) coho (*Oncorhynchus kisutch*) maximum allowable exploitation rate (marine and freshwater combined) of 15% under Amendment 13. For 2002, the PFMC elected to constrain fishing so that the OCN exploitation rate would not exceed 12.5% in accordance with Oregon Department of

Fish and Wildlife's recommendation to provide additional protection for lower Columbia River natural coho, which are listed as endangered under the Oregon Endangered Species Act.

- Conservation and allocation objectives for Klamath River fall chinook as follows: a spawner escapement to natural areas of 35,000 adults; a minimum adult natural spawner escapement rate of 33–34%; 50% of the allowable adult harvest for federally recognized tribal subsistence and commercial fisheries; 15% of the non-Indian harvest to the Klamath River recreational fishery; 17% of the ocean harvest to the KMZ (Horse Mountain, California, to Humbug Mountain, Oregon) recreational fishery.
- The California coastal chinook jeopardy standard of no greater than a 16% age-4 ocean harvest rate on Klamath River fall chinook.
- The Sacramento River fall chinook escapement goal range of 122,000–180,000 hatchery and natural adults.
- The prohibition of retention of coho in California as required under the NMFS 1999 biological opinion for threatened central California coast coho.

In response, a series of regulations were enacted to achieve these objectives. Harvest impacts on northern California coastal chinook are a primary management concern for commercial ocean fisheries from Pigeon Point, California, to Florence, Oregon, and for recreational fisheries in the KMZ (from Horse Mountain, California, to Humbug Mountain, Oregon). To meet the jeopardy standard on California coastal chinook and achieve the management objectives for Klamath River fall chinook, the adopted regulations were designed to result in: (1) a maximum ocean fishery exploitation rate on age-4 Klamath River fall chinook of 12.9% (for fisheries from 1 September 2001 through 31 August 2002); (2) a Klamath River run target of 132,600 fall chinook adults, resulting in a spawner escapement of 35,000 fish in natural areas and taking into account a projected in-river harvest impact of 70,900 adults and returns to basin hatcheries; (3) 50% (50,400) of the allowable adult harvest for tribal subsistence and commercial fisheries; (4) 40.6% (20,500) of the non-tribal harvest to the Klamath River recreational fishery; and (5) 11% of the ocean harvest to the KMZ recreational fishery. These harvest allocations were expected to result in a 49–51% California-Oregon sharing of Klamath River fall chinook ocean troll harvest. The projected California-Oregon troll shares were the result, in part, of the PFMC decision to constrain fisheries so that the OCN exploitation rate would not exceed 12.5% in 2002 rather than the maximum of 15% allowed under Amendment 13.

OCN constraints prevented full access to the allowable harvest of Klamath River fall chinook under both the FMP and NMFS jeopardy standards, and included

a 29-day and 12-day closure in the July recreational fishery in the KMZ and Fort Bragg (Horse Mountain to Point Arena) areas, respectively. Nonetheless, there was for the first time in many years a July (10,000 chinook quota) and August troll fishery in Fort Bragg and an August commercial fishery (3,000 chinook quota) in the California portion of the KMZ (Oregon-California border to Humboldt south jetty). Commercial fishing remained open in both areas during September (California-KMZ 10,000 chinook quota).

For more complete information, see PFMC's Web site, <[www.pcouncil.org](http://www.pcouncil.org)>, where you will find "Review of the 2002 Ocean Salmon Fisheries," compiled by the Salmon Technical Team and PFMC staff.

### Nearshore Live-Fish

Preliminary summaries of 2002 California nearshore commercial finfish landings totaled 352 t. Of that, 257 t were recorded as live landings and 95 t as dead landings of nearshore finfish. Preliminary ex-vessel value of the total landings for year 2002 was \$2.7 million, of which \$2.3 million was paid for live fish (fig. 9). This represents a slight decrease from 2001 in total nearshore landings and in value.

**Management of the Fishery.** The nearshore fishery, as defined in the California Code of Regulations (Title 14, Sec. 1.9) concerns a select group of finfish: black rockfish (*Sebastes melanops*), black-and-yellow rockfish (*S. chrysomelas*), blue rockfish (*S. mystinus*), brown rockfish (*S. auriculatus*), cabezon (*Scorpaenichthys marmoratus*), calico rockfish (*Sebastes dallii*), California scorpionfish (*Scorpaena guttata*), California sheephead (*Semicossyphus pulcher*), china rockfish (*Sebastes nebulosus*), copper rockfish (*S. caurinus*), gopher rockfish (*S. carnatus*), grass rockfish (*S. rastrelliger*), kelp greenling (*Hexagrammos decagrammus*), kelp rockfish (*S. atrovirens*), monkeyface prickleback (*Cebidichthys violaceus*), olive rockfish (*S. ser-ranoides*), quillback rockfish (*S. maliger*), rock greenling (*H. lagocephalus*), and treefish (*S. serriiceps*). These 19 species represent those most commonly captured in the nearshore live-fish fishery. They are primarily found in association with kelp beds or rocky reefs within 3 mi of shore and in waters less than 20 fathoms. All but three (California sheephead, monkeyface prickleback, and rock greenling) of the 19 species are designated as groundfish species under the PFMC fishery management plan for Pacific coast groundfish. This review focuses on the nearshore finfish species most commonly captured and sold live.

The Nearshore Fishery Management Plan (NFMP), adopted in 2002, is a framework plan that identifies a management strategy for many of the nearshore species targeted by the nearshore live-fish fishery. The five integrated management measures (fishery control rule, re-

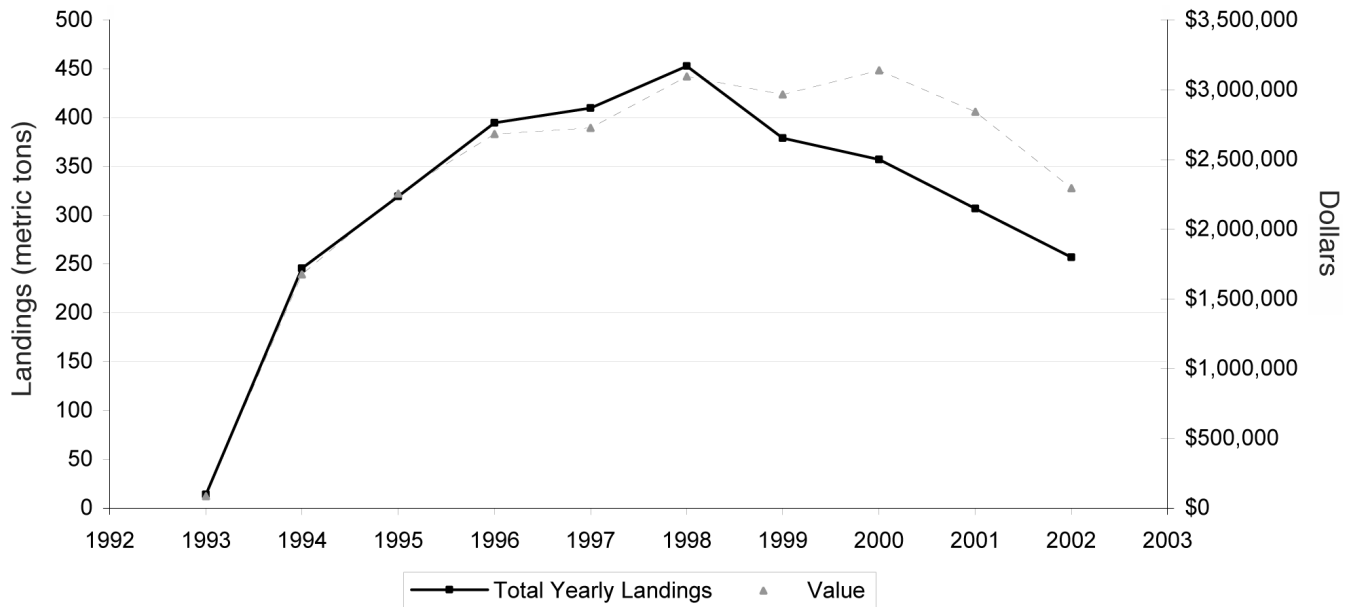


Figure 9. California nearshore live-fish landings and ex-vessel value, 1993–2002.

gional management, resource allocation, marine protected areas, and restricted access) together, over time, will meet the goals and objectives of the Marine Life Management Act and provide for sustainable nearshore stocks and fisheries. The 19 designated nearshore species are territorial, slow-growing, and long-lived, which makes them vulnerable to overfishing even at low exploitation rates.

The nearshore live-fish fishery began in the mid-1980s. Initially, the fishery supplied live fish for the California Asian community. The live-fish market has since expanded and now supplies markets nationally, and in some cases, internationally. The primary gear types used to capture live fish in nearshore waters include various hook-and-line methods and trap gear. Hook-and-line gear includes rod-and-reel, vertical longlines, horizontal longlines, and weighted “stick gear” and is limited to no more than 150 hooks per vessel or 15 hooks per line. Most of the hook-and-line and trap vessels range from 6 m to 12 m in length. The fishery is generally short range, relying on day trips to deliver live fish to market or to dockside holding bins. This small scale also enables operations to quickly redirect effort from reef to reef.

Before market demand for live fish increased, the ex-vessel value (wholesale value) for rockfishes, cabezon, California sheephead, and greenlings was low. An increase in consumer demand for premium, live fish and continued recognition as a specialty product caused the value of live fish to increase dramatically. For example, the average ex-vessel value of cabezon (landed dead) was less than \$.50/lb in 1989. In 2002, the average price for live cabezon was \$4.02/lb (down 5% from \$4.25/lb in

2001). At any time, however, prices vary widely depending on port region, species, size, and marketability of fish. In 2002, prices for live, premium fish ranged from \$0.65 to \$10.00/lb.

Landing receipts, commonly called market receipts, are the primary CDFG resource for quantifying commercial fishing activity. By law, a fish buyer must complete a landing receipt at the time fish are delivered. Basic information such as weight of the landing, price paid, gear type used, and the condition of the fish (e.g., live) must be provided. Considerable effort is spent reviewing and editing landing receipts to ensure that critical information such as market category and condition code are accurately reported. Condition information of ambiguous landings can often be obtained by examining the ex-vessel price: a substantially higher price often indicates a live landing. The data used for this report are preliminary, and live-fish landing weights provided in this review should be interpreted as low estimates of the actual live-fish landings. Condition (live or dead) of fish being landed was not required on landing receipts prior to 1993 and, therefore, was not used for this review.

Landings information reported by market category provides very little information on the species composition of the catch. Market categories on which this review is based likely contain several different species similar in appearance or market value. For example, the “group gopher” market category often includes gopher, brown, black-and-yellow, grass, kelp, copper, China, and quill-back rockfishes. Information on the species composition provided by port sampling was not available for inclusion in this review.

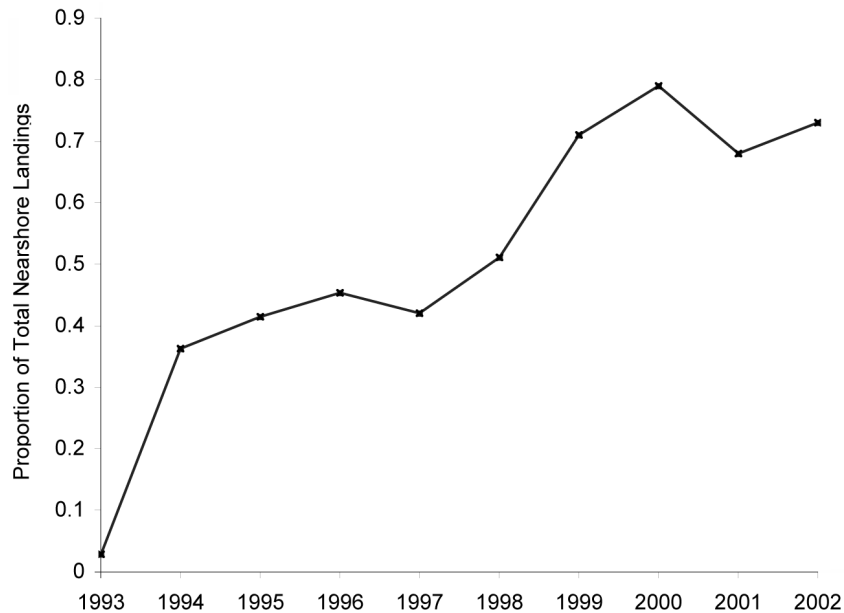


Figure 10. Proportion of fish landed live in the nearshore fishery, 1993–2002.

**Regional Landings.** As in recent years, California sheephead and California scorpionfish were the primary market categories landed live in southern California. In central and northern California, from Point Conception to Cape Mendocino, the dominant market categories of the live-fish landings were more diversified: gopher and brown rockfish market categories (and the multiple species they contain) were by far the most common rockfish landed live in the two central California regions. In the northern region, the black rockfish market category was predominant, followed by the relatively “clean” cabezon market category. Statewide, 73% of nearshore fish were landed live (fig. 10). This is up slightly from 69% in 2001 and reflects the value of the “live” condition. Prices and dominant landings varied by management region, ports within a region, and season. Below is a regional summary for 2002.

Landings in the North Coast Region (Oregon border to Cape Mendocino; port complexes of Eureka and Fort Bragg) totaled 57 t of dead and 87 t of live nearshore market categories. Total landings in this region (144 t) made up 41% of nearshore fish landings statewide, with a preliminary ex-vessel value of \$0.72 million. Approximately 34% of the state’s live fish were landed in the North Coast Region for a value of \$0.55 million. In this region, live landings were dominated by the black rockfish market category (49 t landed) followed by cabezon (8 t landed). These two market categories accounted for 66% of the North Coast Region’s landings of live fish. Hook-and-line gear was used to catch 88% of the live catch in the North-Central Coast Region, and trap gear was used to take approximately 12%.

North-Central Coast Region (Cape Mendocino to Point Año Nuevo; port complexes of Bodega Bay and San Francisco) landings totaled 12 t of dead and 10 t of live nearshore market categories. Total landings in this region (22 t) made up 6% of nearshore fish landings statewide, with an ex-vessel value of \$0.18 million. Roughly 4% of the state’s live fish were landed in the North-Central Region for a value of \$0.10 million. For 2002, live landings were primarily bolina (brown rockfish) market category (4 t landed), followed by gopher market category (ca. 1 t landed). These two market categories accounted for 54% of the North-Central Coast Region’s landings of live fish. Hook-and-line gear was used exclusively to catch live fish in this region (finfish traps are prohibited).

South-Central Coast Region (Point Año Nuevo to Point Conception; port complexes of Monterey and Morro Bay) landings totaled 14 t of dead and 86 t of live nearshore market categories. Total landings in this region (100 t) made up 28% of nearshore fish landings statewide with an ex-vessel value of \$1.0 million. Approximately 33% of the state’s live fish were landed in this region for a value of \$0.97 million. In this region, live landings were dominated by gopher and brown rockfish market categories (38 t landed) and were followed by cabezon (27 t). Together, these market categories accounted for 76% of the south central coast region’s landings of live fish. Hook-and-line gear was used to catch 76% of the live fish in the south-central coast region. Trap gear took approximately 23% of live fish in this region.

South Coast Region (Point Conception to Mexico border; port complexes of Santa Barbara, Los Angeles,

and San Diego) landings totaled 12 t of dead and 75 t of live nearshore market categories. Total landings in this region (87 t) made up 25% of nearshore fish landings statewide with an ex-vessel value of \$0.73 million. About 29% of the state's live fish were landed in the South Coast Region for a value of \$0.68 million. In 2002, live landings were dominated by California sheephead (47 t) and were followed by California scorpionfish and cabezon (16.5 t). These landings together accounted for 85% of the South Coast Region's landings of live fish. Trap gear was used to catch 57% of the live fish in the South Coast Region, and hook-and-line gear and trawl (California scorpionfish) gears were also used.

**Recent Trends in the Fishery.** Landings have declined for the fourth straight year from a peak in 1997–98 (947 t landed). The total value of the fishery has also declined, although somewhat disproportionately due to the continued strong demand for live fish (fig. 9). It is anticipated that statewide landings will continue to decline in the upcoming year due to a planned reduction in fishing effort. Concerns over increased pressure on nearshore finfish stocks, primarily from displaced federally managed shelf fishery participants, have been given specific attention from both federal and state managers. Current nearshore interim regulations (implemented in 2000) reflect a reduced “allowable catch” of nearshore species equivalent to 50% of historical annual harvest levels. This precautionary approach provides a “de facto” contingency for such shifts in effort.

In addition to the size limits on certain nearshore species and recently implemented limited entry program, there remains in place a two-month fishery closure and gear restrictions on the fishery, which are used to achieve the catch limitations set under interim regulations and to conform state regulations to PFMC regulations for fishing activity conducted in state waters. CDFG and the California Fish and Game Commission are also developing regional total-allowable-catch limits, recreational and commercial sector allocation parameters, and cumulative trip limits. The initial phase of this work is being directed toward cabezon, kelp, and rock greenlings, and California sheephead. These upcoming management measures are consistent with the Nearshore Fishery Management Plan and the nearshore regulatory implementation process.

### Pacific Herring

California's Pacific herring (*Clupea pallasii*) fisheries had mixed success in 2002. Statewide landings for the 2001–2002 sac roe season (December 2001–March 2002) totaled 3,339 t, an increase of 9.5% from the 2000–2001 season's landings of 3,049 t; however, permittees did not meet quotas. The San Francisco gill net fleet, composed of three platoons (401 active permits), landed 2,981 t,

20.4% under the 3,744 t quota. The Tomales Bay fishery (35 permits) landed a total of 321.3 t of the 454 t quota. A total of 6.1 t was landed in Crescent City (six permits) from the 27.2 t quota, and Humboldt Bay landings (two permits) totaled 31.3 t, 42.5% below the 54.4 t quota. Annual sac roe landings, January to December 2002 increased from 2,715 t to 3,290 t, up 21.2% from the previous year.

Catch value in the herring sac roe fishery is based on roe recovery rates. Ex-vessel prices for herring with 10% roe recovery averaged an estimated \$500 per short ton for gill net landings with an additional \$50 paid for each percentage point above 10%. The ex-vessel price per ton was lower than the previous season, reflecting the continuing volatility of the Japanese economy. Statewide ex-vessel value of the sac roe fishery was an estimated \$1.8 million, a 38.7% decline from last season, and was well below the average for the previous 17 seasons (US\$8.6 million) For the fifth consecutive season, the San Francisco Bay herring eggs-on-kelp fishery landings were below average. Landings totaled 41.1 t, which was 10.3% less than the 66.4 t quota, but a 66.4% increase from last season's landings of 25.0 t. Total estimated value of the 2001–2002 eggs-on-kelp harvest was \$634,000 based on an average ex-vessel price of \$7.00/lb. Price paid varies with the product's grade, with grade 1 receiving approximately \$10/lb, and grade 5 bringing \$3–4/lb.

CDFG conducted research surveys in three bays to estimate spawning biomass of each herring stock. Hydroacoustic and spawn deposition survey estimates were used in San Francisco Bay. Spawn deposition estimates were used exclusively to assess the Tomales Bay and Humboldt Bay populations.

The 2001–2002 herring spawning biomass estimate for the San Francisco Bay population was 32,109 t, a 5.1% decline from the previous season. Although there was a return of favorable oceanic conditions, and herring returning to the bay were in good physical condition, an apparent displacement or loss of older-year-class fish, namely 5-year-olds and older, continued this season. The Tomales Bay herring spawning biomass continued to demonstrate a tendency to fluctuate widely. The 2001–2002 spawning biomass estimate was 6,570 t, which represents an increase of 72.6% from the previous season's estimate (3,807 t). This season's biomass is the highest since the 10,014 t El Niño season of 1982–83. In Humboldt Bay, CDFG conducted spawning ground surveys and monitoring of the herring gill net fishery for the second consecutive season. An estimate of 560 t of herring spawned in south and north Humboldt Bay. No surveys were conducted in Crescent City Harbor.

A mild to moderate El Niño is forecasted for 2002–2003. Its impact is not expected to be on the same scale as the 1997–98 El Niño, yet it is uncertain how

TABLE 3  
 Southern California CPFV Landings in 2002, 2001, and 2000

Species/Species Group	2002 landings				2001 landings		2000 landings	
	No. of fish	Rank	% change from 2001	% change from 2000	No. of fish	Rank	No. of fish	Rank
Barred sand bass	629,722	1	+5	-15	598,083	1	737,944	1
Albacore tuna	291,681	2	+35	+156	215,516	5	113,971	7
Rockfishes, unspecified	287,799	3	-18	-12	350,596	2	326,918	2
Kelp bass	234,675	4	-23	-15	304,169	3	277,191	3
California barracuda	208,865	5	-22	-19	266,634	4	256,887	4
Sanddab*	122,217	6	+239	+2,291	36,013	13	5,111	21
Ocean whitefish	100,164	7	-27	-30	138,052	7	144,055	6
California scorpionfish	88,343	8	-46	-48	162,302	6	169,417	5
Halfmoon	80,514	9	-17	+149	97,363	9	32,399	14
Yellowtail	69,904	10	-12	-34	79,556	11	105,896	9
Pacific mackerel	69,276	11	-36	-38	108,408	8	111,627	8
Bluefin tuna	32,558	12	+54	+57	21,083	15	20,696	15
California sheephead	27,361	13	-30	-16	39,163	12	32,684	13
Bocaccio rockfish*	21,725	14	+252	+662	6,176	21	2,853	24
Yellowfin tuna	18,572	15	-40	-79	31,118	14	88,302	11
Lingcod	12,939	16	+491	+938	2,189	28	1,246	26
Blue rockfish*	8,598	17	+400	—	1,721	30	0	—
White seabass	8,571	18	-14	-51	9,996	17	17,470	16
Copper rockfish*	7,802	19	+118	—	3,583	25	0	—
Pacific bonito	7,525	20	-56	-83	17,121	16	44,610	12
Blacksmith	7,019	21	+254	+693	1,985	29	885	28
California halibut	5,259	22	-36	-50	8,219	19	10,471	18
Surfperch, unspecified	4,266	23	+32	+339	3,235	26	971	27
Gopher rockfish*	3,349	24	+43	—	2,343	27	0	—
Wahoo	3,012	25	-19	-35	3,730	24	4,647	22
Dolphinfish (dolphin)	2,700	26	-32	-84	3,963	23	16,469	17
Skipjack tuna	2,681	27	-69	-12	8,738	18	3,030	23
Canary rockfish*	2,512	28	+61	—	1,559	31	0	—
Opaleye	2,371	29	+142	+1594	980	33	140	35
Flatfishes, unspecified	2,278	30	-98	-98	96,210	10	95,896	10
Fishes, unspecified	9,137		+2	-49	8,999		17,790	
Sharks, unspecified	1,470		+74	+98	847		743	
Jumbo squid	195,406		—	+2,351	0		7,972	
Total no. kept	2,570,271		-2	-3	2,629,650		2,648,291	
No. of anglers	540,063		-3	-7	558,550		581,972	
Reporting CPFVs	204		-1	0	205		206	

\*Fields added on new logbook form in July 2001.

it may influence herring fisheries for the season. The December 2002 fishery in San Francisco Bay opened to a slow start with limited fishing activity through mid-month.

The herring roe product, “kazunoko,” remains an integral part of traditional Japanese New Year’s festivities. However, changes in the Japanese culture and economy have also resulted in changes to the sac roe market. Demand for kazunoko is expected to wane by industry observers as younger Japanese become more westernized. Ex-vessel prices are expected to decline with concern for the Japanese economy, and, as a result, herring buyers have been proceeding cautiously and offering similar prices in the 2001–2002 season.

### Recreational Fishery

**Southern California.** Hook-and-line saltwater recreational fishing is conducted from private vessels, piers,

shorelines, and CPFVs in southern California. Specific information about these recreational fisheries is collected through phone surveys and field sampling under the MRFSS survey by the Pacific States Marine Fisheries Commission. In addition, CDFG collects and maintains a database derived from mandatory logbook information supplied by CPFVs. Much of our knowledge of CPFV recreational fishing in southern California is based on these logbook data. Landings by CPFVs represent approximately 21% of the total landings by recreational fishers.

Traditionally, the taxa targeted south of Point Conception by CPFVs in southern California and Baja California waters include California barracuda (*Sphyrna argentea*), serranids or sea basses (*Paralabrax clathratus*, *P. nebulifer*), scorpaenids or scorpionfishes (*Scorpaena guttata*, *Sebastes* spp.), scombrids or mackerels (*Scomber japonicus*), tunas (*Katsuwonus pelamis*, *Sarda chiliensis*, *Thunnus alalunga*,

*T. albacares*), wahoo (*Acanthocybium solanderi*), California halibut (*Paralichthys californicus*), ocean whitefish (*Caulolatilus princeps*), white seabass (*Atractoscion nobilis*), yellowtail (*Seriola lalandi*), halfmoon (*Medialuna californiensis*), and California sheephead (*Semicossyphus pulcher*). The taxa being targeted can vary with season and also by year. Occasionally, El Niño conditions greatly increase the availability in southern California waters of species normally found off Mexico. Conversely, La Niña conditions increase the number of colder-water species. CPFVs are typically quick to exploit the fishing opportunities provided by these changing oceanographic conditions.

The top-ten species or species groups in 2002 in southern California (by number of fishes in landings) were barred sand bass, albacore tuna, rockfishes (unspecified), kelp bass, California barracuda, sanddab (*Citharichthys* spp.), ocean whitefish, California scorpionfish, halfmoon, and yellowtail (tab. 3). These species or species groups include eight of the top ten groups from 2001 and 2000. One of the exceptions for both 2001 and 2000 was flatfishes (unspecified). In those years, this category was in the top ten, but in 2002 it dropped to rank 30. This can be explained by the new revised logbooks distributed to CPFV operators in July 2001. By early 2002, most CPFV operators were using the new logbooks. The revised logbooks contained several new fields not in the older version. The new fields included several specific rockfish species: blue (*Sebastes mystinus*), bocaccio (*S. paucispinis*), canary (*S. pinniger*), copper (*S. caurinus*), cowcod (*S. levis*), gopher (*S. carnatus*), and yelloweye (*S. ruberrimus*), and sanddab. Previously, all rockfish species were grouped into the category "rockfishes (unspecified)" and most sanddabs were in the category "other flatfishes." Several fields were removed in the new version, including blue shark, mako shark, jack mackerel, wahoo, and "other flatfishes." All sharks caught are now individually written in the blank fields on the logbook. These are all accounted for in the field "sharks (unspecified)" (tab. 3). CPFV operators also have the option to write in specific species not pre-printed on the logbook form.

Other changes in the top-ten species included Pacific mackerel, which dropped from eighth in 2001 and 2000 to eleventh in 2002. Yellowtail jumped from eleventh in 2001 to tenth in 2002, and halfmoon from fourteenth in 2000 to ninth in 2002. The order of abundance also changed for nine of the top-ten species or species groups each year, except for barred sand bass, which remained number one for all 3 years (tab. 3).

In 2002, 540,063 anglers aboard 204 reporting CPFVs landed 2,570,271 fishes south of Point Conception (tab. 3). These southern California landings represent 81% of the total landings by CPFVs statewide (3,166,234 fishes). The number of fishes landed statewide in 2002

was 6.5% higher than in 2001 (2,974,239 fishes) and 2% lower than in 2000 (3,232,852 fishes). Landings in 2002 in southern California decreased by 2% compared to 2001 and by 3% compared to 2000. The number of anglers using southern California CPFVs dropped by 3% and 7%, respectively, compared to 2001 and 2000. The southern California anglers represented 79% of the anglers using CPFVs statewide.

Decreased landings were reported in 2002 for flatfishes (unspecified) and rockfishes (unspecified), but these can be explained by the new logbook categories. Many of these fishes are now accounted for by individual species fields. Other landings that decreased in 2002 compared to 2001 and 2000 were skipjack tuna, Pacific bonito, California scorpionfish, yellowfin tuna, Pacific mackerel, California halibut, dolphinfish (*Coryphaena hippurus*), California sheephead, ocean whitefish, kelp bass, California barracuda, wahoo, yellowtail, white seabass, and halfmoon (2001 only) (tab. 3). Decreases in some of the more southerly species or species groups (e.g., skipjack tuna, yellowfin tuna, dolphinfish) can be primarily attributed to decreased availability. Cooler oceanic waters moved onshore along the California coast in late 2002, shifting the summer distribution of some of these species southward. Decreased landings of Pacific mackerel and Pacific bonito may have been related to decreased availability, but reduced biomass may also have been a factor.

In response to the decreased availability of southerly species in 2002, the southern California CPFVs shifted their efforts to other species or species groups, including albacore tuna, bluefin tuna, and a number of nearshore species (tab. 3). Albacore landings increased by 35% and 156% compared to 2001 and 2000, respectively, and bluefin landings increased by 54% and 57%, respectively. Increased landings were also reported for a number of nearshore species, including opaleye (*Girella nigricans*), surfperch (unspecified), blacksmith (*Chromis punctipinnis*), and lingcod.

The number of reported jumbo squid (*Dosidicus gigas*) landings in 2002 by CPFVs operating in the Los Angeles area and south increased greatly from the previous 2 years but was similar to 1999 landings (104,549). The 2002 landings jumped to 195,406 from zero in 2001 and 7,972 in 2000. This is in contrast to the central and northern California area, where the reported numbers of jumbo squid remained zero or low all 3 years (tabs. 3, 4). An El Niño was predicted for 2002, but it was weak and dissipated early. Jumbo squid are often seen during El Niño conditions, so there may have been an influx of warm water from the south to bring the jumbo squid into southern California waters. Mass strandings of jumbo squid were seen in La Jolla in July. Tissue samples were taken for analysis to determine if domoic acid poisoning was responsible for the strandings. A large bloom of



TABLE 4  
 Central and Northern California CPFV Landings in 2002, 2001, and 2000

Species/Species Group	2002 landings				2001 landings		2000 landings	
	No. of fish	Rank	% change from 2001	% change from 2000	No. of fish	Rank	No. of fish	Rank
Rockfishes, unspecified	208,967	1	-23	-54	271,159	1	457,833	1
Blue rockfish*	130,192	2	+85	+685,121	70,203	2	19	—
Chinook salmon	74,625	3	+73	-3	43,221	3	76,744	2
Gopher rockfish*	36,291	4	+10	+1,209,600	32,931	4	3	—
Flatfishes, unspecified	27,982	5	+1,618	+641	1,629	15	3,776	7
Lingcod	24,449	6	+165	+159	9,242	8	9,441	5
Albacore tuna	21,238	7	-14	+59	24,665	5	13,382	4
California halibut	10,148	8	-19	+88	12,525	6	5,394	6
Striped bass	6,611	9	-39	-64	10,889	7	18,501	3
Brown rockfish	6,602	10	+132	—	2,841	14	0	—
Copper rockfish*	6,498	11	-14	+4,413	7,587	10	144	19
Bocaccio rockfish*	4,478	12	-41	+152	7,630	9	1,779	9
Canary rockfish*	2,577	13	-60	+36	6,443	11	1,900	8
Sanddab	2,489	14	+6,627	+398	37	34	500	14
Vermilion rockfish	1,782	15	+268	+2,375	484	20	72	21
Cabazon	1,180	16	-75	-32	4,673	12	1,730	10
Kelp greenling*	886	17	-72	+132	3,137	13	382	17
Olive rockfish	853	18	+940	—	82	29	0	—
Sablefish	479	19	+464	+296	85	27	121	20
White croaker	477	20	+151	-3	190	24	493	15
Fishes, unspecified	875		-23	-72	1,130		3,128	
Sharks, unspecified	283		-31	-60	412		710	
Dungeness crab*	25,335		+12	+29	22,566		19,608	
Jumbo squid	666		—	+11	0		600	
Total no. kept	595,963		+12	-3	533,761		616,260	
No. of anglers	141,302		+3	-7	136,674		152,547	
Reporting CPFVs	109		0	-1	109		110	

\*Fields added on new logbook form in February 2001.

the domoic acid-producing diatoms occurred in the spring off central and southern California.

**Central and Northern California.** North of Point Conception, CPFV anglers traditionally target rockfishes (*Sebastes* spp.); salmon (*Oncorhynchus* spp.); lingcod (*Ophiodon elongatus*); and, opportunistically, albacore tuna (*Thunnus alahunga*). Cabazon (*Scorpaenichthys marmoratus*) and other nearshore species are also taken. California halibut (*Paralichthys californicus*), striped bass (*Morone saxatilis*), sturgeon (*Acipenser* spp.), and leopard shark (*Triakis semifasciata*) are primarily taken from within San Francisco Bay. In addition, more southerly species such as bluefin tuna (*Thunnus thynnus*), white seabass (*Atractoscion nobilis*), skipjack tuna (*Katsuwonus pelamis*), and yellowtail (*Seriola lalandi*) may be targeted in warm-water years.

The top-ten species or species groups taken in 2002 by central and northern California CPFVs (by number of fishes in landings) were rockfishes (unspecified), blue rockfish (*Sebastes mystinus*), chinook (king) salmon (*Oncorhynchus tshawytscha*), gopher rockfish (*Sebastes carnatus*), flatfishes (unspecified), lingcod, albacore tuna, California halibut, striped bass, and brown rockfish (*Sebastes auriculatus*) (tab. 4). These top-ten species included eight of the top ten in 2001 and seven of the top ten in 2000. New revised logbooks were distributed to CPFV

operators in February 2001, which explains the absence of the blue and gopher rockfishes in the top-ten species for 2000. Quantities of bocaccio and canary rockfish landings in 2002 decreased from 2001, despite the introduction of the new logbook form. This is likely due to new fishing regulations put in place in 2001 and 2002 limiting the number of certain rockfish species that could be caught. In contrast, the number of brown, vermilion, and olive rockfish reported landed in 2002 increased from previous years, possibly due to the limits on other species of rockfish and subsequent redirected efforts.

By early 2002, most CPFV operators were using the new logbooks. The revised logbooks contained several new fields not in the older version. The new fields included several specific rockfish species—blue (*Sebastes mystinus*), bocaccio (*S. paucispinis*), canary (*S. pinniger*), copper (*S. caurinus*), cowcod (*S. levis*), gopher (*S. carnatus*), and yelloweye (*S. ruberrimus*)—kelp greenling (*Hexagrammos decagrammus*), and Dungeness crab (*Cancer magister*). Unlike the new southern California logbook form, a separate field for sanddabs was not added on the new central and northern California logbook form, but some CPFV operators provided an account of the sanddabs they landed. There has always been the option for operators to write in specific fish species, so some of

these species have occurred in the logbooks in small quantities in previous years. Fields were removed for California barracuda and "other sharks."

Rockfishes (unspecified) was ranked the number one species group for 2002, 2001, and 2000. The top four ranks in 2002 and 2001 were the same, but all other ranks were shuffled between the years (tab. 4). The number of reported flatfishes (unspecified) was extremely high in 2002 compared to earlier years, possibly due to less fishing opportunities for shelf rockfish and more CPFV trips targeting sanddabs.

In 2002, 141,302 anglers aboard 109 reporting CPFVs caught 595,963 fish north of Point Conception, a 12% increase from 2001 and a 3% decrease from 2000 (tab. 4). The increase in the landings between 2002 and 2001 may in part be due to the increased quantities of flatfishes (unspecified), salmon, sanddab, lingcod, and brown rockfish landed. Total landings for 2002 and 2000 are similar. The central and northern California landings accounted for 19% of the state's total landings (3,166,234 fishes). The number of anglers using central and northern California CPFVs increased by 3% compared to 2001 but decreased by 7% from 2000. Central and northern California anglers represented 21% of the anglers using CPFVs statewide. Decreases in 2002 were seen in California halibut, albacore tuna, striped bass, and kelp greenling compared to 2001 (tab. 4). In addition, fewer than 50 individuals of ocean whitefish, California barracuda, white seabass, and yellowtail and no Pacific bonito, skipjack tuna, or dolphinfish were landed in central and northern California ports in 2002. Lower land-

ings of species such as Pacific mackerel, jack mackerel, and Pacific bonito may be due to a decrease in availability as well as a reduction in biomass.

Albacore tuna landings decreased by 14% to 21,238 in 2002 compared to 24,665 in 2001, but increased by 59% from 13,382 in 2000. Increased landings were also reported for flatfishes (unspecified), sanddab, lingcod, Chinook salmon (2001 only), white croaker (2001 only), sablefish, and various rockfish species (blue, brown, gopher, olive, and vermillion) (tab. 4). Landings of Dungeness crab increased 12% between 2002 and 2001 and 29% between 2002 and 2000. No jumbo squid (*Dosidicus gigas*) were caught by CPFV anglers in this region in 2001, and very low numbers were reported in 2002 and 2000 compared to the large numbers reported in southern California for 2002.

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