

REVIEW OF SOME CALIFORNIA FISHERIES FOR 2005: COASTAL PELAGIC FINFISH, MARKET SQUID, DUNGENESS CRAB, SEA URCHIN, ABALONE, KELLET'S WHELK, GROUND FISH, HIGHLY MIGRATORY SPECIES, OCEAN SALMON, NEARSHORE LIVE-FISH, PACIFIC HERRING, AND WHITE SEABASS

CALIFORNIA DEPARTMENT OF FISH AND GAME

Marine Region
8604 La Jolla Shores Drive
La Jolla, CA 92037
DSweetnam@dfg.ca.gov

SUMMARY

In 2005, commercial fisheries landed an estimated 132,600 metric tons (t) of fishes and invertebrates from California ocean waters (fig. 1). This represents a decrease in landings of over 3% from the 137,329 t landed in 2004 and a 47% decline from the 252,568 t landed in 2000. In a shift from recent increasing trends, the preliminary ex-vessel economic value of commercial landings in 2005 was \$107 million, a decrease of 19% from the \$131 million in 2004, mainly the result of a sharp decline in Dungeness crab landings.

After a one-year absence, market squid was once again the largest fishery in the state, both by volume at nearly 56,000 t, and in ex-vessel value at \$31.6 million. Pacific sardine slipped to second in landings at nearly 35,000 t, while the other top five California landings included northern anchovy at over 11,000 t, red sea urchin at over 5,000 t, and Dungeness crab at 4,500 t. The ex-vessel value of Dungeness crab ranked second at nearly \$17 million. This is nearly a 60% decline from 2004 (\$40.5 million). Other top five valued fisheries include Chinook salmon at nearly \$13 million, red sea urchin at over \$6 million, and California spiny lobster at nearly \$6 million.

Statewide landings of red sea urchin dropped nearly 9% while exports for all sea urchin producing states declined by 21%. Fishing effort for red urchin has remained constant in southern California; however, effort in northern California has declined dramatically. Commercial landings of Pacific herring also continued to decline in 2005. An expanding fishery for Kelle's whelk, usually taken as bycatch in lobster and crab traps in southern California, yielded 47 t, an increase of 33% over 2004 landings.

California's commercial groundfish harvest for 2005 was over 10,000 t, a 16% decrease from 2004 landings. The groundfish harvest consisted mainly of Pacific whiting, Dover sole, sablefish, and rockfishes. Ex-vessel value of groundfish landings for 2005 was \$13.8 million, similar to 2004. The Pacific Fisheries Management Council (PFMC) approved stock assessments for 18 groundfish species and removed lingcod from overfished status and considered the stock to be officially rebuilt.

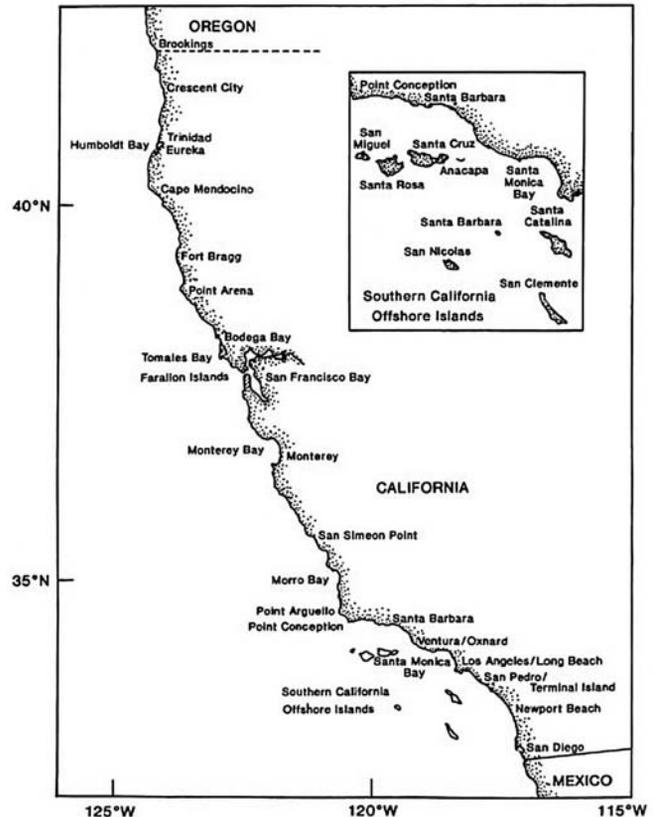


Figure 1. California ports and fishing areas.

For highly migratory species (HMS), commercial and recreational landings of albacore decreased 35% and 53%, respectively, from 2004 landings. Bigeye tuna commercial landings decreased by 57% in the state. In addition, the PFMC declared that overfishing of bigeye tuna is occurring throughout its range in the eastern Pacific Ocean.

In 2005, the California Fish and Game Commission (Commission) undertook 16 rule-making actions that address marine and anadromous species. The Commission also adopted the Abalone Recovery and Management Plan, which provides a cohesive framework for the recovery of depleted abalone populations in southern California, and for the management of the northern California fishery and future fisheries. All of California's abalone species are included in this plan. In addition,

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

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

the Commission instituted a deep-water Tanner Crab fishery and created transferable lobster operator permits.

Coastal Pelagic Finfish

Pacific sardine (*Sardinops sagax*), Pacific mackerel (*Scomber japonicus*), jack mackerel (*Trachurus symmetricus*), and northern anchovy (*Engraulis mordax*) form a complex known as coastal pelagic species (CPS) finfish, all of which are jointly managed by the PFMC and NOAA Fisheries. In 2005, combined commercial landings of CPS finfish totaled 49,219 t (tab. 1), and the ex-vessel value exceeded \$4.8 million (U.S.). The Pacific sardine fishery is the most valuable fishery among these four species, contributing 70% of the total tonnage and 65% of the total ex-vessel value.

Pacific Sardine. The Pacific sardine fishery extends from British Columbia, Canada, southward into Baja California, México (BCM). Although historically the bulk of the catch has been landed in southern California and Ensenada, BCM, landings in the Pacific Northwest have been increasing. In 2005, Oregon landings surpassed those of California for the first time since the sardine fishery expanded.

The Pacific sardine harvest guideline (HG) for each calendar year is determined from the previous year's stock biomass estimate (the number of age 1+ fish on 1 July) in U.S. and Mexican waters. The 1 July 2004

stock biomass estimate for Pacific sardine was 1.2 million t and the recommended U.S. HG for the 2004 season was 136,179 t. The southern sub-area (south of 39°N latitude to the U.S.-México Border) received two-thirds of the HG (90,786 t) and the northern sub-area (north of 39°N latitude to the U.S.-Canada Border) received one-third (45,393 t). On 1 September, 80% (68,106 t) of the uncaught HG was reallocated to the southern sub-area, and 20% (17,026 t) was reallocated to the northern sub-area. On 1 December, the total remaining HG (54,200 t) was opened coast-wide, and by 31 December 2005, 63% (86,430 t) of the HG had been caught coast-wide.

After considering a number of alternatives for a different allocation scheme for the U.S. West Coast, the PFMC decided on a seasonal coast-wide framework in June 2005, effective for the 2006 season. On 1 January, 35 % of the total U.S. HG will be allocated coast-wide. On 1 July, 40% of the HG, plus the uncaught remainder of the previous allocation, will be allocated coast-wide. Then, on 15 September, the remaining 25% of the HG, plus any unharvested remainder, will be allocated coast-wide. U.S. tribes have also shown interest in a portion of the sardine HG. Once a tribal allocation is decided, it will be applied to the coast-wide HG first; the non-tribal allocation will apply to the remainder, after the tribal allocation is accommodated.

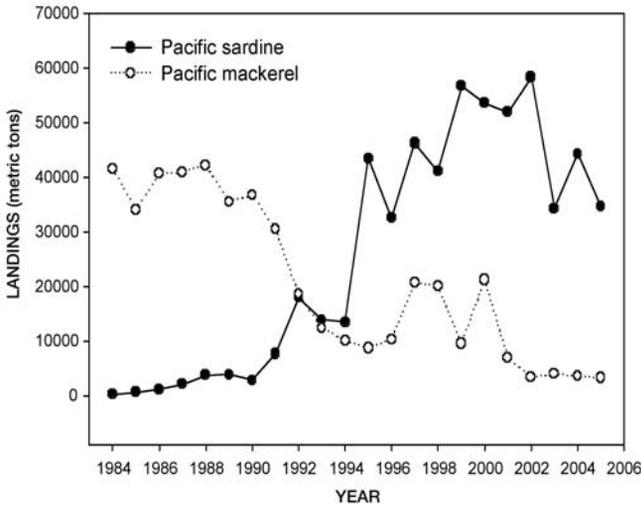


Figure 2. California commercial landings of Pacific sardine (*Sardinops sagax*) and Pacific mackerel (*Scomber japonicus*), 1984–2005.

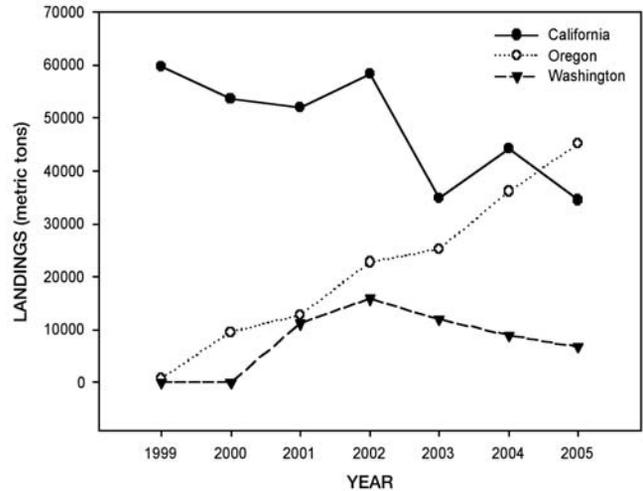


Figure 3. Commercial landings of Pacific sardine (*Sardinops sagax*) in California, Oregon, and Washington, 1999–2005 (PacFIN data).

Because of uncertainties inherent in the fishery and sardine population, the new framework will be reevaluated in 2008.

During 2005, 34,599 t of Pacific sardine, valued at more than \$3.2 million, was landed in California. This represents a 21.9% decrease in commercial sardine landings from 2004 (44,293 t). In California, commercial sardine landings averaged 45,176 t over the ten-year period from 1995–2005 (fig. 2). As in previous years, most (93.4%) of California’s 2005 catch was landed in the Los Angeles (69.9%; 24,173.7 t) and Monterey (23.5%; 8,117.9 t) port areas (tab. 2).

During 2005, a total of 31,800.5 t of sardine product was exported from California to 33 countries. Most of this product was exported to Australia (16,625.6 t), Japan (7,154.8 t), China (3,222.1 t), and South Korea (2,192.3 t), which represents more than 91% of the total export value of nearly \$15.9 million.

Oregon’s sardine landings have increased steadily over the past few years (fig. 3) and, for the first time, exceeded California’s landings in 2005. A total of 45,110 t of sardines with an ex-vessel value of nearly \$6.2 million was landed in Oregon during 2005. This represents a 30% increase over 2003 (25,258 t). In contrast, Washington’s 2004 sardine landings decreased by 25% to 8,934 t in 2004, compared to 11,920 t in 2003 (fig. 3).

Pacific Mackerel. Although Pacific mackerel is occasionally landed in Oregon and Washington, the majority of landings are made in southern California and Ensenada, BCM. The U.S. fishing season for Pacific mackerel runs from 1 July to 30 June. At the beginning of the 2005–06 season (1 July 2005), the biomass was estimated to be 81,383 t and the HG was set at 17,419 t. Because mackerel are often landed incidentally to other CPS, the HG was divided into a directed fish-

TABLE 2
 Landings of Pacific sardine (*Sardinops sagax*) and Pacific mackerel (*Scomber japonicus*) at California Port Areas

Area	Pacific Sardine		Pacific Mackerel	
	Landings t	% Total t	Landings t	% Total t
Eureka	0.0	0.0	0.0	0.00
San Francisco	308.9	0.9	0.0	0.00
Monterey	8,117.9	23.5	0.4	0.01
Santa Barbara	1,976.9	5.7	97.0	2.99
Los Angeles	24,173.7	69.9	3,144.9	96.97
San Diego	21.5	0.1	1.0	0.03
Total	34,598.9	100.0	3,243.3	100.0

ery (13,419 t) with the remaining HG (4,000 t) set aside for incidental catch (limited to 40% of a mixed load).

California landings of Pacific mackerel have been declining since the early 1990s (fig. 2). Over the last ten years, annual landings have averaged 10,136 t; however, since 2002, they have not exceeded 4,000 t. In 2005, 3,243 t of Pacific mackerel were landed in California with an ex-vessel value of \$535,259. Ninety-seven percent (3,145 t) was landed in the Los Angeles port areas (tab. 2).

California exported 1,311 t of mackerel product to thirteen countries worldwide. Most (56%) of this product was exported to Australia and Indonesia. Mackerel exporters generated \$0.8 million in export revenue in 2005. Since 1999, an average of 211 t of Pacific mackerel has been landed in Oregon, and 318 t was landed during 2005. In Washington, annual landings of mackerel (unspecified species) have averaged 144 t since the year 2001; however, only 24 t were landed in 2005.

Jack Mackerel. Landings of jack mackerel in California dropped in 2005 (278 t) from the previous year (1,027 t); this is only about 100 tons more than the

most recent low of 141 t in 2003. Ex-vessel revenues in 2005 totaled \$50,833, a 79% decrease from 2004. In Oregon, landings of jack mackerel totaled 69.8 t with an ex-vessel value of \$19,489. This represents a 41% decrease in landings from 2004 and a 93% increase from 2003. There were no reported landings of jack mackerel in Washington during 2005.

Northern Anchovy. Over the past decade, landings of northern anchovy in California have varied widely. Anchovy landings increased again in 2005, when they totaled 11,178 t, up 39% over the previous year (6,793 t). Ex-vessel revenues for northern anchovy totaled \$1.1 million, making this species the second most valuable CPS finfish in 2005, behind Pacific sardine. In terms of total ex-vessel revenues realized by the four CPS finfish, Pacific sardine represented 65.4%, northern anchovy 22.4%, Pacific mackerel 11.1%, and jack mackerel 1.1%.

California exported 160 t of anchovy product, valued at \$534,231, to four countries in 2005, an increase of three times the weight and nearly two times the value of 2004. Sixty-eight percent of California's anchovy export product was shipped to Australia (108 t; \$355,656). In 2005, no northern anchovy was landed in Washington. Oregon, however, landed 68.4 t valued at \$1,576.

Krill. Krill are composed of several species of euphausiids, small shrimp-like crustaceans that serve as the basis of the food web for many commercially fished species, as well as marine mammals and birds. Krill fisheries exist in other parts of the world, where they are primarily used for bait and as feed for pets, cultured fish, and livestock. Following a request from the National Marine Sanctuaries to prohibit krill fishing in the exclusive economic zone (EEZ) around the three marine sanctuaries off central California, the PFMC initiated an amendment to the CPS FMP to include krill as a management unit. State laws already prohibit the landing of krill in all Washington, Oregon, and California ports. After evaluating alternatives presented in an environmental assessment, the PFMC adopted a wider ban on all commercial fishing for krill in federal U.S. waters, and also designated essential fish habitat (EFH) for krill in order to more easily work with other federal agencies to protect krill.

California Market Squid

In 2005, the market squid (*Loligo opalescens*) was the state's largest fishery, both in quantity and ex-vessel value. Total landings in the squid fishery were 20% greater than in 2004, increasing from 46,323 t to 55,606 t (fig. 4). The ex-vessel price ranged from \$330-\$992/t, with an average of \$569/t (an increase over the average of \$450/t in 2004). The 2005 ex-vessel value was approximately \$31.6 million, a 59% increase from 2004 (\$19.9 million). Market squid is used domestically for food and bait and

remains an important international commodity. Approximately 43,131 t of market squid were exported for a value of \$54.6 million in 2005. Asian countries were the main export market with about 73% of the trade going to China and Japan.

The fishery uses either seine or brail gear that is usually combined with attracting lights to capture shallow-spawning squid populations in areas over sandy substrate. Spawning may occur year-round; however, the fishery is most active from April to September in central California, and from October to March in southern California. The fishing permit season for market squid extends from 1 April through 31 March of the following year. During the 2005-06 season (as opposed to the 2005 calendar year), 70,972 t were landed, a 54% increase from the 2004-05 season (46,211 t). There was a 69% decline in catch from the northern fishery near Monterey in the 2005-06 season with only 2,046 t landed (fig. 5). As in previous seasons, total catch was greater in southern California, with 68,925 t landed (97% of the catch) during the 2005-06 season (fig. 5). In 2005-06, squid fishing centered mainly around Catalina Island—whereas in the 2004-05 season, fishing activity took place primarily in areas around the northern Channel Islands near Santa Rosa and Santa Cruz Islands and along the Port Hueneme coast.

To protect and manage the squid resource, a market squid fishery management plan (MSFMP) was adopted by the Commission in 2004. Goals of the MSFMP were developed to ensure sustainable long-term conservation and to provide a management framework that is responsive to environmental and socioeconomic changes. The 2005-06 fishing season marked the inaugural year that a restricted access program was implemented under the MSFMP. A total of 170 restricted access permits were issued: 77 transferable vessel permits, 14 non-transferable vessel permits, 14 transferable brail permits, 64 light boat permits, and 1 experimental non-transferable vessel permit.

Because market squid live, on average, six to nine months, reproduce at the end of their lifespan, and are harvested on spawning grounds, it is critical that the management of the fishery allows for an adequate number of eggs to be spawned prior to harvest. Biological sampling, carried out by CDFG, is designed to monitor the proportion of the population allowed to spawn before being captured by the fishery. The "egg escapement method," which estimates the level of reproductive output from fished stocks and is used as a proxy for maximum sustainable yield, is described in the 2002 Federal CPS FMP. By spring 2007, the PFMC Coastal Pelagic Species Management Team will review the egg escapement method and its management implications.



Figure 4. California commercial market squid (*Loligo opalescens*) Landings, 1982–2005.

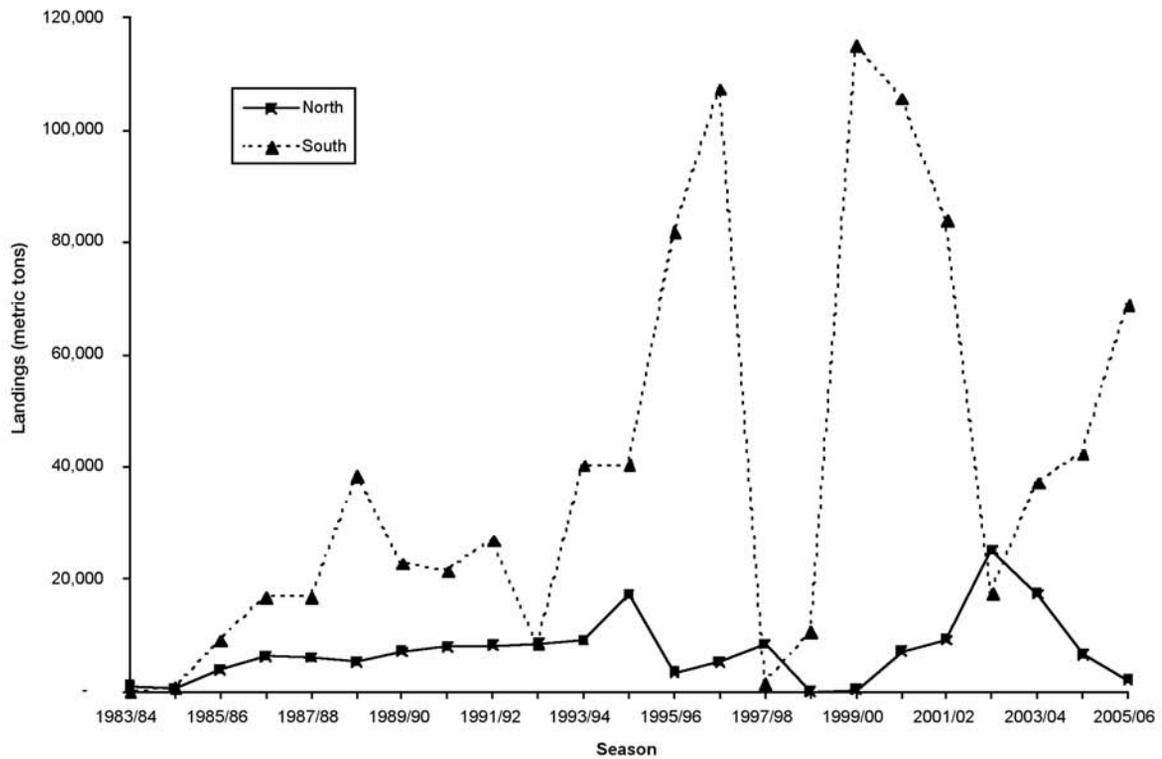


Figure 5. Comparison of market squid (*Loligo opalescens*) landings for northern and southern fisheries by fishing season (1 April–31 March), from the 1982–83 season to 2005–06 season.

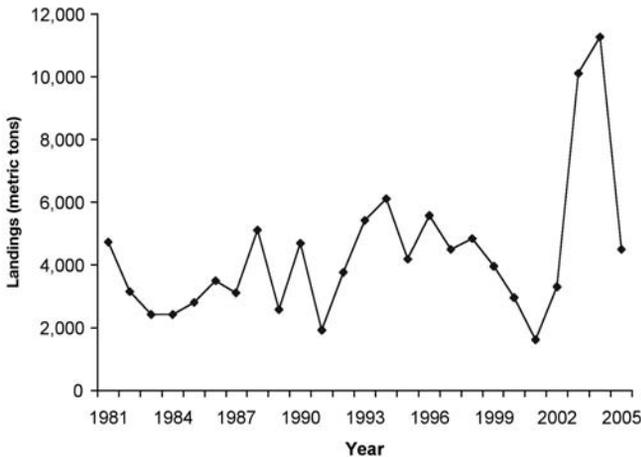


Figure 6. California commercial Dungeness crab (*Cancer magister*) landings, 1981–2005.

Dungeness Crab

Landings of Dungeness crab (*Cancer magister*) in 2005 were estimated at 4,501 t, a 60% decrease from the 11,281 t landed in 2004, which were the highest landings in 25 years (fig. 6). This ends the trend of increased landings since 2001, which had the lowest landings in 25 years. Ex-vessel revenues for 2005 were \$16.6 million, a 59% decrease in value from 2004 (\$40.5 million). The average price per kilogram increased 2% from \$3.59 in 2004 to \$3.68 in 2005.

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 legislation mandates that at least 25% of the meat is picked out and is monitored by the Pacific States Marine Fisheries Commission. 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 conducted, and if the pick-out is still below 25%, the season opening is delayed 15 days. This procedure can continue until 1 January, when no more tests can be made and the season must be opened on 15 January. Tests conducted on 1 November and 17 November yielded an average recovery of less than 25%, which resulted in a postponement of the opening in Del Norte, Humboldt, and Mendocino counties until December 16. Subsequent tests conducted on 7 December yielded similar results, which led to a second 15-day postponement through 31 December 2005. In accordance with a tri-state management compact, Oregon and Washington delayed their season openings, so that the entire West Coast fishery north of Point Arena opened at the same time. The significant decrease in landings in 2005 from 2004 is directly attributable to this 30-day delay in the season opening in these three

counties, which contributed 75% of the annual statewide catch in 2004.

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 159 mm (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 crabs from harvest for one or two seasons, and the timing of the season is designed to provide some measure of protection to crabs when molting is most prevalent. California implemented regulations prohibiting the sale of female Dungeness crabs in 1897. Minimum size regulations were first implemented by California in 1903 and have remained substantially unchanged since 1911. The commercial season runs from 1 December to 15 July from the Oregon border to the southern border of Mendocino County (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 reasonably successful over time.

Summarizing 2004–05 commercial season landings (as opposed to the 2005 calendar year) results in higher landings, since 75% of the landings occurred in November and December of 2004. Landings for the 2004–05 season totaled 10,838 t, a 12% increase from the 2003–04 season and the highest since the 1976–77 season. Landings in the northern area in the 2004–05 season increased 10% over the 2003–04 season and were 230% higher than the 2,442 t long-term 90-year average for this area. Central area landings increased by 18% and were 170% higher than the 993 t long-term 90-year average. The average statewide price for the 2004–05 season was \$3.44/kg, a decrease of \$0.24/kg from the 2003–04 season.

The 2004–05 Dungeness crab season catch was valued at \$36.9 million, a 5% increase in value over the 2003–04 season (\$35.3 million). A total of 423 vessels made landings during the 2004–05 season, up slightly from the 2003–04 season total of 412 boats and from the 30-year low of 385 vessels in 2001–02 season.

Limited entry was established by the legislature in 1995, with most permits transferable. There were 526 resident permits and 75 non-resident permits renewed in 2005. Recent fishery issues have centered on the increasing amount of effort in terms of gear or traps, deployed in both central and northern California. Central California fishermen have in the past two years unsuccessfully tried to legislate a limit on the number of traps allowed in their area. Northern crabbers, particularly those who fish central California during the two weeks prior to the northern opener, have generally opposed this measure.

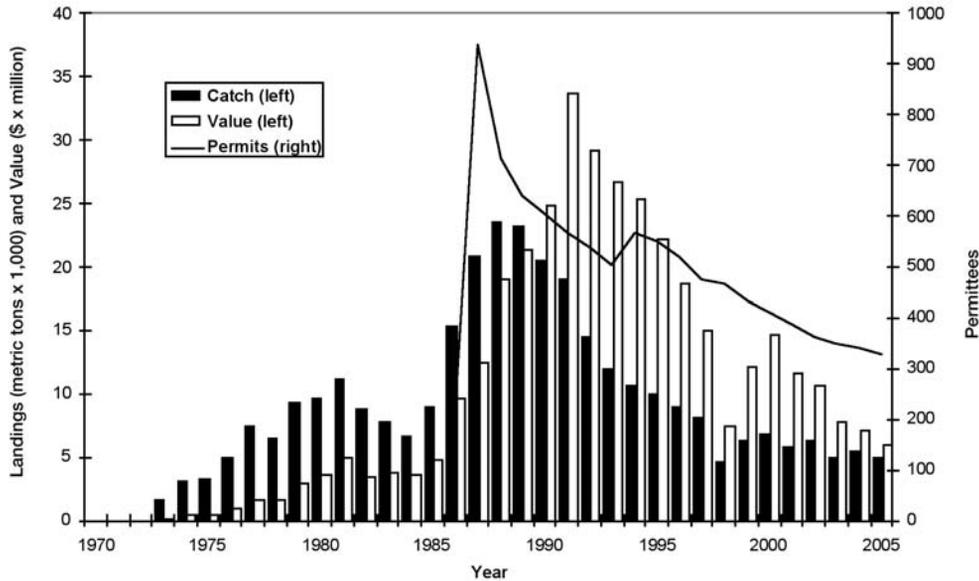


Figure 7. California commercial red sea urchin (*Strongylocentrotus franciscanus*) fishery catch, value and number of permits, 1971–2005.

The Tri-State Committee is also pursuing the extension of each state’s limited entry program out to 200 miles under authority provided by the Magnuson Act. Washington and Oregon have already adopted a reciprocal agreement. California fishermen were polled last summer and are generally in favor of the concept. California would need to act legislatively to enact a “limited entry 200” statute as part of any reciprocal arrangement with Oregon.

Sea Urchin

Statewide landings of red sea urchin (*Strongylocentrotus franciscanus*) in 2005 were estimated at 5,080 t, with an ex-vessel value of \$6.08 million (fig. 7). The catch represents a decrease of 8.5% from the previous year, with both the northern and southern California regions registering declines. Effort in the southern fishery has remained steady since 2000 at around 10,000 landings (market receipts) annually, while northern California effort is only about 23% of what it was in 2000. Bodega Bay landed nearly 450 t in 2002, but gradually declined to only one landing in 2005, largely due to the lack of a buyer. Point Arena catch and effort fell by about 40% from its 2004 level.

In southern California the 2005 catch decreased by 8.7% to 4,510 t from 2004, well below the long-term 1975–2004 average catch of 7,530 t. Santa Barbara landings decreased slightly from 2004 to 2,624 t in 2005; making it the number one port in the state with just over half of the state’s landings. The northern Channel Islands produced 3,360 t of sea urchin, similar to the previous year, while the southern Channel Islands declined by about 140 t from the previous year. Production

throughout southern California remained steady or declined, except for San Nicolas Island which increased by about 60% to just over 140 t.

Northern California catch information from logbooks was weighted by landings data and distributed into segments of 10 minutes of latitude along the coast. The 10 minutes of latitude around the Point Arena area and the area near Mendocino and Albion were the only two sea urchin fishery zones to yield over 50 t in 2005. In 2001, the Mendocino–Albion zone yielded over 770 t.

The red sea urchin fishery yielded \$6.084 million in ex-vessel value in 2005, for an average of \$1.20/kg of landed urchin. This was well below the highest average on record of \$2.36/kg in 1994. When adjusted for inflation using the latest consumer price index figures, fishermen received only an average of \$0.62/kg in 2005. About 35% of the northern California catch was priced below \$0.44/kg, and over 30% of the southern catch was between \$0.66 and \$0.88. It should be noted that some buyers in southern California began writing a minimum price of about \$0.66/kg on the market receipt at the time of unloading, starting in 2003. This was not necessarily the ultimate price and the effect is that price and value data are likely an underestimate of the actual price paid to fishermen for red sea urchins in southern California during this time period. CDFG is working with the industry to rectify this problem.

Exports of fresh urchin roe from all of the sea urchin producing states in the U.S. were down 21% to 4,190 t worth \$34.9 million. Overall value of exports of live fresh urchins and fresh roe combined was down by over \$12 million from 2004. California exports fresh roe exclusively.

Sea urchin permit renewals totaled 331 in 2005, dropping from 340 in 2004 and continuing a slow, steady decline toward the “capacity goal” of 300 set by regulation in the early 1990s. The industry is currently considering whether to ask the Commission to eliminate or reduce the present goal of 300 permits. This is, in part, because only 46 of 229 active divers took 50% of the catch in 2005, and the fishery is generally recognized to have a high level of latent effort. In the event of an improvement in worldwide urchin markets, this latent capacity could reactivate and drive catches considerably higher under the present management scheme. The capacity goal issue has increased in urgency due to the aging of the sea urchin diver population with the average diver age approaching 50 years. The issue of permit transferability is being debated more actively as older divers look to retirement and hope to sell their permits or pass them on to younger family members.

The Sea Urchin Fishery Advisory Committee (SUFAC) voted in 2005 to continue funding of Dr. Stephen Schroeter’s long-term studies of sea urchin larval recruitment that began in 1990. The SUFAC also continued developing its “barefoot ecologist” program; a collaborative effort between industry divers, scientists, and the CDFG whereby urchin divers collect size–frequency and density data on red sea urchin populations. In 2005, CDFG and sea urchin divers worked at a Point Loma kelp bed to calibrate the barefoot ecologist survey methods with the CDFG’s invertebrate transect survey methodology.

Abalone

2005 marks the eighth year of the abalone fishery moratorium for central and southern California. The legislation that created the moratorium mandated the development of the Abalone Recovery and Management Plan (ARMP), which provides a cohesive framework for recovery activities of all abalone species, and management of the northern California recreational red abalone fishery. After a long and comprehensive public review process, the ARMP was adopted by the Commission in December 2005.

The northern California recreational red abalone (*Haliotis sorenseni*) fishery continues under the guidelines of the ARMP. The fishery is currently managed using an adjustable fishery-wide Total Allowable Catch (TAC) of legal-sized abalone and small-scale closures of sites that show evidence of depletion. Adjustment of the TAC is accomplished through changes in regulations that include a minimum size limit, daily and seasonal limits, seasonal closures, and gear restrictions (no SCUBA or surface-supplied air). Changes in the TAC and triggers for site closure are guided by three management criteria: recruitment density, sustainable fishery density, and

catch per unit of effort (CPUE). The data for monitoring these management criteria come from fishery-independent transect surveys, fishery-dependent abalone report cards, and telephone and creel surveys.

Fishery-independent transect surveys at eight index sites provide the criteria for evaluating the TAC. Four of the index sites, Van Damme, Arena Cove, Caspar Cove, and Salt Point State Marine Conservation Area have been surveyed since 2003. Data from these surveys were used as the baseline for the initial evaluation of the status of abalone populations in reference to ARMP management guidelines. Abalone populations at these four sites remain at relatively high densities (abalone/hectare) and were higher than the same sites in 1999 and 2000, but fall short of the minimum density levels needed to increase the TAC (tab. 3).

Fishery-dependent data from abalone cards and telephone surveys are used to estimate the total catch for the year, and creel data are used to detect signs of depleted abalone populations. Creel surveys are scheduled in alternate years. Since the annual recreational limits were reduced in 2002, data are insufficient to determine recent trends in the fishery.

Total abalone catch (number of abalone harvested) was estimated from Abalone Permit Report Cards and from telephone surveys from 2002 through 2004 (fig. 8). Estimates for 2005 are not yet available, although recent catch estimates appear to be more accurate than past estimates. The adjusted total-catch estimates were calculated by taking the catch from returned cards and adding an estimate for the proportion of people who did not return cards based on telephone survey results. Catch estimates from 1998 through 2001 were higher due to a larger bag and annual limit (4 abalone per day and 100 abalone per year). The catch declined in 2002 due to new regulations that reduced the bag limit to 3 abalone per day and the annual limit to 24. The reduced limits reduced catch by over 40%.

Abalone report cards are purchased every year by recreational abalone fishermen and must be returned by 31 December. Card sales have ranged from 30,000 to 41,000 cards sold annually since they’ve been required (fig. 8). After changes in regulations and increases in the cost of the card, card sales have stabilized at just above 35,000 per year in recent years (2002–05).

All abalone species, excluding red abalone at San Miguel Island, continue to exhibit very low population levels although some initial evidence of recovery has been observed. Pink, green, and black abalones are listed as species of concern by NOAA Fisheries. White abalone was listed as an endangered species under the Federal Endangered Species Act in 2001. White abalone recovery is now under the jurisdiction of NOAA Fisheries, and a White Abalone Recovery Team (WART) has been

TABLE 3
 Comparison of Fishery Independent Dive Survey Results and Abalone Recovery
 and Management Plan Critical Density Values

Site/Year	Deep Transects (>8.4 m)		All Depths		Recruitment Density
	Number of Transects	Density (#/hectare)	Number of Transects	Density (#/hectare)	0-177 mm abalone/hectare
Van Damme 2003	17	5,100	33	10,700	4,000
Arena Cove 2003	20	3,700	38	5,700	1,800
Salt Point 2005	16	2,800	36	8,900	2,700
Caspar Cove 2005	12	4,600	29	7,500	3,900
Average		4,000		7,900	3,100
Critical Values for 25% TAC increase		4,100		8,300	4,500

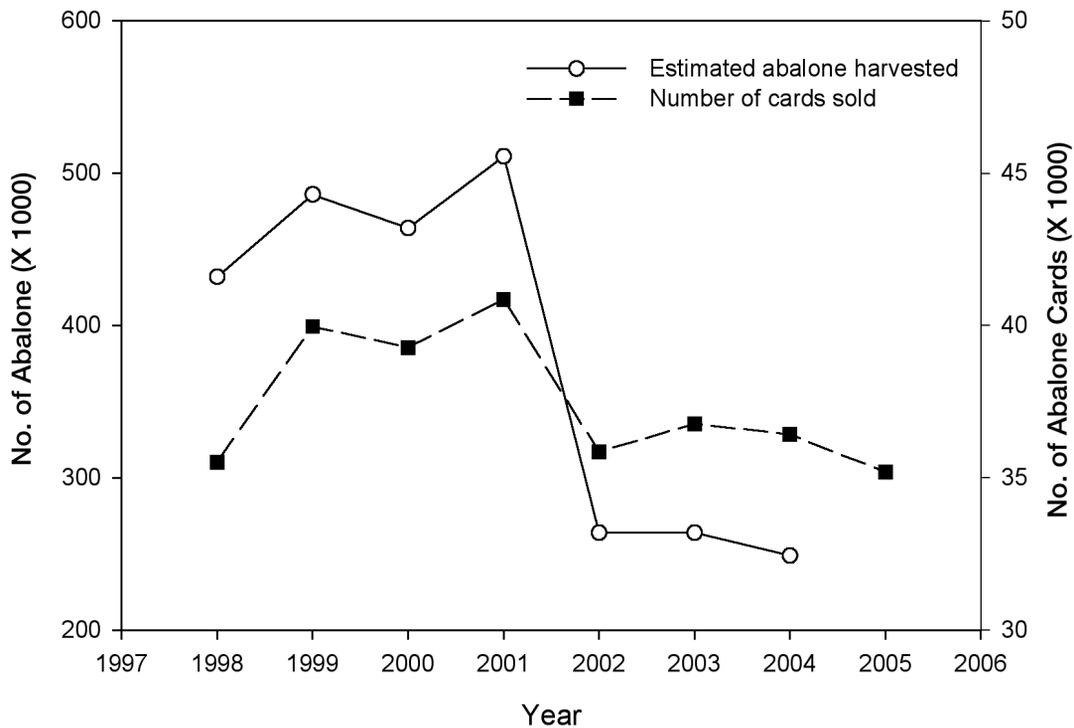


Figure 8. Estimated annual catch of red abalone (*Haliotis sorenseni*) for the northern California recreational abalone fishery and the annual number of abalone report cards sold.

formed. The WART is finishing the draft recovery plan for the white abalone. A white abalone captive rearing program is in its sixth year of operation and has five different families of offspring. The purpose of the program is to propagate white abalone and grow them to a large adult size for out planting to enhance recovery.

Pink, green, and black abalones remain at very low population levels throughout southern California. However, surveys of Santa Catalina Island and the Point Loma kelp bed off of San Diego have shown some evidence of reproduction and recruitment of pink and green abalones. Black abalone populations at all the islands still remain very low. Black abalone recruitment events have been documented at San Nicolas Island in 2003, 2004, and 2005.

Red abalone populations at San Miguel Island appear to be relatively high while surrounding areas are at low levels. The Commission, in adopting the ARMP, adopted an alternative which provides the Commission the opportunity to evaluate the possibility of abalone fisheries in specific areas that have only partially recovered. This consideration ability is first being applied to red abalone at San Miguel Island. The Department is currently engaged in a fishery assessment process for the island. The development process includes an initial stock assessment of the island, development of a TAC, a catch allocation, and other issues related to consideration of reopening the fishery. The Commission expects to complete the entire process by 2008, when a decision about whether a fishery should be reestablished will be made.

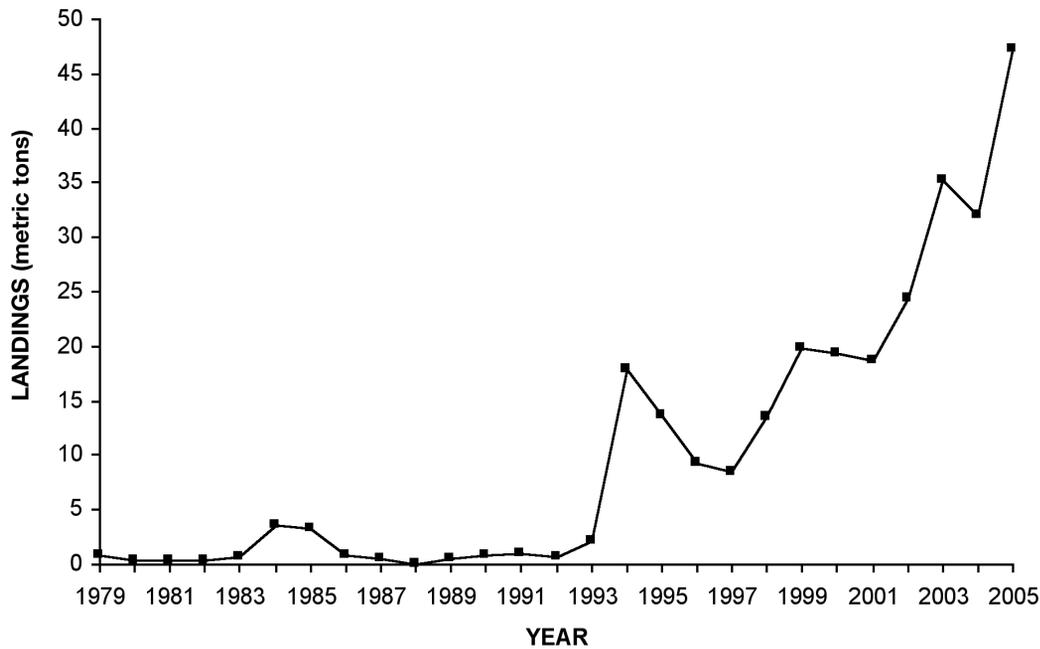


Figure 9. California commercial landings of Kellet's whelk (*Kelletia kelletii*) from 1979–2005.

Kellet's Whelk

Commercial Kellet's whelk (*Kelletia kelletii*) landings for 2005 were 47 t, the highest yearly landings ever recorded for this species in California. Landings were 33% above the 2004 total of 32 t and continued a generally upward trend which started in 1993 (fig. 9). The majority of landings occurred at Los Angeles and Orange County ports (66%); followed by San Diego County ports (25%); then Santa Barbara and Ventura County ports (9%). Only 4 t of Kellet's whelks were landed in Santa Barbara and Ventura Counties in 2005, down 61% from the 11 t landed in 2004. Conversely, San Diego County landings increased from 0.1 t in 2004 to 12 t in 2005.

The ex-vessel value of the Kellet's whelk fishery in 2005 was approximately \$68,000, a 40% increase from 2004. The ex-vessel price in 2005 ranged from \$1.10 to \$4.41/kg, with an average of \$1.43/kg. The price for this species has remained relatively stable over the last 20 years, ranging from \$0.55 to \$1.96/kg, and averaging \$1.01/kg.

Kellet's whelks often enter lobster and crab traps to prey on trapped crustaceans. In 2005, fishermen landed close to 88% of all Kellet's whelks using commercial lobster or rock crab trap gear, with the remaining pounds landed by commercial divers (9%) and fishermen using finfish traps (3%). Sixty-four commercial fishermen landed Kellet's whelk in 2005. Two of these fishers landed close to 50% of the total catch for the year. Captured whelks are landed live for domestic seafood markets. There are few restrictions on the take of Kellet's whelk. Fishermen

using traps to take *Kelletia* commercially are required to have a commercial license and a trap permit; Dungeness crab and spiny lobster permit holders are excepted. Divers taking Kellet's whelk for commercial purposes must have a commercial license and take only animals found 1,000 feet beyond the low tide mark.

Kellet's whelk is one of the largest gastropods found in California waters with a total length close to 175 mm. They range from Isla Asunción, BCM, to Monterey Bay, California (a recent range extension north from Point Conception). Preliminary growth rate studies on *Kelletia* suggest that it is a slow-growing species growing 7 to 10 mm per year.

Groundfish

Commercial Fishery Landings. California's commercial groundfish harvest for 2005 was 10,347 t (tab. 4), a 16% decrease from 2004 (12,225 t), and a 64% decrease compared to 1995 (28,656 t). The ex-vessel value for all groundfish in 2005 was approximately \$13.76 million, which is similar to revenues in 2004 (\$13.82 million).

In 2005, 85% of the groundfish landed was taken by bottom and mid-water trawl gear, a decrease from the nearly 89% observed in 2004. Line gear accounted for the second largest amount (11% as compared to the 8% observed in 2004). Trap gear accounted for about 3.4% of the total 2005 groundfish landings, while the gill and trammel net component remained under 1%.

As in 2004, the state's 2005 groundfish harvest was dominated by Pacific whiting (*Merluccius productus*)

TABLE 4
 California 2005 Commercial Groundfish Landings (metric tons)

	2005	2004	% change since 2004	1995	% change since 1995
Flatfishes	3,814	3,914	-3%	8,765	-56%
Dover Sole	2,216	2,421	-8%	6,086	-64%
English sole	244	307	-21%	499	-51%
Petrale Sole	771	490	57%	592	30%
Rex Sole	213	210	1%	688	-69%
Sanddabs	236	358	-34%	677	-65%
Other flatfishes	134	128	5%	223	-40%
Rockfishes	1,439	1,761	-18%	11,624	-88%
Thornyheads	862	900	-4%	3,641	-76%
Widow	6	9	-33%	1,697	-100%
Chilipepper	66	63	5%	1,279	-95%
Bocaccio	7	9	-22%	762	-99%
Canary	2	1	100%	155	-99%
Darkblotched	16	34	-53%	367	-96%
Splitnose	122	187	-35%	295	-59%
Other rockfishes	358	558	-36%	3,428	-90%
Roundfishes	4,959	6,405	-23%	8,001	-38%
Lingcod	63	63	0%	538	-88%
Sablefish	1,625	1,410	15%	2,806	-42%
Pacific whiting	3,105	4,742	-34%	4,091	-24%
Grenadier	133	139	-4%	477	-72%
Cabezon	31	50	-38%	88	-65%
Other roundfishes	2	1	100%	1	100%
Other groundfishes	135	175	-23%	266	-49%
Total	10,347	12,225	-16%	28,656	-64%

(3,105 t), Dover sole (*Microstomus pacificus*) (2,216 t), sablefish (*Anoplopoma fimbria*) (1,625 t), and rockfishes (*Sebastes* spp.) (1,439 t) (tab. 4). Dover sole, thornyheads (*Sebastolobus alascanus* and *S. altivelis*), and sablefish (the “DTS” complex) landings, in combination, decreased about 1% from those reported in 2004, with Dover sole and thornyheads decreasing by 3% and 4%, respectively, and sablefish landings increasing by 15%. Most of the groundfish landings decreased in 2005 compared to 2004, with the majority of the reductions greater than 40%. As groups, flatfishes decreased by 3%, rockfishes decreased by 18%, roundfishes decreased by 23%, and all other groundfish species decreased by 23%. Only a few species experienced increased landings of any significance. Of those species with over 10 t in total landings, petrale sole (*Eopsetta jordani*) reported the largest increase (57%) with sablefish next at 15%.

Recreational Fishery Catches. Estimates from the relatively new California Recreational Fisheries Survey (CRFS) indicated that in 2005 California anglers, regardless of trip type, spent an estimated 2.4 million angler-days fishing and caught about 1,400 t of groundfish (tab. 5). About 221,000 angler-days were spent targeting rockfish and lingcod. This resulted in a take of 938 t groundfish or about 66% of the total groundfish from all trips. Another 239 t of groundfish were taken during “other” trips (those trips that did not fall into any of the other trip type categories), and included trips that targeted California scorpionfish (*Scorpaena guttata*)

and Pacific sanddab (*Citharichthys sordidus*). As in 2004, much of the remaining groundfish was taken by anglers targeting coastal migratory species—yellowtail (*Seriola lalandi*), barracuda (*Sphyraena argentea*), white seabass (*Atractoscion nobilis*), and Pacific bonito (*Sarda chiliensis*); basses—kelp bass (*Paralabrax clathratus*) and barred sand bass (*P. nebulifer*); bay species—sturgeon (*Acipenser* spp.) and striped bass (*Morone saxatilis*); California halibut (*Paralichthys californicus*); and salmon (*Oncorhynchus* spp.). In particular, a small amount of Pacific whiting was taken during trips targeting rockfish and lingcod, while the landings of leopard shark (*Triakis semifasciata*) and starry flounder (*Platichthys stellatus*) were reported from trips targeting bay species and California halibut. In addition, leopard sharks were taken during trips that targeted highly migratory and coastal migratory species. In contrast to 2004, the 2005 groundfish landings from trips taken by anglers that were fishing for any available finfish species dropped to 50 t of groundfish, or about 4% of the total from all trips.

2005 Groundfish Fishery Management Highlights. The Pacific whiting 2005 Optimum Yield (OY) was estimated to be 364,197 t for the entire West Coast (United States and Canada). Based upon information from the assessment model and from the international catch sharing agreement with Canada, the PFMC adopted in March 2005 an Acceptable Biological Catch (ABC) and OY of 269,545 t and 269,069 t, respectively, for the U.S. portion of the stock. The 2005 fishery continued to in-

TABLE 5
 Statewide California Estimates for Examined and Discarded Dead Catch by Weight (metric tons)
 of Groundfish for Specified Trip Type Categories, and Groundfish Groups and Estimates of
 Recreational Effort (angler-days) by Trip Type Category

Trip Type Groundfish Group	Rockfish			Highly Migratory Coastal		Bay		All Trip Types
	Lingcod	Other ¹	no target	Bass ²	Salmon	Halibut ³	Misc. ⁴	
Leopard Shark/Spiny Dogfish	1.3	0.5	4.6	6.3	0.5	40.9	1.3	55.5
Minor Nearshore Rockfish ⁵	398.1	115.9	10.6	14.0	31.2	7.2	0.3	577.3
Rockfish Species of Concern ⁶	25.0	5.1	4.6	5.2	0.6	0.8	0.0	41.2
Other Shelf/Slope Rockfish	228.5	31.0	18.0	18.4	6.5	4.1	0.0	306.4
Lingcod	256.4	51.7	7.1	8.2	23.9	4.9	0.3	352.5
Cabezon/Greenling	25.5	10.8	4.0	1.8	4.0	0.7	0.4	47.1
Pacific Sanddab, Soles, Thornyheads	2.6	24.1	1.3	0.6	0.3	0.6	0.1	29.6
Starry Flounder	0.6	0.2	0.1	0.0	0.1	4.4	0.1	5.4
Pacific Whiting, Sablefish	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
Total Groundfish Catch	938.0	239.2	50.4	54.5	67.0	63.5	2.5	1,415.1
Total Angler-Days	221,040	133,756	725,957	492,261	180,673	387,605	304,468	2,445,760

¹Other trip types include any target species not covered under the specified groups and include targeted California scorpionfish and Pacific sanddab trips.

²The Highly Migratory Coastal Bass trip type category includes the tuna/sharks/billfish, yellowtail, white seabass, and bass/barracuda/Bonito trip types.

³The Bay Species, Halibut trip type category includes the sturgeon, striped bass, and halibut trip types.

⁴The Miscellaneous trip type category includes the croakers, perches, corbina, and smelt trip types.

⁵The Minor Nearshore rockfish group includes black rockfish.

⁶The Rockfish Species of Concern group includes the following rockfishes: bocaccio, canary, cowcod, widow, and yelloweye.

clude a coast-wide (Washington, Oregon, and California) shoreside component operated under an Experimental Fishing Permit.

In September 2005, the PFMC approved stock assessments for 18 species, including four initial stock assessments (gopher rockfish [*Sebastes carnatus*], California scorpionfish, starry flounder, and the Oregon portion of the kelp greenling [*Hexagrammos decagrammus*] stock). The PFMC also followed the recommendation of the Scientific and Statistical Committee (SSC) to not use the stock assessment results for vermilion rockfish (*S. miniatus*) and the California portion of the kelp greenling stock. In November, the PFMC approved the remaining stock assessments for lingcod, canary rockfish, and petrale sole, and adopted rebuilding analyses for seven rockfishes: bocaccio (*S. paucispinis*), canary, cowcod (*S. levis*), darkblotched, Pacific ocean perch, widow, and yelloweye (*S. ruberrimus*). These rebuilding analyses used a new program, as laid out in the new Terms of Reference document adopted by the PFMC in April 2005, and the new Rebuilding Plan Revision policy adopted by the PFMC in September 2005, to evaluate the rebuilding progress of overfished groundfish stocks.

The lingcod stock assessment, as in previous assessments of this species, modeled the northern (U.S.-Canada border to 43°N lat.) and southern (43°N lat. to U.S.-México border) portions of the stock separately. This latest assessment indicated that the entire stock as a whole was fully rebuilt. However, the estimated spawning biomass to unfished spawning biomass ration (SPR) was higher in the northern (U.S.-Canada border to 43°N lat.) portion of the stock (0.87) than in the southern (43°N lat. to U.S.-México border) portion (0.24).

In November 2005, the PFMC adopted Amendment 18, a description of groundfish bycatch, and provided guidance to NOAA Fisheries on a draft work plan for developing the conservation and management measures necessary to minimize bycatch and bycatch mortality. The PFMC also adopted Amendment 19, a description of Essential Fish Habitat, and provided NOAA Fisheries with guidance on draft language for the proposed regulations.

As a result of the Ninth Circuit Court decision on 24 August 2005 regarding darkblotched rockfish, the PFMC decided in November to pursue a review of all groundfish rebuilding plans for overfished species to evaluate whether each plan rebuilt the stock in as short a time as possible, taking into account the biology of the stock of fish and the needs of fishing communities. The PFMC also adopted a range of OYs for 2007 and 2008 groundfish fisheries that included catch levels of zero for all overfished rockfish species. This action ensured that a broad range of analyses were provided in the 2007–08 Management Specifications EIS should the new rebuilding plan evaluations determine that lower harvest levels than the *status quo* were required for rebuilding.

In-season Adjustments. In-season changes to the commercial and recreational management specifications were implemented throughout 2005 as in past years and are highlighted by the following:

Commercial Fishery

- The PFMC adopted the final management measures for the 2005–06 commercial groundfish fisheries in June and September 2004. New measures included the implementation of a new selective flatfish trawl

gear north of 40°N latitude under an experimental fishing permit. Vessels operating under this permit are allowed greater access to shelf fishing grounds that have been closed since 2002 to reduce bycatch of overfished shelf rockfish species, such as canary rockfish.

- The PFMC recommended an increase in trip limits for minor slope rockfish and splitnose rockfish as well as a 150 fm shoreward trawl Rockfish Conservation Area (RCA) boundary for the area between 40°10'N latitude and 38°N latitude because landings of these species from this area were well below projections. The PFMC also recommended a decrease in trawl trip limits for petrale sole, Dover sole, other flatfish, and arrowtooth flounder (*Atheresthes stomias*) to avoid early attainment of petrale and Dover sole OYs.
- Based on updated bycatch model results, the PFMC increased trip limits for thornyheads, sablefish, and slope rockfishes taken in specific areas by limited entry trawl gear. In addition, the PFMC increased trip limits for shelf and nearshore fishing (including black rockfish [*S. melanops*]) for the limited entry fixed gear and open access fisheries in certain areas because landed catch estimates were actually lower than predicted. The total annual catch limits for canary and yelloweye rockfish in the directed open access fishery were also changed.
- The PFMC increased the trawl RCA to 0–250 fm north of 36°N latitude and 50–250 fm south of 36°N latitude in response to concerns about petrale sole and canary rockfish landings which were tracking ahead of projections. The PFMC also decreased limited entry trawl trip limits for Dover sole, thornyhead, and sablefish while it increased the daily trip limit for limited entry fixed gear and open access sablefish fisheries north of 36°N latitude. In addition, the PFMC approved an action to allow fishers to exceed the commercial harvest guideline for lingcod.
- A review of petrale sole landings indicated that this species was now subject to overfishing. The Council recommended that instead of closing the fishery and starting a race for fish, the DTS fishery should continue to be prosecuted under the current management measures (which were already designed to slow the limited entry bottom trawl harvest) while prohibiting the retention of petrale sole, slope rockfish, and splitnose rockfish for the remainder of the year.

Recreational Fishery

- The PFMC adopted the final management measures for the 2005–06 California recreational groundfish fishery. These measures were developed using a catch projection model constructed by CDFG staff. The base catch estimates for this model were calculated using a 0.7 decay function applied to MRFSS esti-

mates from 1983–89 and 1993–2003. Employing this decay function allowed the use of catch information from all the years to generate the base catch estimates, but the greatest weight was given to the most recent years. Due to an unusually high estimate of effort for private and rental boats in July–August of 2003, estimates from 2003 (which contributed the most to the base catch estimates) were higher than average for some groundfish species. As a consequence, the recreational management structure adopted by the PFMC for 2005–06 was more constraining than the one for 2004.

- Additional recreational measures adopted for the 2005–06 management cycle included:
 - a change in the lingcod minimum size limit from 30 inches (76 cm) total length to 24 inches (61 cm) total length;
 - a change in the lingcod bag limit from one fish to two fish per bag; and
 - designation of canary rockfish, yelloweye rockfish, and lingcod recreational harvest guidelines for California.
- In a move to make federal regulations consistent with California state regulations, the PFMC adopted daily bag limit reductions for the California recreational fisheries for greenlings and cabezon (*Scorpaenichthys marmoratus*).
- In the spring of 2005, annual estimates of groundfish catch from the new CRFS program became available for 2004. These estimates indicated that the current recreational regulations could be relaxed while still keeping catches within harvest targets. After reviewing catch projections based upon the 2004 CRFS estimates, the PFMC adopted a liberalized management structure for California's 2005 and 2006 recreational groundfish fishery.

Highly Migratory Species

Albacore. Albacore tuna (*Thunnus alalunga*) is the most abundant tuna caught in both commercial and recreational fisheries in California. In 2005, 91% of the commercial-caught albacore came from hook-and-line gear (jig/bait/troll). A total of 480 t were commercially landed in California ports in 2005, a decrease of 35% compared to the 1,353 t that were landed in 2004. The ex-vessel value for albacore was \$1.1 million, a decrease of 55% from 2004 (\$2.4 million). The average price per pound increased from \$1.17/lb in 2004 to \$1.57/lb in 2005.

Currently in California, there is no bag or minimum size limit on sport-caught albacore. However, the PFMC and the Commission may consider a bag limit in the near future. Most of the recreational harvest of albacore landed in California comes from Mexican waters which

has a five-fish bag limit. For recreational anglers, the 2005 albacore season started off promising with large fish (20–30 lb) being caught by early spring, in waters just 50–100 miles south of San Diego. But the numbers of fish being caught plummeted and throughout the remainder of the season most anglers targeting albacore came back “empty-handed.” In 2005, only 97,362 albacore were reported taken by California’s Commercial Passenger Fishing Vessel (CPFV) fleet, a 53% decrease from the 182,711 reported in 2004.

Bigeye Tuna. In 2005, 100% of the commercial-caught bigeye tuna (*Thunnus obesus*) landed in California came from longline gear. In 2005, commercial landings of bigeye tuna totaled 9 t, down 57% from the 21 t landed in 2004. In 2005 the ex-vessel value for bigeye tuna also decreased from the average of \$2.82/lb in 2004 to \$2.10/lb.

Current CPFV logbook data indicate that only 38 bigeye tuna were caught recreationally in 2005 compared to 463 caught in 2004.

In 2005 the PFMC declared that overfishing of bigeye tuna is occurring throughout its range in the eastern Pacific Ocean. The PFMC is looking into ways to reduce fishing effort on juvenile bigeye tuna by purse seiners.

Swordfish. In 2005, 70% of the commercial-caught swordfish (*Xiphias gladius*) landed in California came from drift-gillnet gear compared to 76% landed in 2004 by longline gear. In 2005 commercial landings for swordfish totaled 203 t, down 75% from 820 t landed in 2004. The ex-vessel value increased from an average of \$4.34/lb in 2004 to \$5.82/lb in 2005.

Common Thresher. In 2005, 99% of the commercial-caught common thresher shark (*Alopias vulpinus*) landed in California came from gillnet gear. Commercial landings for common thresher shark increased in 2005 to 105 t, compared to 67 t in 2004, while the ex-vessel value decreased from an average of \$1.47/lb in 2004 to \$1.36/lb in 2005.

Shortfin Mako Shark. In 2005, 86% of the commercial-caught shortfin mako shark (*Isurus oxyrinchus*) landed in California came from gillnet gear. Commercial landings for shortfin mako shark decreased in 2005 to 23 t, compared to 38 t in 2004. The ex-vessel value also decreased in 2005 to an average of \$1.08/lb compared to \$1.16/lb in 2004.

2005 HMS Fishery Management Highlights. The PFMC approved the highly migratory species fishery management plan (HMS FMP) in March of 2004. The plan provided a management framework for HMS harvested within the exclusive economic zone (EEZ) and adjacent high seas waters off the West Coast. A total of 13 species, representing seven families of fish, are found in the HMS FMP: **Tunas**—north Pacific albacore (*Thunnus alalunga*), yellowfin (*Thunnus albacares*), north-

ern bluefin (*Thunnus thynnus*), skipjack (*Katsuwonus pelamis*), and bigeye (*Thunnus obesus*); **Billfishes**—striped marlin (*Tetrapturus audax*) and swordfish (*Xiphias gladius*); **Roundfish**—dorado (dolphinfish) (*Coryphaena hippurus*); and **Sharks**—common thresher (*Alopias vulpinus*), pelagic thresher (*Alopias pelagicus*), bigeye thresher (*Alopias superciliosus*), shortfin mako (*Isurus oxyrinchus*), and blue (*Prionace glauca*). The HMS FMP implemented new management and conservation tools and consolidated existing state and federal tools and international agreements for HMS. The new conservation and management tools include harvest control rules for common thresher and shortfin mako sharks, a definition of prohibited and protected species, establishment of incidental HMS catch allowances, requirements for a new federal HMS vessel permit, requirements for logbook reporting and submissions, requirements for carrying fishery observers, and a summary of mandatory time and area closures.

Commercial fishing gear authorized for the harvest of HMS include: harpoons, surface hook-and-line gears, purse seines, drift gillnets, and longlines. Pelagic longline gear is prohibited inside the West Coast EEZ as is shallow-set longline gear in the adjacent high seas areas to avoid gear interactions with endangered sea turtles and sea birds. Recreational gear authorized for harvest of HMS are hook-and-line gear, rod-and-reel gear, and spears.

Some of the major HMS management decisions for 2005 include:

- The PFMC identified Pacific bigeye tuna as overfished and moved to develop an FMP amendment addressing management options for recovery.
- The PFMC adopted for public review a range of alternatives for the drift-gillnet northern time/area closures.
- The PFMC is considering an exempted fishing permit (EFP) that would allow drift-gillnet fishing in the current 15 August–15 November closed area. The EFP fishery would be required to carry an observer, effort would be limited to 300 sets, and the fishery would cease if any sea turtle or marine mammal takes occurred.

Ocean Salmon

The California 2005 salmon seasons were constrained primarily by harvest impacts on Sacramento River winter Chinook salmon south of Point Arena, Klamath River fall Chinook salmon and northern California coastal Chinook salmon from Pigeon Point to the California-Oregon border, and naturally produced coho salmon (*Oncorhynchus kisutch*) over the entire California coast. A series of regulations were enacted to reduce contact rates of these constraining populations. These regulations were expected to result in California and Oregon equally sharing Klamath River fall Chinook salmon ocean troll

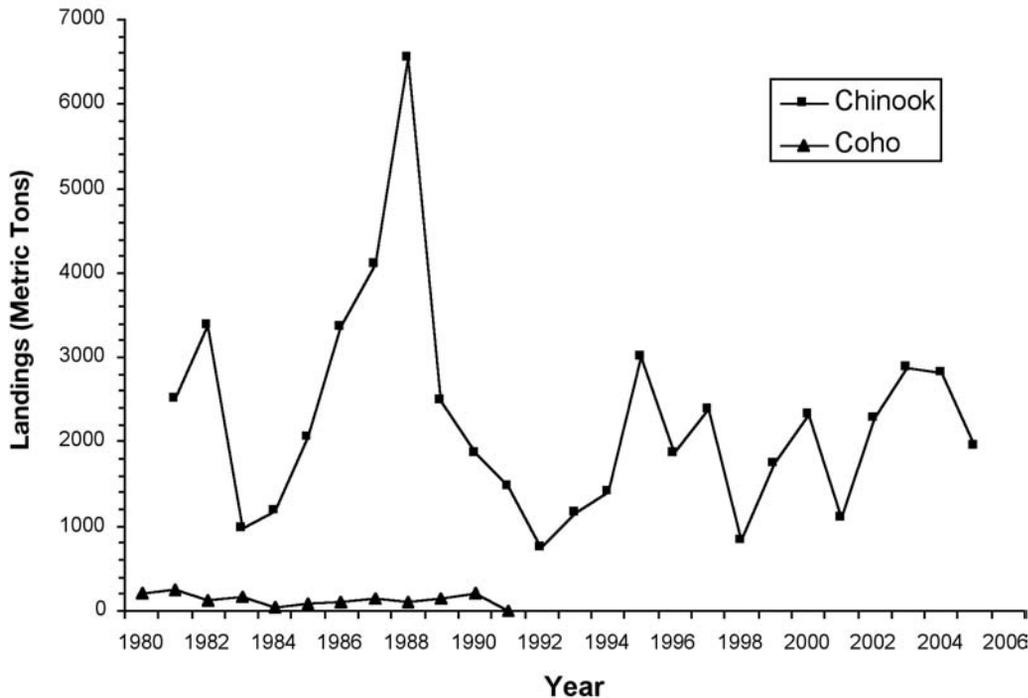


Figure 10. California commercial landings of ocean salmon, 1981–2005. Note: Commercial fishery landings of coho salmon were prohibited since 1992 to protect California coho salmon stocks.

harvest. However, they resulted in a 44% and 56% (3,700 and 4,700 Klamath River fall Chinook salmon) split of the ocean commercial harvest to the states of California and Oregon, respectively.

Commercial and recreational salmon fishing seasons in California were generally shorter in 2005 than in 2004. Compared to the 2004 season, the commercial fishing season in 2005 was reduced by 2 days in the California Klamath Management Zone (KMZ) (Horse Mountain to the California–Oregon border) with a 6,000 fish quota, reduced by 51 days in the Fort Bragg area (Horse Mountain to Point Arena) reduced by 64 days in the San Francisco area (Point Arena to Pigeon Point), and reduced by 33 days in the Monterey area (Pigeon Point to the U.S.–México border). The special commercial fishery targeting Central Valley fall Chinook salmon remained the same as in 2004 (11 days); the fishery occurred between Point Reyes and San Pedro Point during October. The 2005 recreational fishing season was reduced by 37 days in the California KMZ, increased by 22 days in the Fort Bragg area, increased by 14 days in the San Francisco area, and reduced by 7 days in the Monterey area compared to the 2004 season.

As a result of the generally shorter seasons, commercial salmon landings in 2005 were down 32% from 2004. Approximately 340,500 dressed Chinook salmon were landed, weighing 1,946 metric tons, in approximately 16,700 boat days (fig. 10). The value to the commercial

fishing fleet was over \$12.8 million with an average price of \$2.97/lb. Landings occurred primarily in the San Francisco and Monterey port areas when open. This was generally due to a southern shift in effort as a result of the regulation changes made to protect Klamath River Chinook salmon. The harvest of coho salmon has been prohibited in the commercial fishery since 1992. In the California portion of the KMZ, 7,199 Chinook salmon were landed from 3–16 September with a minimum size of 28 inches total length (TL). In all areas south of Horse Mountain, the minimum size limit was 28 inches TL in July and August, and 27 inches TL otherwise, except for the late fall target fishery in October, which had a 26 inch TL size limit.

The recreational landings in 2005 were also down 35% from 2004. Landings totaled 143,200 Chinook salmon during 171,900 angler days (fig. 11). The average catch per angler day was 0.83 Chinook salmon. There was a limit of two fish per angler in all California management areas. The harvest of coho salmon has been prohibited in the recreational fishery since 1996. In the California KMZ, 17,200 Chinook salmon were landed in 17,100 angler days with a minimum size of 24 inches TL. This is the first increase in the recreational size limit in the KMZ since 1983. South of Horse Mountain the minimum size limit was 20 inches TL the entire season. Barbless “circle” hooks were required when fishing by any means other than trolling north of Point Conception.

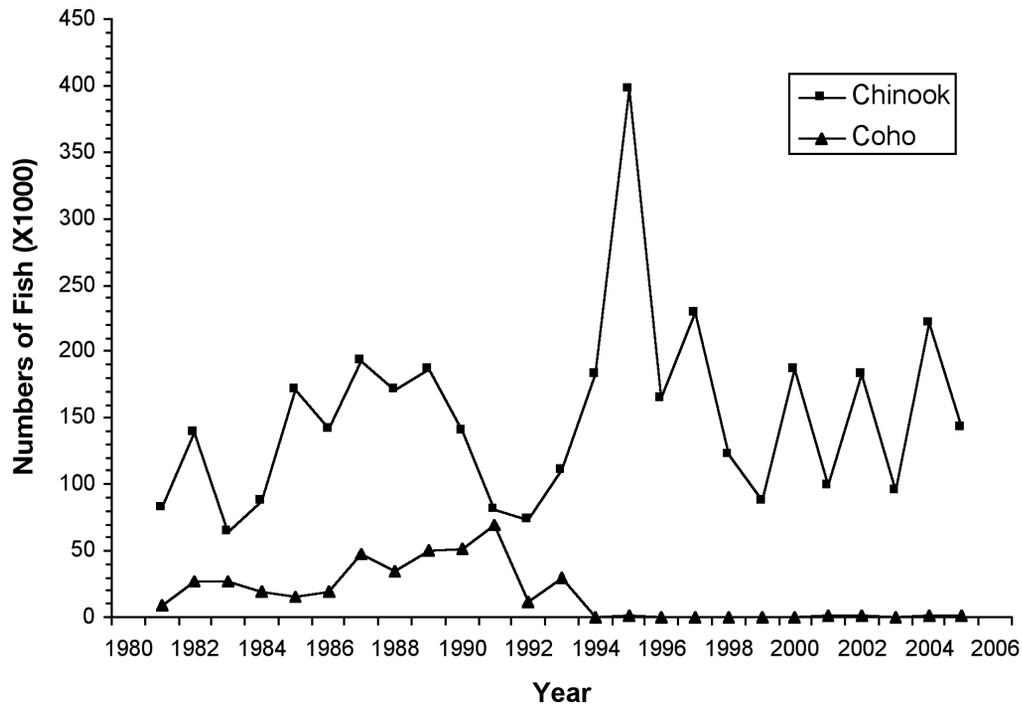


Figure 11. California recreational landings of ocean salmon, 1981–2005. Note: Landings of coho salmon (*Oncorhynchus kisutch*) were prohibited after 1996 to protect California coho salmon stocks. Numbers reported since 1996 are from illegal harvest.

Regulations enacted in 2005 by the PFMC and Commission for commercial and recreational ocean salmon fisheries in California were designed to do the following:

- provide commercial and recreational fisheries south of Point Arena substantially the same as the 2000 and 2001 seasons, in terms of timing and duration, to protect Sacramento River winter-run Chinook salmon (*Oncorhynchus tshawytscha*) which are listed as endangered under California and federal Endangered Species acts (ESAs);
- allow a maximum exploitation rate (marine and fresh-water combined) of 15% for Oregon coast natural coho salmon (*Oncorhynchus kisutch*);
- provide for at least 35,000 naturally spawning adult Klamath River fall Chinook salmon with a minimum adult natural spawner escapement rate of 33%;
- meet the allocation objectives for Klamath River fall Chinook salmon of (1) 50% (8,300 fish) of the allowable adult harvest for federally-recognized tribal subsistence and 50% for non-tribal fisheries, (2) 15% (1,200 fish) of the non-tribal fisheries for the Klamath River (in-river) recreational fishery and 85% (7,100 fish) to the ocean harvest, and (3) 17.1% (1,200 fish) of the ocean harvest to the KMZ recreational fishery;
- limit the ocean harvest rate for age-four Klamath River fall Chinook salmon to no more than 16% to protect California coastal Chinook salmon;

- provide for the escapement of 122,000 to 180,000 hatchery and natural adult Sacramento River fall Chinook salmon; and
- prohibit the retention of coho salmon in California to protect central California coast coho salmon which are listed as endangered under California and federal ESAs.

For more complete information, see PFMC's Website, <www.pcouncil.org>, where you will find the report "Review of the 2005 Ocean Salmon Fisheries," which was compiled by the PFMC Salmon Technical Team and PFMC staff.

Nearshore Live-Fish

Preliminary commercial statewide nearshore finfish landings for 2005 totaled approximately 254 t. This is a slight decrease from the 2004 total of 257 t. Live-fish landings accounted for 87% of the 2005 fishery, totaling 220 t. This is a 3.5% decrease from the 2004 live-fish total of 228 t. The ex-vessel value for the 2005 nearshore finfish fishery was \$2.26 million, of which \$2.16 million was generated from finfish landed in a live condition (fig. 12). This is comparable to the \$2.27 million generated in 2004, with \$2.18 million paid for live-fish. The proportion of live landings in the nearshore fishery declined approximately 2% from the 89% observed in 2004 (fig.13).

Since the live-fishery began in the mid-1980s, principally to supply fish for the California Asian community,

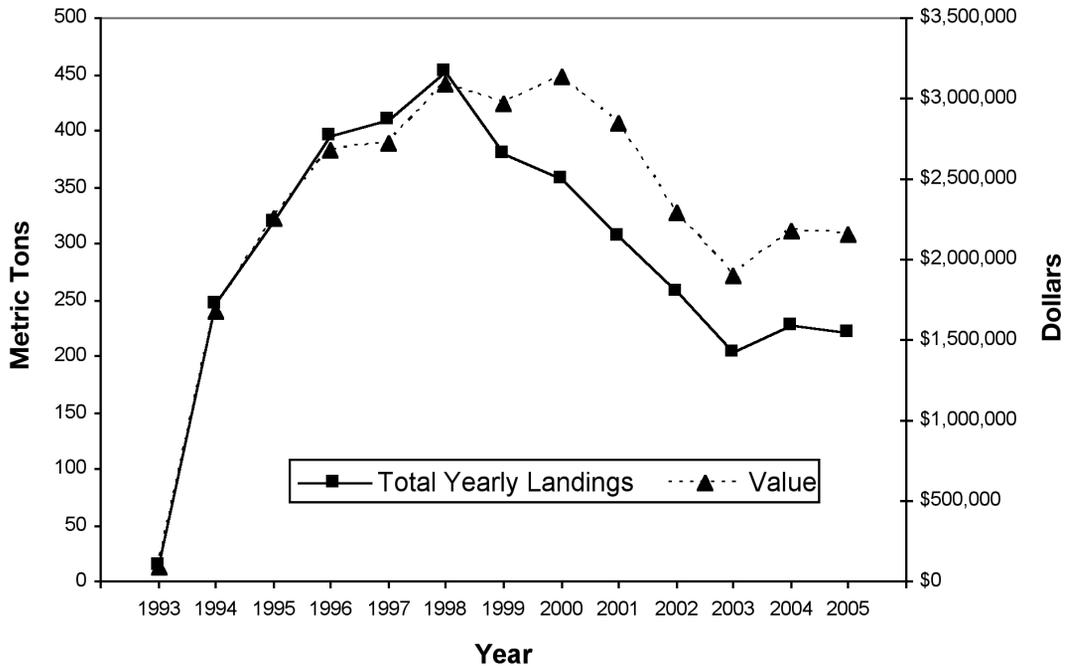


Figure 12. California nearshore live-fish landings in metric tons (left) and ex-vessel value (right), 1993–2005.

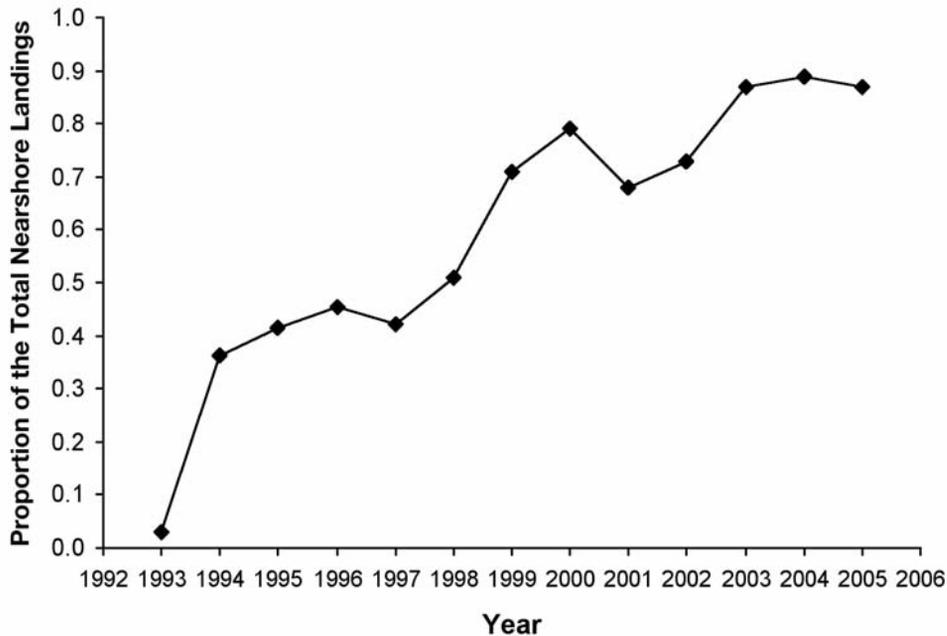


Figure 13. Proportion of fish landed live in the nearshore fishery, 1993–2005.

it has expanded and reached a peak in 1998 (fig. 12). A unique and attractive feature of the fishery is that the wholesale amount paid to fishermen (i.e., ex-vessel value) is generally much higher than that paid for dead fish. In 2005, average prices paid per pound were as high as \$9.22 (grass rockfish); whereas those paid for dead fish reached a high of about \$3.10. This compares to the

2004 live-fish high of approximately \$10.50/lb. Interestingly, the 2005 low-end ex-vessel amounts paid for live-fish were for black and blue rockfishes, at \$1.76 and \$1.64, respectively. Black rockfish was by far landed in the greatest quantity (57.5 t), making up 26.1% of all statewide nearshore live-fish landings, with the bulk of those landings taking place in northern California (north

of 4°10'N). In terms of total ex-vessel amounts generated, the top three species in California's live-fish fishery were California sheephead (\$0.36 million, 16.5%), cabezon (\$0.34 million, 15.7%), and brown rockfish (*Sebastes auriculatus*) (\$0.28 million, 12.8%).

Hook-and-line and trap gear were the major gear types used in the 2005 statewide nearshore live-fish fishery, making up 78.6% and 19.9%, respectively, of landings. Hook-and-line gear includes rod-and-reel, vertical longline, horizontal longline, and weighted stick gear. Most vessels that used hook-and-line and trap gear range from 0–40 feet in length and fish in shallow water close to shore. Trawl gear was used to make 52% of the California scorpionfish landings; hook-and-line, gillnet, and trap gear were used to make 30%, 13%, and 5%, respectively, for this species.

2005 Nearshore Fishery Management Highlights:

There are 19 species of finfish that make up California's nearshore fishery as defined by the Nearshore Fishery Management Plan (NFMP, 2002) and Section 1.9, Title 14 of the California Code of Regulations. These species are generally found associated with kelp beds or rocky reefs less than 20 fathoms deep. All but three species are also managed by the PFMC's Pacific Coast Groundfish Fishery Management Plan. Because these species are managed jointly at the state and federal levels, all regulations relating to federally-managed species must be consistent with federal fishery management policy under the Magnuson-Stevens Fishery Conservation and Management Act. Consequently, most of the management measures and regulatory changes affecting the fishery result from actions by the PFMC, despite the fact that these fish are shallow water dwellers and are generally found within the state's three-mile management zone. Because the live-fish component of the commercial nearshore fishery makes up approximately 90% of all nearshore landings, essentially any discussion about California's nearshore fishery centers on the live-fish fishery.

PFMC and the Commission undertook the following management actions for the commercial nearshore fishery in 2005:

- The first biennial two-year management cycle began.
- Beginning with the July/August period, the cumulative trip limit for minor nearshore rockfish north of 4°10'N was increased from 5,000 pounds to 6,000 pounds (with no more than 1,200 pounds for species other than black and blue rockfishes). This action was taken because catch levels of black rockfish were lower than predicted for the first half of the year.
- Stock assessments for cabezon, gopher rockfish, and California scorpionfish were approved and harvest amounts will change.
- Two fisheries were closed statewide early in 2005 because their respective TACs were attained. The green-

ling fishery was closed on 1 August and the cabezon fishery was closed on 1 October.

- The Cooperative Research and Assessment of Nearshore Ecosystems (CRANE) project completed its first full season of sampling. The multi-agency and academic group surveyed 68 sites for fish and invertebrate abundance and size frequency. A report based on 2004 data and a historical overview of fish abundance will be completed in fall 2006. These results will further our knowledge of basic nearshore fish abundance and provide information useful for future stock assessments.

Pacific Herring

California's commercial fisheries for Pacific herring (*Clupea pallasii*) continued to decline in 2005. Statewide landings for the 2004–05 sac roe season (December 2004–March 2005) totaled 159.2 t, a 90% decrease from the 2003–04 landings of 1,651 t, with permittees in all fishing areas not reaching their quotas. The San Francisco Bay gillnet fleet, composed of three platoons, landed 131.5 t, 95.4% under the 2,874.9 t quota. The Tomales Bay fishery landed a total of 27.2 t of the 362.9 t quota. No fishing effort took place in Crescent City with a 27.2 t quota, and Humboldt Bay landings totaled only 0.5 t, far below the 54.4 t quota for that fishery. Annual sac roe landings January to December 2005 decreased from 1,596 t to 136.4 t, down 91.5% from the previous year (tab. 1). The San Francisco Bay herring egg-on-kelp fishery landings remained below average and there were no landings for the 2004–05 season, despite a 50.5 t quota.

Ex-vessel prices for roe herring are determined by a set base price, and an additional roe percentage point bonus. The base price is set per short ton of roe herring with a minimum roe percentage of 10%. Roe herring that are landed which exceed the minimum roe recovery level are given a bonus for each percentage point exceeding 10%. Typically, the percentage point bonus is 10% of the base price. The 2004–05 ex-vessel prices for roe herring with 10% roe recovery averaged an estimated \$500 per short ton landed, with an additional \$50 paid for each percentage point above the 10% baseline. Ex-vessel prices in the herring sac roe fishery can vary greatly based on roe recovery rates. For example, roe herring caught in San Francisco Bay averaged 16.2% roe (ex-vessel price \$810 per short ton) and Tomales Bay averaged 13.3% roe (ex-vessel price \$665 per short ton). The forecasted base price for roe herring is a good indicator of the economic status of the fishery, and a factor in whether fishermen will participate in the fishery. The statewide ex-vessel value of the sac roe fishery fell from \$879,500 in 2004, to \$119,488 in 2005, the lowest value for this fishery in 30 seasons. The average ex-vessel catch

value over the past 20 seasons in San Francisco Bay has been \$7.5 million.

CDFG conducted research surveys in three bays to estimate the spawning biomass of each herring stock. Spawn deposition survey estimates were used to assess San Francisco, Tomales Bay, and Humboldt Bay populations. The 2004–05 herring spawning biomass estimate for the San Francisco Bay population was 53,464.9 t, which is 3.2% above the 27-year average (51,825 t). It is the first time since the 1996–97 season that the herring spawning biomass has surpassed the long-term average. The 2004–05 spawning biomass estimate for Tomales Bay was 3,343.9 t, which represents a decrease of 70% from the 2003–04 biomass estimate (10,999 t). The drastic decline in spawning biomass in Tomales Bay may be the result of the 2004–05 El Niño as well as the displacement of herring to other spawning areas. In Humboldt Bay, CDFG conducted spawning ground surveys and monitoring of the herring gillnet fishery for the fifth consecutive season. The 2004–05 spawning biomass estimate for Humboldt Bay was 157.5 t, a decrease of 65.7% from the 2003–04 biomass estimate (459 t). No surveys were conducted in Crescent City Harbor. Based on current otolith readings, the age composition of the 2004–05 San Francisco Bay and Tomales Bay stocks continue to reflect a depressed age structure that has been observed coast wide since the 1997–98 El Niño season. The cause of this phenomenon remains unknown, and may be the result of various ecological factors.

The decline in value of California's herring fisheries in 2005 is due to the inability of the industry to fill the existing catch quotas. However, the long-term decline in value is related to cultural and demographic changes in Japan, the status of Japan's economy, and increased competition from other herring fisheries outside of California. The herring roe product, "kazunoko," remains a popular Japanese New Year's food, but it continues to wane as a traditional holiday gift. The market for herring sac roe in Japan is shifting from a high-end seasonal gift product to a lower-value product available throughout the year and geared toward the casual consumer. California's roe herring fishery faces competition in the Japanese market with products from herring fisheries from the United States, Canada, China, and Russia. The cultural changes in Japan, increased market competition, and the prolonged recession in Japan will keep the ex-vessel price for herring low for the 2005–06 season. Participation in California herring fisheries continues to decline as the price of herring has remained low, and operating costs have increased to make the fishery less profitable. The herring fishing industry has attempted to revive the fishery by seeking regulation changes that would help increase the profitability of the fishery. The key regulation change for the 2005–06 sea-

son was a gillnet minimum mesh size reduction from 2 1/8 inch mesh to 2 inch mesh for the San Francisco Bay herring fishery.

White Seabass

The white seabass (*Atractoscion nobilis*) is the largest member of the Sciaenid family found in California waters. In addition to being a popular gamefish, white seabass is also targeted by a commercial fishery. In 2002, the Commission established a management season for the commercial and recreational fisheries of 1 September to 31 August of the following year. The commercial white seabass fishery landed 132 t in 2005 (fig. 14), a 2% decrease from the 2004 total of 135 t. The Recreational Fisheries Information Network (RecFIN) estimated catch of white seabass in 2005, generated from the CRFS, increased by 11% to 50 t from the previous year's total of 45 t. The RecFIN estimates prior to 2004 are from a different survey and are not directly comparable to the estimates from the CRFS. However, historical trends in the recreational catch of white seabass can be determined from CPFV logbook data (fig. 15). The combined commercial and recreational catch for 2005 was 182 t.

There have been commercial and recreational fisheries for white seabass in California since the 1890s. Historically, commercial landings have fluctuated widely, including the landings of white seabass taken in Mexican waters by California commercial fishermen. Before 1982, the white seabass commercial take in Mexican waters comprised from 1% to over 80% of California's white seabass annual landings. Since then, the Mexican government has prohibited access permits to the U.S. commercial fleet (fig.13).

Beginning in 1994, the use of set and drift gillnets within three nautical miles of the mainland shore from Point Arguello to the U.S.-México border and in waters less than 70 fathoms or within 1 mile (whichever is less) of the Channel Islands was prohibited. In April 2002, the use of gill and trammel nets in depths of 60 fathoms or less was prohibited from Point Reyes to Point Arguello. Despite restrictions, most commercial white seabass landings are still taken with set and drift gillnets. In 2005, set and drift gillnets accounted for 96% of the commercial landings and 98% of commercial white seabass landings were from south of Point Arguello.

The commercial fishery for white seabass is closed between Point Conception and the U.S.-México border from 15 March to 15 June. In 2005, the average ex-vessel value paid by dealers was \$2.59/lb. The total ex-vessel value in 2005 was \$757,269, approximately 25% more than in 2004.

The recreational fishery for white seabass occurs almost entirely south of Point Arguello. In 2005, 98%

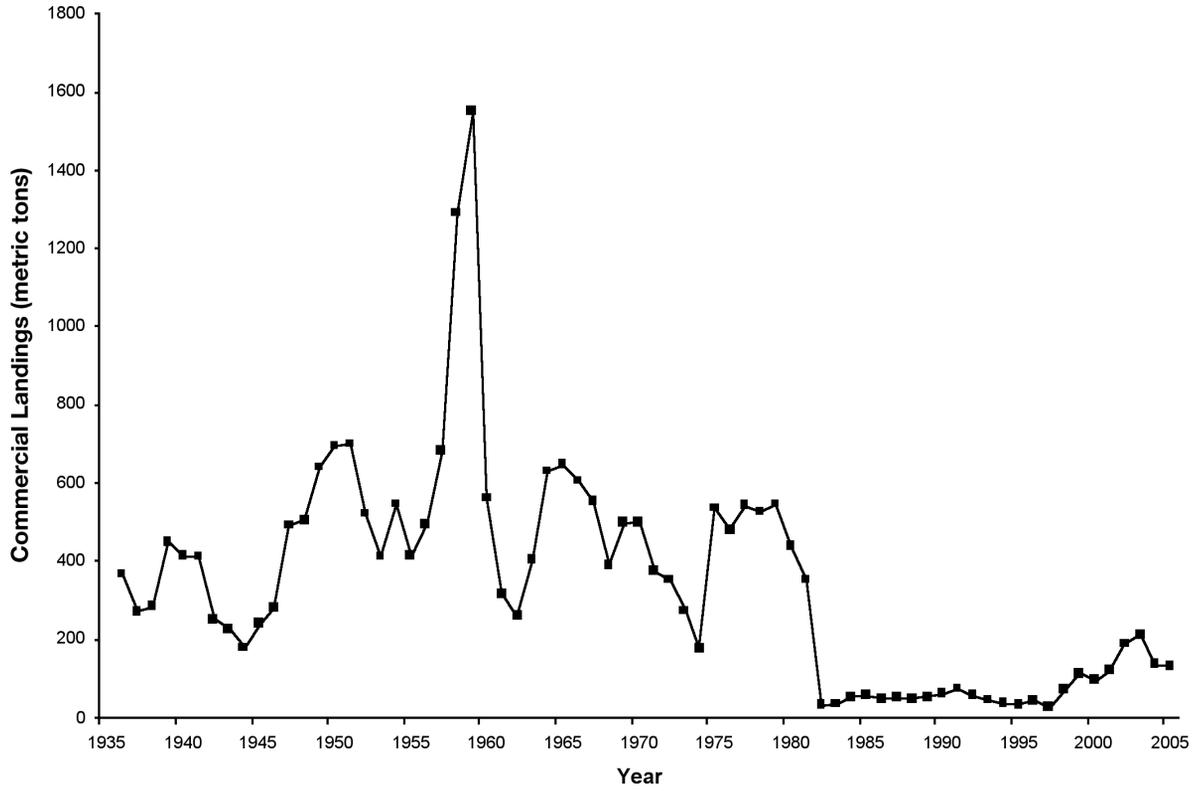


Figure 14. California commercial landings of white seabass (*Atractoscion nobilis*) in metric tons, 1936–2005.

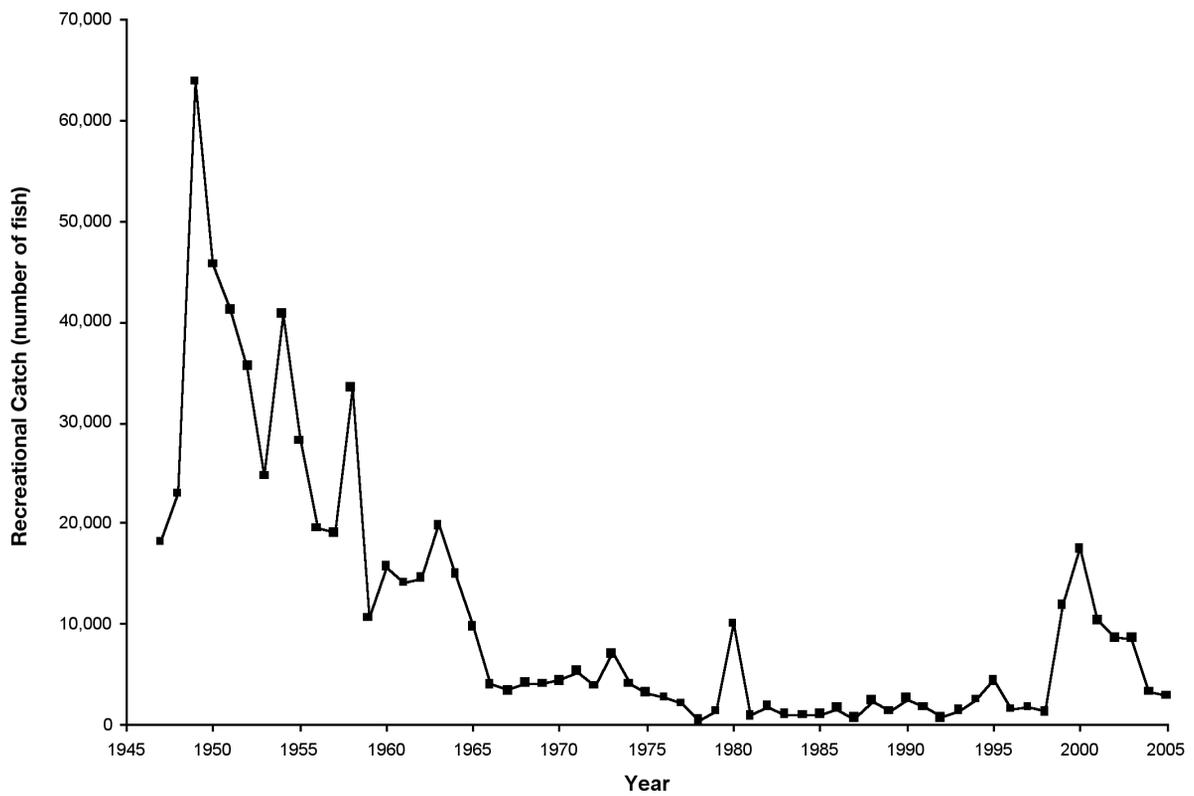


Figure 15. California recreational catch (in numbers of fish) of white seabass (*Atractoscion nobilis*) from CPFVs, 1947–2005.

of the catch occurred south of Point Arguello. The majority of the recreational take occurs between March and September. White seabass have a minimum size limit of 28 inches (710 mm), and the daily bag limit is three fish, except from 15 March through 15 June when the daily bag limit is one fish. Most fish are caught by hook-and-line anglers onboard CPFVs and private boats. However, during the 2004–05 season, an estimated 27% of the total number of fish caught was taken by shore anglers.

In 1983, the California Legislature (Legislature) established the Ocean Resources Enhancement and Hatchery Program (OREHP) managed by CDFG. The program researches artificial propagation, rearing, and stocking methods of marine fish species caught in southern California waters whose populations have declined, adversely affecting to commercial or recreational fishing. Initially, OREHP focused on California halibut and white seabass. But in response to funding constraints, white seabass has been OREHP's primary species for research and production since 1986. In 1995, the building of the OREHP hatchery in Carlsbad, California was completed. The hatchery, located next to Agua Hedionda Lagoon, produces juvenile white seabass that are grown to 150–200 mm before being placed in grow-out facilities. Currently there are 14 grow-out facilities located in bays and marinas from Santa Barbara to San Diego, including Santa Catalina Island. Volunteers raise the fish until they reach 200–300 mm and then release them at or near the grow-out site. In 2004, approximately 270,000 hatchery-produced white seabass were released, the highest total to date. In 2005, OREHP released 100,911 white seabass. Since 1986, 1.1 million white seabass, each implanted with a coded wire tag (CWT), have been released from OREHP facilities.

To evaluate the effectiveness of the program in enhancing stocks of white seabass, OREHP conducts a gillnet survey designed to capture 1 to 4 year old juvenile white seabass at 19 coastal and embayment sites from Santa Barbara to San Diego, including Santa Catalina Island. Initially, the survey focused on determining the distribution of young fish, but switched in the second

half of 1996 to look at recruitment of one-year-old fish and recovery of tagged fish. OREHP also conducts surveys of adult fish taken in the commercial and recreational fisheries to detect CWTs indicating fish produced by the hatchery. In 2005, CWTs were recovered from 14 adult white seabass.

To manage the state's commercial and recreational fisheries for white seabass, the Commission adopted a White Seabass Fishery Management Plan (WSFMP) in 1996. However, regulations to implement the plan were not adopted by the Commission at that time. When the Legislature enacted the Marine Life Management Act (MLMA) in 1998, it granted broader authority to the Commission to manage certain commercial and recreational fisheries, including white seabass. The Legislature also declared that the WSFMP would remain in effect until amended and brought into compliance with the MLMA. The CDFG revised the WSFMP in accordance with the MLMA and submitted it to the Commission, which adopted it on 4 April 2002. To implement the WSFMP, the Commission adopted regulations to establish a fishing season, harvest control rules, an annual review of the resource, and the White Seabass Scientific and Constituent Advisory Panel.

Editor:

D. Sweetnam

Contributors:

D. Aseltine-Neilson, Groundfish
B. Brady, Market squid
M. Connell, White seabass
P. Kalvass, Sea urchin
L. Laughlin, Coastal pelagic finfish
B. Leos, Nearshore live-fish
J. Mello, Kelle's whelk
G. Neillands, Ocean salmon
E. Roberts, Dungeness crab
I. Taniguchi, Abalone
A. Vejar, Highly migratory species
R. Watanabe, Pacific herring