

## REVIEW OF SELECTED CALIFORNIA FISHERIES FOR 2009: COASTAL PELAGIC FINFISH, MARKET SQUID, RED ABALONE, DUNGENESS CRAB, PACIFIC HERRING, GROUND FISH/NEARSHORE LIVE-FISH, HIGHLY MIGRATORY SPECIES, KELP, CALIFORNIA HALIBUT, AND SANDBASSES

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### SUMMARY

In 2009, commercial fisheries landed an estimated 160,615 metric tons (t) of fish and invertebrates from California ocean waters (fig. 1). This represents an increase of nearly 14% from the 141,377 t landed in 2008, and a 39% decline from the peak landings of 252,568 t observed in 2000. The preliminary ex-vessel economic value of commercial landings in 2009 was nearly \$144 million, an increase of 29% from the \$112 million in 2008.

Pacific sardine landings experienced a 35% decrease in volume during 2009. This was largely due to a more restrictive harvest guideline (HG) based on declining stock abundance. Similar to 2008, the fishery exhibited the characteristics of a “derby.” Other coastal pelagic finfish that also experienced a drop in landings were Jack mackerel and Northern anchovy. Pacific mackerel and Pacific bonito, on the other hand, registered increases in landing totals.

California market squid emerged as the largest volume and highest value fishery in the state with over 92,000 t landed and an ex-vessel value of approximately \$56.5 million, a two-fold increase from the \$26.5 million of 2008. Such increases can be attributed to favorable environmental conditions.

California’s recreational red abalone fishery, while tightly managed, remains the only abalone fishery still open. Critical data are collected from fishery independent dive surveys, fishery dependent creel surveys, and a report card system. Additional regulations in 2008 mandated tagging of retained abalone as well as a report card for all fishery participants.

Dungeness crab landings decreased 26% in 2009 compared to 2008, but still remained one of the more valuable state fisheries with an ex-vessel value of \$14.7 million. Concerns regarding increased effort in the fishery have prompted strong support for a statewide, tiered trap limit program. Currently, discussions among constituents are ongoing. Preliminary data suggest an upturn occurring within the fishery.

In 2009, Pacific herring fisheries experienced one of the lowest landings in the history of the 35 year old fishery. California Department of Fish and Game (Depart-

ment) surveys in the San Francisco Bay indicated drastic (57%) declines in the spawning biomass. This was the lowest ever estimate for the fishery. Following these alarming declines, the fishery was closed by the California Fish and Game Commission (Commission) for the first time ever.

Commercial nearshore live-fish landings, consisting of 19 species, totaled 242 t in 2009, a 19% decrease from 2008. A large percentage of the nearshore finfish are sold live at premium prices resulting in a fishery valued at \$2.25 million.

Albacore was the most abundant tuna caught in California waters, as well as along the west coast. Commercial landings totaled 12,262 t with an ex-vessel value \$0.9 million. Recreational albacore landings in California from Commercial Passenger Fishing Vessels (CPFV) totaled 33,679 fish.

The commercial kelp harvest totaled 4,200 t in 2009, a steep decrease from the high of 38,000 t in 2000. Fewer commercial kelp harvesters rather than unfavorable oceanographic conditions are responsible for this decline. Commercial landings of California halibut in 2009 totaled 278 t with an ex-vessel value of \$2.6 million, while recreational landings were 211 t (58,000 fish). In 2009, the Department began compiling data to support the first statewide stock assessment of California halibut.

Sandbasses have not supported a commercial fishery since the 1950s due to steep declines in landings. However, barred sand bass have ranked among the top recreational species caught by southern California CPFV anglers for the past two decades. They also ranked first in terms of number of fish kept. Spotted sand bass, in contrast, rank high among the species not kept with 94% released. Recreational fishing pressure on these species continues to increase over the last two decades.

In 2009, the Commission undertook ten rule-making actions that addressed marine and anadromous species. The Commission adopted changes to salmon, halibut, lobster, herring, white seabass, and sport fishing regulations. For two anadromous species, delta smelt status was upgraded from threatened to endangered under the California Endangered Species Act, and longfin smelt was

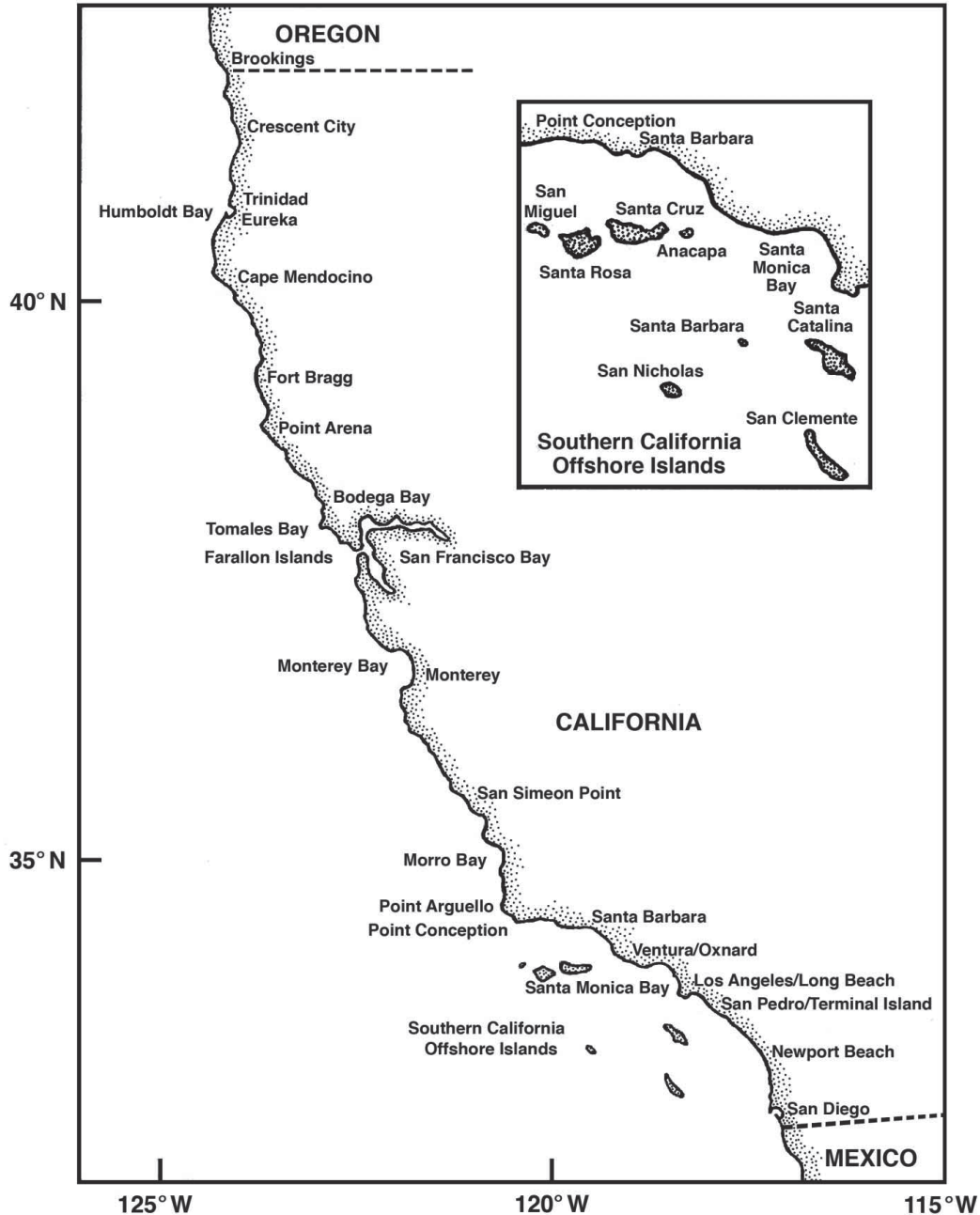


Figure 1. California ports and fishing areas.

listed as threatened. Emergency regulatory action was taken to close the open ocean herring fishery to protect the San Francisco Bay herring stock due to the dramatic decline in biomass. The Commission also implemented a series of 24 marine protected areas (153 square miles) in the north central coast region, defined as state waters between Point Arena (Mendocino County) and Pigeon Point (San Mateo County) under the Marine Life Protection Act (MLPA). The MLPA is a process to consolidate and establish marine protected areas in California state waters.

### Coastal Pelagic Finfish

Pacific sardine (*Sardinops sagax*), Pacific mackerel (*Scomber japonicus*), jack mackerel (*Trachurus symmetricus*), northern anchovy (*Engraulis mordax*), and Pacific herring (*Clupea pallasii*) form a finfish complex known as coastal pelagic species (CPS). These species, with the exception of Pacific herring, are jointly managed by the Pacific Fishery Management Council (Council) and the National Marine Fisheries Service (NMFS). In 2009, total commercial landings for these four CPS equaled 45,444 t (tab. 1), and was worth \$6.9 million in ex-vessel

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

Year	Pacific sardine	Northern anchovy	Pacific mackerel	Jack mackerel	Unspecified mackerel	Pacific herring	Herring roe	Market squid	Total
1977	2	101,132	3,316	47,615		5,286		12,811	170,163
1978	1	11,439	8,241	34,349	48	4,473		17,145	75,696
1979	51	48,880	22,404	21,548	301	4,257		19,982	117,424
1980	21	42,946	25,739	24,181	56	8,061		15,385	116,389
1981	34	52,308	35,257	17,778	132	5,961		23,510	134,980
1982	2	42,150	17,667	19,618	18,398	10,604		16,308	124,747
1983	1	4,427	17,812	9,829	23,659	8,024		1,824	65,576
1984	1	2,889	26,043	9,149	18,038	3,847		564	60,532
1985	6	1,626	18,149	6,876	19,624	7,984		10,275	64,540
1986	388	1,535	22,095	4,777	25,995	7,658		21,278	83,727
1987	439	1,390	26,941	8,020	19,783	8,420		19,984	84,978
1988	1,188	1,478	30,127	5,068	20,736	8,641		37,233	104,471
1989	837	2,449	21,067	10,746	26,661	9,296		40,893	111,950
1990	1,664	3,208	31,077	3,223	9,039	7,436		28,447	84,094
1991	7,587	4,014	31,680	1,693	339	7,347		37,389	90,048
1992	17,950	1,124	18,574	1,209	3	6,319		13,110	58,289
1993	15,346	1,958	11,798	1,673		3,846	0	42,722	77,345
1994	11,644	1,789	10,008	2,704	0	77	2,874	55,508	84,603
1995	40,328	1,886	8,625	1,728		3	4,664	72,433	129,667
1996	32,559	4,421	9,597	2,178	4	249	5,162	80,784	134,954
1997	43,246	5,718	18,398	1,160	1	0	9,147	70,387	148,057
1998	42,956	1,457	20,515	824		0	2,009	2,895	70,656
1999	59,493	5,179	8,688	953	0		2,279	91,950	168,542
2000	53,612	11,754	21,916	1,269	0	26	3,450	118,816	210,843
2001	51,894	19,277	6,925	3,624	1	0	2,768	86,385	170,873
2002	58,354	4,643	3,367	1,006	2	0	3,324	72,920	143,615
2003	34,732	1,676	3,999	156	0	34	1,808	45,061	87,467
2004	44,305	6,793	3,570	1,027	0	60	1,581	41,026	98,362
2005	34,633	11,182	3,244	199		219	136	58,391	108,005
2006	46,577	12,791	5,891	1,167	0	37	694	49,159	116,316
2007	80,981	10,390	5,018	630	1	336	261	49,474	147,091
2008	57,806	14,285	3,530	274	0	131	626	38,101	114,754
2009	37,578	2,668	5,079	119	1	74	460	92,338	138,317

Data Source: Commercial Fisheries Information System (CFIS)

value. Compared to 2008 landings, this represents a 40% and 30% decrease in quantity and ex-vessel value, respectively. Once again Pacific sardine ranked as the largest fishery among these four species, contributing 83% of the combined quantity and 79% of the combined ex-vessel value.

**Pacific Sardine.** In 2009, the total tonnage of Pacific sardine landed (37,578 t) was 35% lower than in 2008 (57,803 t) due in large part to an HG that was 25% lower than in 2008. California landings of Pacific sardine generated an ex-vessel value of approximately \$5.6 million. From 2000–2009, commercial landings of sardine averaged 49,994 t (fig. 2). Nearly all (97%) of California’s 2009 sardine catch was landed in Los Angeles (33%, 12,418 t) and Monterey (64%, 24,151 t) port areas (tab. 2). California exports of sardine product in 2009 decreased by 34% over 2008 exports (51,844 t). A total of 33,909 t of sardine product was delivered to 35 countries. Nearly 80% of this product was exported to Thailand (13,923 t), Australia (6,582 t) and Japan (6,417 t). These three countries represent 75% of the total export value of \$19 million.

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

(BCM). Since the 1970s, the majority of landings have occurred in southern California and northern Baja California. In 1999, fishing pressure and landings increased in the Pacific Northwest. The 2009 combined landings of Pacific sardine for California, Oregon, and Washington totaled 67,050 t, which is a 23% decrease from 2008 (87,189 t). The Pacific sardine HG for each calendar year is determined from the previous year’s stock biomass estimate (of ≥1-year-old fish on 1 July). The HG for the 2009 season was 66,932 t based on a biomass estimate of 662,886 t. The Pacific sardine HG was apportioned coast-wide through the year with 35% allocated from 1 January through 30 June, 40% plus any portion not harvested allocated from 1 July through 14 September, and the last 25%, plus any portion not harvested from the first two allocations, released on 15 September.

In 2009, the U.S. west coast fishery harvested all of the HG. The 1st allocation (Jan 1–June 30) lasted 51 days, and the 2nd (July 1–Sept 14) and 3rd (Sept 15–Dec 31) allocations spanned 17 and 9 days, respectively. Increased fishing efforts, such as vessels making multiple landings per day, were observed during all allocation periods. During the 2nd and 3rd allocation periods, fishing

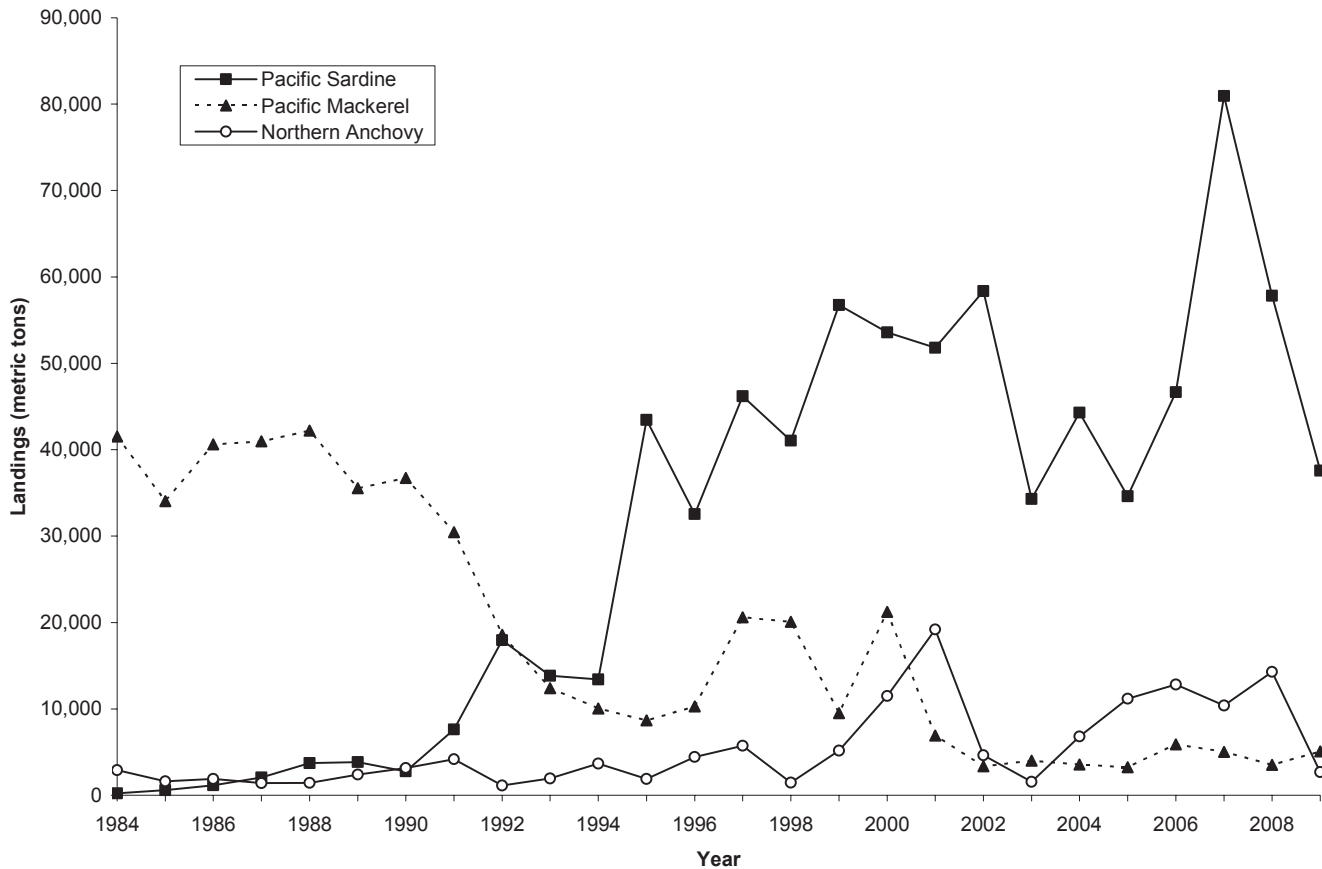


Figure 2. California commercial landings of Pacific sardine (*Sardinops sagax*), Pacific mackerel (*Scomber japonicus*), and northern anchovy (*Engralis mordax*), 1984–2009.

TABLE 2  
 Landings (metric tons) of Pacific sardine (*Sardinops sagax*) and Pacific mackerel (*Scomber japonicus*) at California port areas in 2009.

Area	Pacific sardine		Pacific mackerel	
	Landings	% Total	Landings	% Total
San Francisco	861	2	0	0
Monterey	24,151	64	14	0
Santa Barbara	147	0	53	1
Los Angeles	12,418	33	5,012	99
Total	37,577	100	5,079	100

Data Source: CFIS

effort continued during weekends, a period normally not fished by the CPS California fleet. Since the 2008 reduction in the HG, the fishery has become a “derby,” resulting in early closures of the directed fishery within each allocation period. The directed Pacific sardine fishery during the 2009 third allocation was officially closed by the NMFS on September 23, 2009; however, incidental take of sardine (up to 20% by weight) was allowed until December 23, 2009.

The steady increase of sardines landed in Oregon since 1999 has slowed in the last three years (fig. 3). Sardine

catch in Oregon totaled 21,481 t in 2009, which is slightly less than 2008 (22,949 t). In 2009, Oregon exported 1,901 t of sardine product worth a little over \$1.7 million.

Washington landings of Pacific sardine decreased to 8,026 t in 2009 since a peak in 2002 (15,832 t, fig. 3). This is an increase from 2008 (6,435 t). Washington exported more sardine (25,146 t) than was landed; the product was most likely sardine landed in Oregon or the previous year.

In November 2009, the Council adopted an HG of 72,039 t for the 2010 Pacific sardine fishery. The HG was based on a biomass estimate of 702,024 t and was calculated from the harvest control rule in the CPS. This HG is a 7% increase from the 2009 HG. The HG also includes a 5,000 t set-aside allocated for an industry sponsored aerial research project. Data from the 2009 aerial survey were included in the 2009 sardine stock assessment.

The 2009 recreational Pacific sardine catch as sampled from the California Recreational Fisheries Survey (CRFS) was 50 t (739,000 fish), a 72% (24%, by number of fish) increase from 2008. The majority of the fish landed were from man-made structures, such as piers.

**Pacific Mackerel.** In 2009, 5,079 t of Pacific mackerel were landed in California (tab. 1, fig. 2). The major-

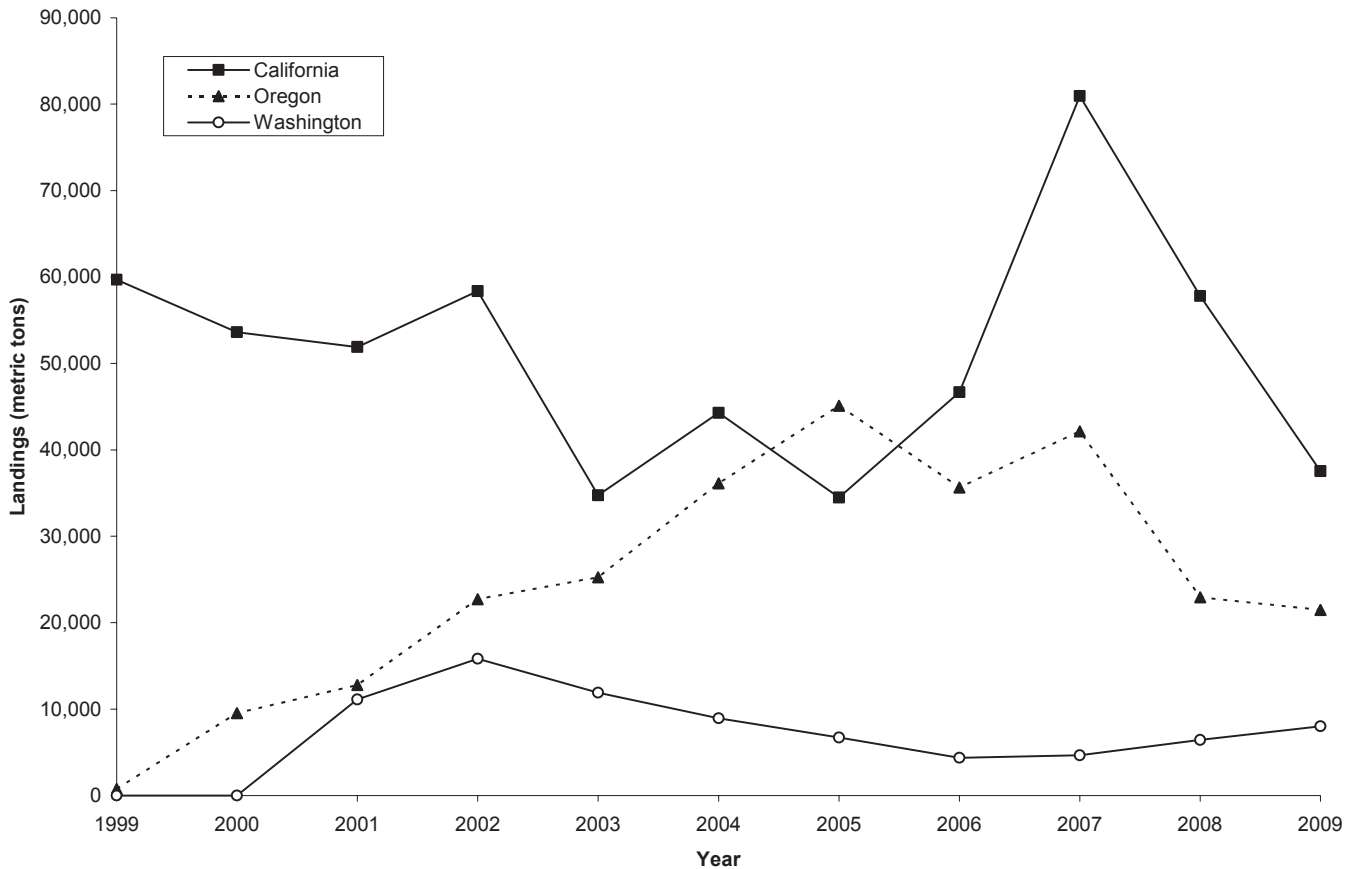


Figure 3. Commercial landings of Pacific sardine (*Sardinops sagax*) in California, Oregon, and Washington, 1999–2009.

ity of landings were made in Southern California port areas (tab. 2). The ex-vessel value in 2009 was \$1.1 million. Industry exported 1,093 t of mackerel product, valued at \$1 million, to 29 countries. Egypt (432 t), Jamaica (143 t), and Mexico (76 t) received 60% of this product.

Oregon reported 53 t of Pacific mackerel landed in 2009 for a total ex-vessel value of \$4,766. This is similar to catch in 2008 (58 t). No landings of mackerel have been reported in Washington since 2005 (unspecified mackerel). Washington landings of Pacific mackerel are typically low, with the greatest landings occurring in 2001 (371 t).

Similar to sardines, the majority of Pacific mackerel landings occur in southern California and Ensenada, BCM. In the U.S., the fishing season for Pacific mackerel is 1 July to 30 June the following year. At the start of the 2009–2010 season, NMFS estimated the biomass at 282,049 t and the Council set the HG at 8,000 t, with a 2,000 t set-aside for incidental landings in other fisheries, much lower than the prior season’s HG of 40,000 t. Landings above the HG would be constrained by an incidental catch rate of 45% by weight when landed with other CPS.

The 2009 recreational Pacific mackerel catch as sampled from CRFS was 118 t (659,000 fish), a 59% (65%, by number of fish) decrease from 2008. A total of 43,000 fish were reported landed on CPFVs.

**Jack Mackerel.** In 2009, jack mackerel landings represented less than 1% of the total catch of federally managed CPS finfish in California with 119 t landed. The ex-vessel revenue for jack mackerel was \$17,962 for California. Landings in Oregon continue to be low with 3 t landed in 2009 (no ex-vessel value). Washington reported no landings of jack mackerel during 2009.

The 2009 recreational jack mackerel catch as sampled from CRFS was 4 t (46,000 fish), a 20% (47%, by number of fish) decrease from 2008. A total of 3,000 fish were landed on CPFVs.

**Northern Anchovy.** Historically, anchovy was primarily reduced to oil or fish meal. When sardine landings have been low in the past, anchovy landings have increased. In the early 1970s, annual harvest exceeded 100,000 t during some years. Presently, landings of northern anchovy are relatively low, averaging about 9,500 t per year over the last 10 years (fig. 2). The majority of landings occur in California on the central sub-population. Landings in Oregon and Washington on the north-



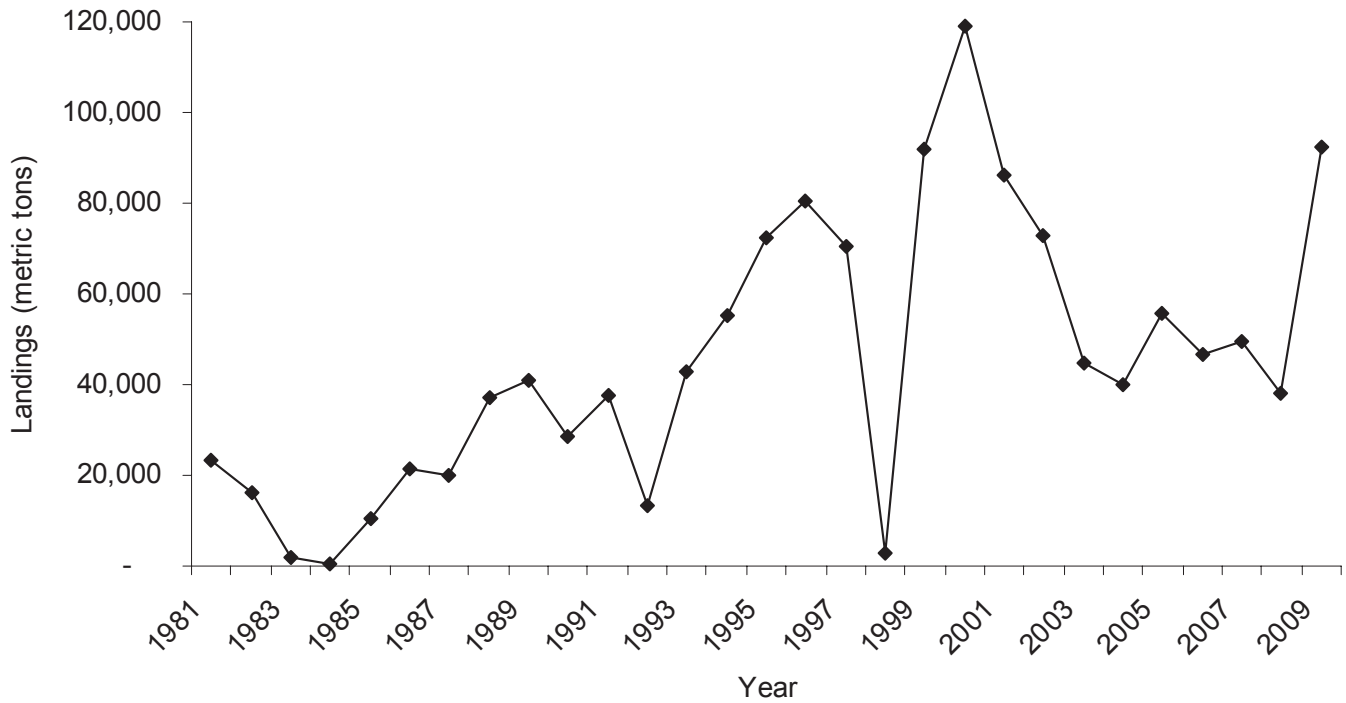


Figure 4. California commercial market squid (*Loligo opalescens*) landings, 1981–2009.

ern sub-population have been increasing in recent years. Anchovy are currently used for human consumption, animal food, and bait. A high-end product of anchovies, marinated in a traditional Spanish style, called “boquerones” has recently been introduced in Oregon and Washington markets.

California landings of northern anchovy in 2009 totaled 2,668 t (tab. 1) with an ex-vessel value of nearly \$369,725. This is an 81% decrease from 2008 landings (14,285 t). Exports of northern anchovy product from California totaled 474 t for an export value of \$283,346. Three countries received anchovy product from California; Australia received the majority at 77%.

For 2009, Oregon landed 39 t (\$8,678 ex-vessel value). Oregon exported 23 t to China with a value of \$80,505. Washington reported 810 t valued at \$133,400 ex-vessel value for 2009. Approximately 121 t was exported to China, Malaysia, Australia, Canada, and Thailand with a value of \$127,007.

**Pacific Bonito.** Annual Pacific bonito (*Sarda chilienis lineolata*) landings has averaged 609 t from 2000 to 2009. In 2009, landings totaled 2,132 t, an increase of 165% from 2008. The landings generated an ex-vessel value of \$1.7 million. No landings of Pacific bonito were reported from Oregon or Washington in 2009. The California recreational catch for Pacific bonito in 2009 was 146 t (42,000 fish), a 67% (44%, by number of fish) decrease from 2008. A total of 15,000 fish were landed on CPFVs.

### California Market Squid

In 2009, California market squid, *Loligo (Doryteuthis) opalescens*, was the state’s largest fishery in terms of volume landed and ex-vessel value. Total landings increased 42% from 2008, increasing from 38,100 t to 92,338 t (fig. 4). The 2009 ex-vessel value was approximately \$56.5 million, a 113% increase from \$26.5 million in 2008. The average ex-vessel value was \$640/t, a slight increase from \$639/t in 2008. Market squid is used domestically for food and as bait in the recreational fishery, and remains an important international commodity. California fish businesses exported 40,630 t of market squid to 36 countries in 2009 for a value of just over \$52 million. This increased from 2008 in which 25,371 t were exported for a value of \$35.8 million. China was again the leading importer accounting for 72% (29.13 t) of the trade. Vietnam, Greece, Spain, and the United Kingdom were the only other countries importing more than 1.26 t each.

The market squid fishery is naturally divided into northern and southern regions, which coincide with the optimal environmental conditions for squid spawning. The northern region (north of Point Conception) is centered in and around Monterey Bay during spring and summer months, while the southern region (south of Point Conception) is centered in the Southern California Bight during fall and winter months. Although the fishery has its historical origins in Monterey Bay, it has been dominated by the southern region in recent years (fig. 5).

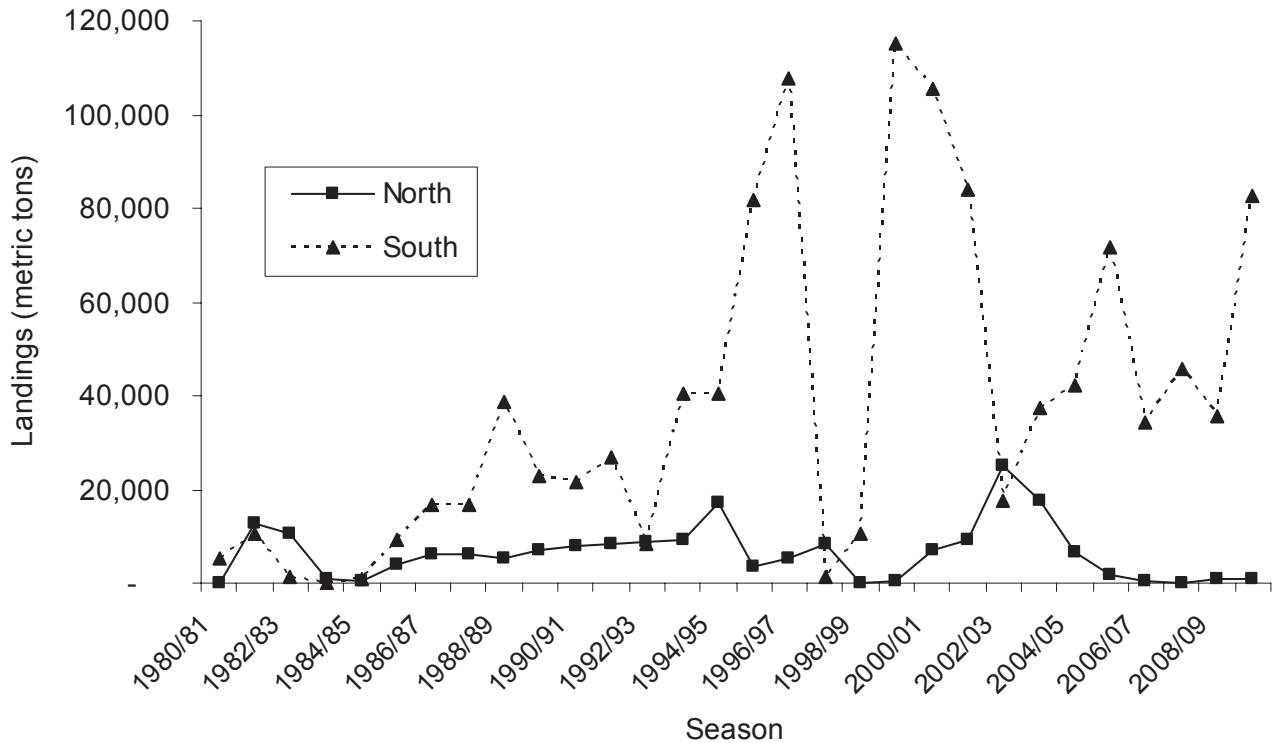


Figure 5. Comparison of market squid landings for northern and southern fisheries by fishing season (1 April–31 March), from 1980–81 to 2009–10 seasons.

The fishery targets adult market squid during spawning events usually in shallow water over sandy substrate. The fishery primarily uses purse and drum seine vessels with attracting lights to catch market squid. These vessels often work with smaller light boats, which use bright lights to aggregate squid near the surface. Depending on weather conditions and regulations, seine vessels and some light boats also brail the squid using dip nets to scoop the squid from the surface. This technique also supports an existing commercial live bait fishery for market squid. Although, the amount of squid harvested and the value of the fishery is largely unknown, the live bait fishery is likely a low-volume, high-value endeavor, as recreational anglers are willing to pay up to \$85 for a “scoop” of live squid.

To protect and sustain the resource and fishery, market squid have been managed by the state of California under the Market Squid Fishery Management Plan (MSFMP) since 2005. The MSFMP instituted fishery control rules including an annual catch limit of 107,048 t, monitoring programs designed to evaluate the impact of the fishery on the resource, weekend closures, light restriction and area closures for seabirds, and a restricted access permit program, with transferable and non-transferable permits based on participation in the fishery. Vessels are required to have a permit to possess or land over 1.8 t of squid. In 2009 a total of 167 restricted access permits were issued including 83 vessels, 63 light boat, and 21 brail permits.

Of the 83 vessel permits issued, 70 vessels made commercial landings, with 50 vessels making approximately ninety percent of the landings.

### Red Abalone

The northern California recreational red abalone (*Haliotis rufescens*) fishery is the only abalone fishery currently open in California. The moratorium placed on commercial and recreational take of all abalone south of San Francisco in 1997 remains in effect. Management of the recreational fishery and recovery of southern abalone stocks are administered under the Abalone Recovery and Management Plan (ARMP), which was adopted by the Commission in 2005. This plan sets management guidelines and triggers for Total Allowable Catch (TAC) adjustments based on 3 criteria: density, recruitment, and catch per unit effort (CPUE). Data for these criteria come from fishery independent dive surveys, fisherman report cards combined with a systematic telephone survey, and fishery dependent creel surveys.

Dive surveys are conducted at eight index sites, with all sites visited on a rotating triennial basis. These surveys are the primary method for providing density and recruitment data for population abundance estimates. The completion of the 2008 and 2009 surveys revealed declines in the abalone abundance index to 0.53 abalone/m<sup>2</sup> (5,300 abalone/hectare) in contrast to densities of 0.68 abalone/m<sup>2</sup> (6,800 abalone/hectare) from sur-

TABLE 3  
 Northern California abalone population survey densities (abalone/m<sup>2</sup>) compared to abalone Recovery and Management Plan critical density values of Total Allowable Catch (TAC).

Site/Year	Deep Transects (>8.4m)		All Depths		Recruitment Density
	Number of Transects	Density (abalone/m <sup>2</sup> )	Number of Transects	Density (abalone/m <sup>2</sup> )	0–177 mm (abalone/m <sup>2</sup> )
Todds Point 2006	18	0.16	34	0.43	0.12
Caspar Cove 2008	24	0.19	50	0.43	0.11
Van Damme 2007	14	0.16	28	0.69	0.30
Arena Cove 2007	19	0.45	36	0.64	0.23
Salt Point 2008	21	0.15	41	0.39	0.15
Ocean Cove 2007	19	0.42	36	0.86	0.39
Timber Cove 2009	20	0.27	35	0.43	0.09
Fort Ross 2009	22	0.17	43	0.33	0.10
Average		0.25		0.53	0.19
Critical Values for TAC decrease		<b>0.25</b>		<b>0.50</b>	

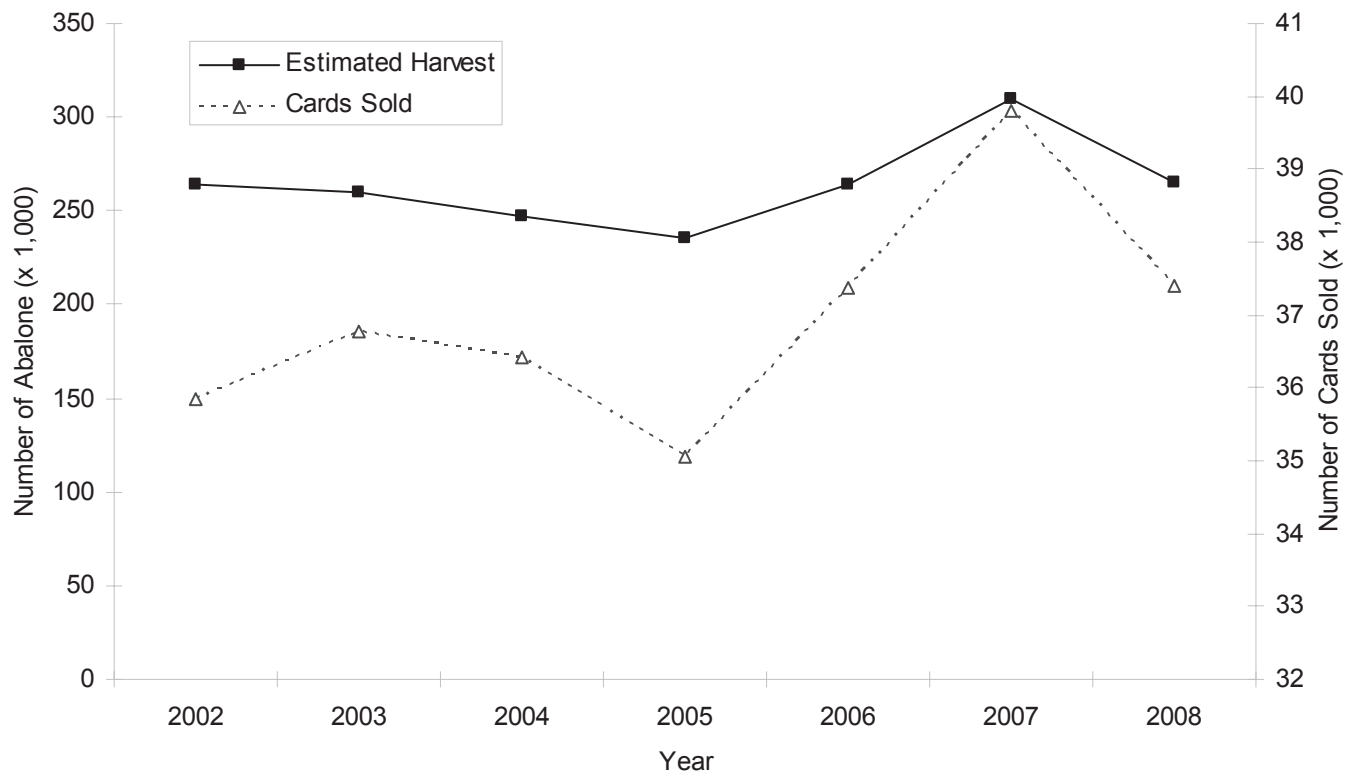


Figure 6. Annual harvest of red abalone (*Haliotis rufescens*) as estimated from combined report card and telephone survey results and number of report cards sold annually.

veys completed between 2005 and 2007 (tab. 3). Using the most recent surveys of all eight index sites, overall densities show declines in abalone at the refuge depth (>8.4 m) and at all depths surveyed, to levels close to the ARMP trigger to reduce the TAC (0.25 and 0.50 abalone/m<sup>2</sup>, respectively) (tab. 3). The 2010 dive surveys will complete a second triennial index site rotation and will provide crucial data to direct management actions regarding the future TAC.

Report card data combined with a systematic telephone survey of report card purchasers provide an esti-

mate of the total harvest per year since 2002 (fig. 6). The telephone survey provides data on report card purchasers who fail to turn their cards in at the end of the season. The most recent catch data available are from the 2008 season in which an estimated 265,066 abalone were harvested, a 14.3% decrease from the 2007 estimated harvest of 309,449 abalone. The number of abalone harvested per picker per year decreased by 7.8% from 8.9 to 8.2 abalone from 2007 to 2008. The number of cards sold in 2008 decreased by 6% from 39,789 sold in 2007, the highest annual sale of cards since 2002, to 37,408 cards



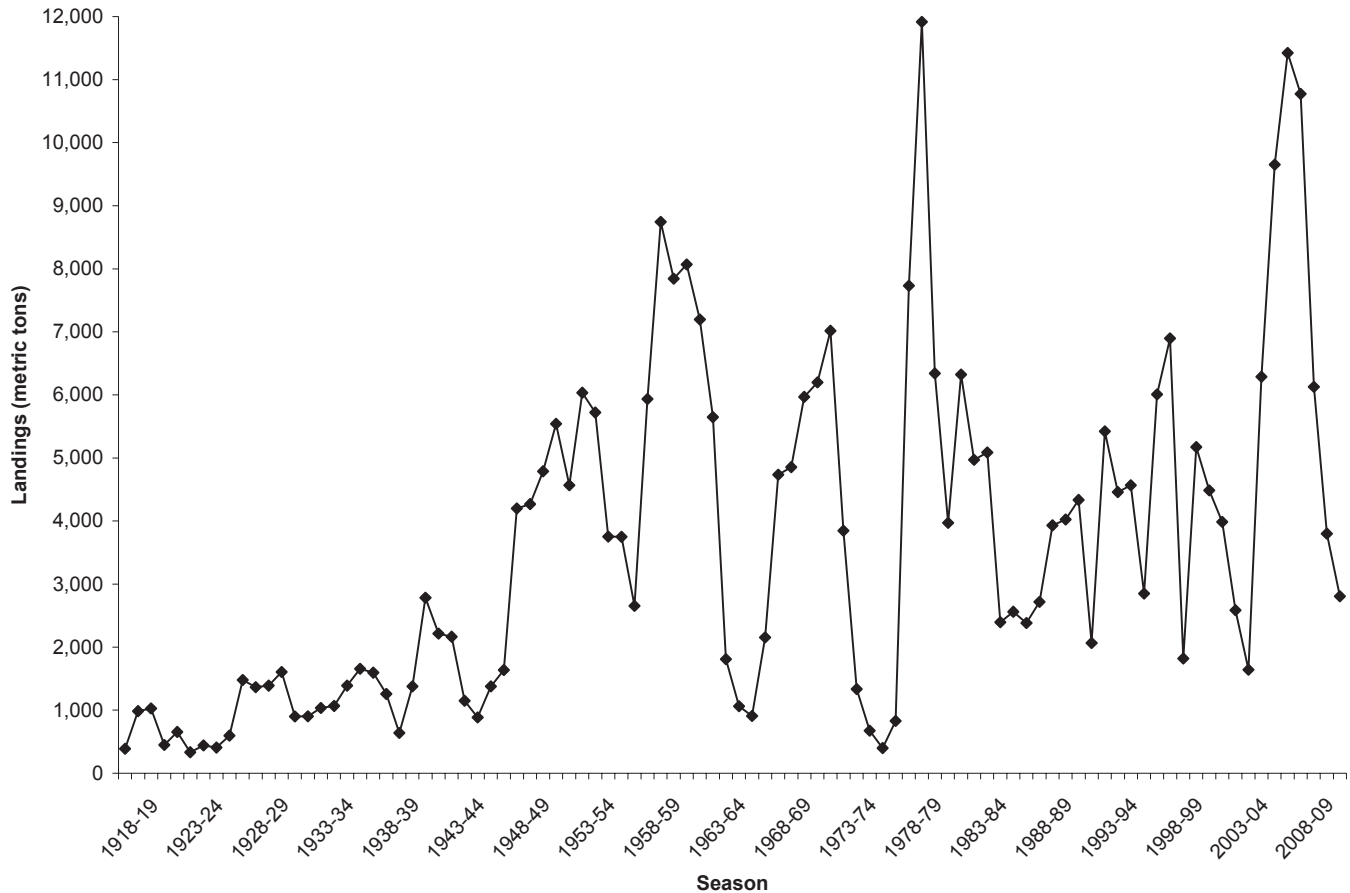


Figure 7. California commercial Dungeness crab (*Cancer magister*) landings, 1915–16 to 2008–09.

sold in 2008. This decrease accounts for only a portion of the harvest decline between those two years.

Creel surveys are completed in alternate years and are used to collect CPUE data in the form of take per picker day or take per picker hour by fishing mode, as well as detailed catch location information and catch size frequencies. The 2009 diver take per day declined by 11% from 2007 while the shore picker take per day decreased by 18%. CPUE in take per hour also decreased between 2007 and 2009. Overall take per hour declined by 24%, with a 16% and 32% drop by divers and shore pickers, respectively. Variations in year to year CPUE can be influenced by ocean conditions during the survey periods. For management decisions, CPUE is compared statistically using blocks of several years and in conjunction with CPUE from the report cards.

New regulations requiring the tagging of each abalone retained were implemented in 2008 to help reduce illegal take and ensure compliance with the daily bag and annual limits of 3 and 24 abalone, respectively. Also new as of 2008, cards are required for everyone taking abalone, regardless of age, in order to provide more accurate take estimates.

### Dungeness Crab

The Dungeness crab (*Cancer magister*) fishery is highly cyclical and ranges from Alaska to Monterey, California. California commercial landings of Dungeness crab for the 2008–09 season totaled 2,807 t (fig. 7), well below both the 10-season and 50-season moving averages of 5,908 t and 4,523 t, respectively. This was the fourth consecutive season in decline, a 26% decrease from the 2007–08 catch. The average price paid to fishermen was \$5.24/kg (\$2.38/lb) resulting in a total ex-vessel value of \$14.7 million, a 36% decrease from the previous season. The decline in landings and value can be attributed to a disproportionate drop in central California’s catch from 1,622 t caught in the 2007–08 season to 498 t in 2008–09. Typically, the central California catch is lower in volume than in northern California, but the statewide fishery value can be disproportionately affected by varying geographical ex-vessel prices. Initial data from the 2009–10 season indicates an upturn in the fishery. Preliminary numbers show the season in progress has already surpassed the 10-season average by at least 2,500 t.

The commercial Dungeness crab fishery is managed through the state legislature and is California’s largest

commercial crab fishery. The commercial fishery regulations are comprised of size, sex, and seasonal restrictions, along with restricted access to the fishery. Only male crabs larger than 159 mm (6.25 in) carapace width can be harvested commercially. The minimum size limit is designed to protect sexually mature male crabs from harvest for at least one season. Studies have shown that, despite the presumption that nearly all legal sized male crabs are harvested each season, most sexually mature female crabs are fertilized each year. The timing of the central (south of the Mendocino/Sonoma County line) and northern (north of the Mendocino/Sonoma County line) California seasons protects the portion of the life-cycle when most crabs are molting or soft-shelled, and thus vulnerable to predation and handling mortality.

Of the 585 vessels with a 2010 commercial Dungeness Crab Vessel Permit, 395 boats made at least one landing in the 2008–09 season. The Dungeness crab fishery has evolved into a derby fishery where much of the total catch is caught in a relatively short period of time at the beginning of the season. For example, in the 2006–07 season, 79% of the total catch was landed within two months of the northern season opener. There is no limit to the number of traps a vessel may fish or the frequency with which they are fished, and no reliable estimates of either effort level. As the groundfish industry has declined, larger multi-purpose vessels have devoted more effort to Dungeness crab. According to a 2003 CalCOFI report based on a fisherman survey, there were at least 172,000 traps being fished in California during the 2001–2002 season. In Oregon's comparable Dungeness crab fishery, the estimated number of traps soared from 150,000 in 2002 to 200,000 in 2005 before implementation of a trap limit. Reports of overcrowded fishing grounds, in central California in particular, have increased in recent years.

Concerns over the number of crab traps deployed in both central and northern California has led to management recommendations from fishery constituents. Recommendations included support for controlling total allowable commercial effort, defining latent permits, putting special restrictions on latent permits, defining vessel size expansion, preventing permit transfers to fish processors, continuing current management schemes (size, sex, season), and, most notably, a strong recommendation for an industry funded, statewide, tiered trap limit program.

The recreational Dungeness crab fishery is managed through size, season, and bag limit regulations by the Commission. The minimum size for sport fishing is 146 mm (5.75 in) and, unlike the commercial fishery, the take is not legally limited to male crabs. California is the only state on the west coast to allow sport take of female crabs. The daily bag limit and possession limit is ten crabs.

Sport fishers on CPFVs, whose activities in catching crab have increased in the last decade, are generally subject to the same regulations, except that when fishing from Sonoma County south, the bag limit is reduced to six. In November 2009, CRFS began sampling Dungeness crab sport fishing from shore and private, rental and CPFV vessels. Expanding sampling to include Dungeness crab as part of the regular CRFS program was motivated by a November 2008 regulation change that opened the sport fishery statewide on the first Saturday of November. Previously, counties north of Sonoma County opened on the fourth Saturday of November, which provided little opportunity for sport fishermen to set their traps before commercial gear dominated the crab grounds.

### **Pacific Herring**

California's Pacific herring (*Clupea pallasii*) fisheries in 2009 had the second lowest landings in the 35 year history of the modern fishery. During the 2008–09 sac roe season (December 2008 through March 2009) the San Francisco Bay fleet landed 459.9 t, 74% of their 2007–08 landings (623.2 t) (fig. 8), and only 49.8% of the 924.4 t quota. There was no fishing effort in Tomales Bay, Humboldt Bay, or Crescent City Harbor during the 2008–09 season.

The forecast 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. Ex-vessel prices for roe herring are set using a base price with 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%. Ex-vessel prices in the herring sac roe fishery can vary greatly based on roe recovery rates. The 2008–09 base price for roe herring with 10% or greater roe recovery was \$771/t (\$700/short ton) landed, with an additional \$70 paid for each percentage point above the 10% baseline. The average roe count for the 2008–09 season was 13.5% resulting in an ex-vessel value of \$1,043/t (\$946/short ton). Due to a decrease in landings, the statewide ex-vessel value of the herring sac roe fishery fell from \$587,852 in 2008 to \$479,446 in 2009.

The San Francisco Bay herring eggs-on-kelp fishery landed 3.0 t which was only 19% of their 16.0 t quota; whereas, in the previous season 13.7 t of the 15.4 t quota was landed. Price paid for eggs-on-kelp ranges from \$13.23–39.68/kg (\$6–18/lb) depending on the quality of the product. The total estimated value of the 2008–09 eggs-on-kelp harvest was approximately \$41,588 based on an average ex-vessel price of \$13.78/kg (\$6.25/lb).

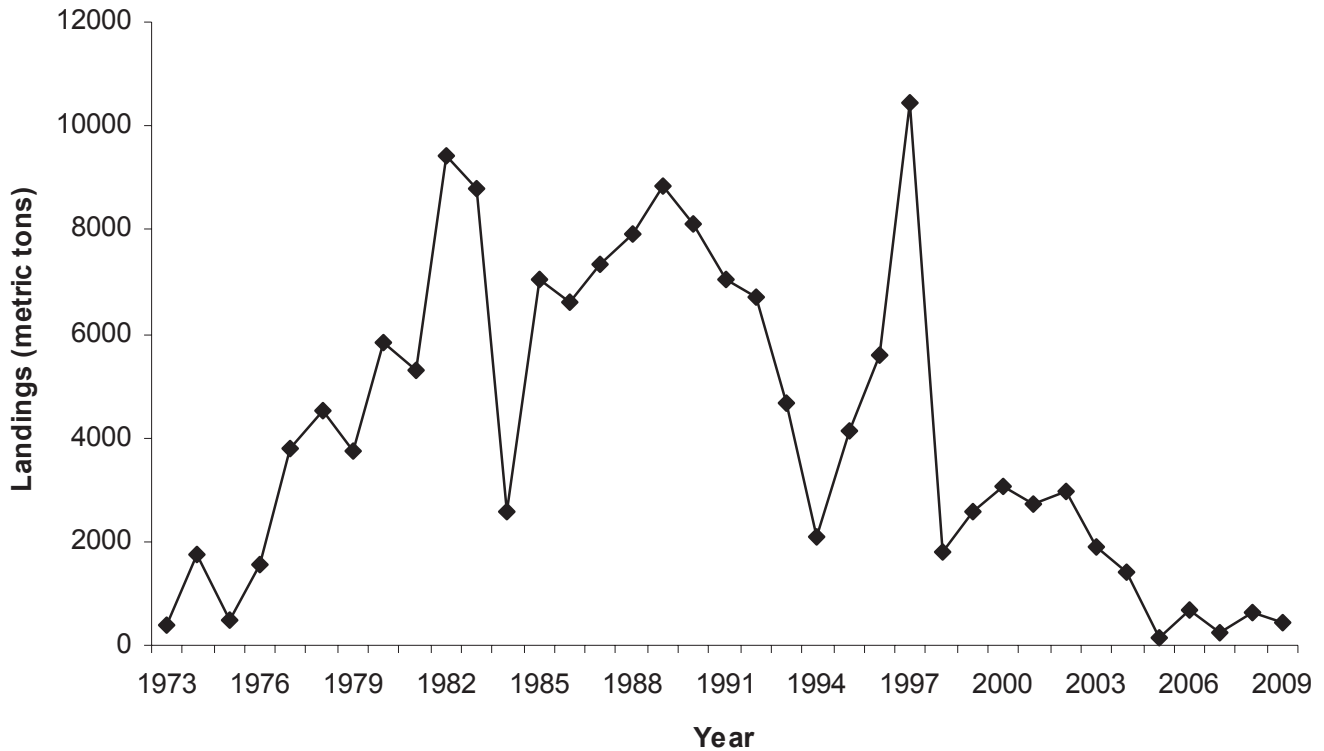


Figure 8. San Francisco Bay commercial Pacific herring (*Clupea pallas*) sac roe, 1972–2009.

During the 2008–09 season the Department conducted spawn deposition surveys in San Francisco Bay to estimate the spawning biomass of the herring stock. The spawning biomass estimate for San Francisco Bay is 4,394 t, a 57% decrease from last season’s estimate of 10,145 t. This estimate is the lowest recorded estimate in the history of the roe herring fishery (1973–74 season to present). No spawning biomass estimates were made for Tomales Bay, Humboldt Bay, or Crescent City in 2008–09.

The Department and the Director’s Herring Advisory Committee (composed of fishing industry representatives) recommended a zero harvest or no fishery option for the 2009–10 season, due primarily to concerns over the low biomass estimate. The Commission adopted this recommendation and closed the San Francisco Bay herring sac-roe and herring-eggs-on-kelp fisheries for the 2009–10 season and the ocean waters fishery for 2010 and beyond. This was the first time a herring roe fishery closure was approved by the Commission since the fishery began in 1972–73. This precaution was enacted so that the San Francisco stock can be rebuilt to a level that provides long term sustainability of the fishery. In addition, potential impacts from the Cosco Busan oil spill remain unresolved, as the results from the Natural Resources Damage Assessment study on oil impacts to herring resources have yet to be released.

Prior to closing the San Francisco Bay herring roe fishery, the Commission took emergency regulatory

action to close the remainder of the 2009 ocean waters fishery beginning in July. This herring fishery occurs during the non-spawning season primarily in the waters of Monterey Bay and was the only herring fishery with no quota limit. From 1998 to 2002, intermittent herring landings have been made from ocean waters, accounting for approximately 0.2 percent of California’s overall herring catch. However, between 2005 and 2008, approximately 35 percent of the overall California commercial herring catch was landed by this fishery. Due to the increase in overall California catch by the ocean waters fishery, the emergency action was sought by the Department to protect the remaining herring stock.

#### Groundfish/Nearshore Live-fish

The nearshore fishery, as defined by California’s Nearshore Fishery Management Plan, includes a select group of finfish: cabezon (*Scorpaenichthys marmoratus*), California scorpionfish (*Scorpaena guttata*), California sheephead (*Semicossyphus pulcher*), kelp greenling (*Hexagrammos decagrammus*), rock greenling (*Hexagrammos lagocephalus*), monkeyface prickleback (*Cebidichthys violaceus*), and the following rockfishes (*Sebastes* spp.): black (*S. melanops*), black-and-yellow (*S. chrysomelas*), blue (*S. mystinus*), brown (*S. auriculatus*), calico (*S. dalli*), 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

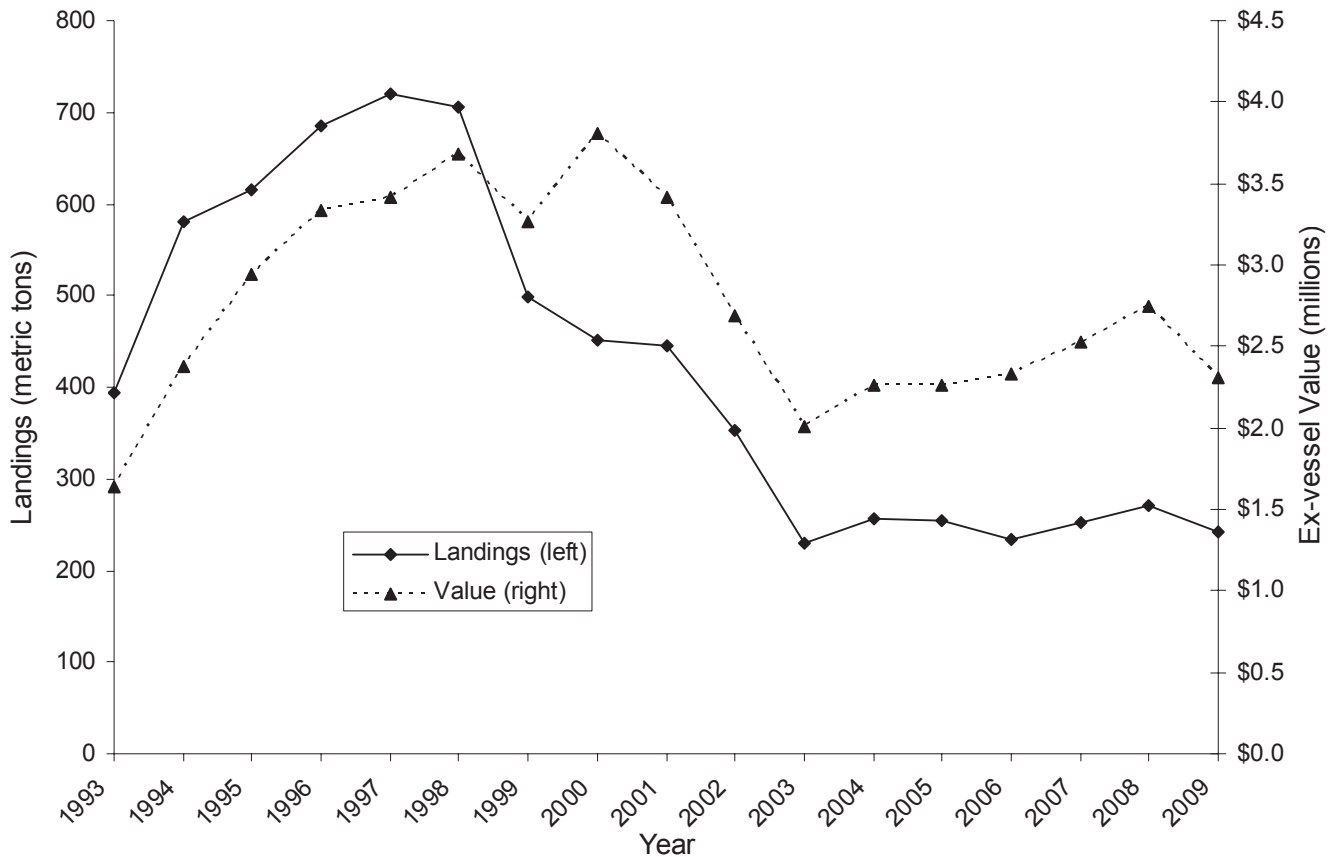


Figure 9. California commercial landings and ex-vessel value of nearshore live finfish, 1993–2009.

sheephead, monkeyface prickleback, and rock greenling are also federally designated as groundfish species under the Council’s fishery management plan for Pacific coast groundfish.

These 19 species represent the most commonly landed fish in the nearshore live-fishery. Many are primarily found in shallow waters less than 20 fathoms and are associated with structures such as kelp beds or rocky reefs. Many are slow-growing, long-lived, and territorial, making them potentially vulnerable to overfishing even at low exploitation rates.

In 2009, statewide commercial landings of nearshore live-fish totalled approximately 242 t (fig. 9). Of that, a total of 219 t or 90% (fig. 10) was recorded as live-landed fishes and 23 t or 10% were recorded as dead-landed. The 2009 landings were 10% less than the 2008 landings (270 t). The total ex-vessel value for the 2009 landings was \$2.32 million, of which \$2.25 million was paid for live fish (fig. 9). This represents a decrease from the 2008 total ex-vessel value of \$2.75 million, where \$2.64 million was paid for live fish. Proportionally, in 2009, 97% of the ex-vessel value can be attributed to live landings; a slight increase from 2008 when 96% of ex-vessel value was attributed to live landings.

The nearshore live-fish fishery evolved from the demand for specialty foods in Asian restaurants and markets in southern California. What started out as an alternative fishery quickly expanded into a multi-million dollar industry by the early 1990s, reaching its peak in the late 1990s (fig. 9). Part of the reason for this boom was the willingness of consumers to pay a much higher price for live fish than dead fish of certain species, particularly plate-sized fish. That premium was passed on to fishermen in the form of higher ex-vessel prices (price per pound paid to fishermen upon landing of catch) for live fish. In 2009, live grass rockfish commanded the highest average price per kilogram of live fish (\$19.16/kg or \$8.69/lb); whereas the highest average price paid for a kilogram of dead fish was \$5.34 (\$2.42/lb) (quillback rockfish).

Black rockfish were landed in the greatest quantity (94.3 t), representing 39% of the total statewide nearshore live fish landings, the bulk of which was landed in the northern region of the state. In dollars, the top three species landed in the statewide live fishery for 2009 were black rockfish (\$0.40 million, 17.4% of total revenue), gopher rockfish (\$0.37 million, 16.1% of total revenue) and California sheephead (\$0.33 million, 14.3% of total revenue).

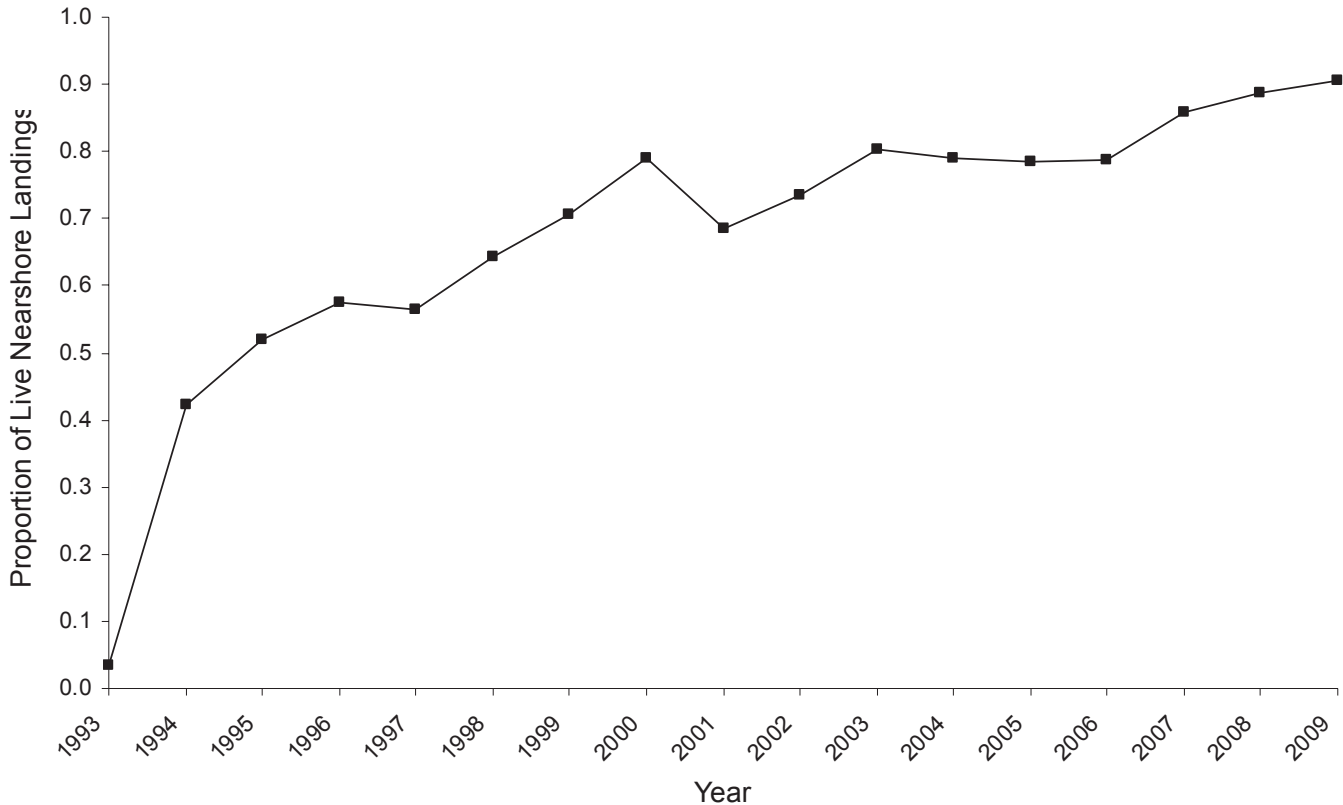


Figure 10. Proportion of commercially landed finfish recorded as live, 1993–2009.

Hook-and-line and trap gear were the primary means used to catch and land nearshore fish species. Hook-and-line gear primarily consisted of rod and reel, vertical and horizontal longlines, and weighted stick gear (although stick gear is commonly used in the nearshore fishery it does not have a designated gear code in the commercial landings database, and is recorded as “hook-and-line gear”). All hook-and-line gears combined were used to land 204 t of live nearshore fish. All trap gears combined resulted in 36.5 t of live nearshore fish. These two gear types accounted for 84% and 15% of the total nearshore live fish landed in 2009, respectively.

**2009 Nearshore Fishery Management Highlights.** Staying within optimum yields (OY) and total allowable catch (TAC) allocations while avoiding impacts to overfished species are the driving forces behind management of the nearshore fishery at both the state and federal levels. One tool to stay within TAC allocations is to close a fishery if landings are projected to exceed the allotted amount; in 2009, the commercial fishery for kelp and rock greenling was closed on 1 September to stay within its annual statewide TAC allocation. Conversely, if a fishery is not expected to attain its OY or TAC allocation, trip limits or other management measures may be changed to increase access to the fishery. In 2009, depth restrictions for the nearshore fishery north of 40°10'N.

lat. required participants to stay in waters shallower than 20 fathoms to minimize impacts to yelloweye rockfish (*S. ruberrimus*) (an overfished species). The black and minor nearshore rockfish trip limit north of 40°10'N. lat. was restructured to allow greater access to the healthy black rockfish stock while minimizing take of other minor nearshore rockfish species. This increase in opportunity required close monitoring to ensure the fishery stayed within the statewide harvest guideline for blue rockfish, which is commonly caught in conjunction with black rockfish.

In 2009, a full cabezon stock assessment off the coast of California was conducted. Results of this new stock assessment will be used to determine the management measures (trip limit and season structure) for use in the 2011–2012 management cycle.

### Highly Migratory Species

**Albacore.** Albacore (*Thunnus alalunga*) is the most abundant tuna caught in both commercial and recreational fisheries in California and along the west coast. In the commercial fishery albacore are caught primarily using hook and line gear (jig/bait/troll), but they can also be caught using drift gill net or a purse seine. Along the entire west coast 12,262 t were commercially landed in 2009 (fig. 11). This is an increase of almost

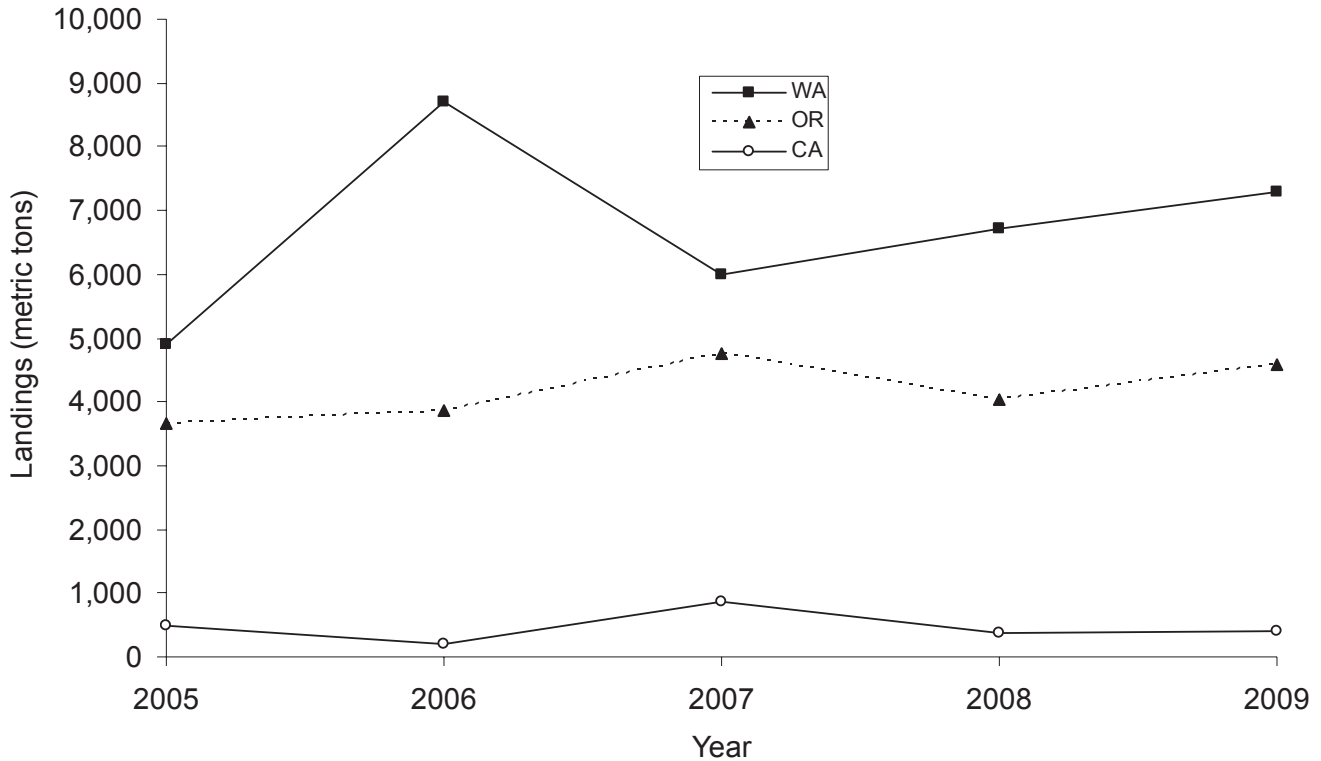


Figure 11. West coast commercial landings of Albacore (*Thunnus alalunga*), 2005-2009.

10% coastwide. California landings held steady from last year, but are still about 50% of the 5 year high of 856 t in 2007. In 2009 the ex-vessel value in California was \$0.9 million and price-per-kilogram decreased slightly to \$2.41/kg (\$1.09/lb), just slightly higher than the coastwide average. Most of this catch was exported for processing and canning, but a small percentage was sold for the restaurant trade.

The Council and the state of California have adopted bag limit conservation measures for albacore (10 fish south of Point Conception, 25 fish north of Point Conception). Most of the recreational take of albacore comes from sportfishing in Mexican waters, which has a 5-fish daily bag limit. In 2009, 33,679 albacore were reported taken by California's CPFVs, which is only a slight decrease from 35,873 fish taken in 2008 (fig. 12). While the California CPFV fishery saw a slight decrease in albacore landings in 2009, all other areas of the recreational fishery in Oregon and California saw increased landings of approximately 25%. RecFIN estimates 9,000 fish were caught in CA, which is primarily from fishing modes other than CPFVs since trips longer than a day are underrepresented in the estimates. A total of 42,000 fish were caught in Oregon and no fish were caught in Washington in 2009.

**Yellowfin Tuna.** Coastwide commercial landings of yellowfin (*Thunnus albacares*) decreased again in 2009 to

45 t, the lowest commercial landings in 5 years. Over 96% of the landings were in California, by hook and line (64%), purse seine (34%), and drift gill net (<1%). Ex-vessel value totaled \$166,281 and price-per-kilogram increased to an average \$3.81/kg (\$1.73/lb) compared to \$1.92/kg (\$0.87/lb) in 2008. Most of the catch was processed into canned consumer product, with some sold to the restaurant trade. Exports of fresh frozen yellowfin tuna from California went to México for processing as there are currently no canneries operating in California. CPFV logbook data indicate recreational anglers landed 77,286 yellowfin, a 48% increase from 2008 and a 5 year high. Recreational landings of yellowfin tuna were on a decline for many years hitting a low of 20,124 in 2007, but have seen significant increases in 2008 and 2009.

**Skipjack Tuna.** West coast commercial landings of skipjack (*Katsuwonus pelamis*) in 2009 all occurred in California (primarily southern) and increased slightly to 5 t from 3 t in 2008, but this is still significantly lower than the 5 year high of 523 t in 2005. The variable catch success is likely due to seasonal fluctuation in abundance of fish within range of southern California vessels. The ex-vessel value decreased to an average of \$1.03/kg (\$0.39/lb) from \$1.24/kg (\$0.56/lb) average paid in 2008. Skipjack is primarily landed in California by purse seine vessels. Frozen skipjack are exported for processing into canned product. CPFV logbook data indicate



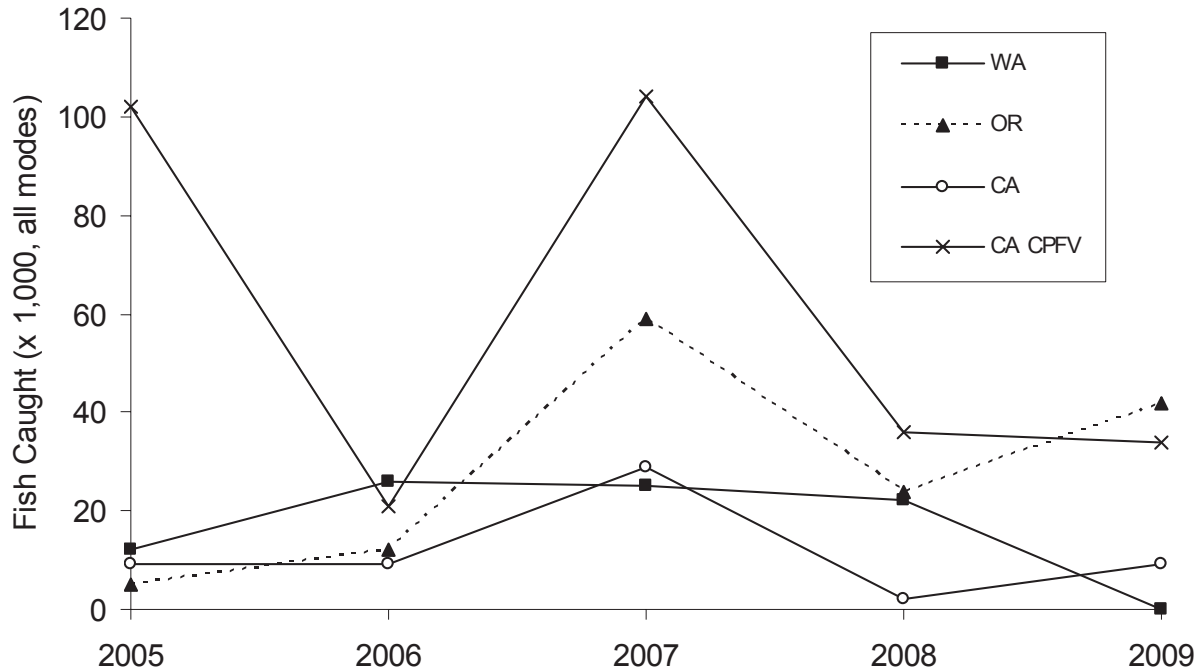


Figure 12. West coast recreational landings of Albacore (*Thunnus alalunga*), 2005–2009. State totals are from RecFIN, all fishing modes. CA CPFV values are from CPFV logbooks and include albacore caught in Mexico.

that recreational anglers landed 9,751 fish in 2009 a 67% increase from 2008 (5,845 fish).

**Bluefin Tuna.** Commercial landings of bluefin (*Thunnus thynnus*) increased to 414.7 t in 2009 (from 0.8 t in 2008), the greatest annual landings in the past 5 years (99% of this was caught in California). Ex-vessel value was \$441,383, and price-per-kilogram decreased to \$1.06/kg (\$0.48/lb) from an average \$4.07/kg (\$1.85/lb) in 2008. Purse seine vessels caught 99% of the bluefin landed in 2009. This is commonly seen in years where the fish are plentiful enough to target, in less abundant years bluefin are only caught incidentally to other fisheries on hook-and-line and drift gillnet. California recreational anglers landed 10,739 bluefin in 2009, up from 10,268 fish landed in 2008.

**Swordfish.** Swordfish (*Xiphias gladius*) is the most valuable fish taken in the California highly migratory species (HMS) fishery. In 2009, commercial landings totaled 404 t, 282 t in California. This was a 23% decrease both coastwide and in California from 2008 (531 t and 366 t respectively). In 2009, the California commercial catch was valued at \$1.9 million and was taken using drift gill net gear (62%), hook-and-line gear types (26%) and by harpoon (12%). The price-per-kilogram increased in 2009 to an average of \$6.83/kg (\$3.10/lb) compared to \$6.44/kg (\$2.93/lb) in 2008. Swordfish caught by harpoon is considered more valuable than gill net caught fish. Ex-vessel price-per-kilogram exceeded \$13.50/kg (\$6.10/lb) for harpooned fish. The recreational catch of

swordfish is very low along the entire west coast for the past 5 years. There have only been recreational landings in California and none recorded in 2009. In April, the Council took final action not to authorize a shallow-set longline fishery seaward of the West Coast Exclusive Economic Zone in the Pacific Ocean.

**Common Thresher Shark.** Common thresher shark (*Alopias vulpinus*) is the most common and most valuable shark taken in the California HMS fishery. In 2009, 90% of the commercial catch of common thresher shark came from gill net vessels. Commercial landings decreased to 62 t in 2009 from 86 t in 2008. The ex-vessel value totaled \$194,788, and price-per-kilogram dropped from an average of \$3.23/kg (\$1.47/lb) in 2006 to \$3.14/kg (\$1.42/lb). CPFV logbook data indicate that 58 fish were landed recreationally in 2009, down from 81 in 2008 and about the same as 2007 (54). Significantly higher landings are seen in RecFIN landings, which are primarily fishing modes other than CPFV. In 2009 an estimated 4,000 thresher sharks were caught in southern California, twice what was caught in 2008. Over the last five years we have seen a steady increase in the recreational fishery with the likely potential for future growth.

**Shortfin Mako Shark.** Shortfin mako shark (*Isurus oxyrinchus*) is the second most common shark landed in the California HMS fishery. In 2009, commercial landings decreased 17% along the entire west coast and in California from 35 t in 2008 to 29 t in 2009. In California 75% of the 20 t commercial catch of mako shark

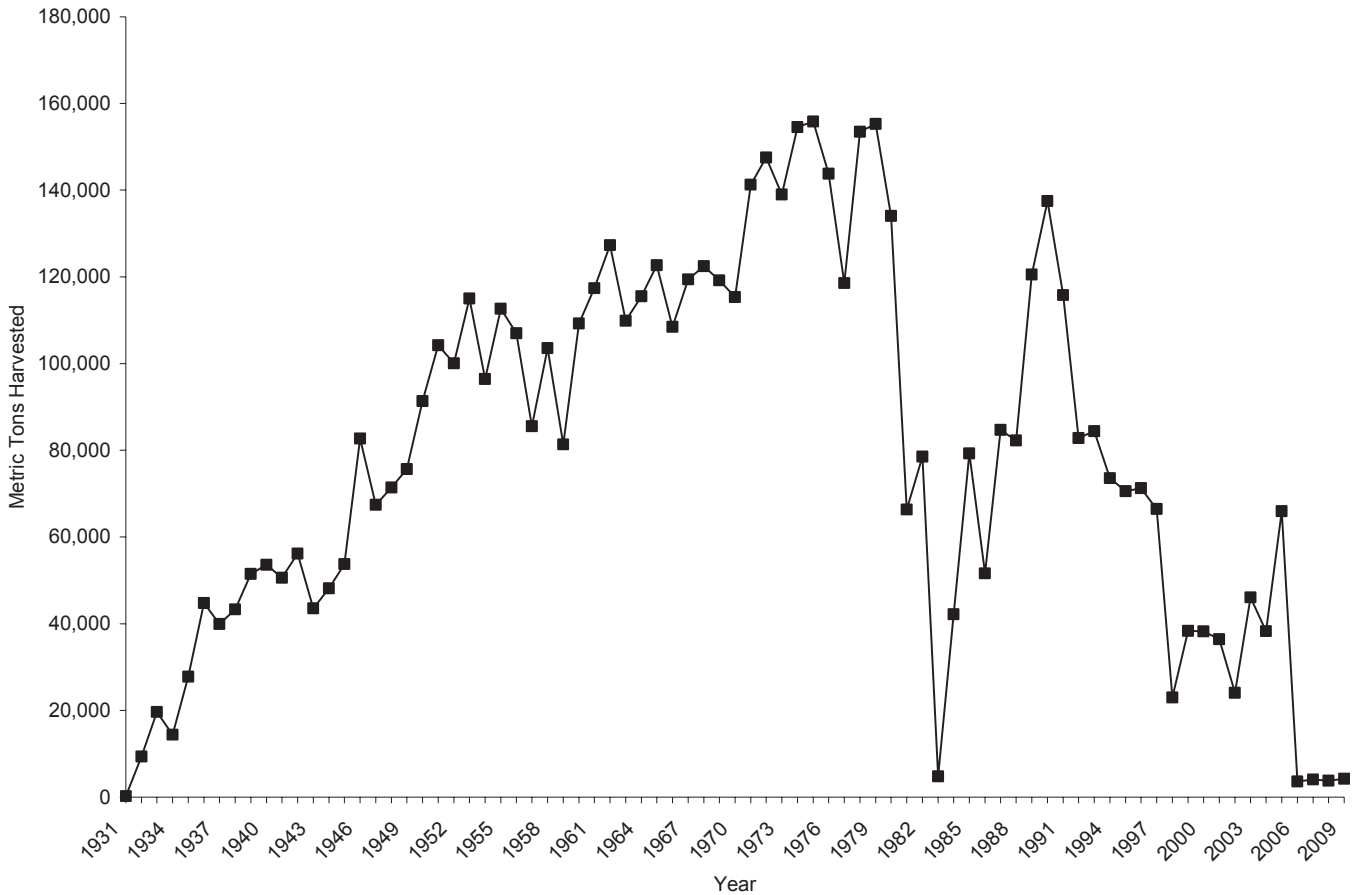


Figure 13. Total California commercial kelp harvest, 1931-2009.

came from drift gill net gear, 12% from set gill nets, 10% from hook-and-line gear types and 3% from harpoon. The ex-vessel value also decreased to \$51,352, with a small drop in the price-per-kilogram from an average of \$2.69/kg (\$1.22/lb) in 2008 to \$2.54/kg (\$1.16/lb) in 2009. According to CPFV logbook data, 292 mako sharks were taken in 2009, a 17% decrease compared to 351 in 2008.

**Dorado (dolphinfish).** Commercial landings of dorado (*Coryphaena hippurus*) totaled 0.6 t in 2009, a 66.6% decrease from the 1.8 t landed in 2006. All of these landings occurred in California. The ex-vessel value was \$3,769, and the price-per-kilogram increased to \$6.14/kg (\$2.79/lb) from \$5.11/kg (\$2.32/lb) in 2008. Historically, dorado landings have been a relatively small component of the HMS fishery and vary from year to year, primarily depending on cyclic intrusions of warm water into the southern California region. Local seafood restaurants purchase dorado when available. CPFV logbook data indicate that recreational anglers landed 7,217 dorado in 2009. This shows how drastically the catch can vary from year to year (31,678 fish landed in 2008 and 7,217 in 2007).

### Kelp

The commercial harvest of giant kelp (*Macrocystis pyrifera*) has shown a sharp decline over the past decade from approximately 38,000 t in 2000 to approximately 4,200 t in 2009 (fig. 13). The sharpest decline occurred in 2005 when one company, ISP Alginates (aka Kelco), moved out of California for economic reasons. Kelp harvesting for algin products was the major purpose for kelp harvesting prior to 2005. ISP Alginates harvested the majority of the kelp for use in its production of alginates. Since 2005, the majority of kelp harvesting has been for the purpose of providing food for abalone aquaculture. Most of this kelp is now harvested from leased beds in central California using small mechanized harvesters. One harvester based in northern California uses a skiff to harvest bull kelp (*Nereocystis luetkeana*). The remaining kelp landings were harvested by the herring-roe-on-kelp fishery, Pacific Gas and Electric Co., edible seaweed distributors, basket makers, and various research organizations.

Edible seaweed harvesting has increased statewide from approximately 5.5 t in 2001 to 23 t in 2009. Kelp is also harvested for recreational use. However, with a cur-

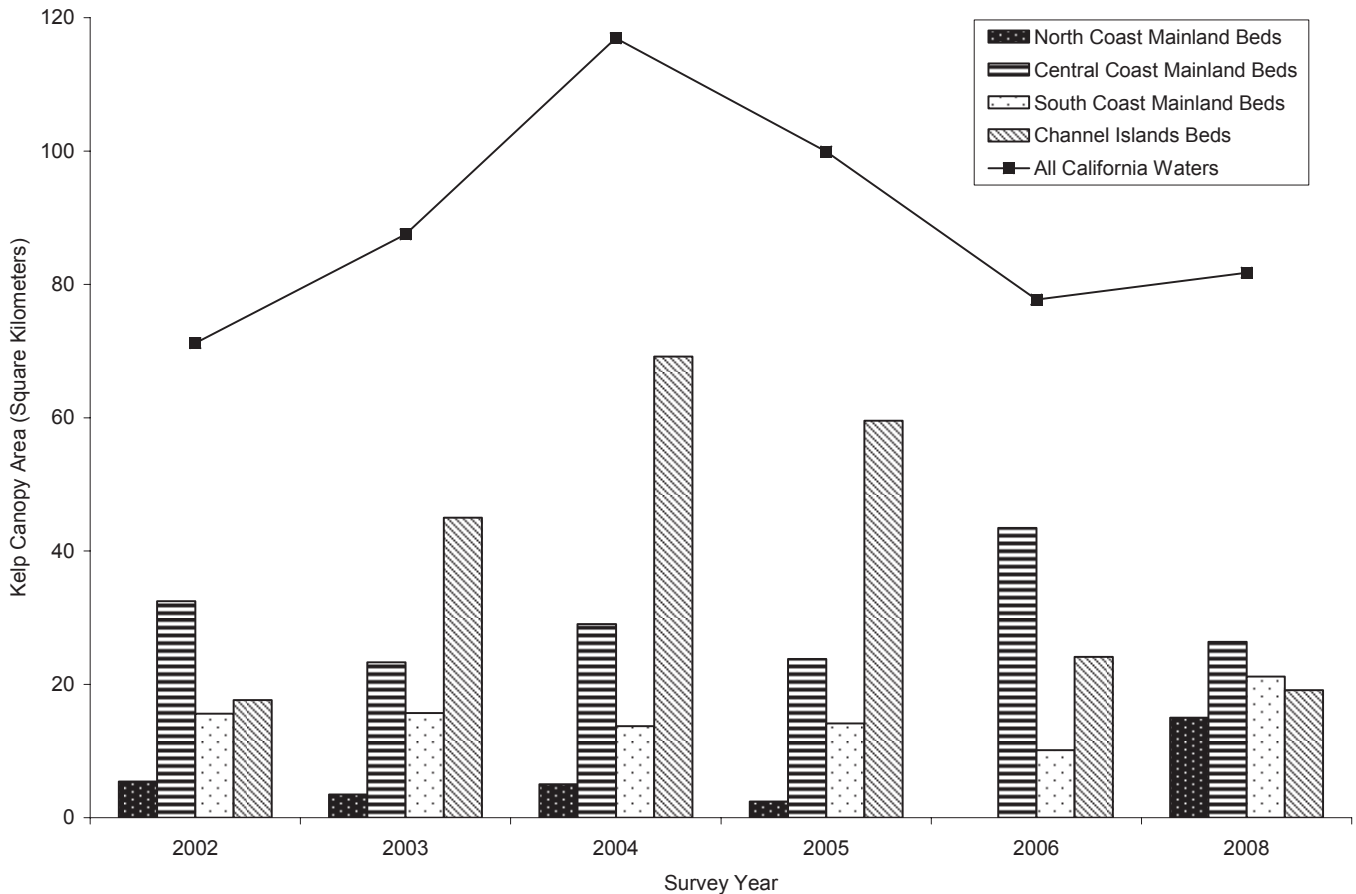


Figure 14. California surveyed kelp canopy area, 2002–2008.

rent bag limit of 4.5 kg/day and a low amount of effort, the total amount taken by this group is probably negligible when compared with the commercial kelp fishery. Recreational harvesters generally collect drift kelp that has been cast ashore.

From 2002 to 2009, generally favorable oceanographic conditions (relatively cool conditions in the mixed layer and a shallow nitracline) should have resulted in productive kelp beds, especially those in the southern California Bight (SCB). However, the total amount of area occupied by kelp canopy in this region is still far below levels documented in the twentieth century. In 1967, 1989, and 1999 Department statewide kelp canopy surveys indicated kelp coverage at 181 km<sup>2</sup>, 105.4 km<sup>2</sup> and 46 km<sup>2</sup> respectively. This long-term decline can be attributed both to natural disturbances, such as warm-water stress and intense storms associated with one El Niño Southern Oscillation (ENSO) event in the 80s and two ENSO events in the 90s. Declines in kelp bed area can also be attributed to human-induced disturbances, such as dredging/sand disposal onto beaches, increased ocean turbidity and siltation in some urban areas, coastal developments, pollution, and commercial/recreational

fishing activities. Some fishing activities remove animals, such as California sheephead and California spiny lobster, which help sustain kelp forests through trophic ecosystem interactions.

The Department began annual kelp aerial surveys statewide in 2002 using multi-spectral imagery to document the abundance and distribution of kelp during the late summer when most beds have reached their maximum canopy potential. Survey images were georeferenced, and used to map and monitor the health of this economically and ecologically important resource. The survey methods have changed over the years in order to provide better data accuracy. The Department has conducted one statewide kelp survey annually from 2002 to 2008, although 2007 data has not been published yet, and no survey was conducted in 2009. Regardless, preliminary results suggest that south coast mainland beds have not increased (recovered) in the same manner that the Channel Island beds have since the last ENSO event in 1997–98 (fig. 14). The kelp beds of the mainland south coast and Channel Island areas are thought to both be subject to the same relative oceanographic conditions and any changes between the two areas might

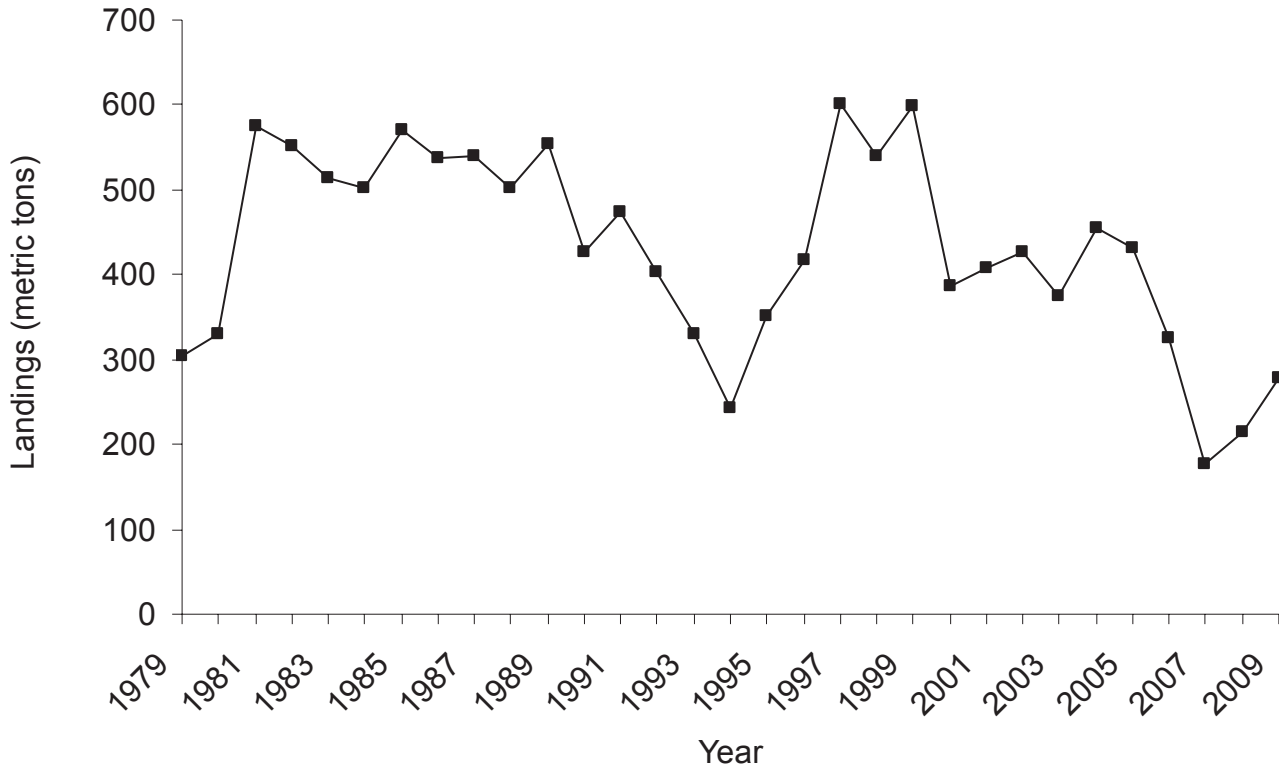


Figure 15. California commercial landings of California halibut (*Paralichthys californicus*), 1979–2009.

suggest other causes, such as differential warming within the SCB or coastal anthropogenic effects. The Department intends to continue annual monitoring of kelp beds statewide in 2010.

### California Halibut

The California halibut (*Paralichthys californicus*) is an important and relatively shallow flatfish species to commercial and recreational fisheries in central and southern California. They are found in nearshore waters from Almejas Bay, BCM to the Quillayute River, Washington, but are most common south of Bodega Bay, California. Individual fish can grow up to 1,524 mm (5 ft) in total length (TL) and weigh as much as 32.7 kg (72 lb).

In the commercial fishery, California halibut are harvested using three primary gears: trawl, hook-and-line, and set gill net. Over the past 30 years, total annual landings of California halibut peaked at 602.4 t with a value of \$3.26 million in 1997, with a low of 176.3 t valued at \$1.84 million in 2007 (fig. 15). Total landings for 2009 were 279.7 t with an ex-vessel value of \$2.57 million. In 2009, the three principle gears comprised 99% of halibut landings. Trawl was the dominant gear used to harvest halibut in 2009, accounting for 52% of the total catch. Hook-and-line and set gill net accounted for 28% and 19%, respectively.

Over the past 30 years, bottom trawls have produced more California halibut landings than any other gear type; landings have fluctuated from a high of 331.3 t in 1997 to a low of 63.4 t in 1979 (fig. 16). At the peak of the halibut trawl fishery (1997), 112 vessels made at least one halibut landing. In the year of lowest trawl landings (1979), 58 vessels made at least one halibut landing. In 2009, a total of 37 trawl vessels landed 145.8 t of halibut compared to 40 trawl vessels that landed 93.1 t in 2008. The San Francisco port complex received a majority (58%) of the landings in 2009, followed by the Santa Barbara (32%) port complex, with Morro Bay accounting for 8% of the trawl catch. Directed trawling for halibut is by Department-issued permit only. Currently there are 48 permitted vessels, but not all actively fish. Vessels with a federal groundfish permit may take up to 150 lb of halibut incidentally while fishing for groundfish.

Gill net landings generally have declined in the past 30 years, from a high of 421.7 t in 1985 to a low of 44.1 t in 2007. A series of depth restrictions, enacted to protect sea bird and sea otter populations along the central California coast and prohibiting set net gear in 60 fm or less, greatly impacted the gill net fleet. This is evident by the lack of landings made north of Point Arguello since 2002. Statewide gill net landings increased slightly in 2009 with 40 gill net vessels landing 54.0 t in 2009

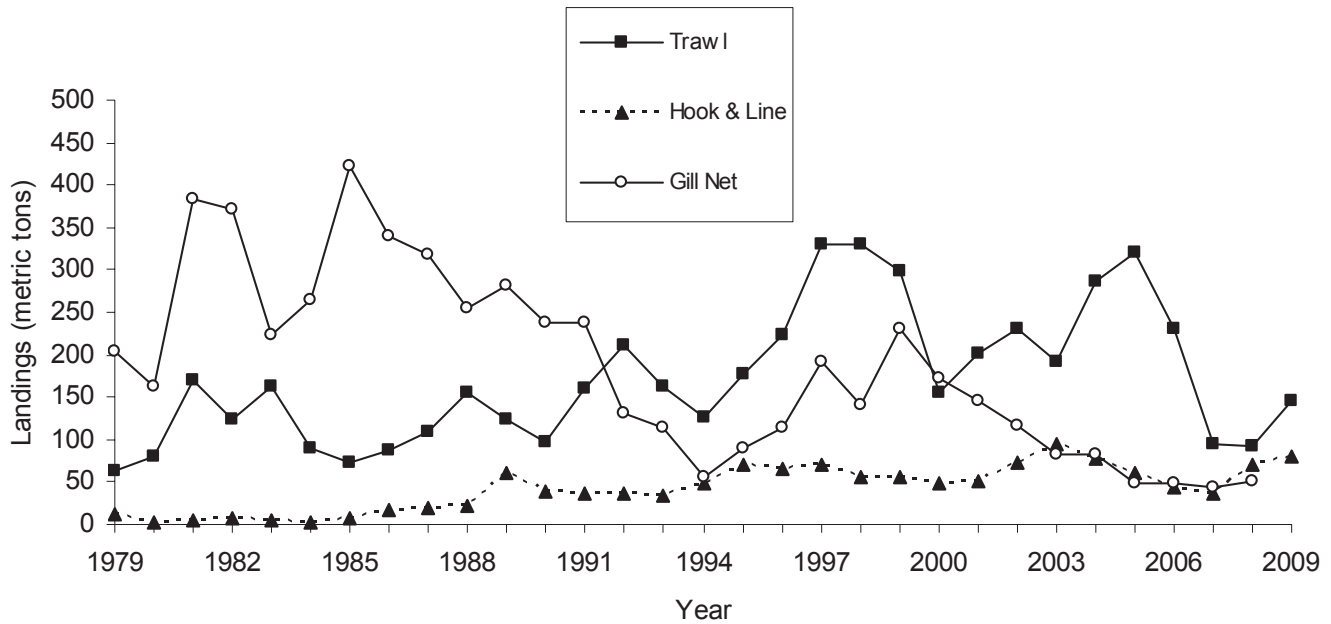


Figure 16. California commercial landings of California halibut (*Paralichthys californicus*) by gear type, 1979–2009.

compared to 42 gill net vessels landing 50.7 t in 2008. The gill net fishery now operates only in southern California, with the Santa Barbara port complex receiving 73% of 2009 landings, followed by the San Diego (14%) and Los Angeles (13%) port complexes.

Annual landings reported by the hook-and-line fleet have fluctuated over the past three decades, ranging from a high of 94.4 t in 2003 to a low of 3.3 t in 1984. From the high of 2003, landings dropped to 37.1 t in 2007, but increased to 71.0 t in 2008 and 78.8 t in 2009. This recent increase in landings can be largely attributed to an increase in effort in the San Francisco Bay fishery, possibly due to displaced salmon fishermen looking for alternate sources of income during the salmon fishery closure of 2008 and 2009. In 2009, 249 hook-and-line vessels landed 78.8 t statewide. The top two port complexes for hook-and-line landings were San Francisco (52%) and Santa Barbara (15%). The hook-and-line fishery is open access; no special permit other than a commercial fishing license is required.

Recreational anglers target California halibut from shore, private and rental skiffs, and CPFVs using hook-and-line gear. Some catch also occurs from scuba divers and free divers using spear guns or pole spears. From 1980 to 2004, the method for estimating recreational catch was the Marine Recreational Fisheries Statistical Survey (MRFSS). During this period, the highest estimated annual recreational catch was 1,062 t (337,000 fish) in 1995 and the lowest estimated annual catch was 122 t (40,000 fish) in 1984 (fig. 17). There are no MRFSS data available for 1990 through 1992. The pre-

dominant fishing mode for 1980 through 2004 was private/rental skiff, followed by CPFV. In 2004, the CRFS replaced the MRFSS. CRFS and MRFSS data and estimates are not comparable.

Preliminary data for the 2009 recreational fishery indicate that an estimated 211 t (58,000 fish) of California halibut was landed for all fishing modes statewide (fig. 18). CRFS data indicate that private and rental boats continued to be the primary mode within the recreational halibut fishery.

For both the commercial and recreational fisheries, a minimum size limit of 559 mm (22 inches) total length is required for retention. Recreational anglers are limited to five California halibut per day south of Point Sur (Monterey County) and three California halibut per day north of Point Sur.

In 2008, the Commission, at the request and with the assistance of industry, adopted regulations which defined the parameters of legal trawl gear (“light touch”) for the California Halibut Trawl Grounds (CHTG) in southern California. The CHTG is the only area within state waters in which bottom trawling is allowed; all other bottom trawling occurs in federal waters. The “light touch” trawl gear allowed within the CHTG must have a minimum cod-end mesh of 190.5 mm (7.5 inches), a headrope less than 27.4 m (90 ft) in length, webbing on any portion of the trawl less than 7 mm (0.28 in.) in diameter, any chain attached to the footrope not exceeding in diameter of the link material, trawl doors not exceeding 226 kg (500 lbs.) in weight, and no rollers or bobbins

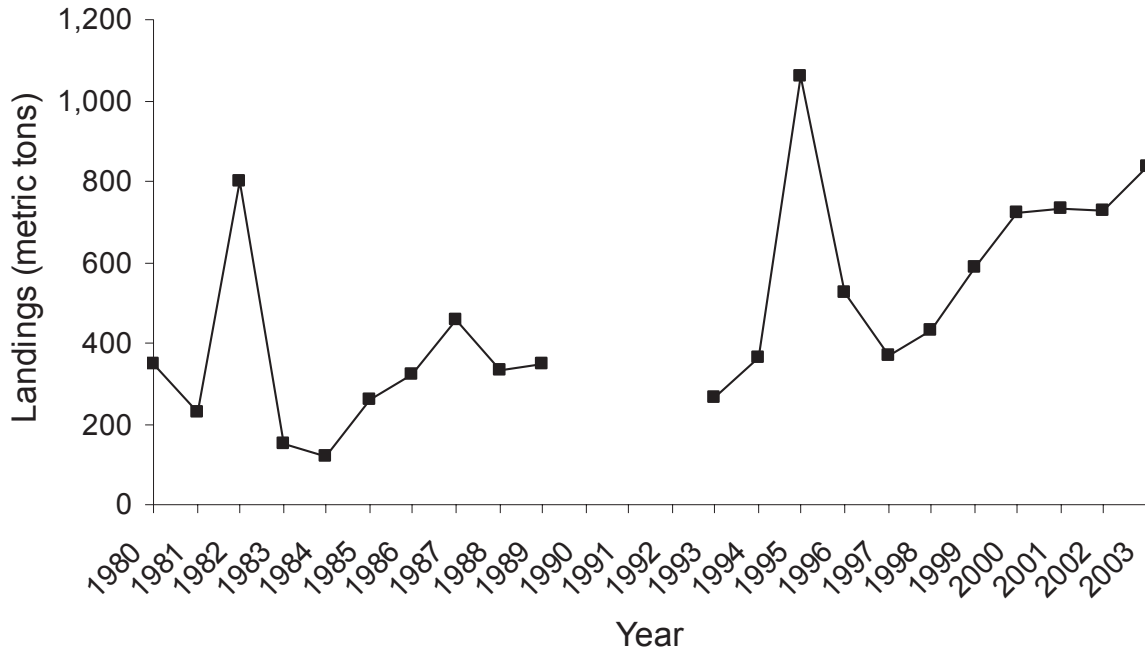


Figure 17. California recreational landing estimates of California halibut (*Paralichthys californicus*), from 1980–2003 as reported by MRFSS. No recreational data from MRFSS were available from 1990–1992.

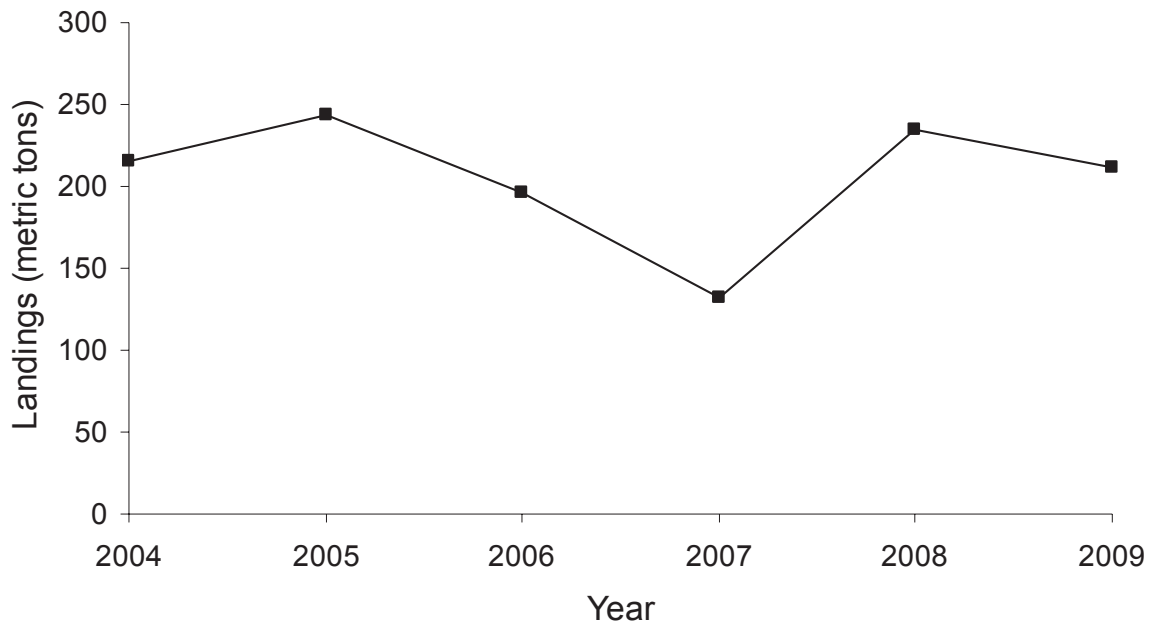


Figure 18. California recreational landing estimates of California halibut (*Paralichthys californicus*), from 2004–2009 as reported by CRFS.

In 2007, the Department began to sample the commercial fishery in central California for the first time for length, weight, age, and sex composition. The Department also resumed ongoing, but discontinuous, sampling of the southern California commercial fishery. Further more, in late 2009, the Department began an aging study for California halibut from central and southern California using cross-sectioned otoliths. The Department is

compiling this essential fish information for a statewide stock assessment of California halibut which is expected to be completed in late 2010.

**Sandbasses**

**Barred Sand Bass.** Barred sand bass (*Paralabrax nebulifer*) is a common species in the nearshore marine environment and an important part of the recreational fishery



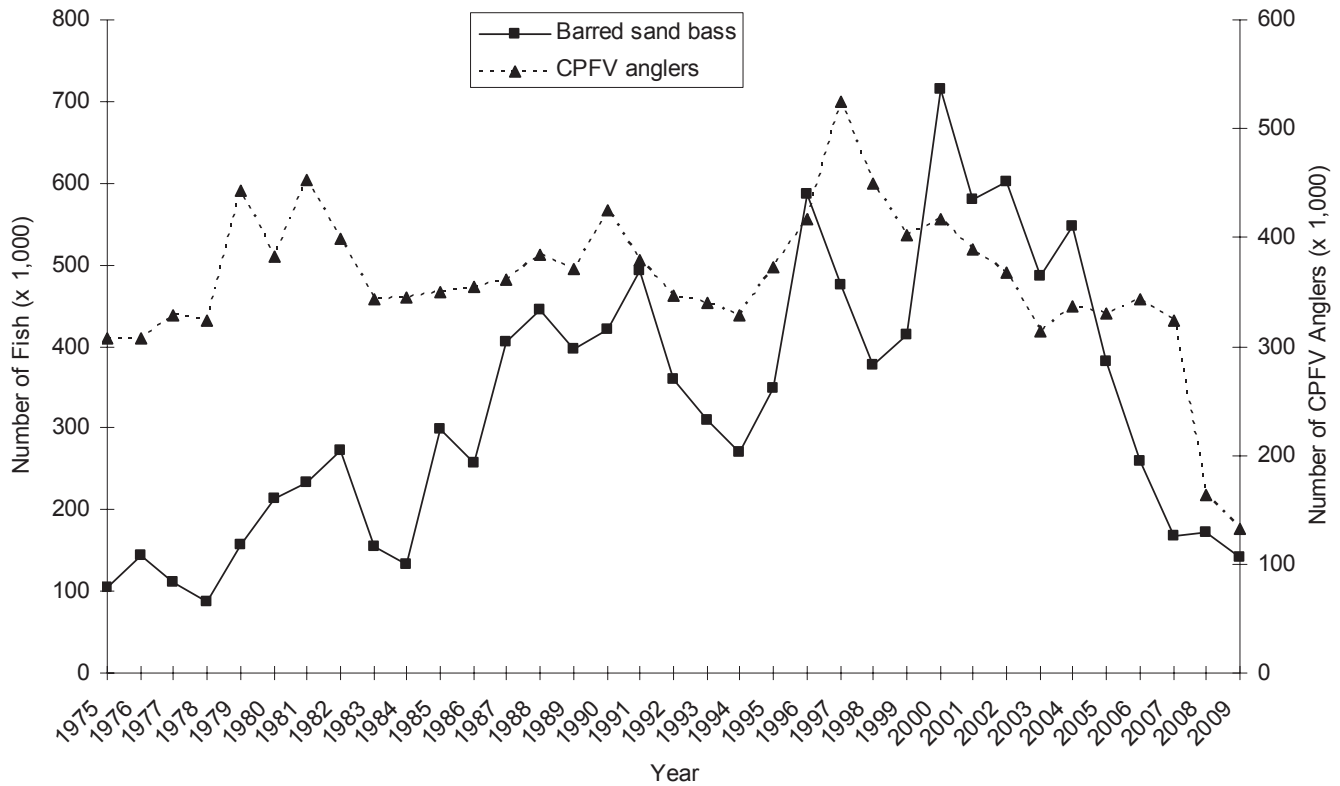


Figure 19. Number of barred sand bass (*Paralabrax nebulifer*) kept by CPFVs in thousands of fish and effort (in thousands of CPFV anglers) in southern California for trips in which barred sand bass were caught. Data are based on CPFV logbooks (1975–2009) for fish caught in U.S. waters. 2009 data are preliminary.

of southern California. Barred sand bass is a warm temperate member of the family Serranidae (sea basses) and one of three species of *Paralabrax* that occurs in southern California. Barred sand bass range from Santa Cruz, California south to Bahia Magdalena, BCM; however, their occurrence is rare north of Pt. Conception. They inhabit waters from the shallow subtidal to about 183 m (600 ft), but are most common less than 30 m (100 ft) and tend to be closely associated with sand/rock interfaces of deep reefs and artificial structures. In the summer months, barred sand bass form large breeding aggregations over specific, sandy bottom sites in depths of 15 to 30 m (~50–100 ft). Barred sand bass are oviparous batch spawners that breed from April through November, with a peak usually in July. They can grow up to 647.7 mm (25.5 in) and weigh up to 6 kg (13.2 lb).

Barred sand bass were fished commercially and recreationally until 1953 when it became illegal to commercially fish for barred sand bass, spotted sand bass (*Paralabrax maculatofasciatus*), and kelp bass (*Paralabrax clathratus*) in California due to a sharp decline in landings of these species. By the mid-1950s the recreational barred sand bass fishery gained popularity and in 1959 a 10-fish bag limit and a 30.5 cm (12 in.) TL minimum size limit were imposed on all bass species to offset declining numbers and a shrinking size composition.

The CPFV fishery responded positively to this management approach, and the landings of legal-sized kelp bass and barred sand bass began to increase substantially in the 1960s and 1970s. The minimum size limit is still in effect today, as well as the bag limit which allows a maximum of 10 barred sand bass, spotted sand bass, and/or kelp bass in combination per day for each angler.

Catch estimates for barred sand bass are available through CPFV logbooks from 1935 to the present, but barred sand bass were not differentiated from the other bass until 1975. Prior to 1975, barred sand bass were recorded in a general “rock bass” category which included kelp bass and spotted sand bass. CPFV logbook data indicate annual barred sand bass catch from 1975 to the present has fluctuated showing a steady increase starting in the mid-1980s and expanding more than five fold and peaking in 2000 with 735,690 fish kept (fig. 19). After 2000 a substantial decline in CPFV barred sand bass catch occurred with numbers going below 200,000 fish per year from 2007–2009, the lowest annual catch since 1984. A corresponding decline in number of anglers occurred in 2008–09.

In addition to CPFVs, barred sand bass are also caught from other sport fishing modes including shore (piers, jetties, and beach/bank), and private/rental boats. From 1980 to 2003, MRFSS data indicate that CPFVs com-

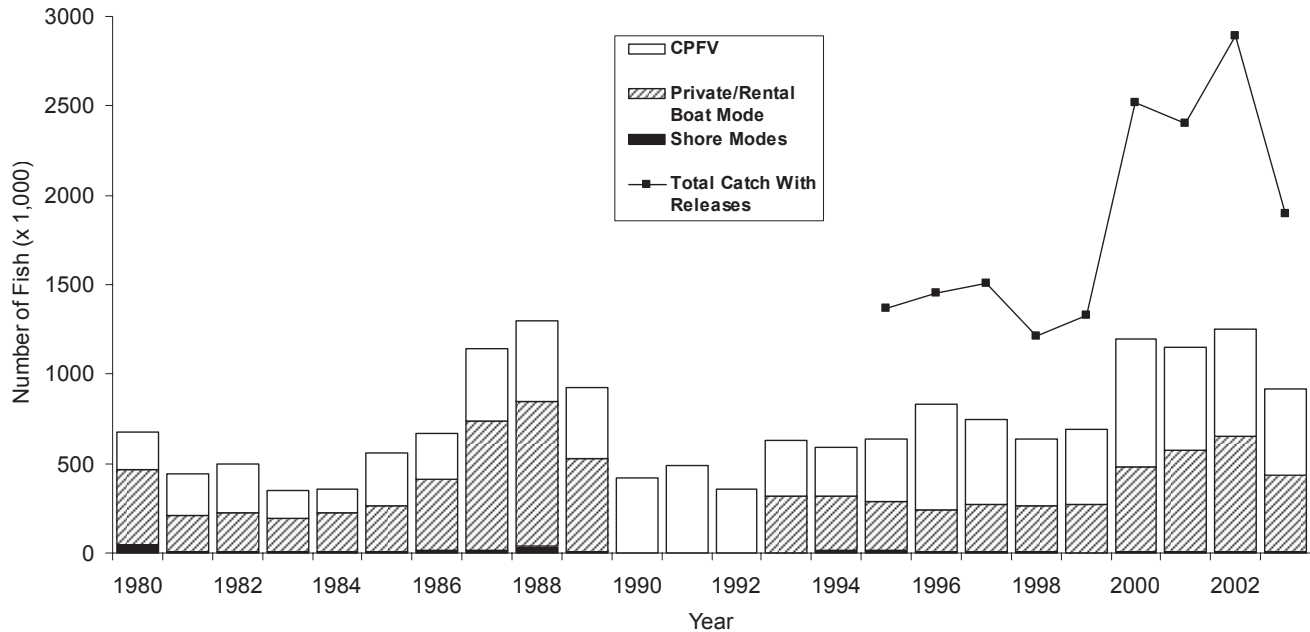


Figure 20. Recreational catch estimates of barred sand bass (*Paralabrax nebulifer*) in southern California in thousands of fish as reported by MRFSS for private/rental boats and shore modes, and by CPFV logbooks, 1980–2003. No recreational data from MRFSS were available from 1990–1992 and for January–February 1995. Data for total combined catch with fish released alive were only available from 1995–2003.

prise the majority (55%) of the catch, with private/rental boats comprising 44% and shore modes comprising 1%. More recent CRFS data indicate a similar pattern with shore based modes comprising less than 10% of the total kept barred sand bass catch annually from 2004–2009, and CPFVs comprising 62% of the annual average catch. MRFSS and CPFV logbook data in aggregate representing all fishing modes from 1980 to 2003 indicate a fluctuating trend with peak catches for kept fish in 1988 and 2002, with 1,295,022 and 1,253,900 fish, respectively (fig. 20). From 1995 to 2003 a substantial number of landed fish were released, resulting in a combined peak total of kept and released fish of 2,893,400 in 2002; CPFV logbook data does not include releases prior to 1995. The mean proportion of released fish differed by fishing mode with 88% for shore based fishing, 68% for private/rental boats, and 12% for CPFVs. Catch estimates (CRFS) and CPFV logbook data in aggregate from 2004 to 2009 show a substantial decline in the number of kept fish for all fishing modes (fig. 21). During this time period the number of fish kept showed a 72% decrease from 694,900 in 2004 to 191,800 in 2009. The mean proportion of released fish by fishing mode from 2004–2009 was similar to 1980–2003 with shore based fishing releasing 86%, private/rental boats releasing 72% and CPFVs releasing 13% of fish annually.

Barred sand bass have consistently ranked among the top species caught by southern California CPFV anglers during the past 20 years. Despite the relatively low catch numbers in the last years, barred sand bass

ranked first in terms of number of fish kept. Over the past years, the port of Long Beach had the highest number of barred sand bass caught by CPFVs comprising approximately 21% of the total state catch (tab. 4). The ports of Newport/Balboa and San Pedro ranked 2nd and 3rd in average catch with 18% and 13% of the total catch, respectively. A large number of barred sand bass are landed in these ports from Mexican waters. From 2000–2009 17% of kept fish on CPFVs for all southern California ports and almost 40% from San Diego ports were taken in Mexican waters, primarily off northern Baja California.

**Spotted Sand Bass.** Spotted sand bass (*Paralabrax maculatofasciatus*) is an important sportfish for nearshore anglers in southern California. Spotted sand bass range from Monterey, California to Mazatlan, Mexico including the Gulf of California; however, this species is rarely found north of Santa Monica Bay. Southern California populations are typically restricted to sandy or mud bottom habitat within shallow bays, harbors, lagoons, and quiet sections of open coast where there is extensive cover such as eelgrass, surfgrass, and rock relief.

Adults usually inhabit waters from 0.6 m–9.1 m (2–30 ft); however, specimens have been taken from waters as deep as 70 m (200 ft) in the Gulf of California. Primary spotted sand bass fishing sites in southern California include Mission and San Diego bays (San Diego County) and Newport and Anaheim Bays (Orange County). These sheltered areas act as warm-water refuges for this generally sub-tropical species.

**TABLE 4**  
**Number of barred sand bass (*Paralabrax nebulifer*) kept by California commercial passenger fishing vessels (CPFVs) in southern California by port for 2008 and 2009 and the 10-year average (2000–2009).**  
 Data were taken from CPFV logbooks for fish caught in U.S. waters.

Port Name	2008		2009*		10-Year Average (2000–2009)	
	No. Fish Caught	% Total	No. Fish Caught	% Total	No. Fish Caught	% Total
Santa Barbara/Ventura	2,366	1%	927	1%	25,006	6%
Marina Del Ray	8,502	5%	10,502	7%	26,606	7%
Redondo Beach	13,536	8%	7,667	5%	25,019	6%
San Pedro	15,484	9%	16,723	12%	51,759	13%
Long Beach	40,438	24%	39,447	28%	85,016	21%
Newport/Balboa	38,359	22%	24,670	17%	73,270	18%
Dana Point	17,388	10%	15,497	11%	49,081	12%
Oceanside	5,938	3%	6,511	5%	22,029	5%
San Diego	29,760	17%	19,757	14%	42,352	10%
Other	180	0%	181	0%	5,100	1%
<b>Total CPFV Catch</b>	<b>171,951</b>	<b>100%</b>	<b>141,882</b>	<b>100%</b>	<b>405,239</b>	<b>100%</b>

Data Source: CFIS  
 \*2009 data are preliminary.

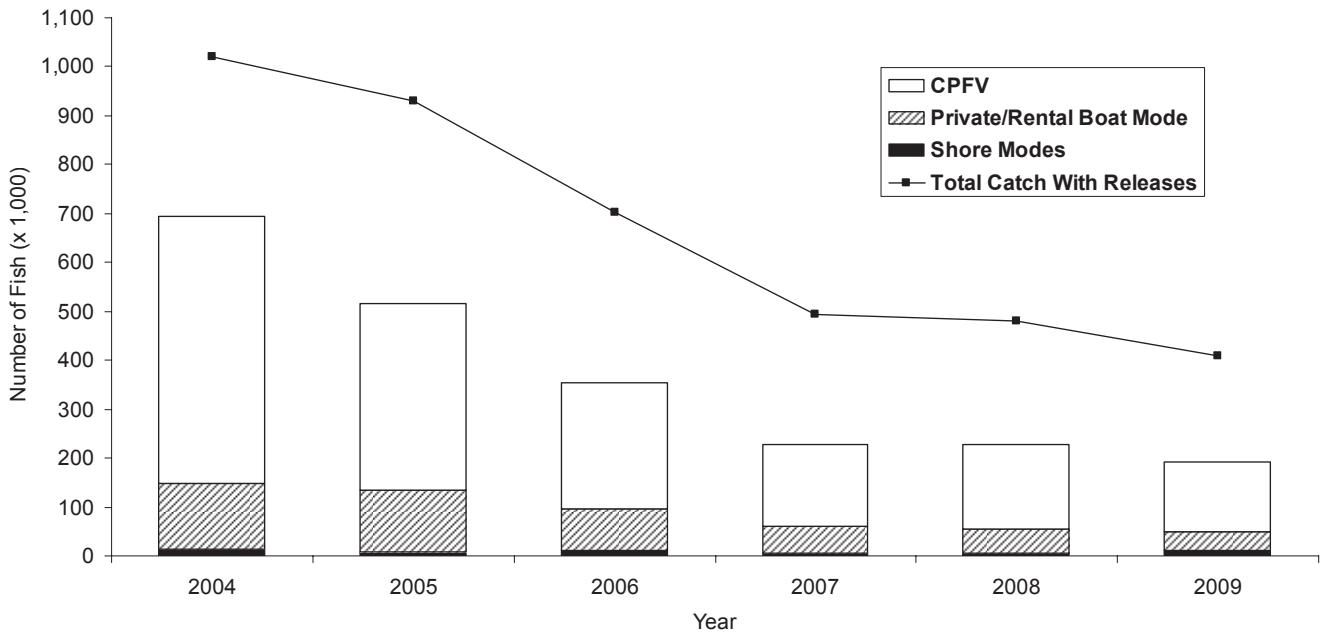


Figure 21. Recreational catch estimates of barred sand bass (*Paralabrax nebulifer*) in southern California in thousands of fish as reported by CRFS for private/rental boats and shore modes, and by CPFV logbooks for party/charter boats, 2004–2009. 2009 data are preliminary.

The spawning season for spotted sand bass occurs in the warm summer months from late May to early September in southern California when spotted sand bass gather to breed at or near entrances of bays and lagoons. The reproductive strategy for spotted sand bass is complex with individual populations in southern California displaying varied patterns. In San Diego Bay spotted sand bass utilize protogynous hermaphroditism, where individual fish start their lives as females and after a period of time change into males. In Anaheim and Newport Bays, spotted sand bass do not exhibit this reproductive strategy resulting in an equal distribution of males and females throughout the age and size classes in the pop-

ulation. Spotted sand bass can grow up to 560 mm (22 in) and up to 3.1 kg (6.8 lb). Significant morphological and genetic differentiation has occurred among spotted sand bass populations throughout their geographic range; populations in the Gulf of California appear to be distinct from those on the Pacific coast and in southern California. This sub-population structure suggests that spotted sand bass exhibit limited dispersal from their restricted habitats.

The spotted sand bass fishery began to gain popularity in the mid-1950s in southern California for shore and small skiff anglers due to the species' aggressive behavior and fighting ability. Adequate landing data for

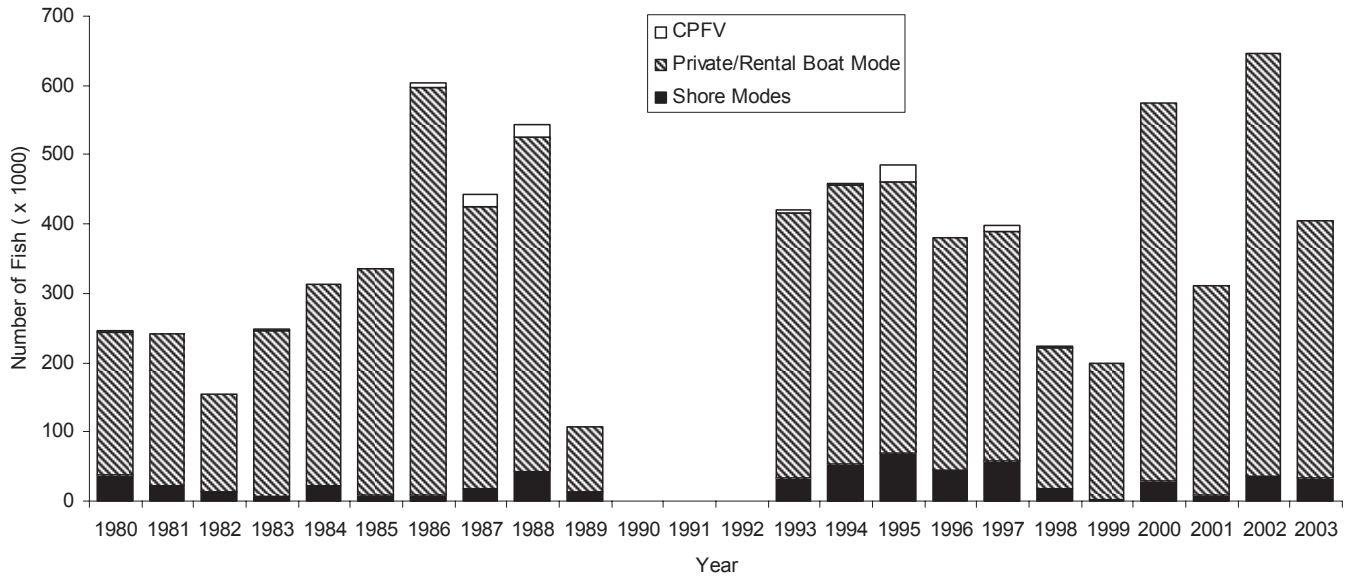


Figure 22. Recreational catch estimates (including kept and released fish) of spotted sand bass (*Paralabrax maculatofasciatus*) in southern California in thousands of fish as reported by MRFSS for private/rental boats and shore modes, and by CPFV logbooks for party/charter boats, 1980–2003. No recreational data from MRFSS were available from 1990–1992 and for January–February 1995.

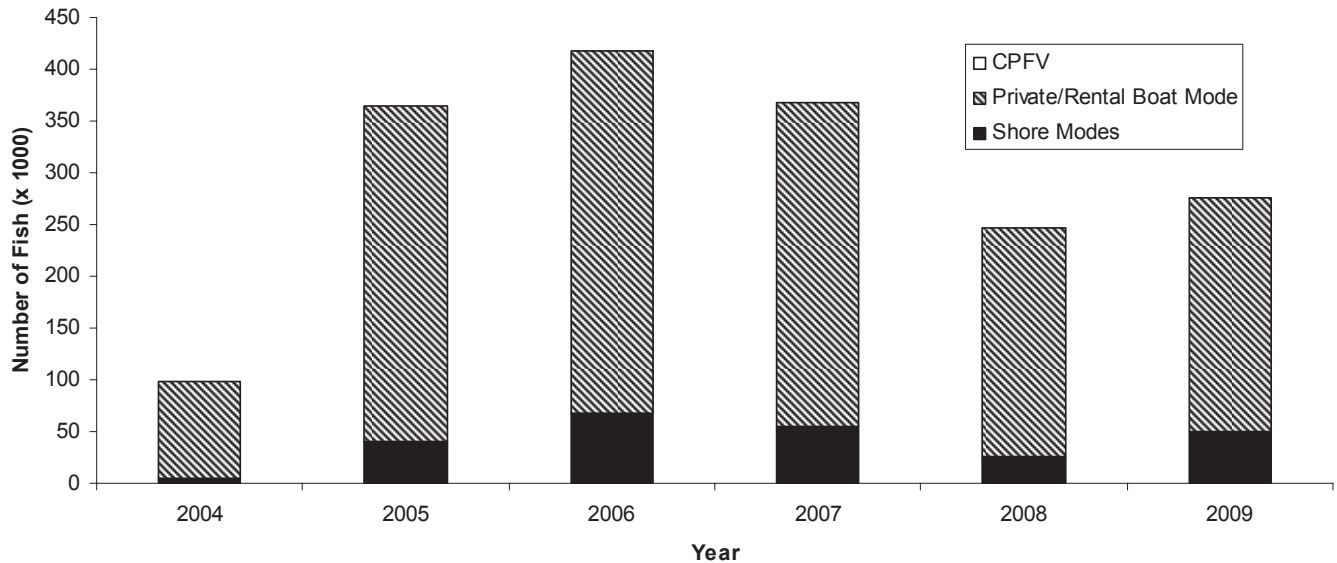


Figure 23. Recreational catch estimates (including kept and released fish) of spotted sand bass (*Paralabrax maculatofasciatus*) in southern California in thousands of fish as reported by CRFS for private/rental boats and shore modes, and by CPFV logbooks for party/charter boats, 2004–2009. CPFV catch is not apparent due to the small contribution to total catch (1%). 2009 data are preliminary.

this species are not available prior to the mid-1970s because early landing data were lumped with the other two *Paralabrax* species or not consistently reported. Surveys conducted by the Department on skiff fishing estimated that annual catch of spotted sand bass in southern California ranged from 12,790 to 23,933 fish between 1976 and 1981. After this time recreational angling for the spotted sand bass has seen a dramatic increase, resulting in angling tournaments that target spotted sand bass exclusively.

MRFSS catch estimates from 1980 to 2003 show that an average of 368,500 spotted sand bass were caught annually. During this time period peak catch occurred in 1986 with 603,800 fish caught (kept and released) and in 2002 with 646,400 fish (fig. 22). The majority of fish (91%) were caught by private/rental boat anglers, with shore based anglers catching 8% and CPFVs catching 1% of the total catch. CRFS data from 2004 to 2009 (fig. 23) show a similar pattern with private/rental boats comprising 86% of spotted sand bass catch and with shore based

anglers and CPFVs comprising 14% and less than 1%, respectively. Catch estimates from this time period show a peak catch in 2006 with 417,700 fish and an annual average catch of 295,200 fish.

Although recreational fishing pressure for spotted sand bass has dramatically increased in the last two decades, CRFS data from 2004–2009 indicate that most of these fish are released (94%). This release rate is dramatically higher than reported for kelp bass (71%) and barred sand bass (55%) during this time period. When comparing CRFS catch estimates (kept and released) for all fishing modes in southern California for the three *Paralabrax* species the last five years, spotted sand bass comprises the smallest proportion of the total estimated sea bass catch with 17%. Barred sand bass and kelp bass comprised 38% and 45%, respectively.

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