

## REVIEW OF SOME CALIFORNIA FISHERIES FOR 1992

CALIFORNIA DEPARTMENT OF FISH AND GAME  
 Marine Resources Division  
 411 Burgess Drive  
 Menlo Park, California 90425

Total landings of fishes, crustaceans, echinoderms, and mollusks decreased 14% from 1991, marking the fourth consecutive year of lower annual landings.

Pelagic wetfish landings decreased 36% from last year's total. Pacific mackerel and squid landings fell dramatically, but Pacific sardine landings increased by 143% (table 1).

All-species groundfish landings decreased minimally, continuing a ten-year trend of diminishing catches. Landings of Dover sole, sablefish, and thornyheads rose in 1992, although most groundfish catches remained stable or declined. California halibut landings decreased moderately as the fishery shifted northward.

Despite a substantial drop in statewide landings, the sea urchin fishery remained one of California's largest and most economically valuable fisheries, with an ex-vessel value of \$29.3 million. Dungeness crab landings decreased throughout the central and northern California fishery. Total statewide all-species abalone landings were the third lowest in the history of the commercial fishery.

Swordfish landings increased substantially as El Niño conditions shifted the fishery north of San

Francisco. Fishers landed decreased tonnages of common thresher shark and shortfin mako shark into southern California ports during 1992.

Both the numbers of recreational fishers and the catch declined slightly in 1992, although southern California fishers benefited from increased availability of highly desirable, southerly species such as yellowtail, bluefin tuna, and barracuda.

### PACIFIC SARDINE

In recent years, the population of Pacific sardine (*Sardinops sagax*) has expanded, and a fishery has been reestablished. The California Department of Fish and Game (CDFG) is required by law to set a quota of at least 1,000 short tons when the biomass exceeds 18,200 metric tons (MT). The quota may be increased, but only at a rate that allows further population growth. To this end, biomass estimates of the adult sardine population in 1992 were made at the third annual Pacific Sardine Resource Assessment and Management Workshop in October 1991 and were subsequently revised in July 1992. The revised assessment, using data for the entire year of 1991, was similar (339,000 MT) to the original.

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

Year	Pacific sardine	Northern anchovy	Pacific mackerel	Jack mackerel	Pacific herring	Market squid	Total
1971	133	40,036	70	26,725	107	14,066	81,137
1972	166	61,680	48	22,814	56	9,640	94,404
1973	68	118,391	25	9,201	1,259	5,383	134,326
1974	6	73,810	60	11,362	2,348	12,901	100,486
1975	3	141,486	129	16,415	1,086	10,542	169,661
1976	24	111,503	293	19,882	2,151	9,063	142,915
1977	5	99,504	5,333	44,775	5,200	12,605	167,424
1978	4	11,253	11,193	30,755	4,401	16,869	74,476
1979	16	48,094	27,198	16,335	4,189	19,660	115,493
1980	34	42,255	29,139	20,019	7,932	15,136	114,514
1981	28	51,466	38,304	13,990	5,865	23,132	132,785
1982	129	41,385	27,916	25,984	10,106	16,023	121,543
1983	346	4,231	32,028	18,095	7,881	1,786	64,367
1984	231	2,908	41,534	10,504	3,786	555	59,518
1985	583	1,600	34,053	9,210	7,856	10,110	63,410
1986	1,145	1,879	40,616	10,898	7,502	20,935	82,975
1987	2,061	1,424	40,961	11,653	8,264	19,662	84,025
1988	3,724	1,444	42,200	10,157	8,677	36,632	102,835
1989	3,845	2,410	35,548	19,477	9,046	40,235	110,560
1990	2,770	3,156	36,716	4,874	7,978	27,989	83,483
1991	7,625	4,184	30,459	1,667	7,345	37,388	87,203
1992*	20,335	1,124	19,699	720	6,125	12,869	57,960

\*Preliminary

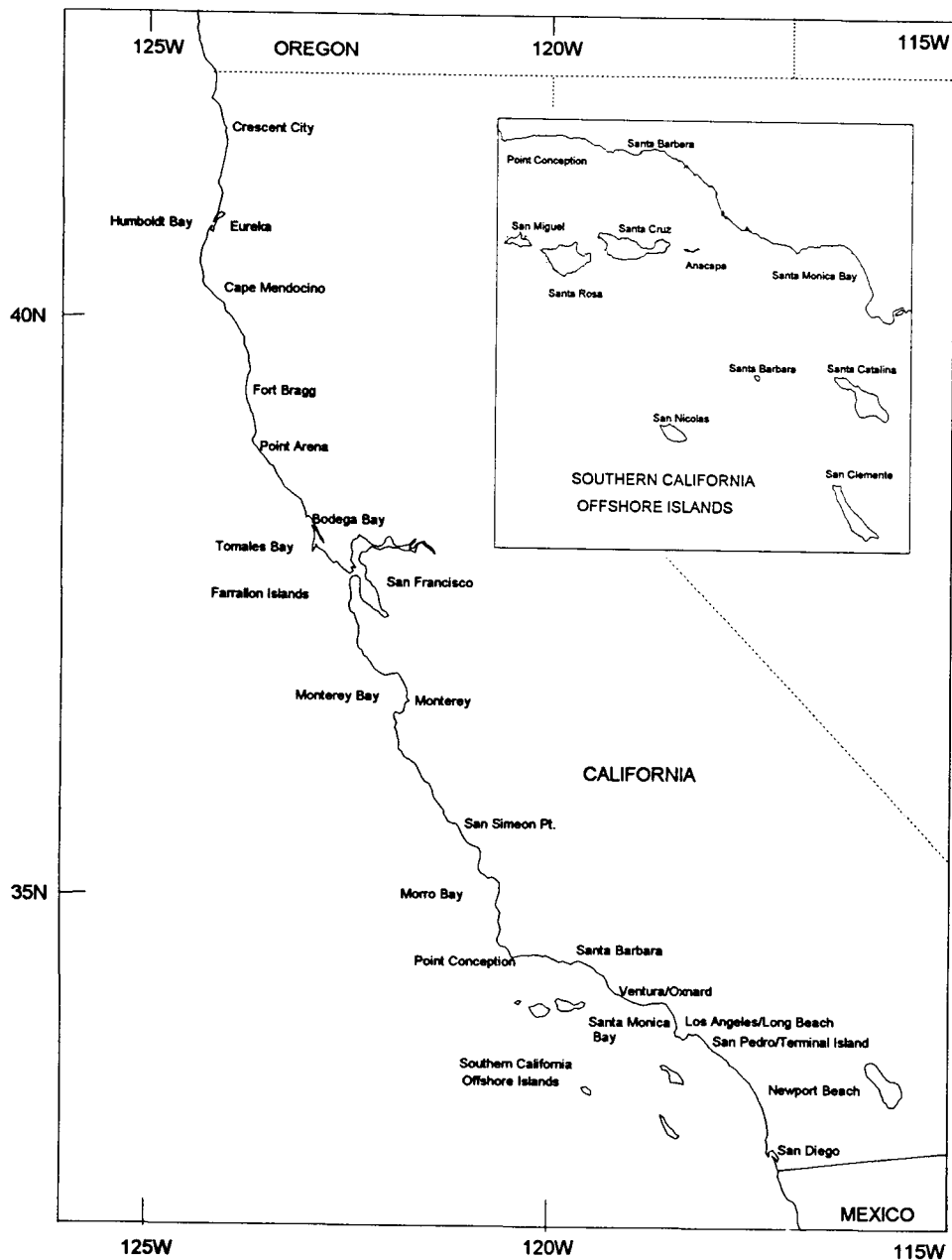


Figure 1. California ports and fishing areas.

For the 1992 season, a 10% harvest rate was continued, but projected Mexican landings of 12,220 MT were considered as the California quota was established. The CDFG allocated the 22,680-MT quota to an 18,600-MT directed fishery, a 2,720-MT reserve for incidental take, a 905-MT live bait fishery, and a 455-MT dead bait fishery. The directed-fishery allocation was divided geographically and temporally, with 6,200 MT allocated for landing at ports north of San Simeon Point after May 13, and

12,400 MT to the south commencing January 6 (figure 1).

Sportfishing vessels used many more small sardines as live bait in 1992 because of a shortage of anchovies. By midsummer the live bait catch of sardines had approached the 905-MT live bait allocation, and in October, CDFG increased the allocation to 1,810 MT by redistributing 905 MT of the incidental catch reserve. By year's end, 1,807 MT had been taken by the live bait fishery. Commercial fish-

ers landed only 65 MT of the total dead bait sardine quota of 455 MT.

Sardine landings into California and Mexico during the first half of 1992 fell below projected levels because of poor market conditions and the increased availability of squid. In early October, a major cannery in southern California reopened in response to improved market demand, and landings dramatically increased. The allocation for the southern area directed fishery was reached in late November, and CDFG applied the remaining 1,815-MT incidental catch reserve to increase the southern allocation to 13,610 MT and the northern allocation to 6,805 MT. The revised southern allocation was captured within two weeks of the adjustment, and the fishery closed on December 8 with total landings of 14,725 MT, or 108% of the allocation. After the closure, an additional 241 MT were landed incidentally to the mackerel fishery.

Almost one-half (3,255 MT) of the northern allocation of the directed quota was landed in the Monterey Bay area. Most of the sardines landed were small, probably young-of-the-year, and market demand was low.

The 1992 California landings total of 20,335 MT (90% of the statewide quota) greatly exceeded any annual figure for the last 20 years (table 1).

Sardine industry consultants introduced an integrated stock assessment model called CANSAR (catch-at-age analysis of sardines) at the fourth annual assessment workshop in October 1992. This model combines simulated population dynamics of the sardine resource with catch and age data and various measures of relative sardine abundance. The general linear model (GLM) used in 1991 includes only the indices of relative abundance. The CANSAR model indicated that the adult biomass was about 100,000 MT in 1992, and that the recovery of the sardine resource may have slowed or stopped. A reanalysis of the GLM, with the same version of the relative abundance indices that was used in CANSAR, reduced the GLM estimate to 256,000 MT, still higher than CANSAR. The apparent large change in the size of the sardine population is partly a result of the new model. Although the two models showed similar trends, the population estimates generated by CANSAR were consistently lower than those generated by the GLM.

Industry representatives, troubled by the low estimates of the CANSAR model, felt that it had not allowed for a northern expansion of the population. Warm water conditions over the past two years may have shifted the sardine population to the north, but the geographical range of the data used in the anal-

yses was largely limited to the area below Point Conception. Therefore, the models may have underestimated the true population biomass, since sampling areas did not cover the entire range of the sardine. The bycatch of sardines in the Pacific whiting trawl fishery off central Oregon from August to mid-October 1992 supports this contention.

## PACIFIC MACKEREL

By January 1, 1992, 17,722 MT of Pacific mackerel (*Scomber japonicus*) had already been landed during the 1991–92 fishing season (July 1, 1991, through June 30, 1992). Current regulations authorize an open fishery when the Pacific mackerel biomass exceeds 136,080 MT (150,000 short tons), and no quota was imposed because biomass was estimated to be 173,000 MT.

Pacific mackerel landings of 6,004 MT during the first quarter of 1992 were similar to landings in the first quarter of 1991. In January, fishing effort was directed toward squid (*Loligo opalescens*) and Pacific sardines. But the fleet targeted Pacific mackerel during February and March, when the sardine market weakened and squid became less available to fishers.

Second-quarter landings totaled 3,024 MT, only 34% of the mean second-quarter landings for the previous five years, partly because a major Terminal Island cannery closed in mid-April as a result of financial problems. Some vessels that had formerly landed their fish at this cannery delivered to San Pedro fish markets instead.

The 1991–92 season ended on June 30, 1992, with a total catch of 26,275 MT of Pacific mackerel—the lowest seasonal catch since the 1979–80 season. The species composition of total statewide mackerel landings for the 1991–92 season was 71% Pacific mackerel, 4% jack mackerel (*Trachurus symmetricus*), and 25% Pacific sardine.

Although the sardine directed fishery was open most of the year, Pacific mackerel were taken when available, because mackerel brought a higher ex-vessel price (\$90–\$110 per MT) than sardines (\$70–\$100 per MT). However, warm water (El Niño) conditions displaced Pacific mackerel to the north, diminishing availability to southern California fishers. Despite this, only 2% of total Pacific mackerel landings was made in the Monterey Bay area.

The 1992–93 season opened on July 1, 1992, without quota restrictions, because total biomass was estimated to be 146,000 MT. In fishery samples, the 1990 and 1991 year classes constituted 31% and 36% of the catch. The Pacific mackerel biomass has declined over the last several years, and the midseason, revised biomass estimate in 1993 is expected to be

lower than 136,080 MT (150,000 short tons), necessitating a quota in the 1993–94 season.

Third-quarter landings totaled 8,817 MT, similar to the same period in the previous year. Landings increased from July to August as mackerel became more available, then decreased during September as market demand declined.

During October and November, Pacific mackerel landings continued their decline because fishers landed sardines instead. Total landings for the fourth quarter were 1,854 MT, a 79% decline from the same period in 1991.

By the end of the year, 10,671 MT of Pacific mackerel had been landed toward the 1992–93 season catch, a 39% decrease from the midseason landings in 1991–92 and less than half of the average midseason landings of the last five years. Pacific mackerel landings for 1992 totaled 19,699 MT, the lowest annual landings since 1978. A combination of warm water conditions (which displace fish to the north), the declining trend of the Pacific mackerel population over the last five years, and the closure of a major Terminal Island cannery contributed to low landings.

### NORTHERN ANCHOVY

No landings of northern anchovy (*Engraulis mordax*) were made for reduction purposes in 1992 (table 2). The 1992 spawning biomass estimate of 220,000 MT was below the 300,000-MT minimum level required by the Anchovy Fishery Management Plan

for a reduction quota, therefore no take for reduction purposes was authorized during the 1992–93 season. This is the second consecutive year that no reduction quota has been allowed. The 1992–93 nonreduction harvest was set at 4,900 MT, with an unspecified amount for use as live bait.

A total of 1,124 MT of anchovy was landed for nonreduction use in 1992 (table 1), a 64% decrease from the previous year. A strong El Niño event persisted throughout the year and may have decreased the availability of anchovy in southern California. In addition, the early-season detection of domoic acid (a toxin that causes amnesic shellfish poisoning) in amounts above the alert level may have decreased demand for anchovy in 1992.

The anchovy live bait catch also declined; approximately 3,044 MT were caught in 1992, a 40% decrease from 1991. Anchovy were often unavailable to bait fishers off southern California, particularly in the San Diego area. As a result, bait fishers and sport anglers relied heavily on small Pacific sardines.

The anchovy reduction fishery in Mexico remained poor in 1992, primarily as a result of the reduced anchovy population.

### PACIFIC HERRING

Annual statewide landings for the Pacific herring (*Clupea pallasii*) roe fishery were 6,125 MT in 1992, a decrease of 17% from the previous year (table 1). Statewide landings for the 1991–92 season (November to March) totaled 6,850 MT. The three gill net platoons in the San Francisco Bay fishery landed 4,974 MT—8% over their quota of 4,600 MT. Round haul (seine and lampara) permittees fishing in San Francisco Bay landed 1,747 MT—7% less than their 1,885-MT quota. Tomales–Bodega Bay permittees fell far short of their 182-MT quota, landing only 22 MT. The entire catch by Tomales–Bodega Bay permittees came from outer Bodega Bay; Tomales Bay remained closed to fishing because of low spawn escapement in the preceding year. Humboldt Bay permittees landed 56 MT, and Crescent City permittees landed 29 MT; each fishery exceeded its quota by 2 MT.

The price of roe herring rebounded from the low prices of the 1990–91 season to \$1,200 per short ton for gill net-caught herring with 10% roe recovery, and \$750 to \$800 per short ton for round haul-caught herring. The total ex-vessel value for statewide herring fisheries was approximately \$11 million.

Ten permittees in the San Francisco Bay herring roe-on-kelp fishery harvested 76.5 MT, which was 26.1% under their 104-MT quota.

Hydroacoustic and spawn-deposition surveys in

TABLE 2

California Anchovy Landings for Reduction (Metric Tons)

Season	Southern permit area	Northern permit area	Total
1972–73	66,404	2,135	68,539
1973–74	99,112	10,328	109,440
1974–75	99,757	6,053	105,810
1975–76	123,082	4,802	127,884
1976–77	92,058	4,544	96,602
1977–78	62,138	6,545	68,683
1978–79	47,825	1,065	48,890
1979–80	30,297	2,146	32,443
1980–81	56,415	4,298	60,713
1981–82	40,975	4,495	45,470
1982–83	4,470	1,153	5,623
1983–84	64	1,602	1,666
1984–85	71	0	71
1985–86	0	1,148	1,148
1986–87	0	38	38
1987–88	0	111	111
1988–89	0	234	234
1989–90	142	29	171
1990–91	182	856	1,038
1991–92	0	0	0
1992–93*	0	0	0

\*Preliminary

San Francisco Bay detected a significant decrease in herring biomass for the second consecutive year. The spawning biomass estimate for the 1991–92 season was 42,400 MT, an 8.5% decrease from the previous season's level. Poor recruitment of two-year-old fish (1990 year class) was a major cause for the decline. Two-year-old fish typically constitute 35% of the spawning population, but made up only 3.1% of the spawning population in 1992. This biomass decline is expected to continue in the next several years, because 1991 and 1992 young-of-the-year (YOY) surveys in San Francisco Bay suggested that those year classes were also weak. While the YOY indexes for 1991 and 1992 were higher than the 1990 index, they fell considerably below the thirteen-year average for the index.

Tomales Bay and Bodega Bay herring are managed as one stock. During the 1991–92 season, the Department of Fish and Game surveyed spawn deposition in Tomales Bay, but not in Bodega Bay. The total biomass estimate for this stock was 1,125 MT, a 41.6% increase from the prior-year estimate, and the third year of increase since the dramatic plunge of 1988–89. Despite its recent resurgence, the Tomales Bay spawning population remained below the historic average of 4,500 to 5,500 MT.

The spawn deposition survey conducted in Humboldt Bay indicated that the 1991–92 biomass was 345 MT, similar to the 1990–91 estimate of 364 MT.

### GROUND FISH

California's 1992 commercial groundfish harvest was 34,478 MT, with an ex-vessel value of approximately \$28.2 million. Total 1992 landings decreased approximately 4%, or 1,285 MT, from the 1991 level, continuing a decline evident since 1982 (figure 2). Rockfishes (*Sebastes* spp.), Dover sole (*Microstomus*

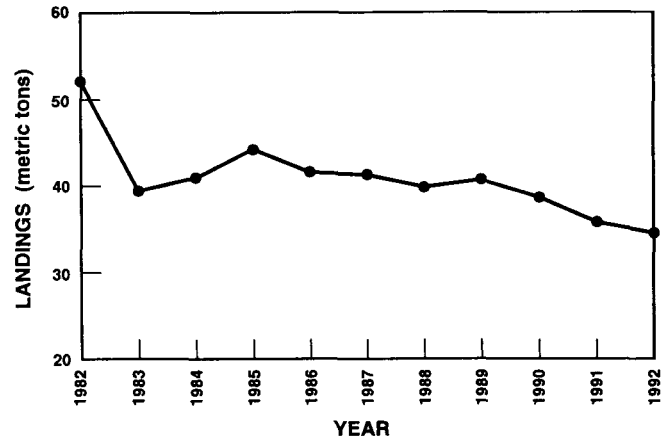


Figure 2. California groundfish landings, 1982–92.

*pacificus*), sablefish (*Anoplopoma fimbria*), thornyheads (*Sebastes* spp.), and Pacific whiting (*Merluccius productus*) were the principal species harvested. Dover sole, sablefish, and thornyhead landings rose in 1992, but most other groundfish landings declined (table 3).

Salmon stocks were again depressed in 1992, and the shift of effort to groundfish persisted into 1992. Incidental salmon catches by the offshore Pacific whiting fleet concerned the Pacific Fisheries Management Council (PFMC). Salmon bycatch in the spring 1992 whiting fishery for at-sea processors dropped to 0.0135 salmon per MT of whiting, compared with 0.0321 salmon per whiting MT in 1991, well below the PFMC target maximum of 0.05 salmon per MT of whiting. Bycatch of salmon by the at-sea processing sector was apparently higher in the fall, but remained below the 0.05-salmon/MT-whiting standard.

Bottom and midwater trawl landings continued to dominate total statewide landings, accounting for 75% of the total groundfish harvest in 1992, down 4% from 1991. The line portion of the catch continued its increase: from 6.6% in 1989, to 12.4% in 1990, to 14.0% in 1991, and to 17.7% in 1992. The trap and gill net components remained unchanged from 1991 at 1.2% and 5.9% of total landings.

The PFMC may establish a quota or harvest guideline for any species needing attention under the framework procedures established by Amendment 4 to the Fishery Management Plan (FMP). In 1992, guidelines were used to limit the total harvest of species or species groups, and trip or cumulative limits were used as the principal means of limiting landings in order to meet the PFMC objective of a year-round groundfish fishery.

For 1992 the PFMC set harvest guidelines, cumulative limits, and trip limits for the sablefish,

TABLE 3  
 California Groundfish Landings (Metric Tons)

Species	1991	1992	Percent change
Dover sole	7,726	8,619	12
English sole	812	564	-31
Petrale sole	735	528	-28
Rex sole	621	439	-29
Other flatfish	880	520	-41
Widow rockfish	1,201	1,102	-8
Bocaccio	1,122	1,467	30
Other rockfish	8,586	7,396	-14
Thornyheads	2,864	4,328	51
Lingcod	786	604	-23
Sablefish	3,308	3,653	10
Pacific whiting	6,893	4,930	-28
Other groundfish	229	328	43
Total	35,763	34,478	-4

widow rockfish (*Sebastes entomelas*), bocaccio, thornyhead, Dover sole, and Pacific whiting fisheries. Most trawl trip limits (biweekly, weekly, and twice-weekly) in effect for 1991 were changed to cumulative vessel limits in 1992 to reduce regulation-caused discards and to reduce violations of trip limits. Cumulative two-week limits were enacted for the *Sebastes* complex (including bocaccio rockfish) and the deepwater complex (Dover sole, sablefish, and thornyheads), while a cumulative four-week limit was set for widow rockfish.

The Pacific whiting fishery in the Washington-Oregon-California (WOC) area opened on April 15. A 208,800-MT harvest guideline was apportioned 98,800 MT for processing at sea (domestic catcher/processors and motherships); 80,000 MT for processing shoreside; 30,000 MT was held in reserve for release to at-sea processing on September 1, if shoreside processors had not taken 60% (48,000 MT) of their allocation, or on October 1, if surplus to shoreside processing needs.

The at-sea processing fleet took its 98,800-MT initial allocation in a record three weeks. Because shore-based processors had taken considerably less than 48,000 MT of whiting by September 1, (approximately 32,000 MT through August 29), the 30,000-MT reserve was released for at-sea processing on September 4, 1992. An additional 24,000 MT of whiting surplus to shore-based processing needs was made available for at-sea processing on October 1, increasing the limit for at-sea processing to 152,800 MT. The fishery for the second release was closed on October 7. When the emergency-rule allocation expired on October 15, two at-sea processors reentered the fishery to use approximately 2,000 MT of their allocation that had not been taken before October 7. Both vessels left the fishery on October 21, when 152,800 MT was projected to have been taken by at-sea processors for the year. The shore-based fishery continued operating, taking close to 56,000 MT for the year. A 3,000-pound trip limit was imposed on October 31, when the 208,800-MT harvest guideline for whiting was projected to be reached.

Unlike 1991, all at-sea processing of whiting was restricted to waters north of 42° N. California's shoreside fishery landed and processed 4,930 MT, which was 1,963 MT less than the previous year. All California's shoreside whiting landings were made between the April opening and the end of June. The unavailability of whiting after June was probably related to unusually warm water (El Niño) conditions.

Within the WOC area a 50,000-pound, 2-week

cumulative limit with no more than 10,000 pounds of bocaccio allowed was in effect all year for the *Sebastes* complex fishery. California's *Sebastes* complex landings dropped from 9,708 MT in 1991 to 8,863 MT in 1992. The 1992 rockfish harvest included nearly 1,467 MT of bocaccio. The commercial bocaccio harvest combined with an estimated 200 MT from the recreational fishery amounted to 1,767 MT, considerably more than the 1,100-MT harvest guideline. However, the PFMC reviewed a new bocaccio assessment and recommended that the 1993 harvest guideline be increased to 1,540 MT. This new assessment incorporates improved estimates of historical trawl, setnet, hook and line, and recreational catches.

For the deepwater complex, the two-week cumulative limit was initially set at 55,000 pounds, of which no more than 25,000 pounds could be thornyheads and no more than 25% or 1,000 pounds per trip (whichever is greater) could be sablefish. By midyear it became clear that the thornyhead cumulative limit would have to be reduced if a year-round fishery for that species were to be ensured. Consequently the cumulative two-week limit for thornyheads was reduced to 20,000 pounds on July 29. In order to further restrict thornyhead landings, the cumulative limit was reduced to 15,000 pounds and the deepwater complex limit to 50,000 pounds on October 7.

In the WOC area, thornyhead landings of 8,606 MT were up from 1991 landings and, in spite of the reduced cumulative limit, were 1,607 MT greater than the harvest guideline. An increased market demand is responsible for the surge in activity. California landed 4,328 MT, or 50%, of the WOC thornyhead catch.

The coastwide catch of Dover sole was 16,009 MT, a decrease of 2,194 MT from 1991 landings. The decrease primarily stems from reduced demand. California 1992 landings of 8,619 MT were 54% of total WOC landings, higher than the 42% share in 1991.

In the WOC area, the 1992 widow rockfish harvest guideline of 7,000 MT was unchanged from 1991. Vessels were at first limited to 30,000 pounds per 4-week period; on August 12, a 3,000-pound trip limit was implemented. By November, however, it was evident that the harvest guideline would not be reached by the end of the year, so the 30,000-pound, 4-week cumulative limit was reinstated for the month of December. The total 1992 landed catch of 6,010 MT in the WOC area was 85% of the harvest guideline. California landings of 1,099 MT were 18% of the WOC total.

Sablefish management in the WOC area during 1992 was similar to 1991, but with greater attention to setting the level of trip limits, because of the large increase in nontrawl vessels participating in the fishery. The 1992 harvest guideline of 8,900 MT was the same as in 1991. After a tribal set-aside of 300 MT was subtracted, 8,600 MT was allocated as follows: trawl, 4,988 MT (58%) and nontrawl, 3,612 MT (42%).

The PFMC adopted a framework allowing the WOC area unrestricted non-sablefish fishery to begin on May 12, three days before the opening of the Alaska sablefish fishery. Beginning on January 1, a 500-pound daily trip limit was allowed for incidental and small directed sablefish fisheries. The trip limit was set to increase to 1,500 pounds daily beginning March 1, and would run until the opening of unrestricted fishing or until 440 MT of the nontrawl sablefish harvest guideline had been taken. By March 21, the 440-MT limit was reached, and the trip limit was reduced to 500 pounds. A much higher than anticipated level of effort remained after the 1,500-pound trip limit was reduced to 500 pounds; as a result, the trip limit was further reduced to 250 pounds on April 17. The unrestricted fishery began on May 12 and was closed on May 27, leaving 300 MT to ensure that enough sablefish remained for a 250-pound trip limit to continue through the remainder of the year.

The total catch of sablefish landed in the WOC area in 1992 was 9,273 MT — 673 MT more than the harvest guideline. Nontrawl landings of 3,851 MT were 7% greater than the nontrawl allocation, and trawl sablefish landings were 5,422 MT, about 9% greater than the trawl allocation. California accounted for 3,652 MT, or 39%, of the total WOC area catch. Of the California total, trawlers landed 2,471 MT, and nontrawl gear took 1,181 MT.

For 1993 the PFMC has adopted a 7,000-MT sablefish harvest guideline. Size and age-composition data from the fishery during 1986–91 and data from NMFS synoptic trawl and sablefish pot surveys were used in a stock synthesis model to reassess the sablefish resource in 1992.

The limited entry plan for groundfish adopted by the PFMC in 1991 was approved by the National Marine Fisheries Service in 1992 and is scheduled for implementation on January 1, 1994. The plan requires that all trawl vessels and any longline or pot vessel fishing above some minimum level have a limited entry permit. Nontrawl vessels not qualifying for a limited entry permit will still be allowed to fish in the open-access fishery but will be constrained by small trip limits.

In 1992 the PFMC examined the feasibility of individual transfer quotas (ITQs) and decided to develop an ITQ program for nontrawl sablefish. For 1993 the PFMC will continue to narrow its focus in developing the program. In the future, ITQs may be set for other gears and species. Work also continued to develop a mandatory, coastwide, onboard observer program for groundfish vessels in the WOC area.

## DUNGENESS CRAB

California Dungeness crab (*Cancer magister*) landings during the 1991–92 season were 4,446 MT, a decrease of 998 MT from the previous season (ten-year average = 3,448 MT).

The northern California season opened on December 1, 1991, but a price dispute kept fishers in port. On December 7, the commercial and recreational crab fisheries off Washington were closed in response to public health concerns about domoic acid levels in crab tissue samples. This naturally occurring toxin is produced by the diatom *Pseudo-nitzschia australis*, and can cause amnesic shellfish poisoning. Oregon officials temporarily closed their season on December 11 because of confusion over public health issues created by Washington's closure. The commercial and recreational crab seasons off northern California were suspended temporarily on December 14, pending domoic acid test results.

Laboratory testing by the California Food and Drug Administration confirmed that crabs off Del Norte, Humboldt, and Mendocino counties were safe for human consumption. Safe domoic acid concentrations were also found in crabs from Oregon waters; consequently, the California and Oregon crab seasons opened simultaneously on December 22.

A price settlement of \$1.20 per pound was reached on December 26, \$0.30 per pound lower than the 1990–91 season price. Approximately 3,902 MT of crab from 400 vessels were landed at the northern California ports of Crescent City, Trinidad, Eureka, and Fort Bragg during the 1991–92 season. The port of Crescent City accounted for 2,132 MT of the season total, followed by Eureka (1,316 MT), Trinidad (408 MT), and Fort Bragg (45 MT).

The San Francisco–area Dungeness crab season opened on November 12, 1991, with an ex-vessel price of \$1.85 per pound. Crab landings decreased by 100 MT from the previous season to a seasonal total of 522 MT. Crab fishers landed 186 MT at Bodega Bay and 263 MT at ports in the San Francisco area. Monterey and Morro Bay contributed 73 MT to the season total.

In June 1992, the Tri-State Dungeness Crab Com-

mittee, comprising crab fishers, processors, and state agency advisors from Washington, Oregon, and California, agreed to a coastwide management approach if soft-shell crabs (crabs recently molted and unmarketable) were commonplace. Should the season in Washington and northern Oregon be delayed because of soft-shell crabs (about one in ten years), the committee agreed to postpone the fishery throughout the range of the soft-shell condition.

The Tri-State Committee circulated a questionnaire to crab fishers in August 1992, and learned that 69% of respondents from the three states favored limited entry. On September 22, 1992, California Assembly Bill 3189 (Hauser) enacted a moratorium on new entrants into the fishery, pending a study of the need to limit entry. Only those fishers who landed crab in California between August 5, 1982, and August 5, 1992, were eligible for an annual Dungeness crab permit. This bill was crafted in response to industry action to establish fishery eligibility cutoff dates of September 15, 1991, in Washington, and August 15, 1991, in Oregon.

The Tri-State Committee also sent letters to the governors of the three states requesting that a unified sampling program be developed to determine levels of domoic acid in Dungeness crabs before the season, as well as to coordinate reporting of test results. As a consequence, a unified monitoring plan was enacted in 1992.

### SWORDFISH AND SHARKS

Swordfish (*Xiphias gladius*) landings increased to 1,061 MT in 1992, nearly 50% more than in 1991 (table 4). Most of the catch (90%) was taken in the drift gill net fishery; another 5% was landed by the harpoon fishery, which registered the first landings increase in eight years. Three vessels, using longline gear outside of the U.S. Exclusive Economic Zone

(3–200 miles offshore), accounted for the remaining landings. Eureka and Fort Bragg became the major landing areas for swordfish, as fishing shifted northward due to El Niño conditions. Approximately 70% of statewide swordfish catches were landed north of San Francisco. Ex-vessel prices ranged from \$1.50 to \$7.00 per pound.

Common thresher shark (*Alopias vulpinus*) landings in 1992 decreased to 179 MT, the lowest level in twelve years (table 4). Immature fish continued to make up most of the catch. Fishers landed thresher shark predominantly at southern California ports, at ex-vessel prices from \$0.50 to \$2.50 per pound.

Shortfin mako shark (*Isurus oxyrinchus*) landings decreased by 36% to approximately 96 MT (table 4), partly because of the California Fish and Game Commission's decision to withhold permits for the experimental drift longline fishery. In past years, drift longline gear accounted for nearly one-third of mako shark landings (recreational and drift gill net fisheries accounted for the remaining catch). Market sampling data indicate that the mean age of landed mako sharks is under two years. Approximately 75% of the mako shark tonnage was landed at southern California ports, at ex-vessel prices from \$0.30 to \$2.50 per pound.

### CALIFORNIA HALIBUT

California halibut (*Paralichthys californicus*) landings in 1992 were approximately 401 MT, a decline of 15% from the 472 MT landed in 1991 (figure 3). The largest annual halibut landings are usually made in the Santa Barbara area. In 1992, however, almost 60% of the total landings were made in more northerly ports (table 5). As in 1983, which was also the second year of an El Niño event, the 1992 fishery shifted northward; the San Francisco area accounted for almost a third of all halibut landings.

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

	Swordfish	Thresher shark	Shortfin mako shark
1982	762.3	1089.5	239.5
1983	1182.5	782.8	146.8
1984	2013.4	755.7	149.9
1985	2362.1	700.4	102.5
1986	1748.2	275.7	215.3
1987	1245.9	238.7	274.0
1988	1129.3	249.8	221.9
1989	1295.8	295.1	176.5
1990	850.7	209.8	262.0
1991	711.2	344.0	150.6
1992*	1061.2	179.1	96.8

\*Preliminary

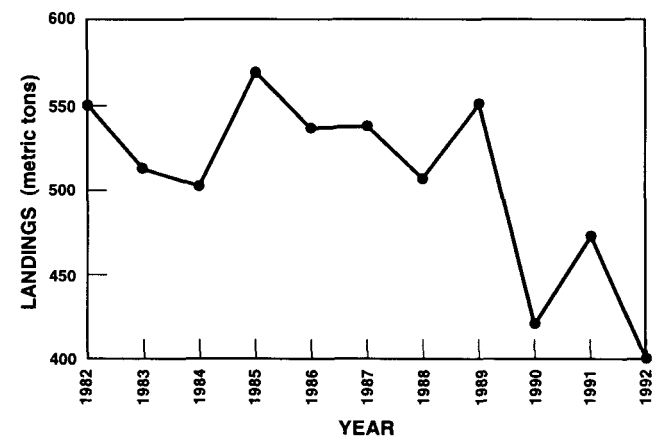


Figure 3. California landings of halibut, 1982–92.



TABLE 5  
 1992 California Halibut Landings by Area

Area	Metric tons	% of total
Eureka	2.5	<1
San Francisco	153.9	38
Monterey	19.4	5
Morro Bay	62.8	16
Santa Barbara	94.1	24
Los Angeles	50.1	13
San Diego	17.1	4
Total	400.5	100

Peak landings of California halibut in 1992 were made from January through July. Trawl nets accounted for 52% of the catch, followed by entangling nets (33%), hook and line (9%), and miscellaneous and unspecified gears (6%). In the past, entangling nets (gill and trammel) harvested the largest proportion of all halibut taken. However, the Marine Resources Protection Act of 1990 (ballot initiative Proposition 132) prohibits the use of gill and trammel nets in state waters beginning on January 1, 1994, so some halibut fishers shifted to other gears in 1992.

Typically, fishers received \$2.25 to \$2.50 per pound for their catch, but live halibut commanded ex-vessel prices of \$3.00 to \$6.00 per pound.

### ALBACORE

In 1992, albacore (*Thunnus alalunga*) landings in California totaled 1,257 MT. This was an increase over the last two years, but was still considerably below the 25-year average of 6,242 MT. Fleet size increased from 133 vessels in 1991 to 173 vessels in 1992, but only about half of the fleet landed at least one ton of albacore during the year. The increase in fleet size probably resulted when salmon trollers entered the fishery because albacore schools not normally within their range became available.

The Western Fishboat Owners Association and the canneries settled on a price of \$1,950 per short ton for albacore over nine pounds and \$740 per short ton for fish under nine pounds. In August the large-fish price rose briefly to \$2,100 per short ton, but returned to \$1,950 by season's end. Cannery competition for increased market shares inflated prices during the 1992 season. Albacore from northern Pacific waters commanded lower prices than fish from southern waters, to offset transshipment fees. A brief market developed for fresh albacore, and fishers received up to \$2,700 per short ton in some areas. Many fishers in Crescent City and Eureka marketed fish directly to consumers for about \$1.50 per lb.

The 1992 season began in July about 600 miles west of northern California and continued in north-

ern waters throughout much of the season. As the season progressed, vessels followed the fish eastward to the Mendocino Ridge area, and by August effort was centered 200–400 miles west of Fort Bragg. In September fishing spread north and east toward the coast from northern California to central Washington. Although fishing extended into November, weather conditions hampered fishing after late October.

During the 1992 season, vessels averaged 91 fish per day compared to 100 fish per day in 1991. Catch rates peaked at 150 fish per day in August. The mean size of landed albacore declined to 5.45 kg in 1992 from 5.68 kg in 1991.

Although the commercial catch of albacore was the highest in 4 years, it lagged far behind the 25-year average. The apparent shift in migration paths caused by warm water conditions in 1991 continued to keep most of the fishery to the north. The apparent lack of three- and four-year-old fish, which historically dominate the commercial catch, and a continued decline in the median size of the fish, may be causes for management concern. High recruitment of two-year-old fish, indicated by their dominance in the catch, may partially explain the decline in median size.

### SEA URCHIN

Commercial urchin divers landed 14,655 MT of red sea urchin (*Strongylocentrotus franciscanus*) statewide in 1992—23% less than the 1991 total of 19,010 MT (figure 4). Red sea urchin landings into southern California and northern California ports declined by 20% and 28% from the previous year. Landings in the third and fourth quarters declined most steeply in both regions because an atypical statewide storm pattern disrupted fishing. Purple sea urchin (*Strongylocentrotus purpuratus*) landings in

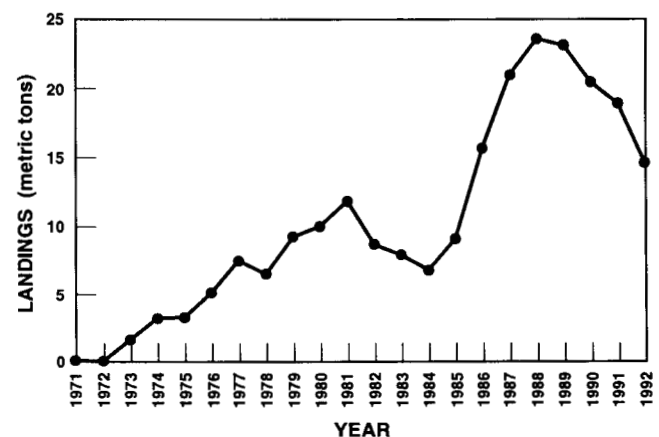


Figure 4. California landings of sea urchin, 1971–92.

1992 were 143 MT, compared to 133 MT in 1991. Average catch per unit of effort (CPUE), in urchin pounds per diving hour, continued its steady decline off northern California, to less than 136 kg (300 pounds) per hour. Southern California CPUE has remained steady at over 91 kg (200 pounds) per hour for the past several seasons.

The California Fish and Game Commission promulgated additional red sea urchin fishing restrictions in 1992 in response to a gradual shift of fishing effort from northern California to southern California waters and a further decline in the northern California sea urchin stock. The minimum size limit increased from 3.00 inches (76 mm) to 3.25 inches (83 mm) for southern California waters. A minimum size limit of 3.50 inches (89 mm) remained unchanged for northern California waters. The Commission further restricted fishing to two-day fishing weeks in July off southern California, three-day weeks in June and August, and four-day weeks in April and October for all state waters. Further regulatory changes are not anticipated for the 1993 season.

Despite the imposition of a limited entry system in 1987 to reduce effort in the fishery, numbers of standard and apprentice permits have diminished by only 9% since the 1988 season, to 625 permits.

In 1992, Department of Fish and Game scientists, using a Leslie depletion regression procedure, estimated historical red sea urchin biomass levels for the Fort Bragg area. From 1988 to 1992, fishers took 21,460 MT of sea urchin in this area of northern California. By regression of cumulative catch on annual mean CPUE, the model estimated a pre-1988 fishable biomass of 31,125 MT ( $R^2 = 0.95$ ) along more than 20 miles of coastline in the Fort Bragg area. Using an estimated annual natural mortality rate of 7.4% (from studies in the unfished Point Cabrillo Marine Reserve near Fort Bragg), the Leslie model calculated a sustainable annual harvest for the Fort Bragg area of 725 MT beginning with the 1993 season. In 1992, approximately 1,588 MT were landed in this area.

## ABALONE

Total statewide commercial abalone landings were 235 MT in 1992, an increase of 64 MT over 1991 (figure 5). The 1992 landings by species, with 1991 values in parentheses, were red abalone, 205 MT (149); black, 17 MT (12); pink, 8 MT (6); and green, 5 MT (4). Although the 1992 landings increased from the 1991 level, they are still the third lowest in the history of the fishery. Landings in southern California originated mostly from the Santa Barbara

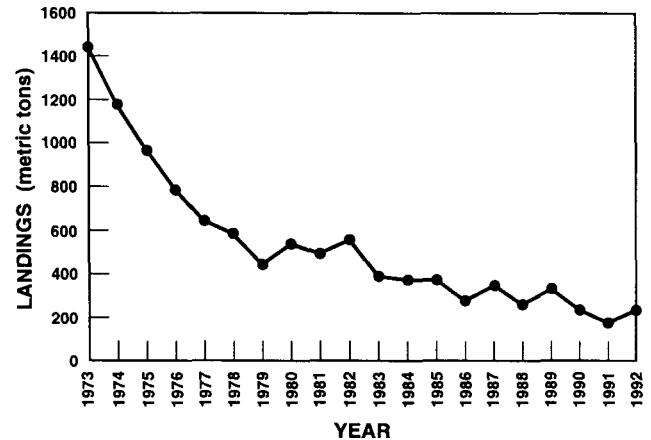


Figure 5. California landings of abalone, 1973–92.

Channel Islands; lesser quantities came from the Santa Barbara and San Diego mainland areas. Central California catches were from the Farallon Islands and the coastline of San Mateo and Santa Cruz counties. Portions of the red abalone landings in some central California ports were allegedly harvested from northern California areas that are closed to commercial harvest.

Eight species of abalones occur in California waters. All inhabit rocky bottoms, but specific distributions are generally related to ambient seawater temperatures and depth. Red (*Haliotis rufescens*), pink (*H. corrugata*), green (*H. fulgens*), and black (*H. cracherodii*) abalones support a commercial fishery in California. Stocks of all abalones increased after the near elimination of sea otters during the nineteenth century, providing a large, highly lucrative fishery with peak annual landings of over 2,270 MT in the 1950s. Landings have declined steadily to about 10% of historic levels as a result of continued harvest pressure, effort shifts, habitat destruction, and increased predation from sea otters as their range expands. In other abalone fisheries worldwide, stock depletion is commonly defined as a decline to 40% of the unfished biomass. The monetary value of abalone appears high enough to sustain fishing effort despite low abundance.

Red abalone are the largest and most desired of all abalones. They reach a maximum size of almost 12 inches, but usually are smaller than 10 inches. This species supported a large and valuable commercial fishery on the central California coast before being displaced by expansion of the sea otter range in the 1960s and 1970s. In northern and north-central California red abalone occur intertidally to depths of over 60 feet, but are found subtidally in southern California in areas where cool-water influences are consistent. North of Point Lobos in San Francisco

County, abalone harvest is restricted to recreational fishers. Most of the current total harvest occurs in southern California. Red abalone have been successfully cultured and are sold commercially at a size of 2 to 3 inches.

Pink abalone occur subtidally to 100 feet or deeper, from Point Conception into Mexico. Pink abalone were an alternative to red abalone in the southern California fishery, but stocks declined after the commercial red abalone fishery moved from central California to the Channel Islands when the sea otter's range expanded.

Green abalone range from Point Conception into Mexico. They are found in shallow subtidal areas often associated with surf grass. This species became commercially important when the pink abalone harvest declined.

Black abalone are an intertidal species ranging from Oregon into Mexico. As recently as 1990, they could be found in dense aggregations off the Channel Islands. Black abalone were not commercially fished until regulations enacted during the 1970s allowed export to Asian markets.

A limited-entry permit is required for commercial harvest of abalone; 123 permits were issued for the 1991–92 season. The target effort level is 70 or fewer permits, and until that number is reached, the permit is transferable, under specific conditions, on a two-for-one basis. Differential minimum harvest sizes exist for sport and commercial fisheries. Daily bag limits and seasonal closures are in effect for the sport fishery. Commercial regulations also include seasonal and area closures, bag limits, and gear restrictions.

In 1986, discolored, atrophied black abalone were first seen off several of the Channel Islands. These symptoms, now known as withering syndrome, eventually affected black abalone off all Channel Islands, killing up to 99% of the population. The cause of withering syndrome is still undetermined, and other species of abalones may be affected as well. Most populations of black abalone north of Point Conception were apparently unaffected. Withering syndrome has reduced black abalone landings from 309,000 pounds in 1987 to the current 37,000 pounds. A fishery closure for this species was under consideration in 1993 to protect remaining stocks.

### CALIFORNIA SPINY LOBSTER

California spiny lobster (*Panulirus interruptus*) range from Monterey to Magdalena Bay, Baja California, and include a small population along the northwestern shore of the Gulf of California. Most of the population is found between Point Concep-

tion and Magdalena Bay. The present distribution suggests a historical range centered farther to the south, encompassing all of Baja California. California spiny lobster larvae spend six to nine months in the plankton and have been collected 530 km from shore. Recruitment of spiny lobster to California waters, from a population center south of the U.S.-Mexico border, is probably patchy, especially at the northern end of the range. Scientists have estimated only 415 square miles of adult lobster habitat along the California coast. Only a small fraction of this habitat contains surfgrass beds—the primary area of larval settlement. Anomalous ocean currents, such as those in El Niño events, could cause poor and sporadic recruitment, because larvae may never reach typical areas of settlement.

A total of 268 MT was landed during the 1991–92 commercial spiny lobster season in southern California (first Wednesday in October to first Wednesday after March 15). This total was 19% less than the 1990–91 total of 331 MT (figure 6).

Landings have generally increased since the paltry 1974–75 season value of 69 MT to a peak of 332 MT during the 1989–90 season. Lobster landings in southern California reached a historic high of 499 MT during the 1949–50 season. From 1989 to 1992, lobster landings have greatly exceeded the past 18-year average of 212 MT.

Landings typically peak during the first month of the season, suggesting heavy fishing pressure on a limited resource. Since 1970, October landings have constituted 40% of seasonal landings; November landings, 22%; December, 15%; January, 11%; February, 8%; and March, 4%.

Since 1965, when the Department instituted a commercial lobster trap permit, the number of permittees has varied from a low of 180 in the 1970–71 season to 614 in 1968–69. The number of permittees

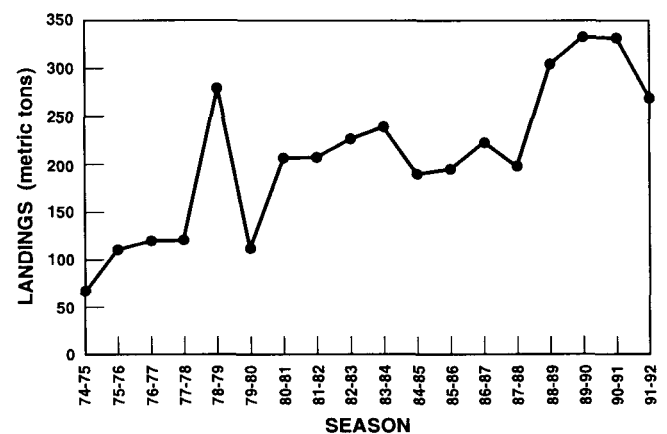


Figure 6. California landings of spiny lobster, 1974–92.

has been relatively stable over the past decade (average = 369).

From 1952 to 1970, the seasonal ex-vessel value of the commercial lobster fishery remained relatively stable, varying from \$250,000 to \$500,000. Since that time, however, the value has steadily increased, and in 1991-92 reached approximately \$4 million. The ex-vessel price in 1992 was \$6.60 per pound. Live shipments to markets in Asia have created increased demand and higher prices for California spiny lobsters.

## SALMON

In 1992, California commercial salmon fishers landed slightly over 728 MT of chinook salmon (*Oncorhynchus tshawytscha*) and approximately 4.6 MT of coho salmon (*Oncorhynchus kisutch*) for an estimated 19,800 days fished. California recreational anglers caught 72,100 chinook salmon and 11,600 coho salmon on 123,600 trips (table 6).

Both commercial and recreational ocean salmon landings reflected the disastrous impact of six years of drought. Very restrictive regulations were therefore necessary to meet the annual escapement goals

(numbers of salmon returning for in-river spawning) for the Klamath and Sacramento fall chinook stocks, which constitute most of California's ocean salmon landings. The annual minimum escapement goal for Klamath River fall chinook was 35,000 natural spawners; the minimum goal for Sacramento River fall chinook was 122,000 adult fish.

The commercial fishery north of Point Arena was closed in 1992. South of Point Arena, fishing for chinook was permitted on an intermittent basis from May 1 through September 30 under quota restrictions above Point San Pedro in San Mateo County. No quota restrictions were imposed for the fisheries south of Point San Pedro. Coho fishing was allowed south of Cascade Head in Oregon on June 1 under a catch ceiling, which was reached on August 7.

Ex-vessel prices for salmon, which are landed in eviscerated, head-on form, were \$2.73 per pound for chinook and \$1.66 per pound for coho, for total ex-vessel values of \$4.4 million for chinook and \$17,000 for coho.

The recreational salmon fishery, like the commercial fishery, operated under catch quotas from the California-Oregon border to Point San Pedro; some of these quotas were very restrictive. Recreational anglers were not subject to quotas in waters south of Point San Pedro. The length of the fishing season varied in different parts of the state; the season opened as early as February 15 and closed as late as November 15.

## LIVE-FISH FISHERY

The live-fish fishery has grown rapidly in California. Statewide landings for live fish in 1992 were estimated to be approximately 335 MT (table 7). This fishery began about five years ago to supply the California Asian community's demand for live fish. Many Asian restaurants allow patrons to select an entree from aquaria before cooking. The most popular species are those that can withstand the rigor of capture and transportation and are bright red in color. Thus the most important species are various nearshore rockfishes (*Sebastes* spp.), California sheephead (*Semicossyphus pulcher*), California

TABLE 6  
 Commercial Landings of Chinook and Coho Salmon,  
 1980-92 (Metric Tons)

Year	Chinook	Coho
1980	2,593	137
1981	2,511	217
1982	3,380	250
1983	973	121
1984	1,189	158
1985	2,050	36
1986	3,356	91
1987	4,105	111
1988	6,548	145
1989	2,491	105
1990	1,870	142
1991	1,469	208
1992	728	5

Recreational Landings of Chinook and Coho Salmon,  
 1980-92 in Numbers of Fish × 1,000

Year	Chinook	Coho
1980	85.2	21.2
1981	84.0	10.6
1982	138.7	26.7
1983	63.8	27.3
1984	87.8	19.0
1985	171.1	15.8
1986	141.6	18.7
1987	192.5	47.3
1988	171.4	34.7
1989	186.6	49.6
1990	139.8	51.6
1991	80.8	69.3
1992	72.1	11.6

TABLE 7  
 Preliminary 1992 Landings of Live Fish (Metric Tons)

	Monterey northward	South of Monterey
All species	139.5	195.9
All rockfishes	134.0	109.0
Red and gopher rockfishes	71.9	14.0
California sheephead	0	74.8

scorpionfish (*Scorpaena guttata*), lingcod (*Ophiodon elongatus*), and cabezon (*Scorpaenichthys marmoratus*). The fish are caught year-round, but especially in summer. The preferred weight range for live fish is 1-2 pounds, which serve well for a single entree. Finfishes brought aboard a vessel are quickly stowed in live wells. At the dock, fish are offloaded directly into trucks equipped with tanks and are delivered to brokers or restaurants. Statewide ex-vessel prices ranged from \$1.00 to \$6.00 per pound, substantially more than the \$0.40 to \$1.00 per pound for dead fish.

The primary fishing gears employed in this fishery are traps and various hook-and-line gears, including rod-and-reel with multiple-hook gangions, set lines, and vertical longlines. Live-fish traps resemble modified lobster traps, with double compartments and two entrance funnels on either side. Preferred baits are whole or freshly crushed rock and spider crabs, mussels, and squid. Gill nets and trawls have also been used for flatfish, primarily California halibut (*Paralichthys californicus*).

The fishery from Monterey northward employs line gear, primarily vertical longlines, for rockfish and lingcod along nearshore rocky reefs and offshore banks. The San Francisco and Monterey areas are the most active fishing ports; there is little activity in the Crescent City, Eureka, and Bodega Bay areas. The principal target rockfish species include canary (*Sebastes pinniger*), vermilion (*S. miniatus*), yelloweye (*S. ruberrimus*), gopher (*S. carnatus*), brown (*S. auriculatus*), china (*S. nebulosus*), copper (*S. caurinus*), and quillback (*S. maliger*).

The live-fish fishery to the south of Monterey uses both hook-and-line and trap gears. Trap use is moderate from Morro Bay to Ventura and increases from Los Angeles to San Diego. Greatest fishing activity takes place in the Santa Barbara area, followed by Los Angeles. Target species include California sheephead; California scorpionfish; cabezon; and treefish (*S. serriceps*), kelp (*S. atrovirens*), brown, grass (*S. rastrelliger*), and gopher rockfishes.

Monitoring and management of this evolving fishery have been a pronounced challenge. Accurate catch accounting is hampered by inconsistent or inaccurate species identification, the rapid removal of fish from landing sites, and the lack of a live-fish designation on state landing receipts. The mobile nature of both the landing and marketing has hampered biological sampling. The Department of Fish and Game has recently changed sampling protocol and the landing receipt system to respond to this challenge.

The bycatch of juvenile fish and nontarget species, and additional fishing mortality on slow-growing,

TABLE 8  
 1992 Commercial Passenger Fishing Vessel Catch

Species/species group	Thousands of fish	Rank
Rockfishes	2,008	1
Kelp bass	458	2
Barred sand bass	361	3
Pacific mackerel	305	4
Barracuda	247	5
Bonito	114	6
Sculpin	76	7
Salmon	43	8
Lingcod	43	9
Halfmoon	42	10
Ocean whitefish	39	11
Yellowtail	39	12
California sheephead	25	13
Jack mackerel	17	14
Bluefin tuna	8	15
Flatfish (misc.)	6	16
Striped bass	5	17
Cabezon	5	18
Croaker	5	19
California halibut	4	20
All others	164	—
Total	4,016	—

long-lived rockfishes have aroused considerable concern among Department scientists.

## RECREATIONAL FISHERY

California's large, diverse marine recreational fishery includes skiff, beach-and-bank, pier, and commercial passenger fishing vessel (CPFV) modes. The CPFV fleet accounts for a substantial proportion of California's recreational landings and is the subject of this summary (table 8). In southern California, traditional CPFV targets include pelagic species such as albacore (*Thunnus alalunga*), Pacific bonito (*Sarda chiliensis*), yellowtail (*Seriola lalandei*), California barracuda (*Sphyrnaea argentea*), yellowfin tuna (*Thunnus albacares*), bluefin tuna (*Thunnus thynnus*), Pacific mackerel (*Scomber japonicus*), rockfishes (*Sebastes* spp.), barred sand bass (*Paralabrax nebulifer*), and kelp bass (*Paralabrax clathratus*). In central and northern California, CPFVs target salmon (*Oncorhynchus* spp.), striped bass (*Morone saxatilis*), rockfishes (*Sebastes* spp.), lingcod (*Ophiodon elongatus*), and white sturgeon (*Acipenser transmontanus*).

CPFV catches were affected by above-normal sea-surface temperatures (El Niño) and drought conditions during 1992. Warm waters displaced subtropical species to the north, and CPFV operators south of Point Conception benefited. Fishing for yellowtail, bluefin tuna, yellowfin tuna, dolphinfish (*Coryphaena hippurus*), and barracuda increased from 1991 values. Operators from northern California were adversely affected by drought conditions. The 1992

salmon catch, in an already declining trend, was the poorest since 1961.

A total of 629,564 CPFV anglers landed 4.02 million fish in 1992 (table 8). Angler numbers declined by 4.3% from last year, and landings declined by 5.0%. Landings of only two of the top ten species increased in 1992: kelp bass (up 42%) and California barracuda (up 39%). Species with lower landings were Pacific bonito (down 2%), rockfishes (down 3%), lingcod (down 14%), barred sand bass (down 27%), sculpin (*Scorpaena guttata*) (down 57%), Pacific mackerel (down 30%), salmon (down 19%), and halfmoon (*Medialuna californiensis*) (down 55%).

Sturgeon (*Acipenser* spp.; down 72%) and sablefish (*Anoplopoma fimbria*; down 97%) showed the most dramatic declines in CPFV landings.

**Contributors:**

K. Barsky, California halibut	E. Konno, Pacific mackerel
D. Busatto, recreational	L. Laughlin, swordfish/shark
R. Dixon, salmon	K. McKee, live fish
T. Foreman, sardine	R. Rodriguez, albacore
P. Haaker, abalone	C. Ryan, herring
S. Harris, lobster	D. Thomas, groundfish
F. Henry, editor	G. Walls, anchovy
P. Kalvass, sea urchin	R. Warner, crab