# Chapter 3. Description of the Fishery

## 3.1 Areas and Stocks Involved

White seabass occur in or near large kelp beds which fringe beaches and rocky headlands in southern California and the offshore islands (Skogsberg 1939; Thomas 1968). They are also found several miles offshore in schools of various sizes. During some months of the year, white seabass tend to occur close to the seafloor in deeper water (Skogsberg 1939). These same patterns have been reported for white seabass taken north of Point Conception (Thomas 1968). Some of the typical areas inhabited by white seabass are Long Point, Palos Verdes Peninsula; Point Loma; Dana Point; the west end of Santa Catalina Island; San Clemente Island; Santa Barbara Island; and Santa Cruz Island.

Historically, recreational and commercial white seabass fishing activity occurred along the coast between San Pedro and San Diego. Over time, as more recreational fishermen became interested in white seabass, fishing activity expanded northward along the coast to Santa Barbara and out to the northern Channel Islands. Since these areas had been used by commercial fishermen, user conflicts increased. In the mid-1990's, implementation of the southern California nearshore gill net ban caused a shift in commercial fishing activity. The San Pedro/Huntington Flats area became less important as effort was focused at San Miguel, Santa Rosa, and Santa Cruz islands and along the mainland from Goleta northward (Department unpubl. data). Increased regulation on the use of various commercial gear has created large areas along the mainland coast and offshore islands that have become defacto commercial fishing closures. As a consequence, recreational fishermen have had better access to white seabass than ever before over the past two decades and the partitioning of the white seabass resource has shifted to the recreational fishery.

## 3.2 History of Exploitation

The white seabass resource of the Eastern Pacific has been shared by the recreational and commercial components of the fishery since at least the late 1890's. Documentation of this common usage can be found in the Avalon Tuna Club’s weight records for white seabass from the early 1900's (Dayton and MacCall 1992) and in Department data (Young 1973; Table 3-1).

Another component of the historical catch is the contribution of white seabass landings by U.S. boats fishing off Mexico. Until the 1960s, that portion of California landings averaged between 35% and 40% of total catches and increased to 75% between 1963 and 1980. However, in January 1982, Mexico began denying fishing permits to U.S. commercial fishermen (Vojkovich and Reed 1983). The result was a substantial reduction in total U.S. commercial seabass landings (Table 3-1).

Table 3-1. Total white seabass take in U.S. and Mexico by U.S. commercial and recreational industries from 1936 to 2000[1]

| | U.S. commercial (lbs) | Mexico[4] commercial (lbs) | U.S.[2] recreational (lbs) | Mexico[2] recreational (lbs) | U.S.[3] Commercial (# of fish) | Mexico[3] commercial (# of fish) | U.S. recreational (# of fish) | Mexico recreational (# of fish) | Total catch (lbs) | Total catch (# of fish) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1936 | 564,956 | 242,823 | 105,516 | | 22,598 | 9,713 | 8,793 | | 913,295 | 41,104 |
| 1937 | 263,195 | 336,224 | 90,192 | | 10,528 | 13,449 | 7,516 | | 689,611 | 31,493 |
| 1938 | 269,987 | 356,660 | 102,108 | | 10,799 | 14,266 | 8,509 | | 728,755 | 33,575 |
| 1939 | 806,604 | 187,792 | 221,784 | | 32,264 | 7,512 | 18,482 | | 1,216,180 | 58,258 |
| 1940 | 809,231 | 104,080 | 132,504 | | 32,369 | 4,163 | 11,042 | | 1,045,815 | 47,574 |
| 1941 | 832,454 | 75,842 | | | 33,298 | 3,034 | | | 908,296 | 36,332 |
| 1942 | 356,526 | 197,200 | No recreational records | | 14,261 | 7,888 | No recreational records | | 553,726 | 22,149 |
| 1943 | 379,178 | 121,005 | available during | | 15,167 | 4,840 | available during | | 500,183 | 20,007 |
| 1944 | 254,050 | 139,918 | WWII | | 10,162 | 5,597 | WWII | | 393,968 | 15,759 |
| 1945 | 380,093 | 147,262 | | | 15,204 | 5,890 | | | 527,355 | 21,094 |
| 1946 | 471,649 | 144,272 | | | 18,866 | 5,771 | | | 615,921 | 24,637 |
| 1947 | 692,314 | 390,709 | 207,972 | 9,252 | 27,693 | 15,628 | 17,331 | 771 | 1,300,247 | 61,423 |
| 1948 | 789,691 | 324,599 | 259,044 | 16,812 | 31,588 | 12,984 | 21,587 | 1,401 | 1,390,146 | 67,560 |
| 1949 | 945,502 | 466,736 | 750,036 | 16,464 | 37,820 | 18,669 | 62,503 | 1,372 | 2,178,738 | 120,365 |
| 1950 | 1,123,429 | 409,301 | 524,280 | 24,636 | 44,937 | 16,372 | 43,690 | 2,053 | 2,081,646 | 107,052 |
| 1951 | 955,145 | 591,410 | 488,928 | 5,484 | 38,206 | 23,656 | 40,744 | 457 | 2,040,967 | 103,063 |
| 1952 | 692,232 | 456,474 | 421,056 | 5,772 | 27,689 | 18,259 | 35,088 | 481 | 1,575,534 | 81,517 |
| 1953 | 471,206 | 437,868 | 292,716 | 3,636 | 18,848 | 17,515 | 24,393 | 303 | 1,205,426 | 61,059 |
| 1954 | 434,354 | 772,198 | 488,052 | 1,548 | 17,374 | 30,888 | 40,671 | 129 | 1,696,152 | 89,062 |
| 1955 | 544,953 | 370,173 | 334,140 | 4,104 | 21,798 | 14,807 | 27,845 | 342 | 1,253,370 | 64,792 |
| 1956 | 413,956 | 676,754 | 230,640 | 3,576 | 16,558 | 27,070 | 19,220 | 298 | 1,324,926 | 63,146 |
| 1957 | 1,261,755 | 245,140 | 226,428 | 1,932 | 50,470 | 9,806 | 18,869 | 161 | 1,735,255 | 79,306 |
| 1958 | 2,750,652 | 99,111 | 332,916 | 74,220 | 110,026 | 3,964 | 27,743 | 6,185 | 3,256,899 | 147,919 |
| 1959 | 3,385,791 | 37,562 | 119,364 | 7,752 | 135,432 | 1,502 | 9,947 | 646 | 3,550,469 | 147,527 |
| 1960 | 1,086,895 | 149,303 | 181,236 | 7,128 | 43,476 | 5,972 | 15,103 | 594 | 1,424,562 | 65,145 |
| 1961 | 458,491 | 238,509 | 164,160 | 4,824 | 18,340 | 9,540 | 13,680 | 402 | 865,984 | 41,962 |
| 1962 | 208,867 | 365,541 | 162,780 | 11,964 | 8,355 | 14,622 | 13,565 | 997 | 749,152 | 37,538 |
| 1963 | 372,479 | 518,741 | 232,452 | 5,124 | 14,899 | 20,750 | 19,371 | 427 | 1,128,796 | 55,447 |
| 1964 | 550,817 | 841,061 | 173,892 | 4,920 | 22,033 | 33,642 | 14,491 | 410 | 1,570,690 | 70,576 |
| 1965 | 577,607 | 851,000 | 115,512 | 1,788 | 23,104 | 34,040 | 9,626 | 149 | 1,545,907 | 66,919 |
| 1966 | 674,545 | 663,000 | 40,572 | 7,092 | 26,982 | 26,520 | 3,381 | 591 | 1,385,209 | 57,474 |
| 1967 | 507,588 | 715,000 | 31,668 | 8,952 | 20,304 | 28,600 | 2,639 | 746 | 1,263,208 | 52,289 |
| 1968 | 210,050 | 652,000 | 41,232 | 8,424 | 8,402 | 26,080 | 3,436 | 702 | 911,706 | 38,620 |
| 1969 | 250,906 | 848,000 | 34,824 | 13,848 | 10,036 | 33,920 | 2,902 | 1,154 | 1,147,578 | 48,012 |
| 1970 | 426,299 | 675,000 | 24,060 | 28,248 | 17,052 | 27,000 | 2,005 | 2,354 | 1,153,607 | 48,411 |
| 1971 | 551,552 | 272,000 | 36,648 | 26,532 | 22,062 | 10,880 | 3,054 | 2,211 | 886,732 | 38,207 |
| 1972 | 548,015 | 227,000 | 25,620 | 20,592 | 21,921 | 9,080 | 2,135 | 1,716 | 821,227 | 34,852 |

Table 3-1. Total white seabass take in U.S. and Mexico by U.S. commercial and recreational industries from 1936 to 2000[1]

| | U.S. commercial (lbs) | Mexico[4] commercial (lbs) | U.S.[2] recreational (lbs) | Mexico[2] recreational (lbs) | U.S.[3] Commercial (# of fish) | Mexico[3] commercial (# of fish) | U.S. recreational (# of fish) | Mexico recreational (# of fish) | Total catch (lbs) | Total catch (# of fish) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1973 | 581,267 | 228,000 | 61,284 | 23,712 | 23,251 | 9,120 | 5,107 | 1,976 | 894,263 | 39,454 |
| 1974 | 286,935 | 104,409 | 40,896 | 7,128 | 11,477 | 4,176 | 3,408 | 594 | 439,368 | 19,656 |
| 1975 | 201,702 | 980,708 | 33,120 | 4,776 | 8,068 | 39,228 | 2,760 | 398 | 1,220,306 | 50,454 |
| 1976 | 198,140 | 860,533 | 22,836 | 9,204 | 7,926 | 34,421 | 1,903 | 767 | 1,090,713 | 45,017 |
| 1977 | 369,712 | 829,932 | 23,340 | 1,812 | 14,788 | 33,197 | 1,945 | 151 | 1,224,796 | 50,082 |
| 1978 | 294,691 | 866,064 | 3,408 | 1,788 | 11,788 | 34,643 | 284 | 149 | 1,165,951 | 46,863 |
| 1979 | 137,907 | 1,067,759 | 7,032 | 9,192 | 5,516 | 42,710 | 586 | 766 | 1,221,890 | 49,579 |
| 1980 | 133,741 | 836,671 | 55,190 | 3,888 | 5,350 | 33,467 | 16,300 | 324 | 1,029,490 | 55,440 |
| 1981 | 84,772 | 691,232 | 32,622 | 3,432 | 3,391 | 27,649 | 8,291 | 286 | 812,058 | 39,167 |
| 1982 | 69,898 | | 76,940 | 4,128 | 2,796 | | 15,514 | 344 | 150,966 | 18,654 |
| 1983 | 77,552 | | 34,584 | 4,416 | 3,102 | | 7,415 | 368 | 116,552 | 10,885 |
| 1984 | 117,801 | | 67,478 | 4,176 | 4,712 | | 8,365 | 348 | 189,455 | 13,425 |
| 1985 | 125,316 | | 114,232 | 2,028 | 5,013 | | 11,527 | 169 | 241,576 | 16,709 |
| 1986 | 105,690 | | 96,141 | 2,664 | 4,228 | | 13,132 | 222 | 204,495 | 17,582 |
| 1987 | 116,074 | | 102,126 | 1,464 | 4,643 | | 14,714 | 122 | 219,664 | 19,479 |
| 1988 | 106,898 | | 88,214 | 4,812 | 4,276 | | 18,475 | 401 | 199,924 | 23,152 |
| 1989 | 116,022 | | 14,227 | 4,104 | 4,641 | | 3,353 | 342 | 134,353 | 8,336 |
| 1990 | 133,661 | | 29,928 | 852 | 5,346 | | 2,494 | 71 | 164,441 | 7,911 |
| 1991 | 163,784 | | 19,836 | 1,080 | 6,551 | | 1,653 | 90 | 184,700 | 8,294 |
| 1992 | 125,104 | | 7,248 | 1,152 | 5,004 | | 604 | 96 | 133,504 | 5,704 |
| 1993 | 99,481 | | 101,324 | 3,960 | 3,979 | | 6,993 | 330 | 204,765 | 11,302 |
| 1994 | 78,896 | | 157,048 | 1,476 | 3,156 | | 14,721 | 123 | 237,420 | 18,000 |
| 1995 | 73,380 | | 202,042 | 912 | 2,935 | | 17,336 | 76 | 276,334 | 20,347 |
| 1996 | 94,769 | | 71,904 | 1,884 | 3,791 | | 8,530 | 157 | 168,557 | 12,478 |
| 1997 | 58,155 | | 108,339 | 1,356 | 2,326 | | 7,479 | 113 | 167,850 | 9,918 |
| 1998 | 156,633 | | 164,093 | 4,248 | 6,265 | | 8,810 | 354 | 324,974 | 15,429 |
| 1999 | 247,050 | | 435,271 | 1,896 | 9,882 | | 28,544 | 158 | 684,217 | 38,584 |
| 2000 | 212,652 | | 716,298 | 1,236 | 8,506 | | 37,410 | 103 | 930,186 | 46,019 |

All take in Mexico denotes catches by U.S. fishermen in Mexican waters.

[1] 1936-1964 commercial catches from Collyer (1949) and Thomas (1968); 1965-2000 commercial values from DFG landing data; 1936-1979 recreational catches from CPFV logbook database; 1980-2000 recreational values from CPFV logbook data plus PSMFC RecFIN.

[2] Computed value used 12 pounds per fish for CPFV and private/rental boats, and 5 pounds per fish for shore-based fishing (Collyer 1949; Thomas 1968). For 1980-1989 and 1993-2000, computed value used average weight of fish caught by fishing mode (from RecFIN database).

[3] Computed value used 25 pounds per fish (Collyer 1949; Thomas 1968).

[4] Catch by U. S. commercial fishermen in Mexican waters; Mexico closed territorial waters to U.S. commercial fleet in 1982.

### 3.2.1 Description of User Groups

Recreational Fishery

White seabass are most often fished with hook and line gear using live bait in relatively shallow water but are also taken with a fast trolled spoon, artificial squid, or bone jig. Live squid appear to be the best and most commonly used white seabass bait, but large anchovies and medium-sized sardines are also effective as live bait. At times, large white seabass will bite only on fairly large, live Pacific mackerel (Fitch 1958). Frozen squid can also be effective when white seabass are feeding aggressively. When live squid are available, relatively large catches of seabass can be made around the full moon in the spring and early summer. The fish can be brought to the surface, or just under the boat, by heavy chumming.

Hook and line anglers can fish for white seabass from shore, including beaches and man-made structures, such as jetties and piers; private or rental boats; and charter or party boats, known as Commercial Passenger Fishing Vessels (CPFV). In 2000, nearly five percent of surveyed angler trips in southern California reported targeting white seabass (RecFIN 2000); thus, an estimated 63,000 anglers targeted white seabass that year in southern California marine waters.

In addition to hook and line anglers, scuba and free divers contribute to the recreational take of white seabass. However, an exact number of active divers who spearfish in California is unknown. Free diving is a more effective method of targeting and spearing white seabass than scuba. Three southern California clubs from Los Angeles and San Diego Counties (Neptune Free Divers, the Fathomiers, and the San Diego Free Divers) are dedicated to free diving and spearfishing. These clubs have a combined membership of approximately 145 free divers; only about 55 are estimated to efficiently target and spear white seabass (Romanowski pers. comm.). In addition, approximately 165 free divers not affiliated with any clubs in Los Angeles and San Diego Counties effectively target and spear white seabass (Lum pers. comm.). An estimated 45 free divers in the Ventura County and Santa Barbara Counties target and successfully spear white seabass (Lum pers. comm.). The number of non-spearfishing free-divers in California that may have some impact on white seabass is unknown. For example, activities such as under-water photography and under-water filming could potentially disrupt the fish's reproductive behavior.

Commercial Fishery

Historically, commercial fishermen have used gill nets; hook and line; trawl nets; and roundhaul gear such as lampara and purse seine nets to take white seabass. Lampara and purse seine nets were used in the early years of the fishery until it became unprofitable (Whitehead 1930). Descriptions of the commercial fishery and gear types used prior to 1980 have been given in Skogsberg (1925, 1939); Whitehead (1930); Thomas (1968); Young (1973); MacCall et al. (1976); and Vojkovich and Reed (1983).

The commercial fishery for white seabass has largely been composed of a small group of fishermen who target white seabass with set gill nets, drift gill nets, and hook and line gear with the remaining catches landed incidentally in other fisheries (Table 3-2). For the past twenty years, an annual average of 141 vessels (range: 91-199 vessels) have participated in this fishery (Table 3-3); however, about twenty vessels participated in the directed fishery, landing 80% (range: 56 to 94%) of the annual catch. This trend holds true even during years of high white seabass abundance and increased participation. A breakdown of the number of vessels by gear type illustrates that there has been a 64% drop in the number of set and drift gill net vessels since 1985, while the number of hook and line vessels has experienced a five-fold increase. This change can be attributed to fishermen shifting from gill nets to hook and line and other fisheries, and attrition to the fishery.

Table 3-2. Total California landings (pounds) of white seabass by gear type from 1981-2000[1]

| Year | Drift gill net | Set gill net | Hook/Line | Trawl | Purse seine | Other/ unknown | Total pounds |
|---|---|---|---|---|---|---|---|
| 1981 | 5,161 | 78,203 | 968 | 95 | 0 | 345 | 84,772 |
| 1982 | 1,620 | 66,778 | 817 | 101 | 0 | 583 | 69,898 |
| 1983 | 367 | 72,422 | 1,626 | 16 | 0 | 3,121 | 77,552 |
| 1984 | 79 | 115,199 | 753 | 44 | 549 | 1,177 | 117,801 |
| 1985 | 7,215 | 116,145 | 1,285 | 93 | 18 | 561 | 125,316 |
| 1986 | 24,674 | 77,825 | 2,425 | 325 | 0 | 441 | 105,690 |
| 1987 | 21,345 | 92,169 | 1,321 | 394 | 0 | 845 | 116,074 |
| 1988 | 28,242 | 72,979 | 1,666 | 3,716 | 0 | 295 | 106,898 |
| 1989 | 32,071 | 78,445 | 2,553 | 856 | 0 | 2,097 | 116,022 |
| 1990 | 31,313 | 95,239 | 5,318 | 794 | 0 | 998 | 133,661 |
| 1991 | 37,832 | 121,205 | 3,745 | 620 | 25 | 357 | 163,784 |
| 1992 | 24,806 | 95,765 | 2,584 | 1,535 | 0 | 415 | 125,104 |
| 1993 | 35,824 | 56,288 | 6,098 | 864 | 0 | 407 | 99,481 |
| 1994 | 53,244 | 19,611 | 5,636 | 325 | 0 | 80 | 78,896 |
| 1995 | 31,506 | 20,807 | 19,542 | 1,451 | 0 | 74 | 73,380 |
| 1996 | 62,812 | 16,059 | 15,300 | 347 | 0 | 250 | 94,769 |
| 1997 | 27,354 | 21,633 | 6,981 | 2,179 | 0 | 8 | 58,155 |
| 1998 | 26,635 | 118,972 | 7,469 | 3,403 | 0 | 154 | 156,633 |
| 1999 | 81,095 | 128,242 | 32,231 | 5,326 | 0 | 156 | 247,050 |
| 2000 | 33,071 | 144,354 | 31,234 | 3,993 | 0 | 175 | 212,652 |

[1] Entangling net data added to drift and set data based on the ratio of drift/set net effort taken from logbook data.

Although the fishermen's ability, aided by advances in marine vessel electronic technology (e.g., fathometers, sea surface temperature faxes) to locate white seabass has increased over time, commercial fishing gear used in the white seabass fishery has not changed much since the fishery began in the late 1890's. Gill nets have been the most important gear type in the commercial white seabass fishery, and are still designed the same way except the materials have changed over time from multi-strand twine to multi-filament nylon webbing, and now to monofilament nylon webbing (Thomas 1968; Vojkovich and Reed 1983). The two types of gill nets used are set

nets and drift gill nets with 6- to 7-inch (152 to 178 mm) mesh (stretched mesh, knot to knot). The most significant change has been the addition of a mechanized net reel, developed in the 1940s. The net reel greatly aides in setting and retrieving nets (Thomas 1968), and it also permits fishermen to increase the length of their nets and the amount of gear set.

In the late 1970s and 1980s, set nets were the principle gear used to take white seabass in California waters while drift gill nets were used primarily in Mexican waters (Vojkovich and Reed 1983). In the mid-1990s, drift gill nets played a larger role in the California fishery (Table 3-3).

Table 3-3. Number of vessels landing white seabass by principle landing gear from 1981-2000[1]

| Year | Hook/ line | Trawl | Drift gill net | Set gill net | Gill nets | Purse seine | Other/ unknown | Total vessels |
|---|---|---|---|---|---|---|---|---|
| 1981 | 14 | 2 | | | 130 | 0 | 3 | 129 |
| 1982 | 27 | 5 | | | 113 | 0 | 19 | 142 |
| 1983 | 12 | 1 | | | 112 | 0 | 34 | 156 |
| 1984 | 13 | 2 | | | 141 | 2 | 26 | 173 |
| 1985 | 12 | 3 | | | 171 | 1 | 18 | 199 |
| 1986 | 21 | 6 | | | 166 | 0 | 16 | 197 |
| 1987 | 19 | 11 | | | 146 | 0 | 14 | 181 |
| 1988 | 18 | 11 | | | 114 | 0 | 7 | 145 |
| 1989 | 23 | 7 | | | 115 | 0 | 10 | 148 |
| 1990 | 29 | 8 | | | 102 | 0 | 12 | 145 |
| 1991 | 33 | 11 | | | 97 | 0 | 7 | 136 |
| 1992 | 26 | 14 | | | 87 | 0 | 7 | 121 |
| 1993 | 56 | 12 | | | 68 | 0 | 7 | 136 |
| 1994 | 41 | 11 | 24 | 40 | 53 | 0 | 4 | 103 |
| 1995 | 42 | 15 | 24 | 45 | 57 | 0 | 4 | 114 |
| 1996 | 33 | 10 | 20 | 42 | 50 | 0 | 1 | 91 |
| 1997 | 32 | 19 | 20 | 47 | 57 | 0 | 1 | 106 |
| 1998 | 40 | 29 | 15 | 53 | 57 | 0 | 2 | 118 |
| 1999 | 64 | 32 | 20 | 65 | 66 | 0 | 4 | 150 |
| 2000 | 84 | 29 | 24 | 65 | 69 | 0 | 3 | 167 |

[1] Reflects total number of vessels landing white seabass, recognizing that many boats use multiple gears within a year.

The size of gill net vessels has not changed significantly. Most boats range from 29 to 40 feet (9 to 12 m) in length and are crewed by a skipper working alone or with at least one deckhand. The set time nets are in the water depends on the availability of white seabass, weather conditions and presence of marine mammals. Most drift gill nets along the mainland shore are set just prior to sunset and pulled two or three hours later. At the Channel Islands, drift gill nets may be set for up to twelve hours. Set gill nets remain in the water for about sixteen hours.

The other principle gear used to take white seabass is hook and line. In the early years of the fishery, handlines were used to take white seabass (Skogsberg 1925). As

technology changed, fishing with rod and reel and live bait became more prevalent (Skogsberg 1939). Over the past ten years, this method of fishing has grown (Table 3-3). Today, rod and reel and longlines are the two types of hook and line gear used. Commercial rod and reel gear is similar to that used by the recreational industry, consisting of monofilament line with two hooks and either live squid or sardine as bait. The boats, ranging in size from 20 to 45 feet (6 to 14 m), will either drift or anchor within or adjacent to kelp beds. Set longlines used in the white seabass fishery are similar to those used in the old east coast cod fishery. The gear consists of a buoy and vertical line attached to an anchor and main line, which can vary in length. Distributed along the mainline are equi-distant, snap-on gangions with hooks. The main line is monofilament and is taken on and off the boat by means of a reel. This gear is typically fished over sandy substrate and the duration of the set is the amount of time it takes to set and retrieve the gear (Athens pers. comm.). It takes at least two people to work longline gear.

Over the last two decades, commercial fishermen have sold their catch to fish businesses distributed along the coast from San Diego to Eureka. The majority of fish businesses that receive white seabass, however, are located in southern California (Table 3-4). Only a small number of these businesses purchase 2.5 tons (2.3 metric tons) or more annually (Table 3-5).

### 3.2.2 Fishing Catch and Effort

Recreational Fishing

A very active recreational fishery for white seabass has existed since the late 1930s (Skogsberg 1939). This species has a special allure for anglers, probably due to its potential size, eating quality, and elusive nature. Large recreational catches of white seabass take place only occasionally, at irregular intervals, and at scattered localities. At times, excellent catches are made near southern California's offshore islands. From the 1950s to1970s, higher catches were seen in nearshore coastal areas. In contrast, throughout the 1980s and 1990s, the highest catches were recorded off the Channel Islands (Department unpubl. data).

Annual recreational catches of white seabass have fluctuated considerably over the years (Table 3-1) with much of the catch occurring aboard CPFVs (Figure 3-1). The majority of white seabass are caught in U.S. waters with a small percentage caught in Mexican waters. Historical records show that at the peak of the recreational fishery for white seabass (1947 to 1959), anglers on CPFV's landed an average of 31,100 fish per year. This was followed by a steady decline in the average annual catch: 10,400 fish during the 1960s, 3,400 fish in the 1970s, and 1,300 fish in the 1980s. In the 1990s, annual catches fluctuated from a low of 700 fish in 1992 to more than 16,000 fish in 1999, with an average of 2,800.

Much higher recreational catches of white seabass occurred in 1999 and 2000 than in previous years (Figure 3-1). This can be attributed to an increase in the availability of

white seabass and fishing effort.  More anglers have targeted white seabass in recent

Table 3-4. Number of fish businesses receiving white seabass by principle landing area from 1981-2000

| Year | San Diego | Orange/ Los Angeles | Ventura/ Santa Barbara | San Luis Obispo | Monterey/ Santa Cruz | San Francisco Bay Area | Ports north of San Francisco | Total No. of Businesses |
|---|---|---|---|---|---|---|---|---|
| 1981 | 23 | 20 | 18 | 5 | 3 | 1 | 0 | 69 |
| 1982 | 18 | 28 | 18 | 7 | 2 | 1 | 0 | 69 |
| 1983 | 20 | 33 | 15 | 6 | 6 | 13 | 1 | 91 |
| 1984 | 22 | 25 | 17 | 8 | 7 | 6 | 0 | 76 |
| 1985 | 21 | 26 | 20 | 7 | 7 | 1 | 0 | 74 |
| 1986 | 19 | 25 | 17 | 7 | 4 | 4 | 0 | 70 |
| 1987 | 22 | 23 | 16 | 8 | 3 | 1 | 0 | 69 |
| 1988 | 20 | 17 | 22 | 5 | 3 | 1 | 1 | 66 |
| 1989 | 16 | 20 | 25 | 8 | 5 | 0 | 0 | 70 |
| 1990 | 16 | 24 | 20 | 7 | 4 | 1 | 0 | 71 |
| 1991 | 19 | 25 | 18 | 6 | 5 | 1 | 0 | 67 |
| 1992 | 14 | 17 | 20 | 6 | 3 | 2 | 0 | 61 |
| 1993 | 13 | 21 | 15 | 6 | 5 | 3 | 0 | 59 |
| 1994 | 10 | 15 | 22 | 5 | 4 | 6 | 0 | 60 |
| 1995 | 8 | 18 | 30 | 5 | 7 | 3 | 0 | 69 |
| 1996 | 7 | 13 | 24 | 5 | 2 | 2 | 0 | 53 |
| 1997 | 8 | 11 | 23 | 8 | 11 | 9 | 0 | 68 |
| 1998 | 8 | 22 | 29 | 13 | 10 | 9 | 0 | 82 |
| 1999 | 12 | 33 | 35 | 8 | 14 | 10 | 0 | 104 |
| 2000 | 9 | 30 | 26 | 6 | 10 | 6 | 1 | 86 |

Table 3-5. Number of fish markets receiving white seabass by pounds received from 1981-2000

| Year | >0 and <1,000 lbs | $1,000 and <5,000 lbs | $5,000 and <10,000 lbs | $10,000 and <20,000 lbs | $20,000 lbs | Total No. of Markets |
|---|---|---|---|---|---|---|
| 1981 | 52 | 14 | 2 | 0 | 1 | 69 |
| 1982 | 52 | 14 | 3 | 0 | 0 | 69 |
| 1983 | 76 | 11 | 2 | 2 | 0 | 91 |
| 1984 | 56 | 10 | 8 | 2 | 0 | 76 |
| 1985 | 48 | 19 | 4 | 3 | 0 | 74 |
| 1986 | 54 | 9 | 3 | 4 | 0 | 70 |
| 1987 | 51 | 10 | 4 | 3 | 1 | 69 |
| 1988 | 49 | 11 | 4 | 1 | 1 | 66 |
| 1989 | 53 | 10 | 2 | 5 | 0 | 70 |
| 1990 | 48 | 17 | 2 | 3 | 1 | 71 |
| 1991 | 41 | 15 | 6 | 5 | 0 | 67 |
| 1992 | 41 | 12 | 5 | 2 | 1 | 61 |
| 1993 | 45 | 9 | 1 | 4 | 0 | 59 |
| 1994 | 47 | 8 | 3 | 2 | 0 | 60 |
| 1995 | 53 | 13 | 2 | 1 | 0 | 69 |
| 1996 | 38 | 10 | 3 | 1 | 1 | 53 |
| 1997 | 57 | 7 | 3 | 1 | 0 | 68 |
| 1998 | 67 | 6 | 5 | 2 | 2 | 82 |
| 1999 | 79 | 14 | 4 | 4 | 3 | 104 |
| 2000 | 68 | 8 | 4 | 2 | 4 | 86 |

years (Figure 3-2), and the CPUE for trips aboard CPFVs targeting white seabass increased dramatically during 1999 (Figure 3-3).

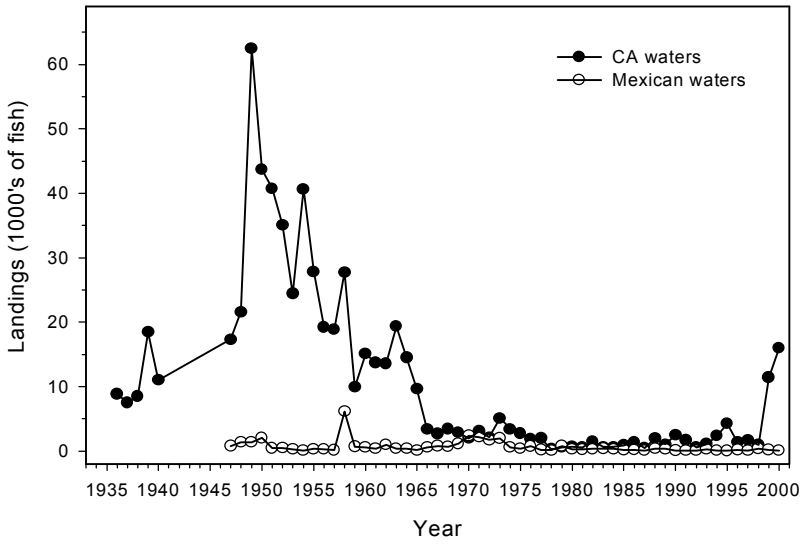


Figure 3-1. Commercial Passenger Fishing Vessel (CPFV) landings of white seabass in U.S. and Mexican waters. Data from Department's historical logbook database.


Figure 3-3. Catch-per-unit-effort (CPUE) of white seabass (WSB) aboard California Passenger Fishing Vessels (CPFVs) targeting white seabass from 1995-1999.

The precise number of white seabass caught by fishermen aboard private boats

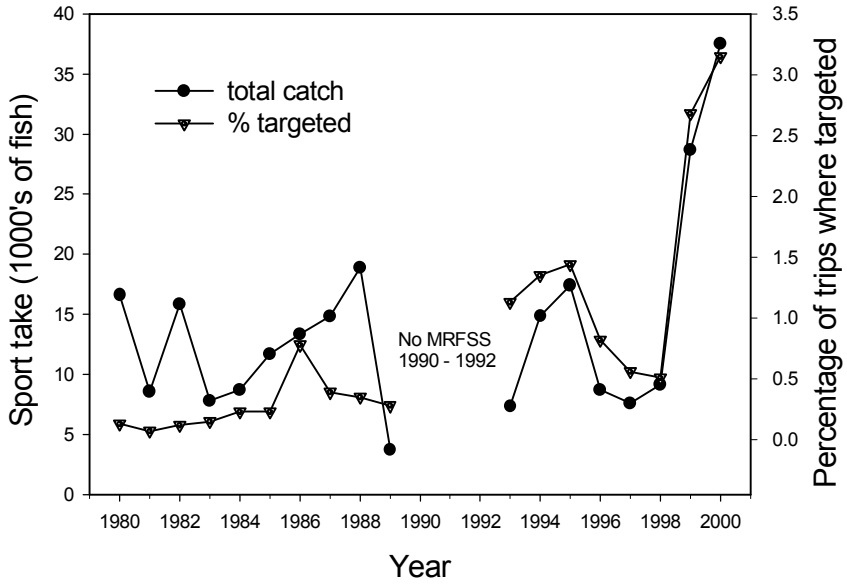


Figure 3-2. Total sport take of white seabass (WSB), in thousands of fish, compared to percentage of trips they are targeted.

(including rental boats) is difficult to determine since few studies have included them in their surveys. However, it is generally believed that private boat fishermen have recently played a larger role in the white seabass fishery. An estimated 3,350 white seabass were caught by private boat fishermen during 1964 (Pinkas et al. 1968); 2,580 during 1976 to 1977; 1,977 during 1977 to 1978; and 1,750 in 1981 (Wine 1978;1979;1982). Data collected by the Marine Recreational Fishery Statistical Survey (MRFSS) from 1980 to 2000 show that private boat catch estimates are consistently higher than CPFV catches (Figure 3-4; RecFIN 2001). Shore-based anglers have also played a large part in the catch of white seabass. Pinkas et al. (1963; 1968) estimated that pier and jetty fishermen caught approximately 8,500 white seabass in 1963 and shoreline anglers caught nearly 700 in 1965 to 1966. These shore-based catches can be higher than CPFV catches, but are generally lower (Figure 3-4; RecFIN 2001).

Much of the earlier catches from 1936 to 1978 contained a number of fish that were under the legal size of 28 inches. For some time, anglers were allowed to take up to fifteen fish per day, five of which could be less than 28 inches. Since white seabass have barely reached sexual maturity at 28 inches, this take of undersized fish may have contributed to today's lower population sizes.

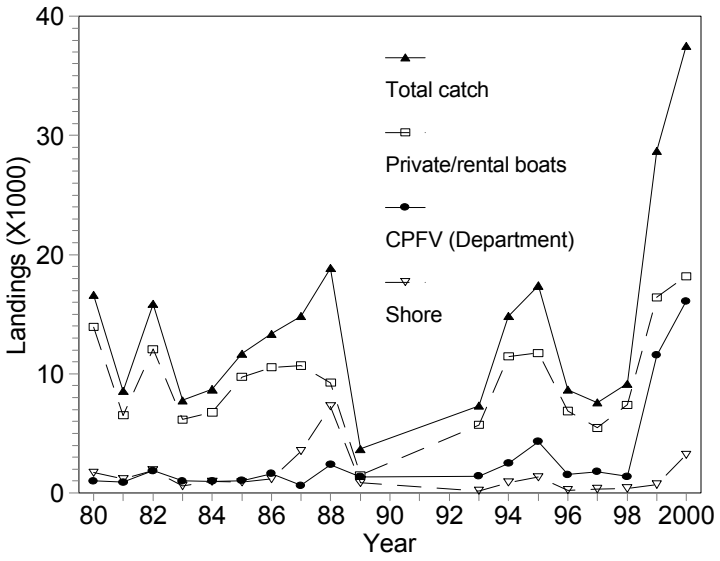


Figure 3-4. Recreational catch of white seabass (thousands of fish) by fishing mode from 1980-2000. Private/rental boats and shore data from RecFIN database; CPFV data from Department logbooks.

Today, anglers have little trouble locating small white seabass throughout the season; however, most have difficulty locating and catching large ones. Anglers fishing from CPFVs typically catch many undersized fish and relatively few large fish, and those fishing from piers and jetties catch undersized fish almost exclusively. Private boat anglers catch fish that are comparable in size to a combination of the CPFV and

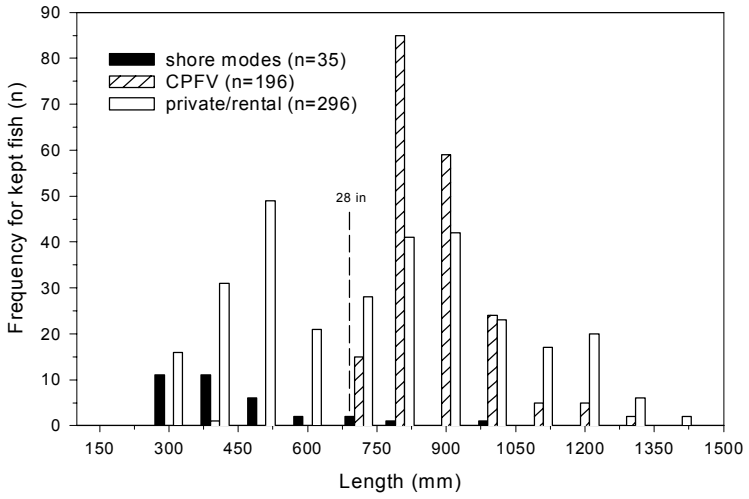


Figure 3-5. Length of white seabass kept by different fishing modes from 1980-2000.

pier/jetty catches (Figure 3-5; MacCall et al. 1976). During a survey of private boat fishermen conducted from 1975 to 1982, only 6% to 16% of the white seabass landed were of legal size (Wine 1978;1979;1982). Another survey showed that from 1985 to 1987, 6% to 40% of the white seabass caught aboard CPFVs were of legal size. Thus, from 60% to 94% of the white seabass caught by recreational anglers have been undersized, and a substantial number were illegally kept (Ally et al. 1992).

The high retention of sub-legal fish occurs because anglers are unaware of the size limit and are unable to correctly identify small white seabass. In a few studies, only 10% of fishermen knew the size limit for white seabass (Wine 1980), and only 23% were able to correctly identify them (Hartmann 1980). This can be a particular problem for pier and private boat fishermen since CPFV anglers can rely on vessel crew for white seabass identification and information on regulations.

Because white seabass are highly sensitive to noise and movement, scuba diving, with its associated bubbles, is a difficult method for effectively spearing these fish. Thus, scuba divers probably do not have a large impact on the total number of white seabass taken. However, some experienced scuba diver/spear fishermen have been known to effectively target white seabass and can spear enough fish to take their full daily bag limits (Lum pers. comm.).

Currently, the average free diver takes about two white seabass per year, and experienced divers take an average of five to ten fish per year (Lum pers. comm.). Compared to the average of 0.5 per year in prior years, this is a 50 to100-fold increase in the number of white seabass taken by free divers. In “good years”, when the number of fish are locally plentiful, the take can be much higher. According to Lum, 1994 and 1999 were exceptionally good years when he saw very large schools of white seabass numbering in the thousands and speared at least 40 large fish, each weighing over 40 pounds (18 kg). Given Lum’s estimate of five white seabass per year, and an estimated 265 free divers who target white seabass, an average of 1,325 fish per year may be taken by southern California free divers.

Lum (pers. comm.) also stated that all fish which appear to be of legal size are targeted in the early part of the season when there is a bag limit of three white seabass per day. Unfortunately, this may include the take of some fish that are less than the legal size of 28 inches (711 mm). When the bag limit is reduced to one white seabass per day from 15 March to 15 June, free divers may tend to target only larger fish.

Commercial Fishing

Commercial white seabass landings have fluctuated dramatically over the years. Landings were moderate during the late 1800s and grew impressively from 1889 to 1915. By 1904, over one million pounds (0.45 million kg) were landed annually. Catches from central and northern California were substantial (often as high as 50% of the total catch), however, the center of the fishery had shifted to southern California by 1916. This was probably due to decreased fish abundance north of Point Conception

and to the increased number of fishermen and increased demand in southern California. The fishery experienced spectacular catches after World War I. Highest total landings in the early years of this fishery occurred in 1919 and 1920 when the landings exceeded two million pounds (0.9 million kg) both years. For the next ten years, the landings fluctuated between 800,000 and 1.4 million pounds (0.6 million kg).

Declining catches in the late 1920s and early 1930s prompted a series of commercial regulations including closed seasons, bag limits, gear restrictions and minimum size limits (Skogsberg 1939). During the 1930s and 1940s, landings ranged from 250,000 to 900,000 pounds (113,400 to 408,240 kg). The greatest peak in California landings occurred during the warm water year of 1959, when more than 3 million pounds (1.4 million kg) were taken. Between 1959 and 1965, landings dropped sharply, falling from over 1 million to 577,607 pounds (262,003 kg). There was a slight increase in 1966 to over 674,000 pounds (305,726 kg). The remainder of the1960s and all of the 1970's show catches below 600,000 pounds (272,160 kg). In the 1980s, catches dropped below 200,000 pounds (90,720 kg) and reached a low of fewer than 70,000 pounds (31,752 kg) in 1982. The large decline (91%) in catch seen between 1981 and 1982 was the result of the loss of catches from Mexican waters. In the 1990s, the commercial fishery experienced wide fluctuations in landings. Beginning in 1994, annual landings dropped below 100,000 pounds (45,360 kg) and reached a record low of 58,554 pounds (26,309 kg) in 1997. This low was followed by three years of large increases with 1999 reaching almost 250,000 pounds (113,400 kg) (Table 3-1; Figure 3-6).

Declining commercial landings of white seabass are partly due to reductions in effort. A decrease in effort for white seabass is reflected in logbook data collected from the commercial set and drift gill net fishery (Figure 3-7). The number of white seabass sets made by fishermen using set gill nets dropped from nearly 2000 in 1982 to less then 50 sets in 1994 (Beeson and Hanan 1994).

Since the commercial fishery began, there have been a number of factors that have affected fishing effort for white seabass. These factors include increased regulation, improvements in technology, market factors (i.e., demand and price), and changes in fish abundance. In the past two decades, there have been two regulatory changes that have greatly affected the commercial catch of white seabass. The first was the closure of Mexican waters to U.S. fishermen in 1982, and the second was passage of the Marine Life Protection Act of 1990, which banned the use of gill nets in State waters south of Point Conception after 1994. Thus, the decline in commercial white seabass landings can, in part, be attributed to decreased effort and participation by commercial fishermen due to the loss of grounds off of Mexico in the 1980s and in the Southern California Bight during the 1990s.

Public demand and fish businesses also influence fishing effort. Because of consumer demand, white seabass has always commanded relatively high prices for whole dressed (gutted) fish, in the range of $1.60 to $2.00 per lb. At the beginning of the

season, a premium price is paid for white seabass. However, if availability is high, the price can drop to as low as $0.60 per lb. This results in fishermen reducing the number

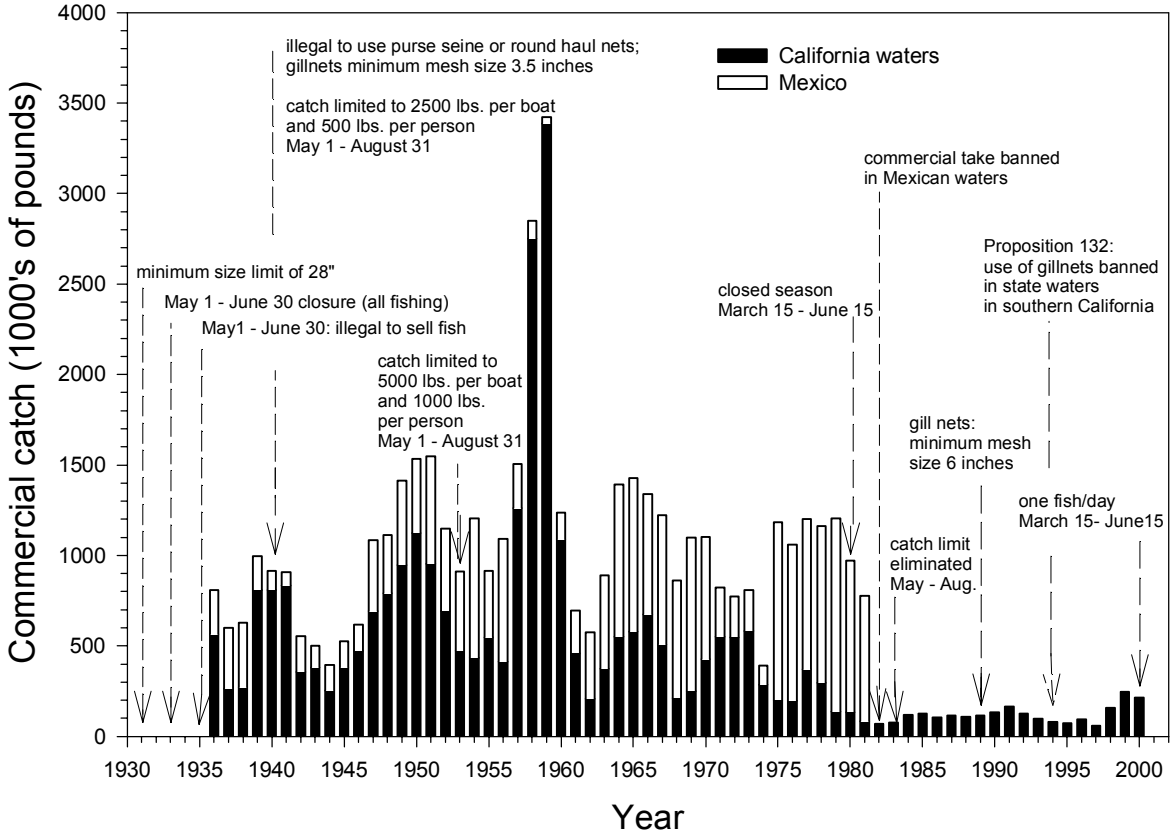


Figure 3-6. Regulation changes and total white seabass commercial catch from U.S. and Mexican waters taken by California fishermen from 1936-2000. Modified from Thomas (1968).

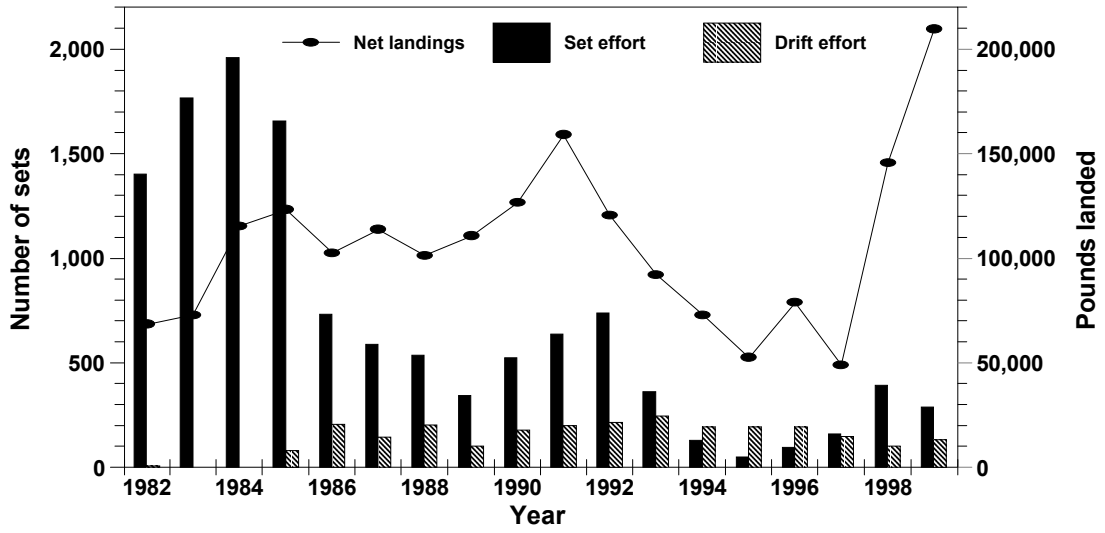


Figure 3-7. Set gill net and drift gill net effort and pounds landed from 1982-2000.

of days they target white seabass or shifting to another species. Another way in which fish businesses influence fishing effort is through the importation of white seabass from Mexico. Imports from Mexico cost about $0.60 to $0.70 per pound, significantly less than the average of over $2.00 per pound paid to California fishermen in 2000. If Mexican seabass is readily available, markets will not buy fish from local fishermen unless there is a special need for local fresh-caught fish.

The commercial CPUE for white seabass has been quite variable. During the period 1950 to1970, the U.S. segment of the fishery had a 50% drop in CPUE while the Mexican fishery remained stable (MacCall et al.1976). Vojkovich and Reed (1983) found a similar decline for California-caught white seabass from 1970 to 1980, indicating that the white seabass resource in California was continuing to decline. Estimates of commercial CPUE for the period 1982 to 2000, however, show an increasing trend (Figure 3-8), and perhaps is evidence that the white seabass stock size is increasing. The amount of fish taken per boat increased almost 3-fold from just

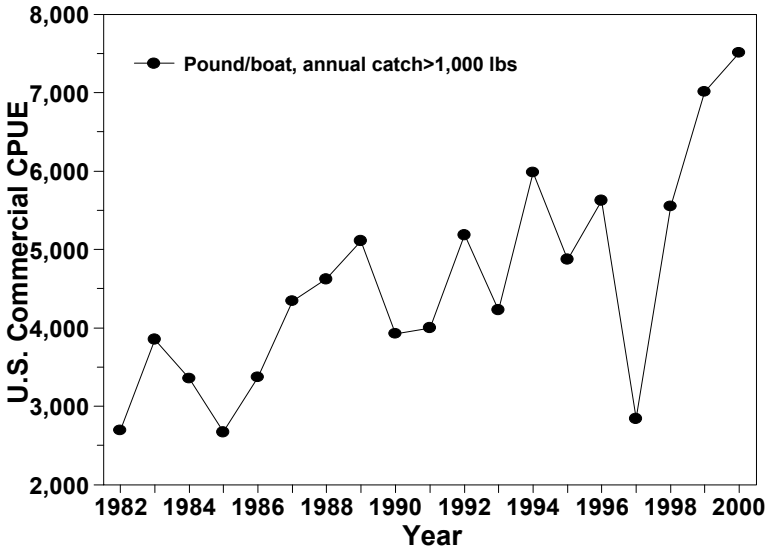


Figure 3-8. Commercial catch-per-unit-effort (CPUE) of white seabass from 1982-2000.

over 2,500 pounds (1,134 kg) in 1982 to over 7,000 pounds (3,175 kg) in 2000.

## 3.3 Social and Economic Characteristics of the Fishery

The commercial and recreational fisheries for white seabass in California produce a ripple effect in our economy. Money generated in these industries stimulates further economic growth throughout the state of California in the form of jobs, income and output. Available socioeconomic data has been gathered and presented below.

However, current data is limited and the need for improved socioeconomic data are addressed in Chapter 7.

### 3.3.1 Recreational Sector

White seabass is an important gamefish that, along with other marine sport fish, has become more popular with recreational anglers every year. The amount of money spent in the pursuit of white seabass contributes to the growth of the recreational fishing industry and California's economy. Socioeconomic information on California's saltwater recreational fishery is available from MRFSS data through the National Marine Fisheries Service (NMFS), the Southern California Sportfish Economic Survey (Thomson and Crooke 1991), and the U.S. Fish and Wildlife Service (USFWS), which conducts a socioeconomic survey every five years. With a few exceptions, data collected in these surveys apply to the recreational fishing industry as a whole, and not specifically to the white seabass fishery.

The Southern California Sportfish Economic Survey estimated the percentage of recreational anglers who participated in the white seabass fishery in 1989 and projected future participation levels in the fishery using the contingent valuation method. This method uses survey questions to elicit net benefits received by respondents from a proposed improvement. The survey found that participation in the fishery and angler avidity varied by county of residence. In addition, survey responses indicate that increases in catch rates of white seabass would have a significant effect on angler participation in the white seabass fishery (Table 3-6).

Table 3-6. 1989 participation in white seabass fishing and projected future participation in response to enhancement of catch rates by county of residence (Thomson and Crooke 1991)

| Participation | County of residence | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Los Angeles | Orange | Riverside | San Bernardino | San Diego | San Luis Obispo | Santa Barbara | Ventura | Non-coastal |
| Anglers targeting white seabass (%) | 16.1 | 15.4 | 13.9 | 17.6 | 16.2 | 10.8 | 14.6 | 15.2 | 13.3 |
| Average # of white seabass trips/year | 1.93 | 2.97 | 1.88 | 2.29 | 1.78 | 1.89 | 2.47 | 2.21 | 1.45 |
| Anglers that would increase their white seabass fishing (%) | 36.5 | 39.5 | 19.7 | 27.9 | 36.4 | 17.1 | 23.6 | 32.3 | 22.0 |
| Average increase in # of white seabass trips/year | 3.46 | 3.31 | 2.39 | 3.06 | 3.03 | 4.77 | 3.84 | 2.88 | 2.40 |

In 2000, saltwater recreational anglers spent a total of $2.5 billion on related goods and services in California, with southern California exhibiting the highest recreational fishing expenditures for the Pacific Coast region (Milon 2000). The most recent employment records for the recreational fishing industry are for 1996 and show that

19,113 individuals were employed statewide, with combined salaries totaling $498,369,450 (USFWS 1997). These salaries would be valued at $548,206,395 with inflation adjustments for 2000 (BLS 2000). White seabass angling activity occurs primarily in

southern California, so socioeconomic data pertaining to this region will be the focus of this section.

Saltwater anglers spend substantial amounts of money on fishing related items such as boat maintenance, fishing licenses, and fishing gear, as well as trip related expenditures such as food, gasoline, parking, lodging, and tickets for CPFV (party boat) trips. Expenses related to private boat and CPFV angling activities are especially significant. In 2000, anglers in southern California spent nearly $127 million on CPFV trip related expenses (over 55% of all trip related expenditures), while private and rental boat trip related expenses totaled about $78 million (about 34% of all trip related expenditures) (Table 3-7). Anglers who fished from shore in southern California spent close to $25 million on trip related expenses, which is about 11% of all marine angler trip expenditures for this region.

Table 3-7. Total annual trip expenditures for saltwater anglers in southern California by fishing mode and resident status for 2000 (MRFSS data)

| Trip expenditure | Party/charter boat | | Private/rental boat | | Shore | |
|---|---|---|---|---|---|---|
| | Resident | Non-resident | Resident | Non-resident | Resident | Non-resident |
| Private transportation | $8,217,000 | $7,599,000 | $11,914,000 | $5,181,000 | $6,754,000 | $2,321,000 |
| Food | $10,605,000 | $4,402,000 | $12,712,000 | $1,213,000 | $5,789,000 | $686,000 |
| Lodging | $995,000 | $6,897,000 | $875,000 | $1,614,000 | $2,873,000 | $1,301,000 |
| Public transportation | $429,000 | $29,405,000 | $46,000 | $4,251,000 | $162,000 | $504,000 |
| Boat fuel | N/A | N/A | $21,700,000 | $1,520,000 | N/A | N/A |
| Party/charter fees | $46,587,000 | $4,332,000 | N/A | N/A | N/A | N/A |
| Access/boat launching | $806,000 | $342,000 | $2,595,000 | $164,000 | $969,000 | $166,000 |
| Equipment rental | $1,525,000 | $4,050,000 | $1,213,000 | $534,000 | $150,000 | $30,000 |
| Bait and ice | $225,000 | $268,000 | $11,570,000 | $762,000 | $2,750,000 | $195,000 |
| Totals | $69,388,000 | $57,294,000 | $62,627,000 | $15,241,000 | $19,446,000 | $5,203,000 |

The MRFSS data reflect a general decline in recreational fishing activity since 1993, despite increases in activity in 1994 and 2000 (Figure 3-9). Overall, the average annual number of sport fishing trips between 1993 and 2000 was 3,659,870. Participation estimates followed the same general trend. The number of participants declined annually except in 1994 and 2000; however, the number of anglers participating in the fishery has

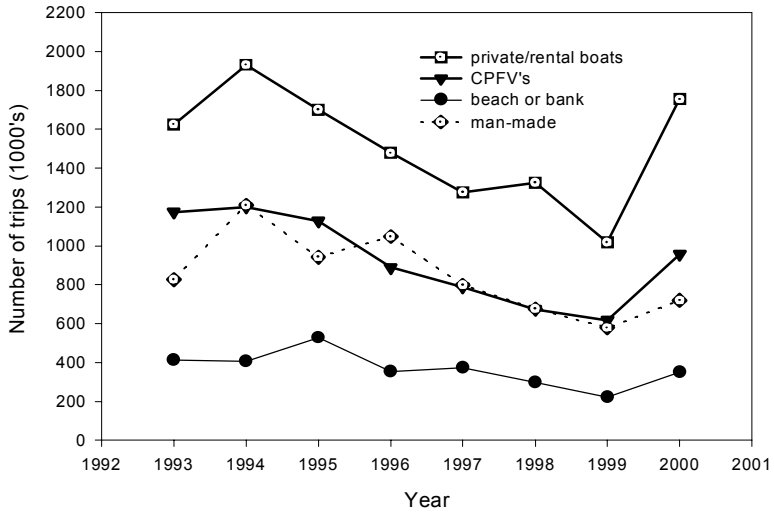


Figure 3-9. Recreational fishing trips (saltwater) taken in southern California from 1993-2000.

been more stable than the annual number of trips taken during the 1993-2000 period (Table 3-8). In addition, participation trends by area of residence has remained fairly constant. Most saltwater anglers fishing in southern California reside in coastal counties (nearly 86% in 2000). Out-of-state anglers comprised about 13%; whereas less than one percent of anglers lived in non-coastal counties in 2000.

Table 3-8. Southern California participation estimates for the saltwater recreational fishery by area of residence, 1993-2000 (MRFSS data)

| Year | Coastal county | Non-coastal | Out of state | Total |
|---|---|---|---|---|
| 1993 | 856,366 | 6,805 | 122,604 | 985,775 |
| 1994 | 1,099,801 | 11,819 | 173,727 | 1,285,347 |
| 1995 | 803,810 | 8,956 | 156,189 | 968,955 |
| 1996 | | Data unavailable for 1996 | | |
| 1997 | 776,860 | 5,818 | 122,023 | 904,701 |
| 1998 | 775,281 | 7,900 | 139,148 | 922,330 |
| 1999 | 630,461 | 4,913 | 108,012 | 743,386 |
| 2000 | 1,086,442 | 10,790 | 168,823 | 1,266,055 |

The MRFSS data enabled estimates to be made on the number of anglers targeting white seabass, and their associated angling expenditures. In 2000, about 3% of surveyed angler trips in the state and nearly 5% of surveyed angler trips in southern California targeted white seabass (Figure 3-7; RecFIN 2001). Five percent of the estimated anglers fishing southern California marine waters in 2000 amounts to over 63,000 anglers specifically targeting white seabass in this region. If it is assumed that these anglers also contributed to about 5% of southern California trip expenditures, then anglers who targeted white seabass spent about $11.5 million on trip related expenses. In addition, annual expenditures on such items as tackle and license fees would amount to nearly $86 million.

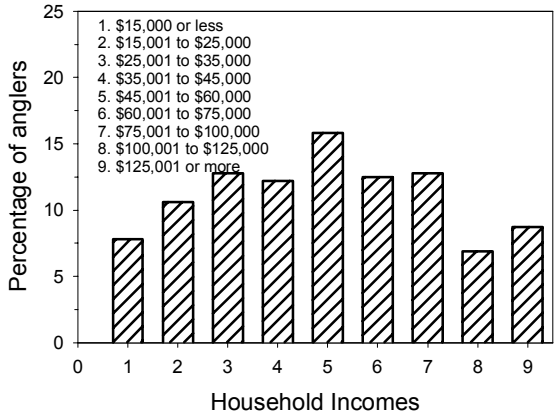


Figure 3-10. Annual household incomes of marine anglers in California in 2000.

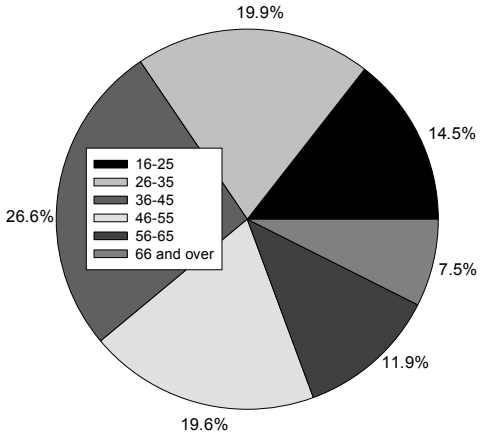


Figure 3-11. Age groups of marine anglers in California in 2000.

Some demographic data from the MRFSS were available for marine anglers fishing in California (Milon 2000). In 2000, 81.1% of surveyed anglers were male and 18.9% were female. Most of these anglers were Caucasian (83.9%), 5.2% were Hispanic, 3.7% were African American, 0.6 % were Asian, and 6.7% were of some other ethnicity. Nearly 60% of California marine anglers had a household income of $60,000 or less (Figure 3-10). About 66% of surveyed anglers were between the ages of 26 and 55 years old (Figure 3-11). Approximately 52% of California anglers surveyed in 2000 were college graduates.

Demographic patterns of characters such as income, gender, ethnicity, and age of surveyed anglers were relatively consistent across the Pacific region, suggesting that these are stable influences on marine angler participation (Milon 2000). Demographic data were not available for anglers specifically targeting white seabass.

### 3.3.2 Commercial Sector

California's fishing industry ranks among the top five seafood producing states in the nation (CSC 1997), and growth or decline in commercial fishing, including the white seabass industry, affects production, trade, and employment throughout the California economy.

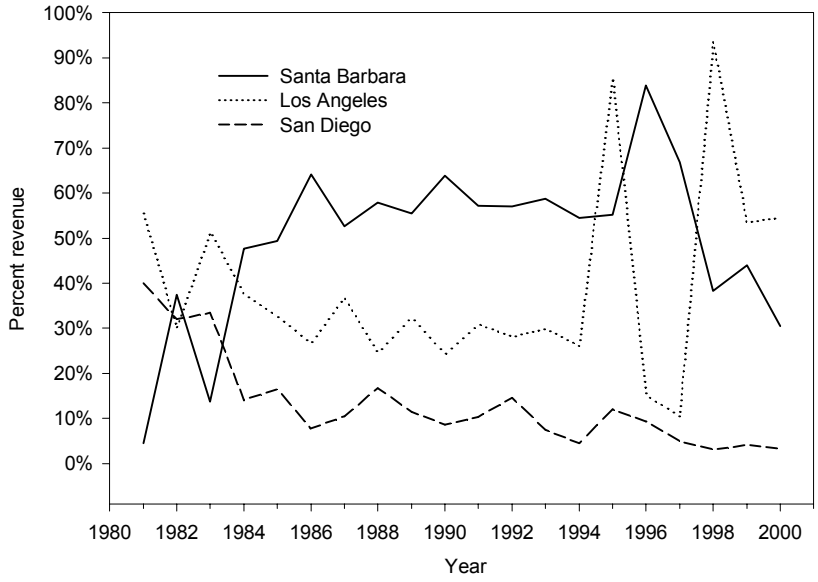


Figure 3-12. Percentage of white seabass revenue by port area from 1981-2000.

There are four major port areas associated with California's commercial white seabass fishing industry: northern California (counties north of San Luis Obispo); Santa Barbara (Ventura, Santa Barbara, and San Luis Obispo Counties); Los Angeles (LA and Orange Counties); and San Diego County. In recent years, the Santa Barbara and Los Angeles port areas have received the bulk of white seabass revenues, with the highest revenues coming into the ports of San Pedro, Los Angeles County, and Santa Barbara Harbor, Santa Barbara County (Figure 3-12).

White seabass landings rank within the top twelve commercially landed finfish for Santa Barbara/Ventura Counties, and Los Angeles/Orange Counties. (McKee-Lewis and Read 1997; Barsky 1998). Historically, San Diego County has been an important area as well, but landings and revenue coming into San Diego ports were significantly diminished following the 1982 ban of U.S. commercial fishermen from Mexican waters. Despite this, white seabass still ranked 12$^{th}$ in commercial finfish landings in San Diego for 1993-1994. Landings north of Point Conception rarely exceed 20% of the catch (Vojkovich 1992), making northern California an area of minor economic importance.

Revenues generated from the white seabass fishery have fluctuated over the years. In general, ex-vessel revenues from white seabass fishing closely parallel landings (Figure 3-13). Market prices are affected by such factors as the availability of white seabass, competition from foreign markets, and consumer demand. For example, the increase in average price per pound from $1.61 in 1981 to $1.80 in 1982 can be attributed to reduced availability brought on by the closure of Mexican waters that occurred that year (Table 3-9). During the period 1981 to 2000, average annual market prices for white seabass ranged from a low of $1.61 per pound to a high of $2.27 per pound. In 1981, the white seabass

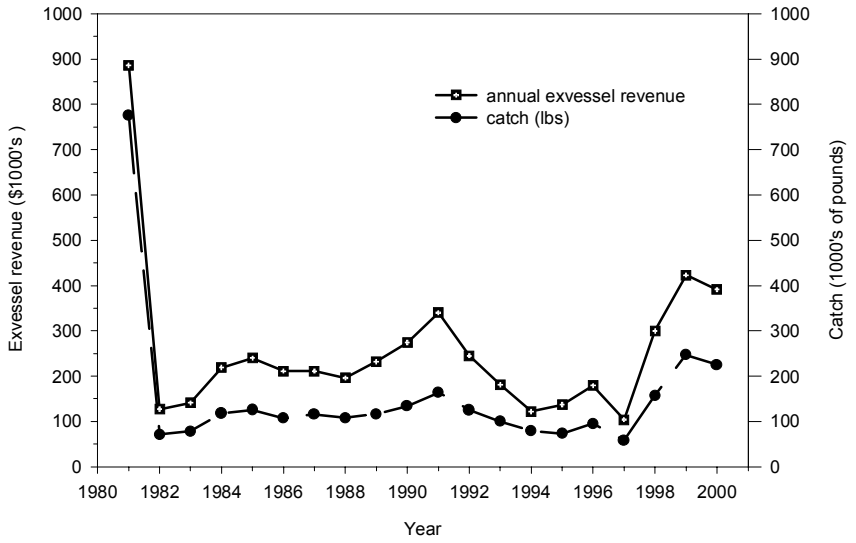


Figure 3-13. Annual white seabass commercial landings and ex-vessel revenue for California from 1981-2000.

catch generated about $886,000 in ex-vessel revenue. Revenues dropped significantly after the 1982 fishing ban in Mexican waters due to lost fishing opportunities and decreased landings. The average annual ex-vessel catch value since 1982 has been about $225,000. The best year for white seabass revenues, since the Mexico ban, occurred in 1999 with the catch valued at $391,339 (Figure 3-13).

Table 3-9. Average annual market price (per pound) for white seabass from 1981-2000

| Year | Average | Minimum | Maximum | Std. Dev. | Year | Average | Minimum | Maximum | Std. Dev. |
|---|---|---|---|---|---|---|---|---|---|
| 1981 | $1.61 | $0.50 | $3.80 | 0.28 | 1991 | $2.14 | $0.90 | $3.85 | 0.34 |
| 1982 | $1.80 | $0.20 | $3.50 | 0.25 | 1992 | $2.21 | $0.50 | $3.25 | 0.32 |
| 1983 | $1.84 | $0.25 | $2.75 | 0.25 | 1993 | $2.19 | $1.00 | $4.30 | 0.35 |
| 1984 | $1.93 | $0.20 | $3.50 | 0.22 | 1994 | $2.23 | $0.35 | $7.50 | 0.48 |
| 1985 | $1.98 | $0.20 | $6.00 | 0.2 | 1995 | $2.27 | $0.45 | $4.25 | 0.55 |
| 1986 | $2.07 | $0.10 | $6.88 | 0.25 | 1996 | $2.32 | $0.75 | $4.00 | 0.52 |
| 1987 | $2.06 | $0.22 | $4.25 | 0.27 | 1997 | $2.27 | $0.50 | $5.50 | 0.50 |
| 1988 | $2.07 | $0.25 | $6.25 | 0.32 | 1998 | $2.02 | $0.50 | $3.90 | 0.63 |
| 1989 | $2.16 | $1.00 | $5.50 | 0.28 | 1999 | $1.96 | $0.50 | $6.00 | 0.69 |
| 1990 | $2.15 | $0.45 | $4.00 | 0.29 | 2000 | $2.09 | $0.20 | $3.75 | 0.50 |

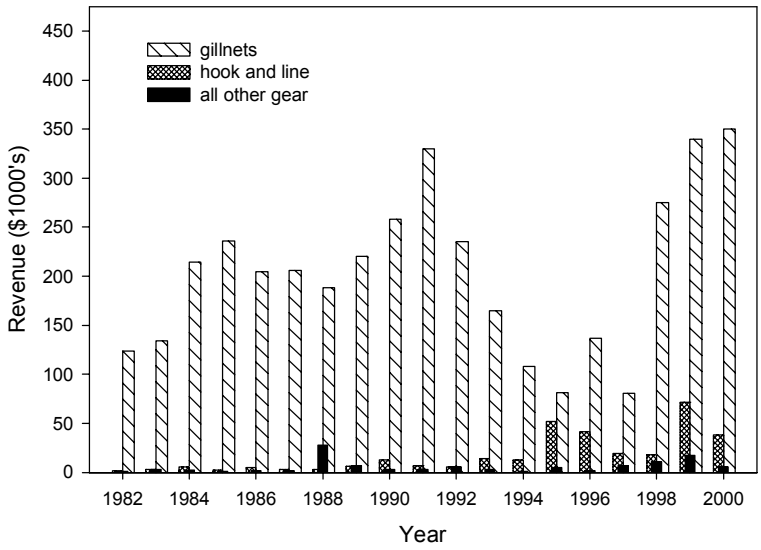

Figure 3-14. White seabass revenue by gear type from 1982-2000.

Most of this revenue is generated by gill net fishermen who dominate the fishery, but hook and line effort in the fishery has been increasing in recent years. From 1996 to 2000, 89% of landings by weight and 83% of revenues were produced by gill net effort, while hook and line effort accounted for close to 13% of landings and about 15% of revenues (Figure 3-14). An annual average of 141 vessels participate in the white seabass fishery, but only 20 of these vessels land 80% of the catch. Assuming that most commercial fishermen employ an average of one crew member, it is estimated that over 280 individuals participate in the fishery annually, with about 40 core individuals.

Representative operating costs were obtained through personal communications with white seabass fishermen (Table 3-10). Although these costs are associated with white seabass fishing, many white seabass fishermen participate in other fisheries, and some of these costs would be shared with other fishing effort.

Table 3-10. Examples of annual operating costs for white seabass fishing by primary gear type

| Expense category | Set longline | Set net | Drift net |
|---|---|---|---|
| Days fished | 220 | 90 | 25 |
| Crew members | 1 full time; | 1 full time; | No crew |
| Fuel | $16,000 | $10,800 | $1,000 |
| Crew wages | 30% share ($40,000) | 20 to 35% share | N/A |
| Maintenance and repair | $25,000 | $14,000 | $5,000 |

| | | | |
|---|---|---|---|
| Gear and equipment | $12,000 | $6,500 | $1,000 |
| Food and provisions | $8,571 | $2,250 | $375 |
| Insurance | $9,500 | $9,000 | $9,000 |
| Fishing licences and permits | $315 | $445 | $445 |
| Property tax (vessel) | $75 | $80 | $75 |
| Mooring fees | $245/mo | $50/mo | $234/mo |

Between 1996 and 2000, 53 to 104 fish businesses received white seabass from commercial fishermen. Santa Barbara and Ventura County businesses made up the highest percentage of these businesses at 23.5%, while Los Angeles and Orange County businesses comprised another 18.7%. All other port areas contained less than 10% of businesses purchasing white seabass. However, 61.8 % of all businesses purchasing white seabass during this period obtained less than 1,000 pounds (454 kg) annually. Only about 3.4% the businesses purchased over 10,000 pounds (4,536 kg) on an annual basis (Table 3-4; Table 3-5).

Demographics

The primary locations for commercial white seabass activity is Los Angeles and Santa Barbara counties. The following demographic information was available for these areas.

Los Angeles County

The population of Los Angeles County increased from 8,863,000 to 9,519,338 between 1990 and 2000. The number of Caucasians declined from 41% to 31% of the population; the Hispanic population increased from 38% to 45%; the percentage of African Americans decreased from 11% to 10%; and the Asian population increased from 10% to 12% (CDF 2001). In the Los Angeles-Long Beach metropolitan area, the unemployment rate dropped from 8.2% in 1991 to 5.9% in 1999 (BLS 2000). In 1998, the average annual wage in Los Angeles County was $36,000, while the average commercial fishing wage was $22,617 (CTTCA 2000).

Community profile - San Pedro

San Pedro, located in southwest Los Angeles on the southeastern slope of the Palos Verdes Peninsula, is the most important port in Los Angeles County with regard to the white seabass fishing industry. The community's roots developed over a century of participation in fishing and related industries and are described in the San Pedro Community Environmental Perspectives (1989). The community is relatively small, with a hometown feeling, enhanced by the fact that many residents are locally employed.

During the 1980s, the commercial fishing industry in Los Angeles continued to decline, directly affecting the local economies of San Pedro and Wilmington. One reason for the decline was price-cutting competition from foreign fisheries, which allegedly operated with lower labor costs and government subsidies. State and local taxes and high insurance costs were blamed as additional burdens on the struggling industry. By 1986, only one fish packing plant remained of the fourteen that operated in 1960 (PFMC 1998).

The population in San Pedro decreased from 85,987 in 1990 to 84,697 in 2001. In 1996, 51.6% of the community was Caucasian, 33.8% was Hispanic, 6.2% was African American, and 7.6% was Asian. The average per capita income in 1996 was $19,413 (Claritas 1996).

Santa Barbara County

The population of Santa Barbara County increased from 369,608 in 1990 to 399,347 in 2000. The unemployment rate for the Santa Barbara-Santa Maria-Lompoc metropolitan area dropped, going from 5.9% in 1991 to 3.9% in 1999 (BLS 2000). The average annual wage in Santa Barbara County in 1998 was $29,277, while the average commercial fishing wage was $27,061 (CTTCA 2000). Community profile information for the Santa Barbara harbor area was not available.

### 3.4 Non-consumptive Use

Non-consumptive use of the fishery includes activities of scuba and skin divers such as underwater photography and wildlife viewing. Data on the number of divers involved in non-consumptive activities in southern California are unavailable. Some demographic data on divers in general were available from the Professional Association of Diving Instructors (PADI 2000). According to their statistics, the average age of sport divers is 36 years. Most are male (72%), and 28% are female. Half have a college degree, and 62% have an income that exceeds $50,000 per year.

Although data are unavailable for the entire southern California area, socioeconomic data related to diving activities in the Channel Islands Marine Sanctuary (CINMS) and surrounding offshore area from Point Sal to Point Mugu are available (Leeworthy 2000). The Sanctuary and surrounding area is a popular diving location, and contains prime habitat for white seabass. In 1997, an estimated 50,884 to 65,375 diver days occurred in the Sanctuary and surrounding area. Divers spent between $5.1 million and $6.5 million in the local economies. This had an income impact of between $6.8 million and $8.5 million, and an employment impact of between 274 and 467 full and part-time employees (including proprietors) (Table 3-11). Recreational diving only accounts for a fraction of a percent of the income and employment in Santa Barbara and Ventura counties (Leeworthy 2000).

Table 3-11. Estimated socioeconomic impact of recreational diving from boats in CINMS reserve area and surrounding waters during 1997 (Leeworthy 2000)

| Activity | Days | | Expenditures (millions$) | | Total income (millions$) | | Employment | |
|---|---|---|---|---|---|---|---|---|
| | lower | upper | lower | upper | lower | upper | lower | upper |
| charter/party | 50,884 | 65,375 | 4.392 | 5.647 | 6.554 | 7.927 | 265 | 453 |
| private /rental | 12,984 | 15,870 | 0.715 | 0.873 | 0.267 | 0.52 | 9 | 14 |
| total | 63,868 | 81,245 | 5.107 | 6.52 | 6.821 | 8.447 | 274 | 467 |

### 3.5 Analysis of Impacts

The adverse effects from fishing activities may include physical, chemical, or biological alterations of the substrate, and loss of, or injury to, benthic organisms, prey species and

their habitat, and other components of the ecosystem (Bargmann et al. 1998). Fishery management plans must include measures that minimize adverse effects on marine ecosystems from fishing, to the extent practicable, and identify conservation and enhancement measures. They must also contain an assessment of the potential adverse effects of all fishing activities and should consider the relative impacts of all fishing equipment types used in different types of habitat (Bargmann et al. 1998).

The commercial and recreational fisheries for white seabass have exploited different age groups of the stock over the years. In general, the recreational fishery catches mostly smaller, younger individuals, whereas the commercial fishery lands relatively larger, older fish. Immature or undersized white seabass are often caught by recreational and some segments of the commercial fisheries. Taking smaller fish may have a negative effect on the overall abundance of the population by removing individuals that have not yet spawned. If the take of immature fish exceeds the rate at which these fish are being replaced, then the resource can become overfished. Similarly, taking too many larger, older more fecund fish may limit the amount of recruits in the future.

The catching, handling, and release of smaller white seabass may also have substantial impacts. These activities may cause injury, permanent damage, or death. White seabass may be particularly vulnerable due to their weak, soft mouths that are easily torn and their susceptibility to barotrauma. Barotrauma (trauma due to rapid changes in atmospheric pressure) injuries affecting the gas bladders of white seabass have been observed in fish brought up from depths as shallow as 10 feet (3 meters) (Crooke pers. comm.). Fish caught in depths greater than 50-feet, will most likely suffer barotrauma injuries that result in death, regardless of proper gas bladder deflation. It is unknown how often white seabass are released and the level of associated mortality. However, MRFSS data shows an increasing number of white seabass being released by private and rental boat fishermen from 1980-2000 (Figure 3-15; RecFIN 2001).

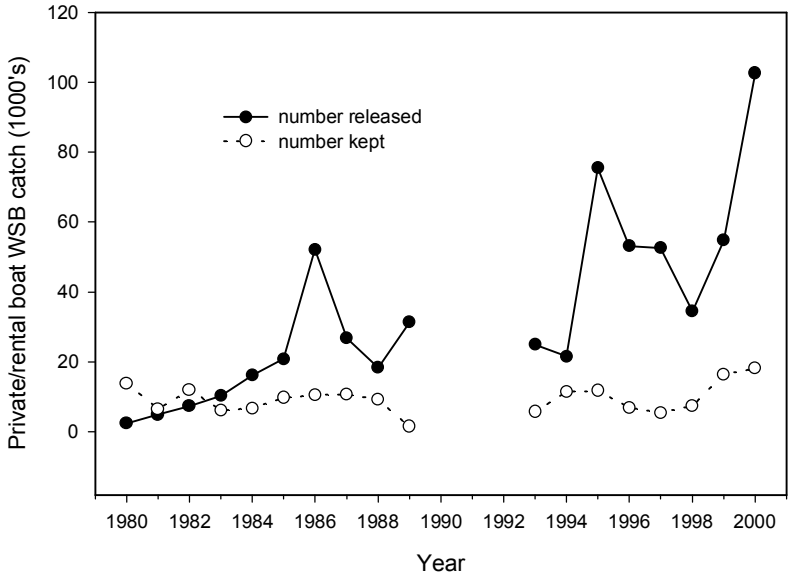


Figure 3-15. Estimated number of white seabass kept and released by anglers who used private/rental boats. No data were collected from 1990-1992.