

Human Ecosystem Dimension

Human Benefits of the Marine Ecosystem

Marine ecosystems provide opportunities for consumptive and non-consumptive uses of marine resources. Some activities, such as commercial, recreational and subsistence fishing, help harvesting and harvesting of marine specimens for aquarium use, are consumptive in the sense that they result in permanent removal of ecosystem resources. Other activities (tidepooling, marine mammal and bird watching, kayaking and observational diving) are more commonly characterized as non-consumptive. However, the distinction between consumptive and non-consumptive use is not always clear cut, as activities that are not necessarily intended to be consumptive may sometimes result in inadvertent injury to marine animals or disruption of their habitat.

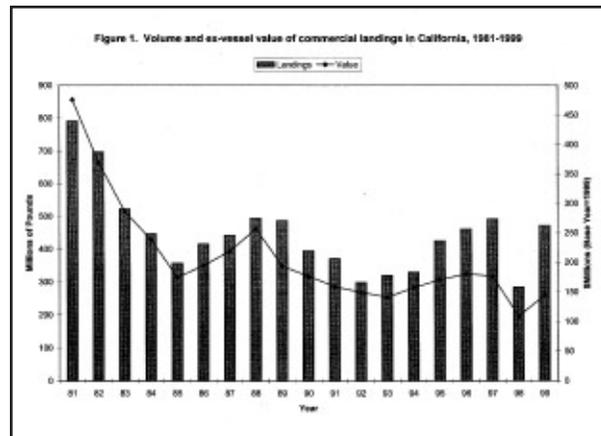
Marine ecosystems also benefit people who may never use or even see marine resources but nevertheless value their existence. Non-use value may be motivated by the desire to have ecosystem resources available for future use or by the satisfaction of knowing that such resources exist, regardless of whether they are ever put to human use.

The remainder of this report focuses on the two major consumptive uses of marine resources— commercial and recreational fishing. The intent is not to diminish the importance of other sources of use and non-use value but rather to address informational and reporting requirements of the Marine Life Management Act.

Factors Affecting Commercial and Recreational Fishery Activity

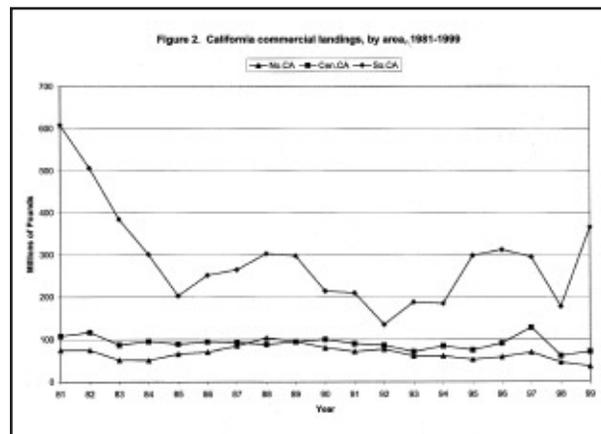
Commercial and recreational fishery landings are affected by many factors. Landings tend to increase with stock abundance, as fish are easier and less costly to locate and harvest when they are at higher levels of abundance. The availability of some species on local fishing grounds may vary across seasons or years, depending on ocean temperature and other environmental factors. Weather conditions and economic circumstances (market demand and prices) may discourage or encourage fishing activity. Fishing behavior is also affected by regulatory restrictions, which are imposed for a variety of reasons and take a variety of forms.

Regulations may be imposed for biological reasons. For instance, harvest restrictions may be imposed to protect a particular fish stock or to reduce incidental take of other stocks that are caught simultaneously with that stock. Regulations may be imposed to protect habitat or to reduce injury or mortality to marine mammals or seabirds



that may result from interactions with fishing operations. Regulations may be imposed for economic reasons. For instance, seasons may be set to coincide with periods when a fish stock is in prime marketable condition or when market demand is high. Regulations may be imposed for social reasons, such as providing equitable harvest opportunities or reducing the potential for conflict among different sectors of a fishery.

Regulations can take a variety of forms, including license and permit programs, harvest quotas, season closures, area closures, trip limits, bag limits (for recreational anglers), size limits and restrictions on quantity and type of gear. Reporting requirements such as landings receipts, logbooks or on-board observers may be imposed to ensure that fishery monitoring, management, enforcement and research needs are met. A particular type of regulation may serve different objectives, depending on the context in which the regulation is imposed. For instance, trip limits may be used to discourage targeting on a particular species while allowing a limited amount of incidental take of that species. Trip limits may be used to slow the harvest rate to enhance real-time monitoring capability in fisheries where quotas would otherwise be quickly exhausted. Trip limits may also serve economic objectives, such as lengthening the duration of the

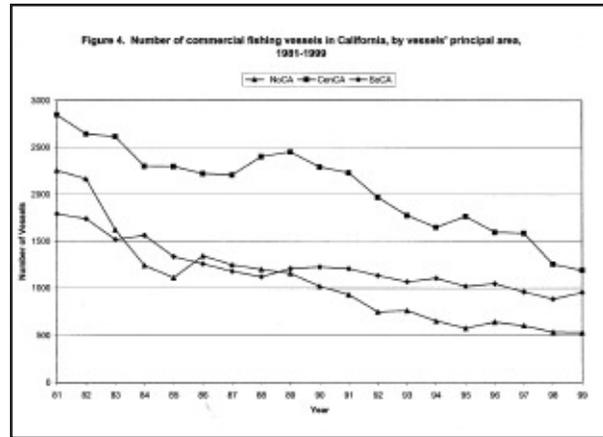
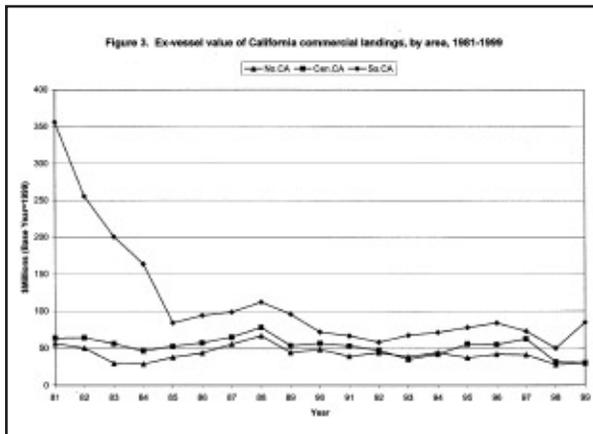


fishing season or ensuring that landings do not exceed processing capacity.

For fishing vessels and fish dealers, net economic benefit is properly measured as the difference between their gross revenues and economic costs. However, net economic benefits cannot be estimated for either of these fishery sectors, due to lack of complete economic data. Instead, landings by fishing vessels and landings receipts by fish dealers are described in terms of their ex-vessel value. Ex-vessel value overstates the economic value of the fishery to fishing vessels, as it does not include any consideration of harvesting costs. For dealers, ex-vessel value represents the cost of obtaining fish. Information on revenues earned from processing/marketing these landings is not generally available. In addition, some dealers may also process/market fish imported from other states or countries; the revenues and costs associated with these imported products are also not known.

Commercial Fisheries Landings and Ex-vessel Value

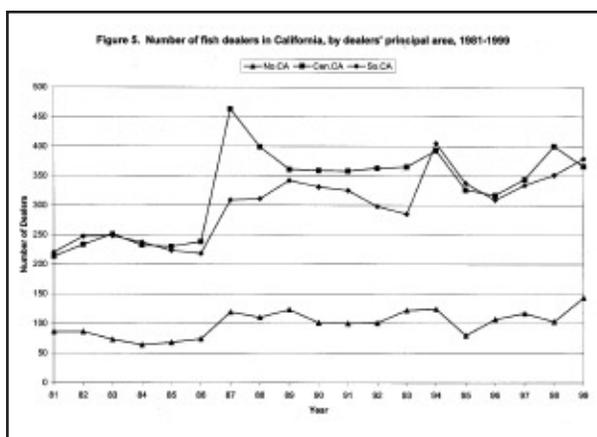
This section describes trends in the volume and ex-vessel value of California commercial landings. The harvest information presented here is based on landings receipts and therefore excludes discards and live bait catch. Fish may be discarded in commercial fishery operations for a variety of reasons. Discards may include fish that are of sublegal size, exceed a vessel's hold capacity or trip limit, or are not of marketable size or species. Information on the level of discards and discard mortality is generally not known. Live bait used by recreational fishermen is also not reported on landings receipts, since transactions between buyers and sellers of live bait typically take place at sea. Logbook data indicate that bait haulers harvest a maximum of 12 million pounds of live bait each year.



Commercial landings in California decreased from 791.4 million pounds in 1981 to 472.1 million pounds in 1999. Ex-vessel revenues also fell during this period from \$475.7 million to \$144.4 million in 1999. All dollar values presented here and throughout the remaining of this report have been corrected for inflation to 1999 dollars. The precipitous decline experienced during the early-1980s was largely the result of a shift in tuna landings from California ports to less costly cannery operations in American Samoa and Puerto Rico. The decline in tuna landings and revenues has been compounded by declines in landings of species such as groundfish, urchin, shark and swordfish, salmon, abalone. Other species (e.g., market squid, lobster, prawn, coastal pelagics) have been the target of expanding fisheries, while still others (e.g., crab, Pacific herring, shrimp) exhibit no obvious pattern or trend in landings and revenues.

From 1995 through 1999, the species groups accounting for most of the ex-vessel value of California landings were (in descending order of value) groundfish, market squid, crab, albacore/other tunas, sea urchin, herring, shark/swordfish, salmon, coastal pelagics, lobster, prawn, shrimp and abalone. The species composition of landings and revenues varies significantly by area. Over 90 percent of the ex-vessel value of landings in northern California consists of groundfish, crab, shrimp and sea urchin. In central California, 90 percent of total ex-vessel value is contributed by groundfish, herring, salmon, crab, prawn, shark/swordfish and coastal pelagics. In southern California, 90 percent of total value is contributed by squid, albacore/other tuna, sea urchin, coastal pelagics, shark/swordfish, lobster and groundfish. Landings and revenues have historically been higher in southern California than in central or northern California. The major reason for this difference is the large contribution made by the high-volume squid and coastal pelagic fisheries to southern California landings and revenues.

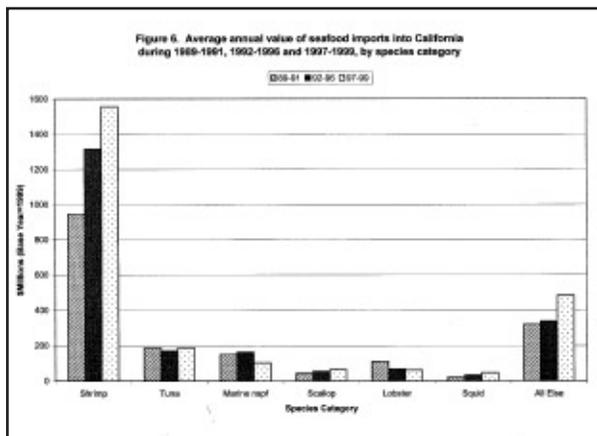
The State of California requires that all commercial fishing vessels, crew members, and fish businesses be licensed



to operate in the state, and further requires that all businesses and fishermen who accept seafood for commercial purposes maintain landings receipts. The state also imposes additional license and permit requirements that are specific to certain types of fishing activities. In addition, federal permits are required for vessels that qualify to participate in the groundfish and coastal pelagics limited-entry fisheries. Permits and licenses represent upper-bound estimates of fishery participation, as not all permit/license holders actively engage in fishery activity each year. The next two sections of this report describe the extent of actual participation in the harvesting and processing sectors.

Harvesting Sector

The number of commercial fishing vessels that land fish in California declined from 6,897 in 1981 to 2,690 in 1999. While the majority of these boats land fish solely at California ports, a significant minority also makes landings in Oregon or Washington. California boats may fish in other states as well (e.g., Alaska); however, the extent of such activity is not known.



Categorizing vessels according to their “principal area” (i.e., the area in which they made the plurality of their revenues from California landings), the statewide pattern of declining fleet size is evident in all areas. From 1981 to 1999, the number of boats declined from 2,256 to 532 (76 percent) in northern California, from 2,848 to 1,191 (58 percent) in central California, and from 1,793 to 967 (46 percent) in southern California. The number of boats has been consistently higher in central California than in the other two areas.

Just as some vessels engage in interstate fishing activity, a small but significant minority of vessels lands fish both inside and outside of their principal fishing area within California. From 1981 through 1999, 82 percent of vessels whose principal area was northern California made landings in northern California only, while the remaining 18 percent also made landings in other areas (mostly central California). Of vessels whose principal area was central California, 87 percent made landings in central California only, and 13 percent also made landings in northern and/or southern California. Of vessels whose principal area was southern California, 88 percent made landings in southern California only, and the remaining 12 percent also made landings in other areas (mostly central California).

The percent of boats earning less than \$5,000 per year declined from 53 percent during the period from 1981 through 1985 to 34 percent during the 1995 through 1999 period, while the percent of boats accounting for 90 percent of the ex-vessel value of statewide landings increased from 20 percent (1981-1985) to 35 percent (1995-1999).

The highly skewed revenue distribution characteristic of the early 1980s reflects the sizeable contribution of tuna fishery participants to total statewide revenues during those years. The tendency toward a less skewed distribution of revenue after the mid-1980s was apparent in northern, central and southern California as well as statewide. Nevertheless, the commercial fishery remains characterized by a large number of low-revenue vessels and a small number of high-revenue vessels, with hook-and-line



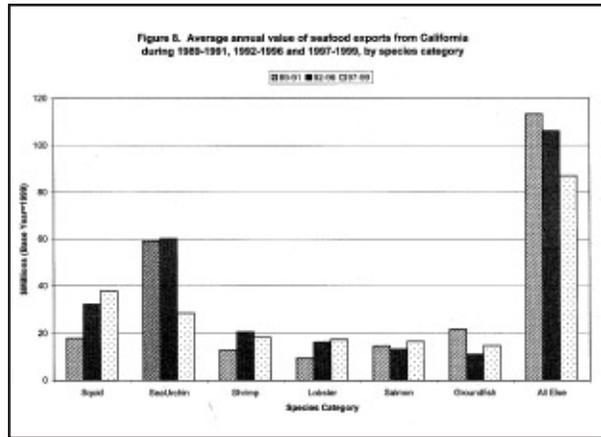
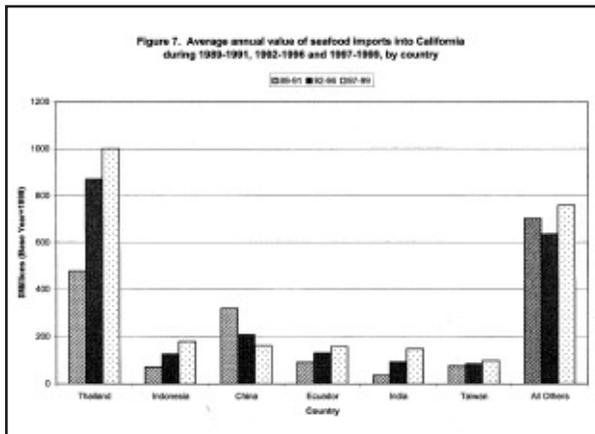
Street fish market, Fisherman's Wharf, San Francisco, CA
Credit: UC Davis Sea Grant

salmon and groundfish vessels disproportionately represented in the low-revenue segment.

From 1981 through 1999, ex-vessel revenue from California landings averaged \$46,500 per boat and did not exhibit any consistent trend or pattern. However, the statewide average masks significant regional differences in this regard. From the 1981-1985 period to the 1994-1999 period, average revenue per boat increased significantly in northern California from \$24,500 to \$60,800, increased less dramatically in central California from \$20,800 to \$30,100, and declined in southern California from \$126,000 to \$74,900. The fishing opportunities that developed in southern California after the mid-1980s were not sufficient to compensate for the decline in revenues from the highly lucrative tuna fishery. Nevertheless, average revenue per boat is still higher in southern California than elsewhere in the state.

For the years 1995 through 1999, commercial landings and revenues were categorized into 23 different combinations of species and gear that depict major types of fishery activity in the state. Table II-7 describes average annual landings and revenues in each major fishery in northern, central and southern California during the 1995-1999 period, presented in declining order of revenue. For each fishery, the table also includes the number of participating vessels (defined as vessels who earned at least five percent of their California revenue from that fishery) and the number of participating vessels for whom the fishery is their "principal fishery" (that is, the fishery from which they derive the plurality of their California revenue).

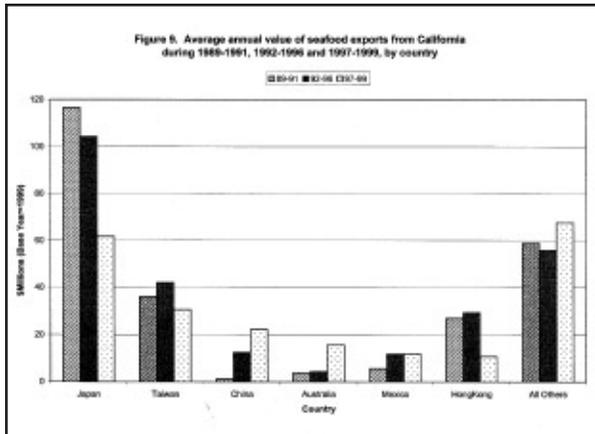
Table II-8 characterizes the vessels in each principal fishery category in terms of average landings and revenues per year from the vessel's principal California fishery, from other California fisheries, and from Oregon and Washington fisheries. Average revenue per boat varies widely among fisheries, and tends to be lowest in the groundfish and salmon hook-and-line fisheries and highest in the trawl and seine fisheries. The distribution of average revenue per vessel among fisheries is suggestive of vessels' economic dependence on their principal fishery relative to other California fisheries and to Oregon and Washington fisheries.



For instance, some vessels (e.g., shrimp trawl in northern California) earn more revenue from their out-of-state landings than their California landings. For these vessels in particular, adverse conditions in their out-of-state fisheries can result in a significant diversion of effort to the California fisheries in which they also participate, and vice versa. At the other end of the spectrum are vessels that derive most if not all of their revenue from their principal fishery (e.g., urchin diving in central California). Because of this lack of diversification, such vessels are particularly vulnerable to changing conditions in the fishery in which they do participate. It should be cautioned that ex-vessel revenue comparisons are merely suggestive of differences in economic value, as such comparisons do not account for differences in operating costs across fisheries.

According to Tables II-7 and II-8, the highest-revenue fisheries do not necessarily support the largest numbers of boats or generate large ex-vessel revenues per boat. For instance, the salmon hook-and-line fishery is the third largest contributor to ex-vessel revenue in central California (\$6.5 million) and serves as the principal fishery for 579 vessels, yet generates only \$9,000 in ex-vessel revenue per boat per year. The tuna seine fishery is the third largest contributor to ex-vessel revenue in southern California (\$9.6 million) and yields higher revenue per boat than any other fishery statewide (\$914,600 per boat per year); yet tuna seine is the principal fishery for only 10 boats.

The Tables in II-3 describe the most common combinations of fisheries in which vessels participated from 1995 through 1999. The number in each rectangle represents the average annual number of vessels that participated solely in that fishery during the 1995-1999 period, and the number on each line connecting the rectangles represents the average annual number of vessels that participated



in that particular two-fishery combination. The asterisks denote the most common three-fishery combinations. Only fisheries or fishery combinations that represent an annual average of at least three vessels appear in the figure. Since the abalone dive fishery has been closed to commercial fishing since 1998, the 1995-1999 statistics on that fishery included in Tables II-7, II-8 and II-3 include the recent years of zero fishing activity (1998-1999).

Patterns of behavior vary significantly by area. In northern California, crab pot is the predominant fishery in terms of the number of vessels that participate solely in that fishery (153) and the frequency with which crab pot vessels also engage in other fisheries. In central California, the largest numbers of vessels engage in the salmon hook-and-line (419), groundfish hook-and-line (332) and herring (121) fisheries. The most common combinations involve salmon and groundfish hook-and-line (92), and salmon hook-and-line and crab pot (88). In southern California, the largest numbers of vessels engage in the sea urchin (156), groundfish hook-and-line (119) and lobster pot (102) fisheries. Groundfish hook-and-line vessels are also notable in terms of the number of other fisheries in which they participate. While interactions exist among the prawn, groundfish and cucumber trawl fisheries, trawl fisheries in southern California are seldom pursued in combination with other gear types.

The Processing Sector

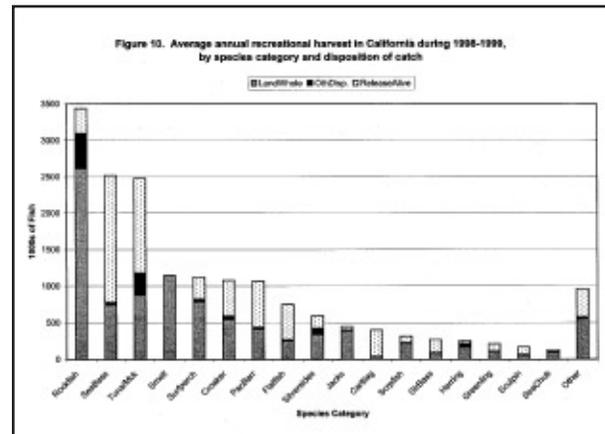
Between 1981 and 1999, the number of fish dealers increased statewide from 519 to 888. Categorizing dealers according to their "principal area" (e.g., the area of California accounting for the plurality of the ex-vessel value of their landings receipts), the number of dealers increased from 86 to 143 (+66 percent) in northern California, from 213 to 366 (+42 percent) in central California, and from 220 to 379 (+72 percent) in southern California. The number of dealers has been consistently lower in northern California than in other areas of the state.

The increase in numbers of dealers has followed a distinctive pattern: a relatively stable number of dealers during the 1981-1986 period, followed by a stepwise increase in 1987 and relatively stable (albeit higher) numbers thereafter. The ex-vessel value of average annual landings receipts per dealer shows a parallel though opposite stepwise pattern. From the 1981-1986 period to the 1987-1999 period, the average annual number of dealers increased from 547 to 825, while the value of landings receipts per dealer decreased from \$531,500 to \$209,500 over the same period. The decline in average value per dealer is largely due to the post-1986 increase in the number of dealers for whom the value of landings was less than \$5,000. Many of these small dealers are commercial fishing vessel operators who sell their landings directly to restaurants and markets rather than to a processor. The decline in annual value per dealer has been particularly severe in southern California (falling from \$805,500 in 1981-1985 to \$233,900 in 1986-1999), where the effect of the post-1986 increase in the number of small dealers was compounded by the drastic reduction in high-priced tuna landings experienced in that area through the early 1980s. Since the decline of the tuna fishery, northern California has generally replaced southern California as the area with the highest average value of landings per dealer.

The distribution of landings receipts among dealers is highly skewed, with 16 percent of the dealers responsible for 90 percent of the value of landings from 1987 through 1999. This pattern is repeated throughout the state, with 20 percent of dealers in northern California and 16 percent of dealers in central and southern California accounting for 90 percent of ex-vessel value in their respective areas of the state.

The Trade Sector

Generally speaking, imports into the U.S. are categorized by their initial port of entry, which is not necessarily their final destination. Thus, some imports that

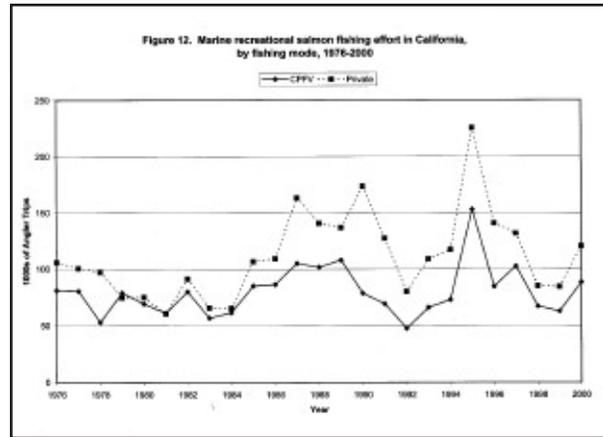
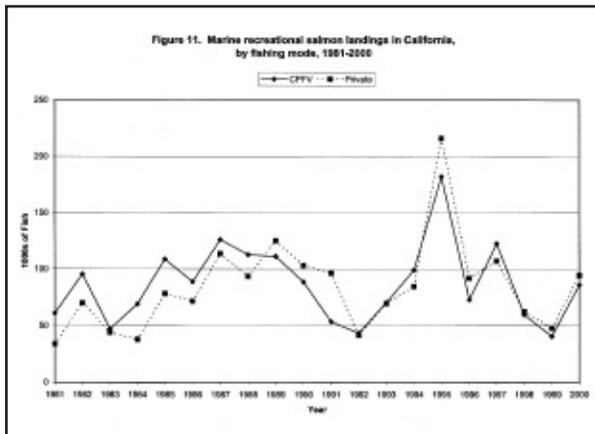


enter the U.S. at Nogales, Arizona and Honolulu, Hawaii likely end up in California markets. For this reason, seafood imports into California should be considered suggestive rather than definitive estimates of California consumer demand for imported seafood.

Like imports, exports from the U.S. are categorized in terms of the port from which they left the U.S. Thus, not all exports from a state necessarily originate from fisheries in that state. California exports may include fish landed in Mexico and subject to additional handling or processing in California before being sold to a third country. Exports also include fish that were imported and not sold, then re-exported in substantially the same condition as when imported.

The dollar value attached to imports represents the Customs value, that is, the price actually paid for merchandise when sold to the U.S., excluding U.S. import duties, freight, insurance and other charges incurred in bringing the goods to the U.S. The dollar values attached to exports and re-exports is the "free alongside ship" value, that is, the value at the port of export, defined as the transaction price including charges and transportation costs incurred in bringing the merchandise to the port of exportation.

Between 1989 and 1999, the value of seafood products imported into California increased from \$1.6 trillion to \$2.4 trillion, while imports into the U.S. as a whole increased from \$6.9 trillion to \$9.0 trillion. About 30 percent of the value of U.S. imports enters the country at California ports. Shrimp imports, which have increased dramatically over the past decade, have consistently comprised about 60 percent of the value of California seafood imports. The average annual value of shrimp imports was \$1.6 trillion during the 1997-1999 period. Significant though much smaller amounts of tuna (\$187.6 million), unspecified marine fish (\$104.1 million), scallop (\$65.1 million), lobster (\$62.2 million) and squid (\$47.0 million) were also imported during that period. The countries from which California received most of its seafood imports

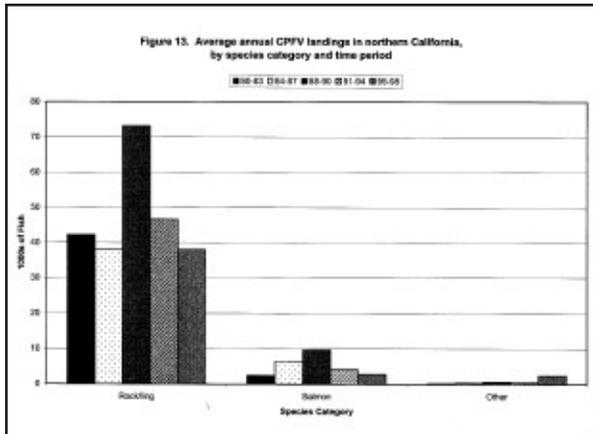


during the 1997-1999 period (in order of declining annual import value) were Thailand (\$999.6 million), Indonesia (\$179.1 million), China (\$162.5 million), Ecuador (\$157.9 million), India (\$148.6 million) and Taiwan (\$99.4 million). Imports from all of these countries except China have been on a generally increasing trend over the past decade.

From 1989 through 1999, the value of seafood products exported from California and from the U.S. as a whole averaged \$246.2 million and \$3,215.3 million respectively. About eight percent of total U.S. seafood exports originated from customs districts in California. In recent years (1997-1999), squid has replaced sea urchin as California's major export. The major species groups comprising California exports during the 1997-1999 period (in order of declining average annual value) were squid (\$37.9 million), sea urchin (\$28.5 million), shrimp (\$18.3 million), lobster (\$17.4 million), salmon (\$16.6 million) and groundfish (\$14.7 million). Although exports to Japan have declined significantly over the past decade, Japan remains the major recipient of California exports. California's major seafood export trading partners from 1997 through 1999 (in order of declining annual export value) were Japan (\$61.7 million), Taiwan (\$30.6 million), China (\$22.2 million), Australia (\$15.7 million), Mexico (\$11.9 million) and Hong Kong (\$10.8 million).

Sport and Subsistence Fisheries

Some fishermen do not earn revenue from their catch but rather fish for pleasure and/or to provide food for personal consumption. The economic value of the sport/subsistence (hereafter loosely referred to as "recreational") fishery depends on which segment of the fishery is being considered. For instance, the value of fishing to anglers would be measured by consumer surplus, that is, the maximum amount that anglers would be willing to pay for the fishing experience over and above what they actually pay. The value of fishing to businesses that provide services to anglers, such as commercial passenger



fishing vessels (CPFVs), would be measured by the difference between their gross revenues and economic costs. The economic impact of fishing on local economies would be measured by the multiplier effects on income and employment that occur as money spent by anglers moves through the economy. Collection and analysis of data needed to estimate these various types of economic effects are underway. Until such studies are completed, all that is available at this time are approximate estimates of angler expenditures.

Effort and Harvest

Approximately 4.7 million marine recreational angler trips were made annually in California during 1998-1999 – 2.9 million trips (61 percent) in southern California (Santa Barbara County and southward) and 1.9 million trips (39 percent) in central/northern California (San Luis Obispo County and northward). The proportion of total effort in each area associated with man-made structures (e.g., piers), beaches, CPFVs and private boats was 22 percent, 10 percent, 22 percent and 46 percent respectively in southern California, and 24 percent, 18 percent, nine percent and 49 percent in central/northern California. Approximately 17.8 million fish were harvested annually during 1998-1999, of which 9.6 million were landed in whole condition, 7.1 million were discarded alive, and 1.2 million were used as bait, filleted, given away or discarded dead.

Harvest levels vary significantly across species groups. During 1998-1999, the major components of harvest included rockfish (3.4 million fish), sea basses and tuna/mackerel (2.5 million fish each), and smelt, surfperch, croakers and Pacific barracuda (1.1 million fish each). Flatfish, silversides, jacks, sharks, rays, scorpionfish, striped bass, herring greenlings, sculpins and sea chubs made smaller though significant contributions to total harvest. The percentage of total catch retained by anglers or discarded dead (e.g., not released alive)

varies widely, ranging from a high of 85-90 percent for smelt, rockfish, jacks and herring to a low of 11 percent for cartilaginous fish.

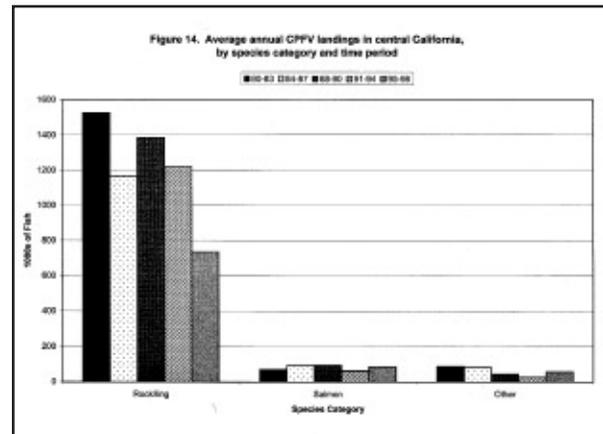
Harvests vary across fishing modes and areas as well as species. During 1998-1999, annual harvests (excluding fish released alive) ranged from highs of 1,995,000 fish for CPFV anglers and 2,171,000 fish for private boat anglers in southern California, to lows of 344,000 fish for southern California beach anglers and 600,000 fish for central/northern California anglers fishing from man-made structures. Sea basses, tuna/mackerel, Pacific barracuda, California scorpionfish and jacks are much more commonly caught in southern California, while striped bass and salmon are more commonly caught in central/northern California. Rockfishes are an important component of boat-based harvests in southern California and the dominant component in northern California.

Recreational Fishery Expenditures

Based on the average annual number of marine recreational fishing trips made in U.S. waters during 1998-1999, aggregate annual trip-related expenditures were estimated to be approximately \$202.0 million for southern California and \$107.9 million for central/northern California. These estimates, combined with license, fishing gear and boat-related expenses of \$128.4 million in southern California and \$68.6 million in central/northern California, bring total annual statewide angler expenditures to \$506.9 million.

Additional Information on the Salmon and CPFV Sport Fisheries

DFG sponsors a number of data collection programs that provide detailed information regarding certain segments of the marine sport fishery. One such program is the Ocean Salmon Project (OSP), which provides informa-



tion on harvest and effort in California's ocean salmon fisheries (both recreational and commercial). It also sponsors a CPFV logbook program. Not all CPFVs participate in the program and the participation rate varies somewhat from year to year. Nevertheless, logbook-based estimates of effort and catch are generally considered to be useful indicators of trends in the CPFV fishery.

According to data collected in the OSP, recreational salmon landings and effort in both central and northern California were lower and less variable in the years prior to 1985 than they have been in subsequent years 1985 through 2000. Record low levels of landings and effort were experienced by both CPFV and private boat anglers in 1992 and record highs in 1995. While CPFV and private boat landings have been markedly similar over time, fishing effort has been consistently higher for private boats than CPFVs. From 1985 through 2000, annual salmon landings averaged 91,600 fish for CPFVs and 93,600 for private boats, while annual effort averaged 86,200 CPFV trips and 128,300 private boat trips. Neither landings nor effort exhibit any consistent long term trend.

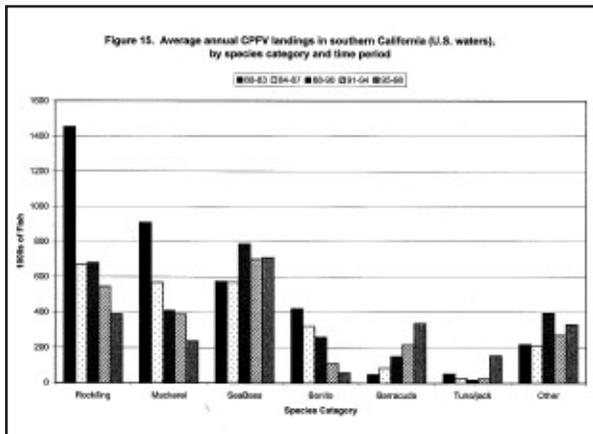
According to data collected in CPFV logbooks, the number of CPFVs that participate annually in the marine recreational fishery averaged 297 boats from 1980 through 1998. Categorizing CPFVs according to their "principal area" (e.g., the area in which they made the plurality of their fishing trips), the number of northern California CPFVs increased from an annual average of 18 boats during the 1980-1987 period to 30 boats during the 1988-1991 period, then decreased to an average of 13 boats during the 1992-1998 period. The number of central California CPFVs declined from an annual average of 137 boats during the 1980-1991 period to 105 boats during the 1992-1998 period. The CPFV fleet in southern California, many of which fish in Mexican as well as U.S. waters, increased in size from an average of 145 boats (1980-1994) to 183 boats (1995-1998). Of these 183 boats, 119 fished exclusively in U.S. waters, 58 fished in both U.S. and

Mexican waters, and five fished exclusively in Mexican waters.

The number of CPFV angler trips in northern California averaged 6,782 (1980-1984), increased to 13,271 (1985-1991), then declined to 6,087 (1992-1998). In central California, fishing effort declined from an annual average of 206,121 angler trips (1980-1991) to 159,634 angler trips (1992-1998). For CPFVs based in southern California, fishing effort in U.S. waters experienced peaks in 1980-1982, 1990 and 1997-1998, while effort in Mexican waters peaked in 1984-1985 and 1997-1998. Fishing effort in southern California (in both U.S. and Mexican waters) displays no obvious trend over time.

Paralleling the changes in fishing effort, CPFV landings in northern California also increased through the 1980s, peaked in the late 1980s and early 1990s, then declined throughout the 1990s. This same trend was followed by both major components of northern California landings - rockfish/lingcod and salmon. Landings of "other" species, which have historically been very modest, were augmented by crab harvests from 1995 through 1998, when CPFVs began employing crab pots on fishing trips to help supplement declining harvests of finfishes. Central California landings, which ranged from 1.5 to 1.8 million fish during the early 1980s, have declined to well under one million fish in recent years. This decline has been largely driven by the precipitous decline in rockfish/lingcod landings. Salmon landings and landings of "other" species (including species such as crab, striped bass, sturgeon, flatfishes, mackerel, tuna, shark) followed no obvious trend. Landings associated with southern California trips in U.S. waters declined from well over four million fish during the early 1980s to around two million fish during the late 1990s. Increases in sea bass and barracuda landings during 1980-1998 were overshadowed by much larger declines in rockfish, mackerel and bonito landings. Tuna/jack landings do not follow any obvious long term trend, although they have been unusually high in recent years. "Other" landings include a diversity of species, including California scorpionfish, ocean whitefish, sea chubs, wrasses, croakers and flatfishes among others.

Since 1995, the CPFV logbook database has included information that allows fishing trips to be distinguished from diving trips and also allows trips to be distinguished by target species. From 1995 through 1998, diving trips comprise a very modest proportion of total CPFV activity in both northern and central California. CPFV fishing trips in northern California were targeted largely at salmon (39 percent), rockfish/lingcod (48 percent) and salmon and rockfish/lingcod combined (10 percent). CPFV fishing trips in central California were targeted at salmon (45 percent), rockfish/lingcod (35 percent), salmon and rockfish/lingcod (three percent), and striped bass/sturgeon, shark, tuna



and other/unspecified species (17 percent). From 1995 through 1998, the contribution of salmon to total CPFV landings in northern and central California (seven percent and 10 percent respectively) was much lower than the proportion of trips targeted at salmon. Conversely, the rockfish/lingcod contribution to total northern and central California landings (88 percent and 84 percent respectively) was much higher than the proportion of trips targeted at rockfish/lingcod. Such marked disproportionalities between landings and effort highlight the large differences in catch-per-unit-effort that can exist among species groups. The singular reliance of northern and central California CPFVs on salmon, rockfish and lingcod harvests and the unprecedented regulatory restrictions on harvests of these species in recent years are significant contributing factors to the decline in effort and landings experienced in northern and central California in recent years.

Southern California CPFVs participate in a range of fishing and diving activities. From 1995 through 1998, about 79 percent of angler trips made by southern California boats involved fishing in U.S. waters, 14 percent involved fishing in Mexican waters, seven percent involved diving in U.S. waters, and less than one percent involved dive trips in Mexican waters. Of the 183 CPFVs that operated in southern California during 1995-1998, 63 fished in Mexican waters. Mexican as well as California fishing regulations are an important consideration for this significant minority of southern California CPFVs.

From 1995 through 1998, 91 percent of southern California CPFV fishing trips in U.S. waters were not targeted at any particular species, reflecting the prevalence of freelance trips on which anglers are provided with the opportunity to catch a diversity of species. Of the remaining nine percent of trips, two percent were specifically targeting tuna and seven percent rockfish/lingcod. About 55 percent of total rockfish/lingcod landings in southern California were made on trips specifically targeting rockfish/lingcod and the remaining 45 percent landed on freelance trips. This highlights one of the complexities associated with management of the southern California CPFV fishery, that is, how to meet harvest goals for managed species (like rockfish and lingcod) that are taken jointly with other species without unduly restricting harvests of these other species.

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References

- Thomson, Cynthia J. and Daniel D. Huppert. 1987. Results of the Bay Area Sportfish Economic Study (BASES), NOAA Technical Memorandum NOAA-TM-NMFS-SWFSC-78, 70 pp.
- Thomson, Cynthia J. and Stephen J. Crooke. 1991. Results of the southern California Sportfish Economic Survey. NOAA Technical Memorandum NOAA-TM-NMFS-SWFSC-164, 264 pp.

Table II-1. Commercial landings (millions of pounds), by year and species group, 1981-1999.¹

Year	Groundfish	Squid	Crab	Alb/Other Tuna	Urchin	Herring	Shark/Sword	Salmon
1981	94.4	51.8	11.8	337.1	26.5	13.1	4.8	6.0
1982	116.7	36.9	8.2	251.6	19.5	23.4	5.7	8.0
1983	90.0	4.0	6.7	248.7	17.8	17.7	5.8	2.4
1984	90.1	1.2	7.0	182.4	15.1	8.5	7.6	2.9
1985	95.0	22.7	7.9	68.2	20.1	17.6	8.9	4.3
1986	92.5	46.9	9.8	69.0	34.1	16.9	6.7	7.3
1987	91.8	44.1	8.6	80.6	46.1	18.6	5.3	8.8
1988	88.5	82.1	12.7	75.7	52.0	19.1	4.3	14.2
1989	94.4	90.2	7.2	55.5	51.4	20.6	4.5	5.6
1990	86.7	62.7	12.3	37.4	45.3	16.5	3.5	4.3
1991	79.7	83.2	6.0	19.0	42.3	16.3	3.1	3.7
1992	77.3	28.9	9.9	20.6	33.2	14.2	3.3	1.6
1993	62.4	94.4	13.5	24.9	27.0	9.6	3.5	2.5
1994	54.8	122.0	14.6	26.0	23.9	6.7	3.4	3.1
1995	63.5	154.9	10.4	26.1	22.3	10.4	2.4	6.6
1996	62.4	177.6	13.6	42.4	20.1	12.2	2.5	4.1
1997	65.5	155.1	11.3	37.2	18.1	20.8	3.1	5.3
1998	50.6	6.6	12.1	38.1	10.4	4.5	2.8	1.8
1999	33.1	201.8	9.6	24.6	14.2	5.2	3.8	3.8

Table II-1. Commercial landings (millions of pounds), by year and species group, 1981-1999.¹ (continued)

Year	CPS	Lobster	Prawn	Shrimp	Nearshore	Abalone	All Else	Total
1981	232.6	0.5	0.6	5.3	2.6	1.1	3.2	791.4
1982	215.7	0.5	0.4	5.4	2.3	1.2	3.2	697.8
1983	122.9	0.5	0.3	2.1	1.5	0.8	1.7	522.8
1984	123.7	0.4	0.6	3.0	2.3	0.8	1.5	447.3
1985	102.0	0.4	1.0	4.6	3.0	0.8	1.3	357.6
1986	120.8	0.5	0.8	7.0	2.1	0.6	1.1	416.1
1987	124.7	0.4	0.3	8.2	2.1	0.8	1.5	442.1
1988	129.2	0.6	0.3	11.5	2.3	0.6	1.7	494.8
1989	136.1	0.7	0.4	14.6	2.1	0.7	3.6	487.5
1990	106.2	0.7	0.4	10.3	2.0	0.5	6.0	394.9
1991	99.9	0.6	0.4	11.8	2.9	0.4	1.7	371.2
1992	85.7	0.6	0.3	19.6	1.8	0.5	1.3	298.9
1993	67.9	0.6	0.4	8.6	2.1	0.5	1.8	319.8
1994	57.6	0.5	0.6	12.1	3.1	0.3	1.7	330.4
1995	115.7	0.6	0.8	6.8	3.2	0.3	1.4	425.4
1996	107.5	0.7	1.1	10.6	3.4	0.2	3.3	461.6
1997	151.2	0.9	1.1	15.7	2.7	0.1	4.2	492.3
1998	147.2	0.7	1.3	3.0	1.4	0.0	3.3	283.9
1999	163.4	0.5	2.0	5.8	1.4	0.0	2.9	472.1

¹ "Nearshore" includes non-rockfish species caught in nearshore areas (e.g., California sheephead, white croaker, white seabass).

Table II-2. Ex-vessel value (\$millions, base year=1999), by year and species group, 1981-1999.¹

Year	Groundfish	Squid	Crab	Alb/Other Tuna	Urchin	Herring	Shark/Sword	Salmon
1981	38.3	8.5	17.2	317.6	8.4	7.9	9.6	25.3
1982	46.5	5.6	13.6	198.7	5.6	15.8	12.5	31.5
1983	36.5	1.1	14.0	163.1	5.8	18.9	13.7	7.0
1984	35.8	0.4	14.3	118.2	5.3	2.8	20.7	11.4
1985	39.9	5.3	14.7	36.6	6.8	8.7	23.1	15.3
1986	42.8	6.2	17.9	38.3	13.4	7.6	20.8	20.2
1987	44.5	5.3	15.2	48.3	17.9	7.9	18.2	32.6
1988	40.1	10.2	21.0	55.1	25.2	7.4	15.2	52.5
1989	40.7	8.7	11.3	32.8	28.4	5.9	16.6	16.5
1990	37.2	5.7	21.8	18.4	29.7	10.5	10.7	14.1
1991	34.4	7.2	10.0	9.4	39.5	11.1	9.3	10.5
1992	34.9	2.8	14.1	11.5	33.9	10.5	9.6	5.1
1993	28.0	11.3	16.4	15.2	29.4	2.8	10.9	6.3
1994	28.2	15.6	21.4	16.5	27.7	3.5	11.5	7.0
1995	38.7	23.7	16.9	11.4	24.1	10.3	7.8	12.4
1996	37.8	22.8	19.5	23.5	19.6	15.8	7.1	6.3
1997	35.8	21.2	20.8	20.1	15.7	15.6	7.3	7.5
1998	25.0	1.7	21.8	19.0	8.0	0.6	6.7	3.1
1999	22.4	33.3	18.2	16.3	13.4	2.2	9.1	7.4

Year	CPS	Lobster	Prawn	Shrimp	Nearshore	Abalone	All Else	Total
1981	23.7	2.7	1.6	5.3	2.8	3.5	4.0	475.7
1982	21.1	3.0	1.7	5.4	1.2	3.6	4.0	369.6
1983	15.5	3.0	0.8	2.1	0.9	2.6	1.2	286.3
1984	14.7	2.6	0.8	3.0	1.1	3.2	1.2	238.4
1985	11.5	2.7	1.3	4.6	1.8	3.4	1.0	174.4
1986	12.7	3.1	1.5	7.0	1.3	2.6	0.9	194.7
1987	11.0	2.9	1.0	8.2	1.3	3.3	1.2	218.7
1988	12.7	4.2	1.3	11.5	1.4	2.6	1.3	256.7
1989	12.3	5.0	1.3	14.6	1.2	3.9	2.0	193.4
1990	7.9	4.8	1.9	10.3	1.2	3.0	3.6	176.5
1991	8.3	4.4	2.1	11.8	1.5	2.1	1.5	158.8
1992	7.1	4.4	1.7	19.6	1.0	3.2	1.4	149.3
1993	4.2	4.0	2.6	8.6	0.6	3.5	2.6	141.2
1994	4.1	3.8	3.2	12.1	2.0	2.9	2.0	157.0
1995	5.6	5.1	3.3	6.8	2.1	2.7	1.0	170.5
1996	5.6	5.3	4.4	10.6	2.0	2.3	1.4	180.5
1997	8.4	7.0	5.8	15.7	1.8	1.1	1.2	176.5
1998	6.8	4.8	6.4	3.0	1.6	0.0	1.3	109.0
1999	7.4	3.7	5.8	5.8	1.3	0.0	1.1	144.4

¹ "Nearshore" includes non-rockfish species caught in nearshore areas (e.g., California sheephead, white croaker, white seabass).

Table II-3. Average annual landings and ex-vessel value during 1995-1999, by area and major species group.

Northern California

Species Group	Pounds x 1000	Percent	(Base Year \$=1999)	Percent
Groundfish	30,233.7	57%	13,564.4	38%
Crab	8,067.0	15%	13,257.6	37%
Shrimp	6,425.7	12%	3,531.2	10%
Urchin	3,321.6	6%	2,724.9	8%
Albacore/Other Tuna	1,105.3	2%	951.8	3%
All Else	3,402.0	7%	1,467.9	4%
Total	52,555.3	100%	35,497.8	100%

Central California

Species Group	Pounds x 1000	Percent	(Base Year \$=1999)	Percent
Groundfish	22,771.8	27%	14,985.8	32%
Herring	10,431.2	12%	8,800.1	19%
Salmon	4,131.5	5%	6,939.9	15%
Crab	2,428.0	3%	5,135.0	11%
Prawn	335.6	0%	2,279.0	5%
Shark/Swordfish	758.9	1%	2,093.4	5%
Coastal Pelagics	32,000.3	38%	1,499.2	3%
Albacore/Other Tuna	1,618.6	2%	1,448.6	3%
Shrimp	1,912.5	2%	1,314.0	3%
Market Squid	7,709.4	9%	1,197.8	2%
All Else	1,192.4	1%	1,181.2	2%
Total	85,290.2	100%	46,874.0	100%

Southern California

Species Group	Pounds x 1000	Percent	(Base Year \$=1999)	Percent
Market Squid	131,468.9	45%	19,344.8	26%
Albacore/Other Tuna	30,924.4	11%	15,662.8	21%
Urchin	13,057.8	5%	12,906.9	18%
Coastal Pelagics	104,979.2	36%	5,261.4	7%
Shark/Swordfish	2,059.3	1%	5,229.5	7%
Lobster	683.1	0%	5,174.6	7%
Groundfish	2,007.4	1%	3,382.5	5%
Prawn	915.9	0%	2,813.2	4%
Crab	891.2	0%	1,067.1	1%
All Else	2,237.8	1%	2,974.6	4%
Total	289,225.0	100%	73,817.4	100%

Total California

Species Group	Pounds x 1000	Percent	(Base Year \$=1999)	Percent
Groundfish	55,012.9	13%	31,932.7	20%
Market Squid	139,187.8	33%	20,546.4	13%
Crab	11,386.1	3%	19,459.6	13%
Albacore/Other Tuna	33,648.2	8%	18,063.1	12%
Urchin	17,040.0	4%	16,151.1	10%
Herring	10,628.9	2%	8,910.9	6%
Shark/Swordfish	2,915.3	1%	7,609.2	5%
Salmon	4,348.7	1%	7,347.7	5%
Coastal Pelagics	137,003.8	32%	6,764.9	4%
Lobster	683.2	0%	5,175.5	3%
Prawn	1,261.4	0%	5,157.7	3%
Shrimp	8,373.9	2%	4,876.8	3%
Abalone	121.7	0%	1,205.1	1%
All Else	5,458.6	1%	2,988.4	2%
Total	427,070.5	100%	156,189.2	100%

Table II-4. Number of vessels that make commercial landings in California, categorized according to whether or not they also make landings in Oregon or Washington, 1981-1999.

Year	CA Only	CA & OR	CA & WA	CA, OR & WA	Total
1981	5,832	787	135	143	6,897
1982	5,762	555	106	130	6,553
1983	5,257	396	83	94	5,830
1984	4,779	261	103	31	5,174
1985	4,451	235	87	37	4,810
1986	4,305	365	106	69	4,845
1987	4,162	352	104	76	4,694
1988	4,204	354	135	92	4,785
1989	4,376	309	125	64	4,874
1990	4,155	273	122	48	4,598
1991	4,032	214	102	40	4,388
1992	3,536	170	118	46	3,870
1993	3,271	196	93	58	3,618
1994	3,102	161	107	52	3,422
1995	3,074	184	83	35	3,376
1996	2,994	205	74	30	3,303
1997	2,857	190	96	20	3,163
1998	2,505	119	51	24	2,699
1999	2,495	128	45	22	2,690

Table II-5. Number of vessels by principal area, categorized according to whether or not they also make landings outside their principal area, 1981-1999.

Year	Principal Area=Northern CA			Principal Area=Central CA			Principal Area=Southern CA			So. CA Only	So. & Cen.	Other Comb.	Total
	No. CA Only	No. & Cen.	Other Comb.	Total	Cen. CA Only	No. & Cen.	So. & Cen.	Other Comb.	Total				
1981	1920	311	25	2256	2488	259	82	19	2848	1635	135	23	1793
1982	1842	289	36	2167	2274	232	110	29	2645	1566	155	19	1740
1983	1472	141	10	1623	2269	190	139	21	2619	1325	159	35	1519
1984	1066	160	16	1242	2008	177	102	15	2302	1313	230	20	1563
1985	891	198	23	1112	2033	147	105	13	2298	1160	152	24	1336
1986	1127	198	20	1345	1935	164	108	16	2223	1112	121	26	1259
1987	951	241	57	1249	1843	244	99	21	2207	1025	132	23	1180
1988	940	211	49	1200	2035	250	101	16	2402	979	90	53	1122
1989	858	240	60	1158	2069	296	69	20	2454	1056	89	64	1209
1990	842	130	48	1020	2011	184	84	14	2293	1111	76	40	1227
1991	767	127	40	934	1944	189	82	18	2233	1080	101	27	1208
1992	597	71	83	751	1778	90	83	18	1969	998	90	47	1135
1993	605	94	65	764	1562	132	63	20	1777	954	73	42	1069
1994	521	101	33	655	1370	155	101	23	1649	958	107	42	1107
1995	470	76	33	579	1539	97	116	14	1766	903	96	21	1020
1996	507	112	24	643	1428	92	70	7	1597	929	95	25	1049
1995	512	68	24	604	1406	88	84	9	1587	858	86	18	962
1998	445	76	17	538	1105	64	76	11	1256	806	64	17	887
1999	459	59	14	532	1057	56	74	4	1191	846	98	11	955

Table II-6. Average annual number of boats that make California landings, ex-vessel revenue per boat from California landings, number and percent of boats earning less than \$5,000 per year from California landings, and number and percent of boats accounting for 90 percent of ex-vessel value of aggregate landings, by principal area and time period.

	1981-1985	1986-1994	1995-1999
Principal Area=Northern CA:			
Number of Boats	1,680	1,008	579
Ex-Vessel Revenue Per Boat	\$24,500	\$48,300	\$60,800
#(%) Boats Earning <\$5K Per Year	983(59%)	386(37%)	162(28%)
#(%) Boats Accting for 90% of Ex-Vessel Value of Northern California Landings	419(25%)	341(35%)	236(41%)
Principal Area=Central CA:			
Number of Boats	2,542	2,134	1,479
Ex-Vessel Revenue Per Boat	\$20,800	\$25,100	\$30,100
#(%) Boats Earning <\$5K Per Year	1,420(56%)	967(46%)	627(43%)
#(%) Boats Accting for 90% of Ex-Vessel Value of Central California Landings	727(29%)	737(34%)	512(35%)
Principal Area=Southern CA:			
Number of Boats	1,630	1,201	988
Ex-Vessel Revenue Per Boat	\$126,000	\$67,400	\$74,900
#(%) Boats Earning <\$5K Per Year	682(42%)	402(33%)	256(26%)
#(%) Boats Accting for 90% of Ex-Vessel Value of southern California Landings	290(18%)	401(34%)	382(39%)
Total California:			
Number of Boats	5,853	4,344	3,046
Ex-Vessel Revenue Per Boat	\$50,600	\$41,800	\$50,700
#(%) Boats Earning <\$5K Per Year	3,085(53%)	1,755(40%)	1,045(34%)
#(%) Boats Accting for 90% of Ex-Vessel Value of Total California Landings	1,119(20%)	1,375(32%)	1,072(35%)

Table II-7. Average annual 1995-1999 landings, ex-vessel value of landings, and vessel participation in major commercial fisheries, by area.

# Vessels	Landings (1000 lbs)	Value (\$1000s, Base Year=1999)	# Participating Vessels	Participating As Principal Fishery
Major Northern CA Fisheries				
Crab trap	7,886.0	13,095.5	309	247
Groundfish trawl	28,683.7	11,322.9	71	56
Shrimp trawl	6,084.1	3,179.5	58	25
Urchin dive	3,318.9	2,742.1	64	61
Groundfish H&L	1,562.8	1,925.4	158	103
Tuna H&L	966.4	837.6	43	17
Salmon H&L	406.1	654.5	86	44
Groundfish/misc. trap	363.9	459.4	35	16
Shark/swordfish gillnet	102.0	308.9	9	4
Herring	121.1	104.4	5	4
Major Central CA Fisheries				
Groundfish trawl	17,406.2	9,097.8	73	61
Herring	10,014.2	8,585.5	149	136
Salmon H&L	3,847.1	6,512.4	704	579
Crab trap	2,564.3	5,209.2	207	127
Groundfish H&L	4,056.2	4,710.2	520	415
Prawn trawl	317.9	2,039.2	18	13
Shark/swordfish gillnet	581.9	1,683.5	30	21
Squid seine/other net	8,817.7	1,282.9	13	5
Tuna H&L	1,470.1	1,248.1	123	44
CPS seine	20,333.9	961.6	13	7
Shrimp trawl	985.7	956.9	19	10
Urchin dive	686.7	546.9	17	10
Groundfish/misc. trap	153.1	382.5	34	13
Abalone dive	31.8	313.1	9	8
Prawn trap	34.4	249.2	8	3
Shark/swordfish H&L	101.2	240.9	9	3

Table II-7 (continued).

# Vessels	Landings	Value (\$1000s,	# Participating	Participating As
Major Southern CA Fisheries	(1000 lbs)	Base Year=1999)	Vessels	Principal Fishery
Squid seine/other net	129,556.2	19,150.2	87	70
Urchin dive	13,007.9	12,835.5	223	207
Tuna seine	23,001.5	9,644.1	21	10
Tuna H&L	7,473.2	5,736.9	115	65
CPS seine	115,869.4	5,671.8	46	23
Lobster trap	680.7	5,157.5	202	168
Shark/swordfish gillnet	1,053.9	2,548.2	80	50
Groundfish H&L	1,588.5	2,193.8	205	157
Shark/swordfish H&L	795.6	1,875.9	42	27
Prawn trawl	745.3	1,679.9	27	19
Groundfish/misc. net	810.8	1,232.3	58	31
Crab trap	900.4	1,097.2	76	35
Prawn trap	135.1	1,011.9	28	18
Abalone dive	87.6	877.0	33	13
Groundfish/misc. trap	219.1	663.2	66	19
Shark/swordfish dive	119.3	632.0	24	20
Groundfish trawl	255.0	525.3	32	20
Cucumber dive	398.6	244.3	22	21
Salmon H&L	89.8	171.1	18	7
Cucumber trawl	236.4	167.1	12	5
Shrimp other net	63.5	22.2	3	3

Table II-8. Average annual 1995-1999 landings and ex-vessel revenue per boat from the principal fishery, from other California fisheries and from Oregon and Washington fisheries, by vessels' principal area and principal fishery.

	Landings/Boat/Year (1000 Pounds)				Ex-Vessel Revenue/Boat/Year (\$1000s)			
	Principal Fishery	Other CA	OR/WA	Total	Principal Fishery	Other CA	OR/WA	Total
Northern California Principal Fisheries								
Crab trap	26.0	17.1	9.8	52.9	43.8	12.7	8.8	65.2
Groundfish trawl	473.1	61.1	385.7	919.8	185.1	37.2	44.8	267.2
Shrimp trawl	110.2	38.9	249.4	398.5	58.6	30.1	134.5	223.2
Urchin dive	54.2	0.7	2.7	57.6	43.9	1.5	2.5	47.9
Groundfish H&L	10.6	3.1	1.6	15.3	12.7	4.3	2.3	19.4
Tuna H&L	27.1	2.7	30.6	60.5	24.0	3.6	28.3	55.9
Salmon H&L	1.8	0.8	0.2	2.8	3.2	1.1	0.3	4.6
Groundfish/misc. trap	10.8	3.7	3.5	18.0	14.8	5.1	6.3	26.2
Shark/swordfish gillnet	13.2	10.3	107.6	131.0	42.3	11.3	102.9	156.5
Herring	25.9	1.2	0.0	27.1	19.4	1.2	0.0	20.5
Groundfish trawl	275.3	18.8	333.9	628.0	145.4	11.1	52.9	209.4
Herring	64.2	18.5	1.8	84.5	53.4	2.9	1.3	57.7
Salmon H&L	5.3	1.4	1.9	8.6	9.0	1.8	2.3	13.1
Crab trap	16.1	9.1	1.9	27.0	32.7	8.4	1.9	43.1
Groundfish H&L	8.6	0.8	0.2	9.6	10.2	1.1	0.2	11.5
Prawn trawl	23.3	44.7	87.4	155.4	153.8	34.0	46.3	234.1
Squid seine/other net	573.8	479.3	0.0	1053.1	85.7	46.0	0.0	131.6
Tuna H&L	17.1	2.7	17.9	37.6	14.4	4.0	16.7	35.2
CPS seine	2030.9	334.9	0.0	2365.9	99.2	53.2	0.0	152.4
Shrimp trawl	26.1	4.2	78.7	109.0	52.7	4.9	52.4	110.0
Urchin dive	60.3	1.1	0.0	61.4	47.6	2.2	0.0	49.7
Groundfish/misc. trap	8.1	2.2	0.0	10.3	20.8	4.3	0.0	25.1
Abalone dive	2.3	2.0	0.1	4.4	22.5	2.1	0.1	24.7
Prawn trap	8.1	16.2	0.9	25.2	59.8	12.6	0.5	72.8
Shark/swordfish H&L	11.2	2.7	0.7	14.6	27.0	7.5	1.9	36.4

Table II-8 (cont.)

Southern California Principal Fisheries	Landings/Boat/Year (1000 Pounds)				Ex-Vessel Revenue/Boat/Year (\$1000s)			
	Principal Fishery	Other CA	OR/WA	Total	Principal Fishery	Other CA	OR/WA	Total
Squid seine/other net	1516.9	674.7	5.2	2196.7	226.0	44.9	4.5	275.4
Urchin dive	60.2	3.0	5.1	68.2	58.8	4.2	0.9	63.8
Tuna seine	1882.1	1288.6	4.9	3175.6	806.4	104.0	4.1	914.6
Tuna H&L	105.0	15.1	36.2	156.3	70.5	9.4	31.3	111.3
CPS seine	2475.8	482.5	0.4	2958.8	132.0	89.5	0.1	221.6
Lobster trap	3.7	3.8	0.1	7.6	28.2	6.4	0.1	34.7
Shark/swordfish gillnet	16.4	23.5	8.3	48.2	42.9	19.7	7.1	69.7
Groundfish H&L	8.9	1.7	0.3	11.0	12.2	1.4	0.3	13.9
Shark/swordfish H&L	26.8	6.7	3.0	36.5	62.8	15.3	2.4	80.4
Prawn trawl	32.5	9.2	56.5	98.2	79.4	11.6	12.2	103.2
Groundfish/misc. other net	17.5	12.1	0.6	30.3	28.1	10.6	0.5	39.2
Crab trap	15.1	1.4	0.0	16.6	18.3	4.7	0.0	23.0
Prawn trap	6.1	2.6	0.5	9.1	47.4	9.1	0.4	56.9
Abalone dive	2.1	9.1	0.4	11.7	21.4	9.7	0.3	31.5
Groundfish/misc. trap	4.6	2.9	0.0	7.5	14.0	7.2	0.0	21.3
Shark/swordfish dive	5.2	1.2	0.0	6.3	27.3	1.8	0.0	29.1
Groundfish trawl	9.0	8.0	7.9	24.9	20.9	6.0	2.7	29.6
Cucumber dive	2.6	4.0	0.5	32.9	15.1	9.8	0.0	24.8

Table II-9. Number of fish dealers by principal area, categorized according to whether or not they also receive landings outside their principal area, 1981-1999.

Year	Principal Area=Northern CA				Principal Area=Central CA				Principal Area=Southern CA				Total Dealers	
	No.CA Only	No.& Cen.	Other Comb.	Total	Cen.CA Only	No.& Cen.	So.& Cen.	Other Comb.	So.CA Total	So.& Only	Other Cen.	CA Comb.		Total
1981	81	3	7	86	182	15	12	4	213	201	17	2	220	519
1982	77	8	1	86	209	9	11	4	233	227	18	2	247	566
1983	67	6	0	73	221	14	12	4	251	217	27	4	248	572
1984	53	11	0	64	211	8	9	4	232	207	28	2	237	533
1985	59	9	0	68	200	9	19	2	230	187	35	1	223	521
1986	65	7	2	74	213	4	18	3	238	188	24	6	218	530
1987	103	12	4	119	420	22	17	4	463	275	29	5	309	891
1988	102	6	2	110	361	21	15	2	399	272	29	10	311	820
1989	108	10	5	123	329	15	12	5	361	294	37	11	342	826
1990	85	11	5	101	322	14	21	2	359	285	34	12	331	791
1991	85	12	3	100	312	21	19	6	358	290	26	9	325	783
1992	85	10	6	101	307	21	24	11	363	257	26	15	298	762
1993	104	14	4	122	318	21	21	5	365	237	31	17	285	772
1994	98	14	12	124	333	24	27	9	393	331	59	15	405	922
1995	54	14	12	80	284	9	27	6	326	292	37	8	337	743
1996	88	13	6	107	274	19	18	6	317	267	30	12	309	733
1997	89	24	4	117	301	17	18	8	344	297	30	7	334	795
1998	78	19	6	103	360	16	19	5	400	312	29	10	351	854
1999	120	16	7	143	339	11	13	3	366	328	43	8	379	888

Table II-10. Average annual number of fish dealers, ex-vessel value of California landings receipts per dealer, number and percent of dealers accounting for less than \$5,000 per year in California landings receipts, and number and percent of dealers accounting for 90 percent of ex-vessel value of aggregate landings receipts, 1981-1986 and 1987-1999, by dealers' principal area.

	1981-1986	1987-1999
Principal Area – Northern CA:		
Number of Dealers	75	112
Ex-Vessel Value of CA Landings Receipts/Dealer	\$542,700	\$380,300
#(%) Dealers With <\$5K Per Year in CA Receipts	18(23%)	52(46%)
#(%) Dealers Accounting for 90% of Ex-Vessel Value of Northern California Landings	25(33%)	22(20%)
Principal Area – Central CA:		
Number of Dealers	233	370
Ex-Vessel Value of CA Landings Receipts/Dealer	\$246,700	\$138,800
#(%) Dealers With <\$5K Per Year in CA Receipts	76(33%)	186(50%)
#(%) Dealers Accounting for 90% of Ex-Vessel Value of Central California Landings	50(21%)	58(16%)
Principal Area – Southern CA:		
Number of Dealers	239	344
Ex-Vessel Value of CA Landings Receipts/Dealer	\$805,500	\$233,900
#(%) Dealers With <\$5K Per Year in CA Receipts	69(29%)	131(38%)
#(%) Dealers Accounting for 90% of Ex-Vessel Value of southern California Landings	28(12%)	55(16%)
All California:		
Number of Dealers	547	825
Ex-Vessel Value of CA Landings Receipts/Dealer	\$531,500	\$209,500
#(%) Dealers With <\$5K Per Year in CA Receipts	163(30%)	369(45%)
#(%) Dealers Accounting for 90% of Ex-Vessel Value of Total California Landings	103(19%)	134(16%)

Table II-11. Volume and value of imports and exports of edible fish products at California customs districts and at all United States customs districts, by year, 1989-1999.

Year	Imports				Exports			
	Millions of Pounds (Base Year=1999)		Millions of Pounds (Base Year=1999)		Millions of Pounds (Base Year=1999)		Millions of Pounds (Base Year=1999)	
	Calif.	U.S.	Calif.	U.S.	Calif.	U.S.	Calif.	U.S.
1989	569.8	3,243.0	1,636.7	6,863.7	106.6	1,406.0	255.2	2,940.8
1990	627.4	2,884.6	1,808.6	6,289.9	99.2	1,947.3	231.7	3,463.1
1991	687.0	3,014.8	1,895.1	6,595.2	131.6	2,058.6	260.1	3,669.5
1992	710.3	2,894.0	2,015.5	6,491.3	105.2	2,087.6	223.6	3,942.7
1993	708.9	2,917.2	1,948.3	6,477.0	86.7	1,986.0	216.6	3,407.3
1994	777.1	3,034.8	2,325.8	7,207.3	135.9	1,978.5	284.8	3,390.6
1995	729.8	3,066.5	2,230.8	7,217.5	183.8	2,047.2	293.8	3,466.8
1996	759.6	3,169.8	2,222.9	7,017.3	218.7	2,112.1	281.8	3,161.9
1997	832.0	3,338.8	2,533.5	7,961.2	248.3	2,018.9	269.7	2,785.5
1998	911.1	3,647.0	2,513.8	8,289.2	142.6	1,663.9	158.9	2,291.8
1999	979.0	3,887.9	2,471.5	9,013.9	285.4	1,961.1	232.3	2,848.5

Table III-1. Average annual marine recreational fishing effort and harvest during 1998-1999 in southern and central/northern California, by fishing mode (1000s of fish).

Area/Fishing Mode	1000s of Angler Trips	Landed Whole	Released Alive	Other Disposition	Total
Southern California					
Man-made	624	837	644	233	1,714
Beach	281	327	247	17	590
CPFV	641	1,733	973	262	2,968
Private	1,324	1,960	4,075	211	6,246
Total	2,869	4,857	5,939	723	11,518
Central/Northern California					
Man-made	440	533	192	67	792
Beach	344	1,582	206	17	1,805
CPFV	168	1,131	122	171	1,423
Private	921	1,459	648	205	2,311
Total	1,872	4,705	1,168	460	6,331
Total California					
Man-made	1,064	1,370	836	300	2,506
Beach	625	1,909	453	34	2,395
CPFV	808	2,864	1,095	433	4,391
Private	2,245	3,419	4,723	416	8,557
Total	4,741	9,562	7,107	1,183	17,849

Source: Marine Recreational Fishery Statistics Survey.
Includes harvests in U.S. waters only. "Other Disposition" refers to fish used as bait, filleted, given away or discarded dead. All landings are in 1000s of fish.

Table III-2. Average annual marine recreational harvest (excluding fish released alive) during 1998-1999 in southern and central/northern California, by fishing mode and species category.

Species Category	Southern California		Central/Northern California	
	1000s of Fish (%)		Species Category	1000s of Fish (%)
Man-Made				
Tuna/mackerel	413 (39%)		Silversides	185 (31%)
Croaker	204 (19%)		Surfperch	164 (27%)
Silversides	150 (14%)		Croaker	78 (13%)
Herring	145 (14%)		Herring	61 (10%)
Surfperch	71 (7%)		Anchovy	47 (8%)
Other	87 (8%)		Other	65 (11%)
Total	1,070 (100%)		Total	600 (100%)
Beach				
Surfperch	218 (63%)		Smelt	1,145 (72%)
Croaker	59 (17%)		Surfperch	343 (21%)
Silversides	24 (7%)		Silversides	41 (3%)
Sea chub	16 (5%)		Other	70 (4%)
Other	27 (8%)		Total	1,599 (100%)
Total	344 (100%)			
CPFV				
Rockfish	668 (33%)		Rockfish	1,204 (92%)
Sea basses	313 (16%)		Salmon	50 (4%)
Tuna/mackerel	281 (14%)		Greenling	21 (2%)
Pacific barracuda	269 (13%)		Other	27 (2%)
Calif scorpionfish	151 (8%)		Total	1,302 (100%)
Other	313 (16%)			
Total	1,995 (100%)			
Private Boat				
Sea basses	502 (23%)		Rockfish	1,034 (60%)
Tuna/mackerel	379 (17%)		Tuna/mackerel	89 (5%)
Rockfish	328 (15%)		Croaker	85 (5%)
Pacific barracuda	192 (9%)		Flatfish	80 (5%)
Jacks	168 (8%)		Striped bass	70 (4%)
Croaker	156 (7%)		Greenling	68 (4%)
Flatfish	125 (6%)		Salmon	55 (3%)
Calif scorpionfish	86 (4%)		Other	237 (14%)
Other	235 (11%)		Total	1,718 (100%)
Total	2,171 (100%)			

Source: Salmon harvest estimates obtained from DFG's Ocean Salmon Project. All other harvest estimates obtained from Marine Recreational Fishery Statistics Survey.

Table III-3. Estimated average annual expenditures by marine anglers during 1998-1999 in southern and central/northern California (\$millions, base year=1999), by expenditure category.

Expenditure Category	Southern CA	Northern CA	Total CA
Trip-Related Expenses			
Man-Made	\$ 18.1	\$ 13.2	\$ 31.3
Beach	9.8	15.1	24.9
CPFV	81.4	17.0	98.4
Private	92.7	62.6	155.3
Total	\$202.0	\$107.9	\$309.9
Licenses/Fishing Gear	54.3	29.0	83.3
Boat-Related Expenses	74.1	39.6	113.7
Grand Total	\$330.4	\$176.5	\$506.9

Source: Trip-related expenses based on average annual 1998-1999 effort estimates (Table III-1) and estimates of average expenditures per trip by fishing mode derived from Thomson and Crooke (1991) for southern California and from Thomson and Huppert (1987) for central/northern California and corrected for inflation to 1999 dollars. License/gear and boat-related expenses based on the observation from Thomson and Crooke (1991) that license/gear and boat-related expenses are 27 percent and 37 percent respectively of total trip expenditures in southern California, and extrapolating that result to central/northern California.

Table III-4. Number of CPFVs participating in the marine recreational fishery during 1980-1998, by vessels' principal fishing area.

Year	NoCA	CenCA	U.S.Only	SoCA:U.S. & Mex	MexOnly	Total	All Boats
1980	14	142	83	57	6	147	303
1981	15	125	85	52	14	151	291
1982	20	136	92	50	9	151	307
1983	21	145	96	52	6	154	320
1984	19	140	80	65	17	162	321
1985	17	142	78	58	19	155	314
1986	18	140	82	53	7	142	300
1987	22	134	76	45	10	131	287
1988	27	132	102	47	8	157	316
1989	41	146	83	55	14	152	339
1990	32	135	87	45	11	143	310
1991	21	125	87	23	15	125	271
1992	16	120	91	39	3	133	269
1993	16	107	90	32	6	128	251
1994	13	107	98	34	7	139	259
1995	13	99	117	47	6	170	282
1996	10	105	121	47	6	174	289
1997	11	105	125	66	4	195	311
1998	13	95	114	73	5	192	300

Source: CPFV logbooks. Southern California CPFVs distinguished according to whether they fish in U.S. and/or Mexican waters.

Table III-5. Number of CPFV angler trips, by year and area.

Year	NoCA	CenCA	SoCA	Total U.S. Waters	Mexican Waters	Grand Total
1980	5,665	204,146	492,290	702,101	59,739	761,840
1981	6,948	205,380	556,721	769,049	61,460	830,509
1982	6,694	213,206	503,280	723,180	52,756	775,936
1983	8,024	180,898	433,514	622,436	69,210	691,646
1984	6,577	188,275	415,036	609,888	91,666	701,554
1985	11,591	210,894	413,102	635,587	81,601	717,188
1986	11,064	189,780	407,614	608,458	51,755	660,213
1987	13,251	208,989	396,309	618,549	59,862	678,411
1988	12,496	217,284	427,610	657,390	53,967	711,357
1989	15,595	226,333	420,976	662,904	74,681	737,585
1990	14,724	222,149	474,761	711,634	57,433	769,067
1991	14,179	175,329	434,945	624,453	37,100	661,553
1992	7,586	164,792	407,831	580,209	55,258	635,467
1993	5,617	169,566	377,125	552,308	40,626	592,934
1994	4,949	161,637	364,774	531,360	51,765	583,125
1995	6,806	169,402	408,547	584,755	58,074	642,829
1996	6,021	137,312	435,940	579,273	74,846	654,119
1997	5,456	165,899	554,117	725,472	99,304	824,776
1998	6,175	133,133	483,420	622,728	106,504	729,232

Source: CPFV logbooks. "Mexican waters" pertains to trips departing from southern California ports to fish in Mexican waters.

Table III-6. Landings on CPFV fishing trips (1000s of fish), by year and area.

Year	NoCA	CenCA	SoCA	Total U.S. Waters	Mexican Waters	Grand Total
1980	24.2	1,545.4	4,517.1	6,086.6	321.2	6,407.8
1981	51.9	1,747.0	4,267.0	6,065.9	248.6	6,314.5
1982	42.4	1,781.8	3,363.5	5,187.7	182.9	5,370.6
1983	60.9	1,654.9	2,547.0	4,262.7	362.2	4,624.9
1984	33.5	1,485.3	2,249.5	3,768.3	404.0	4,172.3
1985	53.5	1,364.3	2,471.2	3,889.0	290.1	4,179.1
1986	41.6	1,198.9	2,617.9	3,858.4	217.1	4,075.5
1987	50.4	1,314.3	2,485.0	3,849.7	256.2	4,105.9
1988	56.9	1,390.1	2,651.2	4,098.2	254.2	4,352.4
1989	82.4	1,574.1	2,618.9	4,275.4	321.6	4,597.0
1990	111.1	1,606.5	2,824.5	4,542.1	243.5	4,785.6
1991	73.0	1,345.9	2,694.5	4,113.4	175.9	4,289.2
1992	69.7	1,526.7	2,275.7	3,872.1	219.6	4,091.7
1993	31.4	1,312.3	2,112.2	3,455.9	166.7	3,622.6
1994	30.8	1,049.1	1,945.7	3,025.6	189.4	3,215.1
1995	43.9	923.2	1,980.0	2,947.1	222.8	3,169.8
1996	32.1	743.7	2,350.6	3,126.5	249.0	3,375.5
1997	43.4	957.3	2,356.1	3,536.8	384.2	3,921.0
1998	53.7	882.8	2,008.1	2,944.6	377.9	3,322.5

Source: CPFV logbooks. "Mexican waters" pertains to harvests on trips that depart from southern California ports to fish in Mexican waters.

Table III-7. Annual number of CPFV boat and angler trips in 1995-1998, by area and trip type.

Area/Trip Type	1995	1996	1997	1998	Avg.
Northern California					
Total Fishing Trips:	6,806	6,021	5,456	6,175	6,115
Salmon	2,948	3,264	1,808	1,554	2,394
Rockfish/lingcod	3,222	2,161	2,839	3,410	2,908
Salmon/rockfish/lingcod	321	519	553	1,034	607
Other/unspecified	314	77	256	177	207
Total Dive Trips	26	15	0	10	13
NoCA Total	6,832	6,036	5,456	6,185	6,128
Central California					
Total Fishing Trips:	169,402	137,312	165,899	133,133	151,437
Salmon	86,899	56,567	78,202	48,645	67,578
Rockfish/lingcod	58,008	52,865	52,233	51,795	53,725
Salmon/rockfish/lingcod	5,098	3,408	5,135	3,777	4,354
Strbass/sturgeon	2,522	3,720	5,572	5,349	4,291
Shark	1,012	526	628	428	648
Tuna	140	1,127	6,500	4,014	2,945
Other/unspecified	15,723	19,099	17,629	19,125	17,894
Total Dive Trips	1,126	1,249	716	38	782
CenCA Total	170,528	138,561	166,615	133,171	152,219
Southern California					
Total Fishing Trips-CA:	408,547	435,940	554,117	483,420	470,506
Rockfish/lingcod	31,684	34,923	30,525	26,595	30,932
Tuna	12,006	2,992	13,586	18,124	11,677
Other/unspecified	364,857	398,025	510,006	438,701	427,897
Total Fishing Trips-Mex:	58,074	74,846	99,304	106,504	84,682
Tuna	35,691	34,692	56,029	62,164	47,144
Other/unspecified	22,383	40,154	43,275	44,340	37,538
Total Dive Trips-CA	37,089	43,128	44,938	33,014	39,542
Total Dive Trips-Mex	446	790	394	659	572
SoCA Total	504,156	554,704	698,753	623,597	595,303

Source: CPFV logbooks.