

REVIEW OF SOME CALIFORNIA FISHERIES FOR 2003: MARKET SQUID, COASTAL PELAGIC FINFISH, DUNGENESS CRAB, SEA URCHIN, GROUND FISH, OCEAN SALMON, TUNA, NEARSHORE LIVE-FISH, PACIFIC HERRING, AND ROCK CRAB

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SUMMARY

In 2003, commercial fisheries landed an estimated 121,010 metric tons (t) of fishes and invertebrates from California ocean waters (fig. 1). This represents a decrease in landings of over 32% from the 178,982 t landed in 2002 and a 52% decline from the 252,568 t landed in 2000. However, the preliminary ex-vessel economic value of commercial landings in 2003 was \$127 million, a 21% increase from the \$104 million in 2002 and an 8% decrease from the \$137 million in 2000.

Market squid was once again the largest fishery in the state, by volume, at nearly 45,000 t, although the Dungeness crab fishery had the highest ex-vessel value at just over \$34 million. The ex-vessel value of squid landings was over \$24 million. Pacific sardine landings were second in volume at over 34,000 t and eighth in ex-vessel value at over \$2.9 million. Other top five California landings included Dungeness crab at over 10,000 t, sea urchin at nearly 4,900 t, and Pacific mackerel at 4,400 t. Besides Dungeness crab and market squid, the top five California landings in terms of ex-vessel value included Chinook salmon at over \$12 million, swordfish at \$7.6 million, and sea urchin at \$6.9 million. Notable changes in invertebrate landings for 2003 were the large (86%) increase in Dungeness crab landings compared with 2002, and the decrease in sea urchin landings, which were the lowest on record since 1975.

California's commercial groundfish harvest for 2003 was over 10,000 t, consisting mainly of Dover sole, rockfishes, Pacific whiting, sablefish, and thornyheads. Ex-vessel value of groundfish landings for 2003 was \$14.9 million. Declines in groundfish landings reflect landing restrictions that went into effect in 2002 that were designed to reduce the harvest of depleted rockfish stocks. Depth-based fishery restrictions were implemented to reduce catch of impacted species.

Pacific herring landings for 2003 decreased by over 40% from 2002. Concerns over the status of the stocks led to an independent review of survey techniques and assessment models for the San Francisco Bay herring population. In contrast, declines in nearshore live-fish landings in 2003 were expected and reflect management measures set forth in the Nearshore Fisheries Manage-

ment Plan adopted by the California Fish and Game Commission (Commission) in 2002.

In 2003, the Commission undertook 15 rule-making actions that addressed marine and anadromous species. In addition, the Commission voted to list the nocturnal seabird Xantus's murrelet as a threatened species, which may affect fisheries around the Channel Islands, where the majority of its nesting habitat is located. In addition, the California legislature gave the Commission authority to manage the commercial rock crab fishery.

During 2003, the Pacific Fishery Management Council (PFMC) revised the process for reallocating unharvested sardine, set a series of recreational and commercial salmon regulations to comply with both state and federal Endangered Species Act (ESA) biological opinions, and adopted the Highly Migratory Species Fishery Management Plan (HMSFMP). The PFMC also set 2003 optimal yields for a large number of groundfish species and species groups. The allowable harvest was reduced for nearly all groups in order to protect those species in rebuilding status, and emergency closures of selected recreational and commercial fisheries were implemented by both federal and state jurisdictions to reduce impacts. In the Pacific whiting fishery, an agreement between Canada and the United States set the coastwide allocation of landings at 26% to Canada and 74% to the United States.

MARKET SQUID

Market squid (*Loligo opalescens*) was the largest fishery in the state by volume and second in ex-vessel value in 2003. A total of 44,965 t were landed: 38% less than the 72,878 t landed in 2002, and 62% less than the record high set in 2000 (118,902 t) (fig. 2). High ex-vessel prices of \$500 to \$600 per ton for market squid were consistently paid throughout 2003. The 2003 ex-vessel value was approximately \$24.1 million, second to Dungeness crab. This represents a 32% increase over the \$18.2 million ex-vessel value of market squid recorded in 2002.

The fishing season for market squid runs from 1 April through 31 March of the following year. A northern fishery normally occurs during the spring and summer and is centered in Monterey Bay. A southern fishery

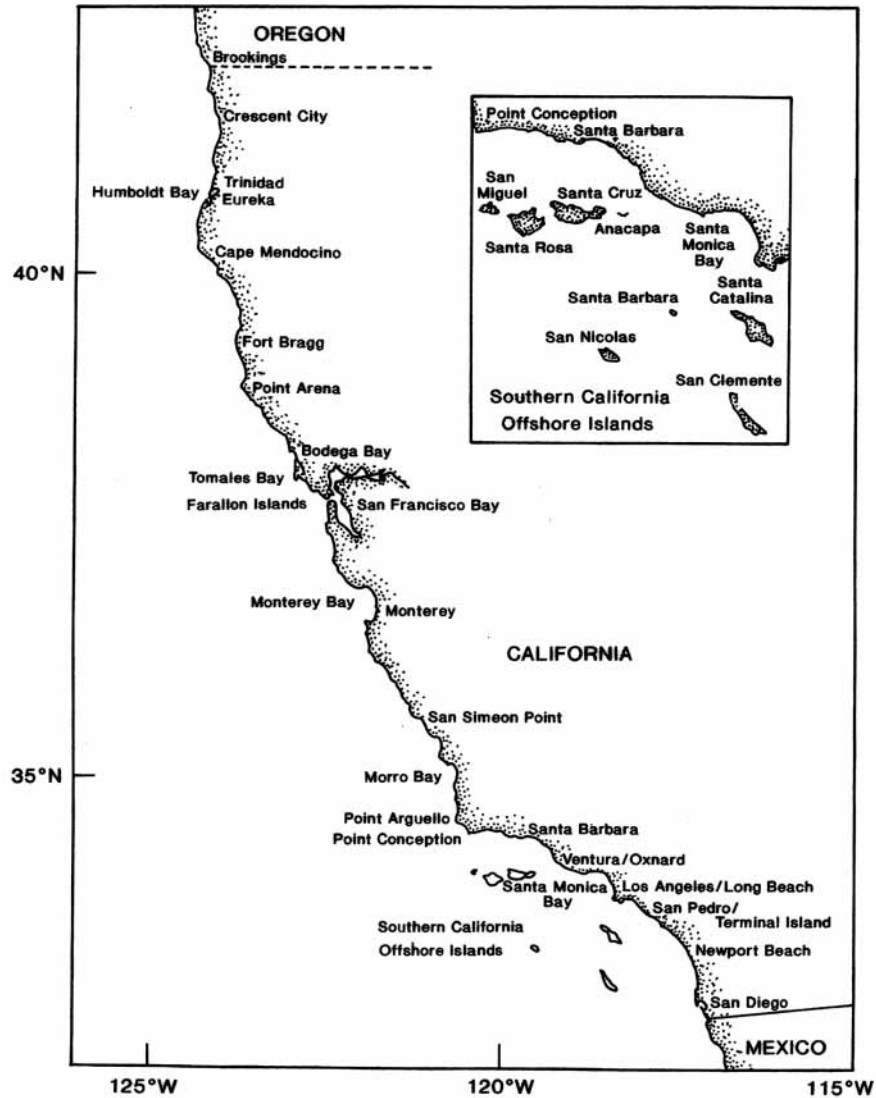


Figure 1. California ports and fishing areas.

normally occurs during the fall and winter off the Channel Islands and coastal southern California. Lingering effects of the moderate 2002 El Niño condition may have reduced the amount of squid available to the fishery. During the 2003–2004 season, 48,044 t were landed, 13% more than in the 2002–2003 season (42,596 t) (fig. 3).

The northern fishery experienced a significant decline in catch levels during the 2002–2003 season. A total of 17,377 t was landed (fig. 3), a 31% decrease from the total recorded in the 2002–2003 season. For the first time market squid were harvested in significant numbers from the Farallon Islands area. The length of harvest time was also unusually long. Landings began in mid-February and continued through November. There was also an increase in daytime fishing activity. During the day, squid were concentrated enough to allow for detection and capture by vessels using sonar. Daytime

fishing also was reported to have reduced the number of interactions with sea lions.

The southern fishery surpassed the northern fishery in the 2003–2004 season (fig. 3), with 30,667 t landed (64% of the catch). Catches were made almost all year, even during the summer when historically squid are not available. Night fishing utilizing attracting lights is the predominant fishing mode in southern California.

California market squid has become an important international commodity. While some squid are used domestically for consumption and bait, most are packed and processed for export. In 2003, strong international demand for squid fueled high ex-vessel prices in California. Approximately 23,000 t of market squid were exported for a value of \$27 million. Asian destinations are the main export market, with China and Japan taking about 68% of the trade.

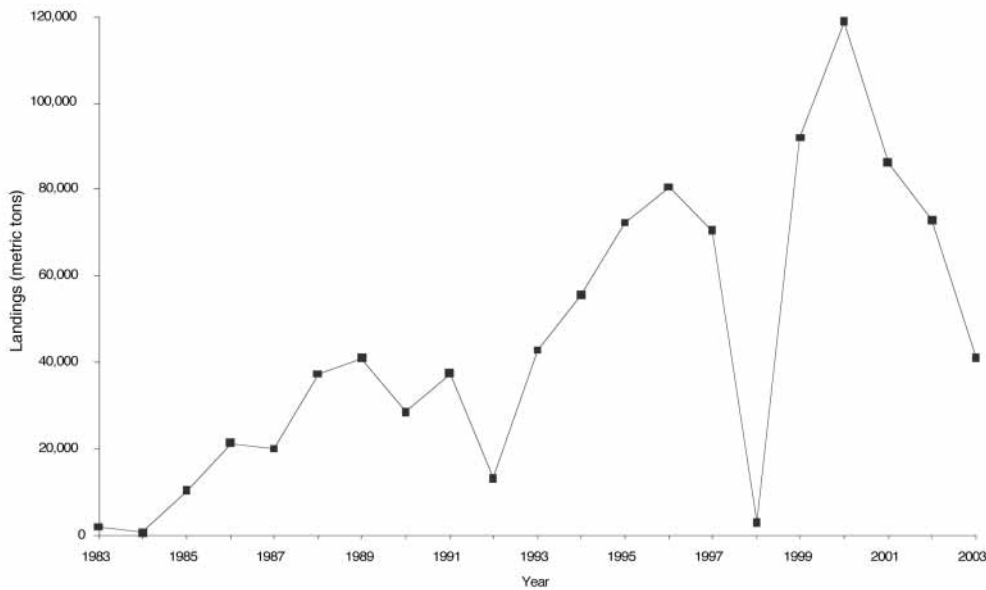


Figure 2. California commercial market squid landings, 1982-2003

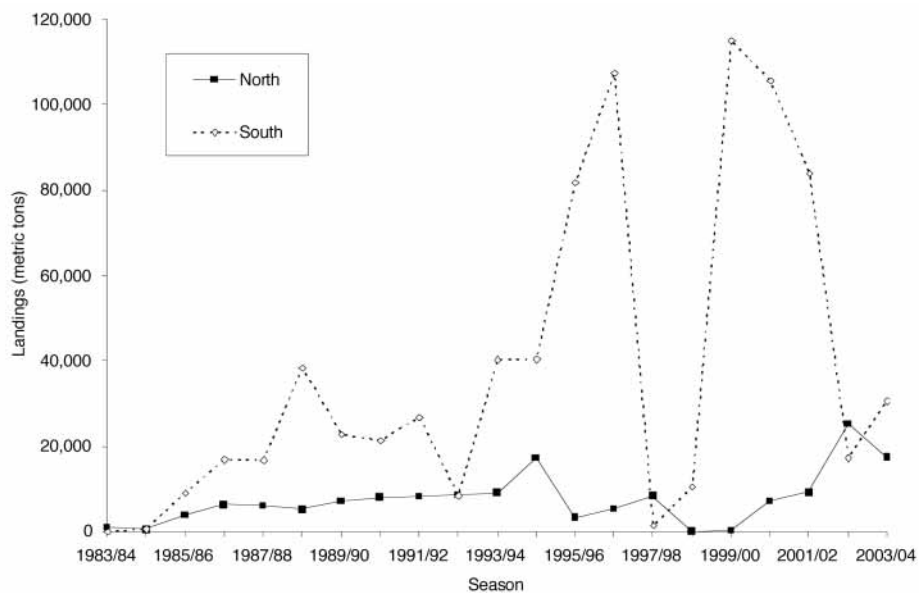


Figure 3. Comparison of market squid landings for northern and southern fisheries by fishing season (1 April to 31 March), from the 1982-83 season to the 2003-2004 season.

In May 2003, a revised draft of the Market Squid Fishery Management Plan (MSFMP) was released for public review and comment. Developed under guidelines set forth by the Marine Life Management Act of 1998, the MSFMP establishes a management program and procedures by which the Commission will manage the market squid resource. The goals of the MSFMP are to provide a framework and set of procedures to ensure sustainability of the resource and the marine life that de-

pends on it, provide for an economically viable fishery, and to reduce the potential of overfishing. Key features of the MSFMP include (1) fishery control rules; (2) a restricted access program; (3) ecological considerations such as harvest replenishment and general habitat closures, as well as time and area closures to protect nesting seabirds; and (4) administrative items. Adoption by the Commission was postponed until mid-2004, with scheduled implementation for the 2005-2006 fishing season.

TABLE 1
 Landings of Coastal Pelagic Species in California

Year	Landings (in metric tons)						Total
	Pacific sardine	Northern anchovy	Pacific mackerel	Jack mackerel	Pacific herring	Market squid	
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	115,522
1980	34	42,255	29,139	20,019	7,932	15,385	114,764
1981	28	51,466	38,304	13,990	5,865	23,510	133,163
1982	129	41,385	27,916	25,984	10,106	16,308	121,828
1983	346	4,231	32,028	18,095	7,881	1,824	64,405
1984	231	2,908	41,534	10,504	3,786	564	59,527
1985	583	1,600	34,053	9,210	7,856	10,275	63,577
1986	1,145	1,879	40,616	10,898	7,502	21,278	83,318
1987	2,061	1,424	40,961	11,653	8,264	19,984	84,347
1988	3,724	1,444	42,200	10,157	8,677	36,641	102,843
1989	3,845	2,410	35,548	19,477	9,046	40,893	111,219
1990	2,770	3,156	36,716	4,874	7,978	28,447	83,941
1991	7,625	4,184	30,459	1,667	7,345	37,388	88,668
1992	17,946	1,124	18,570	5,878	6,318	13,110	62,946
1993	13,843	1,954	12,391	1,614	3,882	42,708	76,392
1994	13,420	3,680	10,040	2,153	2,668	55,395	87,356
1995	43,450	1,881	8,667	2,640	4,475	70,278	131,391
1996	32,553	4,419	10,286	1,985	5,518	80,360	135,121
1997	46,196	5,718	20,615	1,161	11,541	70,257	155,488
1998	41,056	1,457	20,073	970	2,432	2,709	68,697
1999	56,747	5,179	9,527	963	2,207	90,322	164,945
2000	53,586	11,504	21,222	1,135	3,736	117,961	209,144
2001	51,811	19,187	6,924	3,615	2,715	85,828	170,080
2002	58,353	4,643	3,367	1,006	3,339	72,878	143,586
2003	34,300	1,547	3,999	155	1,975	44,965	86,941

TABLE 2
 Northern and Southern California Commercial Landings and Ex-vessel Values of CPS Finfish for 2003

Species	Northern California		Southern California		Total landings (metric t)	Total ex-vessel value
	Landings (metric t)	Ex-vessel value	Landings (metric t)	Ex-vessel value		
Pacific sardine	7,321	\$673,543	26,379	\$2,265,831	33,700	\$2,939,049
Pacific mackerel	1	\$4,662	3,998	\$628,002	3,999	\$632,364
Jack mackerel	20	\$2,478	135	\$52,276	155	\$54,754
Northern anchovy	706	\$81,964	841	\$178,340	1,547	\$260,310
Totals	8,048	\$762,647	31,353	\$3,124,449	39,401	\$3,887,096

COASTAL PELAGIC FINFISH

Pacific sardine (*Sardinops sagax*), Pacific mackerel (*Scomber japonicus*), jack mackerel (*Trachurus symmetricus*), and northern anchovy (*Engraulis mordax*) are known as coastal pelagic species (CPS) finfishes. These species are jointly managed by the PFMC and NOAA Fisheries. During 2003, combined commercial landings of these four species totaled 39,401 t (tab. 1). Recent historical landings of these coastal species, as well as two managed by California, Pacific herring (*Clupea pallasii*) and market squid, are presented in Table 1.

Pacific Sardine

The Pacific sardine fishery extends from British Columbia, Canada, southward to Baja California,

México; however, the bulk of the catch is landed in southern California and Ensenada, Baja California, México (BCM). The Pacific sardine harvest guideline (HG) for each calendar year is determined from the previous year's stock biomass estimate (\geq 1-year-old fish on 1 July). The 2003 Pacific sardine HG was set at 110,908 t using the 2002 stock biomass estimate of nearly 1.0 million t. Sixty-six percent (73,199 t) of this HG was allocated to the southern California fishery (south of Point Piedras Blancas, 35°40'00"N lat.) and the remaining 33% (36,600 t) was allocated to the northern California, Oregon, and Washington fisheries.

During 2003, the PFMC revised the process for reallocating unharvested sardine. The following allocation arrangement became effective on 4 September

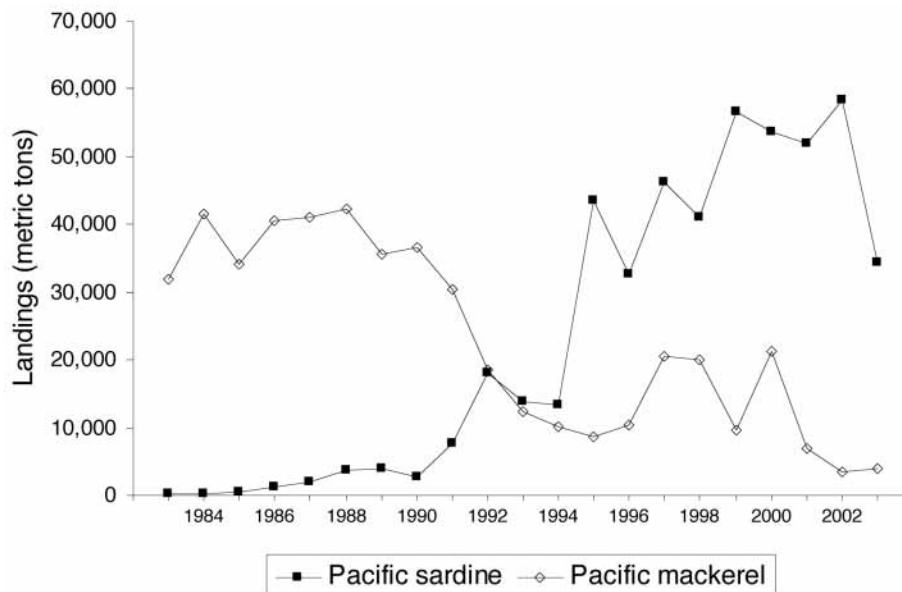


Figure 4. California commercial landings of Pacific sardine (*Sardinops sagax*) and Pacific mackerel (*Scomber japonicus*), 1983–2003.

2003: (1) The geographic boundary between the northern U.S. west coast fisheries (Subarea A) and the southern west coast fishery (Subarea B) was changed from 35°40'00"N latitude (Point Piedras Blancas) to 39°00'00"N latitude (Point Arena); (2) the date when unharvested Pacific sardine is reallocated to Subarea A and Subarea B was changed from 1 October to 1 September; (3) the percentage of the unharvested sardine that is reallocated to Subarea A and Subarea B was changed from 50% to both subareas to 20% to Subarea A and 80% to Subarea B; and (4) all unharvested sardine that remains on 1 December will be reallocated coast-wide. This revised allocation framework will remain in place through the 2004 fishing season and may be used in 2005 if the 2005 harvest guideline is at least 90% of the 2003 harvest guideline.

In California, a total of 33,700 t of Pacific sardine was landed during 2003; a 41% decrease from the previous year (fig. 4). The 2003 ex-vessel value for Pacific sardine totaled just over \$2.9 million dollars (tab. 2); a 50% decrease from 2002. Most of the catch (77%) was landed in southern California, and 71% was landed in Los Angeles County.

A total of 26,906 t of sardine, valued at \$14.2 million, was exported from California ports during 2003. Of the 25 countries that imported sardine product from California, Australian (8,403 t) and Japanese (8,150 t) markets received 61% of the product.

Commercial landings of Pacific sardine increased in Oregon to 25,253 t in 2003 from 22,711 t in 2002, whereas Washington's 2003 landings decreased from 15,212 t in 2002 to 11,604 t in 2003. Like California

and Washington, Ensenada, BCM, also experienced a decline in sardine landings during 2003. Approximately 30,537 t were landed in Ensenada in 2003; a 30% decline from 43,437 t in 2002.

Pacific Mackerel

Although Pacific mackerel are occasionally landed in Oregon and Washington, the majority of landings are made in southern California and Ensenada, BCM. California landings of Pacific mackerel have been steadily declining over the past 15 years (fig. 4); however, 19% more were landed in 2003 (3,999 t) than were landed in 2002 (3,367 t). Only one metric ton of Pacific mackerel was landed north of Point Piedras Blancas (tab. 2) in 2003. Most of the catch (99%) was landed in Los Angeles County, and of that, 69% (2,759 t) was landed in the port of San Pedro. The ex-vessel value of California's 2003 catch was \$632,364. Ninety-three percent of Pacific mackerel were landed using purse seines. Export data on Pacific mackerel alone are not available; however, exports of all mackerel species for the year 2003 totaled 2,408 t, with an export value of \$1.4 million.

The fishing season for Pacific mackerel runs from 1 July through 30 June of the following year. The HG for the 2002–2003 season was set at 12,456 t, based on a biomass estimate of 77,516 t. The HG for the 2003–2004 season was set at 10,652 t, based on a biomass estimate of 68,924 t. In accord with a 3 November 2003 federal ruling, 40% of Pacific mackerel in landings of any CPS will be allowed as incidental take in order to minimize bycatch of mackerel. This incidental allowance would become effective after 7,500 t of Pacific mackerel have

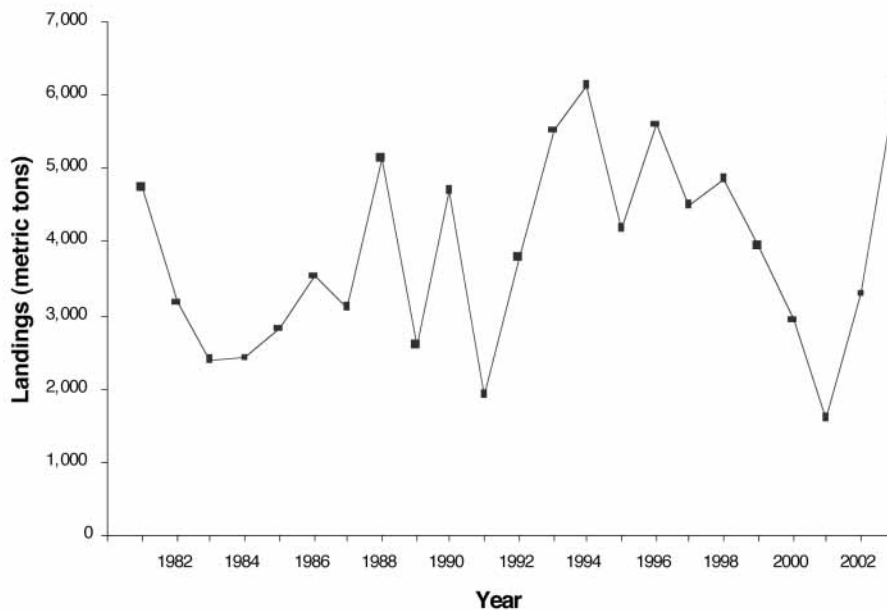


Figure 5. California commercial landings of Dungeness crab, 1981–2003.

been landed during the 2003–2004 season. Current landing trends suggest that the implementation of this allowance may not be necessary.

In Oregon, nearly 234 t of Pacific mackerel were landed in 2003, primarily as bycatch in the sardine fishery. Washington's commercial landings of Pacific mackerel totaled 51 t in 2003, and approximately 2,678 t were landed in Ensenada, BCM.

Jack Mackerel

Landings of jack mackerel in California decreased substantially in 2003 to 155 t (tab. 1), down from 1,006 t in 2002. This represents an 85% decline from 2002 landings and a 96% decline from 2001 landings (3,615 t). Ex-vessel revenues totaled \$54,754, a 73% decline from \$202,000 in 2002 (tab. 2). Eighty percent of the California catch was taken by purse seine vessels, and 87% of the catch was landed in southern California ports. There were no reported commercial landings of jack mackerel in Oregon or Ensenada, BCM, during 2003, and less than 2 t were landed in Washington.

Northern Anchovy

California's 2003 northern anchovy catch declined by two-thirds from 4,643 t in 2002, to 1,547 t (tab. 1). The ex-vessel value in 2003 was \$260,304. Forty-six percent (706 t) of the catch was landed in Monterey County, and 54% (841 t) was landed in southern California. Most of the fish (66%) were taken using lampara nets and 17% using purse seines. During 2003, 52 t of preserved or salted anchovy product were exported from California ports at a value of \$260,357.

Approximately 1,287 t of northern anchovy were landed in Ensenada, BCM.

Domoic acid health advisories continued to plague California's CPS fisheries during 2003 as they had in 2002. The Monterey fishery was affected from 18 April to 24 June and again from 1 September to 31 October 2003. Likewise, health advisories were in effect in counties extending from San Luis Obispo to Los Angeles between 15 May and 2 July 2003. During these health advisories, fish could not be sold for human or pet consumption owing to high levels of domoic acid, a nerve toxin produced by marine diatoms belonging to the genus *Pseudo-nitzschia*.

DUNGENESS CRAB

Landings of Dungeness crab (*Cancer magister*) in 2003 were estimated at 6,112 t, an 86% increase in landings over 2002 (3,286 t) (fig. 5). This continues the trend of increased landings since 2001, which had the lowest landings in 25 years. Ex-vessel revenues for 2003 were \$38.1 million, a 184% increase in value over 2002 (\$13.4 million) and greatly above 2001 revenues (\$9 million). The average price per pound decreased 4% from \$1.84 in 2002 to \$1.77 in 2003.

The Dungeness crab fishery in California is managed under a regimen of size, sex, and season. Only male Dungeness crabs are harvested commercially, and the minimum commercial harvest size is 6.25 in., measured by the shortest distance across the carapace immediately in front of the posterior lateral spines. The minimum size limit is designed to protect sexually mature crab from harvest for one or two seasons, and the timing of the

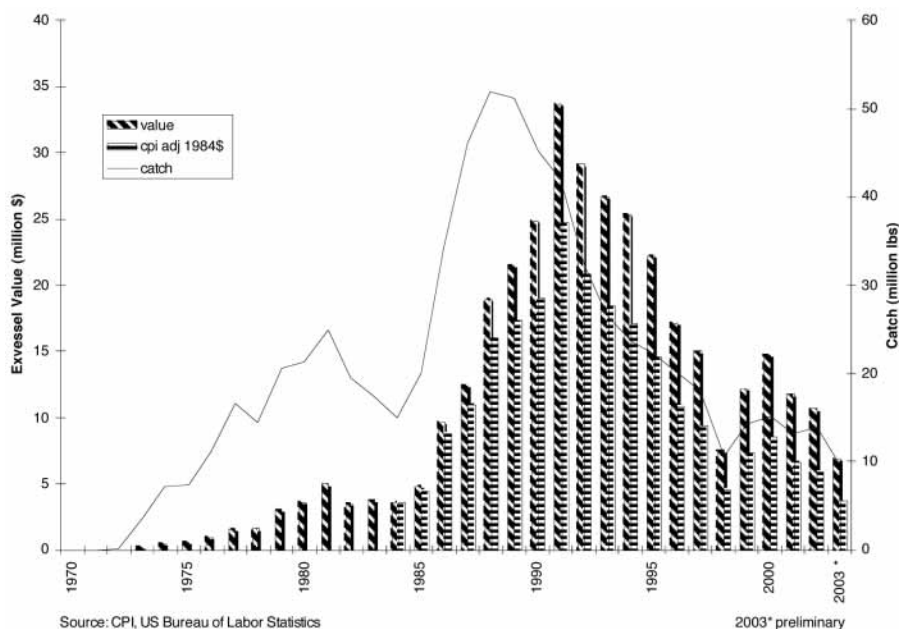


Figure 6. California sea urchin catch and value, adjusted by consumer price index, 1970–2003.

season is designed to provide some measure of protection to crabs when molting is most prevalent. California implemented regulations prohibiting the sale of female Dungeness crabs in 1897. Minimum size regulations were first implemented by California in 1903 and have remained substantially unchanged since 1911. The commercial season runs from 1 December to 15 July from the Oregon border to the southern border of Mendocino County (northern area) and from 15 November to 30 June in the remainder of the state (central area). This basic management structure has been stable and very successful over time. Legislation to authorize a preseason soft-shell testing program was introduced during 1994, and industry-funded preseason testing began prior to the 1995–96 season. The testing is monitored by the Pacific States Marine Fisheries Commission, and a minimum crab meat recovery of 25% is required. The program is initiated each year around 1 November; if the crab meat recovery is less than 25%, another test is mandated. Two weeks later the second test is made, and if the pick-out is still below 25%, the season opening is delayed 15 days. This procedure can continue until 1 January, when no more tests can be made and the season must be opened on 15 January.

Summarizing 2002–2003 commercial season landings, rather than the annual totals presented above, results in lower landings, since 42% of the landings occurred in November and December, the start of the 2002–2003 season. Landings for the 2002–2003 season totaled 6,228 t, a 246% increase from the 2001–2002 season and the highest since the 1979–80 season. Landings in the

northern area in the 2002–2003 season increased 372% over the 2001–2002 season and were 75% higher than the 2,316 t long-term 88-year average for this area. Central area landings increased by 135% and were 82% higher than the 999 t long-term 88-year average.

The average statewide price per pound for the 2002–2003 season was \$1.90/lb, a decrease of \$0.24/lb from the 2001–2002 season. The central area fishery began on the opening date of 15 November with a starting price of \$2.22/lb. The northern area season opener was delayed because of a strike over the price, which was lowered due to the large volume of crab landed in the central area in November. The northern area season began 22 days after the 1 December official opening date with an agreed upon price per pound of \$1.40. Price remained low throughout the remainder of the season, rising briefly at the end to over \$3.50/lb. The 2002–2003 Dungeness crab season catch was worth \$26.1 million, a 239% increase in value over the 2001–2002 season (\$7.7 million). A total of 400 vessels made landings during the 2002–2003 season, up slightly from the 30-year low of 385 vessels in 2001–2002 season.

SEA URCHIN

In 2003, landings of sea urchin (*Strongylocentrotus franciscanus*) were the lowest on record since 1975. A total of 4,878 t were landed in 2003, with an ex-vessel value of \$7.7 million. Northern California landings barely surpassed those of 1985, the year considered the onset of that fishery (fig. 6). This decline, at least in recent years, has been mostly market driven. Northern California

TABLE 3
 2003 California Commercial Groundfish Landings (in metric tons)

	2003	2002	Change since 2002 (%)	1993	Change since 1993 (%)
Flatfishes	4,767	4,969	-4	8,490	-44
Dover sole	3,256	3,124	4	6,554	-50
English sole	131	373	-65	474	-72
Petrale sole	380	480	-21	464	-18
Rex sole	258	288	-10	457	-44
Sanddabs	605	564	8	351	72
Other flatfishes	137	140	-2	190	-28
Rockfishes	1,984	2,725	-27	12,727	-84
Thornyheads	1,281	1,581	-19	4,162	-69
Widow	5	49	-90	1,207	-99
Chilipepper	18	167	-89	2,317	-99
Bocaccio	1	22	-95	1,367	-100
Canary	1	11	-91	196	-99
Darkblotched	12	48	-75	287	-96
Splitnose	151	60	152	434	-65
Other rockfishes	515	787	-35	2,757	-81
Roundfishes	3,631	4,415	-18	6,803	-47
Lingcod	52	81	-36	699	-93
Sablefish	1,629	1,313	24	2,601	-37
Pacific whiting	1,741	2,773	-37	3,100	-44
Grenadier	163	189	-14	383	-58
Cabezon	40	50	-20	18	122
Other roundfishes	6	9	-33	2	200
Other groundfishes	182	147	24	101	80
Total	10,564	12,256	-14	28,121	-62

landings dropped by over 50% from 2002 levels, while CPUE (catch per diver) was virtually unchanged in Mendocino County ports and only down 16% in Bodega Bay.

A major contributing factor to California's declining landings is the dramatic slide in U.S. sea urchin exports during the past decade. In 1993, \$110 million worth of sea urchins were exported to Japan from the states. By 2003, the value had declined to \$50 million (about \$36 million when adjusted for inflation compared to 1993 values). The increased domestic market for California sea urchin during the past 5 years has made up some of this shortfall.

Urchin diving is a rigorous occupation, and the increasing age of the commercial sea urchin diver pool has had a noticeable impact on fishery effort. The average age of permitted divers is now 48, with 25 of the 348 divers over 60 years of age. This trend will likely continue as entry into the fishery is limited to one new permit for every 10 retired.

Several changes to the commercial sea urchin regulations became effective in 2003. The most significant of these from a management perspective is the elimination of the once monthly, week long closures from May through September that have been a fixture of the fishery since 1992. The closures were intended to reduce effort during the period when fishery value was lowest and opportunity highest due to favorable weather conditions. The industry has long argued that the closures

made it difficult to maintain a consistent market presence during the summer months, and that the overall effort decline has made the closures unnecessary. In addition to eliminating the weekly closures, the month of July was partially opened to fishing in northern California, providing for a uniform season statewide.

During June 2003, Humboldt State University contract divers partnered with CDFG divers to complete a total of 85, 30 m × 2 m transects at Point Arena Cove, Van Damme State Park, and Point Cabrillo Marine Reserve, Mendocino County. These sites serve a dual purpose as they are used for both abalone and sea urchin assessments. Van Damme had 1.4 red urchins per square meter, Point Arena had 0.76/m², and Point Cabrillo had 6.0/m². Point Cabrillo has been consistent since it was first surveyed in 1988 (it has been a reserve since 1975). Van Damme shallow water urchins (< 30 ft) have declined in number, while deep water urchins have increased since the 1990 survey (though fewer transects were surveyed in 1990). This was the first year for the Point Arena survey.

GROUND FISH

California's commercial groundfish harvest for 2003 was 10,564 t (tab. 3). Total 2003 landings decreased 14%, from 12,256 t in 2002, and 62%, from 28,121 t in 1993. The ex-vessel value for all groundfish in 2003 was approximately \$14.8 million, a decrease of 8% from 2002 revenues of \$16.1 million.

In 2003, 85% of groundfish were landed using bottom and midwater trawl gear, a slight decrease from the 88% observed in 2002. Line gear accounted for the second largest amount at 11%, a slight increase from the 9% observed in 2002. The line gear contribution was at a recent high of 18% in 1992. Trap gear accounted for just over 2% of the total 2003 groundfish landings. The gill and trammel net component remained at just under 1% after a steady decline from 5% in 1993 to 1% in 1996.

The state's 2003 groundfish harvest was again dominated by Dover sole (*Microstomus pacificus*), rockfishes (*Sebastes* spp.), Pacific whiting (*Merluccius productus*), sablefish (*Anoplopoma fimbria*), and thornyheads (*Sebastolobus* spp.) (tab. 3). Landings of Dover sole, thornyheads, and sablefish (the DTS complex) experienced a slight increase (2%) from the 2002 total, owing mainly to a 24% increase in sablefish landings, despite a 19% decrease in thornyhead landings. Lingcod (*Ophiodon elongatus*), other flatfishes, and Pacific whiting all experienced declines from the 2002 totals. The declines reflected significant landing limitations, adopted by the PFMC in September 2002, designed to reduce the harvest of depleted rockfish stocks. These management measures were considered historic in scope considering the breadth of the restrictions and the large-scale economic impacts to the west coast fishing communities. A center piece of these measures was the adoption of depth-based restrictions that seasonally move fisheries that catch overfished stocks out of the depth zones they inhabit.

As in previous years, the PFMC continued to set 2003 optimal yields for a myriad of groundfish species and species groups. The allowable harvest was reduced for nearly all groups in order to protect those species in rebuilding status. Cumulative landing limits as well as trip limits were again used by the PFMC to meet their objective of staying within the small optimum yields while continuing to provide for a year-round fishery. Despite these efforts, emergency actions had to be implemented by both federal and state jurisdictions in the fall to shut down coastwide recreational fisheries and most commercial fisheries. This was due to an unexpectedly high take in the recreational sector during July and August.

A noteworthy event took place in 2003 in the Pacific whiting fishery. An agreement was reached between Canada and the United States to set the percentage of take so as not to exceed the allowable catch, which had been happening during the past few years. The percentages were set at approximately 74% for the United States and 26% for Canada. The allowable catch had been separately allocated each year at 80% for the United States and 30% for Canada. This agreement was reached, in part, because Pacific whiting was given an overfished

designation in 2002 by the National Marine Fisheries Service. The formal implementation of this agreement, however, will not take place until 2005, but both countries will use it informally as early as 2004.

The Scientific and Statistical Committee recommended, and the PFMC adopted, new full stock assessments for use in 2004 management decision-making for Pacific ocean perch (*Sebastes alutus*), bocaccio (*S. paucispinis*), and widow (*S. entomelas*) and black (*S. melanops*) rockfishes, and assessment updates for cowcod (*S. levis*), and darkblotched (*S. crameri*) and yellowtail (*S. flavidus*) rockfishes. The PFMC also adopted new rebuilding analyses for Pacific Ocean perch, bocaccio, and widow and darkblotched rockfishes.

Additionally, the bocaccio assessment used a new estimate for natural mortality and validation of a strong 1999 year class. As a result, it is estimated the stock can rebuild in about 25–30 years, with higher levels of harvest during the rebuilding phase than what had previously been estimated. However, the new widow rockfish assessment is much more pessimistic than the one completed in 2001, with lower harvest levels under the new rebuilding analysis possibly having negative consequences for the Pacific whiting and other midwater trawl fisheries. Assessments for Pacific Ocean perch and darkblotched and yellowtail rockfishes have not significantly changed since their last assessments.

On the positive side, a new stock assessment of black rockfish for Oregon and California waters indicates that a portion of the stock is above the biomass that supports maximum sustainable yield. Also, the PFMC's non-retention measures and area closures to rebuild cowcod have been effective in constraining fishing mortality to prescribed levels.

Regulatory changes adopted by the Commission in December 2002 as interim management measures for 2003 affected the cabezon (*Scorpaenichthys marmoratus*) and the kelp (*Hexagrammos decagrammus*) and rock greenling (*H. superciliosus*) fisheries, as well as the California sheephead (*Semicossyphus pulcher*) fishery (CGS complex). Statewide cumulative trip limits were established for January and February, and a statewide closure was established for March and April. This action was done to align the fishing season for these species with the new federal seasons for nearshore rockfishes in most areas and to allow consistent fishing seasons for the CGS complex and nearshore rockfishes at the same time so as to minimize bycatch that might occur.

Management measures at both the federal and state level have evolved dramatically within the last few years. Some of those set in place, being developed, and under consideration as future management tools include groundfish management measures to be developed over the course of a two-meeting schedule for the PFMC,

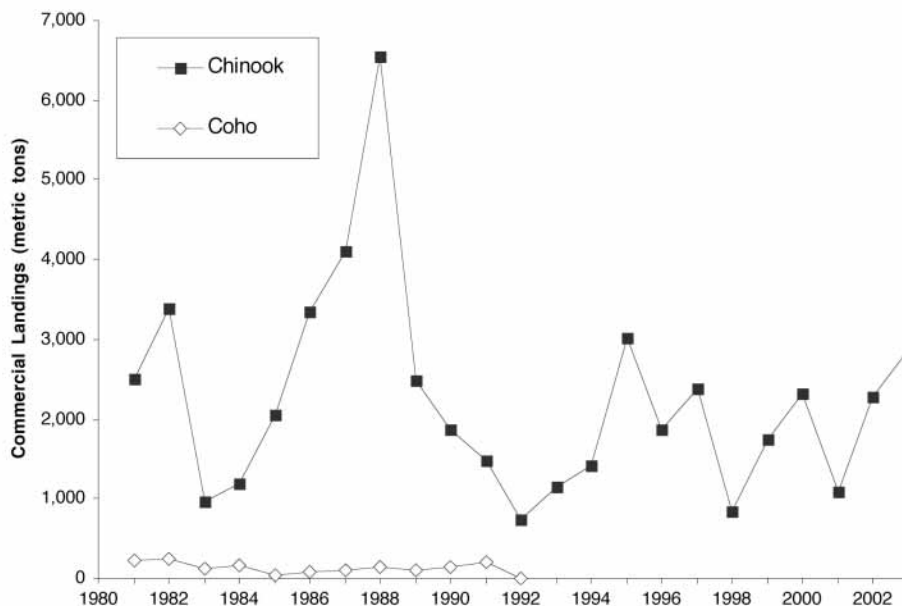


Figure 7. California commercial ocean salmon landings, 1981–2003.

conservative approach to area and season restrictions to facilitate rebuilding of stocks, depth-based restrictions, vessel monitoring systems (VMS), a multi-year management process, permit stacking, and moving from open-access to limited-entry fisheries to achieve capacity reduction, a buyback program, approval of the formation of an Ad Hoc Groundfish Habitat Technical Review Committee, and using exempted fishing permits (EFP) to test the ability of innovative fishing gears and strategies to more cleanly target healthy groundfish stocks while avoiding overfished stocks. Also, the Commission set aside 132 sq. nmi within the Channel Islands National Marine Sanctuary, creating a system of 12 separate no-take marine reserves. These marine reserves went into effect on 9 April 2003. And, finally, in response to concerns voiced by west coast industry and fishery managers, the recreational data system went through an overhaul. The nearly 25-year-old Marine Recreational Fisheries Statistics Survey (MRFSS) is to be phased out in California starting in January 2004. In its place a new program was developed that will be an all-inclusive recreational fisheries survey encompassing the salmon fishery and other marine fisheries. This new program is called the California Recreational Fisheries Survey (CRFS).

OCEAN SALMON

In 2003 the commercial troll fishery landed approximately 2,883 t (488,800 fish) of dressed Chinook (*Oncorhynchus tshawytscha*) (fig. 7) and fished approximately 15,600 boat days. Ex-vessel prices for dressed salmon averaged \$1.90/lb, and the total ex-vessel value of the fishery exceeded \$12.1 million.

Statewide recreational landings totaled 93,100 Chinook during 132,300 angler days (catch per angler day = 0.70) (fig. 8). Anglers were limited to two salmon a day (all species except coho, *Oncorhynchus kisutch*). South of Horse Mountain (near Cape Mendocino in Humboldt County) the minimum size limit was 24 in. total length (TL) through 30 April, and 20 in. TL thereafter. Anglers fishing with bait and by any means other than trolling in the area between Point Conception and Horse Mountain were required to use barbless “circle” hooks. In the Klamath Management Zone (KMZ: Horse Mountain, California, to Humbug Mountain, Oregon) the bag limit was two salmon a day and a minimum size limit of 20 in. TL. In the California portion of the KMZ, anglers landed 8,700 Chinook during 15,800 angler days.

In 2003, the PFMC enacted commercial and recreational ocean salmon regulations in California to meet the following objectives:

- The NOAA Fisheries Sacramento River winter Chinook 2002 Biological Opinion required that the duration and timing of the 2003 commercial and recreational fisheries south of Point Arena not change substantially relative to the 2000 and 2001 seasons.
- The Oregon coast natural (OCN) coho maximum allowable exploitation rate (marine and freshwater combined) of 15% under Amendment 13 of the Salmon Fishery Management Plan (FMP).
- Conservation and allocation objectives for Klamath River fall Chinook as follows: a spawner escapement to natural areas of 35,000 adults; a minimum adult natural spawner escapement rate of 33–34%; 50% of

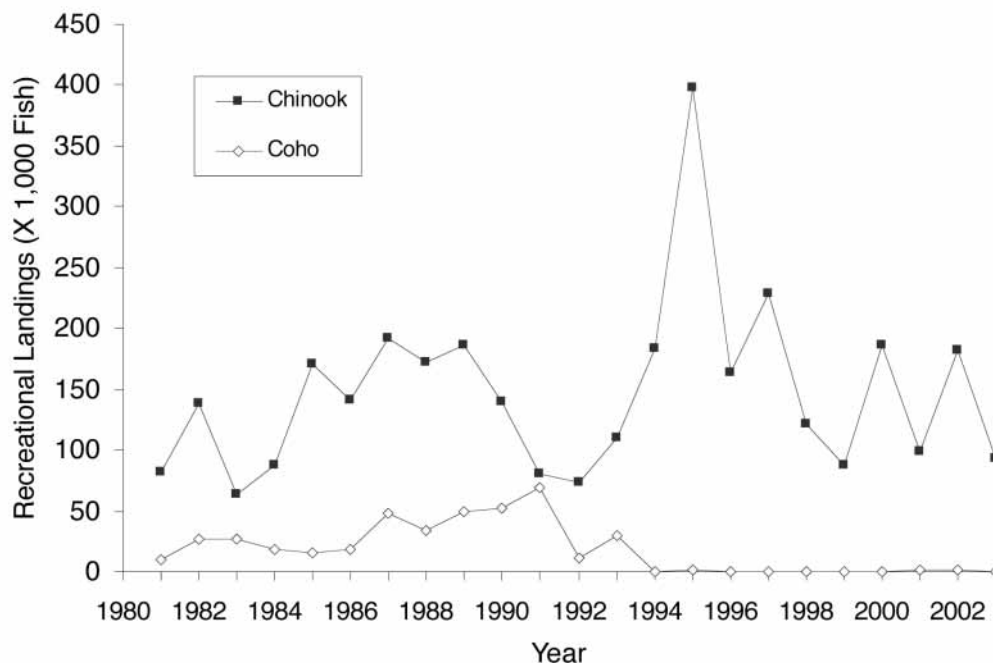


Figure 8. California recreational landings of ocean salmon, 1981–2003.

the allowable adult harvest for federally recognized tribal subsistence and commercial fisheries; 26.1% of the non-Indian harvest to the Klamath River recreational fishery; 14.8% of the ocean harvest to the KMZ recreational fishery.

- The California coastal Chinook consultation standard provided by NOAA Fisheries under the federal ESA of no greater than a 16% age-4 ocean harvest rate on Klamath River fall Chinook.
- The Sacramento River fall Chinook escapement goal range of 122,000 to 180,000 hatchery and natural adults.
- The prohibition of retention of coho in California as required under the NOAA Fisheries 1999 Biological Opinion for threatened central California coast coho.

Harvest impacts on northern California coastal Chinook are a primary management concern for commercial ocean fisheries from Pigeon Point, California, to Florence, Oregon, and for recreational fisheries in the KMZ. These regulations were expected to result in a 51%–49% California-Oregon sharing of Klamath River fall Chinook ocean troll harvest.

Commercial fishing opportunity in the Fort Bragg area (Horse Mountain to Point Arena) was increased, due to a moderate abundance of Klamath River fall Chinook and an increase in the exploitation rate on OCN coho over that permitted in 2002. In addition, recreational fishing opportunity was expanded in the KMZ and Fort Bragg areas.

For more complete information, see the PFMC’s website, www.pcouncil.org, where you will find “Review of the 2003 Ocean Salmon Fisheries,” compiled by the Salmon Technical Team and PFMC staff.

TUNA, INCLUDING ALBACORE

North Pacific albacore (*Thunnus alalunga*), eastern Pacific yellowfin tuna (*Thunnus albacares*), northern bluefin tuna (*Thunnus orientalis*), skipjack tuna (*Katsuwonus pelamis*), and bigeye tuna (*Thunnus obesus*) are managed under the PFMC’s HMSFMP. The plan was first adopted in June 2003 and approved by NOAA Fisheries in March 2004.

There are several west coast commercial fisheries regulated by the HMSFMP that annually land tunas in California. The surface hook-and-line fishery, which accounts for almost all albacore landings on the west coast, consists mainly of trollers using trolling jigs or live bait. There is a small-mesh drift gill net fishery that incidentally lands and occasionally targets albacore, bluefin, yellowfin, and skipjack tunas. California prohibits pelagic longline gear inside of 200 mi, but longliners can fish outside of 200 mi and land their fish in California ports. California also has small coastal purse seiners (< 400 short tons, or 363 t carrying capacity) that primarily harvest coastal pelagic species. They also fish for northern bluefin and other tunas when these species enter west coast waters during May through October.

The recreational fisheries for tunas consist of commercial passenger fishing vessels (CPFVs) and private vessels using hook-and-line gear. Around 200 CPFVs

annually provide recreational anglers with a platform to fish tuna. In southern California, there are an estimated 4,000–6,000 private boats fishing for tunas. Many of these boats fish in Mexican waters.

Under the HMSFMP, stock status is determined by estimating the abundance (biomass) of the stock throughout its range and comparing the estimate of abundance with the adopted acceptable level of abundance. Most stock assessments are conducted by the Inter-American Tropical Tuna Commission (IATTC), but the IATTC does not determine if a stock is overfished. Therefore, the criteria in the FMP will be used to determine stock status. West coast fisheries harvest a small fraction of the total catch taken by all nations in the North Pacific. The catch of all HMS by U.S. vessels based on the west coast, as a percentage of the total catch for the stock, ranges from less than 1% for bigeye tuna to about 16% for albacore. In most cases, effective conservation of tunas requires international action.

Albacore

Albacore is the leading species of tuna caught in both commercial and recreational fisheries in California. In 2003, both commercial and CPFV landings decreased. Commercial landings decreased by 34% from 2,602 t in 2002 to 1,710 t in 2003. Ex-vessel value decreased 31% from \$3.76 million in 2002 to \$2.59 million in 2003. The average price per ton paid to fishers for albacore increased 15% from \$1,320 in 2002 to \$1,516 in 2003. The decline in commercial harvest does not necessarily reflect a decline in the albacore population. Commercial landings for albacore have varied dramatically over the last decade, ranging from a high of 5,590 t in 1999 to a low of 818 t in 1995. These landings are still significantly lower than the peak decades of the 1950s and 1960s when commercial landings were routinely over 27,000 t. During the 1950s there were over 3,000 vessels in the commercial fleet; now there are fewer than 500. Also, during those early years the fleet used pole-and-line gear, trolling gear, longlines, purse seines, and drift gillnets. Since the 1980s trolling operations have dominated the fishery, taking 90% of the annual catch of albacore.

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

Preliminary landing figures derived from CPFV logbooks for 2003 indicate that the fleet landed 248,292 albacore, down 21% from the record high catch of

312,776 fish landed in 2002. In 2003, 172 CPFVs reported 3,687 trips in which at least one albacore was landed. A total of 62,536 anglers landed the 248,292 albacore, resulting in an increase in the catch-per-unit angler from 2.96 in 2002 to 3.97 in 2003.

In California there are no recreational size or bag limits on albacore, but California vessels fishing in Mexican waters must adhere to Mexican regulations. Mexican law permits the take of only 5 albacore, or any tuna, per day and no more than 10 fish per day of all species of tuna combined. According to CPFV logbooks, 78% of the 2003 catch of albacore was harvested from Mexican waters. Typically the majority of fish are landed in July and August when the bulk of the stock travels through the range of the southern California CPFV fleet. However, the arrival and departure times associated with albacore migration can vary from early spring arrivals to late winter departures.

Landing estimates of private boat anglers in California is provided by the Recreational Fisheries Information Network (RecFIN) through data collected by MRFSS. RecFIN offers a different view of recreational catches in that it only includes in its estimates fish taken in waters of the United States. In this case, private boat landings increased 79% (126,946 fish) from 2002 (70,897 fish). The average weight also increased 28% (10.19 kg) from 2002 (7.97 kg). RecFIN estimates that 1,181 t of albacore from U.S. waters were harvested by California private boaters in 2003. This is an 86% increase from 2002 (634 t).

Stock status of albacore is reviewed at 1–2-year intervals by the North Pacific Albacore Workshop (members: United States, Japan, Canada, and Taiwan). Presently, the stock is healthy and not being overfished. Stock and catches are increasing. No quotas are being contemplated, and no regional harvest guidelines are recommended.

Yellowfin Tuna

Commercial landings decreased by 15% from 544 t in 2002 to 465 t in 2003. Ex-vessel value decreased 24% from \$588,676 in 2002 to \$448,222 in 2003. The average price per metric ton paid to fishers for yellowfin dropped 11% from \$1,082 in 2002 to \$964 in 2003. Commercial landings of yellowfin tuna in California, while fluctuating, generally increased from 350,000 pounds in 1919 to 280 million pounds in 1976. Since 1976 yellowfin tuna landings declined steadily to 1 million pounds in 2003. The decline in commercial landings in California can be attributed to the relocation of cannery operations to American Samoa and Puerto Rico and the reflagging of U.S. vessels. Currently, there are no canneries operating in California. Purse seine and bait boat fisheries supply the bulk of the California com-

mercial yellowfin tuna landings. Some commercial landings are also supplied by longline, troll, and gillnet fisheries. Almost all commercial landings of yellowfin are from waters south of the U.S. border.

In 2003, CPFVs logged 28,955 yellowfin, up 56% from the 18,594 fish caught in 2002. This increase was due to the availability of small yellowfin (< 40 in.) in coastal waters in the late summer and early fall. The catch was still significantly lower than the record high catch of 116,000 yellowfin landed in 1983. While CPFVs from San Pedro to San Diego recorded catches of yellowfin, 91% of the 2003 catch was harvested from Mexican waters. Currently, the majority of yellowfin landed by CPFVs are by the long-range boats operating out of San Diego. These boats specialize in multiday fishing excursions south of the U.S. border that land large yellowfin (> 40 in.) up to 140 kg.

RecFIN estimates private boats landed 6,774 yellowfin in 2003. The average weight was 5.18 kg. RecFIN has no estimates for 2002. Yellowfin may have been landed by private boaters in U.S. waters, but due to the random sampling protocol of MRFSS they may have been excluded.

The yellowfin stock appears to be below but near maximum sustainable yield (MSY), with fishing mortality higher than what is recommended by the FMP. The IATTC conducts stock assessments annually, and the recommended quota is usually between 250,000 and 300,000 t. In view of the small share (about 1%) of total eastern Pacific yellowfin catch made by west coast fishers, the productivity of the stock, and the apparent effectiveness of the IATTC management, no regional harvest guidelines are recommended.

Skipjack Tuna

Commercial landings increased by 48% from 236 t in 2002 to 349 t in 2003. Ex-vessel value also increased 25% from \$128,245 in 2002 to \$159,886 in 2003. The average price per metric ton paid to fishers for skipjack dropped 16% from \$543 in 2002 to \$458 in 2003. Commercial landings of skipjack tuna in California, while fluctuating, increased from 3 million pounds in 1918 to 174 million pounds in 1980. Since 1976, skipjack tuna landings have decreased steadily to the low of 125,000 pounds in 2001. The decline in commercial landings in California can be attributed to the relocation of cannery operations to American Samoa and Puerto Rico and the reflagging of U.S. vessels. Currently, there are no canneries operating in California. Purse seine and bait boat fisheries supply the bulk of the California commercial skipjack tuna landings. Some commercial landings are also supplied by longline, troll, and gillnet fisheries. Almost all commercial landings of skipjack are from waters south of the U.S. border.

In 2003 CPFVs had a substantial increase in landings of 968% (31,675 fish) over 2002 (2,967 fish). This increase was due to an abundance of skipjack schooling in coastal waters during the late summer and early fall. Skipjack were frequently caught by boats targeting albacore. In 2003, 68% of the skipjack landed by CPFVs was harvested in Mexican waters.

RecFIN estimates private boats landed 12,366 skipjack tuna in 2003. The average weight was 3.4 kg. RecFIN has no estimates for 2002. Skipjack may have been landed by private boaters in U.S. waters, but due to the nature of the random sampling protocols of MRFSS, skipjack may have been excluded.

The skipjack tuna stock of the eastern Pacific is assessed annually by the IATTC and appears to be very productive. No upper limit to the catch is evident, and no MSY has been established. In view of the small share (about 3%) of total catch made by west coast fishers, the productivity of the stock, and the apparent effectiveness of the IATTC management, no regional harvest guidelines are recommended.

Bluefin Tuna

Commercial landings increased dramatically by 272% from 9.6 t in 2002 to 35.7 t in 2003. Ex-vessel value also increased 131% from \$31,937 in 2002 to \$73,768 in 2003. The average price per metric ton paid to fishers for bluefin dropped 38% from \$3,327 in 2002 to \$2,066 in 2003. Commercial bluefin tuna landings in California peaked in the 1960s at nearly 40 million pounds. Bluefin are mostly taken by small purse seiners that primarily target coastal pelagic species. Small amounts of bluefin are caught off the California coast by drift gillnets and further offshore by longline vessels.

CPFV logbooks for 2003 showed the fleet landed 22,212 bluefin tuna, down 33% from 33,316 fish landed in 2002. In 2003 87% of the bluefin landed by CPFVs was harvested in Mexican waters. RecFIN has no estimates of bluefin catch for 2003. We are aware that private boaters in U.S. waters landed bluefin, but due to the nature of the random sampling protocols of MRFSS, they were not sampled. The RecFIN high estimate for private boaters was 1,605 bluefin in 1998.

The IATTC reviews the status of the northern bluefin tuna stock occasionally. Evidence of overfishing or persisting decline in the stock is lacking. West coast fishers account for about 10% of the total catch of the stock, harvesting mainly juveniles that migrate irregularly to the eastern Pacific. In view of the limited impact west coast fisheries have on the spawning stock and the lack of international agreement on the need to control fishing mortality, no regional harvest guidelines are recommended.

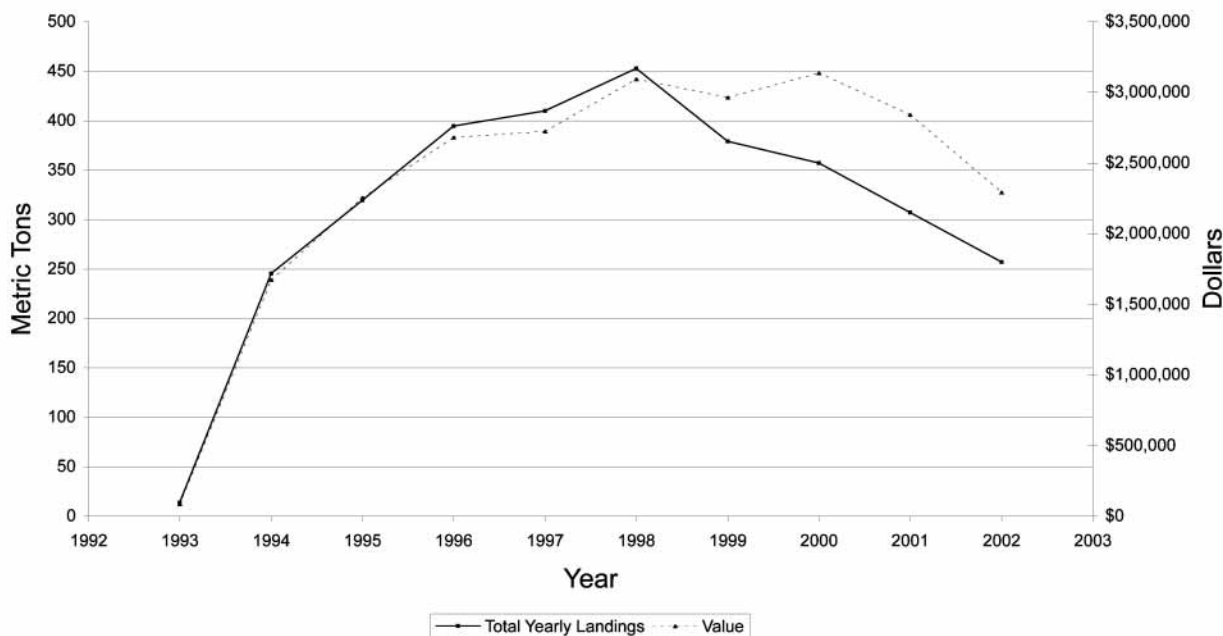


Figure 9. California nearshore live-fish landings and ex-vessel value, 1993–2002.

Bigeye Tuna

Commercial landings increased dramatically by 263% (34.1 t) from 2002 (9.4 t), and ex-vessel value also increased 200% (\$262,765) from 2002 (\$87,303). The average price per metric ton paid to fishers for bigeye dropped 17% from \$9,287 in 2002 to \$7,728 in 2003. Almost all the fish come from the offshore long-line fishery.

In 2003, CPFVs landed 60 bigeye tuna, all from Mexican waters. RecFIN has no estimates of bigeye tuna catch for 2003. We are aware private boaters in U.S. waters may have landed bigeye, but due to the random sampling protocol of MRFSS they may have been excluded. The RecFIN high estimate for private boaters was 2,517 bigeye in 1982.

Bigeye tuna stocks appear to be at a level below MSY. The IATTC assesses the status of bigeye annually and has adopted both quotas and restrictions on floating object sets to control the catch of juvenile bigeye. In view of the small share (< 1%) of total bigeye catch made by west coast fishers, the productivity of the stock, and the apparent effectiveness of the IATTC management, no regional harvest guidelines are recommended.

NEARSHORE LIVE-FISH

Preliminary summaries of 2003 data indicated that commercial landings of California nearshore finfish totaled 231 t. Of that, 203 t were recorded as live landings and 28 t as dead landings. Preliminary ex-vessel value of total landings for 2003 was \$2.0 million, of which \$1.9 million was paid for live fish (fig. 9). Compared to 2002,

this represents a 34% decrease in total nearshore landings and a 26% decrease in value.

Management of the Fishery

The nearshore fishery, as defined in the California Code of Regulations (Title 14, Section 1.9), includes a select group of finfish: cabezon (*Scorpaenichthys marmoratus*), California scorpionfish (*Scorpaena guttata*), California sheephead (*Semicossyphus pulcher*), kelp and rock greenlings (*Hexagrammos decagrammus* and *H. lagocephalus*), monkeyface eel (*Cebidichthys violaceus*), and the following rockfishes (*Sebastes* spp.): black (*S. melanops*), black-and-yellow (*S. chrysomelas*), blue (*S. mystinus*), brown (*S. auriculatus*), calico (*S. dallii*), China (*S. nebulosus*), copper (*S. caurinus*), gopher (*S. carnatus*), grass (*S. rastrelliger*), kelp (*S. atrovirens*), olive (*S. serranoides*), quillback (*S. maliger*), and treefish (*S. serripes*). All except California sheephead, monkeyface prickleback, and rock greenling are designated as groundfish species under the PFMC's fishery management plan for Pacific coast groundfish. These 19 species represent the species most commonly captured in the nearshore live-fish fishery. They are primarily found in association with kelp beds or rocky reefs in waters less than 20 fathoms. They are territorial, slow-growing, and long-lived, which makes them vulnerable to overfishing even at low exploitation rates. This review focuses on the nearshore finfish species most commonly captured and sold live.

The Nearshore Fishery Management Plan (NFMP), adopted in 2002, is a framework plan that identifies a management strategy for many of the nearshore species

targeted by the nearshore live-fish fishery. The five integrated management measures (fishery control rule, regional management, resource allocation, marine protected areas, and restricted access) together, over time, will meet the goals and objectives of the Marine Life Management Act (MLMA) and provide for sustainable nearshore stocks and fisheries.

History and Fishery Operations

The nearshore live-fish fishery began in the mid-1980s. Initially, the fishery supplied live fish for the California Asian community. The live-fish market has since expanded and now supplies markets nationally and, in some cases, internationally. Before the market for live fish developed, the wholesale value (ex-vessel value) for rockfishes, cabezon, California sheephead, and greenlings was low. An increase in consumer demand for premium live fish caused the value of the fishery to increase dramatically. For example, the average ex-vessel value of cabezon (landed dead) was less than \$0.50 per pound in 1989. In 2003, the average price for live cabezon was \$4.81 per pound (up from \$4.02 in 2002). At any time, however, prices vary widely depending on port region, species, size, and marketability of fish. In 2003, ex-vessel prices for live landings of the 19 nearshore species ranged from \$0.25 to \$10.50 per pound.

Primary gear types used to capture nearshore fish include various hook-and-line methods and trap gear. Hook-and-line gear includes rod-and-reel, vertical longlines, horizontal longlines, and weighted “stick gear.” Vessels using hook-and-line gear are limited to 150 hooks per vessel and 15 hooks per line. Vessels using fish traps along the mainland shore are limited to 50 traps per day. Most of the hook-and-line and trap vessels range from 20 to 40 ft in length and are capable of operating in shallow water close to shore. The fishery is generally short-range, taking day trips to deliver live fish to market or to dockside holding bins.

Nearshore Landings Information

Landing receipts, commonly called market or dealer receipts, are the primary CDFG information source for quantifying commercial fishing activity. By law, a fish buyer must complete a landing receipt at the time fish are delivered. Basic information such as species or market category, weight of the landing, price per pound, gear type, and condition (e.g., live) must be provided. Considerable effort is spent reviewing and editing landing receipts to ensure that critical information, such as market category and condition code, is accurately reported. When condition information is ambiguous, it can often be determined by examining the ex-vessel price: a substantially higher price usually indicates a live landing.

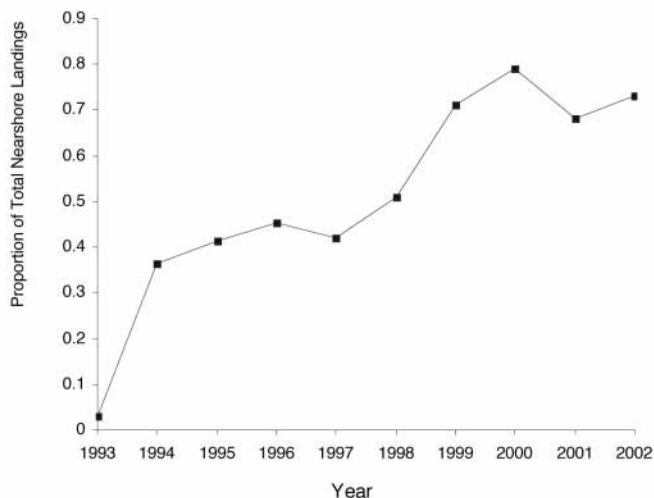


Figure 10. Proportion of fish landed live in the nearshore fishery, 1993–2002.

Landings information reported by market category provides very little information on the species composition of the catch. In recent years, regulations mandating dealers to record landing weights by species for the 19 nearshore finfishes has reduced the use of group market categories. Nevertheless, market categories on which this review is based likely contain several different species similar in appearance or market value. For example, the “group gopher” market category often includes gopher, brown, black-and-yellow, grass, kelp, copper, China, and quillback rockfishes. Information on the species composition of market categories provided by port sampling was not available for inclusion in this review.

Data used for this report are preliminary and live-fish landing weights provided in this review should be interpreted as low estimates of the actual live-fish landings in 2003. It should also be noted that condition (live or dead) of fish landed was not required on landing receipts until 1993; therefore, years prior were not considered in this review.

Statewide, 87% of nearshore fish were landed live in 2003 (fig. 10). This is the highest proportion of live nearshore catch recorded and is a reflection of the much higher value placed on the “live” condition.

Regional Landing

Prices and dominant landings varied by management region, ports within a region, and season. North Coast Region (Oregon border to Cape Mendocino; port complexes of Crescent City and Eureka) landings totaled 66 t, or 29% of nearshore fish landings statewide, with a preliminary ex-vessel value of \$0.33 million. Of the total, 51 t were landed live and 15 t were landed dead. Approximately 25% of the state’s live fish were landed in the North Coast Region for a value of \$0.29 million.

Live landings were dominated by the black rockfish market category (42 t) followed by cabezon (2 t). These two categories accounted for 86% of the North Coast Region's landings of live fish. Hook-and-line gear was used for 100% of the live landings in the North Coast Region. There were no recorded landings of nearshore species made with trap gear.

North-Central Coast Region (Cape Mendocino to Point Año Nuevo; port complexes of Fort Bragg, Bodega Bay, and San Francisco) landings totaled 23 t or 10% of nearshore fish landings statewide, with an ex-vessel value of \$0.21 million. Nineteen tons were landed live and 4 t were landed dead. Approximately 9% of the state's live fish were landed in the North-Central Coast Region for a value of \$0.19 million. The largest market category landed was cabezon (6 t), followed by gopher (2 t), black-and-yellow (2 t), and black rockfish (approx. 2 t). These four market categories accounted for 64% of the North-Central Coast Region's landings of live fish. Hook-and-line gear accounted for approximately 75% of live landings, and traps for 25%. Finfish traps are not allowed in all areas of the North-Central Coast Region.

South-Central Coast Region (Point Año Nuevo to Point Conception; port complexes of Monterey and Morro Bay) landings totaled 78 t or 34% of nearshore fish landings statewide with an ex-vessel value of \$0.88 million. Seventy-two tons were landed live and 6 t were landed dead. Approximately 36% of the state's live fish were landed in this region for a value of \$0.86 million. Live landings were dominated by cabezon, brown, gopher, and grass rockfish market categories (62 t), accounting for 85% of the South-Central Coast Region's landings of live fish. Hook-and-line gear accounted for approximately 75% of live landings, and traps for 25% in the South-Central Coast Region.

South Coast Region (Point Conception to México border; port complexes of Santa Barbara, Los Angeles, and San Diego) landings totaled 64 t or 28% of nearshore fish landings statewide with an ex-vessel value of \$0.57 million. Sixty-one tons were landed live and 3 t were landed dead. About 30% of the state's live fish were landed in the South Coast Region for a value of \$0.56 million. In 2003, live landings were predominantly California sheephead (47 t), followed by cabezon (approx. 6 t), and California scorpionfish (4 t). All together, these categories accounted for 92% of the South Coast Region's landings of live fish. Trap gear was used to catch 63% of the live fish in the South Coast Region, and hook-and-line caught 30%; trawl gear (primarily for California scorpionfish) was also used.

Recent Trends in the Fishery

Preliminary data for 2003 showed a decline in landings for the fifth straight year, from a peak in 1998 (947 t

landed). The 2003 total value of the fishery declined in proportion to landings (fig. 9), reflecting stable demand. The decline in landings can be attributed to management measures consistent with the Nearshore Fishery Management Plan. Current nearshore interim regulations (implemented in 2000) established an "allowable catch" of nearshore species equal to 50% of historical annual harvest levels. In addition, the Limited Entry/Restricted Access program reduced the number of permittees from a high of 1,127 in permit year 1999–2000, to 525 in 2002–2003, then to 207 in 2003–2004. (A permit year runs from 1 April through 31 March of the following year.) Size limits for certain nearshore species, a 2-month fishery closure, and gear restrictions were also used to achieve catch limitations set under interim regulations and to conform state regulations to the PFMC regulations for fishing in state waters.

CDFG and the Commission continue to develop regional total allowable catch limits (TACs), recreational and commercial sector allocation parameters, and cumulative trip limits. The initial phase of this work is being focused on cabezon, kelp and rock greenlings, and California sheephead.

PACIFIC HERRING

California's Pacific herring fisheries suffered a decline in landings in 2003. Statewide landings for the 2002–2003 sac roe season (December–March) totaled 1,975 t, a decline of 40.9% from last season's landings of 3,339 t. The San Francisco gill net fleet, composed of three platoons (332 permits fished, a decline of 17% from the 2001–2002 season) landed 1,902 t, 41% under the 3,211 t quota. The Tomales Bay fishery landed a total of 71 t, 15.6% of the 454 t quota. No permittees fished in Crescent City, which had a 27.2 t quota. Humboldt Bay landings totaled 1.8 t, 97% below the 54.4 t quota. Annual sac roe landings, January to December, fell from 3,290 t to 1,943 t, down 40.9% from the previous year (tab. 1).

Ex-vessel prices for herring with 10% roe recovery averaged an estimated \$500 per short ton for gill net landings, with an additional \$50 paid for each percentage point above 10%. The ex-vessel price per ton was lower than the previous season, reflecting continuing volatility of the Japanese economy. State wide ex-vessel value of the sac roe fishery was an estimated \$1.6 million, an 11% decrease from last season and well below the average for the previous 17 seasons (\$8.6 million).

The only bright spot in this otherwise disappointing season for California's herring fishery was the San Francisco Bay herring eggs-on-kelp fishery. Landings totaled 48.4 t, a 18% increase from last season's landings of 41.1 t, and 8% less than the 52.3 t quota. Total estimated value of the 2002–2003 eggs-on-kelp harvest was \$745,934

based on an average ex-vessel price of \$7.00 per pound. Price paid varies with product grade, with grade 1 receiving approximately \$10 per pound, and grade 5 bringing \$3–4 per pound.

Hydroacoustic and spawn deposition surveys were conducted by CDFG to estimate herring spawning biomass in San Francisco Bay. Spawn deposition estimates were used exclusively to assess the Tomales Bay and Humboldt Bay populations. Historically, the spawn deposition survey was used to set quotas from 1973 through 1989 for the San Francisco Bay fishery. From 1990 through 2003, the spawning biomass estimate was derived by integrating results of the spawn deposition survey and the hydroacoustic survey on a spawning-wave-by-spawning-wave basis. Over time, the two survey estimates have been diverging, and in recent years the population trends have differed. In 2003, results of the two surveys could not be resolved. Hydroacoustic survey results indicated the presence of large schools, while the spawn surveys did not find corroborating amounts of spawn. Concern regarding the status of the stock and survey results led to the establishment of an independent peer review panel to evaluate the use of a stock assessment model for the San Francisco Bay herring population as well as to evaluate the assessment surveys.

One of the panel's findings was that the method of combining the two surveys, often involving using the higher of the two estimates, has contributed to over-exploitation by overestimating spawning biomass. The panel recommended continuing the spawn deposition survey annually as the primary index of abundance and as the spawning biomass estimate for use in setting the fishery quota. The panel also recommended continuing the hydroacoustic survey to support the location and timing of the spawn deposition survey, to better understand prespawning behavior of herring and to collect information on the age structure of the spawning population in San Francisco Bay. In addition to those recommendations, the peer review panel found that the San Francisco Bay herring population is presently at or near the lowest abundance observed since the 1970s and recommended that a rebuilding policy be implemented.

The moderate 2002 El Niño appeared to manifest its effects on San Francisco Bay herring. Weights of older fish, age 4 and above, were 5–10% lower than long-term averages, whereas 2- and 3-year-olds appeared to be 3% longer and heavier.

The Tomales Bay herring spawning biomass continued to demonstrate a tendency to fluctuate widely. The 2002–2003 spawning biomass estimate was 3,905 t, representing a 41% decline from the previous season's estimate (6,570 t). However, this season's biomass is the second highest since the 10,014 t El Niño season of 1982–83. For the third consecutive season, CDFG con-

ducted spawning-ground surveys and monitoring of the herring gill net fishery in Humboldt Bay. An estimated 151 t of herring spawned in south and north Humboldt Bay. This is a decline of 73% from the previous season's estimate of 560 t. No surveys were conducted in Crescent City Harbor.

Neutral ocean conditions were forecast into the fall prior to the 2003–2004 season. The December fishery in San Francisco Bay opened to a slow start once again with limited fishing activity through mid-month. Kazunoko remains an integral part of traditional Japanese New Year's festivities. However, changes in Japanese culture and economy have also resulted in changes in the sac roe market. Demand for kazunoko is forecasted to wane by industry observers as younger Japanese become more westernized. Ex-vessel prices are expected to decline with concern for the Japanese economy, and herring buyers were offering similar prices to the those of the 2002–2003 season.

ROCK CRAB

Three species of crab are landed in the California commercial rock crab fishery: yellow rock crab (*Cancer anthonyi*), brown rock crab (*C. antennarius*), and red rock crab (*C. productus*). Rock crabs are fished along the entire coast of California, although the fishery is most active in southern California (from Morro Bay south), where 85–90% of the landings occur. The preliminary estimate of rock crab landings in 2003 is 412 t, a 26% decrease from 2002 (554 t) (fig. 11). This ends a 3-year trend of increasing landings that began in 1999, which had the lowest landings seen in the fishery in 28 years. Preliminary ex-vessel revenues for 2003 were \$1.2 million, a 26% decrease in value from 2002 (\$1.5 million). The average price per pound for rock crab has remained relatively stable in the last 5 years, ranging from \$1.27 to \$1.29/lb, with the average price since 1999 at \$1.28.

Tracking historic landings of rock crab is complicated by the past use of generic CDFG market codes that lumped all crab landed in California, including Dungeness, into one category. All crab landed in the Monterey, San Francisco, and Eureka regions were assumed to be Dungeness crab, with all crab landed south of Monterey assumed to be rock crab. This practice was abandoned in 1950 when a separate market category was created for rock crab, which included red, brown, and yellow rock crabs. From 1950 to 1985, landings also include any rock crab claws that were landed separately. The crab claws were converted to whole crab weight using a 1:4 ratio (1 lb of crab claws equaled 4 lb of whole crab). In 1986 a new market category was created for crab claws; however, this category contains claw weight from both sheep crab and rock crab and is not included in more recent rock crab landing tables. In 1991 it became illegal

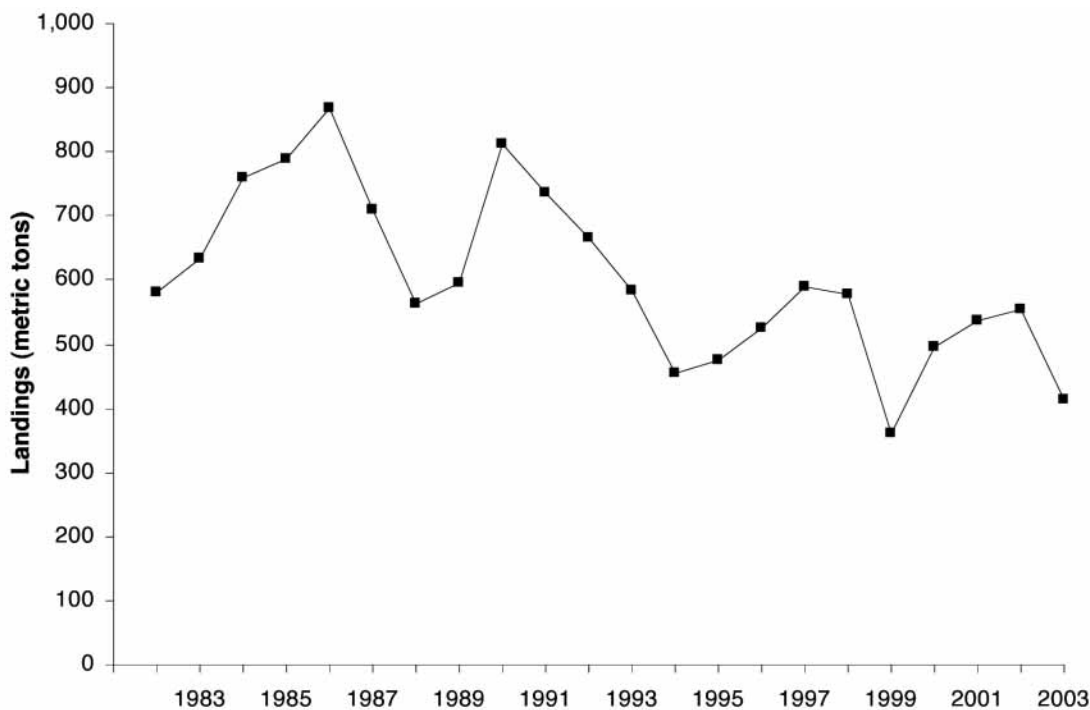


Figure 11. California commercial rock crab landings, 1982–2003.

to take rock crab claws, and the crab claw category became exclusively for sheep crab claws. Three additional, species-specific, market categories were created in 1994 for red, yellow, and brown rock crab. Landings for 1994–2003 are the sum of the combined rock crab market category and the three additional categories. Commercial rock crab landings in California appear to have steadily declined since the 1980s. However, due to the inconsistent methods of recording commercial landings in past years, it is difficult to determine if this is stock or sampling related. Individual rock crab species harvests are almost entirely recorded by fishers and processors in the general “rock crab” category instead of the species-specific categories. Efforts to assess the overall health of this fishery would be greatly enhanced by requiring fishers and processors to record the specific rock crab species being landed.

The majority of rock crabs commercially landed in California are captured by traps, with a small percentage caught as bycatch by vessels using trawl gear. It is unlawful to take or possess more than 500 lb of crabs on any boat on which any type of trawl or drag net is carried or operated. Commercial laws and regulations protect crabs that are below reproductive size. The law presently requires a minimum harvest size of 4.25 in. carapace width (widest part of the body shell), and each trap must include escape rings that measure 3.25 in. across. The minimum harvest size and escape ring size

were chosen to accommodate the different characteristics of the three rock crab species. Growth studies conducted on yellow and brown rock crabs have shown that both species molt 10–12 times before reaching sexual maturity at about 3 in. carapace width.

A state law enacted in 2002 authorized the Commission to adopt regulations to manage the rock crab resource in a manner consistent with the MLMA. CDFG has proposed regulatory action that would create a northern and southern regional rock crab trap permit requirement beginning 1 April 2005, with the north/south boundary located at Lopez Point (latitude 36°N), Monterey County.

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