

REVIEW OF SOME CALIFORNIA FISHERIES FOR 1994

CALIFORNIA DEPARTMENT OF FISH AND GAME
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Total annual landings of fishes, crustaceans, echinoderms, and mollusks in California increased by 4% from 1993, to 149,596 metric tons (MT). The ex-vessel economic value of California's 1994 commercial landings rose 17% from the prior year's level, to \$149.5 million.

Pelagic wetfish landings increased 12% from 1993, but the increase was mostly attributable to a 31% increase in market squid landings; Pacific sardine, Pacific mackerel, and Pacific herring, however, registered declines (table 1). The 1994 statewide market squid landings of 55,769 MT represent a new record for this species.

Groundfish landings continued an eleven-year decline with a 14% decrease from the previous year. California halibut landings also reflected this declining trend with a dramatic drop of 32% from the prior year's level.

The prevalence of soft-shell, postmolt Dungeness crabs delayed the start of the northern California season by four weeks and perhaps accounted for the reduced landings. Statewide sea urchin landings were 11% lower than in 1993 and declined 18% in northern California. Spot prawn catches increased by 25% in 1994, to 70 MT; ridgeback prawn catches increased by 89%, to 198 MT.

Swordfish landings decreased by 5%, and only 45% of the catch was taken in the drift gill net fishery. The con-

tribution of longline gear to statewide landings increased 4.5 times, to 45% of the all-gears total. Twenty vessels used longline gear to fish outside U.S. waters and land swordfish in southern California. Statewide landings of live fish were estimated at 408 MT, an 88% increase over the previous year. Live-fish catches were primarily by hook and line gear, although over 73% of live California sheephead landings in southern California were made with trap gear.

PACIFIC SARDINE

In 1986, spawning biomass estimates of the Pacific sardine (*Sardinops sagax*) increased above the legally specified level for reestablishment of a commercial fishery in California. Each year since 1986, the California Department of Fish and Game (CDFG) has established a harvest quota based on an estimate of current spawning biomass. CDFG is required by law to include in the quota a directed fishery quota of at least 910 MT whenever the spawning biomass exceeds 18,200 MT.

At the fifth annual Pacific Sardine Resource Assessment and Management Workshop, scientists using the CANSAR (Catch at Age Analysis of Sardines) model estimated the 1993 sardine spawning biomass to be 71,700

TABLE 1
 Landings of Pelagic Wetfishes in California (Metric Tons)

Year	Pacific sardine	Northern anchovy	Pacific mackerel	Jack mackerel	Pacific herring	Market squid	Total
1974	6	73,810	60	11,362	2,348	13,111	100,697
1975	3	141,486	129	16,415	1,086	10,715	169,834
1976	24	111,503	293	19,882	2,151	9,211	143,064
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	41,543	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*	12,346	1,965	10,052	3,129	2,668	55,769	85,929

*Preliminary

TABLE 2
 Pacific Sardine Quota Allocations (Metric Tons) for California, 1994

	Original allocations*			Revised allocations		
	Quota	Total landings	Unused	Quota	Total landings	Unused
Fisheries						
Directed						
Northern	3,327	1,832	1,495	868	463	405
Southern	6,652	7,677	—	990	1,256	—
Total	9,979	9,508	1,495	1,858	1,719	405
Dead bait						
Northern	56	0	56	56	0	56
Central	56	64	—	56	0	—
Southern	341	86	255	341	588	—
Total	454	150	311	454	588	56
Live bait	907	1,257	—	907	1,345	—
Incidental reserve	454	73	381	91	307	—
Grand total	10,886	9,732	2,187	2,403	2,614	461

*Original allocations were effective 1/1/94 to 9/30/94; revised allocations were effective 10/1/94 to 12/31/94.

**Live-bait quota is not included in the total allowable harvest.

MT, a decline from 116,200 MT in 1992. This decrease may have been caused by the displacement of sardines to the north of Point Conception, beyond the range of CDFG data collection efforts and consequently not included in the biomass estimate.

The total allowable harvest was set at 10,886 MT and allocated among three categories: (1) directed fishery—9,979 MT, (2) dead bait fishery—454 MT, and (3) incidental catch in the mackerel fishery—454 MT (table 2). A separate live-bait fishery allocation of 907 MT was not included in the overall total allowable harvest.

The directed fishery quota was divided geographically and opened on January 1, 1994 (table 2). The southern directed fishery quickly surpassed its quota and closed on May 6, 1994. After the closure, sardine landings remained low through October 1 in the dead bait fishery (86 MT) and as incidental catch (73 MT) in the mackerel fishery.

Recent installation in a northern California cannery of a new canning line which produces 155 g cans increased the utilization of smaller sardines prevalent in the area. Consequently, northern California landings increased greatly over previous years, and by October 1, 1994, over one-half (1,832 MT) of the northern California directed quota had been landed. On October 1, the remaining northern directed-fishery allocation (1,495 MT) was split 50:50 between the north and south (table 2). In addition, 363 MT of the incidental catch reserve was reallocated (one-third to the north, two-thirds to the south). Despite this reallocation, the northern directed fishery remained open through year's end, landing a total of 2,295 MT.

The southern directed fishery reopened on October 11, 1994, with an additional 990 MT. Approximately

1,256 MT were quickly captured, and the fishery closed on October 18. The central California dead bait fishery closed on April 1, 1994, with total landings of 64 MT, 8 tons over its 56 MT quota. The pace of the southern California dead bait fishery was slow, due to the small size of the fish, and the quota was not attained until December 5, 1994. Once again no landings occurred against the northern dead bait quota.

In September, the live bait fishery exceeded its allocation because many sportfishing vessels used small sardines because of a shortage of anchovies. The fishery was allowed to continue landing live bait because historically their landings decreased at year's end and it appeared that the northern directed fishery would not use all of its allocation.

In April 1994, the CDFG, the National Marine Fisheries Service (NMFS), and Mexico jointly conducted a cooperative daily egg production method (DEPM) cruise. The cruise ranged from San Francisco to Punta Abreojos, Baja California. Over 680 stations were occupied, and 74 were positive for sardine eggs. In addition, adult sardines were captured at 43 stations. In November 1994, the 1994 spawning biomass was estimated, by means of the CANSAR model, to be 330,495 MT. The large increase in biomass was due to the inclusion of DEPM cruise data from both northern California and Mexico, areas for which there had been no data for the previous two years.

PACIFIC MACKEREL

The California fishery for Pacific mackerel (*Scomber japonicus*) has declined precipitously since 1990, and statewide landings during 1994 totaled only 10,052 MT (table 1). The principal causes of the reduced 1994 catches

were low biomass and poor availability on the traditional fishing grounds in southern California.

California-based round-haul vessels (commonly referred to as the wetfish fleet) account for nearly all the commercial fishing effort for Pacific mackerel in U.S. waters. The wetfish fleet also targets several other schooling species (e.g., Pacific sardine, jack mackerel, market squid, bonito, Pacific herring, and occasionally bluefin tuna and northern anchovy). Historically, Pacific mackerel landings have been concentrated in southern California, with most vessels operating from San Pedro/Terminal Island and a few others from Port Hueneme or Santa Barbara. A smaller fleet in Monterey catches a minor percentage of the state's total annual mackerel landings.

The fishing season for Pacific mackerel is defined by the California Department of Fish and Game as the 12-month period from July 1 of one calendar year through June 30 of the following calendar year. Pacific mackerel are fished during every month, as long as total landings remain below the harvest quota. Quota restrictions are set for the commercial fishery when the stock's total biomass is determined by the CDFG to be greater than 18,160 MT but less than 136,200 MT. Within that range, the harvest formula specifies that the quota shall be 30% of the biomass in excess of 18,160 MT. If the biomass is less than 18,160 MT, a moratorium on any directed catch is implemented; if the biomass is greater than 136,200 MT, there is no limitation on the total catch.

Total landings for the 1993/94 fishing season were 10,796 MT, well below the season quota of 23,154 MT. Poor mackerel availability continued during the last half of 1994, when the fishery operated with a 1994/95 season quota of 14,710 MT. Landings during July through December were only 3,973 MT, about 1,000 MT less than the same period for 1993, and 78% less than the average for 1988–1992.

Prices paid to fishermen for Pacific mackerel have declined since the early 1980s and are currently near the record low. During the 1993/94 season, fishermen received an average price of \$105 per metric ton, with a total annual ex-vessel value of \$1.4 million. The average ex-vessel mackerel price improved slightly in the latter half of 1994, to \$109 per metric ton.

Several sources of information were available to scientists on the status of the Pacific mackerel stock. Landing statistics for both the U.S. and Mexican fisheries have shown similar declines during recent years. Data from aerial observations (spotter pilots employed to locate fish schools) and CalCOFI plankton surveys (mackerel larvae data) have also shown declines in abundance since the early 1980s. CDFG staff used a tuned virtual population analysis (VPA) model called ADEPT to estimate

Pacific mackerel abundance during 1994. The model finds the best statistical fit (lowest sums of squares) between fishery-based, age-structured biomass estimates and other data from aerial observations and plankton surveys. Based on model output, the CDFG estimated that the Pacific mackerel biomass was 64,468 MT on July 1, 1994—the lowest estimate of biomass since the late 1970s.

Estimates of age-specific abundance suggested that the numbers of fish age three and older were currently at the lowest levels in many years, and that recruitment has been below average since 1989. Three of the four most recent year classes are the weakest ones to appear since the stock recovered from depressed levels in the late 1970s. Despite poor abundance for the 1993 and 1994 year classes, together they compose about 70% of the current biomass, because of the lack of older fish in the population.

A warm-water oceanic regime has dominated the California current region for about 15 years, and may have caused a northern emigration of Pacific mackerel, particularly the older ones. This may have been compounded during 1993, because of another strong El Niño influence on sea-surface temperatures. Such emigration would exacerbate availability problems to the southern California wetfish fleet. Model-derived estimates of age-specific fishing vulnerabilities support this hypothesis, with reduced vulnerability for each successive age beyond age two.

PACIFIC HERRING

Annual statewide landings for the Pacific herring (*Clupea pallasii*) roe fishery were 2,668 MT in 1994, a decrease of 39% from the previous year. Statewide landings for the 1993–94 season (November to March) totaled 2,380 MT. The three gill net platoons (352 permittees) in the San Francisco Bay fishery landed 1,618 MT, which was 23% over their 1,320 MT quota. Thirty-two round haul (purse seine and lampara) permittees fishing in San Francisco Bay landed 470 MT, four percent less than their 491 MT quota. Tomales Bay (figure 1) was open to commercial herring fishing for the second consecutive year since the 1988–89 season, and outer Bodega Bay remained closed to commercial herring fishing. Thirty-nine Tomales Bay permittees landed 199 MT, 27% under their 272 MT quota. The four Humboldt Bay permittees landed 57 MT, exceeding their 54 MT quota by 6%. Crescent City fishermen (three permittees) landed 30 MT, which was 9% over their 27 MT quota.

The price of roe herring rose from the previous season's level, when predictions of record Alaskan harvests depressed California roe herring prices. Ex-vessel prices for gill net-caught herring with 10% roe recovery ranged

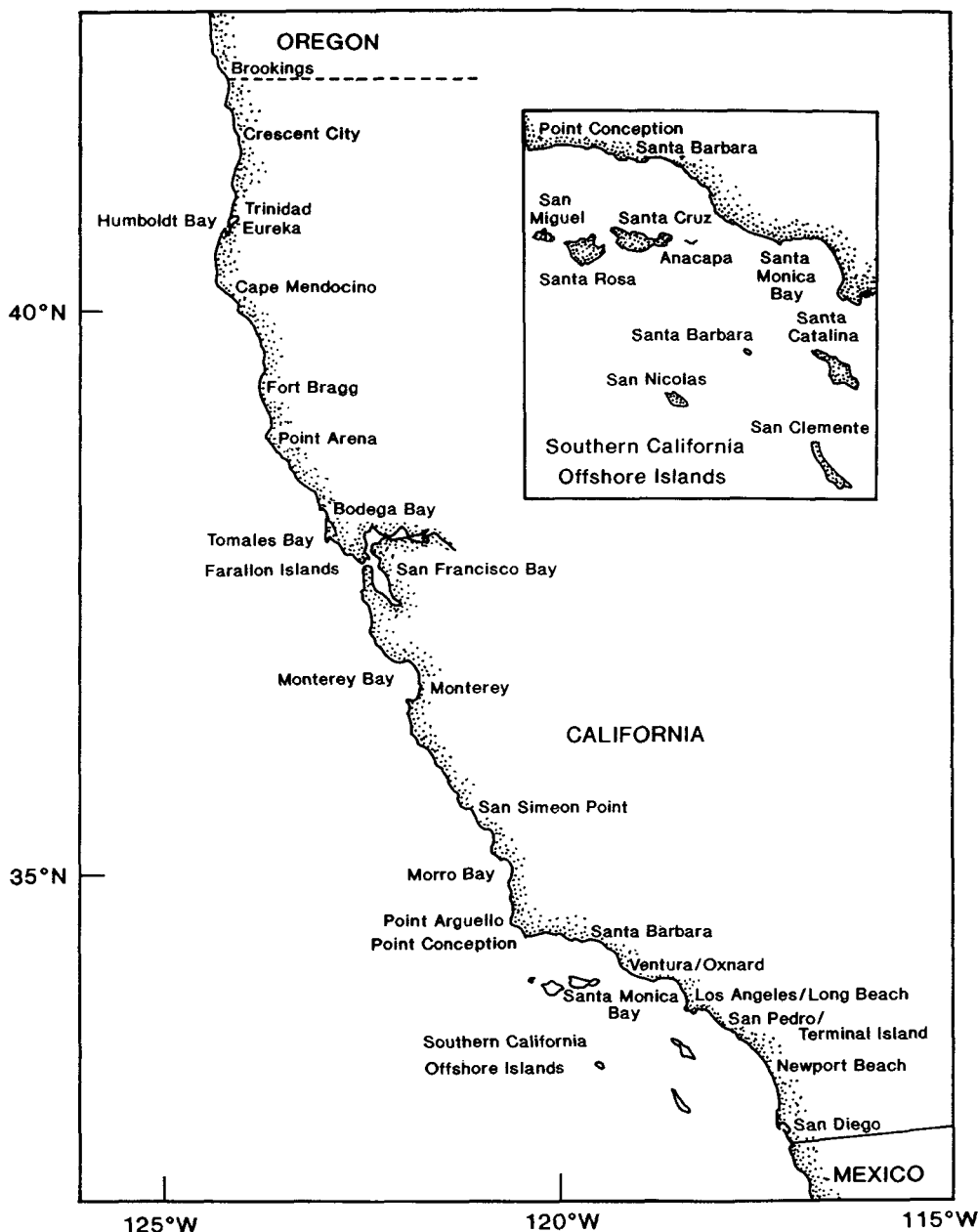


Figure 1. California ports and fishing areas.

from \$700 to \$800 per short ton during the 1993–94 season. The base ex-vessel price for round haul herring was \$700 per short ton. The combination of a relatively low price-per-ton for roe herring and a lower quota than the previous season reduced the total ex-vessel value for California’s 1993–94 roe fisheries to approximately \$2.1 million. The ex-vessel value was 36% less than that of the 1992–93 season—well below the ten-year average of nearly \$10 million.

Ten permittees in the San Francisco Bay herring roe-on-kelp fishery harvested slightly less than their aggregate 32 MT quota. The estimated ex-vessel value of the

1993–94 roe-on-kelp fishery was \$910,000, at prices ranging from \$8 to \$16 per pound.

CDFG biologists estimated spawning biomass for San Francisco Bay and Tomales Bay populations, but not for the spawning populations in outer Bodega Bay, Humboldt Bay, or Crescent City Harbor. Hydroacoustic and spawn-deposition surveys were used to estimate spawning biomass in San Francisco Bay, and spawn-deposition surveys were used in Tomales Bay. After three consecutive years of decline, estimated spawning biomass of San Francisco Bay herring increased to 36,197 MT, 86% higher than the previous season’s estimate of 19,500 MT.

However, the San Francisco Bay population remained below the long-term average of 49,900 MT. An apparent strong appearance of three-year-old herring from the 1991 year class accounted for most of the increase in biomass. Higher biomass levels might also be attributable to the return of fish temporarily displaced to the north by recent El Niño conditions.

The total spawning biomass estimate for Tomales Bay was 2,234 MT, a decrease of 40% from the 1992–93 estimate of 3,700 MT. This biomass decline followed four consecutive seasons of increase of the Tomales Bay population. The decline was anticipated because historical data indicated that biomass usually falls in years following El Niño conditions. The prior trend of increasing biomass and the population's age composition (indicating good recruitment) suggest that migration from Tomales Bay was the most likely cause of the current low biomass level.

GROUND FISH

The California commercial groundfish harvest for 1994 was 24,156 MT, with an ex-vessel value of approximately \$24 million. Total 1994 landings decreased approximately 14%, or 3,757 MT, from 1993. Dover sole (*Microstomus pacificus*), thornyheads (*Sebastolobus* spp.), sablefish (*Anoplopoma fimbria*), rockfish (*Sebastes* spp.), and Pacific whiting (*Merluccius productus*) continued to dominate the harvest. In 1994, as in 1993, significant decreases in harvest were noted for most categories (table 3). Reasons for the decline include a drop in production as stocks are fished down to optimum levels, and reduced market demand for some species. Pacific whiting and flatfish other than Dover sole showed increases in 1994.

The general distribution of 1994 landings for trawl and line gear showed the same trend evident during the past two years. The bottom and midwater trawl com-

ponent rose to 82%, up from 78% in 1993 and 75% in 1992. The line portion of the catch dwindled from 18% in 1992 to 16% in 1993 then to 14% in 1994. The trap component was the same as in 1993 at 1%, but setnet groundfish landings dropped from 5% in 1993 to 3% in 1994.

The Pacific Fishery Management Council (PFMC) implemented a license limitation program on January 1 within the Washington–Oregon–California (WOC) area. Annual harvest guidelines were allocated between a permitted limited entry (L.E.) fleet and nonpermitted “open access” (O.A.) fleet, and separate trip limits were established for each sector. The PFMC set harvest guidelines that affected the California fishery for Pacific whiting; Dover sole, thornyheads, and trawl-caught sablefish (the DTS complex); the *Sebastes* complex, widow rockfish (*Sebastes entomelas*); bocaccio rockfish (*S. paucispinis*); yellowtail rockfish (*S. flavidus*); and, for the first time, lingcod (*Ophiodon elongatus*). The PFMC continued to use cumulative landing limits as well as trip limits during 1994 in order to meet their objective of staying within the annual harvest guideline while providing a year-round groundfish fishery. However, cumulative landing limits were expanded by applying these limits to full calendar months and eliminating biweekly options.

No factory trawl vessels initially qualified for L.E. permits, but seven vessels eventually purchased and combined enough small-trawler permits to fish during the 1994 whiting season. By year's end, 109 of 390 original trawl permits had been combined, leaving a fleet of 291 trawlers (including 9 factory trawlers) permitted to take groundfish in the WOC area. The reduction was insufficient to significantly increase trawl trip limits. Each permitted factory trawler was entitled to only one catch limit for any species or species group, regardless of the number of permits purchased and combined. By year's end 204 vessels were permitted to use longline, and 31 vessels were permitted to use traps in the L.E. groundfish fishery. All other vessels targeting groundfish were delegated to the O.A. fishery with its more restrictive harvest guidelines and trip limits.

A 1994 WOC-area Pacific whiting harvest guideline of 260,000 MT was fully utilized by the domestic industry. As in 1992 and 1993, the resource was allocated between at-sea and shoreside processing sectors. The PFMC again restricted at-sea processing of whiting to waters north of California. Five midwater trawl vessels, fishing off the Eureka and Crescent City areas, landed virtually all of the California catch of 3,662 MT, a small increase from the 3,144 MT landed in 1993. A whiting fishery observation program, established in 1992 to monitor the bycatch of salmon and other species in the shoreside landings, continued through 1994. The California salmon-bycatch rate was 0.012 salmon per metric ton

TABLE 3
 California 1994 Groundfish Landings (Metric Tons)

Species	1993	1994	Percent change
Dover sole	6,540	4,462	-32
English sole	470	432	-8
Petrale sole	457	524	13
Rex sole	456	548	17
Other flatfish	479	682	30
Widow rockfish	1,181	930	-21
Bocaccio	1,254	887	-29
Other rockfish	6,061	5,406	-11
Thornyhead	4,101	3,282	-20
Lingcod	686	546	-20
Sablefish	2,570	1,879	-27
Pacific whiting	3,144	3,662	14
Other groundfish	514	644	20
Total	27,913	24,156	-14

of Pacific whiting—a slight decrease from the previous season's 0.018 rate. All salmon observed were chinook (*Oncorhynchus tshawytscha*).

The monthly DTS-complex cumulative limit was initially set at 50,000 pounds, of which no more than 30,000 pounds could be thornyhead and no more than 12,000 pounds could be sablefish. Sablefish were further limited to 1,000 pounds or 25% of the DTS complex per trip (whichever was greater). High thornyhead prices attracted much greater effort than anticipated, and on July 1, the overall DTS limit was reduced to 30,000 pounds, of which no more than 8,000 pounds could be thornyheads and no more than 6,000 pounds could be trawl-caught sablefish. It became evident by October that the sablefish component of the DTS complex continued to be harvested at a high rate and that the harvest guideline would be exceeded by the end of the year. Consequently, the PFMC opted to prohibit the trawl-take of sablefish and limit Dover sole to 6,000 pounds cumulative catch per month and thornyheads to 1,500 pounds cumulative catch per month during December.

The coastwide 1994 catch of Dover sole was 9,340 MT, a decrease of 4,980 MT from 1993 landings and 4,260 MT lower than the 1994 harvest guideline. The decline in production was the result of both reduced market demand and a redirection of effort toward the more valuable sablefish and thornyheads. California 1994 landings of 4,462 MT were 48% of total WOC landings, compared with the previous year's 46% share.

Total coastwide thornyhead landings of 6,188 MT represent a decline from 1993 landings and were slightly less than the 1994 6,440 MT harvest guideline. California landed 3,282 MT, or 53% of the WOC thornyhead total, a near-identical proportion to 1993.

The WOC area trawl/nontrawl sablefish allocation remained at 58:42. The 7,000 MT harvest guideline (excludes INPFC Conception area) for 1994 remained unchanged from 1993. In addition, an acceptable biological catch (ABC) of 425 MT was established for the INPFC Conception area. After respective tribal and open-access allotments of 300 MT and 630 MT were granted, 6,070 MT remained for allocation between trawl (3,521 MT; 58%), and L.E. nontrawl (2,549 MT; 42%), fisheries. Total WOC-area landings of sablefish were 7,274 MT—4% over the harvest guideline. California accounted for 1,879 MT, or 26% of the total WOC sablefish catch.

WOC-area trawl sablefish landings were 3,581 MT, about 6% greater than the trawl harvest guideline, despite the landing prohibition in December. California trawl vessels landed 1,223 MT, or 34% of coastwide trawl sablefish landings.

In 1992 and 1993, the nontrawl unrestricted sablefish season lasted just 15 and 21 days, respectively. With

the implementation of a limited entry system, managers and fishers expected a longer season because vessels without L.E. permits could not participate in the unrestricted season. But permitted vessel owners apparently purchased additional gear, because the 1994 season lasted only 20 days. Total L.E. nontrawl landings of 3,127 MT exceeded the 2,549 MT allocation by 19%. The O.A. fishery, limited to 250-pound or 350-pound trip limits, landed 256 MT of its 630 MT allocation. California fishers landed 656 MT, or 21%, of the total WOC-area nontrawl landings.

On January 1, the L.E. monthly cumulative limit for the *Sebastes* complex (including yellowtail and bocaccio rockfish) was set at 80,000 pounds coastwide, of which no more than 14,000 pounds could be yellowtail rockfish north of Cape Lookout, Oregon; no more than 30,000 pounds could be yellowtail rockfish south of Cape Lookout; and no more than 30,000 pounds could be bocaccio south of Cape Mendocino. The cumulative monthly limit was raised to 100,000 pounds south of Cape Mendocino on September 1. The O.A. cumulative limit was initially set at 40,000 pounds, with no more than 10,000 pounds per trip. The bocaccio and yellowtail rockfish limits were the same as L.E. limits. On May 1, the 10,000-pound-per-trip limit was removed for vessels using setnets.

PFMC manages the *Sebastes* complex with two harvest guidelines: *Sebastes* north and *Sebastes* south. The southern management area includes the Eureka, Monterey, and Conception INPFC statistical areas (California to Brookings, Oregon). For 1994 the *Sebastes* south harvest guideline of 13,000 MT allocated to limited entry (8,920 MT) and open access (4,520 MT) fisheries. The bocaccio component of 1,540 MT was allocated in the same proportion. California's *Sebastes*-complex landings dropped from 7,315 MT in 1993 to 6,293 MT in 1994. The 1994 bocaccio harvest included 887 MT of commercial catch and an estimated 200 MT from the recreational fishery. While all-fisheries *Sebastes* south landings were only 48% of the harvest guideline, the O.A. bocaccio landings of 442 MT approached the 450 MT harvest guideline.

The 1994 WOC-area widow rockfish harvest guideline of 6,500 MT was reduced from a 7,000 MT 1993 harvest guideline. The PFMC implemented a 30,000-pound cumulative catch limit until December 1 before imposing a 3,000-pound-per-trip limit. California landings constituted 15% (930 MT) of the WOC-area total of 6,183 MT.

In 1992 the PFMC examined the feasibility of individual transfer quotas (ITQs) and decided to proceed with developing an ITQ program for nontrawl sablefish. However, at its October 1994 meeting, the commission voted to postpone action indefinitely, largely in response

to a congressional request for a delay while major policy issues are resolved at the national level.

The development of a coastwide mandatory onboard observer program for groundfish vessels was further delayed pending reauthorization of the federal Magnuson Fishery Conservation and Management Act.

DUNGENESS CRAB

California Dungeness crab (*Cancer magister*) landings during the 1993–94 season were 2,752 MT, a decrease of 1,815 MT from the previous season, and well below the ten-year average of 3,662 MT.

The northern California season opened on December 1, 1993, but most fishers agreed not to fish because crab were in poor (soft-shell), postmolt condition. Oregon fishers from the port of Brookings violated the gentleman's agreement with California fishers to delay the season, and set gear in waters from the Oregon border to Point St. George. The conflict between Oregon and California crab fishers in California waters repeated a similar situation of the previous season. On December 27, northern California Dungeness crab marketing associations agreed to an ex-vessel price of \$1.00 per pound, despite marginally acceptable crab condition, and fishing began in earnest.

A fleet of 424 vessels (30 fewer vessels than in 1992–93) landed approximately 2,371 MT at the northern California ports of Crescent City, Trinidad, Eureka, and Fort Bragg during the 1993–94 season. The port of Crescent City accounted for 1,568 MT of the total, followed by Eureka (510 MT), Trinidad (249 MT), and Fort Bragg (44 MT).

The San Francisco–area Dungeness crab season opened on November 10, 1993, with an ex-vessel price of \$1.90 per pound. Total crab landings increased by 124 MT from the previous season, to a 1993–94 total of 245 MT. Crab fishers landed 79 MT at Bodega Bay, and 166 MT at ports in the San Francisco area. Monterey and Morro Bay contributed 136 MT to the season total.

Assembly Bill 3337 was signed into law by the governor in September 1994 chiefly to replace the current temporary moratorium on entry into the Dungeness crab fishery with a limited-entry program requiring permits on vessels, effective April 1, 1995. This bill also created a quality testing program, and empowered the CDFG director to delay the season, if necessary, on a recommendation from the California Seafood Council. Lastly, Assembly Bill 3337 prohibits a fishing vessel from taking crab for both commercial and sport use in the same day.

RIDGEBACK AND SPOT PRAWN

Ridgeback prawn (*Sicyonia ingentis*) are fished commercially with trawl nets. Ridgeback prawn may be

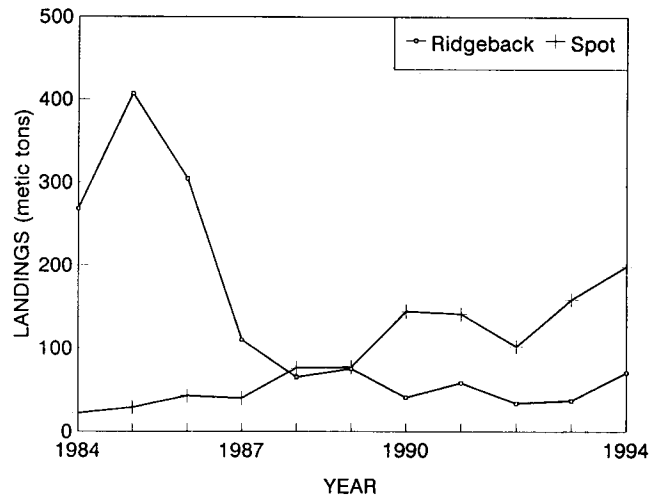


Figure 2. California ridgeback and spot prawn landings, 1984–94.

trawled by permit from October 1 through May 31. An incidental catch of 50 pounds per trip is allowed during the closed season. Preliminary landings for 1994 totaled 70 MT, a catch total almost double that of 1993 (figure 2). Most of the 1994 catch came from the Santa Barbara Channel. A portion of the catch, approximately 6 MT, was sold live at ex-vessel prices ranging between \$2.35 and \$2.50 per pound. The ex-vessel price for fresh, dead ridgeback prawn ranged between \$1.35 and \$1.60 per pound. The average price paid in 1994 for ridgeback prawn, regardless of condition, was \$1.50 per pound.

The spot prawn (*Pandalus platyceros*) is a large shrimp, and commands a higher price than the ridgeback. Spot prawn were caught with traps until the mid-1970s, when trawl nets became the primary capture gear. Because of an increasing demand for live product, traps have again become a significant method of harvest, and many trawl vessels have been retrofitted with live wells to keep their prawn catches alive. Preliminary 1994 spot prawn landings totaled 198 MT, a 25% increase over the 158 MT landed in 1993.

Approximately 132 MT of spot prawn were harvested by trawl, while 66 MT were taken with trap gear. Eighty-two percent of the combined trawl/trap spot prawn catch was landed and sold in live condition, thereby commanding significantly higher ex-vessel prices. Ex-vessel prices ranged from \$2.50 to \$3.50 per pound for dead spot prawn and from \$4.50 to \$9.00 per pound for live spot prawn. The average ex-vessel price for all spot prawn landed in 1994 was \$5.80 per pound.

Spot prawn may be trawled by permit from February 1 through October 31. During the closed period, an incidental catch of 50 pounds per trip is allowed. Much of the 1994 trawl catch was taken in the Santa Barbara Channel, as in previous years, but Monterey Bay and the

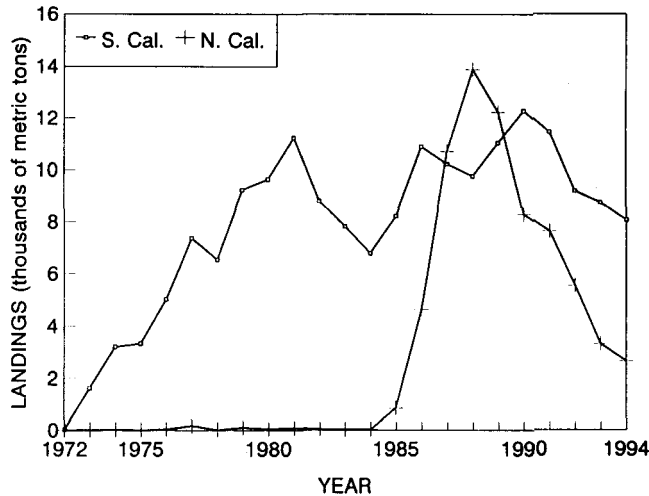


Figure 3. California sea urchin landings, 1972-94.

coastline between Point Piedras Blancas (San Luis Obispo County) and Point Arguello (Santa Barbara County) also contributed substantial trawl catches. Spot prawn may be harvested by trap year-round, except for a 50-fathom restriction from Point Conception south to the U.S./Mexico border. Santa Catalina, San Clemente, and San Nicolas Islands again proved to be productive prawn trapping sites.

SEA URCHIN

Statewide landings of red sea urchin (*Strongylocentrotus franciscanus*) in 1994 totaled 10,707 MT, a decrease of 11% from the 1993 total of 12,046 MT. Southern California landings decreased by 9% from the previous year, while northern California landings decreased by 18% (figure 3).

Catch per unit of effort (CPUE), in kilograms per diving hour, increased in both regions of the state. Northern California CPUE increased from 112 kg/hr in 1993 to 124 kg/hour in 1994, while southern California CPUE expanded from 93 kg/hr in 1993 to 99 kg/hr last year. The rise in CPUE was unusual because of the continued decrease in total landings (figure 4).

The number of sea urchin permits increased from 520 in 1993-94 to 525 for the 1994-95 season. The increase is credited to the termination of the sea urchin apprentice-diver program and the subsequent granting of full permit status to the holders of apprentice permits. The California Fish and Game Commission canceled the apprentice-diver program in March 1994 and will issue no additional sea urchin permits until the number falls below 300 permittees.

Statewide landings of purple sea urchin (*Strongylocentrotus purpuratus*) increased from 49 MT in 1993 to 63 MT in 1994. Although the market for purple urchins

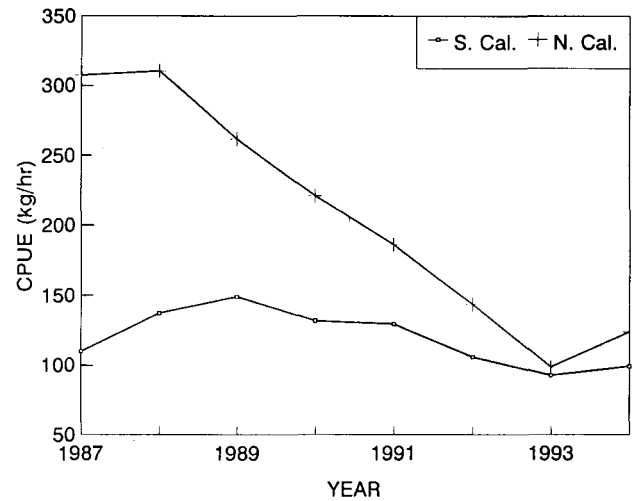


Figure 4. California sea urchin catch per unit of effort, 1987-94.

remained quite limited, interest in the fishery may grow as red sea urchin landings continue to decrease.

SWORDFISH AND SHARKS

Swordfish (*Xiphias gladius*) landings were 1,159 MT in 1994, 5% less than in 1993 (table 4). During the past decade the drift gill net fishery accounted for the majority of the catch. This year, however, only 45% of the catch was taken with drift gill nets. Harpoon landings constituted 9% of the catch, and longline landings increased 4.5 times from 1993, to 45% of the catch. Approximately 20 vessels (compared to only 6 in 1993) used longline gear outside the U.S. Exclusive Economic Zone (EEZ) and landed swordfish in southern California ports. Forty percent of the statewide swordfish catch was landed in Crescent City.

Gear type affected swordfish ex-vessel prices in 1994. Typically, fishers landing drift gill net-caught swordfish received \$3.00 to \$5.50 per pound, whereas longline-caught fish commanded only \$2.00 to \$5.00 per pound.

TABLE 4
 Landings of Swordfish and Selected Shark Species (Metric Tons)

	Swordfish	Common thresher shark	Shortfin mako shark
1984	2,013	756	150
1985	2,362	700	103
1986	1,749	276	215
1987	1,246	239	274
1988	1,129	250	222
1989	1,296	295	177
1990	851	210	262
1991	711	344	151
1992	1,068	179	97
1993	1,218	162	84
1994*	1,159	190	87

*Preliminary

Fishers landing harpoon-caught swordfish received the highest prices: \$4.00 to \$6.50 per pound.

Landings of common thresher shark (*Alopias vulpinus*), caught almost exclusively by drift gill nets, increased to 190 MT in 1994—a slight improvement after a decade of decline (table 4). Forty-two percent of the catch was landed in the ports of Santa Barbara and Ventura. Ex-vessel prices varied from \$0.90 to \$2.00 per pound.

Shortfin mako shark (*Isurus oxyrinchus*) landings in 1994 increased slightly from the previous year's level, to 87 MT (table 4). Most (82%) of the catch was landed in southern California ports, at ex-vessel prices between \$0.50 and \$1.65 per pound. Mako sharks are caught primarily by the drift gill net fishery (63%), although hook-and-line gear accounted for approximately 21% of the mako catch, and 15% of the catch was landed by long-line vessels operating outside the EEZ.

CALIFORNIA HALIBUT

The Marine Resource Protection Act of 1990 (Proposition 132), went into effect on January 1, 1994, restricting gill netting to outside of three miles in waters south of Point Arguello. Since nearshore gill netting has historically been the major method of take in southern California, the closure had a dramatic effect on California halibut (*Paralichthys californicus*) landings. In 1994, 232 MT of halibut were landed statewide (table 5), a 32% reduction from the 1993 catch (figure 5). Landings in southern California decreased by 54% (80 MT landed); landings in northern California decreased by only 14% (149 MT landed); illustrating the effect of Proposition 132 on the fishery in the south.

San Francisco accounted for 49% of the catch, followed by Santa Barbara (26%) and Morro Bay (7%). In Eureka there was a surprising 4.6-fold increase in halibut landings. Although the Eureka landings (2 MT) are a very small fraction of the statewide catch, they offer interesting anecdotal evidence of a possible shift in halibut population to the north. The halibut caught in Eureka were uniformly just over the minimum size limit

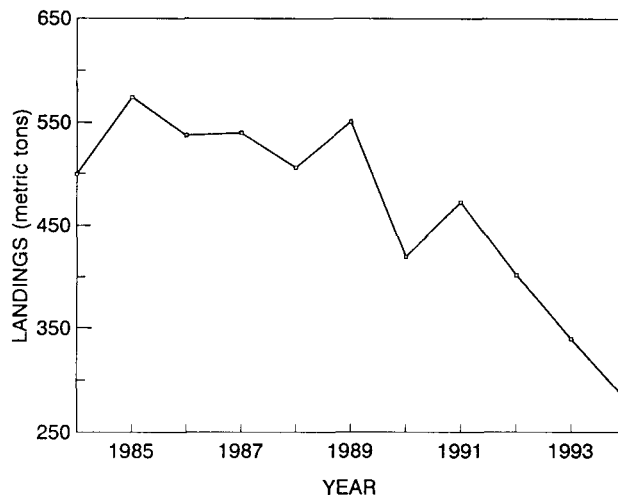


Figure 5. California landings of halibut, 1984-94.

(R. Warner, CDFG, pers. comm.), and may be a recruitment product of a recent El Niño.

Halibut landings peaked in the months of August (44 MT) and September (30 MT). The most productive fishing gear was the trawl (112 MT), followed by hook and line (52 MT). Gill nets landed 42 MT, a 65% decrease from 1993. Hook and line produced 38% more halibut than in 1993, a possible result of the growing live-fish market, which brings a higher price than the fresh, dead market.

The per pound ex-vessel price for halibut ranged from \$0.27 to \$9.50, with the highest prices paid for live fish. The average price of halibut was \$3.00 per pound, and the total value of halibut landed in 1994 was \$1.34 million.

OCEAN SALMON

In 1994, the Pacific Fishery Management Council enacted restrictive commercial and recreational ocean salmon regulations off California to (1) protect endangered chinook (*Oncorhynchus tshawytscha*) stocks—Sacramento River winter chinook and Snake River fall chinook; (2) ensure the fall chinook spawner escapement goals for Klamath, Sacramento, and Oregon coastal rivers; and (3) protect depressed coho (*Oncorhynchus ksutch*) stocks coastwide.

In California, commercial fishing for ocean salmon was allowed only south of Horse Mountain, in concert with various time and area closures during the May 1–September 30 season. A minimum size limit of 26 inches remained in effect. Commercial trollers, expending approximately 19,600 days of effort, landed almost 1.4 MT (≈275,400 fish; figure 6) of dressed (eviscerated and cleaned at sea) chinook during 1994. Ex-vessel prices for dressed salmon averaged \$2.06 per pound, and the total ex-vessel value of the fishery exceeded \$5.9 million.

TABLE 5
 California Commercial Halibut Landings, 1994

Port	Catch (MT)	Percent of catch	Value
Unknown	2.81	2.81	\$15,247
Eureka	1.73	0.75	\$8,742
Bodega Bay	6.61	2.85	\$38,334
San Francisco	111.23	47.98	\$560,660
Monterey	13.72	5.92	\$67,764
Morro Bay	15.66	6.76	\$104,712
Santa Barbara	61.00	26.31	\$438,456
Los Angeles	9.87	4.26	\$68,828
San Diego	9.18	3.96	\$33,815
Totals	231.82	100.00	\$1,336,559

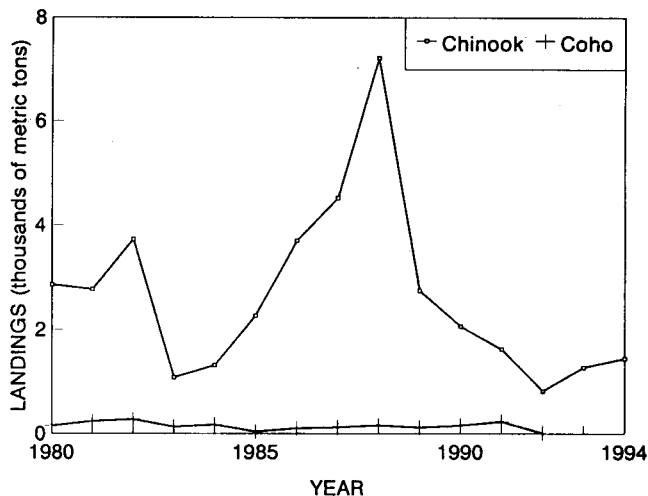


Figure 6. California commercial salmon landings, 1980-94.

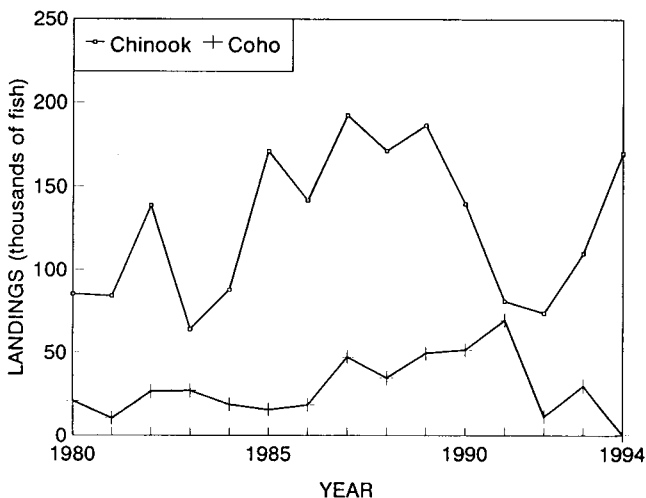


Figure 7. California recreational salmon landings, 1980-94.

Commercial fishing for coho salmon was not allowed during 1994.

In the Klamath Management Zone (KMZ; Horse Mountain, California, to Humbug Mountain, Oregon) quotas were used to manage the fisheries. The KMZ fishery opened on May 1 with a 10,300-fish quota (it closed on June 7), then reopened under a 500-fish quota from August 27 to 31. From September 1 to 5, there was an open, "no quota" fishery.

Recreational fishing regulations were similar to those of 1993, with various time and area closures enacted for the February 12–November 13 season. Anglers were allowed two salmon per day (no coho after May 1) with a minimum size limit of 20 inches. Statewide, recreational anglers landed 170,400 chinook (figure 7) during 169,000 angler trips, for an average of 1.0 fish per angler trip. This represented a 54% increase over 1993 landings of 110,000 chinook.

In the California portion of the KMZ, 1994 recreational landings of chinook exceeded the 1993 catch of 4,900 fish by 106%. Recreational anglers landed 10,100 chinook during 15,800 angler trips for an average of 0.6 fish per angler trip. Most fishing was done from private skiffs, although there was some charter boat activity.

No catch quotas were employed to manage the recreational fishery in waters south of Horse Mountain. Recreational anglers landed 160,300 chinook during 153,200 angler trips (average catch 1.1 chinook per angler trip) from both private skiffs and charter boats. This was a 52% increase over 1993 landings of 105,100 salmon. Approximately 80% of the recreationally caught salmon in this area were caught near the San Francisco port area.

LIVE-FISH FISHERY

The 1994 statewide landings for live fish were estimated at 408 MT, 88% more than in 1993 (table 6). This increase was attributable, at least in part, to the introduction in 1994 of new landing receipts that differentiate between live and dead fish. All such receipts were reviewed by CDFG biologists for completeness and accuracy. Knowledge of the port areas combined with pointed investigations of questionable data produced a more accurate estimate of reported landings for the live-fish fishery. Northern California live-fish landings may be underestimated by an unquantified amount because some fish buyers failed to properly code landings as live, not dead, fish.

The live-fish fishery began in 1988 to supply fish mainly to the California Asian community. For this market, fishes must be visually attractive and able to withstand rigors of capture and transportation. Optimum individual weights range between one and three pounds, a suitable single-entrée size at Asian restaurants. Ex-vessel prices ranged from \$2.00 to \$7.00 per pound. Larger fish were also sold live, but at a considerably reduced price. Prices fluctuated due to market demand, fish size, fish condition, and weather conditions. Hook and line gear was used to capture 59% of the live fish landed statewide; trap gear landed 22%.

Live-fish landings in southern California (Morro Bay

TABLE 6
 Preliminary 1994 Landings (MT) of Live Fish (Data through September)

	Southern California	Northern California
Rockfishes	119	57
California sheephead	99	1
California halibut	36	7
Lingcod	23	13
All others	48	5
Total	325	83

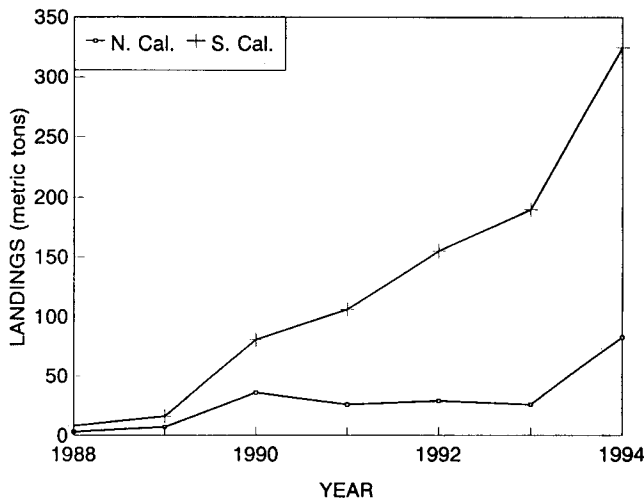


Figure 8. California live-fish landings, 1988-94.

southward) totaled 325 MT, 71% more than in 1993 (figure 8). Target species for all gear types included California sheephead (*Semicossyphus pulcher*); California halibut (*Paralichthys californicus*); California scorpionfish (*Scorpaena guttata*); cabezon (*Scorpaenichthys marmoratus*); lingcod (*Ophiodon elongatus*); and grass (*S. rastrelliger*), brown (*S. auriculatus*), and gopher (*S. carnatus*) rockfishes. Trapping accounted for 73% of all live California sheephead taken. Traps used for finfish were constructed like lobster traps, but variations abounded as this fishery continued to develop. Commercial fishery targeting on both the nearshore rockfish complex and California halibut was more intensive than prior landing data suggested. Live California halibut were caught with line, net, and trawl gear, primarily from the ports of Santa Barbara and Morro Bay. Halibut were kept alive to ensure optimum freshness, then bled, iced, and quickly shipped. This is a slight departure from the original market that displays live fish for entrée selection. Morro Bay reportedly has a rudimentary cabezon trap fishery.

Live-fish landings in northern California (north of Morro Bay) totaled 83 MT, 219% greater than in 1993 (figure 8). Landings were made primarily by hook and line vessels using vertical longlines, horizontal longlines, and troll longlines to harvest rockfish along nearshore rocky reefs and offshore banks. Finfish traps are not authorized for use in waters from Pigeon Point (San Mateo County) to the southern boundary of Mendocino County. Principal finfishes caught were gopher, brown, china (*S. nebulosus*), and copper (*S. caurinus*) rockfishes. Lingcod, halibut, and cabezon were specifically targeted for the first time in 1994.

In February, a state assembly bill was introduced to further regulate the live-fish trapping fishery. The bill proposed a limited-entry program, limitations on numbers of traps, requirements for trap construction, and in-

cidental catch restrictions. General trap permit sales rose 10% in 1994, presumably fueled by fishermen's fears of exclusion in a future limited-entry program. However, the legislature defeated this bill in December 1994.

RECREATIONAL FISHERY

Statewide landings from commercial passenger fishing vessels (CPFV) for 1994 were not available at the time of publication because of a change in the logbook format. Although the new format was tested before being issued, a problem arose about how to interpret the number of fish landed. Because of this, all 1994 logs must be reviewed before final landing tables are released.

During 1994, CDFG personnel recorded the southern California CPFV catch as reported in the sports section of the *Los Angeles Times* newspaper. Each landing submitted a daily report of the catch to the *Los Angeles Times*, which published the reports the following day. All landings from San Diego to San Simeon (San Luis Obispo County) reported daily, but occasionally missed a day due to bad weather or the inability to meet the newspaper's deadline.

Because landing operators perceive the newspaper fish report as a marketing tool, they may overstate the number of fish caught by sport anglers. Because of this, comparisons of absolute numbers of fish in the newspaper reports with catches reported on CDFG logs are not appropriate. However, ranking (order of importance when ranked by number caught) comparisons between years or between the two reporting methods within a year are unaffected by potential overreporting. This review compares 1994 *Los Angeles Times* catches for southern California with reported CPFV logbook landings for 1993 (table 7).

Rockfishes (*Sebastes* spp.) as a group dominated the CPFV fishery during both years, primarily because there are a large number of species within the group and they are fished year-round. California barracuda (*Sphyræna argentea*) increased in importance, moving from fifth rank in 1993 to second rank in 1994. Kelp bass (*Paralabrax clathratus*) and barred sand bass (*P. nebulifer*) continued to rank third and fourth. Pacific mackerel (*Scomber japonicus*) slipped from second to fifth place, probably due to underreporting of this less-desirable species by CPFV landing operators to the newspaper. Pacific bonito (*Sarda chiliensis*) remained in sixth place. Ocean whitefish (*Caulolatilus princeps*) moved from ninth to seventh rank, reflecting a dramatic increase in catch due to the recruitment of a strong year class. Although landings of spotted scorpionfish (*Scorpaena guttata*) apparently doubled, they decreased in relative importance, dropping from seventh to eighth rank. Halfmoon (*Medialuna californiensis*) landings declined in rank, moving from eighth to ninth place. Yellowfin tuna (*Thunnus albacares*) remained

TABLE 7
 Southern California Commercial Passenger Fishing Vessel Landings

Species/species-group	1994 L.A. Times		1993 CDFG logbook	
	Number of fishes	Rank	Number of fishes	Rank
Rockfishes	1,293,448	1	939,460	1
Barracuda	384,416	2	203,681	5
Kelp bass	384,084	3	355,077	3
Barred sand bass	382,966	4	313,390	4
Pacific mackerel	277,118	5	414,571	2
Pacific bonito	149,837	6	139,557	6
Whitefish	142,551	7	44,132	9
Spotted scorpionfish	124,273	8	69,527	7
Halfmoon	71,303	9	60,743	8
Yellowfin tuna	46,977	10	37,142	10
Sheephead	28,979	11	26,857	12
Skipjack	21,363	12	23,823	13
Lingcod	16,000	13	15,038	14
Yellowtail	10,518	14	35,681	11
California halibut	4,542	15	3,978	17
White seabass	3,821	16	1,401	18
Cabezon	1,382	17	1,500	19
Dolphin	689	18	8,952	16
Bluefin tuna	677	19	10,535	15

in tenth place, while skipjack (*Euthynnus pelamis*) moved from thirteenth to twelfth place. Among less frequently caught species, both California sheephead (*Semicossyphus pulcher*) and lingcod (*Ophiodon elongatus*) increased in importance by one rank. Two pelagic species, yellowtail (*Seriola lalandi*) and dolphin (*Coryphaena hippurus*) decreased in rank, dropping to fourteenth and eighteenth, respectively. California halibut (*Paralichthys californicus*), white seabass (*Atractoscion nobilis*), and cabezon (*Scorpaenichthys marmoratus*) each increased in importance by two ranks. While bluefin tuna (*T. thynnus*) dropped from fifteenth to nineteenth place, total landings de-

creased dramatically because of the absence of fish on the fishing grounds during the summer.

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- | | |
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