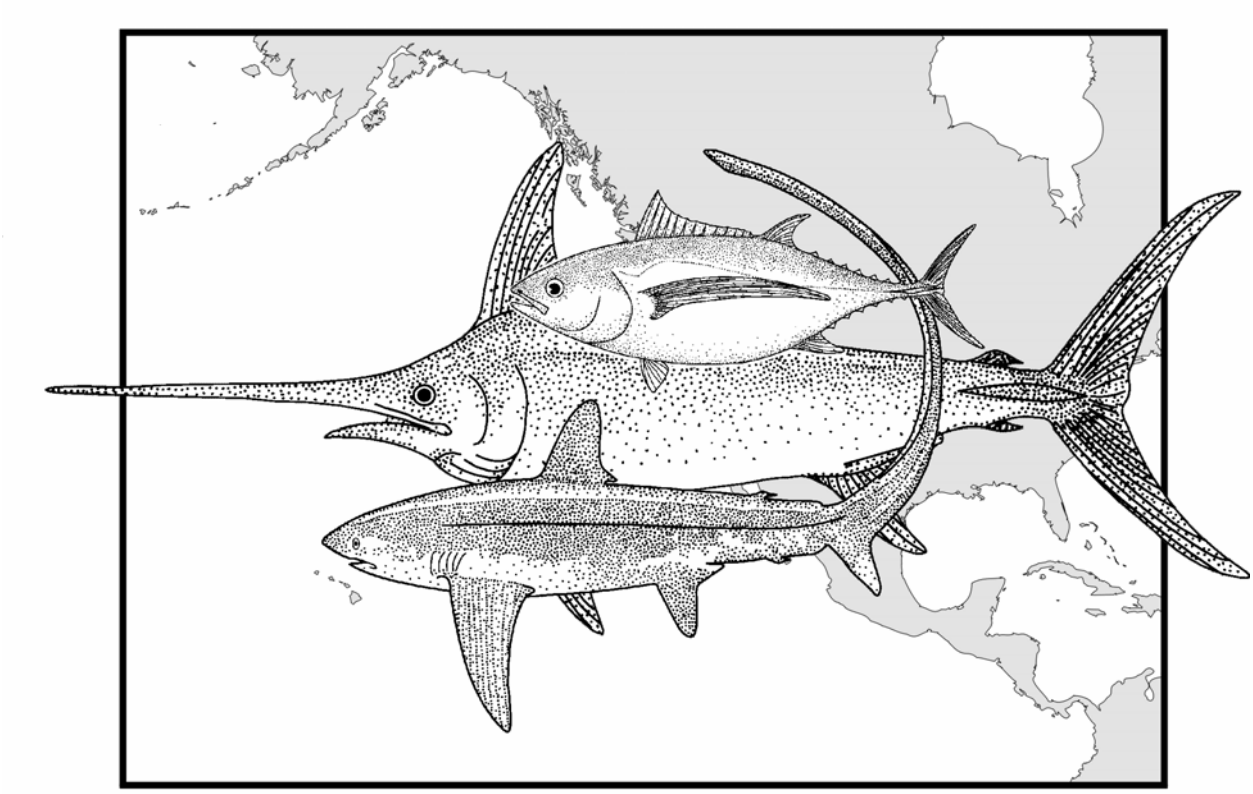
STATUS OF THE U.S. WEST COAST FISHERIES FOR HIGHLY MIGRATORY SPECIES THROUGH 2004



STOCK ASSESSMENT AND FISHERY EVALUATION

OCTOBER 2005

PACIFIC FISHERY MANAGEMENT COUNCIL
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1.0 INTRODUCTION

1.1 Goals and Objectives of the Fishery Management Plan

The Fishery Management Plan For U.S. West Coast Fisheries For Highly Migratory Species (HMS FMP) was developed by the Pacific Fishery Management Council (Council) in response to the need to coordinate state and federal management of the stocks listed in Table 1-1. The National Marine Fisheries Service (NMFS), on behalf of the Secretary of Commerce, partially approved the HMS FMP on February 4, 2004. Implementing regulations became effective on April 7, 2004. The FMP identifies the following goals and objectives for HMS management:

1. Promote and actively contribute to international efforts for the long-term conservation and sustainable use of highly migratory species fisheries that are utilized by West Coast-based fishers, while recognizing these fishery resources contribute to the food supply, economy, and health of the nation.
2. Provide a long-term, stable supply of high-quality, locally caught fish to the public.
3. Minimize economic waste and adverse impacts on fishing communities to the extent practicable when adopting conservation and management measures.
4. Provide viable and diverse commercial fisheries and recreational fishing opportunity for highly migratory species based in ports in the area of the Pacific Council's jurisdiction, and give due consideration for traditional participants in the fisheries.
5. Implement harvest strategies which achieve optimum yield for long-term sustainable harvest levels.
6. Provide foundation to support the State Department in cooperative international management of highly migratory species fisheries.
7. Promote inter-regional collaboration in management of fisheries for species which occur in the Pacific Council's managed area and other Councils' areas.
8. Minimize inconsistencies among federal and state regulations for highly migratory species fisheries.
9. Minimize bycatch and avoid discard and implement measures to adequately account for total bycatch and discard mortalities.
10. Prevent overfishing and rebuild overfished stocks, working with international organizations as necessary.
11. Acquire biological information and develop a long-term research program.
12. Promote effective monitoring and enforcement.
13. Minimize gear conflicts.
14. Maintain, restore, or enhance the current quantity and productive capacity of habitats to increase fishery productivity for the benefit of the resource and commercial and recreational fisheries for highly migratory species.
15. Establish procedures to facilitate rapid implementation of future management actions, as necessary.
16. Promote outreach and education efforts to inform the general public about how West Coast HMS fisheries are managed and the importance of these fisheries to fishers, local fishing communities, and consumers.
17. Manage the fisheries to prevent adverse effects on any protected species covered by the Marine Mammal Protection Act (MMPA) and Migratory Bird Treaty Act (MBTA) and promote the recovery of any species listed under the ESA to the extent practicable.
18. Allocate harvest fairly and equitably among commercial, recreational and charter fisheries for HMS, if allocation becomes necessary.

Table 1-1. HMS FMP management unit species.

Common Name	Scientific Name
striped marlin	*Tetrapturus audax*
swordfish	*Xiphias gladius*
common thresher shark	*Alopias vulpinus*
pelagic thresher shark	*Alopias pelagicus*
bigeye thresher shark	*Alopias superciliosus*
shortfin mako (bonito shark)	*Isurus oxyrinchus*
blue shark	*Prionace glauca*
north Pacific albacore	*Thunnus alalunga*
yellowfin tuna	*Thunnus albacares*
bigeye tuna	*Thunnus obesus*
skipjack tuna	*Katsuwonus pelamis*
northern bluefin tuna	*Thunnus thynnus*
dorado (a.k.a. mahi mahi, dolphinfish)	*Coryphaena hippurus*

1.2 Purpose of the SAFE Report

Federal regulations (40 CFR 600.315(e)) pursuant to National Standard 2 in the Magnuson-Stevens Act, *Conservation and management measures shall be based upon the best scientific information available*, require preparation of a stock assessment and fishery evaluation (SAFE) report for each FMP. The HMS FMP summarizes the requirements for a SAFE report as follows:

> The SAFE report is a document or set of documents that provides the Council with a summary of information concerning the most recent biological condition of stocks and the marine ecosystems in the management unit and the social and economic condition of the recreational and commercial fishing interests, fishing communities, and the fish processing industries. It summarizes, on a periodic basis, the best available scientific information concerning the past, present, and possible future condition of the stocks, marine ecosystems, and fisheries being managed under federal regulation.
>
> The Secretary of Commerce has the responsibility to assure that a SAFE report or similar document is prepared, reviewed annually, and changed as necessary. The Secretary or Council may utilize any combination of talent from Council, state, Federal, university, or other sources to acquire and analyze data and produce the SAFE report.
>
> The SAFE report provides information to the Council and Southwest Region of NMFS for determining annual harvest levels from each stock, documenting significant trends or changes in the resource, marine ecosystems, and fishery over time, and assessing the relative success of existing state and Federal fishery management programs. Information on bycatch and safety for each fishery should also be summarized. In addition, the SAFE report may be used to update or expand previous environmental and regulatory impact documents, and ecosystem and habitat descriptions.

The HMS FMP also establishes an annual cycle for the delivery of the SAFE report to the Council, intended to coincide with the management cycle: a draft report is provided in June for initial decision-making on the need for new harvest specifications and management measures. The final report is delivered in September to provide the recommendations and information necessary to develop and implement any harvest specifications and management measures. Any such measures become effective at the start of the next fishing year, April 1 of the following year, and stay in effect for at least two years. Because the HMS FMP was just implemented in 2004, no changes to the current harvest specifications and management measures have been proposed.

1.3 Highly Migratory Species Management Team

This SAFE report was prepared by the members of the Highly Migratory Species Management Team (HMSMT). The HMSMT members at the time this report was published, and their primary responsibilities in preparing the report, are listed below.

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Washington Department of Fish and Wildlife representative

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Economist, NMFS Southwest Fisheries Science Center

In addition to HMSMT members, the following people contributed to this SAFE report:

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Staff Officer, Pacific Fishery Management Council

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Computer Specialist, NMFS Southwest Fisheries Science Center

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California Department of Fish and Game

2.0 DESCRIPTION OF THE FISHERIES

2.1 Description of West Coast Commercial Fisheries

2.1.1 California

2.1.1.1 Surface Hook-and-Line Fishery for Albacore

Albacore is a very important species for commercial and recreational fisheries in California. Troll and live bait are the principal commercial gears, although some albacore are occasionally taken using purse seine, longline, and drift gillnet gear as well. The number of surface hook-and-line vessels that have landed albacore in California ports annually has ranged from 1,312 in 1981 to 194 in 2004 (Table 2-1). The fishing season varies from year to year, depending on when the fish come in range of the California-based fleet and market demand; however, a typical season runs July through October, with landings peaking in September. A general resident or non-resident commercial fishing license and a current California Department of Fish and Game (CDFG) vessel registration are required to catch and land albacore in the state of California.

For the period 1981-2004, annual landings have been variable, ranging from 9,136 mt in 1981 to 643 mt in 1991 (Figure 2-1 and Table 2-1). In 2004, landings totaled 1,339 mt, 57% less than from the 24 year mean of 3,147 mt. The recent decline does not necessarily reflect a decline in the albacore population but a shift in fishing effort by California-based vessels into waters off Oregon and Washington where albacore have been more available due to oceanographic conditions. Commercial landings of albacore in Oregon and Washington in 2004 were 4,807 mt and 6,157 mt, respectively.

Table 2-1. Annual number of vessels, landings (round mt), and ex-vessel revenue for albacore tuna landed in California by the surface hook-and-line fishery, 1981-2004.

Year	Vessel (number)	Landing (mt)	Ex-vessel[1] (dollar)	Year	Vessel (number)	Landing (mt)	Ex-vessel[1] (dollar)
1981	1,312	9,136	17,775,999	1993	203	1,498	2,969,985
1982	611	3,902	5,809,227	1994	296	3,121	6,539,994
1983	1,274	7,447	9,552,822	1995	149	781	1,424,234
1984	1,031	8,201	11,253,019	1996	298	5,052	10,594,368
1985	769	6,209	7,035,113	1997	626	3,296	5,694,142
1986	394	3,093	3,698,919	1998	399	2,244	3,182,954
1987	327	1,432	2,337,806	1999	455	5,383	10,069,301
1988	173	947	1,819,685	2000	376	1,825	3,734,042
1989	190	825	1,461,481	2001	483	2,827	4,977,102
1990	110	762	1,464,622	2002	324	2,660	3,866,315
1991	85	643	1,091,457	2003	325	1,699	2,578,795
1992	146	1,208	2,978,044	2004	194	1,339	2,423,489

[1]Ex-vessel revenues are nominal values (not adjusted for inflation). Source: PacFin, extracted August 2005.
Additional processing information: landings data reported without an accompanying gear code was excluded from the analysis if a correction could not be made.

In 2004, the ex-vessel revenue was 54% ($2.4 million) of the 24 year mean of $5.2 million. Exports of fresh frozen albacore from California went to Ecuador and Spain for canning in 2004.

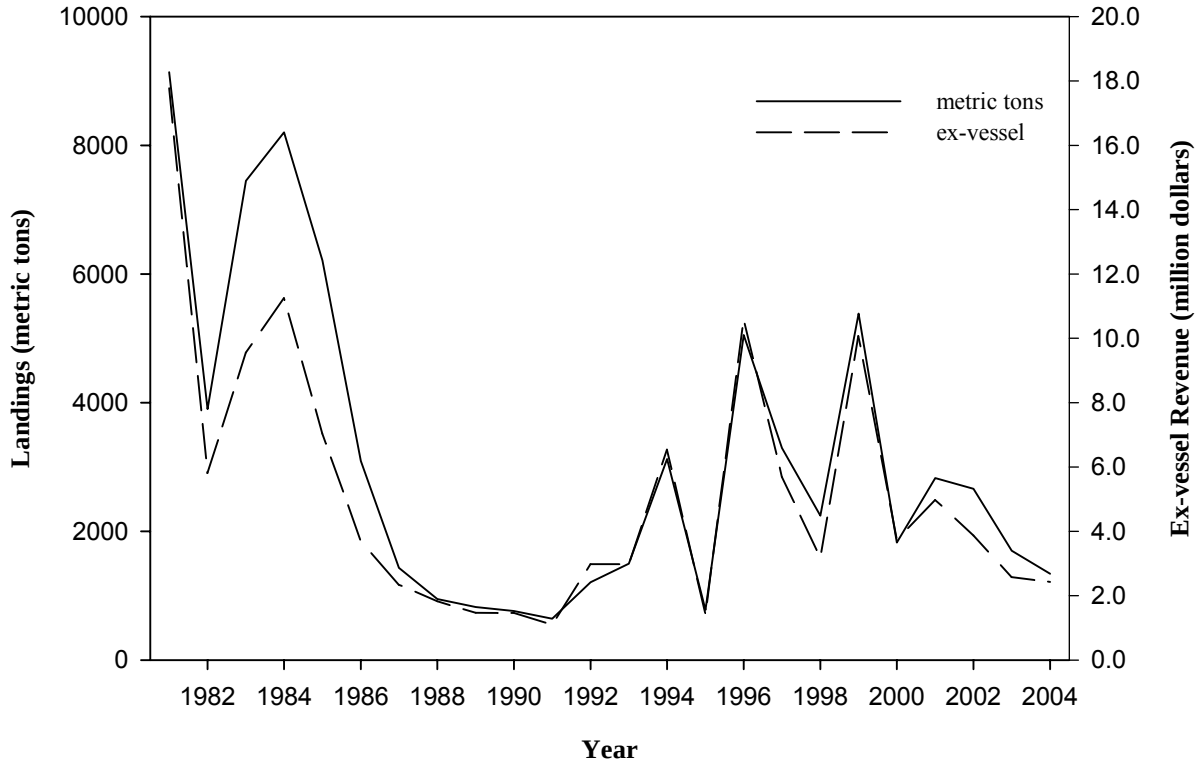

Figure 2-1. California commercial landings of albacore by the surface hook-and-line fishery, 1981-2004.

2.1.1.2 Coastal Purse Seine Fishery for Northern Bluefin, Yellowfin, and Skipjack Tuna

In the eastern Pacific Ocean (EPO) more than 90% of the bluefin, yellowfin, and skipjack tuna catch is made by small coastal purse seine vessels (<640 mt carrying capacity) operating in the Southern California Bight (SCB) from May to October. These vessels primarily target small pelagic species, especially Pacific mackerel, Pacific sardine, and market squid. However, they will switch to higher-valued northern bluefin tuna when they enter the nearshore waters of the SCB. Similarly, they will target yellowfin tuna and skipjack tuna when they become available during periods of warm water. Coastal purse seiners will even target albacore on occasions when they are sufficiently available. A general resident or non-resident commercial fishing license and a current CDFG vessel registration are required to catch and land tuna caught in purse seine gear.

Bluefin Tuna: Since 1980, the number of purse seiners that have landed bluefin tuna has ranged from 228 in 1986 to 1 in 2003. Annual landings of bluefin tuna were punctuated by two relatively high peaks in 1986 and 1996, followed by declines; no landings were reported for purse seine gear in 2002 or 2004 (Figure 2-2 and Table 2-2). The annual ex-vessel revenue trend mirrored the landings trend for the same period, peaking at $4.4 million in 1986 and $3.9 million in 1996. Exports of fresh frozen bluefin tuna from California went to Japan in 2003.

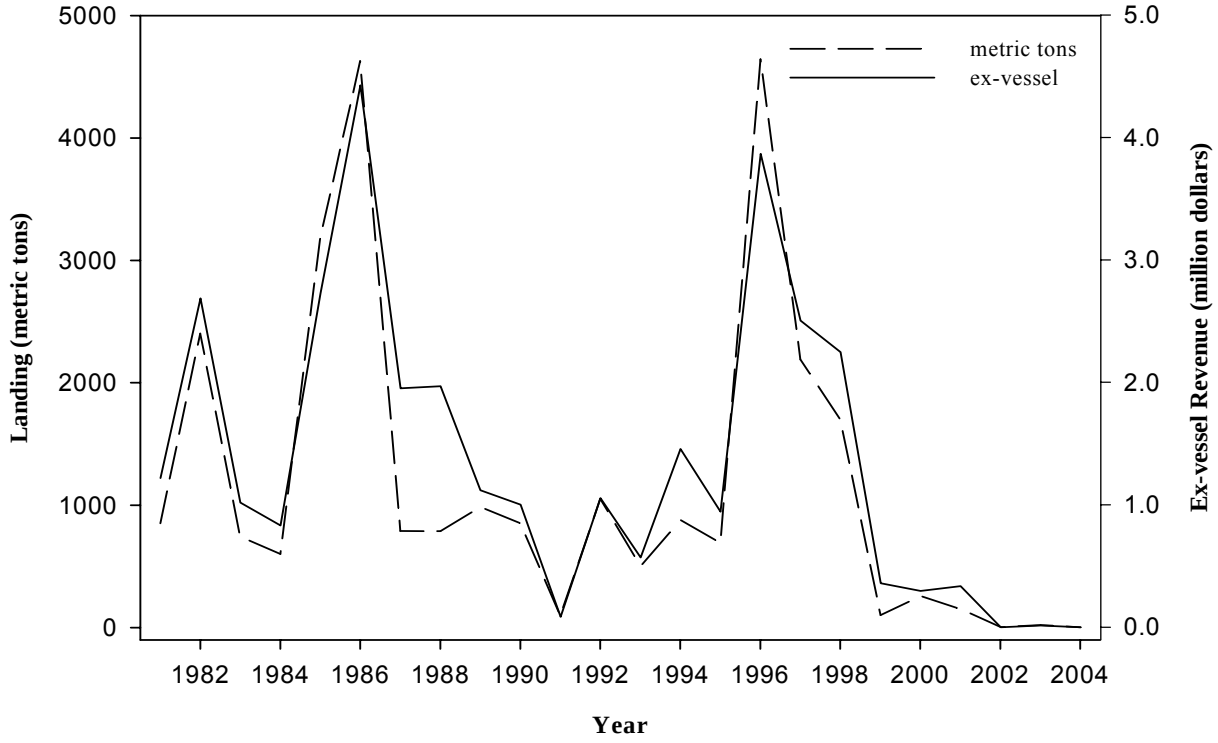

Figure 2-2. California commercial landings of bluefin tuna by purse seine fishery, 1981-2004.

Table 2-2. Annual number of vessels, landings (round mt), and ex-vessel revenue for bluefin tuna landed in California by the purse seine fishery, 1981-2004.

Year	Vessel (number)	Landing (mt)	Ex-vessel[1] (dollar)	Year	Vessel (number)	Landing (mt)	Ex-vessel[1] (dollar)
1981	110	853	1,218,230	1993	46	497	569,367
1982	186	2,403	2,685,733	1994	56	877	1,455,357
1983	128	743	1,018,847	1995	31	689	943,602
1984	108	600	831,791	1996	133	4,639	3,865,969
1985	226	3,185	2,726,898	1997	80	2,189	2,505,166
1986	228	4,626	4,424,444	1998	90	1,695	2,246,485
1987	76	788	1,951,470	1999	16	99	360,136
1988	127	785	1,968,839	2000	17	255	296,687
1989	96	983	1,118,646	2001	23	149	336,831
1990	100	851	1,000,473	2002	0	0	0
1991	17	95	84,851	2003	1	19	14,874
1992	77	1,050	1,055,511	2004	0	0	0

[1]Ex-vessel revenues are nominal values (not adjusted for inflation). Source: PacFin, extracted August 2005
Additional processing information: landings data reported without an accompanying gear code was excluded from the analysis if a correction could not be made.

Yellowfin Tuna: For the period 1981-2004, the number of purse seiners landing yellowfin tuna decreased from 126 in 1985 to 1 in 2003. Annual landings of yellowfin tuna in California have been declining since 1974, when more than 111,600 mt was landed. The decline in landings is attributed to the relocation of large cannery operations overseas. Currently there are no canneries operating in California.

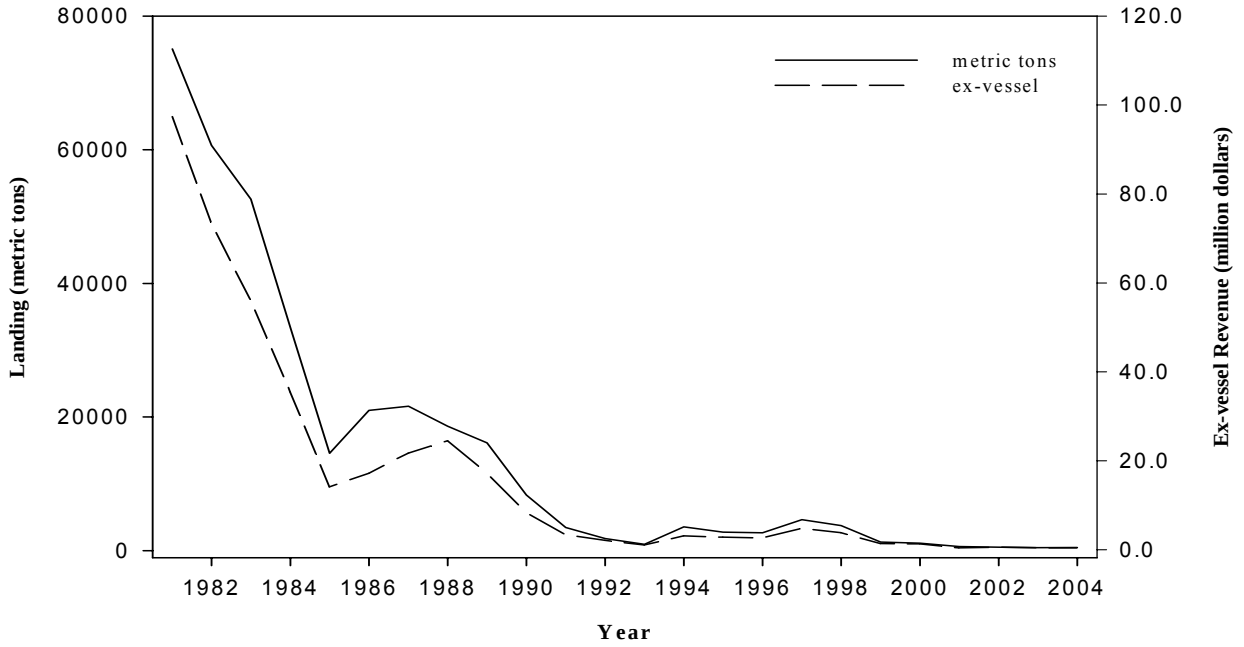

Figure 2-3. California commercial landings of yellowfin tuna by purse seine fishery, 1981-2004.

Table 2-3. Annual number of vessels, landings (round mt), and ex-vessel revenue for yellowfin tuna landed in California by the purse seine fishery, 1981-2004.

Year	Vessel (number)	Landing (mt)	Ex-vessel[1] (dollar)	Year	Vessel (number)	Landing (mt)	Ex-vessel[1] (dollar)
1981	121	75,078	97,409,053	1993	14	951	1,051,265
1982	105	60,663	73,321,129	1994	24	3,563	3,126,514
1983	102	52,616	56,017,914	1995	17	2,792	2,805,451
1984	68	33,381	35,534,553	1996	22	2,683	2,669,391
1985	126	14,596	14,167,823	1997	30	4,659	4,795,089
1986	26	21,009	17,192,025	1998	26	3,753	3,818,069
1987	35	21,641	21,751,550	1999	7	1,297	1,397,578
1988	32	18,613	24,508,031	2000	16	1,141	1,271,258
1989	17	16,152	17,240,966	2001	9	631	411,133
1990	14	8,348	8,359,568	2002	2	541	577,814
1991	11	3,479	3,358,043	2003	1	463	442,370
1992	19	1,838	2,095,370	2004	9	484	439,523

[1]Ex-vessel revenues are nominal values (not adjusted for inflation). Source: PacFin, extracted August 2005.
Additional processing information: landings data reported without an accompanying gear code was excluded from the analysis if a correction could not be made.

Annual landings and ex-vessel revenues have been relatively flat since the historic low of 1991, averaging 2,020 mt and $2.0 million, respectively (Figure 2-3 and Table 2-3). Exports of fresh frozen yellowfin tuna from California went to Mexico for processing in 2004.

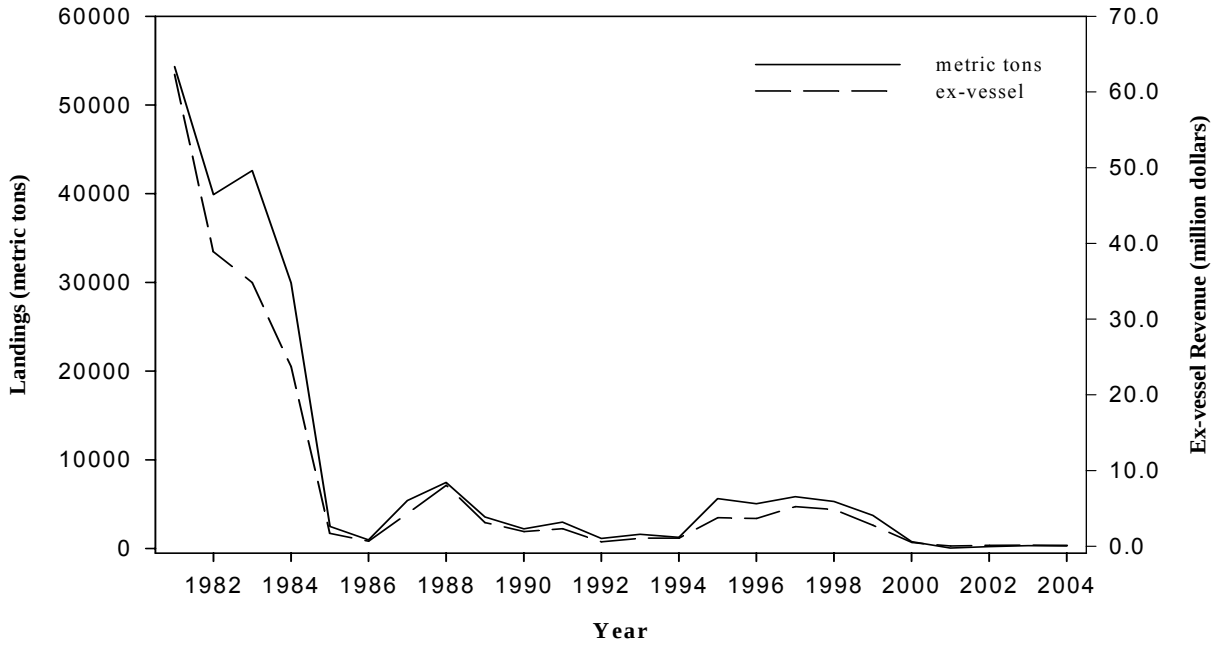

Figure 2-4. California commercial landings of skipjack tuna by purse seine fishery, 1981-2004.

Table 2-4. Annual number of vessels, landings (round mt), and ex-vessel revenue for skipjack tuna landed in California by the purse seine fishery, 1981-2004.

Year	Vessel (number)	Landing (mt)	Ex-vessel[1] (dollar)	Year	Vessel (number)	Landing (mt)	Ex-vessel[1] (dollar)
1981	117	54,338	62,318,320	1993	18	1,619	1,047,039
1982	105	39,905	38,924,282	1994	23	1,283	1,078,217
1983	115	42,617	34,799,320	1995	21	5,624	3,768,447
1984	69	29,949	23,747,326	1996	23	5,052	3,646,207
1985	14	2,504	1,713,118	1997	29	5,843	5,248,321
1986	20	977	643,905	1998	20	5,310	4,826,380
1987	26	5,429	4,309,562	1999	11	3,742	2,732,409
1988	27	7,456	8,048,815	2000	3	7,75	475,592
1989	20	3,561	3,135,147	2001	1	55	28,595
1990	22	2,242	1,911,029	2002	2	236	128,094
1991	15	2,988	2,323,081	2003	1	336	152,188
1992	17	1,159	551,340	2004	10	306	109,932

[1]Ex-vessel revenues are nominal values (not adjusted for inflation). Source: PacFin, extracted August 2005.
Additional processing information: landings data reported without an accompanying gear code was excluded from the analysis if a correction could not be made.

Skipjack Tuna: For the period 1981-2004, the number of purse seiners landing skipjack tuna decreased from 117 in 1985 to 1 in 2001 and 2003. Annual skipjack tuna landings in California have declined since the historic high of 78,926 mt recorded in 1980. In general, the decline is attributed to the relocation of large cannery operations to overseas locations and the re–flagging of US vessels. Almost all commercial skipjack landings in California are caught south of the U.S.-Mexico border.

Annual landings and ex-vessel revenues have been relatively flat following the historical low of 1985, averaging 2,825 mt and $2.3 million, respectively (Figure 2-4 and Table 2-4). Exports of fresh frozen skipjack went to Mexico and Spain for processing and canning in 2004.

2.1.1.3 Harpoon Fishery for Swordfish

The harpoon fishery primarily targets swordfish, although fishermen take small quantities of common thresher and mako shark with this gear. Fishing is primarily conducted in the SCB, from May to December depending on weather conditions and availability of the fish in coastal waters. During an El Niño event, fishing operations can span into coastal waters north of San Francisco. To reduce their search time, vessel operators often work in conjunction with an airplane to spot swordfish basking at the surface beyond binocular range from a vessel and to spot sub-surface swordfish. To participate in the harpoon fishery, a permit and logbook is required, in addition to a general resident or non-resident commercial fishing license, and a current CDFG vessel registration. The number of harpoon vessels that have landed swordfish in California ports annually has ranged from 246 in 1982 to 23 in 2001 (Table 2-5).

For the period 1981-2004, swordfish landings in California have ranged from 236 mt in 1981 to 16 mt in 1991. Since 1990, landings have averaged 86 mt (Figure 2-5 and Table 2-5). The ex-vessel revenue ranged from $1.5 million in 1986 to $148,029 in 1991. Because harpooned fish are boated relatively quickly when compared to drift gillnet (DGN) caught fish, there is less lactic acid in their flesh. Also the fishery operates relatively close to shore, so they are landed in a fresher condition. Therefore, markets tend to pay more for harpooned fish. The average ex-vessel price-per-pound was $3.70 for harpooned fish compared to $3.30 for DGN fish from 1991 to 2004.

Table 2-5. Annual number of vessels, landings (round mt), and ex-vessel revenue for swordfish in California by the harpoon fishery, 1981-2004.

Year	Vessel (number)	Landing (mt)	Ex-vessel[1] (dollar)	Year	Vessel (number)	Landing (mt)	Ex-vessel[1] (dollar)
1981	187	267	1,350,973	1993	42	169	1,129,601
1982	246	156	841,765	1994	49	153	1,242,991
1983	88	58	313,735	1995	38	96	752,189
1984	110	96	524,872	1996	30	81	633,027
1985	96	211	935,845	1997	31	84	683,866
1986	112	236	1,434,837	1998	26	48	398,933
1987	97	211	1,455,414	1999	30	81	607,877
1988	82	180	1,328,332	2000	26	90	750,533
1989	44	54	432,232	2001	23	52	468,289
1990	49	51	416,969	2002	29	90	678,934
1991	32	16	148,029	2003	34	107	838,754
1992	47	74	581,146	2004	28	69	669,060

[1]Ex-vessel revenues are nominal values (not adjusted for inflation). Source: PacFin, extracted August 2005.

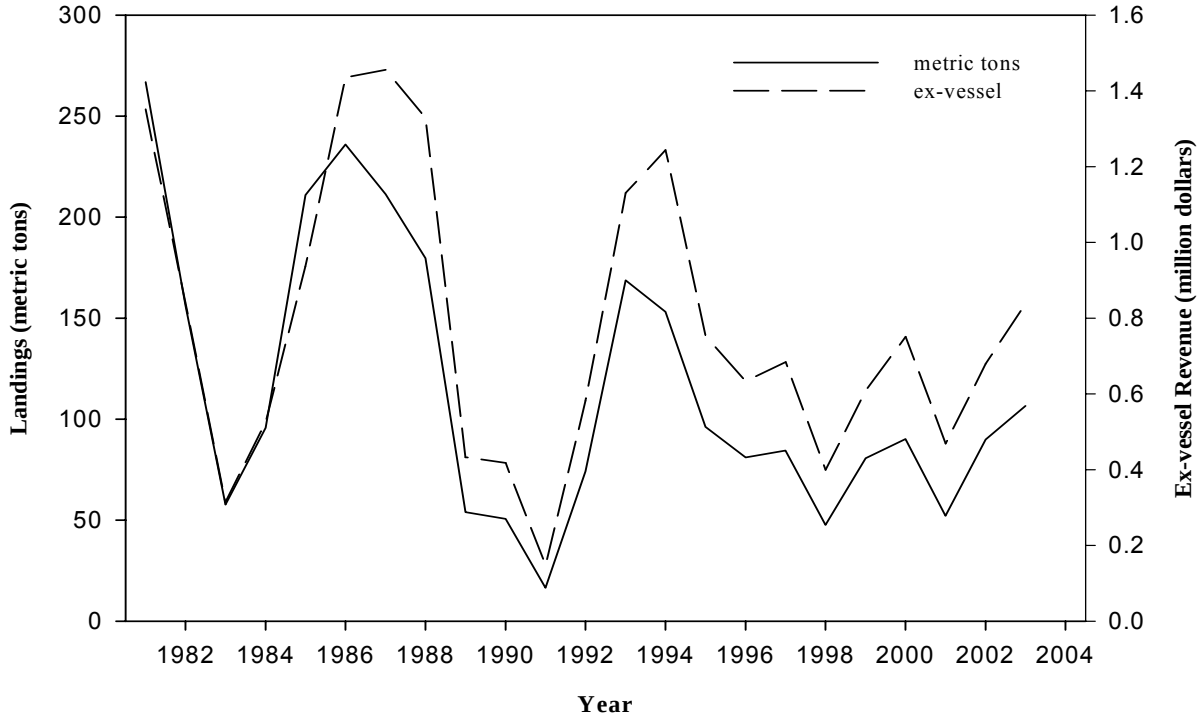

Figure 2-5. California commercial landings of swordfish by harpoon fishery, 1981-2004.

2.1.1.4 Drift Gillnet Fishery for Swordfish and Shark

Swordfish: California's swordfish fishery transformed from primarily a harpoon fishery to a DGN fishery in the late 1970s, and landings soared to a historical high of 2,371 mt by 1985. The DGN fishery is a limited entry fishery, regulated through various gear, season, depth closures, and logbooks. The limited entry program was established in 1984. The permit is non-transferable and it is linked to an individual fisherman, not a vessel. Since 1984, the number of permits has declined from 251 in 1986 to 96 in 2004 (Table 2-6). To keep a permit active, current permittees are required to purchase a permit from one consecutive year to the next; however, they are not required to make landings using DGN gear. In addition, a general resident or non-resident commercial fishing license and a current vessel registration are required to catch and land fish caught in DGN gear.

Historically, the California DGN fleet has operated within EEZ waters adjacent to the state and as far north as the Columbia River, Oregon, during El Niño years. Fishing activity is highly dependent on seasonal oceanographic conditions that create temperature fronts that concentrate feed for swordfish. Because of the seasonal migratory pattern of swordfish and seasonal fishing restrictions, about 90% of the fishing effort occurs August 15 to December 31.

In 2001, NMFS implemented two Pacific sea turtle conservation areas on the West Coast with seasonal drift gillnet restrictions to protect endangered leatherback and loggerhead sea turtles. The larger of the two closures spans the EPO north of Point Conception, California (34° 27' N latitude) to Oregon (45° N latitude) and west to 129° W longitude. Drift gillnet fishing is prohibited annually within this conservation area from August 15 to November 15 to protect leatherbacks. The smaller closure implemented to protect Pacific loggerhead sea turtles from drift gillnet gear during a forecasted, or

occurring, El Niño event, is located south of Point Conception, California and west of 120° W from January 1 through January 31, and from August 15 to August 31. These closures have had an affect on the fleets fishing activities, contributing to a reduction in fleet size from 78 in 2000 to 43 vessels in 2004 (Table 2-6).

Table 2-6. Annual number of vessels, limited entry permits, landings (round mt), and ex-vessel[1] value for swordfish and common thresher shark landed in California by the drift gillnet fishery, 1981-2004.

			Swordfish		Common Thresher	
Year	Vessel (number)	Permit (number)	Landing (mt)	Ex-vessel[1] (dollar)	Landing (mt)	Ex-vessel[1] (dollar)
1981	118	-	270	1,609,959	917	1,302,515
1982	166	-	208	1,450,243	650	1,147,990
1983	193	-	242	1,381,237	421	283,782
1984	214	226	286	1,590,026	915	245,463
1985	228	229	197	1,150,726	1,095	304,391
1986	204	251	78	546,727	451	105,229
1987	185	218	6	53,901	393	9,245
1988	154	207	1	4,820	393	444
1989	144	189			460	1,430
1990	134	183			335	
1991	114	165	51	524,282	569	20,214
1992	119	149	60	349,626	285	4,672
1993	123	117	162	1,331,728	245	42,645
1994	138	162	760	6,568,631	272	831,132
1995	117	185	682	5,889,173	207	586,845
1996	111	167	708	5,495,001	241	760,720
1997	108	120	655	4,511,924	249	744,913
1998	98	148	847	5,322,810	281	811,912
1999	84	136	585	3,954,968	152	470,793
2000	78	127	631	3,957,374	155	486,827
2001	69	114	351	2,234,670	273	764,804
2002	50	106	298	2,173,786	216	626,306
2003	43	99	198	1,483,895	241	664,460
2004	43	96	175	1,300,805	66	186,256

[1]Ex-vessel revenues are nominal values (not adjusted for inflation). Source: PacFin, extracted August 2005.
Additional processing information: significant swordfish and shark landings by drift gillnet gear prior to 1994 have been mis-assigned to California entangling net, trammel net, several trawl, encircling net, set gillnet, and unknown gears, and therefore are not reported here.

For the period 1981-2004, the number of drift gillnet vessels landing swordfish declined from 228 in 1985 to 43 in 2004. Since 1984, annual landings and ex-vessel revenues have been declining in general, averaging 354 mt and $2.5 million, respectively (Figure 2-6 and Table 2-6). Most swordfish landed in California supports domestic seafood restaurant businesses.

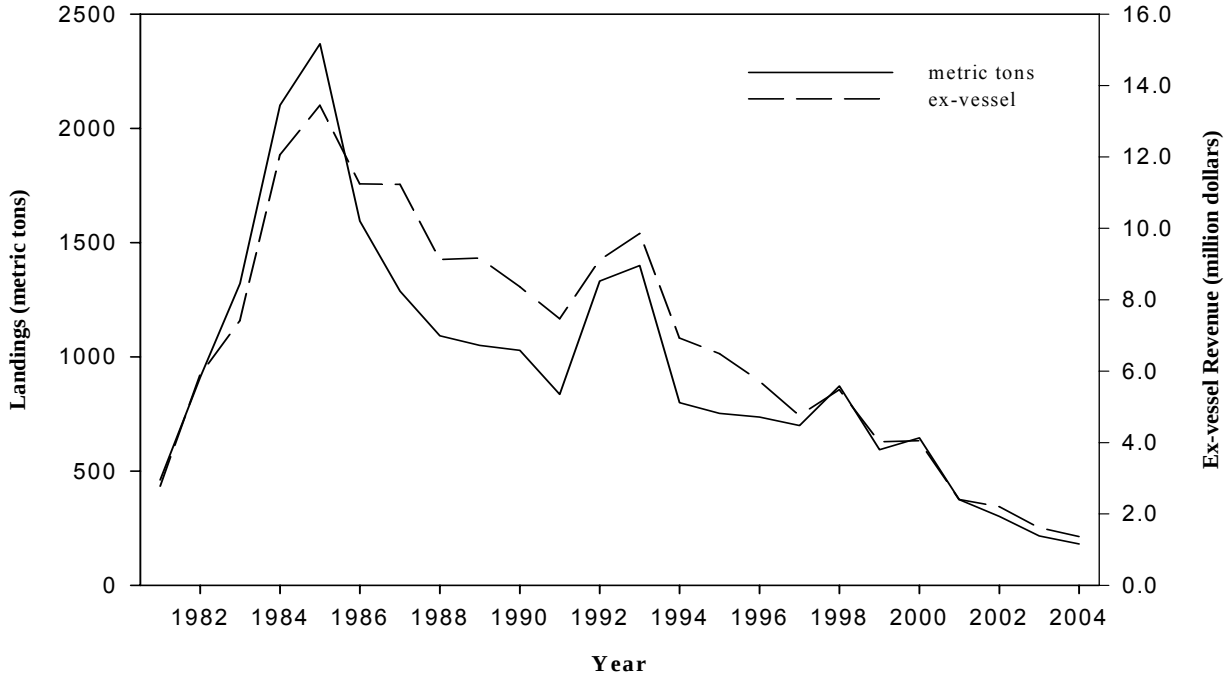

Figure 2-6. California commercial landings of swordfish by drift gillnet fishery, 1981-2004.

Thresher Shark: Initial development of the DGN fishery in the late 1970s was founded on catches of common thresher shark. The thresher shark fishery rapidly expanded, peaking at more than 800 mt in 1981. After 1981, swordfish became the primary target species for the fleet, because it commands a higher price-per-pound than thresher shark, resulting in a decline in reported thresher shark landings to zero in 1990. However, common thresher is still a target species of the DGN fishery and is commonly landed with swordfish. Since 1990, annual landings and ex-vessel revenue have averaged 169 mt and $500,179, respectively (Figure 2-7 and Table 2-6). Most thresher shark landings in California support domestic seafood restaurant businesses.

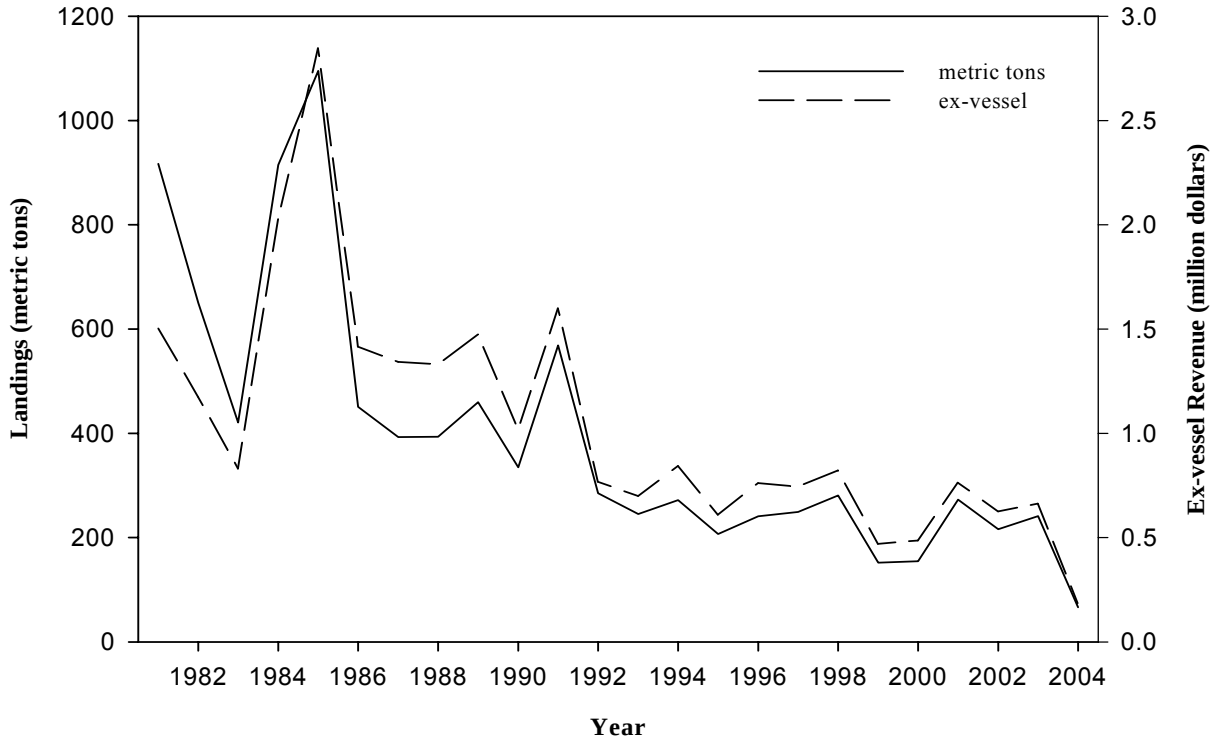

Figure 2-7. California commercial landings of common thresher shark by drift gillnet fishery, 1981-2004.

2.1.1.5 High Seas Longline Fishery

California prohibits the use of pelagic longline fishing within the EEZ and the retention of striped marlin. Vessels operating outside of the EEZ can land fish in California ports if the operator has a general resident or non-resident commercial fishing license and a current CDFG vessel registration. The operator must comply with the High Seas Compliance Act, which requires U.S. vessel operators to maintain logbooks if they fish beyond the EEZ.

High seas vessels using pelagic longline gear primarily land swordfish in California ports. Occasionally bigeye, yellowfin, and bluefin tuna, and mako sharks are also landed, but in relatively small quantities when compared to swordfish. Since 1981, 23 vessels on average have landed swordfish in California ports from year to year (Table 2-7). By 1998, a majority of these vessels were based in Hawaii. The Hawaiian fleet targets the fish as they migrate east of the Hawaiian Islands during the fall and winter months. In early spring, the Hawaiian fleet re-provisions and targets the swordfish as they migrate west of California and land their catch in Hawaii.

For the period 1981-2004, annual landings of swordfish in California ports by the high seas longline fishery ranged from 1 mt in 1981 to 1,916 mt in 2000. Since 1998, landings and ex-vessel revenues have averaged 1,359 mt and $7.1 million, respectively (Table 2-7 and Figure 2-8).

Table 2-7. Annual number of vessels, landings (round mt), and ex-vessel revenue for swordfish in California by the pelagic longline fishery, 1981-2004.

Year	Vessel (number)	Landing (mt)	Ex-vessel[1] (dollar)	Year	Vessel (number)	Landing (mt)	Ex-vessel[1] (dollar)
1981	5	1	7,233	1993	20	166	1,226,278
1982	7	8	50,548	1994	43	740	5,110,035
1983	12	5	23,791	1995	34	281	1,616,815
1984	22	14	104,617	1996	25	348	1,925,475
1985	10	46	205,627	1997	30	665	3,083,010
1986	10	4	31,427	1998	38	428	2,167,422
1987	12	4	41,688	1999	42	1,335	7,214,730
1988	9	19	171,164	2000	54	1,916	11,929,721
1989	13	29	207,384	2001	40	1,767	9,520,343
1990	11	18	159,543	2002	23	1,322	6,051,277
1991	12	39	313,996	2003	30	1,812	8,548,125
1992	24	96	685,431	2004	24	935	4,671,173

[1]Ex-vessel revenues are nominal values (not adjusted for inflation). Source: PacFin, extracted August 2005.
Additional processing information: landings data reported without an accompanying gear code was excluded from the analysis if a correction could not be made.

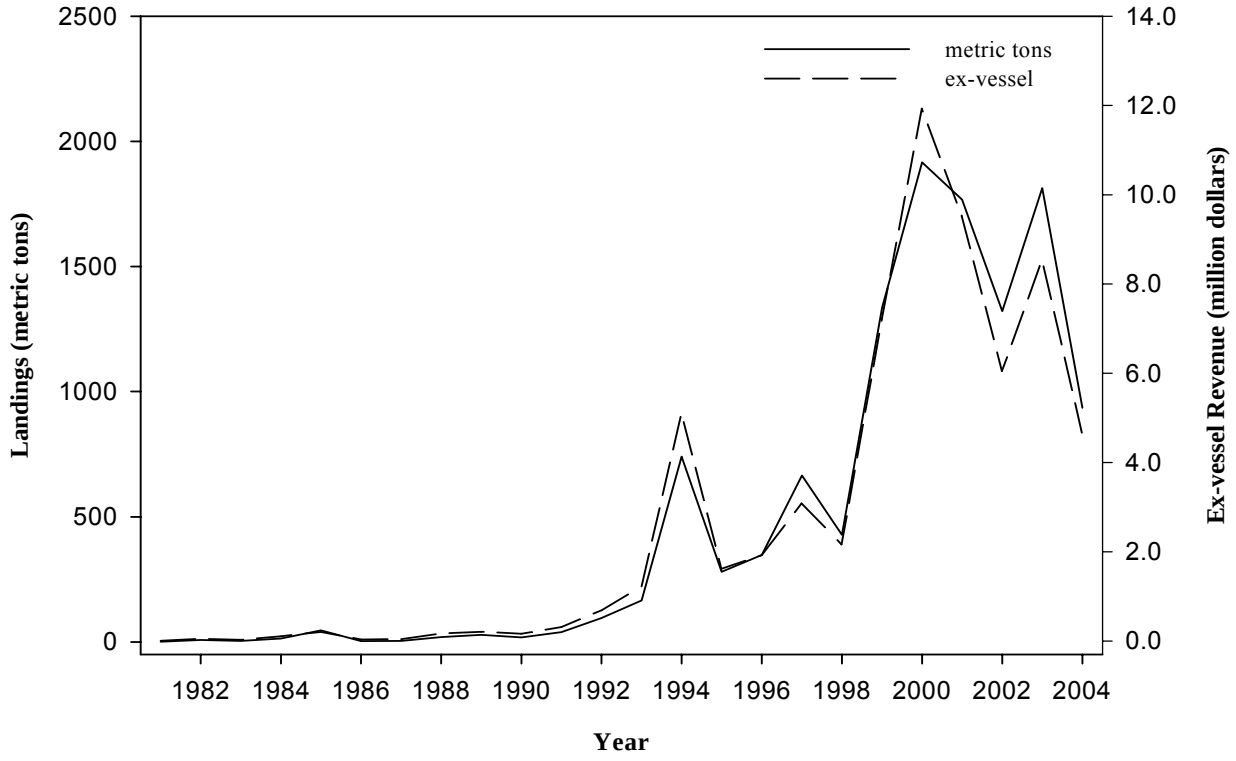

Figure 2-8. California commercial landings of swordfish by pelagic longline fishery, 1981-2004.

2.1.2 Oregon

2.1.2.1 Surface Hook-and-Line Fishery for Albacore

Albacore has been fished commercially off of Oregon since the mid-1930s when the fishery expanded north from the traditional grounds off southern California. For many years, both bait boats and jig boats fished for albacore off Oregon, but in recent years predominantly jig-caught (troll-caught) fish have been landed. The current fleet consists primarily of small to medium (20 ft to 60 ft) "combination" boats, which may fish crab, salmon, or bottom fish at other times of the year, and large freezer boats (most longer than 60 ft) that travel the north and south Pacific, fishing principally albacore.

Oregon albacore landings have been highly variable through the years, ranging from a low of 12.5 mt in 1936 to a high of over 17,000 mt in 1968. In the last decade, annual landings in Oregon have averaged about 3,600 mt.

Sampling of Oregon's commercial albacore fishery is a cooperative effort between the Oregon Department of Fish and Wildlife (ODFW), NMFS, and the Pacific States Marine Fisheries Commission (PSMFC).

Landings of albacore into Oregon ports usually begin in June, however, in 2004, they began in late May. Landings generally continue into November with the peak occurring in July or August (Table 2-8). Total landings for 2003 and 2004 were 4,156 mt and 4,806 mt, respectively, slightly above the average for the last few years (Table 2-9). Oregon landings might have been much higher in 2004, but some Oregon vessels, attracted by a higher ex-vessel price offered by a Washington dealer, delivered into Ilwaco, Washington. Newport generally receives the majority of Oregon deliveries, followed by Charleston and Astoria. Nine other ports also received deliveries in 2003-2004 (Table 2-10).

Table 2-8. Oregon commercial albacore landings (mt) by month, 2003-2004

Month	2003	2004
May		0.2
June	6.9	215.7
July	1,227.7	1,537.2
August	1,720.9	1,358.7
September	801.8	1,173.2
October	358.6	516.7
November	41.0	4.0
Total	4,157	4,806

Data source: ODFW fish ticket landings data, extracted August 2005.

Table 2-9. Oregon commercial albacore landings (mt) by year, 1994-2004.

Year	metric tons
1994	2,131.1
1995	2,283.3
1996	4,058.9
1997	4,158.5
1998	4,808.4
1999	2,064.2
2000	3,971.5
2001	4,063.1
2002	1,958.0
2003	4,156.8
2004	4,805.8

Data source: ODFW fish ticket landings data, extracted August 2005.

Table 2-10. Oregon commercial albacore landings (mt) by port, 2003-2004.

Port	2003	2004
Astoria	802.4	974.3
Garibaldi	106.7	79.3
Pacific City	3.8	2.4
Depoe Bay	5.0	5.4
Newport	2,261.1	2,214.6
Florence	59.4	23.3
Winchester Bay	93.4	44.8
Charleston	756.9	1,427.7
Bandon	4.3	1.0
Port Orford	11.5	5.2
Gold Beach	2.0	2.1
Brookings	50.3	25.7
Total	**4,157**	**4,806**

Data source: ODFW fish ticket landings data, extracted August 2005

Albacore markets remained fairly stable during 2003 and 2004 with fish going to European, Asian, Ecuadorean (Star Kist), and custom packers and off-vessel sales (directly to the public). Ex-vessel prices were slightly higher in 2004 than in 2003 for all product forms (Table 2-11).

The number of vessels landing albacore in Oregon increased over the 265 in 2002, with 385 and 475 vessels in 2003 and 2004, respectively. The estimated number of trips landed into Oregon also increased over the 753 in 2002, with 1,265 trips in 2003 and 1,528 trips in 2004.

In 2004 the average landing was about 3.1 mt (3.2 mt in 2003, 2.6 mt in 2002). The average size of albacore delivered to Oregon buyers was again variable, but larger in 2004, ranging from 12 to 30 lb compared to 12 to 25 pound in 2003 and 10 to 20+ pound in 2002.

Table 2-11. Ex-vessel[1] price-per-pound for albacore tuna in Oregon, 2003-2004.

Product Form	2003	2004
frozen	$0.60 to $1.00	$0.75 to $1.50
fresh	$0.575 to $0.90	$0.65 to $1.00
off-vessel (whole)	$0.90 to $1.75	$1.75
off-vessel (loins)		$3.50

[1]Ex-vessel revenue are nominal values (not adjusted for inflation).
Data source: ODFW fish ticket landings data, extracted August 2005.

2.1.2.1 Drift Gillnet Fishery for Swordfish and Shark

The Oregon commercial DGN fishery is an extension of the California fishery. However, with implementation of the seasonal closure off northern California and southern Oregon, fishing effort off Oregon has dropped considerably. In Oregon, the DGN fishery for swordfish is managed under the Developmental Fisheries Program, which limits the number of permits available. Although 10 permits are available each year, in 2003 and 2004, only 3 and 1 permits were issued, respectively. Landings in both years totaled less than 1 mt (Table 2-12).

Table 2-12. Oregon landings (mt) with drift gillnet gear, 2003-2004.

Species	2003	2004
swordfish	0.24	0.03
thresher shark		0.07
bluefin tuna	0.18	
shortfin mako	0.07	
opah	0.03	
Total	0.51	0.10

Data source: ODFW fish ticket landings data, extracted August 2005.

2.1.3 Washington

The highly migratory species fisheries—commercial and recreational—off the Washington coast are primarily for albacore tuna, although there are occasional, smaller landings of thresher shark and blue shark. While there is not a fixed season, albacore fisheries begin in early to mid-July and continue until the tuna are no longer accessible off Washington, usually around late September.

The albacore fisheries off Washington include commercial troll, bait boats, charter boats, and recreational fishing boats. There is no state license requirement to fish for albacore tuna in Washington; however, a state delivery permit is required to land any fish. As the primary commercial HMS fishery in Washington is the albacore troll fishery, and the state salmon troll license also includes a delivery permit, many of the landings occur on salmon troll licenses (which are limited in number). Individuals without salmon troll licenses may land albacore with a state "non-salmon delivery permit" (which are unlimited). Commercial fish receiving tickets are used to determine the number of troll vessels that landed albacore into Washington (Table 2-13).

Table 2-13. Number of vessels participating in Washington highly migratory species fisheries in 1995-2004.

Year	Commercial	Recreational
1995	208	27
1996	217	23
1997	244	50
1998	220	33
1999	186	17
2000	180	26
2001	203	19
2002	236	29
2003	322	30
2004	271	30

Surface Hook-and-Line Fishery for Albacore

The two major ports along Washington's coast, which have the highest HMS landings, are Westport and Ilwaco. There are several other ports along the coast and in Puget Sound that typically receive albacore landings as well. Landings at individual ports continue to vary and are a direct reflection of market conditions. Many vessels, particularly in Westport, sell their product directly to the public off the dock, rather than to a fish buyer for processing.

Large amounts of albacore tuna have been landed in Washington in recent years and, in general, the tuna fishery has remained stable since the early 1990s. In recent years, variability in tuna landings has likely been an indication of changes in availability of tuna, rather than effort, as the number of participating vessels has been fairly consistent. Commercial albacore tuna landings into Washington are contained in Table 4-16.

2.2 Description of West Coast Recreational Fisheries

2.2.1 California

Recreational anglers in California take all highly migratory species included within the HMS FMP. Fishing occurs within the EEZ of the United States as well as Mexico. Data are available from both the CDFG Commercial Passenger Fishing Vessel (CPFV) logbook program and the PSMFC through their Recreational Fisheries Information Network (RecFIN) website. While RecFIN can provide estimates of CPFV catches, the state's logbook program provides more reliable data. The logbook system is a census of most vessels while RecFIN relies on field sampling to make catch estimates. The fact that catches of HMS species constitute a relatively rare event is why logbooks are preferred over RecFIN in determining the catch of most HMS species on CPFVs. Logbooks also have the advantage of supplying catch information on HMS taken in Mexico. RecFIN is limited to estimating HMS catches in the EEZ of the United States.

California-based CPFVs rely heavily on access to the EEZ of Mexico for most of their HMS catch (Figure 4-17). The catch of sharks is the only exception to this. Landings from within the EEZ of the United States can range from none to 100% of the yearly total for the fleet, depending on the species and year. During the past five years, albacore (average yearly catch: 53,202 fish) continued to be the most important species taken by CPFVs within the EEZ of the United States. It was followed by yellowfin tuna (3,254), bluefin tuna (2,112), skipjack (1,147), dorado (912), and bigeye tuna (28). Among the sharks, makos (150) were the most important followed by blue sharks (80) and common threshers (28).

In recent years, very few marlin or swordfish were landed by CPFVs. The CPFV fleet has experienced some of the best fishing ever for several HMS species in the past six years when catches in the EEZ of the United States and Mexico are combined. Over 312,700 albacore were landed in 2002 while 1999, 2003, and 2001 produced the second through fourth best years in history. Exceptional bluefin tuna catches also occurred during this period. During 1999, 36,390 fish were landed making it the best year in history while 2002, 2003, 2001, and 2000 produced the third through sixth best years in history. CPFV anglers caught 86,737 yellowfin tuna in 2000 making it the fourth best year on record while 1998 produced the fifth best year on record.

Catch estimates for private boats are presented in Table 2-14. The estimates are for vessels fishing exclusively in the EEZ of the United States. Many private vessels fish in the EEZ of Mexico, but the number and catch of these vessels are unknown. Albacore was the most frequently taken species during the six-year period examined in this report. Dorado was the second most important followed by mako sharks, thresher sharks, skipjack, and bluefin tuna. Sharks assume much greater importance when ranking catches among private boaters, because they are best fished by one or two anglers from a small vessel. By contrast, CPFVs are two to three times larger than private boats and may carry 20 times the number of anglers as a private boat. The catch estimates of private boat catch from RecFIN must be used with caution because sampling anglers that pursue HMS is a rare occurrence, and as such can lead to unusually high or low catch estimates with high variances.

Table 2-14. Estimated private boat catch of highly migratory species from the RecFIN, 1999-2004.

Year	Yellowfin Tuna	Skipjack Tuna	Bluefin Tuna	Albacore Tuna	Mako Shark	Thresher Shark	Blue Shark	Dorado
Number Landed (1,000s of fish)								
1999	0	0	0	106	1	1	0	1
2000	37	0	0	57	2	2	0	61
2001	0	3	1	88	5	2	0	0
2002	0	0	1	69	6	2	0	0
2003	7	12	0	126	4	2	0	0
2004	8	0	0	21	2	4	0	2
Number Thrown Back Alive (1,000s of fish)								
1999	0	0	0	1	1	2	18	0
2000	1	0	0	0	2	2	49	0
2001	0	0	0	8	6	3	15	0
2002	0	2	0	1	7	2	7	0
2003	0	40	0	1	3	4	12	0
2004	1	1	0	1	3	0	1	1
Average Weight (kg)								
1999	--	--	--	10.1	37.4	10.0	--	5.9
2000	5.5	3.5	--	10.7	13.3	4.7	--	4.5
2001	--	0.6	5.6	8.3	--	21.8	--	--
2002	--	--	--	8.0	12.3	6.5	--	--
2003	5.2	3.4	5.4	10.4	3.6	12.6	--	--
2004	3.5	2.9	8.8	7.7	13.8	13.6	27.7	5.2

Data source: RecFin, extracted August 2005.

2.2.2 Oregon

The recreational albacore fishery off Oregon has increased more than four-fold in the last five years, both in number of trips (Tables 2-15 – 2-17) and in number of fish (Tables 2-18 – 2-20). Catch per unit of effort was up slightly in 2004 (4.3 fish/trip) over 2003 (3.4 fish/trip) (Tables 2-21 – 2-23). During 2004, the recreational fishery contributed approximately 125.1 mt (17,253 fish at about 16 pound average weight) to the total albacore landings. This was again up from the 2003 catch of approximately 76.3 mt (10,195 fish at about 16.5 pound average). Private boats accounted for 65–70% of the total recreational landings. Newport accounted for approximately one-third of the trips and number of fish, with Coos Bay and Depoe Bay, combined, accounting for another third.

Table 2-15. Oregon charter albacore fishing effort (angler trips) by year and port, 2000-2004.

Port	2000	2001	2002	2003	2004
Astoria				24	58
Garibaldi		62	50	31	57
Pacific City		3			12
Depoe Bay	366	318	230	104	255
Newport	313	395	601	568	679
Winchester Bay		31	30	97	156
Coos Bay		99		58	68
Bandon		22		36	48
Port Orford					
Gold Beach				14	
Brookings		18		44	47
Total	679	948	911	976	1380
			5 year average		979

Data Source: ODFW Ocean Recreational Boat Survey, extracted August 2005.

Table 2-16. Oregon private boat albacore fishing effort (angler trips) by year and port, 2000-2004.

Port	2000	2001	2002	2003	2004
Astoria			19	77	95
Garibaldi	33	63	49	94	88
Pacific City	22	197	12	133	132
Depoe Bay	34	33	100	255	420
Newport	164	240	133	223	700
Winchester Bay		14		46	98
Coos Bay	21	579	106	530	565
Bandon		30		4	54
Port Orford				10	
Gold Beach	4			75	
Brookings		101	51	610	505
Total	278	1257	470	2057	2657
			5 year average		1344

Data Source: ODFW Ocean Recreational Boat Survey, extracted August 2005.

Table 2-17. Oregon combined (charter and private boat) albacore fishing effort (angler trips) by year and port, 2000-2004.

Port	2000	2001	2002	2003	2004
Astoria	0	0	19	101	153
Garibaldi	33	125	99	125	145
Pacific City	22	200	12	133	144
Depoe Bay	400	351	330	359	675
Newport	477	635	734	791	1379
Winchester Bay	0	45	30	143	254
Coos Bay	21	678	106	588	633
Bandon	0	52	0	40	102
Port Orford	0	0	0	10	0
Gold Beach	4	0	0	89	0
Brookings	0	119	51	654	552
Total	957	2205	1381	3033	4037
				5 year average	2323
Private boat (%)	29.0%	57.0%	34.0%	67.8%	65.8%

Data Source: ODFW Ocean Recreational Boat Survey, extracted August 2005.

Table 2-18. Oregon charter albacore catch (number of fish) by year and by port, 2000-2004.

Port	2000	2001	2002	2003	2004
Astoria				84	188
Garibaldi		316	160	156	183
Pacific City		3			62
Depoe Bay	796	881	204	240	592
Newport	1772	2140	1490	1942	2498
Winchester Bay		108	15	501	768
Coos Bay		479		225	192
Bandon		116		243	216
Port Orford					
Gold Beach				147	
Brookings		83		85	273
Total	2568	4126	1869	3623	4972
				5 year average	3432

Data Source: ODFW Ocean Recreational Boat Survey, extracted August 2005.

Table 2-19. Oregon private boat albacore catch (number of fish) by year and port, 2000-2004.

Port	2000	2001	2002	2003	2004
Astoria			16	496	499
Garibaldi	16	279	60	498	819
Pacific City	14	991	7	369	1932
Depoe Bay	45	177	490	1300	2259
Newport	239	852	562	762	2894
Winchester Bay		7		191	624
Coos Bay	19	1777	72	811	2258
Bandon		102		2	167
Port Orford		12		46	
Gold Beach				135	
Brookings		338	208	1962	812
Total	333	4535	1415	6572	12264
				5 year average	5024

Data Source: ODFW Ocean Recreational Boat Survey, extracted August 2005.

Table 2-20. Oregon combined (charter and private boat) albacore catch (number of fish) by year and port, 2000-2004.

Port	2000	2001	2002	2003	2004
Astoria	0	0	16	580	687
Garibaldi	16	595	220	654	1002
Pacific City	14	994	7	369	1994
Depoe Bay	841	1058	694	1540	2851
Newport	2011	2992	2052	2704	5392
Winchester Bay	0	115	15	692	1392
Coos Bay	19	2256	72	1036	2450
Bandon	0	218	0	245	383
Port Orford	0	12	0	46	0
Gold Beach	0	0	0	282	0
Brookings	0	421	208	2047	1085
Total	2901	8661	3284	10195	17236
				5 year average	8455
Private boat (%)	11.5%	52.4%	43.1%	64.5%	71.2%

Data Source: ODFW Ocean Recreational Boat Survey, extracted August 2005.

Table 2-21. Oregon charter albacore catch per unit of effort (number of fish/angler trip) by year and port, 2000-2004.

Port	2000	2001	2002	2003	2004
Astoria				3.5	3.2
Garibaldi		5.1	3.2	5.0	3.2
Pacific City		1.0			5.2
Depoe Bay	2.2	2.8	0.9	2.3	2.3
Newport	5.7	5.4	2.5	3.4	3.7
Winchester Bay		3.5	0.5	5.2	4.9
Coos Bay		4.8		3.9	2.8
Bandon		5.3		6.8	4.5
Port Orford					
Gold Beach				10.5	
Brookings		4.6		1.9	5.8
Total	3.8	4.4	2.1	3.7	3.6
			5 year average		3.5

Data Source: ODFW Ocean Recreational Boat Survey, extracted August 2005.

Table 2-22. Oregon private boat albacore catch per unit of effort (number of fish/angler trip) by year and port, 2000-2004.

Port	2000	2001	2002	2003	2004
Astoria			0.8	6.4	5.3
Garibaldi	0.5	4.4	1.2	5.3	9.3
Pacific City	0.6	5.0	0.6	2.8	14.6
Depoe Bay	1.3	5.4	4.9	5.1	5.4
Newport	1.5	3.6	4.2	3.4	4.1
Winchester Bay		0.5		4.2	6.4
Coos Bay	0.9	3.1	0.7	1.5	4.0
Bandon		3.4		0.5	3.1
Port Orford				4.6	
Gold Beach	0.0			1.8	
Brookings		3.3	4.1	3.2	1.6
Total	1.2	3.6	3.0	3.2	4.6
			5 year average		3.1

Data Source: ODFW Ocean Recreational Boat Survey, extracted August 2005.

Table 2-23. Oregon combined (charter and private boat) albacore catch per unit of effort (number of fish/angler trip) by year, by port, 2000-2004.

Port	2000	2001	2002	2003	2004
Astoria			0.8	5.7	4.5
Garibaldi	0.5	4.8	2.2	5.2	6.9
Pacific City	0.6	5.0	0.6	2.8	13.8
Depoe Bay	2.1	3.0	2.1	4.3	4.2
Newport	4.2	4.7	2.8	3.4	3.9
Winchester Bay		2.6	0.5	4.8	5.5
Coos Bay	0.9	3.3	0.7	1.8	3.9
Bandon		4.2		6.1	3.8
Port Orford				4.6	
Gold Beach	0.0			3.2	
Brookings		3.5	4.1	3.1	2.0
Total	3.0	3.9	2.4	3.4	4.3
				5 year average	3.4

Data Source: ODFW Ocean Recreational Boat Survey, extracted August 2005.

2.2.3 Washington

Discussions with the Westport charter boat operators indicate the recreational albacore tuna fishery has been fairly stable, with increases in catches in recent years. There has been a small amount of turnover in participating charter operations, including new entrants into the charter tuna fishery. Some charter operators take "test trips" in mid-July to assess the tuna abundance and distance off the coast. In years when abundance has been low, many charter trips have been canceled.

In July 2004, however, Westport charter boats caught albacore while targeting salmon less than 10 miles off the coast, as a result of warmer water temperatures of up to 5 degrees higher than usual for this time of year.

In 2000, WDFW implemented a voluntary charter boat logbook program (with a 69% return); the reported logbook data is summarized in Table 2-24.

Table 2-24. Washington charter logbook data summary for 2000 (non-expanded).

Number of albacore caught:	8,283 fish
Number of boat trips:	150 trips
Number of anglers:	1,339 anglers
Catch per unit of effort:	6.19 fish/angler trip
Average weight:	14.5 lb
Average distance from shore:	64 nm

According to the voluntary logbook data, the only other HMS species caught (and released) was blue shark. The federal logbook requirement for charter boats, which is being implemented this year, is expected to provide more accurate recreational catch information. Washington's Ocean Sampling Program is planning to continue to collect catch data through its shoreside interview program; these data could then be used for comparison to the logbook data.

3.0 REGULATIONS CURRENTLY IN PLACE

3.1 Summary of the HMS FMP Management Measures and Regulations

On April 7, 2004, NMFS published a final rule to implement the provisions of the HMS FMP. Copies of the regulations published in the HMS FMP final rule (69 FR 18444), along with an abridged Compliance Guide explaining pertinent details, can be found on the NMFS Southwest Region website at: http://swr.nmfs.noaa.gov. Since fishery rules frequently change, fishermen must familiarize themselves with the latest regulations and are responsible for complying with the current official regulations set forth in the Code of Federal Regulations at 50 CFR Part 660.[1]

The HMS FMP final rule implements rules and regulations necessary for federal management of U.S. fishing vessels targeting HMS within the U.S. West Coast EEZ of California, Oregon, and Washington and the adjacent high seas waters. This HMS FMP applies to all U.S. vessels that fish for HMS within the EEZ (3-200 nautical miles) off California, Oregon, or Washington and to U.S. vessels that pursue HMS on the high seas (seaward of the EEZ) and land their fish in California, Oregon, or Washington. The HMS FMP does not apply to U.S. vessels that fish for HMS on high seas and land into a non-U.S. port. Additional restrictions apply under the High Seas Fishing Compliance Act and for Western Pacific longline permitted vessels landing into West Coast ports.

Regulations for HMS in Washington, Oregon, and California vary from state to state. The HMS FMP contains federal measures for HMS fisheries, which provide a region-wide management regime applicable to all vessels landing in West Coast ports. State regulations not superseded by the initial federal regulations will continue to remain in effect until such time as the Council determines they should be supplanted by federal regulations. Some of the state regulations are inconsistent from state to state, but these inconsistencies do not pose management problems that require immediate federal action.

The HMS FMP, under the management auspices of the Council, serves as a mechanism to cooperate with other regional Councils to achieve consistent management of U.S. fisheries in the Pacific Ocean. Federal measures impacting these fisheries, which arise from several different federal laws, can be more efficiently addressed within the Council framework, and related regulations can be viewed together. An important goal of the HMS FMP is to assure that issues of national and international concern are addressed, and determine how recommendations of international bodies should be applied to domestic fisheries of the U.S. West Coast.

The HMS FMP identifies 13 highly migratory species as management unit species (listed in Table 1-1) and defines the legal gear types and management measures used to harvest them.

The fishing gears described below are authorized for the commercial and recreational harvest of HMS in the EEZ by all permitted vessels, and beyond the EEZ by vessels landing into U.S. West Coast ports. Gear that is not defined as legal gear is prohibited from harvesting HMS under the HMS FMP. Specific management measures regulating the use of legal gear types will be developed if necessary, using the framework procedures of the HMS FMP.

[1] The Code of Federal Regulations at 50 CFR part 660 is available on-line at: http://www.access.gpo.gov/nara/cfr/waisidx_03/50cfr660_03.html

3.1.1 HMS Commercial Gear

Harpoon: fishing gear consisting of a pointed dart or iron attached to the end of a line several hundred feet in length, the other end of which is attached to a flotation device. Harpoon gear is attached to a pole or stick that is propelled only by hand, and not by mechanical means.

Surface Hook-and-Line: one or more hooks attached to one or more lines (includes troll, rod and reel, handline, albacore jig, live bait, and bait boat; excludes pelagic longline and mousetrap gear[2]). Surface hook-and-line is always attached to the vessel.

Drift Gillnet: a panel of netting, suspended vertically in the water by floats along the top and weights along the bottom, which is neither stationary nor anchored to the bottom. The HMS FMP final rule defines drift gillnet gear as 14 inch (35.56 cm.) stretched mesh or greater.

Purse Seine: a floated and weighted encircling net that is closed by means of a purse line threaded through rings attached to the bottom of the net (includes encircling net, purse seine, ring net, drum purse seine, lampara net).

Pelagic Longline: a main line that is suspended horizontally in the water column, which is neither stationary nor anchored, and from which dropper lines with hooks (gangions) are attached.

3.1.2 HMS Recreational Gear

Rod-and-Reel (pole-and-line): a hand-held (including rod holder) fishing rod with a manually or electrically operated reel attached.

Spear: a sharp, pointed, or barbed instrument on a shaft. Spears can be operated manually or shot from a gun or sling.

Hook-and-Line: one or more hooks attached to one or more lines (excludes mousetrap gear).

3.1.3 Landings and Gear Use Regulations

At this time there are no quotas for HMS species, although there are harvest guidelines. A quota is a specified numerical harvest objective, the attainment of which triggers the closure of the fishery or fisheries for that species. A harvest guideline is a numerical harvest level that is a general objective and is not a quota. If the harvest guidelines have been reached, NMFS will initiate a review of the species according to provisions in the HMS FMP and in consideration of Council guidance. The HMS FMP establishes annual harvest guidelines of 340 mt for common thresher sharks and 150 mt for shortfin mako sharks. Because total catches and basic population dynamic parameters for these shark species are poorly known, they are being managed using precautionary harvest guidelines.

The HMS FMP final rule prohibits the retention of the species listed below in Table 3-1. In general, prohibited species must be released immediately if caught, unless other provisions for their disposition are established in accordance with HMS FMP guidelines.

[2] Mousetrap gear means a free floating set of gear thrown from a vessel, composed of a length of line with a float on one end and one or more hooks or lures on the opposite end.

In addition, U.S. citizens fishing in waters covered under the HMS FMP are bound by the rules and regulations set forth in the Shark Finning Prohibition Act of 2002.[3] The Act prohibits, among other things, any person subject to U.S. jurisdiction from: (1) engaging in shark finning, (2) possessing shark fins aboard a U.S. fishing vessel without the corresponding carcass, or (3) landing shark fins without a corresponding carcass.

Table 3-1. Prohibited Species covered under the HMS FMP final rule.

Common Name	Scientific Name
great white shark	*Carcharodon carcharias*
basking shark	*Cetorhinus maximus*
megamouth shark	*Megachasma pelagio*
Pacific halibut	*Hippoglossus stenolepis*
pink salmon	*Onchorhynchus gorbuscha*
Chinook salmon	*O. tshawytscha*
chum salmon	*O. keta*
sockeye salmon	*O. nerka*
coho salmon	*O. kisutch*

The HMS FMP prohibits the sale of striped marlin by all vessels as a means to provide for and maximize recreational fishing opportunities for this species. Striped marlin is considered to have far greater value as a recreational target species than as a commercial target species. Prohibiting sale removes the incentive for commercial fishermen to take striped marlin.

3.1.4 Incidental Landings

The HMS FMP authorizes incidental commercial landings of HMS, within limits, for non-HMS gear such as bottom longline, trawl, pot gear, small mesh drift gillnet, set/trammel gillnets, and others. Incidental catch refers to harvest of HMS that are unavoidably caught while fishing for other species or fishing with gear that is not legal for the harvest of HMS.

1. Small-mesh gillnetters and set net gillnetters will not be permitted to land swordfish but would be permitted to land other HMS, with the restriction of 10 fish per landing of each non-swordfish HMS.

2. Bottom longline (set line) fishery landings are restricted to three HMS sharks, or 20% of total landings by weight of HMS sharks, whichever is greater.

3. For trawl, pot gear, and other non-HMS gear, a maximum of 1% of total weight per landing for all HMS shark species combined is allowed (i.e., blue shark, shortfin mako shark, and bigeye, pelagic, and common thresher sharks) or two HMS sharks, whichever is greater.

A drift gillnet vessel with a stretched mesh size less than 14 inches will not be able to target HMS, although an incidental landing of 10 HMS per trip, other than swordfish, will be allowed to minimize bycatch while fishing for state managed species.

[3] Copies of the Act can be downloaded at: http://www.nmfs.noaa.gov/sfa/hms/hmsdocuments.html. Copies of the Small Entity Compliance Guide Outlining the Regulations to Implement Shark Finning Prohibition Act can be viewed at: http://swr.nmfs.noaa.gov/pir/cg2.htm.

Albacore surface hook-and-line vessels may not deploy small-mesh drift gillnets to target albacore as was customarily practiced by selected vessels prior to passage of the HMS FMP final rule.

In Washington, it is unlawful to land thresher shark taken by any means from state and offshore waters of the Pacific Ocean north of the Washington-Oregon boundary and south of the United States-Canada boundary. It is unlawful to land any thresher shark in Washington taken south of the Washington-Oregon boundary unless each thresher shark landed is accompanied by a minimum of two swordfish.

In Oregon, it is unlawful to take thresher shark for commercial purposes with gillnets, except as bycatch in the swordfish fishery. In the swordfish fishery, under a developmental fisheries permit, thresher shark may be retained at a ratio of one thresher for every two swordfish retained. Thresher shark, taken with gear legal for other ocean food fish and within catch and season restrictions for other food fish, may be landed in Oregon.

3.1.5 Data Collection

Catch, effort, and catch disposition data are critical for monitoring HMS fisheries, assessing the status of the stocks, and evaluating the effectiveness of management. All commercial fishing and recreational charter vessels are required to maintain logbooks. All information specified on the logbook forms must be recorded on the forms within 24 hours after the completion of each fishing day. The original logbook form for each day of the fishing trip must be submitted to NMFS or the appropriate state management agency within 30 days of each landing or transshipment of HMS. Each form must be signed and dated by the fishing vessel operator.

3.1.6 Observer Requirements

All U.S. fishing vessels operating in HMS fisheries (including catcher/processors, at-sea processors, and vessels that embark from a port in Washington, Oregon, or California and land catch in another area), may be required to carry a NMFS-certified observer on board to collect scientific data when directed to do so by the NMFS Regional Administrator. NMFS shall advise the permit holder or the designated agent of any observer requirement at least 24 hours (not including weekends and federal holidays) before any trip.

3.1.7 Enforcement of Regulations

Penalties for violating the regulations and prohibitions outlined in the HMS FMP final rule are determined on a case-by-case basis; they can include significant civil penalties and permit sanctions. NOAA intends to develop a civil administrative penalty schedule for the HMS FMP Final Rule, which will be available to the public at: http://www.gcel.noaa.gov/schedules/index.html.

3.1.8 Changes in State HMS Regulations

Since implementation of the HMS FMP in 2004 the following HMS-related change was made to Oregon sportfishing regulations.

Prior to 2003, tuna and miscellaneous species (which included sharks and billfish) were included in Oregon's 25 fish-in-aggregate bag limit along with flounder, surfperch, sole greenling, rock fish, and cabezon. In 2003, tuna, surfperch, and sanddab were put into one category with a 25 fish in aggregate limit, and rockfish, greenling, flonder, sole, cabezon, and miscellaneous species were in a second category with a 10 fish in aggregate bag limit. In 2004, an “offshore pelagic species” category was created, which

is defined as "all species of tuna and mackerel (family Scombridae), swordfish, all species of billfish (family Istiophoridae), all species of jacks (family Carangidae), opah, dorado, Pacific pomfret, and all species of sharks." This offshore pelagic species category has a bag limit of 25 in the aggregate. White shark and basking shark are prohibited and must be immediately released unharmed.

3.2 Protected Resources Regulations

Longline and drift gillnet vessels encounter endangered and threatened species of sea turtles and marine mammals while targeting HMS. Longline vessels also encounter a number of sea birds, including the endangered short-tailed albatross. Endangered and threatened marine species are protected through a number of federal laws, including the Endangered Species Act (ESA) and the Marine Mammal Protection Act (MMPA). The HMS FMP final rule adopted measures to minimize interactions of HMS gears with protected species and to ensure that the fisheries are operating consistent with federal law. These measures include time and area closures, gear requirements, and safe handling and release techniques for protected seabirds and sea turtles. Refer to 50 CFR 660.712, .713, .720 and 50 CFR 229.31 and 223.206 for the complete list and text of the regulations.

Impacts to protected resources were analyzed as part of the ESA section 7 consultation and 2004 biological opinion (BO) on the HMS FMP. The BO included an Incidental Take Statement (ITS) with anticipated mortalities and entanglements of ESA listed marine mammals and sea turtles that are likely to interact with the drift gillnet and longline vessels targeting HMS species (see Table 3-2).

Table 3-2. Anticipated incidental takes of listed species in the HMS fisheries.

Species	Estimated Entanglement	Estimated Mortalities	Conditions Resulting in Take
Fin whale	4 in 3 years	2 in 3 years	
Humpback whale	4 in 3 years	0	
Sperm whale	4 in 3 years	2 in 3 years	
Green turtle	4	1	SSTs in fishing area similar to Nov 99
Leatherback turtle	3	2	
Loggerhead turtle	5	2	Only in El Niño years
Olive ridley turtle	4	1	SSTs in fishing area similar to Nov 99

Note: SST – sea surface temperature.

Except where noted, the anticipated mortalities are annual estimates. Takes of listed marine mammals are rare events and are calculated over a three-year time period. Takes of green, olive ridley and loggerhead sea turtles are uncommon except under certain environmental conditions (e.g., El Niño or higher than usual sea surface temperatures) when turtles may move into the areas of drift gillnet fishing.

3.2.1 Drift Gillnet Fishery

The HMS FMP final rule contains measures to protect marine mammals and sea turtles that may interact with the drift gillnet fishery. A suite of time and area drift gillnet closures to protect marine mammals in the U.S. EEZ were adopted into the HMS FMP (see 50 CFR 660.713). Additional protections for marine mammals include the use of pingers and extenders as specified in the Pacific Offshore Cetacean Take Reduction Plan, found at 50 CFR 229.31.

The HMS FMP includes a time and area closure for the drift gillnet fishery from August 15th to November 15th in the area north of Point Conception to approximately central Oregon to protect endangered leatherback sea turtles. In addition, drift gillnet fishing is prohibited in an area south of Pt. Conception during declared El Niño events to protect loggerhead sea turtles. See 50 CFR 660.713 (c) for specific areas and terms of the closures. Drift gillnet fishing is also prohibited north of 46°16' N. latitude (Washington coast) to address bycatch of sea turtles and marine mammals, and to minimize incidental catch of thresher shark.

3.2.2 Shallow Longline Fishery

The HMS FMP final rule prohibits the use of shallow longlines targeting HMS within the HMS FMP management area. This rule provides protection for threatened loggerhead and endangered leatherback sea turtles. The rule also details proper handling and release requirements for incidentally captured sea turtles and seabirds, requires vessel monitoring systems (VMS) on vessels if requested to carry one by NMFS Office of Law Enforcement, and requires vessel owners and operators to attend a NMFS protected species workshop. Complete details are found at 50 CFR 660.712 and 223.206. They are also posted on the NMFS Southwest Region website.

3.3 International Regulatory Aspects of the HMS FMP

Management of HMS fisheries is complicated by the wide-ranging behavior of the stocks and the many jurisdictions that are involved. The fish are distributed throughout the Pacific Ocean and vessels from the U.S. and many other nations harvest them. Effective management of the stocks throughout their ranges requires international cooperation. The HMS FMP and associated fisheries are affected by international regulations, primarily resolutions enacted by the Inter-American Tropical Tuna Commission (IATTC), but also by other regional fisheries management organizations and treaties. These include the recently formed Western and Central Pacific Fisheries Commission (WCPFC) and the U.S.-Canada Albacore Treaty.

3.3.1 The Inter-American Tropical Tuna Commission

The IATTC is an international convention that was established in 1950 for the conservation and management of fisheries for tunas, tuna-like species, and other species of fish taken incidentally by tuna-fishing vessels in the EPO. There are 14 member nations to the IATTC Convention: Costa Rica, Ecuador, El Salvador, France, Guatemala, Japan, Mexico, Nicaragua, Panama, Peru, Spain, the United States, Vanuatu, and Venezuela. Canada, China, the European Union, Honduras, Korea, and Chinese Taipei are cooperating non-parties or cooperating fishing entities.

The IATTC has a variety of responsibilities, including the scientific study of tunas and tuna-like species, recommending conservation and management measures, and implementing programs to reduce bycatch. The Tuna Convention Act of 1950 provides limited federal authority to regulate activities of U.S. fishing vessels in the eastern Pacific Ocean. Under this authority, NMFS promulgates regulations to implement recommendations of the IATTC that have been approved by the U.S. Department of State. The HMS FMP provides a mechanism that could be used to implement or supplement recommendations of the IATTC or other international fishery management bodies, particularly for U.S. fisheries based on the West Coast.

Under the Agreement on the International Dolphin Conservation Program, the IATTC has significant responsibilities for the implementation of the International Dolphin Conservation Program. More information on the IATTC and the current resolutions can be found at www.IATTC.org.

3.3.1.1 Summary of IATTC Resolutions With Implications for the HMS FMP

IATTC Resolution C-05-02 on Northern Albacore Tuna

The Resolution on Northern Albacore Tuna passed at the June 2005 meeting in Spain and calls upon nations to not increase the total level of fishing effort for North Pacific albacore tuna in the EPO. Within this Resolution nations will need to report their catches of North Pacific albacore tuna by gear type to the IATTC every six months. This Resolution calls upon the WCPFC to consider taking such action as may be necessary to ensure the effective conservation and management of North Pacific albacore tuna throughout its range and to work in close concert with the IATTC.

IATTC Resolution C-04-09 on Tuna Conservation Measures

The Resolution on Tuna Conservation Measures was adopted in June 2004, establishing a multi-annual program on the conservation of tuna in the EPO for 2004, 2005, and 2006. The resolution includes conservation measures for yellowfin, bigeye, and skipjack tunas. Purse seine vessels fishing in the EPO will be affected by these conservation measures. The conservation resolution includes a national choice of one of two possible six week closures of the Convention Area. The possible choices are either a six-week closure in the summer or winter. Longline vessels fishing for bigeye tuna will be restricted to a national catch not to exceed their national catch for the year 2001. The 2004 conservation resolution introduced a precedent-setting multi-year management framework with a review of the stock(s) response in 2005 and 2006. The multi-annual plan allows the industry to plan and minimize economic impacts. Pole-and-line and sportfishing vessels are not subject to this resolution. Also, members of the IATTC agreed to compliance measure prohibiting landings, transshipments, and commercial transactions involving tunas caught in contravention of the conservation measures in this resolution.

IATTC Resolution C-05-03 on the Conservation of Sharks Caught in Association with Fisheries in the Eastern Pacific Ocean

The Resolution on the Conservation of Sharks passed at the June 2005 meeting in Spain banning the practice of shark finning. The resolution mandates shark data collection and assessment programs while encouraging research into shark nursery areas and ways to avoid incidental bycatch of sharks. The resolution, co-sponsored by the United States, the European Union, Japan, and Nicaragua, calls upon nations to implement National Plans of Action for Shark Conservation in accordance with the United Nations Food and Agricultural Organization 1999 International Plan of Action for Sharks.

IATTC Resolution C-04-05 (Revised) on Bycatch

The IATTC adopted resolutions pertaining to bycatch in 2000, 2001, and 2002. The current revised resolution on bycatch was passed at the 2005 meeting with the intent to consolidate the operative parts of the earlier resolutions into one comprehensive resolution on bycatch. The revised resolution on bycatch continues to include full retention of juvenile tunas and non-target species. The revised resolution was extended until January 2007, with the addition of a review of compliance on the full retention of juvenile tunas. This compliance review will take place in the Permanent Working Group on Compliance in 2006.

3.3.2 Western and Central Pacific Fishery Commission

The international Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean entered into force on April 19, 2004. The Convention establishes a Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and

Central Pacific Ocean, now more commonly referred to as the Western and Central Pacific Fishery Commission. Initial staffing for the Commission is in progress at its site in Pohnpei, Federated States of Micronesia. A noteworthy aspect of the Convention is the fact that it will exercise management control into the high seas zones outside national EEZs in contrast to some other regional fishery management organizations.

3.3.3 The U.S.-Canada Albacore Treaty

The U.S.-Canada Albacore Treaty is a 1981 agreement between the governments of Canada and the United States, amended in 2002, and codified by law in April 2004 (69 FR 23715). It allows U.S. vessels to fish for albacore in Canadian waters seaward of 12 miles from shore and Canadian vessels to fish for albacore in U.S. waters seaward of 12 miles from shore. The Treaty also allows Canadian vessels to use certain U.S. ports to obtain supplies and services and to land fish, and it allows U.S. vessels to use certain Canadian ports for the same purposes. The Treaty also calls for exchange of fisheries data between the governments of the two nations.

Regulations as part of the treaty establish vessel marking, record keeping, and reporting requirements for U.S. albacore tuna fishing vessel operators and for Canadian albacore tuna fishing vessel operators when they are fishing in U.S. waters. In addition, the U.S. and Canada have agreed to establish limits on reciprocal fishing access so that, over a period of three years, the number of fishing vessels that will be permitted to fish under the Treaty will decrease. The fishing access limit can be set by each nation as either a maximum number of individual vessels from one nation that can fish in waters of the other nation for up to four months in a single year, or a maximum number of vessel months that vessels of one nation can spend in the waters of the other nation in a single year.

The mandatory reporting requirement calls for United States albacore fishing vessels to report to ShipCom, LLC, the company selected to accept hail-in, hail-out messages, 24 hours before entering Canadian waters and within 24 hours after leaving Canadian waters. In addition, Canadian regulations require vessels to report to the Canadian Coast Guard at least 24 hours prior to entering Canadian waters and 72 hours before leaving Canadian waters.

4.0 STATISTICAL SUMMARIES OF CATCH, REVENUE, AND EFFORT

4.1 Overview: Pacific Coast Commercial Highly Migratory Species Landings and Revenues

Table 4-1. Pacific Coast commercial HMS landings, revenues, and average prices by species, 2003-2004.

	2003			2004		
Species	Landings (round mt)	Ex-vessel revenue ($1000)	Average price ($/ round lb)	Landings (round mt)	Ex-vessel revenue ($1000)	Average price ($/ round lb)
Tunas						
Albacore	16,670	$24,477	$0.67	14,469	$27,346	$0.86
Yellowfin	465	$451	$0.44	488	$447	$0.42
Skipjack	349	$160	$0.21	307	$109	$0.16
Bigeye	35	$263	$3.41	22	$148	$3.05
Bluefin	36	$76	$0.96	38	$38	$0.46
Unspecified Tuna	<0.5	$0		9	$55	$2.77
Tunas subtotal	**17,555**	**$25,427**	**$0.66**	**15,333**	**$28,143**	**$0.83**
Swordfish	**2,135**	**$7,850**	**$1.67**	**1,185**	**$4,830**	**$1.85**
Sharks						
Common Thresher	301	$488	$0.74	114	$197	$0.78
Pelagic Thresher	4	$3	$0.32	2	$3	$0.57
Bigeye Thresher	6	$4	$0.29	5	$4	$0.37
Shortfin Mako	70	$116	$0.75	53	$98	$0.84
Blue	1	$1	$0.39	1	$1	$0.44
Sharks subtotal	**382**	**$611**	**$0.73**	**175**	**$302**	**$0.78**
Dorado	**6**	**$10**	**$0.78**	**1**	**$6**	**$2.56**
Total HMS	**20,078**	**$33,899**	**$0.77**	**16,694**	**$33,281**	**$0.90**

Interpretation: Table 4-1 shows the total Pacific Coast commercial HMS catch was 16.7 thousand metric tons in 2004, down 17% (-3.4 thousand metric tons) from 2003. Tunas represented 92% of the total catch. Although albacore tuna catch was down 13% from the catch observed in the previous year, it was nonetheless the largest component of tuna catch, representing about 94% of the total. Yellowfin tuna was the next largest component of tuna catch.

Swordfish were the category with the next largest share of landings behind tuna at 7% of the total weight. Swordfish landings were down by 44% (-950 metric tons) from 2003 to 2004. The common thresher shark comprised the largest component of the sharks category in 2004. Total commercial sharks landings by weight decreased by 54% from 2003 to 2004.

Total current dollar Pacific coast commercial HMS ex-vessel revenue of $33.3 million decreased slightly from $33.9 million in the previous year, or a decrease of 1.8%. Tunas comprised 85% of the 2004 revenue total. Albacore generated by far the most important component of revenue for any single species, at $27.3 million. Swordfish was the next highest contributor to total revenue at $4.8 million.

The overall average Pacific coast commercial HMS fish price per pound increased from $0.77 in 2003 to $0.90 in 2004. The average price for tuna was 10% higher in 2003. The overall increase in price was largely driven by an increase in the price of albacore from $0.67 in 2003 to $0.86 in 2004. The increase

in overall average price was nearly sufficient to offset the effect on revenue of the 17% drop in landings by weight.

Source and Calculations: The data were extracted from PacFIN in August 2005, and represent the latest two years of current dollar revenues and landings data in the tables which accompany Figure 4-1. Landings in pounds were converted to round weight in metric tons by multiplying the landed weights by the conversion factors in each fish ticket line then dividing by 2,204.6. Revenues were computed for each species as the sum total of landed weights in pounds multiplied by the prices per pound in each fish ticket line. Aquaculture fish ticket / fish ticket line information is excluded from the data. Average prices are estimated as revenue divided by round pounds, where the latter are metric tons multiplied by 2,204.6. Estimated averages are subject to rounding error for categories with small revenues or landings.

Table 4-2. Pacific Coast commercial HMS landings, revenues, and average price by fishery, 2003-2004.

	2003			2004		
Fishery	Landings (round mt)	Ex-vessel revenue ($1000)	Average price ($/ round lb)	Landings (round mt)	Ex-vessel revenue ($1000)	Average price ($/ round lb)
Surface Hook-and-line	13,482	$19,677	$0.66	13,392	$24,470	$0.83
Drift Gillnet	584	$1,718	$1.33	335	$1,227	$1.66
Harpoon	107	$841	$3.57	70	$673	$4.36
Pelagic longline	1,854	$6,148	$1.50	951	$3,439	$1.64
Purse seine	862	$626	$0.33	791	$545	$0.31
Total HMS	**16,889**	**$29,009**	**$0.78**	**15,539**	**$30,355**	**$0.89**

Interpretation: Table 4-2 shows the total Pacific Coast commercial HMS catch for the indicated fisheries was 15.5 thousand metric tons in 2004, down 8% (-1.4 thousand metric tons) from 2003. The surface hook-and-line fishery represented 86% of the total catch.

Total current dollar Pacific Coast commercial HMS ex-vessel revenue for these fisheries of $30.4 million increased from $29.0 million in the previous year, for an increase of 4.6%. The overall average Pacific coast commercial HMS fish price for these fisheries increased from $0.78 in 2003 to $0.89 in 2004. The increase in average price was more than sufficient to offset the effect of less catch by weight on total revenues.

Source and Calculations: The data were extracted from PacFIN in October 2005, and represent the latest two years of current dollar revenues and landings data in the tables displayed in Sections 4.2.1 and 4.2.2. Landings in pounds were converted to round weight in metric tons by multiplying the landed weights by the conversion factors in each fish ticket line then dividing by 2,204.6. Revenues were computed for each species as the sum total of landed weights in pounds multiplied by the prices per pound in each fish ticket line. Aquaculture fish ticket / fish ticket line information is excluded from the data. Average prices are estimated as revenue divided by round pounds, where the latter are metric tons multiplied by 2,204.6. Estimated averages are subject to rounding error for categories with small revenues or landings.

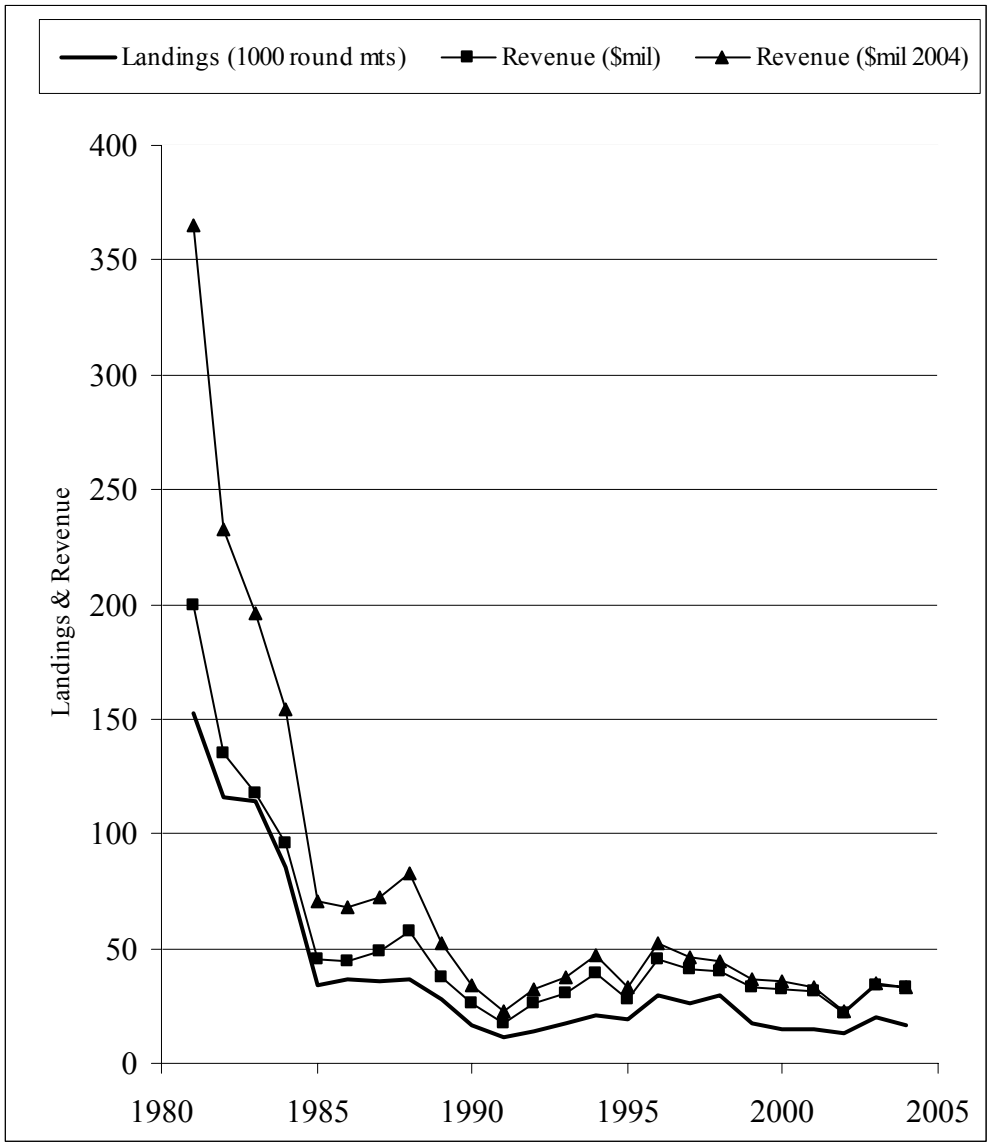

Figure 4-1. Pacific Coast commercial HMS landings and revenues, 1981-2004.

Interpretation: Figure 4-1 shows aggregate Pacific Coast HMS commercial landings in thousands of round metric tons against aggregate revenues in millions of both current and 2004 dollars from 1981 through 2004, and Tables 4.3.a – 4.3.d below show commercial landings and revenues by species. Data for the graph are displayed in the far right columns of the three accompanying tables. As can be seen by examining the data in Tables 4-3.b – 4-3.d, tuna species were the most important component of catch and revenue at the beginning of the 1980s, and species other than albacore showed precipitous decline over the early part of the decade.

The most striking feature is a precipitous drop in both commercial landings and revenues over the period from 1981 through 1985. Landings fell from a level of about 150,000 metric tons in 1981 to a level which remained permanently below 50,000 metric tons from 1985 onwards. Revenues, in real (2004) dollars, fell from over $365 million in 1981 to a level permanently below $100 million after 1984. The

drops in landings and revenues are primarily explained by the substantial decline in tuna landings during the 1980s for species other than albacore.

Source and Calculations: The data were extracted from PacFIN. Landings in pounds were converted to round weight in metric tons by multiplying the landed weights by the conversion factors in each fish ticket line then dividing by 2,204.6. Current dollar revenues were computed as the sum total of landed weights in pounds multiplied by the prices per pound in each fish ticket line. Aquaculture fish ticket / fish ticket line information is excluded from the data. Revenues in current dollars were adjusted to 2004 dollars using the implicit GDP deflator as calculated by the Bureau of Economic Analysis. Data for the graph were calculated by summing revenues and landings across all species in each year.

Table 4-3.a. Pacific Coast commercial HMS landings and revenues, 1981-2004.

Year	Landings (1000 round mts)	Revenue ($mils)	Revenue (2004 $mil)
1981	152	$200	$365
1982	116	$135	$232
1983	115	$118	$196
1984	85	$96	$154
1985	34	$46	$71
1986	37	$45	$68
1987	36	$49	$72
1988	37	$58	$83
1989	28	$38	$52
1990	17	$26	$34
1991	11	$17	$22
1992	14	$26	$33
1993	17	$31	$37
1994	21	$39	$47
1995	19	$28	$33
1996	29	$46	$53
1997	26	$41	$46
1998	29	$40	$45
1999	18	$33	$36
2000	14	$33	$35
2001	15	$31	$33
2002	13	$22	$23
2003	20	$34	$35
2004	17	$33	$33

Table 4-3.b. Pacific Coast commercial landings of HMS by all gears, 1981-2004.

	Landings (round mt)													
	Tunas							Sharks						
Year	Albacore	Yellowfin	Skipjack	Bigeye	Bluefin	Unspecified Tuna	Swordfish	Common Thresher	Pelagic Thresher	Bigeye Thresher	Shortfin Mako	Blue	Dorado	Total
1981	13,712	76,091	57,869	1,168	868	40	749	1,521			182	92	4	152,296
1982	5,410	61,769	41,904	968	2,404	51	1,112	1,848		28	351	27	1	115,873
1983	9,574	55,741	44,995	21	764	56	1,758	1,331	9	96	217	7	1	114,570
1984	12,654	35,063	31,251	126	635	1,014	2,890	1,279	9	57	160	2	4	85,144
1985	7,301	15,025	2,977	7	3,254	468	3,418	1,190	<0.5	95	149	1	<0.5	33,885
1986	5,243	21,517	1,361	29	4,731	143	2,530	974	<0.5	48	312	2	2	36,892
1987	3,160	23,201	5,724	50	823	129	1,803	562	2	20	403	2	<0.5	35,879
1988	4,908	19,520	8,863	6	804	11	1,636	500	1	9	322	3	<0.5	36,583
1989	2,214	17,615	4,505	1	1,019	77	1,357	504	<0.5	17	255	6	<0.5	27,570
1990	3,030	8,509	2,256	2	925	46	1,236	357	1	31	373	20	1	16,787
1991	1,676	4,178	3,407	7	104	11	1,029	584		32	219	1	<0.5	11,248
1992	4,899	3,350	2,586	7	1,087	10	1,546	292	<0.5	22	142	1	3	13,945
1993	6,151	3,795	4,539	26	559	16	1,771	275	1	44	122	<0.5	17	17,316
1994	10,686	5,056	2,111	47	916	33	1,700	330	<0.5	37	128	12	41	21,097
1995	6,528	3,038	7,037	49	714	1	1,161	270	5	31	95	5	5	18,939
1996	14,173	3,347	5,455	62	4,688	3	1,191	319	1	20	96	1	10	29,366
1997	11,292	4,775	6,070	82	2,251	11	1,459	320	35	32	132	1	5	26,465
1998	13,801	5,799	5,846	53	1,949	12	1,408	361	2	11	100	3	3	29,348
1999	9,768	1,353	3,759	106	186	12	2,021	320	10	5	63	<0.5	17	17,620
2000	9,042	1,148	780	87	312	1	2,653	295	3	5	80	1	43	14,450
2001	11,194	655	58	53	196	1	2,195	373	2	2	46	2	16	14,793
2002	10,029	544	236	10	11	2	1,714	301	2		82	41	<0.5	12,972
2003	16,670	465	349	35	36	<0.5	2,135	301	4	6	70	1	6	20,078
2004	14,469	488	307	22	38	9	1,185	114	2	5	53	1	1	16,694

Source: PacFIN, extracted July 13, 2005.
Landings in pounds are converted to round weight in mt by multiplying the landed weights by the conversion factors in each fish ticket line and then dividing by 2,204.6.
Aquaculture fish ticket/fish ticket line info is excluded.

Table 4-3.c. Pacific Coast nominal commercial ex-vessel revenues from HMS landings by all gears, 1981-2004.

	Revenues ($)													
	Tunas							Sharks						
Year	Albacore	Yellowfin	Skipjack	Bigeye	Bluefin	Unspecified Tuna	Swordfish	Common Thresher	Pelagic Thresher	Bigeye Thresher	Shortfin Mako	Blue	Dorado	Total
1981	26,525,453	98,724,677	66,331,030	1,569,755	1,239,060	72,694	3,355,010	1,477,222			162,347	59,064	2,566	199,518,878
1982	8,032,319	74,589,361	40,609,429	1,208,147	2,690,102	98,923	5,115,995	1,980,592		15,169	339,130	18,808	956	134,698,931
1983	12,159,819	59,161,123	36,757,179	45,946	1,062,909	96,258	6,786,595	1,474,162	8,449	91,151	229,831	4,566	695	117,878,683
1984	17,199,730	37,038,532	24,790,708	174,431	904,904	2,590,289	11,647,973	1,642,439	7,690	47,104	189,731	2,457	4,273	96,240,261
1985	8,292,983	14,690,273	2,118,170	17,693	2,819,416	2,053,110	13,412,222	1,816,241	716	95,812	193,384	2,232	377	45,512,629
1986	6,186,180	17,642,348	904,609	90,685	4,636,698	198,207	12,723,397	1,690,452	194	66,710	428,366	1,318	757	44,569,921
1987	5,117,671	23,301,233	4,543,245	176,504	2,047,068	448,477	11,124,210	1,183,771	1,849	22,074	714,733	1,853	357	48,683,045
1988	9,169,396	25,580,895	9,467,036	26,156	2,070,411	80,548	9,719,363	980,384	821	9,803	650,031	2,188	527	57,757,559
1989	3,791,347	18,811,566	3,969,322	2,394	1,208,511	127,261	8,275,636	944,280	149	24,616	552,201	3,458	429	37,711,170
1990	5,623,397	8,533,332	1,922,827	8,467	1,139,952	56,750	7,146,437	638,611	1,682	34,688	740,001	10,178	1,948	25,858,270
1991	2,831,679	3,996,409	2,649,335	42,810	116,520	21,161	6,336,099	968,065		24,865	415,108	929	1,142	17,404,122
1992	11,506,367	3,616,875	1,412,867	44,731	1,129,709	21,279	7,561,338	464,042	602	14,591	231,017	1,788	6,239	26,011,445
1993	11,665,487	4,821,735	3,282,778	211,513	753,109	72,678	8,981,948	458,634	463	28,190	221,626	608	42,223	30,540,992
1994	20,070,078	4,522,313	1,751,242	307,147	1,674,099	55,245	9,596,037	584,318	42	33,478	247,068	16,057	74,889	38,932,013
1995	11,570,350	3,044,639	4,753,240	258,727	1,057,948	5,136	6,567,289	477,755	8,777	24,896	165,215	2,796	5,479	27,942,247
1996	27,222,294	3,231,332	3,986,113	260,306	4,035,455	28,296	6,063,837	603,054	1,557	17,745	166,763	587	9,815	45,627,154
1997	19,923,890	4,991,070	5,504,526	359,780	2,773,705	21,895	6,147,930	591,268	62,496	34,768	227,432	278	10,858	40,649,896
1998	18,733,198	5,862,107	5,213,131	271,919	2,965,539	61,678	5,981,512	625,234	2,584	9,428	176,124	5,977	10,492	39,918,923
1999	17,762,248	1,468,209	2,748,208	644,775	1,060,785	60,572	8,412,295	617,397	18,424	5,876	110,482	73	47,854	32,957,198
2000	17,156,838	1,294,367	483,242	579,384	577,458	2,298	11,779,652	587,718	2,738	4,636	132,992	867	63,293	32,665,483
2001	20,715,644	465,558	33,633	320,855	473,821	3,069	8,696,689	595,542	2,767	8,428	75,780	1,520	19,397	31,412,703
2002	14,296,619	588,677	128,245	87,304	43,512	6,325	6,374,092	503,487	1,946		124,521	18,659	725	22,174,112
2003	24,477,172	451,273	159,961	262,768	76,079	21	7,850,314	487,783	2,814	3,779	115,685	853	10,370	33,898,872
2004	27,346,019	446,571	109,254	147,696	38,312	54,879	4,830,297	196,645	2,500	4,060	98,279	972	5,637	33,281,121

Source: PacFIN, extracted August 2, 2005.
Additional processing info:
Landed weights in pounds are multiplied by the prices per pound in each fish ticket line.
Aquaculture fish ticket/fish ticket line info is excluded.

Table 4-3.d. Pacific Coast real commercial ex-vessel revenues (2004 $) from HMS landings by all gears, 1981-2004.

	Revenues (2004 $)													
	Tunas							Sharks						
Year	Albacore	Yellowfin	Skipjack	Bigeye	Bluefin	Unspecified Tuna	Swordfish	Common Thresher	Pelagic Thresher	Bigeye Thresher	Shortfin Mako	Blue	Dorado	Total
1981	48,563,668	180,748,370	121,441,020	2,873,958	2,268,512	133,090	6,142,462	2,704,546			297,231	108,136	4,699	365,285,692
1982	13,860,188	128,707,851	70,073,698	2,084,720	4,641,913	170,697	8,827,917	3,417,616		26,174	585,186	32,454	1,649	232,430,063
1983	20,184,066	98,201,457	61,013,186	76,265	1,764,321	159,779	11,265,058	2,446,959	14,025	151,302	381,497	7,580	1,154	195,666,649
1984	27,516,772	59,255,630	39,661,102	279,061	1,447,700	4,144,042	18,634,864	2,627,636	12,302	75,358	303,539	3,931	6,835	153,968,772
1985	12,875,757	22,808,243	3,288,689	27,470	4,377,450	3,187,676	20,823,931	2,819,911	1,112	148,759	300,249	3,465	585	70,663,297
1986	9,397,524	26,800,769	1,374,206	137,761	7,043,681	301,099	19,328,314	2,567,992	295	101,340	650,738	2,002	1,150	67,706,871
1987	7,567,646	34,456,194	6,718,225	261,002	3,027,058	663,176	16,449,685	1,750,475	2,734	32,642	1,056,896	2,740	528	71,989,001
1988	13,111,580	36,578,848	13,537,183	37,401	2,960,540	115,177	13,897,992	1,401,879	1,174	14,018	929,498	3,129	753	82,589,172
1989	5,223,840	25,919,185	5,469,061	3,299	1,665,126	175,344	11,402,439	1,301,059	205	33,917	760,841	4,765	591	51,959,672
1990	7,459,978	11,320,287	2,550,816	11,232	1,512,256	75,284	9,480,438	847,180	2,231	46,016	981,683	13,503	2,584	34,303,488
1991	3,629,535	5,122,439	3,395,814	54,873	149,350	27,123	8,121,363	1,240,828		31,871	532,069	1,191	1,464	22,307,920
1992	14,417,024	4,531,802	1,770,266	56,046	1,415,481	26,661	9,474,058	581,427	755	18,282	289,455	2,240	7,817	32,591,314
1993	14,286,299	5,905,003	4,020,299	259,033	922,306	89,007	10,999,865	561,672	567	34,524	271,418	744	51,709	37,402,446
1994	24,067,683	5,423,078	2,100,059	368,325	2,007,550	66,249	11,507,398	700,704	50	40,146	296,280	19,255	89,805	46,686,582
1995	13,596,726	3,577,863	5,585,700	304,039	1,243,232	6,036	7,717,452	561,427	10,314	29,256	194,150	3,286	6,439	32,835,920
1996	31,394,743	3,726,609	4,597,077	300,204	4,653,982	32,632	6,993,261	695,486	1,796	20,465	192,323	677	11,320	52,620,575
1997	22,601,527	5,661,836	6,244,298	408,132	3,146,473	24,838	6,974,171	670,730	70,895	39,440	257,997	316	12,318	46,112,971
1998	21,017,758	6,577,005	5,848,886	305,080	3,327,193	69,199	6,710,972	701,482	2,899	10,578	197,603	6,706	11,771	44,787,132
1999	19,644,137	1,623,764	3,039,377	713,088	1,173,174	66,990	9,303,567	682,809	20,376	6,498	122,187	81	52,924	36,448,972
2000	18,570,047	1,400,984	523,047	627,108	625,023	2,488	12,749,942	636,129	2,963	5,018	143,946	938	68,506	35,356,139
2001	21,896,690	492,101	35,550	339,148	500,834	3,243	9,192,507	629,495	2,925	8,909	80,101	1,606	20,503	33,203,612
2002	14,865,918	612,118	133,352	90,780	45,244	6,577	6,627,912	523,536	2,023		129,480	19,402	753	23,057,095
2003	24,994,204	460,806	163,340	268,319	77,686	21	8,016,137	498,087	2,873	3,859	118,128	871	10,590	34,614,921
2004	27,346,019	446,571	109,254	147,696	38,312	54,879	4,830,297	196,645	2,500	4,060	98,279	972	5,637	33,281,121

Source: PacFIN, extracted August 2, 2005.
Additional processing info:
Real values are calculated to eliminate the effects of inflation by dividing current nominal values by the current year GDP implicit price deflator, with a base year of 2004. Landed weights in pounds are multiplied by the prices per pound in each fish ticket line and then divided by the corresponding deflator. Deflators were downloaded from the Bureau of Economic Analysis on June 8, 2005. Aquaculture fish ticket/fish ticket line info is excluded.

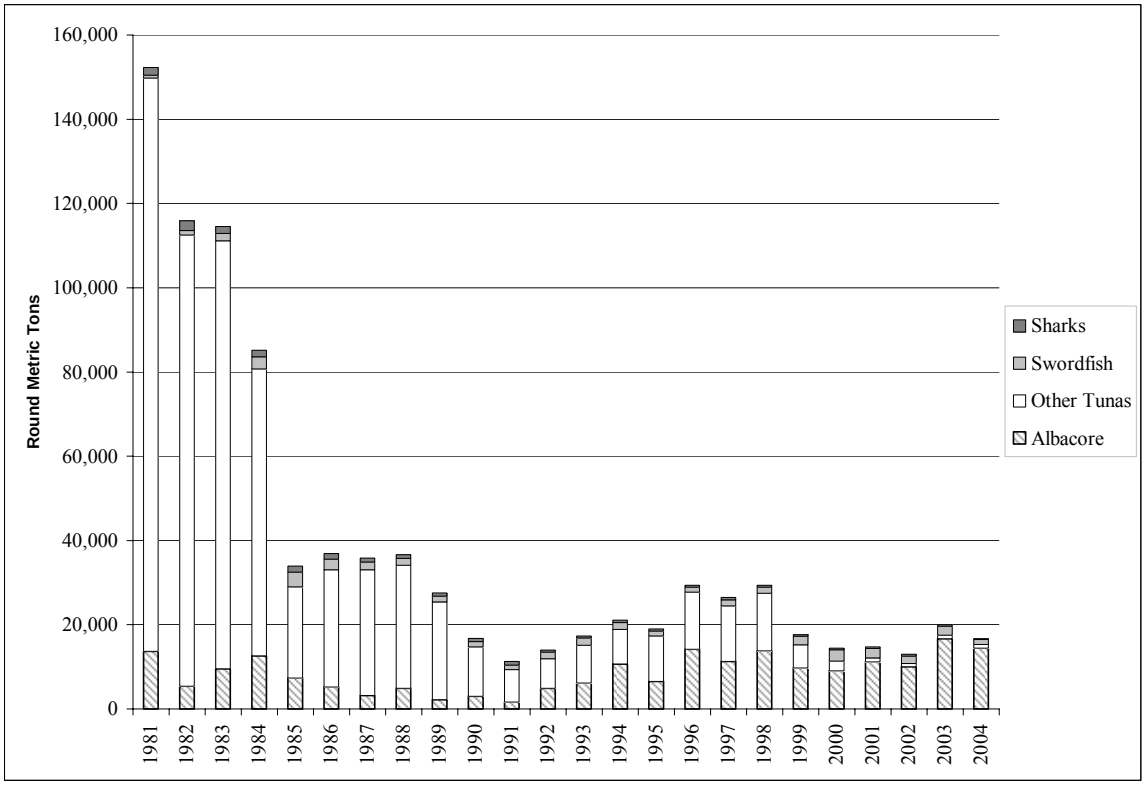

Figure 4-2. Pacific Coast commercial landings of albacore, other tunas, swordfish, and sharks, 1981-2004.

Interpretation: Figure 4-2 shows Pacific Coast HMS commercial landings in round metric tons grouped into categories of similar species. Table 4-4 shows the numeric values for the landings in metric tons.

The principal species targeted are the tunas, with albacore gradually supplanting other tunas as a share of the catch over the period from 1981 through 2004. Swordfish followed by sharks comprise a far smaller share of recent total landings, with a steadily declining share over time.

The most striking feature is a large drop in aggregate commercial landings from a level of about 150,000 mt in 1981 to a level which stabilized near 20,000 mt by 1990. The drop is primarily explained by the substantial decline in tuna landings during the 1980s for species other than albacore.

Source and Calculations: The data were extracted from PacFIN. They represent a portion of the Pacific Coast commercial landings by species in Table 4-3.b. Landings in pounds were converted to round weight in metric tons by multiplying the landed weights by the conversion factors in each fish ticket line then dividing by 2,204.6. Aquaculture fish ticket / fish ticket line information is excluded from the data.

Table 4-4. Pacific Coast commercial landings of albacore, other tunas, swordfish, and sharks, 1981-2004.

Year	Landings (round mt)				
	Albacore	Other Tunas	Swordfish	Sharks	Total
1981	13,712	136,036	749	1,795	152,292
1982	5,410	107,096	1,112	2,254	115,872
1983	9,574	101,577	1,758	1,660	114,569
1984	12,654	68,089	2,890	1,507	85,140
1985	7,301	21,731	3,418	1,435	33,885
1986	5,243	27,781	2,530	1,336	36,890
1987	3,160	29,927	1,803	989	35,879
1988	4,908	29,204	1,636	835	36,583
1989	2,214	23,217	1,357	782	27,570
1990	3,030	11,738	1,236	782	16,786
1991	1,676	7,707	1,029	836	11,248
1992	4,899	7,040	1,546	457	13,942
1993	6,151	8,935	1,771	442	17,299
1994	10,686	8,163	1,700	507	21,056
1995	6,528	10,839	1,161	406	18,934
1996	14,173	13,555	1,191	437	29,356
1997	11,292	13,189	1,459	520	26,460
1998	13,801	13,659	1,408	477	29,345
1999	9,768	5,416	2,021	398	17,603
2000	9,042	2,328	2,653	384	14,407
2001	11,194	963	2,195	425	14,777
2002	10,029	803	1,714	426	12,972
2003	16,670	885	2,135	382	20,072
2004	14,469	864	1,185	175	16,693

Source: PacFIN, extracted July 13, 2005.

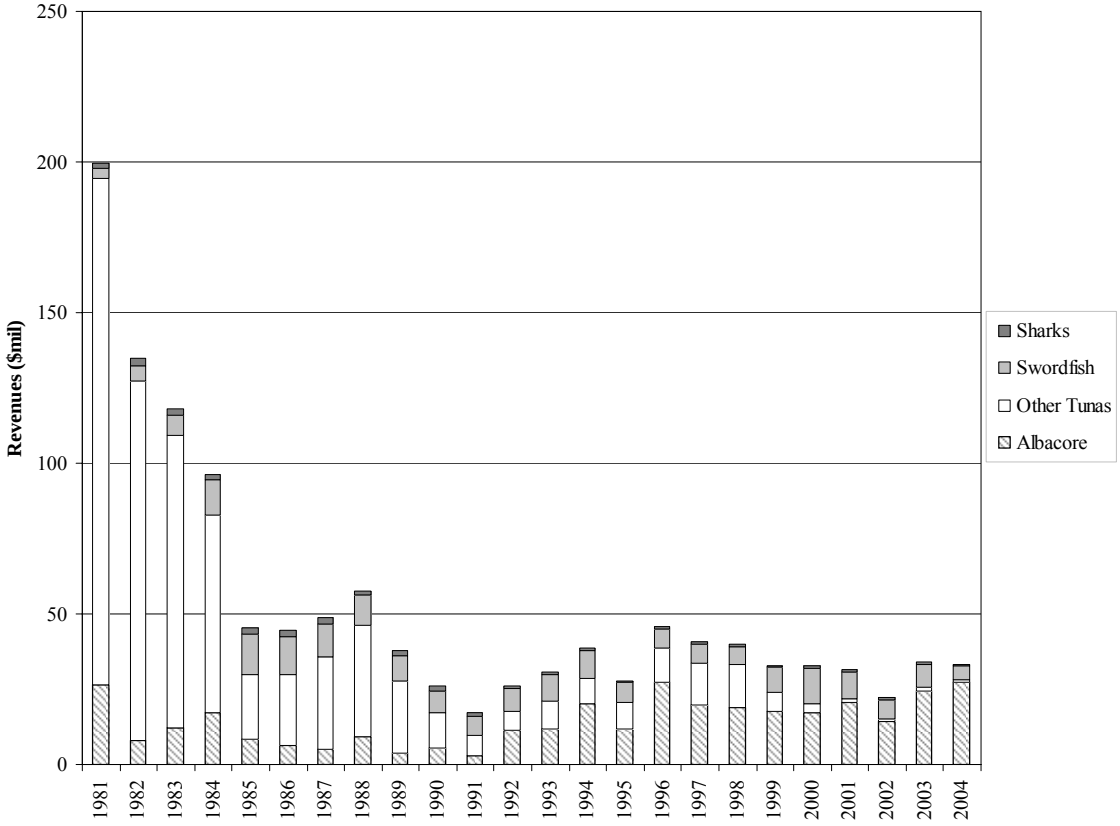

Figure 4-3. Pacific Coast commercial revenues for albacore, other tunas, swordfish, and sharks, 1981-2004.

Interpretation: Figure 4-3 shows Pacific Coast HMS commercial revenues in current dollars grouped into categories of similar species. Table 4-5 shows the numeric values for the revenues.

The principal constituent of revenues is the tunas, with albacore gradually supplanting other tunas as a share of the revenues over the period from 1981 through 2004.

Source and Calculations: The data were extracted from PacFIN. Aquaculture fish ticket / fish ticket line information is excluded from the data. Data were obtained by copying from or summing across applicable columns of the Table 4-3.d, current dollar revenues by species. Current dollar revenues were computed as the sum total of landed weights in pounds multiplied by the prices per pound in each fish ticket line.

Table 4-5. Pacific Coast commercial revenues for albacore, other tunas, swordfish, and sharks, 1981-2004.

Year	Revenues ($)				
	Albacore	Other Tunas	Swordfish	Sharks	Total
1981	26,525,453	167,937,216	3,355,010	1,698,633	199,516,312
1982	8,032,319	119,195,962	5,115,995	2,353,699	134,697,975
1983	12,159,819	97,123,415	6,786,595	1,808,159	117,877,988
1984	17,199,730	65,498,864	11,647,973	1,889,421	96,235,988
1985	8,292,983	21,698,662	13,412,222	2,108,385	45,512,252
1986	6,186,180	23,472,547	12,723,397	2,187,040	44,569,164
1987	5,117,671	30,516,527	11,124,210	1,924,280	48,682,688
1988	9,169,396	37,225,046	9,719,363	1,643,227	57,757,032
1989	3,791,347	24,119,054	8,275,636	1,524,704	37,710,741
1990	5,623,397	11,661,328	7,146,437	1,425,160	25,856,322
1991	2,831,679	6,826,235	6,336,099	1,408,967	17,402,980
1992	11,506,367	6,225,461	7,561,338	712,040	26,005,206
1993	11,665,487	9,141,813	8,981,948	709,521	30,498,769
1994	20,070,078	8,310,046	9,596,037	880,963	38,857,124
1995	11,570,350	9,119,690	6,567,289	679,439	27,936,768
1996	27,222,294	11,541,502	6,063,837	789,706	45,617,339
1997	19,923,890	13,650,976	6,147,930	916,242	40,639,038
1998	18,733,198	14,374,374	5,981,512	819,347	39,908,431
1999	17,762,248	5,982,549	8,412,295	752,252	32,909,344
2000	17,156,838	2,936,749	11,779,652	728,951	32,602,190
2001	20,715,644	1,296,936	8,696,689	684,037	31,393,306
2002	14,296,619	854,063	6,374,092	648,613	22,173,387
2003	24,477,172	950,102	7,850,314	610,914	33,888,502
2004	27,346,019	796,712	4,830,297	302,456	33,275,484

Source: PacFIN, extracted August 2, 2005.

4.2 Pacific Coast Commercial HMS Landings, Revenues, and Species by Fishery

4.2.1 Pacific Coast Commercial HMS Landings by Fishery, 1981-2004

Interpretation: The following tables display Pacific Coast commercial HMS landings by fishery over the years 1981-2004 for the surface hook-and-line, drift gillnet, harpoon, pelagic longline, and purse seine fisheries, respectively.

Source and Calculations: The data were extracted from PacFIN. Landings in pounds were converted to round weight in metric tons by multiplying the landed weights by the conversion factors in each fish ticket line then dividing by 2,204.6. Aquaculture fish ticket / fish ticket line information is excluded from the data.

Table 4-6.a. Commercial landings (round mt) in the Pacific Coast albacore surface hook-and-line (troll and baitboat) fishery, 1981-2004.

Year	Albacore	Other Tunas	Swordfish	HMS Sharks	Dorado	Groundfish	Coastal Pelagics	Crab	Salmon	Other	Total
1981	13,421	14		<0.5	<0.5	4	2		37	1	13,479
1982	4,964	4	4	2	1	4	<0.5		3	<0.5	4,981
1983	3,877	3	3	1	<0.5	10	2		11	1	3,908
1984	7,025	6	<0.5	<0.5	<0.5	4	1		1	1	7,038
1985	6,184	2	9	4	<0.5	4	<0.5		1	1	6,205
1986	4,479	2	1	<0.5		20	<0.5	<0.5	2	<0.5	4,504
1987	2,486	<0.5	1	<0.5		1	1		1	1	2,491
1988	4,273	<0.5	13	2		1	<0.5		2	<0.5	4,291
1989	2,130	1	7	8	<0.5	9		<0.5	2	2	2,159
1990	2,926	<0.5	2	<0.5	<0.5	3	<0.5		1	1	2,933
1991	1,638	<0.5				<0.5		<0.5	1	<0.5	1,639
1992	4,613	1	13	2	<0.5	6			1	1	4,637
1993	5,701	18	90	5	9	4			3	1	5,831
1994	10,534	<0.5	1	<0.5	<0.5	1			<0.5	1	10,537
1995	6,404	1	1	<0.5	<0.5	<0.5	<0.5		8	1	6,415
1996	13,287	42	<0.5	<0.5		<0.5			10	1	13,340
1997	10,824	8	1	1	<0.5	5	<0.5		12	2	10,853
1998	12,610	116	4	3	<0.5	2	<0.5		5	2	12,742
1999	8,749	24	15	1	<0.5	1	<0.5		2	5	8,797
2000	8,057	2	22	<0.5	<0.5	1	<0.5		3	1	8,086
2001	10,217	10	<0.5	1	<0.5	3	<0.5		9	6	10,246
2002	9,311	2	2	<0.5	<0.5	<0.5	<0.5		7	5	9,327
2003	13,472	3		<0.5	<0.5	1	<0.5		4	2	13,482
2004	13,384	1		<0.5	<0.5	<0.5	<0.5		4	3	13,392

Source: PacFIN, extracted October 13, 2005.
Additional processing info:
Only fish tickets where at least 1 pound of albacore was landed for the albacore surface hook-and-line (troll and baitboat) fishery were used.
Landings in pounds are converted to round weight in mt by multiplying the landed weights by the conversion factors in each fish ticket line and then dividing by 2,204.6.
Canadian vessels were excluded by outer joining the fish ticket tables with the state vessel table and checking the "idtype."
Aquaculture fish ticket/fish ticket line info is excluded.

Table 4-6.b Commercial landings (round mt) in the Pacific Coast drift gillnet fishery, 1981-2004.

		Sharks					Tunas								
Year	Sword-fish	Common Thresher	Pelagic Thresher	Bigeye Thresher	Shortfin Mako	Blue	Albacore	Other	Dorado	Ground-fish	Coastal Pelagics	Crab	Salmon	Other	Total
1981	270	808			91	9		6		6	7			88	1,285
1982	208	634		13	125	1	5	10		5	2			14	1,017
1983	242	150		17	38		6	11		<0.5	7	<0.5		20	491
1984	286	95		2	11		10	4		5	<0.5			13	426
1985	197	110		2	15		7	<0.5		1	<0.5			13	345
1986	78	455		2	21		8	2		<0.5	<0.5			10	576
1987	6	94	<0.5	1	2		1	<0.5		2	<0.5			3	109
1988	1	81					4			<0.5				<0.5	86
1989		<0.5													<0.5
1990															
1991	51	8		4	2		<0.5	<0.5						2	67
1992	60	2		<0.5	5		1	1			<0.5			3	72
1993	162	16	<0.5	7	11		15	7		<0.5				10	228
1994	760	268	<0.5	32	70	<0.5	52	27	<0.5	4	2			113	1,328
1995	684	200	5	29	73	<0.5	31	30	<0.5	2	1	<0.5		92	1,147
1996	724	240	1	19	79	<0.5	63	41		1	6	<0.5		132	1,306
1997	663	249	34	27	114	<0.5	42	58	<0.5	1	4			108	1,300
1998	898	277	2	9	80	1	62	45	<0.5	2	2	<0.5		148	1,526
1999	593	152	7	4	46	<0.5	93	19		1	<0.5	<0.5		105	1,020
2000	631	155	3	3	52	<0.5	40	30	<0.5	2	2	<0.5		82	1,000
2001	351	273	1	<0.5	26		51	16		2	1			63	784
2002	298	216	2		59		14	4		3	1			71	668
2003	198	241	4	6	50	<0.5	8	22		1	1			53	584
2004	175	66	<0.5	5	23		10	9		2	1			44	335

Source: PacFIN, extracted September 27, 2005.
Note 1: There is no drift gillnet gear for Washington.
Note 2: Significant swordfish and shark landings by drift gillnet gear prior to 1994 have been mis-assigned to California entangling net, trammel net, several trawl, encircling net, set gillnet, and unknown gears, and therefore are not reported here.
Additional processing info:
Only fish tickets where at least 1 pound of swordfish or any HMS shark was landed for the drift gillnet fishery were used.
Landings in pounds are converted to round weight in mt by multiplying the landed weights by the conversion factors in each fish ticket line and then dividing by 2,204.6.
Aquaculture fish ticket/fish ticket line info is excluded.

Table 4-6.c. Commercial landings (round mt) in the Pacific Coast harpoon fishery, 1981-2004.

Year	Swordfish	HMS Sharks	Tunas		Dorado	Other	Total
			Albacore	Other			
1981	265	5	2	<0.5		5	277
1982	156	2		<0.5		<0.5	158
1983	58	1				43	102
1984	95	7	<0.5	<0.5		1	103
1985	210	1	<0.5			1	212
1986	236	1	<0.5			<0.5	237
1987	211	3	1	<0.5		40	255
1988	179	3	1			1	184
1989	54	1	<0.5			<0.5	55
1990	51	2		<0.5		<0.5	53
1991	16	1				<0.5	17
1992	74	3	<0.5	<0.5		1	78
1993	168	1	1			1	171
1994	153	1	<0.5			1	155
1995	96	2				<0.5	98
1996	81	1	<0.5			1	83
1997	84	3	<0.5		<0.5	<0.5	87
1998	48	1				<0.5	49
1999	81	<0.5				2	83
2000	90	<0.5	<0.5			5	95
2001	52	1			<0.5	1	54
2002	90	1				1	92
2003	107	<0.5				<0.5	107
2004	69	1				<0.5	70

Source: PacFIN, extracted August 23, 2005.
Note 1: Only California has harpoon landings.
Note 2: Some of the non-swordfish species may have been taken by dual-gear permit holders, who may have fished with drift gillnets but landed under harpoon.
Additional processing info:
Landings in pounds are converted to round weight in mt by multiplying the landed weights by the conversion factors in each fish ticket line and then dividing by 2,204.6.
Aquaculture fish ticket/fish ticket line info is excluded.

Table 4-6.d. Commercial landings (round mt) in the Pacific Coast pelagic longline fishery, 1981-2004.

		Sharks					Tunas								
Year	Sword-fish	Common Thresher	Pelagic Thresher	Bigeye Thresher	Shortfin Mako	Blue	Albacore	Other	Dorado	Ground-fish	Coastal Pelagics	Crab	Salmon	Other	Total
1981	<0.5				19	72	25	1		2	<0.5			1	120
1982	<0.5	1			6	18	42	1	<0.5	<0.5	<0.5			2	70
1983	<0.5	<0.5			1	2	6	3	<0.5	<0.5	<0.5			7	19
1984	12	3		<0.5	2		2	2	3	2	<0.5			4	30
1985	<0.5	1			<0.5	<0.5	<0.5			10				1	12
1986		2			1	<0.5				6	<0.5			4	13
1987		<0.5			3	<0.5	<0.5			43				3	49
1988	<0.5	1			152	1		<0.5		27	<0.5			5	186
1989					5	1				<0.5					5
1990		<0.5			15	4	<0.5	1		<0.5	<0.5			<0.5	20
1991	27	<0.5			23	<0.5	<0.5	2	<0.5	3				18	73
1992	63	2		<0.5	2	<0.5	1	<0.5		21	<0.5			2	91
1993	27	<0.5			1	<0.5	<0.5	5	1	1	1			2	38
1994	721	18		3	19	12	49	56	32	4	<0.5			15	929
1995	271	11		1	7	5	4	58	5	8	2			4	376
1996	346	2			5	<0.5	3	68	9	6	<0.5			5	444
1997	664	4		2	3	<0.5	6	83	1	31	<0.5			2	796
1998	418	3			4	<0.5	9	96	1	9	1			20	561
1999	1,317	5			6		66	159	17	1				4	1,575
2000	1,885	5	<0.5	<0.5	7	<0.5	22	99	41	12		3		10	2,084
2001	1,749	20		1	7	2	22	73	15	7	<0.5			53	1,949
2002	1,320	2			3	41	1	12	<0.5	12	<0.5			2	1,393
2003	1,811	<0.5			3		2	29	1	4				4	1,854
2004	898	1		<0.5	2		2	31	1	13	<0.5			3	951

Source: PacFIN, extracted September 2, 2005.
Additional processing info:
Only fish tickets where at least 1 pound of any highly migratory species (except striped marlin) was landed for the pelagic longline fishery were used.
Landings in pounds are converted to round weight in mt by multiplying the landed weights by the conversion factors in each fish ticket line and then dividing by 2,204.6.
Aquaculture fish ticket/fish ticket line info is excluded.

Table 4-6.e. Commercial landings (round mt) in the Pacific Coast purse seine fishery, 1981-2004.

	Tunas						Sword-	HMS		Ground-	Coastal				
Year	Albacore	Yellowfin	Skipjack	Bigeye	Bluefin	Unspecified	fish	sharks	Dorado	fish	Pelagics	Crab	Salmon	Other	Total
1981	181	75,046	54,338	1,156	853	28					203			2	131,807
1982	367	60,562	39,812	962	2,400	27					29				104,159
1983	11	46,556	37,478		629	10	1	<0.5			25			1	84,711
1984	3,551	30,172	26,450	116	600	1,010	23	1			267			2	62,192
1985	17	14,560	2,498	<0.5	3,098		1	<0.5			252			1	20,427
1986	48	20,803	977	5	4,392	132	41	2			48			1	26,449
1987	27	19,507	4,801	42	708	56		3			13			1	25,158
1988	151	17,693	7,088	<0.5	722	7					63			2	25,726
1989	23	15,308	3,463		954	70	1	<0.5	<0.5		29			<0.5	19,848
1990	71	7,848	2,097		783	39					129			1	10,968
1991		3,463	2,867		95	8					94			3	6,530
1992	8	1,698	1,100	1	996	1	10	2	1	<0.5	323			8	4,148
1993	1	951	1,619	2	497	<0.5	17	1	<0.5	<0.5	91			11	3,190
1994		3,563	1,283		779	8					66			123	5,822
1995		2,788	5,488		689						38			39	9,042
1996	11	2,683	5,052		4,639						244			54	12,683
1997	2	4,659	5,843		2,189	7	1	1	1		33			74	12,810
1998	136	3,753	5,310		1,695						252			160	11,306
1999	48	1,297	3,742		99						56	1		88	5,331
2000	4	1,141	775		255						218				2,393
2001	51	631	55		149						42				928
2002	<0.5	541	236				1							<0.5	778
2003	44	463	337		19										862
2004	1	484	306												791

Source: PacFIN, extracted September 29, 2005.
Note: There is no purse seine gear for Washington.
Additional processing info:
Only fish tickets where at least 1 pound of any HMS tuna was landed for the purse seine fishery were used.
Landings in pounds are converted to round weight in mt by multiplying the landed weights by the conversion factors in each fish ticket line and then dividing by 2,204.6.
Aquaculture fish ticket/fish ticket line info is excluded.

4.2.2 Pacific Coast Commercial HMS Revenues by Fishery, 1981-2004.

Interpretation: The following tables display Pacific Coast commercial HMS revenues by fishery over the years 1981-2004 for the surface hook-and-line, drift gillnet, harpoon, pelagic longline, and purse seine fisheries, respectively. Tables 4.7.a – 4.7.e display nominal revenues, and Tables 4.7.f – 4.7.j display revenues in real 2004 dollars.

Source and Calculations: The data were extracted from PacFIN. Aquaculture fish ticket / fish ticket line information is excluded from the data.

Table 4-7.a. Nominal commercial ex-vessel revenues ($) for the Pacific Coast albacore surface hook-and-line (troll and baitboat) fishery, 1981-2004.

Year	Albacore	Other Tunas	Swordfish	HMS Sharks	Dorado	Groundfish	Coastal Pelagics	Crab	Salmon	Other	Total
1981	25,951,445	17,982		173	72	2,074	946		133,177	1,406	26,107,275
1982	7,327,942	5,360	13,219	2,771	557	5,398	13		13,834	386	7,369,480
1983	5,047,001	4,288	7,453	1,039	33	8,460	1,334		25,685	2,396	5,097,689
1984	9,923,285	10,008	1,332	391	220	5,649	458		4,841	1,460	9,947,644
1985	7,068,657	3,701	23,409	6,552	6	5,489	197		7,648	1,640	7,117,299
1986	5,247,994	6,096	6,427	180		18,438	106	26	9,166	541	5,288,974
1987	4,029,689	1,090	5,110	74		1,469	590		6,772	341	4,045,135
1988	7,937,773	952	69,939	3,140		766	614		9,502	389	8,023,075
1989	3,638,022	1,407	34,556	11,295	25	16,375		19	8,305	2,277	3,712,281
1990	5,412,160	79	13,332	560	17	6,163	85		2,792	1,350	5,436,538
1991	2,758,520	71				189		562	3,479	220	2,763,041
1992	10,709,333	2,195	53,848	2,361	281	6,084			6,120	591	10,780,813
1993	10,722,369	154,056	442,687	7,992	23,216	4,992			10,385	1,806	11,367,503
1994	19,806,519	603	6,797	302	180	590			537	345	19,815,873
1995	11,354,444	914	3,260	173	21	140	16		22,290	3,029	11,384,287
1996	25,635,696	38,596	2,608	295		440			26,524	997	25,705,156
1997	19,092,316	14,949	4,390	1,628	371	11,828	89		37,637	3,725	19,166,933
1998	17,340,522	138,138	17,122	5,018	525	4,788	279		16,340	5,264	17,527,996
1999	16,046,070	115,448	77,899	2,623	1,413	4,347	455		9,742	7,584	16,265,581
2000	15,292,758	4,497	97,814	252	298	1,927	522		9,445	5,233	15,412,746
2001	18,768,046	27,752	2,037	2,191	544	7,797	178		33,158	12,397	18,854,100
2002	13,239,791	6,838	9,996	664	170	916	1,241		21,889	7,792	13,289,297
2003	19,641,891	11,045		62	567	2,742	547		14,013	5,722	19,676,589
2004	24,437,718	2,513		520	655	1,834	1,061		22,772	3,425	24,470,498

Source: PacFIN, extracted October 13, 2005.
Additional processing info:
Only fish tickets where at least 1 pound of albacore was landed for the albacore surface hook-and-line (troll and baitboat) fishery were used.
Landed weights in pounds are multiplied by the prices per pound in each fish ticket line.
Canadian vessels were excluded by outer joining the fish ticket tables with the state vessel table and checking the "idtype."
Aquaculture fish ticket/fish ticket line info is excluded.

Table 4.7.b. Nominal commercial ex-vessel revenues ($) for the Pacific Coast drift gillnet fishery, 1981-2004.

		Sharks					Tunas								
Year	Sword-fish	Common Thresher	Pelagic Thresher	Bigeye Thresher	Shortfin Mako	Blue	Albacore	Other	Dorado	Ground-fish	Coastal Pelagics	Crab	Salmon	Other	Total
1981	1,110,316	766,185			78,538	5,109		12,191		6,569	4,419			144,187	2,127,514
1982	1,000,168	675,288		6,837	116,429	653	7,330	17,851		5,820	904			19,682	1,850,962
1983	952,577	166,931		25,634	37,715		11,115	18,232		714	5,677	10		20,143	1,238,748
1984	1,096,570	144,390		2,427	13,638		15,242	6,022		8,410	293			9,482	1,296,474
1985	793,604	181,145		2,456	19,059		7,399	911		1,151	126			12,258	1,018,109
1986	377,053	673,561		2,756	29,629		8,793	4,777		311	65			10,566	1,107,511
1987	37,173	160,487	104	1,649	3,517		1,710	80		4,460	122			5,225	214,527
1988	3,324	134,924					7,092			393				140	145,873
1989		841													841
1990															
1991	361,574	11,891		1,849	3,238		851	1,205						707	381,315
1992	241,122	2,748		74	7,744		1,080	2,559			310			3,498	259,135
1993	918,433	25,086	118	5,221	21,315		23,922	23,511		1,019				10,951	1,029,576
1994	4,530,090	488,901	42	27,214	127,973	7	91,871	132,327	40	5,531	844			155,679	5,560,519
1995	4,085,001	345,633	8,681	22,921	128,311	105	49,903	86,473	13	1,961	506	15		135,427	4,864,950
1996	3,909,106	447,482	1,557	16,155	137,767	39	106,175	123,890		1,084	2,557	492		204,195	4,950,499
1997	3,159,075	438,184	61,815	24,976	192,267	6	67,693	258,126	494	2,268	3,506			142,982	4,351,392
1998	3,929,676	477,595	2,440	7,744	138,001	4,810	75,056	208,325	2,457	3,411	1,761	88		209,304	5,060,668
1999	2,774,520	277,121	13,704	3,899	80,524	19	101,667	89,271		1,304	122	715		187,077	3,529,943
2000	2,731,388	286,369	2,143	2,999	85,800	164	66,184	123,217	545	1,293	2,253	20		136,741	3,439,116
2001	1,541,152	449,885	465	402	42,706		70,729	38,695		1,273	399			107,533	2,253,239
2002	1,499,163	368,415	1,725		86,811		19,494	11,258		2,429	833			199,253	2,189,381
2003	1,025,092	390,859	2,676	3,577	81,427	11	13,466	67,074		825	279			132,347	1,717,633
2004	897,283	109,638	227	3,795	40,105		22,379	31,046		1,987	386			119,953	1,226,799

Source: PacFIN, extracted September 28, 2005.
Note 1: There is no drift gillnet gear for Washington.
Note 2: Significant swordfish and shark landings by drift gillnet gear prior to 1994 have been mis-assigned to California entangling net, trammel net, several trawl, encircling net, set gillnet and unknown gears, and therefore corresponding revenues are not reported here.
Additional processing info:
Only fish tickets where at least 1 pound of swordfish or any HMS shark was landed for the drift gillnet fishery were used.
Landed weights in pounds are multiplied by the prices per pound in each fish ticket line.
Aquaculture fish ticket/fish ticket line info is excluded.

Table 4.7.c. Nominal commercial ex-vessel revenues ($) for the Pacific Coast harpoon fishery, 1981-2004.

Year	Swordfish	HMS Sharks	Tunas		Dorado	Other	Total
			Albacore	Other			
1981	1,341,067	4,975	3,952	385		12,029	1,362,408
1982	838,929	1,988		146		907	841,970
1983	313,735	1,962				9,937	325,634
1984	521,184	8,412	330	150		2,026	532,102
1985	931,147	1,464	225			1,596	934,432
1986	1,433,919	1,775	53			1,260	1,437,007
1987	1,452,591	4,780	4,150	188		84,371	1,546,080
1988	1,327,151	5,994	8,552			881	1,342,578
1989	432,232	1,111	2,106			135	435,584
1990	416,969	3,927		108		811	421,815
1991	148,029	1,661				121	149,811
1992	580,438	5,726	1,236	133		1,335	588,868
1993	1,126,592	1,890	7,730			1,001	1,137,213
1994	1,242,991	1,613	2,490			2,701	1,249,795
1995	752,189	4,078				1,757	758,024
1996	633,027	3,217	216			831	637,291
1997	683,866	5,567	200		90	675	690,398
1998	398,933	1,603				766	401,302
1999	607,877	811				5,850	614,538
2000	750,533	798	302			8,259	759,892
2001	468,289	1,152			50	2,748	472,239
2002	678,934	1,259				1,141	681,334
2003	838,754	562				1,768	841,084
2004	669,060	2,364				1,644	673,068

Source: PacFIN, extracted August 24, 2005.
Note 1: Only California has revenues from harpoon landings.
Note 2: Some of the non-swordfish species may have been taken by dual-gear permit holders, who may have fished with drift gillnets but landed under harpoon.
Additional processing info:
Landed weights in pounds are multiplied by the prices per pound in each fish ticket line.
Aquaculture fish ticket/fish ticket line info is excluded.

Table 4-7.d. Nominal commercial ex-vessel revenues ($) for the Pacific Coast pelagic longline fishery, 1981-2004.

		Sharks					Tunas								
Year	Sword-fish	Common Thresher	Pelagic Thresher	Bigeye Thresher	Shortfin Mako	Blue	Albacore	Other	Dorado	Ground-fish	Coastal Pelagics	Crab	Salmon	Other	Total
1981	1,544				16,874	47,633	48,207	1,270		2,579	114			1,155	119,376
1982	306	1,422			5,442	12,083	73,415	1,957	314	24	21			231	95,215
1983	506	44			878	435	11,969	7,857	13	204	35			2,882	24,823
1984	62,804	3,979		334	3,325		2,831	7,567	2,693	1,855	3			5,252	90,643
1985	752	1,923			25	88	740			8,727				163	12,418
1986		3,843			1,634	104				5,549	33			10,302	21,465
1987		184			6,950	396	164			72,173				1,112	80,979
1988	1,601	2,322			321,911	542		395		44,957	25			5,539	377,292
1989					11,692	445				30					12,167
1990		534			31,154	2,330	45	4,018		194	5			196	38,476
1991	146,305	199			44,731	355	528	16,726	36	4,576				80,015	293,471
1992	298,852	3,302		365	3,348	184	1,790	5,204		29,917	2			2,760	345,724
1993	151,635	63			1,350	20	545	37,080	1,937	4,110	951			2,993	200,684
1994	3,392,847	13,221		3,532	31,498	15,812	80,573	339,409	57,737	11,850	120			18,482	3,965,081
1995	1,064,427	17,409		360	6,685	2,318	5,351	311,205	5,365	17,114	7,223			7,224	1,444,681
1996	1,319,868	4,255			6,349	44	3,702	310,754	9,077	12,759	88			5,709	1,672,605
1997	2,118,498	8,211		7,342	3,992	6	10,507	367,004	2,707	110,611	140			2,640	2,631,658
1998	1,454,529	5,286			9,372	116	21,315	540,202	3,995	24,087	1,010			62,470	2,122,382
1999	4,871,723	7,067			10,833		133,537	1,176,037	44,608	2,317				6,566	6,252,688
2000	8,067,896	8,318	404	655	9,407	94	37,304	674,861	53,566	52,271		776		14,687	8,920,239
2001	6,527,196	20,572		7,380	9,680	1,206	39,876	392,412	17,425	14,348	997			69,995	7,101,087
2002	4,161,507	3,024			5,068	18,253	1,882	101,166	555	43,730	24			9,072	4,344,281
2003	5,886,380	649			5,415		3,679	227,083	1,556	12,966				10,294	6,148,022
2004	3,160,012	2,310		65	4,816		4,397	202,879	3,224	53,520	360			7,079	3,438,662

Source: PacFIN, extracted September 13, 2005.
Additional processing info:
Only fish tickets where at least 1 pound of any highly migratory species (except striped marlin) was landed for the pelagic longline fishery were used.
Landed weights in pounds are multiplied by the prices per pound in each fish ticket line.
Aquaculture fish ticket/fish ticket line info is excluded.

Table 4.7.e. Nominal commercial ex-vessel revenues ($) for the Pacific Coast purse seine fishery, 1981-2004.

	Tunas						Sword-	HMS		Ground-	Coastal				
Year	Albacore	Yellowfin	Skipjack	Bigeye	Bluefin	Unspecified	fish	Sharks	Dorado	fish	Pelagics	Crab	Salmon	Other	Total
1981	362,636	97,366,697	62,318,320	1,552,545	1,218,230	54,643					119,029			1,455	162,993,555
1982	575,736	73,076,799	38,729,266	1,196,824	2,680,401	54,023					5,155				116,318,204
1983	15,349	49,758,661	30,618,333		889,626	18,346	1,796	261			6,638			586	81,309,596
1984	4,819,956	32,979,977	21,470,408	141,429	831,791	2,578,710	87,097	651			59,937			4,883	62,974,839
1985	23,276	14,113,892	1,709,972	95	2,629,650		7,080	460			38,910			956	18,524,291
1986	57,757	16,978,729	643,905	7,452	4,007,655	172,249	182,606	2,595			5,315			2,452	22,060,715
1987	44,560	19,584,327	3,811,065	150,602	1,726,642	176,454		900			2,005			2,496	25,499,051
1988	266,685	23,403,991	7,656,513	680	1,750,072	67,724					25,342			0	33,171,006
1989	44,900	16,347,998	3,053,962		1,091,186	112,194	6,955	270	128		6,300			138	20,664,031
1990	139,859	7,866,719	1,787,737		924,527	32,343					39,793			0	10,790,976
1991		3,309,632	2,229,430		84,851	7,985					36,278			3,314	5,671,490
1992	19,291	1,636,219	538,481	2,927	952,941	1,200	51,873	3,524	2,597	220	62,091			10,927	3,282,291
1993	1,202	1,051,265	1,047,039	4,229	569,367	880	98,722	1,599	175	14	16,833			10,658	2,801,983
1994		3,126,514	1,078,217		1,277,619	3,377					36,342			125,354	5,647,423
1995		2,793,642	3,708,565		943,602						15,670			20,463	7,481,942
1996	875	2,669,391	3,646,207		3,865,969						69,959			25,250	10,277,651
1997	3,806	4,795,089	5,248,321		2,505,166	4,195	6,666	1,909	1,425		17,321			51,753	12,635,651
1998	162,925	3,808,622	4,717,085		2,246,485						162,501			109,262	11,206,880
1999	33,416	1,397,578	2,732,409		360,132						5,340	720		59,188	4,588,783
2000	6,615	1,271,258	475,592		296,687						24,484				2,074,637
2001	62,841	411,133	28,595		336,831						5,092				844,492
2002	358	577,814	128,094				2,623							45	708,934
2003	16,462	442,370	152,188		14,874										625,893
2004	1,537	435,085	108,853												545,475

Source: PacFIN, extracted October 4, 2005.
Note: There is no purse seine gear for Washington.
Additional processing info:
Only fish tickets where at least 1 pound of any HMS tuna was landed for the purse seine fishery were used.
Landed weights in pounds are multiplied by the prices per pound in each fish ticket line.
Aquaculture fish ticket/fish ticket line info is excluded.

Table 4-7.f. Real commercial ex-vessel revenues (2004 $) for the Pacific Coast albacore surface hook-and-line (troll and baitboat) fishery, 1981-2004.

Year	Albacore	Other Tunas	Swordfish	HMS Sharks	Dorado	Groundfish	Coastal Pelagics	Crab	Salmon	Other	Total
1981	47,512,754	32,922		316	131	3,797	1,731		243,824	2,579	47,798,054
1982	12,644,749	9,249	22,810	4,781	961	9,315	22		23,871	667	12,716,425
1983	8,377,510	7,118	12,370	1,725	55	14,043	2,215		42,634	3,976	8,461,646
1984	15,875,643	16,011	2,131	625	352	9,037	733		7,746	2,335	15,914,613
1985	10,974,858	5,746	36,345	10,173	10	8,522	305		11,874	2,546	11,050,379
1986	7,972,311	9,261	9,763	273		28,009	161	40	13,924	822	8,034,564
1987	5,958,815	1,611	7,556	109		2,172	872		10,014	507	5,981,656
1988	11,350,448	1,361	100,007	4,490		1,096	877		13,588	555	11,472,422
1989	5,012,584	1,939	47,613	15,563	34	22,562		26	11,442	3,138	5,114,901
1990	7,179,752	105	17,686	743	23	8,176	113		3,703	1,791	7,212,092
1991	3,535,763	91				243		721	4,460	279	3,541,557
1992	13,418,373	2,751	67,469	2,958	352	7,623			7,669	738	13,507,933
1993	13,131,295	188,667	542,143	9,787	28,431	6,113			12,718	2,213	13,921,367
1994	23,751,628	723	8,151	362	216	708			644	413	23,762,845
1995	13,343,006	1,074	3,831	203	24	164	19		26,194	3,561	13,378,076
1996	29,564,962	44,512	3,007	340		507			30,590	1,151	29,645,069
1997	21,658,194	16,959	4,980	1,846	421	13,417	101		42,695	4,227	21,742,840
1998	19,455,242	154,984	19,210	5,630	589	5,372	313		18,332	5,906	19,665,578
1999	17,746,132	127,680	86,152	2,900	1,563	4,807	503		10,775	8,388	17,988,900
2000	16,552,422	4,867	105,871	273	323	2,086	565		10,223	5,664	16,682,294
2001	19,838,055	29,334	2,153	2,316	574	8,242	188		35,048	13,106	19,929,016
2002	13,767,007	7,110	10,394	690	176	952	1,291		22,760	8,104	13,818,484
2003	20,056,787	11,278		63	579	2,799	559		14,309	5,844	20,092,218
2004	24,437,718	2,513		520	655	1,834	1,061		22,772	3,425	24,470,498

Source: PacFIN, extracted October 12, 2005.
Additional processing info:
Only fish tickets where at least 1 pound of albacore was landed for the albacore surface hook-and-line (troll and baitboat) fishery were used.
Real values are calculated to eliminate the effects of inflation by dividing current nominal values by the current year GDP implicit price deflator, with a base year of 2004.
Landed weights in pounds are multiplied by the prices per pound in each fish ticket line and then divided by the corresponding deflator.
Deflators were downloaded from the Bureau of Economic Analysis on June 8, 2005.
Canadian vessels were excluded by outer joining the fish ticket tables with the state vessel table and checking the "idtype."
Aquaculture fish ticket/fish ticket line info is excluded.

Table 4-7.g. Real commercial ex-vessel revenues (2004 $) for the Pacific Coast drift gillnet fishery, 1981-2004.

		Sharks					Tunas								
Year	Sword-fish	Common Thresher	Pelagic Thresher	Bigeye Thresher	Shortfin Mako	Blue	Albacore	Other	Dorado	Ground-fish	Coastal Pelagics	Crab	Salmon	Other	Total
1981	2,032,803	1,402,757			143,790	9,355		22,319		12,028	8,090			263,980	3,895,122
1982	1,725,842	1,165,245		11,798	200,904	1,127	12,649	30,802		10,043	1,560			33,961	3,193,931
1983	1,581,182	277,088		42,550	62,602		18,450	30,264		1,184	9,424	17		33,435	2,056,196
1984	1,754,333	231,000		3,883	21,819		24,384	9,634		13,455	469			15,171	2,074,148
1985	1,232,157	281,248		3,813	29,591		11,487	1,415		1,787	196			19,031	1,580,725
1986	572,787	1,023,216		4,186	45,010		13,358	7,257		473	99			16,051	1,682,437
1987	54,969	237,316	153	2,439	5,200		2,529	118		6,596	181			7,726	317,227
1988	4,753	192,931					10,140			562				202	208,588
1989		1,159													1,159
1990															
1991	463,451	15,241		2,369	4,150		1,091	1,545						907	488,754
1992	302,116	3,443		93	9,703		1,353	3,206			388			4,384	324,686
1993	1,124,771	30,721	145	6,393	26,103		29,296	28,793		1,247				13,415	1,260,884
1994	5,432,404	586,282	50	32,634	153,462	8	110,170	158,684	47	6,632	1,012			186,692	6,668,077
1995	4,800,428	406,166	10,201	26,935	150,783	123	58,643	101,617	15	2,304	594	18		159,147	5,716,974
1996	4,508,267	516,069	1,796	18,631	158,883	45	122,448	142,879		1,250	2,949	568		235,493	5,709,278
1997	3,583,633	497,073	70,122	28,332	218,106	6	76,791	292,816	560	2,572	3,978			162,201	4,936,190
1998	4,408,910	535,839	2,737	8,688	154,830	5,397	84,209	233,731	2,756	3,827	1,975	98		234,832	5,677,829
1999	3,068,477	306,481	15,156	4,312	89,056	21	112,439	98,729		1,442	135	791		206,897	3,903,936
2000	2,956,373	309,957	2,319	3,246	92,868	178	71,635	133,366	589	1,399	2,438	21		148,007	3,722,396
2001	1,629,016	475,534	492	424	45,141		74,762	40,901		1,346	422			113,664	2,381,702
2002	1,558,861	383,086	1,794		90,268		20,270	11,706		2,526	866			207,186	2,276,563
2003	1,046,745	399,115	2,733	3,653	83,147	11	13,751	68,490		843	285			135,142	1,753,915
2004	897,283	109,638	227	3,795	40,105		22,379	31,046		1,987	386			119,953	1,226,799

Source: PacFIN, extracted September 27, 2005.

Note 1: There is no drift gillnet gear for Washington.

Note 2: Significant swordfish and shark landings by drift gillnet gear prior to 1994 have been mis-assigned to California entangling net, trammel net, several trawl, encircling net, set gillnet, and unknown gears, and therefore corresponding revenues are not reported here.

Additional processing info:

Only fish tickets where at least 1 pound of swordfish or any HMS shark was landed for the drift gillnet fishery were used.

Real values are calculated to eliminate the effects of inflation by dividing current nominal values by the current year GDP implicit price deflator, with a base year of 2004.

Landed weights in pounds are multiplied by the prices per pound in each fish ticket line and then divided by the corresponding deflator.

Deflators were downloaded from the Bureau of Economic Analysis on June 8, 2005.

Aquaculture fish ticket/fish ticket line info is excluded.

Table 4-7.h.. Real commercial ex-vessel revenues (2004 $) for the Pacific Coast harpoon fishery, 1981-2004.

Year	Swordfish	HMS Sharks	Tunas		Dorado	Other	Total
			Albacore	Other			
1981	2,455,270	9,108	7,235	705		22,022	2,494,340
1982	1,447,616	3,430		252		1,565	1,452,863
1983	520,767	3,256				16,497	540,520
1984	833,810	13,458	528	240		3,241	851,277
1985	1,445,707	2,272	350			2,478	1,450,807
1986	2,178,289	2,696	81			1,914	2,182,980
1987	2,147,987	7,069	6,137	277		124,762	2,286,232
1988	1,897,731	8,570	12,228			1,262	1,919,791
1989	595,544	1,530	2,902			186	600,162
1990	553,150	5,209		143		1,076	559,578
1991	189,738	2,130				154	192,022
1992	727,266	7,175	1,549	167		1,672	737,829
1993	1,379,696	2,315	9,466			1,226	1,392,703
1994	1,490,573	1,934	2,986			3,239	1,498,732
1995	883,924	4,793				2,064	890,781
1996	730,053	3,710	249			959	734,971
1997	775,773	6,316	226		102	766	783,183
1998	447,584	1,798				860	450,242
1999	672,280	897				6,470	679,647
2000	812,355	863	327			8,939	822,484
2001	494,987	1,217			53	2,905	499,162
2002	705,969	1,309				1,187	708,465
2003	856,471	574				1,806	858,851
2004	669,060	2,364				1,644	673,068

Source: PacFIN, extracted August 24, 2005.
Note 1: Only California has revenues from harpoon landings.
Note 2: Some of the non-swordfish species may have been taken by dual-gear permit holders, who may have fished with drift gillnets but landed under harpoon.
Additional processing info:
Real values are calculated to eliminate the effects of inflation by dividing current nominal values by the current year GDP implicit price deflator, with a base year of 2004.
Landed weights in pounds are multiplied by the prices per pound in each fish ticket line and then divided by the corresponding deflator.
Deflators were downloaded from the Bureau of Economic Analysis on June 8, 2005.
Aquaculture fish ticket/fish ticket line info is excluded.

Table 4-7.i. Real commercial ex-vessel revenues (2004 $) for the Pacific Coast pelagic longline fishery, 1981-2004.

		Sharks					Tunas								
Year	Sword-fish	Common Thresher	Pelagic Thresher	Bigeye Thresher	Shortfin Mako	Blue	Albacore	Other	Dorado	Ground-fish	Coastal Pelagics	Crab	Salmon	Other	Total
1981	2,826				30,894	87,209	88,259	2,325		4,721	209			2,114	218,557
1982	528	2,454			9,390	20,849	126,681	3,377	541	41	35			403	164,299
1983	839	73			1,457	722	19,866	13,042	21	339	59			4,785	41,203
1984	100,475	6,366		535	5,319		4,530	12,106	4,308	2,968	4			8,403	145,014
1985	1,167	2,985			39	137	1,149			13,550				253	19,280
1986		5,839			2,482	158				8,429	51			15,648	32,607
1987		272			10,277	586	242			106,724				1,645	119,746
1988	2,290	3,320			460,310	775		565		64,286	35			7,919	539,500
1989					16,109	613				41					16,764
1990		709			41,329	3,090	60	5,330		258	7			260	51,043
1991	187,528	255			57,335	455	676	21,438	46	5,866				102,561	376,160
1992	374,450	4,137		458	4,195	230	2,243	6,520		37,485	3			3,457	433,178
1993	185,702	77			1,653	24	668	45,410	2,372	5,033	1,165			3,666	245,770
1994	4,068,643	15,855		4,236	37,772	18,962	96,622	407,014	69,237	14,211	144			22,160	4,754,856
1995	1,250,845	20,458		423	7,856	2,724	6,288	365,708	6,305	20,111	8,488			8,489	1,697,695
1996	1,522,168	4,907			7,322	50	4,270	358,384	10,468	14,715	101			6,585	1,928,970
1997	2,403,210	9,315		8,329	4,528	6	11,920	416,327	3,071	125,476	159			2,995	2,985,336
1998	1,631,912	5,931			10,515	130	23,914	606,081	4,482	27,025	1,133			70,089	2,381,212
1999	5,387,876	7,816			11,981		147,685	1,300,637	49,334	2,563				7,261	6,915,153
2000	8,732,449	9,003	437	708	10,182	102	40,376	730,450	57,978	56,577		839		15,898	9,654,999
2001	6,899,327	21,745		7,801	10,232	1,275	42,149	414,785	18,419	15,166	1,054			73,983	7,505,936
2002	4,327,220	3,144			5,270	18,979	1,957	105,195	577	45,471	25			9,435	4,517,273
2003	6,010,718	663			5,529		3,757	231,880	1,589	13,240				10,511	6,277,887
2004	3,160,012	2,310		65	4,816		4,397	202,879	3,224	53,520	360			7,079	3,438,662

Source: PacFIN, extracted September 9, 2005.
Additional processing info:
Only fish tickets where at least 1 pound of any highly migratory species (except striped marlin) was landed for the pelagic longline fishery were used.
Real values are calculated to eliminate the effects of inflation by dividing current nominal values by the current year GDP implicit price deflator, with a base year of 2004.
Landed weights in pounds are multiplied by the prices per pound in each fish ticket line and then divided by the corresponding deflator.
Deflators were downloaded from the Bureau of Economic Analysis on June 8, 2005.
Aquaculture fish ticket/fish ticket line info is excluded.

Table 4-7.j. Real commercial ex-vessel revenues (2004 $) for the Pacific Coast purse seine fishery, 1981-2004.

	Tunas						Sword-	HMS		Ground-	Coastal				
Year	Albacore	Yellowfin	Skipjack	Bigeye	Bluefin	Unspecified	fish	Sharks	Dorado	fish	Pelagics	Crab	Salmon	Other	Total
1981	663,927	178,262,135	114,094,419	2,842,450	2,230,376	100,043					217,922			2,664	298,413,936
1982	993,463	126,097,847	66,829,378	2,065,183	4,625,172	93,220					8,895				200,713,157
1983	25,478	82,594,325	50,823,324		1,476,689	30,452	2,980	433			11,019			974	134,965,674
1984	7,711,146	52,762,602	34,349,162	226,264	1,330,731	4,125,517	139,341	1,041			95,890			7,809	100,749,503
1985	36,138	21,913,349	2,654,917	147	4,082,818		10,992	714			60,411			1,486	28,760,972
1986	87,739	25,792,655	978,167	11,321	6,088,092	261,666	277,400	3,941			8,074			3,725	33,512,780
1987	65,892	28,959,900	5,635,530	222,699	2,553,234	260,927		1,331			2,965			3,692	37,706,170
1988	381,340	33,466,032	10,948,266	972	2,502,477	96,840					36,237			0	47,432,163
1989	61,864	22,524,801	4,207,847		1,503,472	154,584	9,582	372	177		8,680			192	28,471,571
1990	185,536	10,435,961	2,371,606		1,226,474	42,905					52,789			0	14,315,270
1991		4,242,156	2,857,596		108,758	10,235					46,499			4,249	7,269,493
1992	24,171	2,050,118	674,696	3,667	1,193,998	1,504	64,995	4,415	3,254	276	77,797			13,690	4,112,581
1993	1,472	1,287,446	1,282,271	5,179	697,283	1,078	120,902	1,958	214	17	20,615			13,052	3,431,487
1994		3,749,260	1,292,978		1,532,098	4,050					43,581			150,323	6,772,290
1995		3,282,907	4,358,065		1,108,860						18,414			24,047	8,792,293
1996	1,009	3,078,537	4,205,073		4,458,519						80,682			29,119	11,852,939
1997	4,317	5,439,517	5,953,660		2,841,844	4,759	7,562	2,166	1,616		19,648			58,709	14,333,798
1998	182,794	4,273,093	5,292,345		2,520,449						182,318			122,588	12,573,587
1999	36,957	1,545,650	3,021,904		398,287						5,906	796		65,459	5,074,959
2000	7,160	1,375,972	514,766		321,125						26,501				2,245,525
2001	66,424	434,572	30,225		356,035						5,383				892,639
2002	372	600,823	133,195				2,727							47	737,164
2003	16,810	451,714	155,402		15,188										639,114
2004	1,537	435,085	108,853												545,475

Source: PacFIN, extracted October 3, 2005.
Note: There is no purse seine gear for Washington.
Additional processing info:
Only fish tickets where at least 1 pound of any HMS tuna was landed for the purse seine fishery were used.
Real values are calculated to eliminate the effects of inflation by dividing current nominal values by the current year GDP implicit price deflator, with a base year of 2004.
Landed weights in pounds are multiplied by the prices per pound in each fish ticket line and then divided by the corresponding deflator.
Deflators were downloaded from the Bureau of Economic Analysis on June 8, 2005.
Aquaculture fish ticket/fish ticket line info is excluded.

4.3 Landings and Revenue for Selected Species

Interpretation: The following table displays Pacific Coast commercial tuna landings by fishery over the years 1981-2004 for the surface hook-and-line, drift gillnet, harpoon, pelagic longline, and purse seine fisheries, respectively.

Source and Calculations: The data were extracted from PacFIN. Landings in pounds were converted to round weight in metric tons (mt) by multiplying the landed weights by the conversion factors in each fish ticket line then dividing by 2,204.6. Aquaculture fish ticket / fish ticket line information is excluded from the data.

Table 4-8. Pacific Coast commercial tuna landings by fishery, 1981-2004.

	Landings (round mt)					
Year	Surface Hook-and-line	Drift Gillnet	Harpoon	Pelagic Longline	Purse Seine	Total
1981	13,435	6	2	26	131,602	145,071
1982	4,968	15	0	43	104,130	109,156
1983	3,880	17	0	9	84,684	88,590
1984	7,031	14	0	4	61,899	68,948
1985	6,186	7	0	0	20,173	26,366
1986	4,481	10	0	0	26,357	30,848
1987	2,486	1	1	0	25,141	27,629
1988	4,273	4	1	0	25,661	29,939
1989	2,131	0	0	0	19,818	21,949
1990	2,926	0	0	1	10,838	13,765
1991	1,638	0	0	2	6,433	8,073
1992	4,614	2	0	1	3,804	8,421
1993	5,719	22	1	5	3,070	8,817
1994	10,534	79	0	105	5,633	16,351
1995	6,405	61	0	62	8,965	15,493
1996	13,329	104	0	71	12,385	25,889
1997	10,832	100	0	89	12,700	23,721
1998	12,726	107	0	105	10,894	23,832
1999	8,773	112	0	225	5,186	14,296
2000	8,059	70	0	121	2,175	10,425
2001	10,227	67	0	95	886	11,275
2002	9,313	18	0	13	777	10,121
2003	13,475	30	0	31	863	14,399
2004	13,385	19	0	33	791	14,228

Source: PacFIN, extracted October 13, 2005.

Interpretation: The following table displays Pacific Coast commercial tuna revenues by fishery over the years 1981-2004 for the surface hook-and-line, drift gillnet, harpoon, pelagic longline, and purse seine fisheries, respectively.

Source and Calculations: The data were extracted from PacFIN. Aquaculture fish ticket / fish ticket line information is excluded from the data.

Table 4-9. Pacific Coast commercial tuna revenues by fishery, 1981-2004.

	Revenues ($)					
Year	Surface Hook-and-line	Drift Gillnet	Harpoon	Pelagic Longline	Purse Seine	Total
1981	25,969,427	12,191	4,337	49,477	162,873,071	188,908,503
1982	7,333,302	25,181	146	75,372	116,313,049	123,747,050
1983	5,051,289	29,347	0	19,826	81,300,315	86,400,777
1984	9,933,293	21,264	480	10,398	62,822,271	72,787,706
1985	7,072,358	8,310	225	740	18,476,885	25,558,518
1986	5,254,090	13,570	53	0	21,867,747	27,135,460
1987	4,030,779	1,790	4,338	164	25,493,650	29,530,721
1988	7,938,725	7,092	8,552	395	33,145,665	41,100,429
1989	3,639,429	0	2,106	0	20,650,240	24,291,775
1990	5,412,239	0	108	4,063	10,751,185	16,167,595
1991	2,758,591	2,056	0	17,254	5,631,898	8,409,799
1992	10,711,528	3,639	1,369	6,994	3,151,059	13,874,589
1993	10,876,425	47,433	7,730	37,625	2,673,982	13,643,195
1994	19,807,122	224,198	2,490	419,982	5,485,727	25,939,519
1995	11,355,358	136,376	0	316,556	7,445,809	19,254,099
1996	25,674,292	230,065	216	314,456	10,182,442	36,401,471
1997	19,107,265	325,819	200	377,511	12,556,577	32,367,372
1998	17,478,660	283,381	0	561,517	10,935,117	29,258,675
1999	16,161,518	190,938	0	1,309,574	4,523,535	22,185,565
2000	15,297,255	189,401	302	712,165	2,050,152	18,249,275
2001	18,795,798	109,424	0	432,288	839,400	20,176,910
2002	13,246,629	30,752	0	103,048	706,266	14,086,695
2003	19,652,936	80,540	0	230,762	625,894	20,590,132
2004	24,440,231	53,425	0	207,276	545,475	25,246,407

Source: PacFIN, extracted October 13, 2005.

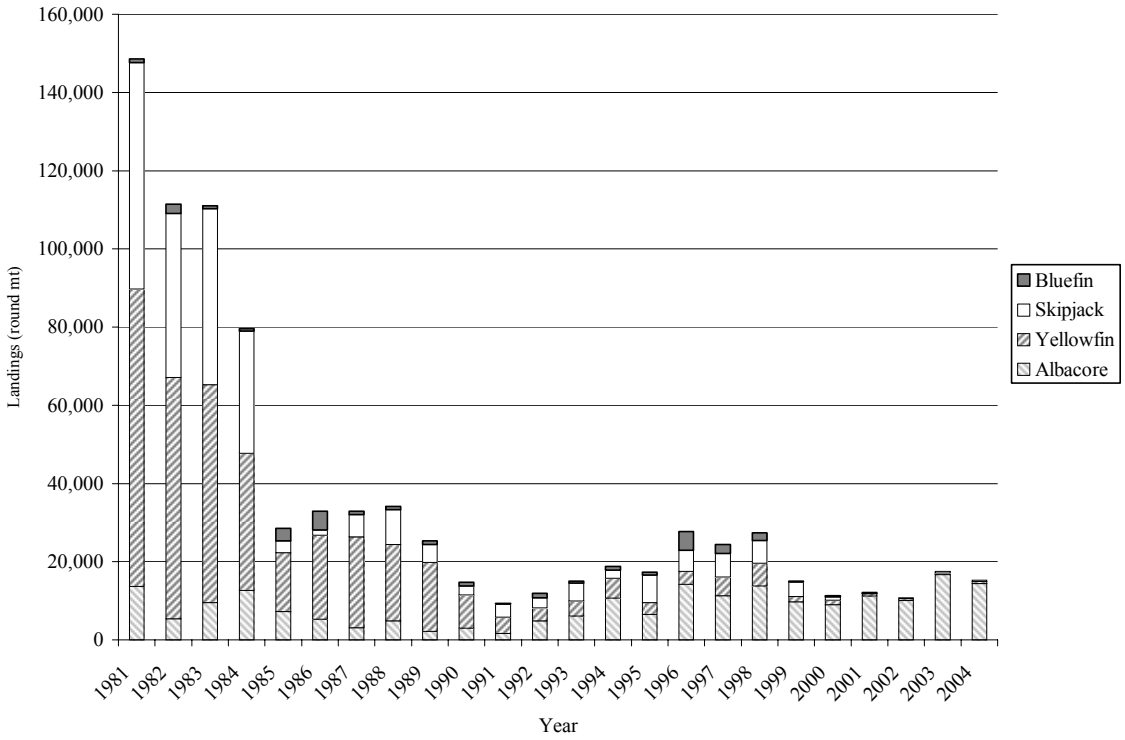

Figure 4-4. Species composition of the commercial tuna landings, 1981-2004.

Interpretation: The graph shows Pacific Coast HMS commercial tuna landings in round metric tons for all gear types from 1981 through 2004 for the four principal species. The landings of these species, and other tuna species that comprise a smaller part of the catch, are shown in Table 4-10.

The principal species of tuna targeted by commercial fishers consisted of four varieties: albacore, yellowfin, skipjack, and bluefin. The levels of yellowfin and skipjack landings declined precipitously during the 1980s, and by 1995 were supplanted by albacore as the most important constituent of commercial landings. By 2000, yellowfin, skipjack, and bluefin landings had all declined to far below their levels in the early 1980s and only albacore landings remained near their long term average.

Source and Calculations: The data were extracted from PacFIN. They represent a portion of the Table 4-3.b, Pacific Coast commercial landings by species. Landings in pounds were converted to round weight in metric tons (mt) by multiplying the landed weights by the conversion factors in each fish ticket line then dividing by 2,204.6. Aquaculture fish ticket / fish ticket line information is excluded from the data.

Table 4-10. Species composition of the commercial tuna landings, 1981-2004.

	Landings (round mt)						
Year	Albacore	Yellowfin	Skipjack	Bigeye	Bluefin	Unspecified Tuna	Total
1981	13,712	76,091	57,869	1,168	868	40	149,748
1982	5,410	61,769	41,904	968	2,404	51	112,506
1983	9,574	55,741	44,995	21	764	56	111,151
1984	12,654	35,063	31,251	126	635	1,014	80,743
1985	7,301	15,025	2,977	7	3,254	468	29,032
1986	5,243	21,517	1,361	29	4,731	143	33,024
1987	3,160	23,201	5,724	50	823	129	33,087
1988	4,908	19,520	8,863	6	804	11	34,112
1989	2,214	17,615	4,505	1	1,019	77	25,431
1990	3,030	8,509	2,256	2	925	46	14,768
1991	1,676	4,178	3,407	7	104	11	9,383
1992	4,899	3,350	2,586	7	1,087	10	11,939
1993	6,151	3,795	4,539	26	559	16	15,086
1994	10,686	5,056	2,111	47	916	33	18,849
1995	6,528	3,038	7,037	49	714	1	17,367
1996	14,173	3,347	5,455	62	4,688	3	27,728
1997	11,292	4,775	6,070	82	2,251	11	24,481
1998	13,801	5,799	5,846	53	1,949	12	27,460
1999	9,768	1,353	3,759	106	186	12	15,184
2000	9,042	1,148	780	87	312	1	11,370
2001	11,194	655	58	53	196	1	12,157
2002	10,029	544	236	10	11	2	10,832
2003	16,670	465	349	35	36	<0.5	17,555
2004	14,469	488	307	22	38	9	15,333

Source: PacFIN, extracted July 13, 2005.

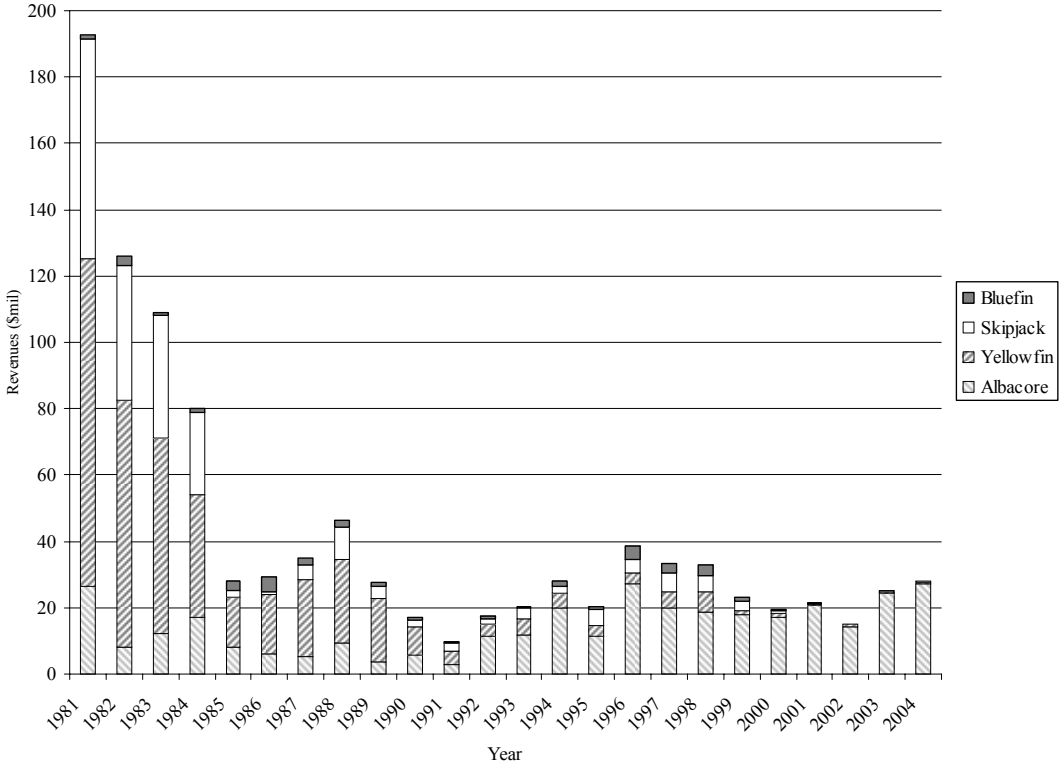

Figure 4-5. Species composition of the commercial tuna revenues, 1981-2004.

Interpretation: Figure 4-5 shows Pacific Coast HMS commercial tuna revenues in current dollars from 1981 through 2004 for the four principal species across all gear types. The revenues of these species and other tuna species which comprise a smaller part of the catch are shown in Table 4-11.

The principal species of tuna targeted by commercial fishers consisted of four varieties: albacore, yellowfin, skipjack, and bluefin. The levels of yellowfin and skipjack revenues declined precipitously during the 1980s, and by 1995 were supplanted by albacore as the most important constituent of commercial revenues. By 2000, yellowfin, skipjack, and bluefin revenues had all declined to far below their levels in the early 1980s and albacore revenues were an increasingly dominant share of the total.

Source and Calculations: The data were extracted from PacFIN. They represent a portion of the table of Pacific Coast commercial current dollar revenues by species in Table 4-3.d. Current dollar revenues were computed as the sum total of landed weights in pounds multiplied by the prices per pound in each fish ticket line. Aquaculture fish ticket / fish ticket line information is excluded from the data.

Table 4-11. Species composition of the commercial tuna revenues, 1981-2004.

	Revenues ($)						
Year	Albacore	Yellowfin	Skipjack	Bigeye	Bluefin	Unspecified Tuna	Total
1981	26,525,453	98,724,677	66,331,030	1,569,755	1,239,060	72,694	194,462,669
1982	8,032,319	74,589,361	40,609,429	1,208,147	2,690,102	98,923	127,228,281
1983	12,159,819	59,161,123	36,757,179	45,946	1,062,909	96,258	109,283,234
1984	17,199,730	37,038,532	24,790,708	174,431	904,904	2,590,289	82,698,594
1985	8,292,983	14,690,273	2,118,170	17,693	2,819,416	2,053,110	29,991,645
1986	6,186,180	17,642,348	904,609	90,685	4,636,698	198,207	29,658,727
1987	5,117,671	23,301,233	4,543,245	176,504	2,047,068	448,477	35,634,198
1988	9,169,396	25,580,895	9,467,036	26,156	2,070,411	80,548	46,394,442
1989	3,791,347	18,811,566	3,969,322	2,394	1,208,511	127,261	27,910,401
1990	5,623,397	8,533,332	1,922,827	8,467	1,139,952	56,750	17,284,725
1991	2,831,679	3,996,409	2,649,335	42,810	116,520	21,161	9,657,914
1992	11,506,367	3,616,875	1,412,867	44,731	1,129,709	21,279	17,731,828
1993	11,665,487	4,821,735	3,282,778	211,513	753,109	72,678	20,807,300
1994	20,070,078	4,522,313	1,751,242	307,147	1,674,099	55,245	28,380,124
1995	11,570,350	3,044,639	4,753,240	258,727	1,057,948	5,136	20,690,040
1996	27,222,294	3,231,332	3,986,113	260,306	4,035,455	28,296	38,763,796
1997	19,923,890	4,991,070	5,504,526	359,780	2,773,705	21,895	33,574,866
1998	18,733,198	5,862,107	5,213,131	271,919	2,965,539	61,678	33,107,572
1999	17,762,248	1,468,209	2,748,208	644,775	1,060,785	60,572	23,744,797
2000	17,156,838	1,294,367	483,242	579,384	577,458	2,298	20,093,587
2001	20,715,644	465,558	33,633	320,855	473,821	3,069	22,012,580
2002	14,296,619	588,677	128,245	87,304	43,512	6,325	15,150,682
2003	24,477,172	451,273	159,961	262,768	76,079	21	25,427,274
2004	27,346,019	446,571	109,254	147,696	38,312	54,879	28,142,731

Source: PacFIN, extracted August 2, 2005.

Interpretation: The following table displays Pacific Coast commercial swordfish landings by fishery over the years 1981-2004 for the surface hook-and-line, drift gillnet, harpoon, pelagic longline, and purse seine fisheries, respectively.

Source and Calculations: The data were extracted from PacFIN. Landings in pounds were converted to round weight in metric tons (mt) by multiplying the landed weights by the conversion factors in each fish ticket line then dividing by 2,204.6. Aquaculture fish ticket / fish ticket line information is excluded from the data.

Table 4-12. Pacific Coast commercial swordfish landings by fishery, 1981-2004.

	Landings (round mt)					
Year	Surface Hook-and-line	Drift Gillnet	Harpoon	Pelagic Longline	Purse Seine	Total
1981	0	270	265	<0.5	0	535
1982	4	208	156	<0.5	0	368
1983	3	242	58	<0.5	1	304
1984	<0.5	286	95	12	23	416
1985	9	197	210	<0.5	1	417
1986	1	78	236	0	41	356
1987	1	6	211	0	0	218
1988	13	1	179	<0.5	0	193
1989	7	0	54	0	1	62
1990	2	0	51	0	0	53
1991	0	51	16	27	0	94
1992	13	60	74	63	10	220
1993	90	162	168	27	17	464
1994	1	760	153	721	0	1,635
1995	1	684	96	271	0	1,052
1996	<0.5	724	81	346	0	1,151
1997	1	663	84	664	1	1,413
1998	4	898	48	418	0	1,368
1999	15	593	81	1,317	0	2,006
2000	22	631	90	1,885	0	2,628
2001	<0.5	351	52	1,749	0	2,152
2002	2	298	90	1,320	1	1,711
2003	0	198	107	1,811	0	2,116
2004	0	175	69	898	0	1,142

Source: PacFIN, extracted October 13, 2005.

Interpretation: The following table displays Pacific Coast commercial swordfish revenues by fishery in current dollars over the years 1981-2004 for the surface hook-and-line, drift gillnet, harpoon, pelagic longline, and purse seine fisheries, respectively.

Source and Calculations: The data were extracted from PacFIN. Aquaculture fish ticket / fish ticket line information is excluded from the data.

Table 4-13. Pacific Coast commercial swordfish revenues by fishery, 1981-2004.

	Revenues ($)					
Year	Surface Hook-and-line	Drift Gillnet	Harpoon	Pelagic Longline	Purse Seine	Total
1981	0	1,110,316	1,341,067	1,544	0	2,452,927
1982	13,219	1,000,168	838,929	306	0	1,852,622
1983	7,453	952,577	313,735	506	1,796	1,276,067
1984	1,332	1,096,570	521,184	62,804	87,097	1,768,987
1985	23,409	793,604	931,147	752	7,080	1,755,992
1986	6,427	377,053	1,433,919	0	182,606	2,000,005
1987	5,110	37,173	1,452,591	0	0	1,494,874
1988	69,939	3,324	1,327,151	1,601	0	1,402,015
1989	34,556	0	432,232	0	6,955	473,743
1990	13,332	0	416,969	0	0	430,301
1991	0	361,574	148,029	146,305	0	655,908
1992	53,848	241,122	580,438	298,852	51,873	1,226,133
1993	442,687	918,433	1,126,592	151,635	98,722	2,738,069
1994	6,797	4,530,090	1,242,991	3,392,847	0	9,172,725
1995	3,260	4,085,001	752,189	1,064,427	0	5,904,877
1996	2,608	3,909,106	633,027	1,319,868	0	5,864,609
1997	4,390	3,159,075	683,866	2,118,498	6,666	5,972,495
1998	17,122	3,929,676	398,933	1,454,529	0	5,800,260
1999	77,899	2,774,520	607,877	4,871,723	0	8,332,019
2000	97,814	2,731,388	750,533	8,067,896	0	11,647,631
2001	2,037	1,541,152	468,289	6,527,196	0	8,538,674
2002	9,996	1,499,163	678,934	4,161,507	2,623	6,352,223
2003	0	1,025,092	838,754	5,886,380	0	7,750,226
2004	0	897,283	669,060	3,160,012	0	4,726,355

Source: PacFIN, extracted October 13, 2005.

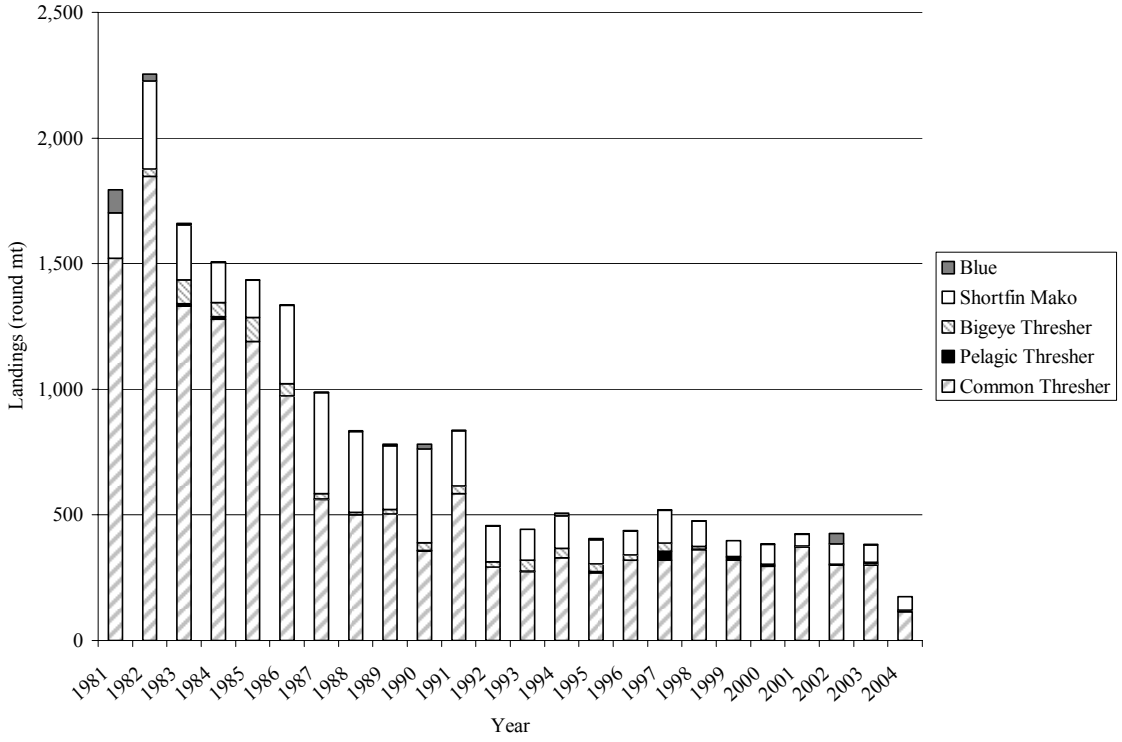

Figure 4-6. Species composition of the commercial shark landings, 1981-2004.

Interpretation: Figure 4-6 shows Pacific Coast commercial shark landings in round metric tons for all gear types from 1981 through 2004. The numeric data used to produce the graph are shown in Table 4-14.

The graph shows a general pattern of decline in landings from the a level as high as 2,000 metric tons in the early 1980s down to a level near 500 metric tons or below from 1992 onwards. The decline was primarily driven by a downward trend in common thresher landings, and to a lesser extent by a similar decline in shortfin mako landings. For 2004 total Pacific Coast commercial shark landings were below 250 metric tons (mt). In a broader sense, the decline in landings reflects fewer drift gillnet vessels.

Source and Calculations: The data were extracted from PacFIN. They represent a portion of the Table 4-3.b, Pacific Coast commercial landings by species. Landings in pounds were converted to round weight in mt by multiplying the landed weights by the conversion factors in each fish ticket line then dividing by 2,204.6. Aquaculture fish ticket / fish ticket line information is excluded from the data.

Table 4-14. Species composition of the commercial shark landings, 1981-2004.

	Landings (round mt)					
Year	Common Thresher	Pelagic Thresher	Bigeye Thresher	Shortfin Mako	Blue	Total
1981	1,521			182	92	1,795
1982	1,848		28	351	27	2,254
1983	1,331	9	96	217	7	1,660
1984	1,279	9	57	160	2	1,507
1985	1,190	<0.5	95	149	1	1,435
1986	974	<0.5	48	312	2	1,336
1987	562	2	20	403	2	989
1988	500	1	9	322	3	835
1989	504	<0.5	17	255	6	782
1990	357	1	31	373	20	782
1991	584		32	219	1	836
1992	292	<0.5	22	142	1	457
1993	275	1	44	122	<0.5	442
1994	330	<0.5	37	128	12	507
1995	270	5	31	95	5	406
1996	319	1	20	96	1	437
1997	320	35	32	132	1	520
1998	361	2	11	100	3	477
1999	320	10	5	63	<0.5	398
2000	295	3	5	80	1	384
2001	373	2	2	46	2	425
2002	301	2		82	41	426
2003	301	4	6	70	1	382
2004	114	2	5	53	1	175

Source: PacFIN, extracted July 13, 2005.

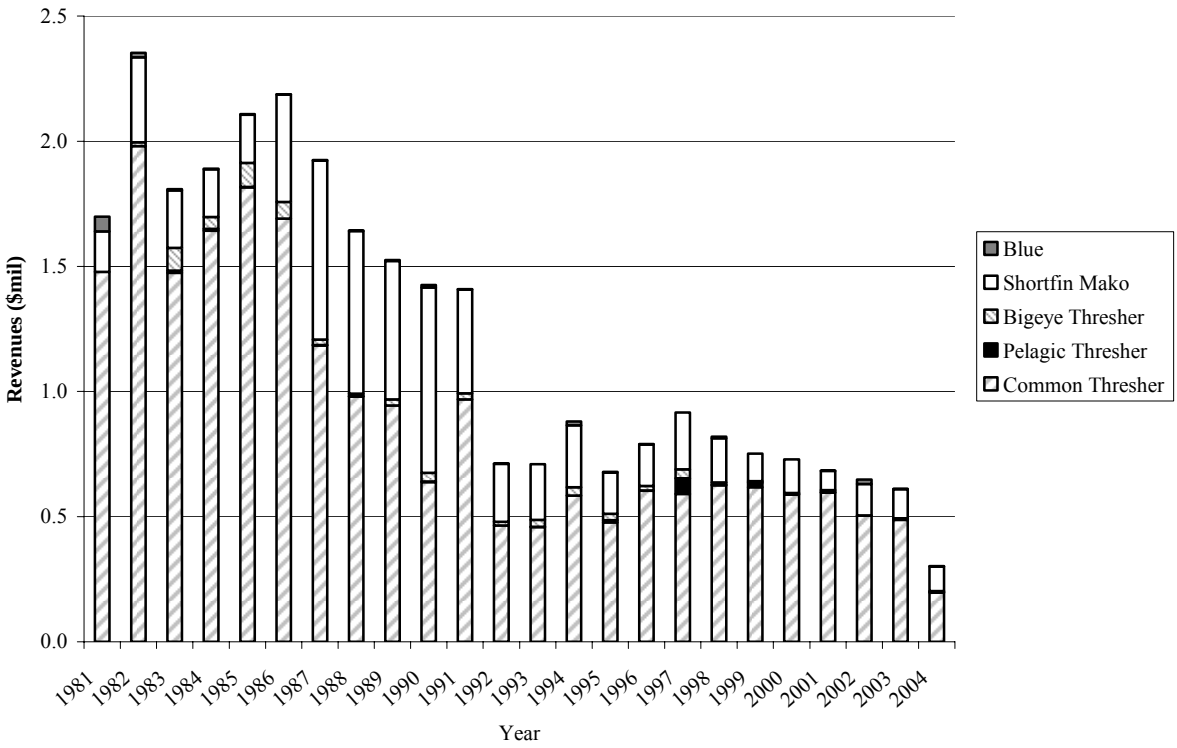

Figure 4-7. Species composition of the commercial shark revenues, 1981-2004.

Interpretation: Figure 4-7 shows Pacific Coast commercial shark revenues in current dollars by species for all gear types from 1981 through 2004. The numeric data used to produce the graph are shown in the Table 4-15.

The graph shows a long term downtrend in commercial shark revenues from levels approaching $2.5 million in the early 1980s to a level near below $500,000 in 2004. The decline was primarily driven by a downward trend in common thresher revenue, and to a lesser extent by a similar decline in shortfin mako revenue. A key factor underlying the decline in revenues is a drop in the number of drift gillnet vessels.

Source and Calculations: The data were extracted from PacFIN. They represent a portion of the Table 4-3.d, Pacific Coast commercial current dollar revenues by species. Current dollar revenues were computed as the sum total of landed weights in pounds multiplied by the prices per pound in each fish ticket line. Aquaculture fish ticket / fish ticket line information is excluded from the data.

Table 4-15. Species composition of the commercial shark revenues, 1981-2004.

	Revenues ($)					
Year	Common Thresher	Pelagic Thresher	Bigeye Thresher	Shortfin Mako	Blue	Total
1981	1,477,222			162,347	59,064	1,698,633
1982	1,980,592		15,169	339,130	18,808	2,353,699
1983	1,474,162	8,449	91,151	229,831	4,566	1,808,159
1984	1,642,439	7,690	47,104	189,731	2,457	1,889,421
1985	1,816,241	716	95,812	193,384	2,232	2,108,385
1986	1,690,452	194	66,710	428,366	1,318	2,187,040
1987	1,183,771	1,849	22,074	714,733	1,853	1,924,280
1988	980,384	821	9,803	650,031	2,188	1,643,227
1989	944,280	149	24,616	552,201	3,458	1,524,704
1990	638,611	1,682	34,688	740,001	10,178	1,425,160
1991	968,065		24,865	415,108	929	1,408,967
1992	464,042	602	14,591	231,017	1,788	712,040
1993	458,634	463	28,190	221,626	608	709,521
1994	584,318	42	33,478	247,068	16,057	880,963
1995	477,755	8,777	24,896	165,215	2,796	679,439
1996	603,054	1,557	17,745	166,763	587	789,706
1997	591,268	62,496	34,768	227,432	278	916,242
1998	625,234	2,584	9,428	176,124	5,977	819,347
1999	617,397	18,424	5,876	110,482	73	752,252
2000	587,718	2,738	4,636	132,992	867	728,951
2001	595,542	2,767	8,428	75,780	1,520	684,037
2002	503,487	1,946		124,521	18,659	648,613
2003	487,783	2,814	3,779	115,685	853	610,914
2004	196,645	2,500	4,060	98,279	972	302,456

Source: PacFIN, extracted August 2, 2005.

4.4 Landings by State

Interpretation: The following table displays commercial landings in round metric tons for the albacore surface hook-and-line (troll and bait boat) fishery that were landed in Washington over the years 1981-2004.

Source and Calculations: The data were extracted from PacFIN. Aquaculture fish ticket / fish ticket line information is excluded from the data. The data only includes fish tickets where at least 1 pound of albacore was landed. Landings in pounds are converted to round weight in mt by multiplying the landed weights by the conversion factors in each fish ticket line and then dividing by 2,204.6. Canadian vessels were excluded by outer joining the fish ticket tables with the state vessel table and checking the "idtype."

Table 4-16. Commercial landings (round mt) of the albacore surface hook-and-line (troll and baitboat) fishery in Washington, 1981-2004.

Year	Albacore	Other Tunas	Swordfish	HMS Sharks	Dorado	Groundfish	Coastal Pelagics	Crab	Salmon	Other	Total
1981	875				N.A.	1			9		885
1982	266				N.A.						266
1983	530				N.A.	1			4		535
1984	67				N.A.						67
1985	172				N.A.						172
1986	845				N.A.						845
1987	529				N.A.						529
1988	1,900		1		N.A.	<0.5	<0.5		<0.5	1	1,902
1989	855				N.A.	<0.5					855
1990	1,225				N.A.						1,225
1991	428	<0.5			N.A.	<0.5			<0.5		428
1992	1,850	<0.5			N.A.	<0.5					1,850
1993	2,155		1	<0.5	N.A.	<0.5			<0.5	1	2,157
1994	5,355				N.A.						5,355
1995	3,344		<0.5		N.A.				1		3,345
1996	4,630				N.A.						4,630
1997	3,670				N.A.	<0.5					3,670
1998	6,087				N.A.						6,087
1999	1,821	12			N.A.						1,833
2000	2,979				N.A.						2,979
2001	3,849	1			N.A.	1			<0.5		3,851
2002	4,729				N.A.	<0.5			1	1	4,731
2003	7,969				N.A.						7,969
2004	7,487				N.A.						7,487

Source: PacFIN, extracted October 14, 2005.
Additional processing info:
Only fish tickets where at least 1 pound of albacore was landed for the albacore surface hook-and-line (troll and baitboat) fishery were used.

Interpretation: The following table displays commercial landings in round metric tons (mt) for the albacore surface hook-and-line (troll and bait boat) fishery that were landed in Oregon over the years 1981-2004.

Source and Calculations: The data were extracted from PacFIN. Aquaculture fish ticket / fish ticket line information is excluded from the data. The data only includes fish tickets where at least 1 pound of albacore was landed. Landings in pounds are converted to round weight in mt by multiplying the landed weights by the conversion factors in each fish ticket line and then dividing by 2,204.6. Canadian vessels were excluded by outer joining the fish ticket tables with the state vessel table and checking the "idtype."

Table 4-17. Commercial landings (round mt) of the albacore surface hook-and-line (troll and baitboat) fishery in Oregon, 1981-2004.

Year	Albacore	Other Tunas	Swordfish	HMS Sharks	Dorado	Groundfish	Coastal Pelagics	Crab	Salmon	Other	Total
1981	3,505					1			25		3,531
1982	853	<0.5				<0.5			1		854
1983	1,509	<0.5				3	<0.5		5		1,517
1984	733	<0.5				<0.5			1		734
1985	692					<0.5			<0.5		692
1986	1,116	<0.5				<0.5			1		1,117
1987	1,038								1		1,038
1988	1,794					<0.5			2		1,796
1989	490					<0.5			<0.5		490
1990	943					<0.5	<0.5		1		944
1991	571								1		571
1992	1,716			<0.5		<0.5			1		1,717
1993	2,147					1			3		2,151
1994	2,131			<0.5					<0.5		2,131
1995	2,283	1			<0.5	<0.5			6		2,290
1996	3,619	<0.5				<0.5			10		3,629
1997	3,867	<0.5			<0.5	1			9		3,877
1998	4,292			<0.5		1			4		4,296
1999	1,632	6		<0.5		<0.5			2		1,640
2000	3,282	<0.5		<0.5		<0.5			2		3,284
2001	3,572	<0.5		<0.5		<0.5			6	1	3,579
2002	1,924								3		1,927
2003	3,807	<0.5							1		3,808
2004	4,562	<0.5		<0.5		<0.5	<0.5		2		4,564

Source: PacFIN, extracted October 14, 2005.
Additional processing info:
Only fish tickets where at least 1 pound of albacore was landed for the albacore surface hook-and-line (troll and baitboat) fishery were used.

Interpretation: The following table displays commercial landings in round metric tons for the albacore surface hook-and-line (troll and bait boat) fishery that were landed in California over the years 1981-2004.

Source and Calculations: The data were extracted from PacFIN. Aquaculture fish ticket / fish ticket line information is excluded from the data. The data only includes fish tickets where at least 1 pound of albacore was landed. Landings in pounds are converted to round weight in mt by multiplying the landed weights by the conversion factors in each fish ticket line and then dividing by 2,204.6. Canadian vessels were excluded by outer joining the fish ticket tables with the state vessel table and checking the "idtype."

Table 4-18. Commercial landings (round mt) of the albacore surface hook-and-line (troll and baitboat) fishery in California, 1981-2004.

Year	Albacore	Other Tunas	Swordfish	HMS Sharks	Dorado	Groundfish	Coastal Pelagics	Crab	Salmon	Other	Total
1981	9,042	14		<0.5	<0.5	1	2		3	1	9,063
1982	3,845	3	4	2	1	4	<0.5		2	1	3,862
1983	1,838	3	3	1	<0.5	7	2		1	1	1,856
1984	6,226	6	<0.5	<0.5	<0.5	4	1		<0.5	<0.5	6,237
1985	5,321	2	9	4	<0.5	4	<0.5		1	<0.5	5,341
1986	2,517	2	1	<0.5		19	<0.5	<0.5	1	2	2,542
1987	919	<0.5	1	<0.5		1	1		<0.5	1	923
1988	579	<0.5	12	2		<0.5				1	594
1989	786	1	7	8	<0.5	9		<0.5	2	1	814
1990	758	<0.5	2	<0.5	<0.5	3	<0.5		<0.5	1	764
1991	639	<0.5				<0.5		<0.5		1	640
1992	1,047	<0.5	13	2	<0.5	6			<0.5	1	1,069
1993	1,399	18	89	5	9	3				1	1,524
1994	3,048	<0.5	1	<0.5	<0.5	1			<0.5	1	3,051
1995	777	<0.5	<0.5	<0.5		<0.5	<0.5		<0.5	2	779
1996	5,038	42	<0.5	<0.5		<0.5			<0.5	2	5,082
1997	3,288	7	1	1	<0.5	5	<0.5		3	1	3,306
1998	2,231	116	4	3	<0.5	1	<0.5		1	3	2,359
1999	5,296	6	15	1	<0.5	1	<0.5		<0.5	5	5,324
2000	1,796	2	22	<0.5	<0.5	1	<0.5		1	2	1,824
2001	2,796	8	<0.5	1	<0.5	2	<0.5		3	6	2,816
2002	2,659	2	2	<0.5	<0.5	<0.5	<0.5		3	3	2,669
2003	1,696	3		<0.5	<0.5	1	<0.5		2	3	1,705
2004	1,335	1		<0.5	<0.5	<0.5	<0.5		2	3	1,341

Source: PacFIN, extracted October 14, 2005.
Additional processing info:
Only fish tickets where at least 1 pound of albacore was landed for the albacore surface hook-and-line (troll and baitboat) fishery were used.

4.5 Recreational Private Sport Fleet

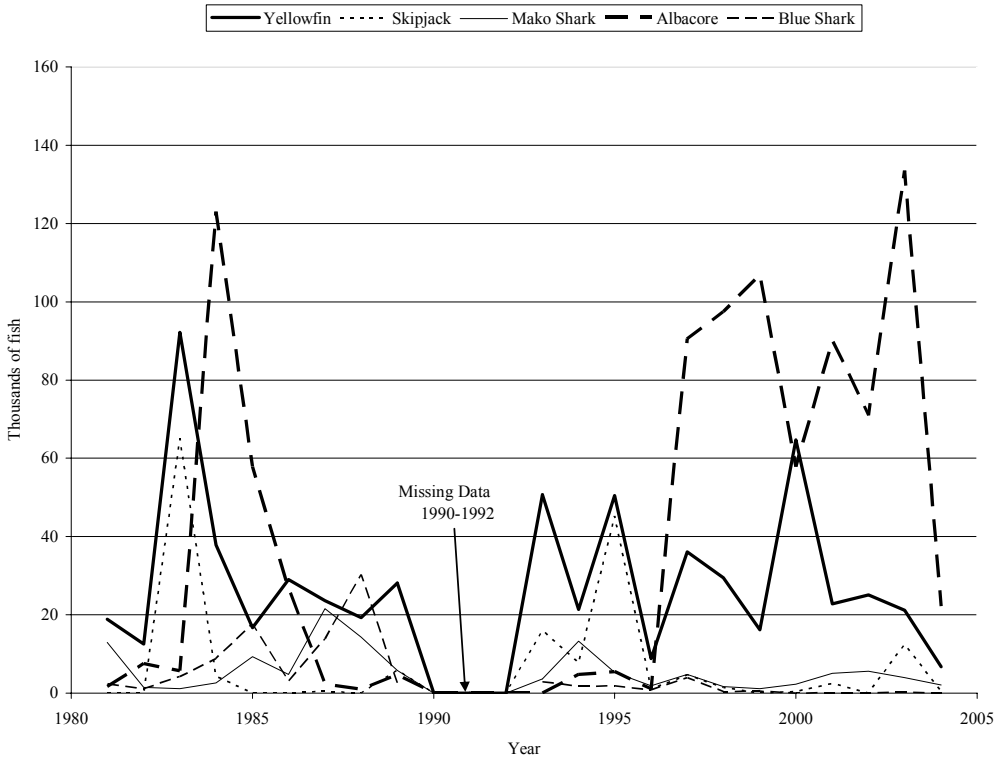

Figure 4-8. Catch by species for the recreational private sport fishing fleet, 1981-2004.

Interpretation: Figure 4-8 shows Pacific Coast recreational private sport fishing fleet HMS catches by species. Table 4-19 shows the numeric values, with added columns for species representing negligible shares of the overall catch (bluefin tuna, bigeye tuna, marlin, and thresher shark).

The principal species targeted are the tunas, with albacore and yellowfin comprising the most important components of the number of fish caught. Skipjack tuna was next most important historically, although it appears to represent a declining share of recent catch. Blue shark and thresher shark were the most important shark species included in the HMS private boat catch, although both of these species constitute a much smaller share of the overall catch than the three tuna species shown in the graph.

Source and Calculations: The data were extracted from RecFIN. Tables were created for each species by requesting "examined" and "dead" catch types summed across the range of waves within each year from 1981 through 2004. The primary source for the data was the Marine Recreational Fisheries Statistics Survey (MRFSS) survey for years through 2003 and California Recreational Fish Survey (CRFS) for 2004. Blank table entries represent missing values (including the years 1990–1992 for which no data is available). No catch records were available in RecFIN for swordfish or dorado. Data for 2003 and 2004 are preliminary and may be incomplete.

Table 4-19. Catch by species (1000s of fish) for the recreational private sport fishing fleet, 1981-2004.

Year	Yellowfin	Skipjack	Bluefin	Albacore	Bigeye Tuna	Marlin	Mako	Common Thresher	Blue Shark
1981	18.9			1.7			13.0		2.4
1982	12.5			7.6	2.5	0.8	1.5	2.2	1.1
1983	92.2	65.0	0.6	5.7	0.6	0.4	1.1	2.4	4.2
1984	37.8	4.4	0.6	123.0	0.6	1.2	2.6	0.8	8.8
1985	16.7			57.9		0.7	9.3	0.4	17.6
1986	29.0			26.7			4.8	1.4	3.0
1987	23.6	0.5		2.3		0.9	21.6	4.8	13.9
1988	19.3			1.0		0.8	14.3	0.9	30.3
1989	28.1	5.8		4.7			5.8	0.8	2.6
1990									
1991									
1992									
1993	50.7	16.0		0.0		0.3	3.6	2.6	2.9
1994	21.4	7.7		4.8		0.4	13.3	3.6	1.8
1995	50.5	45.2		5.5		0.3	5.3	2.7	1.9
1996	8.8	1.0		1.0			1.9	0.7	0.8
1997	36.1	4.7		90.5		0.4	4.8	0.5	3.9
1998	29.5	1.5	1.6	97.5			1.7	0.6	0.4
1999	16.2			106.9			1.1	1.3	0.5
2000	64.7	0.4		57.9	0.4		2.3	1.7	0.0
2001	22.8	2.5	1.0	90.1			5.1	2.2	0.1
2002	25.1		0.9	70.9			5.6	1.6	0.1
2003	21.2	12.4		133.5	0.2		3.9	2.0	0.2
2004	6.7	0.3	0.1	22.2	0.0	0.0	2.1	4.3	0.1

Source: RecFin (extracted August 2005)

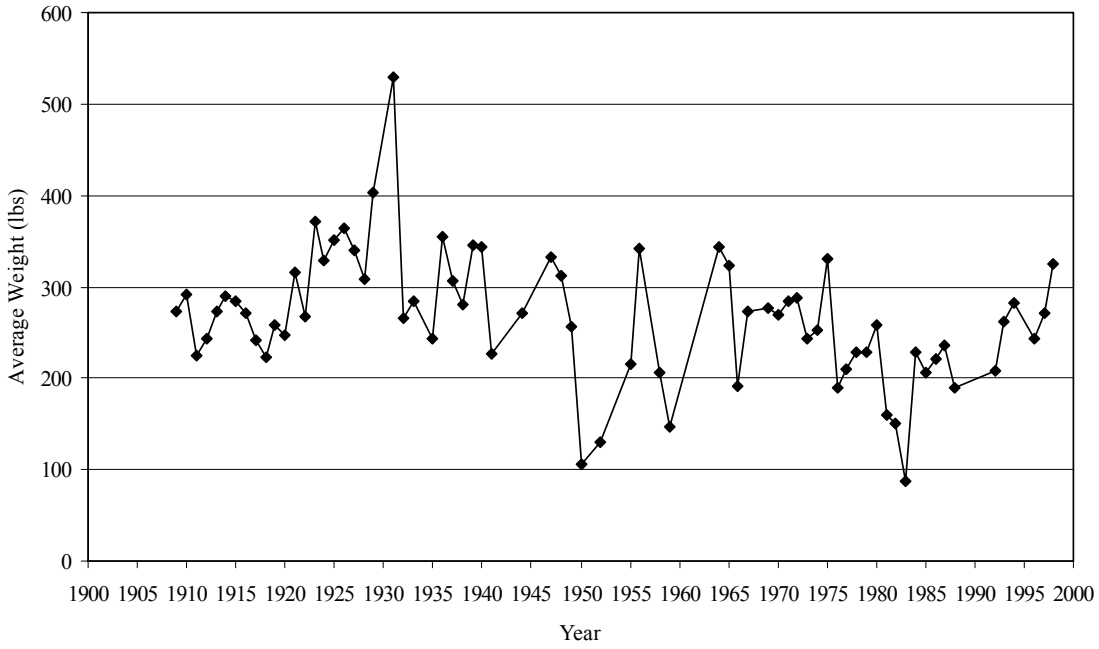

Figure 4-9. Average weight (pounds) of swordfish weighed in at the Tuna Club, Balboa Club, and San Diego Marlin Club, 1909-1998.

Interpretation: Figure 4-9 shows the average weight of swordfish weighed in at three Southern California angling clubs from 1909. The maximum average shown on the graph of 529 pounds actually reflects the catch of only one unusually large swordfish for the year 1931. The average weight of about 280 pounds for swordfish caught before 1945 was significantly higher by about 42 pounds than the post-war average.

Source and Calculations: The three angling clubs provided their raw weight data through the NMFS Southwest Fisheries Science Center (SWFSC) Billfish Tagging Program. These data were compiled to generate the averages shown in the figure and Table 4-20.

Table 4-20. Average weight (pounds) of swordfish weighed in at the Tuna Club, Balboa Club, and San Diego Marlin Club, 1909-1998.

Year	Average Weight	Year	Average Weight
1909	273.5	1954	
1910	292.0	1955	215.3
1911	224.0	1956	341.5
1912	243.8	1957	
1913	272.3	1958	206.0
1914	289.7	1959	146.0
1915	284.0	1960	
1916	270.7	1961	
1917	241.7	1962	
1918	222.0	1963	
1919	258.8	1964	344.5
1920	247.0	1965	323.5
1921	316.5	1966	191.8
1922	266.7	1967	273.6
1923	371.0	1968	
1924	329.6	1969	277.4
1925	351.6	1970	269.6
1926	363.3	1971	284.9
1927	339.7	1972	288.8
1928	307.8	1973	243.0
1929	403.0	1974	252.2
1930		1975	331.6
1931	529.0	1976	189.0
1932	266.0	1977	210.0
1933	284.7	1978	227.9
1934		1979	228.3
1935	244.0	1980	257.7
1936	355.0	1981	160.2
1937	305.7	1982	151.0
1938	280.0	1983	87.0
1939	346.3	1984	228.0
1940	344.2	1985	207.0
1941	226.0	1986	220.4
1942		1987	236.0
1943		1988	189.5
1944	272.0	1989	
1945		1990	
1946		1991	
1947	332.2	1992	208.0
1948	311.8	1993	261.0
1949	255.8	1994	282.0
1950	106.0	1995	
1951		1996	243.0
1952	130.0	1997	271.0
1953		1998	325.0

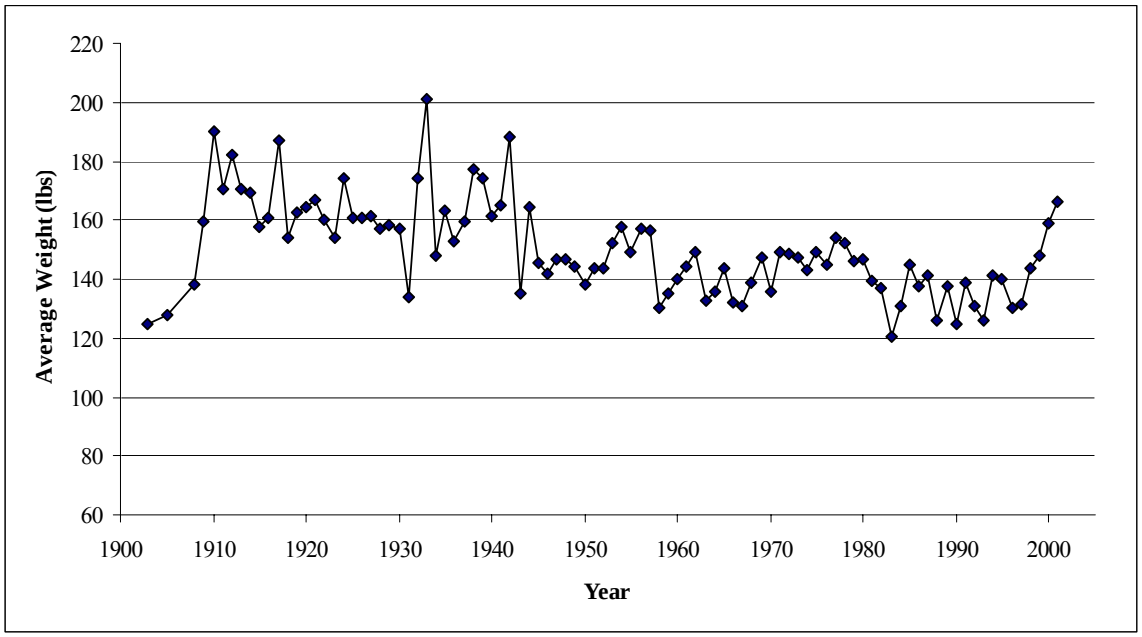

Figure 4-10. Average weight (pounds) of striped marlin weighed in at selected Southern California angling clubs, 1903-2001.

Interpretation: Figure 4-10 shows the average weight of striped marlin weighed in at three Southern California angling clubs from 1903 through 2001. The average weight of striped marlin caught varied between 120 pounds and 200 pounds for the duration of the period. The average weight in 2001 exceeded 160 pounds for the first time since 1944, providing a preliminary indication that the average weight of striped marlin may be on the increase in recent years.

Source and Calculations: The three angling clubs provided their raw weight data through the NMFS SWFSC Billfish Tagging Program. These data were compiled to generate the averages shown in Table 4-21.

Table 4-21. Average weight (pounds) of striped marlin weighed in at selected Southern California angling clubs, 1903-2001.

Year	Average	Year	Average
1903	125.0	1954	157.5
1905	128.0	1955	149.3
1908	138.0	1956	157.2
1909	159.6	1957	156.7
1910	190.4	1958	130.3
1911	170.5	1959	135.0
1912	182.0	1960	140.2
1913	170.4	1961	144.6
1914	169.5	1962	149.0
1915	157.6	1963	133.0
1916	160.6	1964	135.5
1917	187.1	1965	143.6
1918	153.9	1966	131.8
1919	162.7	1967	130.7
1920	164.6	1968	138.6
1921	166.9	1969	147.2
1922	159.9	1970	135.8
1923	154.1	1971	148.9
1924	174.1	1972	148.6
1925	161.0	1973	147.4
1926	160.8	1974	143.1
1927	161.3	1975	149.3
1928	157.4	1976	145.0
1929	158.0	1977	154.1
1930	157.3	1978	152.5
1931	134.1	1979	146.1
1932	174.1	1980	147.0
1933	201.1	1981	139.5
1934	147.8	1982	137.2
1935	163.2	1983	120.6
1936	152.6	1984	130.7
1937	159.5	1985	144.8
1938	177.3	1986	137.3
1939	173.9	1987	141.1
1940	161.1	1988	126.0
1941	165.0	1989	137.3
1942	188.2	1990	124.6
1943	135.1	1991	138.9
1944	164.7	1992	130.8
1945	145.6	1993	126.1
1946	141.8	1994	141.4
1947	146.6	1995	140.0
1948	146.4	1996	130.0
1949	144.3	1997	131.6
1950	138.3	1998	143.6
1951	143.5	1999	148.2
1952	143.8	2000	159.2
1953	152.1	2001	166.0

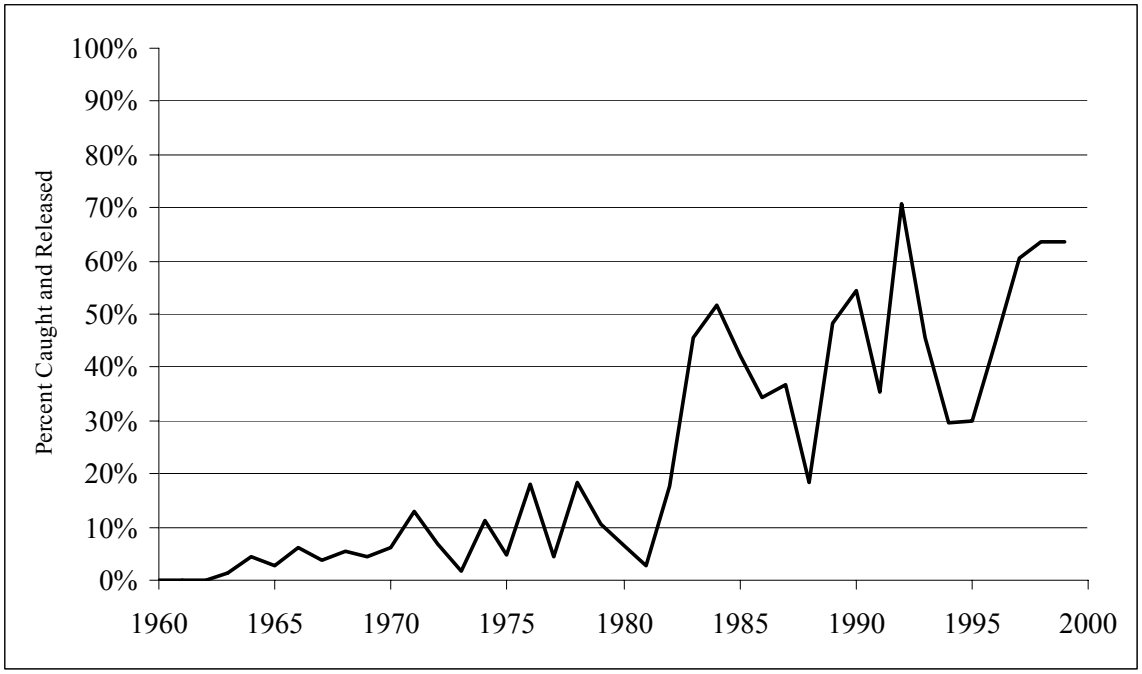

Figure 4-11. Southern California recreational marlin catch/release.

Interpretation: Figure 4-11 shows the percentage of marlin caught and released by members of three Southern California angler clubs over the period from 1961 through 1999 either with or without tagging.

Source and Calculations: The three angling clubs provided their raw catch/release data through the NMFS SWFSC Billfish Tagging Program. These data were compiled to generate the percentages shown in Figure 4-11 and Table 4-22.

Table 4-22. Southern California recreational marlin catch/release.

Year	Percent
1960	0.0%
1961	0.0%
1962	0.0%
1963	1.4%
1964	4.4%
1965	2.9%
1966	6.0%
1967	3.7%
1968	5.4%
1969	4.5%
1970	6.0%
1971	13.0%
1972	6.9%
1973	1.8%
1974	11.3%
1975	4.7%
1976	18.0%
1977	4.3%
1978	18.2%
1979	10.5%
1980	6.4%
1981	2.8%
1982	17.7%
1983	45.5%
1984	51.6%
1985	42.3%
1986	34.4%
1987	36.7%
1988	18.5%
1989	48.2%
1990	54.5%
1991	35.3%
1992	70.6%
1993	45.5%
1994	29.6%
1995	29.9%
1996	44.9%
1997	60.6%
1998	63.7%
1999	63.4%

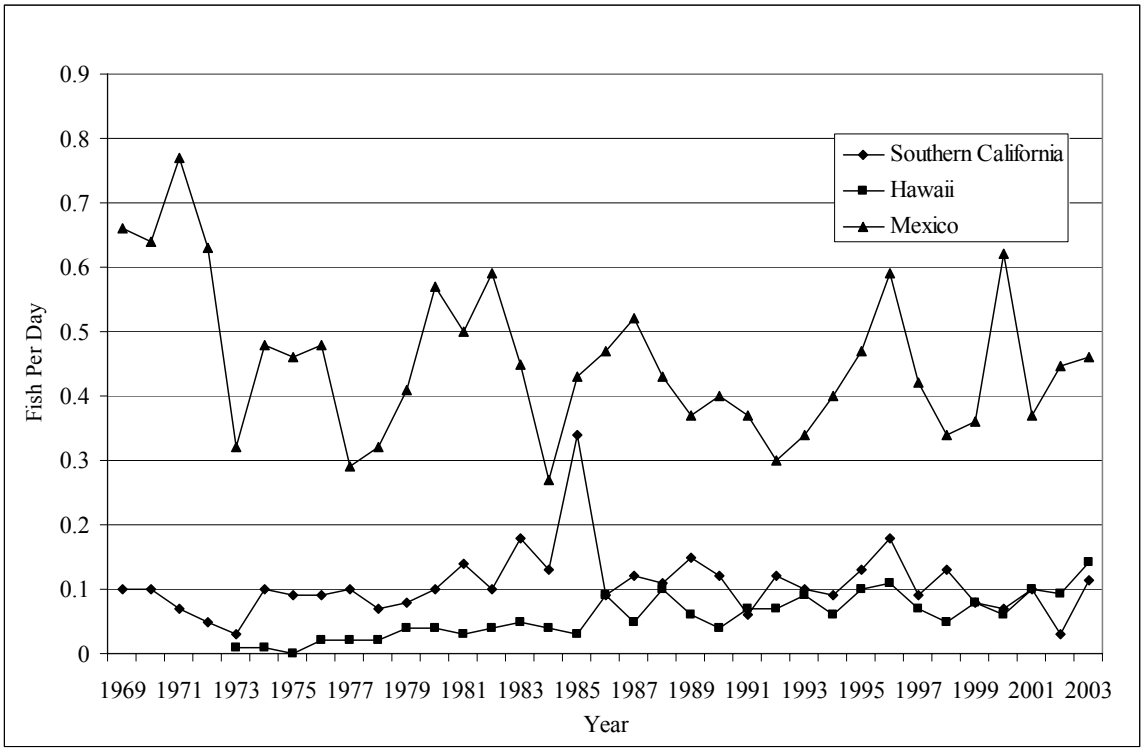

Figure 4-12. Catch rates for striped marlin in Southern California, Baja California, and Hawaii, 1970-2003.

Interpretation: Figure 4-12 shows the number of striped marlin caught-per-day by anglers in Southern California, Baja Mexico, and Hawaii in each year from 1969 through 2003. The graph indicates that the catch rate was by far the highest in Mexico waters. The Hawaii and Southern California catch rates were lower and very similar, with Southern California slowing a slight edge.

Source and Calculations: Data were collected through the NMFS SWFSC Billfish Tagging Program. These data were compiled to generate the catch rates shown in Figure 4-12 and Table 4-23.

Table 4-23. Catch rates for striped marlin in Southern California, Baja California, and Hawaii, 1970-2003.

Year	SOCAL	HAWAII	MEXICO
1969	0.1		0.66
1970	0.1		0.64
1971	0.07		0.77
1972	0.05		0.63
1973	0.03	0.01	0.32
1974	0.1	0.01	0.48
1975	0.09	0	0.46
1976	0.09	0.02	0.48
1977	0.1	0.02	0.29
1978	0.07	0.02	0.32
1979	0.08	0.04	0.41
1980	0.1	0.04	0.57
1981	0.14	0.03	0.5
1982	0.1	0.04	0.59
1983	0.18	0.05	0.45
1984	0.13	0.04	0.27
1985	0.34	0.03	0.43
1986	0.09	0.09	0.47
1987	0.12	0.05	0.52
1988	0.11	0.1	0.43
1989	0.15	0.06	0.37
1990	0.12	0.04	0.4
1991	0.06	0.07	0.37
1992	0.12	0.07	0.3
1993	0.1	0.09	0.34
1994	0.09	0.06	0.4
1995	0.13	0.1	0.47
1996	0.18	0.11	0.59
1997	0.09	0.07	0.42
1998	0.13	0.05	0.34
1999	0.08	0.08	0.36
2000	0.07	0.06	0.62
2001	0.1	0.1	0.37
2002	0.03	0.092	0.447
2003	0.114	0.142	0.46

4.6 Recreational Charter/Party Boat Catches in California and Mexico Waters

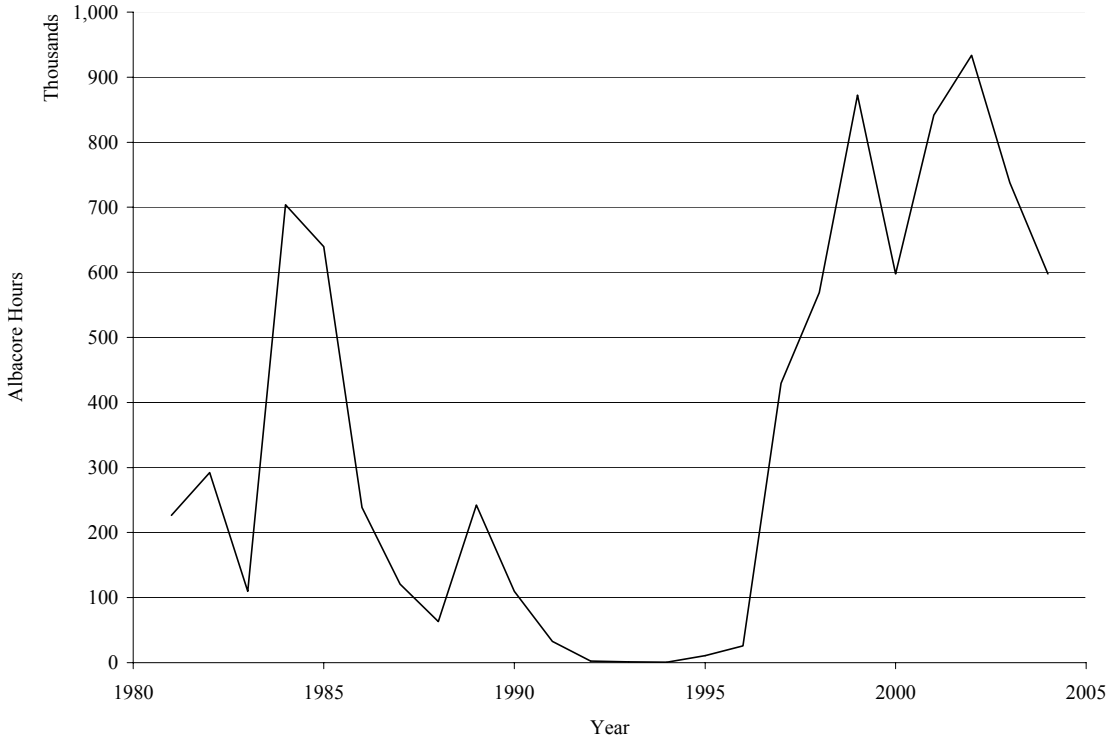

Figure 4-13. Albacore fishing hours for the California CPFV fleet, 1981-2004.

Interpretation: Figure 4-13 shows the total number of recorded hours of albacore fishing time for passengers on boats in the CPFV fleet for each year from 1981-2004. Table 4-24 shows the numeric values. The fishing time shows a wide range of variation over the period, from a low of 891 hours in 1994 to a high of 933,977 hours in 2002.

Source and Calculations: The data were extracted from the CPFV logbook database. Albacore hours were computed as number of fishing hours multiplied by the number of passengers.

Table 4-24. Albacore fishing hours for the California CPFV fleet, 1981-2004.

Year	Albacore Hours
1981	226,458
1982	292,213
1983	109,208
1984	704,068
1985	639,672
1986	238,502
1987	121,043
1988	63,171
1989	242,391
1990	109,356
1991	32,513
1992	2,625
1993	1,458
1994	891
1995	10,466
1996	25,899
1997	429,277
1998	568,535
1999	872,330
2000	597,693
2001	841,465
2002	933,977
2003	737,746
2004	597,476

Source: CPFV Logbook Database.
Extracted August 2005.

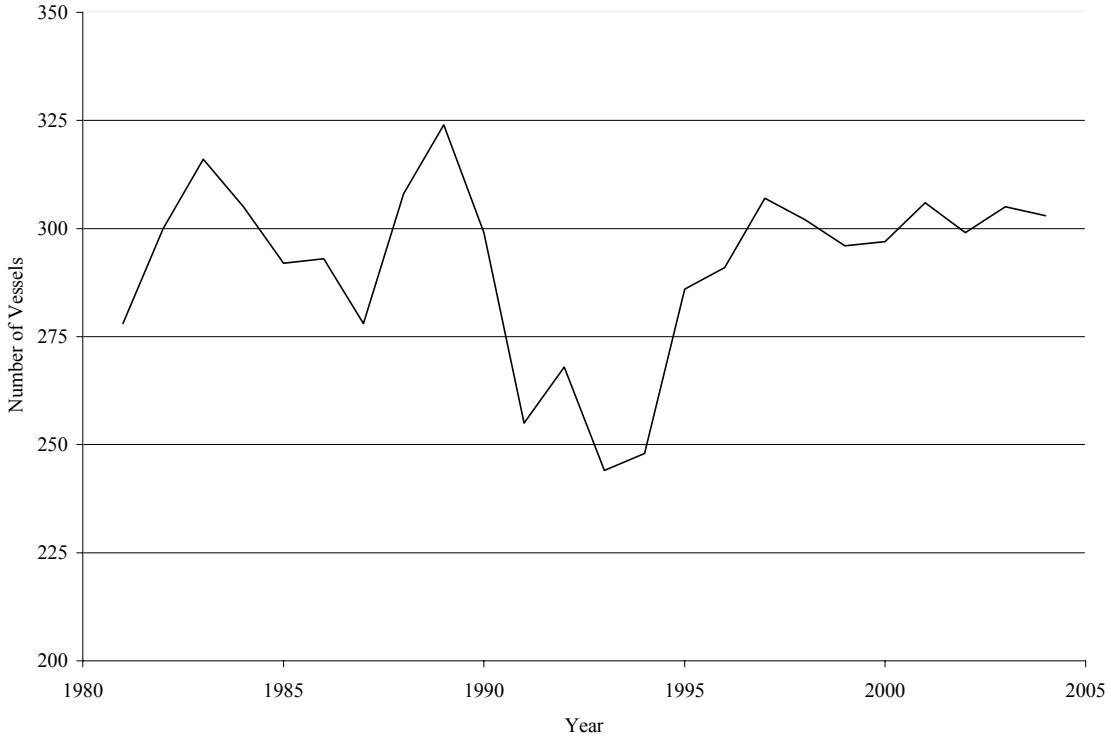

Figure 4-14. Number of recreational charter vessels targeting HMS in California waters, 1981-2004.

Interpretation: Figure 4-14 shows the number of vessels in the CPFV fleet which targeted HMS in each year. Table 4-25 displays the numeric values.

The number of vessels peaked at 324 in 1989 before falling off to a level of 244 by 1993. The subsequent California economic recovery of the latter half of the 1990s was mirrored by an increase in the number of operating CPFV vessels back to a level near 300 from 1996 to 2004.

Source and Calculations: The data were extracted from the CPFV logbook database.

Table 4-25. Number of recreational charter vessels targeting HMS in California waters, 1981-2004.

Year	Vessels
1981	278
1982	300
1983	316
1984	305
1985	292
1986	293
1987	278
1988	308
1989	324
1990	299
1991	255
1992	268
1993	244
1994	248
1995	286
1996	291
1997	307
1998	302
1999	296
2000	297
2001	306
2002	299
2003	305
2004	303

Source: CPFV Logbook Database.
Extracted September 2005.

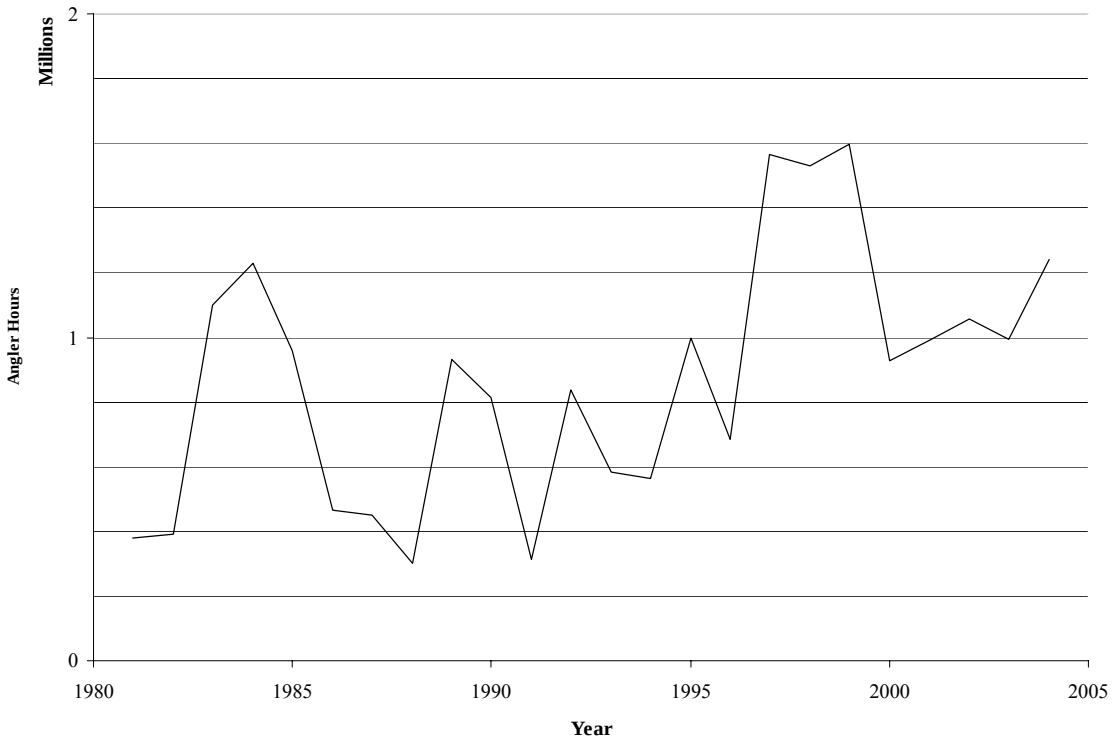

Figure 4-15. Number of angler-hours for the California CPFV fleet, 1981-2004.

Interpretation: Figure 4-15 shows the number of angler hours for the CPFV fleet which targeted HMS in each year from 1981-2004. Table 4-26 displays the numeric values.

The number of angler hours shows a sizable amount of annual variation, from as low as 301,811 in 1988 to as high as 1,597,008 in 1999. Since 1997, the number of angler hours has remained with the range from 900,000 to 1.6 million hours.

Source and Calculations: The data were extracted from the CPFV logbook database.

Table 4-26. Number of angler-hours for the California CPFV fleet, 1981-2004.

Year	Angler Hours
1981	379,694
1982	390,452
1983	1,098,855
1984	1,230,846
1985	960,023
1986	464,594
1987	452,011
1988	301,811
1989	933,147
1990	814,060
1991	313,121
1992	836,353
1993	582,539
1994	563,451
1995	999,271
1996	684,639
1997	1,564,055
1998	1,532,109
1999	1,597,008
2000	928,464
2001	991,526
2002	1,058,418
2003	993,669
2004	1,241,161

Source: CPFV Logbook Database.
Extracted September 2005.

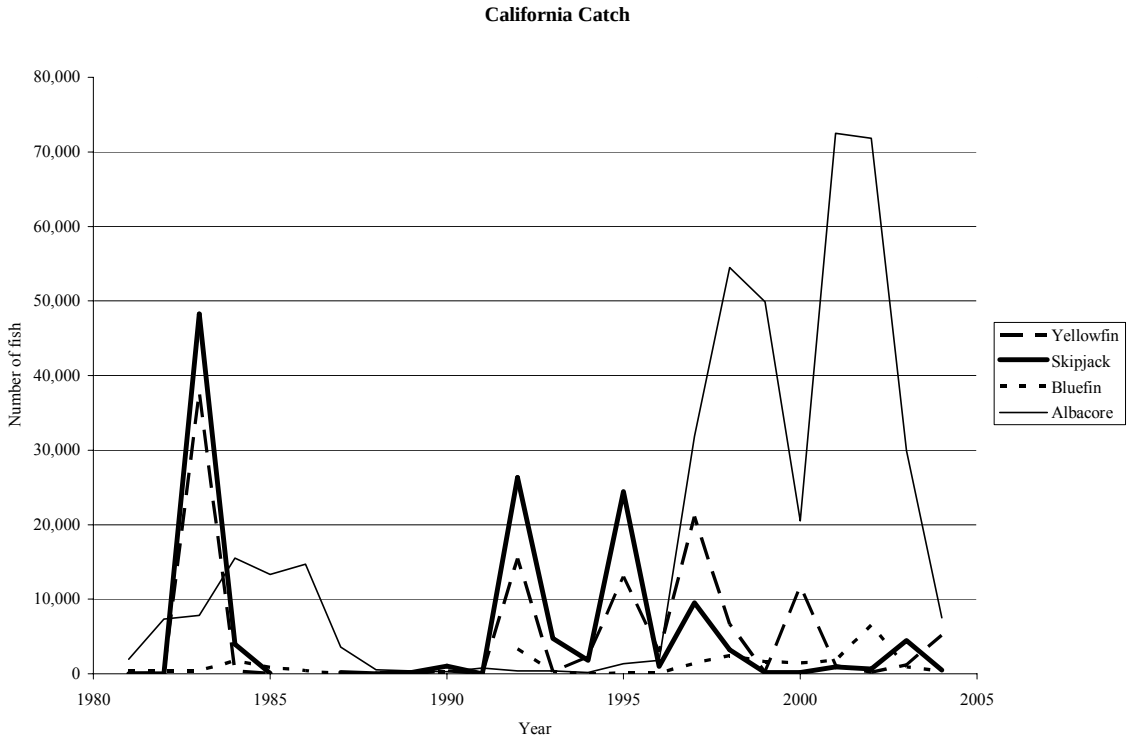

Figure 4-16. Catch by species for the California CPFV fleet in California waters, 1981-2004.

Interpretation: Figure 4-16 shows California CPFV fleet HMS catches by species which were caught in California waters. The graph only displays the four most important constituents of the catch, which are all tuna species. Figure 4-17 shows a similar display for California CPFV fleet HMS catches by species which were caught in Mexico waters.

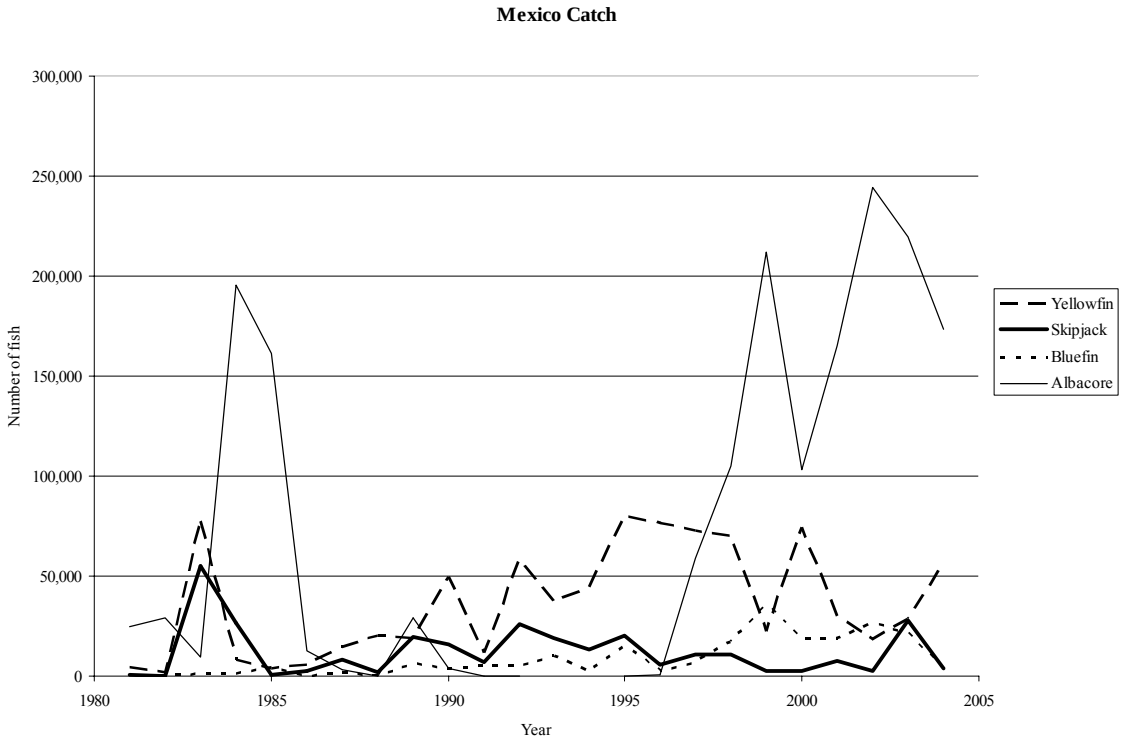

Figure 4-17. California CPFV fleet HMS catches by species caught in Mexico waters.

Table 4-27 displays the numeric values, with added columns for species representing negligible shares of the overall catch (bluefin tuna, bigeye tuna, marlin, and thresher shark), displayed in Figures 4-16 and 4-17. For several species (e.g., dorado and the tunas), recent catch in Mexican waters far exceeds that taken in U.S. waters for the CPFV fleet.

The principal species targeted are the tunas, with albacore of increasing importance relative to other species of tuna in recent years. Blue shark was the most important shark species of the late 1980s, but has steeply declined as a share of the catch in recent periods.

Source and Calculations: The data were extracted from the CPFV logbook database.

Table 4-27. Catch by species for the California CPFV fleet in California and Mexico waters, 1981-2004.

Year	Yellowfin	Skipjack	Bluefin	Albacore	Bigeye Tuna	Swordfish	Marlin	Mako	Common Thresher	Blue Shark	Dorado
1981	81	17	419	1,946	25		37	34	7	100	35
1982	129	8	392	7,352	9		13	18	36	83	
1983	37,816	48,254	443	7,833	176		28	28	136	22	1,258
1984	421	3,993	1,765	15,527	26	2	9	49	16	35	527
1985	46	40	850	13,309	10		7	18	29	19	5
1986			443	14,706	37		13	58	13	217	11
1987	58	167	5	3,580	7		8	296	15	645	
1988	35	2	147	547	2	2	2	115	15	882	1
1989	25	165	88	367	2		7	302	45	4,469	1
1990	367	1,008	198	275	5		7	231	51	2,675	7,147
1991	60	18		741			1	129	50	5,802	
1992	15,457	26,326	3,325	379	7		12	130	29	1,109	1,912
1993	299	4,743	316	393		3	1	297	163	694	707
1994	2,285	1,797	10	171			5	269	30	497	64
1995	12,992	24,436	93	1,341	1		6	146	59	494	12
1996	2,926	961	89	1,805			4	233	30	441	341
1997	21,048	9,504	1,397	31,853	28		13	306	46	503	5,734
1998	6,627	3,185	2,430	54,487	26		6	150	27	140	394
1999	230	171	1,623	49,907	14		1	70	47	129	392
2000	11,648	175	1,478	20,514	60		2	165	40	146	4,169
2001	1,072	938	1,780	72,499		1		188	14	140	390
2002	217	643	6,546	71,858	1	2	2	181	11	14	139
2003	1,191	4,473	905	29,941				66	26	47	23
2004	5,165	482	340	7,494	53	2	2	240	18	6	359
Mexico											
1981	4,478	418	123	24,702	217	1	30	3		1	1,246
1982	1,906	24	273	29,338	129		20	8		2	1,099
1983	78,482	54,786	1,469	9,328	2,077		37	1		6	3,734
1984	8,227	26,364	1,069	195,758	511		278	13			6,005
1985	3,882	317	4,298	161,194	659		64	8		1	1,357
1986	5,505	2,249	250	12,616	1,478		30	8		2	1,855
1987	14,796	8,038	1,946	3,466	628		160	8		6	3,518
1988	20,109	1,896	183	12	426		132	17		62	3,348
1989	19,059	19,571	6,431	29,361	42		33	8	1	6	2,340
1990	49,534	15,523	3,558	3,568	2,191		101	12		2	24,574
1991	11,702	6,788	5,330	272	256		11	10			1,301
1992	58,282	25,976	5,261	1	42		13	6	1	1	20,815
1993	37,069	19,080	10,219		46		29	11		1	8,245
1994	43,999	13,513	2,233		15		37	17		4	5,151
1995	80,502	20,423	15,332	1	37	1	32	33		37	5,055
1996	76,304	5,881	2,658	390	129		13	55	1	56	24,486
1997	72,666	10,821	6,907	59,136	241		12	19	2	32	24,199
1998	70,166	10,699	17,321	105,219	1,771	3	10	28		39	6,164
1999	22,418	2,635	35,231	212,074	1,092	1	2	28		72	3,746
2000	74,094	2,804	18,902	102,927	482			35		9	10,932
2001	29,665	7,725	19,172	165,142	11			48		72	3,433
2002	18,204	2,325	26,709	244,320	7		1	29			2,564
2003	28,655	27,775	21,429	219,405	60	2	4	47			3,178
2004	56,277	3,770	3,016	173,592	381		3	59			7,356

Source: CPFV Logbook Data Base (extracted August 2005)

4.7 Information and Sources

Table 4-28. PacFIN species codes used to extract commercial fisheries data for HMS SAFE 2005 report.

AGID	Category	SPID	MGRP[1]	Description
C	5	ALBC	HMSP	TUNA, ALBACORE
O	375	ALBC	HMSP	TUNA, ALBACORE
W	101	ALBC	HMSP	ALBACORE TUNA THUNNUS ALALUNGA
C	1	YTNA	HMSP	TUNA, YELLOWFIN
O	376	YTNA	HMSP	TUNA, YELLOWFIN
C	2	STNA	HMSP	TUNA, SKIPJACK
O	372	STNA	HMSP	TUNA, SKIPJACK
W	104	STNA	HMSP	SKIPJACK TUNA
C	8	ETNA	HMSP	TUNA, BIGEYE
O	377	ETNA	HMSP	TUNA, BIGEYE[2]
C	4	BTNA	HMSP	TUNA, BLUEFIN
O	378	BTNA	HMSP	TUNA, BLUEFIN
W	102	BTNA	HMSP	BLUEFIN TUNA (THUNNUS THYNNUS)
C	6	UTNA	HMSP	TUNA, UNSPECIFIED[3]
C	91	SWRD	HMSP	SWORDFISH
O	385	SWRD	HMSP	SWORDFISH
W	106	SWRD	HMSP	SWORDFISH XIPHIAS GLADIUS
C	155	TSRK	HMSP	SHARK, COMMON THRESHER
O	023	TSRK	HMSP	SHARK, THRESHER
W	287	TSRK	HMSP	THRESHER SHARK ALOPIUS VULPINUS
W	387	TSRK	HMSP	THRESHER SHARK (REDUCTION) ALOPIUS VULPINUS
W	487	TSRK	HMSP	THRESHER SHARK (ANIMAL FOOD) ALOPIUS VULPINUS
C	98	PSRK	HMSP	SHARK, PELAGIC THRESHER
C	97	ISRK	HMSP	SHARK, BIGEYE THRESHER
C	151	MAKO	HMSP	SHARK, BONITO (MAKO)
O	026	MAKO	HMSP	SHARK, SHORTFIN MAKO
C	167	BSRK	HMSP	SHARK, BLUE
O	031	BSRK	HMSP	SHARK, BLUE
W	282	BSRK	HMSP	BLUE SHARK PRIONACE GLAUCA
W	382	BSRK	HMSP	BLUE SHARK (REDUCTION) PRIONACE GLAUCA
W	482	BSRK	HMSP	BLUE SHARK (ANIMAL FOOD) PRIONACE GLAUCA
C	481	DRDO	HMSP	DOLPHINFISH
O	292	DRDO	HMSP	DOLPHINFISH

AGID = agency id (C=CDFG, O=ODFW, W=WDFW)
CATEGORY = state species character code
SPID = PacFIN species ID
MGRP = PacFIN species management group
DESCRIPTION = state species description

[1]PacFIN species codes in the HMSP management group that are not used include:

C	O
92	388
MRLN	MRLN
HMSP	HMSP
MARLIN, STRIPED	MARLIN, STRIPED

[2]New code since tables for HMS FMP developed in 2001
[3]Code not used when tables for HMS FMP developed in 2001

Table 4-29. PacFIN gear codes used to extract commercial fisheries data for HMS SAFE 2005 report.

AGID	GEAR	GRID	GRGROUP	DESCRIPTION
SURFACE HOOK AND LINE (ALBACORE)				
C	001	POL	HKL	HOOK AND LINE
C	002	POL	HKL	LIVE BAIT
C	006	POL	HKL	JIG (ALBACORE)
C	007	TRL	TLS	TROLL (ALBACORE)
C	009	TRL	TLS	TROLL, (SALMON)
O	120	TRL	TLS	OCEAN TROLL
O	170	POL	HKL	TUNA BAITBOAT
W	41	TRL	TLS	TROLL (SALMON)
DRIFT GILLNET (SWORDFISH & SHARK)				
C	065	DGN	NET	GILL NET, DRIFT
O	140	GLN	NET	OCEAN GILLNET
HARPOON				
C	012	OTH	MSC	HARPOON (PLANK)
PURSE SEINE (TUNA)				
C	070	SEN	NET	ENCIRCLING NETS
C	071	SEN	NET	PURSE SEINE AND RING NET
C	073	SEN	NET	DRUM PURSE SEINE
C	075	SEN	NET	LAMPARA NET
O	160	SEN	NET	TUNA SEINE[1]
LONGLINE (HMS)				
C	005	LGL	HKL	LONG LINE, SET
O	150	LGL	HKL	PELAGIC LONGLINE
W	43	LGL	HKL	SET LINE/LONG LINE[1]

AGID = agency id (C=CDFG, O=ODFW, W=WDFW)
GEAR = state gear character code
GRID = PacFIN gear ID
GRGROUP = PacFIN gear group
DESCRIPTION = state gear description
[1]Code not used when tables for HMS FMP developed in 2001.

5.0 UPDATED STATUS OF THE HIGHLY MIGRATORY SPECIES MANAGEMENT UNIT SPECIES

This chapter contains a brief review of the stock status for each species with respect to the Council-adopted Control Rules. First (Section 5.1), the adopted Control Rules and the Status Determination Criteria are summarized. Secondly (Section 5.2), a table of the recent and upcoming assessment efforts of various international scientific bodies responsible for assessing several of the stocks is presented. The third section (Section 5.3) contains selected excerpts from recent stock assessment conclusions, if there has been an update since publication of the HMS FMP. These excerpts are taken directly from executive summaries of the assessments or reports of working group meetings associated with the assessments and do not necessarily represent the conclusions of the Council's HMS Management Team or NMFS. In many cases there has been minimal outside review of the assessment. Nevertheless, the excerpts represent the most recent available information for those species to compare to past and future work. Finally, a table summarizes the current stock status of the management unit species with respect to overfishing and overfished criteria. The conclusions presented in the table should be reasonably accurate, but should also be treated with caution. Assessments of stock status always involve assumptions, use of uncertain parameters, and particular interpretations of fishery statistics. There are no universally-accepted standards by which to determine confidence for particular assessments, and "ground-truthing" (i.e., comparing assessment estimates to actual population counts) will never be possible over the broad range occupied by HMS species. Furthermore, for most of these species, the scientific bodies developing the assessments have not agreed upon an appropriate biological reference point for use in the context of managing fisheries. Therefore, explicit definitions for both overfished and sustainable exploitation levels are not currently available.

5.1 Control Rules for Management

The Control Rules and Status Determination Criteria implemented in the HMS FMP are based on the Technical Guidance for National Standard 1 of the Magnuson-Stevens Fishery Conservation and Management Act (Restrepo et al. 1998). The following is a summary of the Management Control Rules adopted for the HMS Fishery Management Plan.

In general, a default maximum sustainable yield (MSY) control rule was adopted for most management unit species (MUS), with an optimum yield (OY) target control rule for the vulnerable species (Figure 5-1).

For the less vulnerable species managed under the MSY Control Rule, the minimum stock size threshold (MSST), the minimum biomass at which recovery measures are to begin, is the ratio B_{MSST}/B_{MSY}. It specifies a lower biomass level that allows remedial action not to be triggered each time B drops below B_{MSY}, simply from natural variation. In terms of B_{MSY}, the recommended level of B_{MSST} is:

$B_{MSST} = (1\text{-}M)B_{MSY}$ when M (natural mortality) ≤ 0.5, and
$B_{MSST} = 0.5B_{MSY}$ when $M > 0.5$

(i.e., whichever is greater). B_{MSST} must not be less than $B_{MIN} = 0.5B_{MSY}$ and should allow recovery back to B_{MSY} within 10 years when F (fishing mortality) is reduced to zero (to the extent possible).

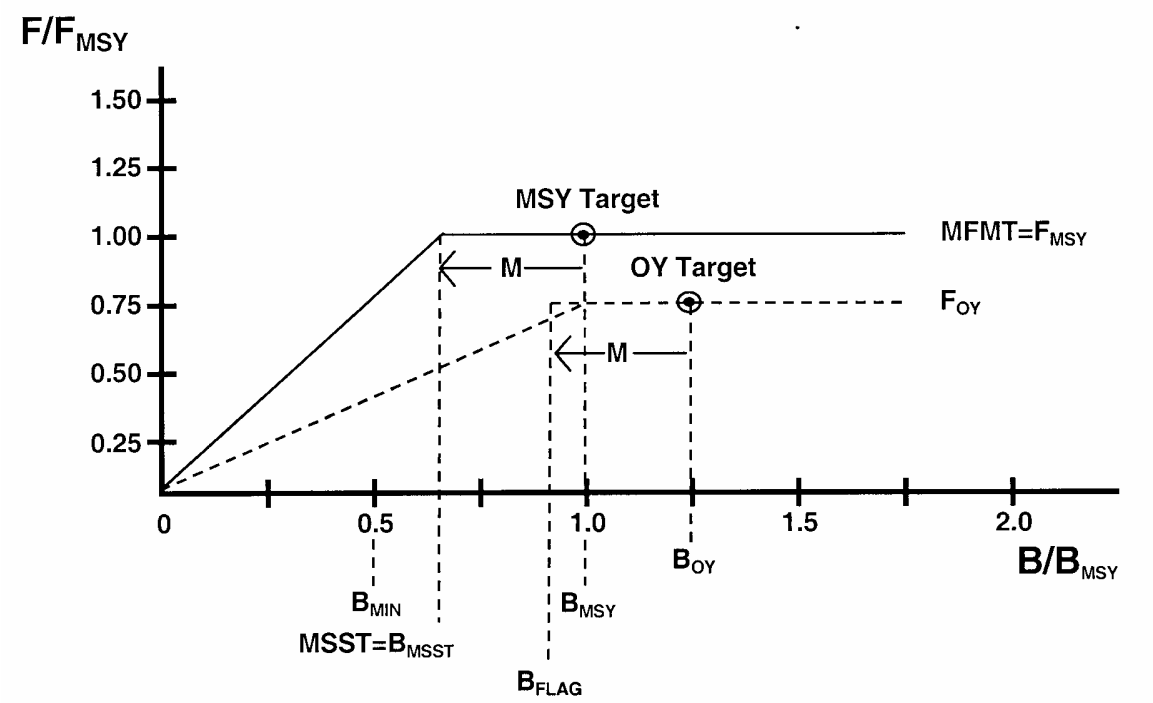

Figure 5-1. General model of MSY and OY Control Rules, from Restrepo et al. 1998.

For the vulnerable species, which in this FMP includes the pelagic sharks, bluefin tuna, and striped marlin, there is a Minimum Biomass Flag (B_{FLAG}) for the OY Control Rule equal to $(1\text{-}M)B_{OY}$ or $0.5B_{OY}$ (whichever is greater). B_{FLAG}, which would then be equivalent to $1.25(B_{MSST}/B_{MSY})$, serves as a warning call to halt biomass reduction that would jeopardize obtaining OY (which is defined as MSY reduced by relevant socioeconomic factors, ecological considerations, and fishery-biological constraints so as to provide the greatest long-term benefits to the Nation) on average. In this FMP, the OY for vulnerable species is set at 0.75MSY (or MSY proxy), and any harvest guideline is set equal to OY.

Rebuilding of overfished stocks is a unilateral requirement by the Magnuson-Stevens Act, but internationally-fished stocks require cooperative catch reductions among the fishing nations for this rebuilding to be effective. U.S. responsibility in the rebuilding, however, will be greater the more localized the stock and the greater the domestic take of the stock's production.

5.2 Recent and Projected Assessment Schedule

Species (Stock)	Date (Anticipated)	Organization Responsible for the Assessment
TUNAS		
Albacore (NPO)	2004 (2006)	North Pacific Albacore Workshop (ISC)
Bluefin (NPO)	2004 (2006)	ISC (ISC)
Bigeye (EPO)	2004 (2005)	IATTC (IATTC)
Bigeye (WCPO)	2004 (2005)	SCTB (WCPFC)
Skipjack (EPO)	2004 (2006)	IATTC (IATTC)
Yellowfin (EPO)	2004 (2005)	IATTC (IATTC)
BILLFISHES		
Striped Marlin (EPO)	2003	IATTC
Striped Marlin (NPO)	(2005)	(ISC)
Swordfish (EPO)	2004	IATTC
Swordfish (NPO)	2004 (2006)	ISC (ISC)
SHARKS		
Common Thresher (WA/OR/CA EEZ)	2001	NMFS
Pelagic Thresher		
Bigeye Thresher		
Shortfin Mako		
Blue (NPO)	2001	NMFS and NRIFSF, Japan
OTHER		
Dorado (EPO)		

Note: Text in parentheses indicates the year the next assessment is anticipated and the organization expected to conduct the assessment. The acronyms listed in this table are defined in Section 8.0.

5.3 Conclusions from Recent Pacific HMS Stock Assessments

5.3.1 Albacore (NPO)

From Stocker 2005.

Estimated stock biomass decreased from about 360,000 mt in 1975 to about 270,000 mt in the late 1980s. Stock biomass then increased to a peak of roughly 460,000 mt by the early-2000s and has remained at this level to date, likely due, in large part, to improved recruitment. The point estimate of the 2004 stock biomass is roughly 429,000 mt with 80% confidence limits (derived from a bootstrap method based on 500 replications) ranging from roughly 329,000 to 563,000 mt. Spawning stock biomass (SSB) has experienced slight fluctuations since the late 1970s, but generally it has remained relatively stable at roughly 90,000 mt over the last two decades. A historically high estimate of SSB observed in 2004 (approximately 165,000 mt) was largely the outcome of a very successful year class in 1999. However, recruitment levels from 2001 to the present were considerably lower, and thus projected estimates of SSB declined to levels more typical of the historical time period.

Stock status in relation to a suite of common biological reference points was determined based on two assumed fishing levels: for "low F," fishing mortality was assumed to be 0.43 (arithmetic mean of

estimated Fs on ages 4–9+ in 2003), whereas the "high F" hypothesis was based on an F of 0.68 (arithmetic mean of estimated Fs on ages 7–9+ in 2003). The biological reference points considered fall into two categories: (1) reference points that are potential candidates as F-based MSY proxies, namely $F_{40\%}$, $F_{30\%}$, and $F_{0.1}$; and (2) candidates to serve as F-based limit proxies, namely $F_{20\%}$ and F_{Max}.

Depending on the current level of F assumed in the uncertainty analysis, the population is being fished between roughly $F_{17\%}$ (assuming $F_{2003} = 0.68$) and $F_{30\%}$ (assuming $F_{2003} = 0.43$). In order to compare current levels of biomass with those at equilibrium that would result from fishing at any given F-based reference point, it is necessary to postulate the current productivity of the stock. Under a high productivity scenario as has been observed within the population since 1990, B_{MSY} ranges from approximately 560,000 to 660,000 mt (49% to 57% of B_o). The estimate of stock biomass in 2004 (B_{2004}) is 22% below this range. Similarly, SSB_{MSY} ranges from roughly 220,000 to 290,000 mt (30% to 40% of SSB_0), with SSB_{2004} 25% below this range. Under a low productivity scenario, as had been observed in the late 1970s and throughout the 1980s, B_{MSY} ranges from approximately 410,000 to 480,000 mt (49% to 57% of B_0). The estimate of stock biomass in 2004 is near the middle of the MSY range. Similarly, SSB_{MSY} ranges from roughly 160,000 to 210,000 mt (30% to 40% of SSB_0), with SSB_{2004} at the lower-end of the MSY range. The current fishing mortality rate is high relative to commonly used reference points, and may be cause for concern regarding the current stock status of North Pacific albacore. Future conditions are less well known, but if rates of F continue at assumed levels, under most of the scenarios considered within the suite of uncertainty analyses, it is unlikely that the SSB will rebuild to SSB_{MSY} levels within a five-year time horizon.

5.3.2 Pacific Bluefin Tuna (NPO)

From ISC 2004a.

The Pacific bluefin (PBF) fishery has been sustained for over 50 years while taking annual catches similar to those taken in recent years. PBF biomass and SSB have fluctuated widely over the 50-year history examined in the stock assessment (1952-2002). These fluctuations have been driven mainly by recruitment changes (without trend) over this period. Biomass appears to have recovered from a record low level in the late 1980s to a more intermediate level in recent years, largely due to better than average recruitment during the 1990s (particularly the strong 1994 year class). Despite good recruitment, however, the SSB has generally declined since 1995, and if the estimated recent fishing mortality rates (F) continue, SSB would likely continue to decline at least over the 2003-2005 period. Recent F is greater than F_{Max}, which has economic implications (too much fishing effort for the yield returned) and is also generally taken as an indicator of biological concern. In particular, the high F on young fish (ages 0–2) and older fish (ages 6+) may be cause for concern with respect to maintaining a sustainable fishery in future years. It is recommended that there be no further increases in F for any of the fisheries taking PBF. Further, every effort should be made to reduce the uncertainty associated with the assessment results by undertaking improvements in the data collection, data analyses, and assessment models used in the PBF stock assessment process.

5.3.3 Bigeye Tuna

5.3.3.1 Bigeye Tuna (EPO)

From Harley and Maunder 2004.

At the beginning of January 2004, the spawning biomass of bigeye tuna in the EPO was declining from a recent high level. At that time the spawning biomass ratio (the ratio of spawning biomass to that of the unfished stock (SBR)) was about 0.14, about 32% less than the level that would be expected to produce

the average maximum sustainable yield (AMSY), with lower and upper confidence limits (±2 standard deviations) of about 0.07 and 0.21. The estimate of the upper confidence bound is only slightly greater than the estimate of SBR_{AMSY} (0.20), suggesting that, at the start of January 2004, the spawning biomass of bigeye in the EPO was less than the level that is required to produce the AMSY. The dramatic change from being above the SBR_{AMSY} level to below it has been predicted by the past three assessments.

The relatively narrow confidence intervals (±2 standard deviations) around the SBR estimates suggest that for most quarters during January 1975 to January 1997 the spawning biomass of bigeye in the EPO was probably greater than the level that would be expected to occur if the population were producing the AMSY.

Recent catches are estimated to have been about 26% above the AMSY level. If fishing mortality is proportional to fishing effort, and the current patterns of age-specific selectivity are maintained, the level of fishing effort that is estimated to produce AMSY is about 62% of the current level of effort. Decreasing the effort to 62% of its present level would increase the long-term average yield by 8% and would increase the spawning potential of the stock by about 156%. The AMSY of bigeye in the EPO could be maximized if the age-specific selectivity pattern were similar to that for the longline fishery that operates south of 15° N, because it catches larger individuals close to the critical size.

All analyses considered suggest that at the start of 2004 the spawning biomass was below the level that would be present if the stock were producing the AMSY. AMSY and the F multiplier are sensitive to how the assessment model is parameterized, the data that are included in the assessment, and the periods assumed to represent average fishing mortality, but under all scenarios considered, fishing mortality is well above the level that will produce the AMSY.

5.3.3.2 Bigeye Tuna (WCPO)

From Hampton et al. 2004.

The bigeye tuna model is age (40 age-classes) and spatially structured (five regions) and the catch, effort, size composition, and tagging data used in the model are classified by 17 fisheries and quarterly time periods from 1950 through 2007. The last four to five years (depending on the fishery) constitute a projection period in which the last year's fishing effort for each fishery is assumed to continue into the future.

The SHBS (statistical habitat-based standardization) and GLM (general linear model standardization) based analyses, for which catchability in the main longline fisheries was assumed constant, produced results that were broadly comparable to those of the 2003 assessment. Recruitment showed an increasing trend from the 1970s on, while biomass declined through the 1960s and 1970s after which it was relatively stable or declining slightly. The fisheries are estimated to have reduced overall biomass to around 40% of unfished levels by 2003, with impacts more severe in the equatorial region of the WCPO, particularly in the west. Yield analyses suggest that recent average fishing mortality-at-age is approximately equivalent to the fishing mortality at MSY, although the probability distribution of F_{Recent}/F_{MSY} is skewed such that the probability of the ratio being greater than 1.0 (i.e., overfishing is occurring) is 0.67−0.77, depending on assumptions regarding the stock-recruitment steepness coefficient. On the other hand, the current level of biomass is estimated to be high, around 1.7−2.3 times the equilibrium biomass expected at MSY. Current biomass has remained high because of above average recruitment since about 1990.

On the basis of all of the results presented in the assessment, we conclude that maintenance of current levels of fishing mortality carries a high risk of overfishing. Should recruitment fall to average levels,

current catch levels would result in stock reductions to near and possibly below MSY-based reference points. Reduction of juvenile fishing mortality in the equatorial regions would have significant benefits for both the bigeye tuna stock and the longline fishery.

5.3.4 Skipjack Tuna (EPO)

From Maunder and Harley 2004a.

The assessment is still considered preliminary because: (1) it is not known whether catch per day of fishing for purse-seine fisheries is proportional to abundance; (2) it is possible that there is a population of large skipjack that is invulnerable to the fisheries; and (3) stock structure in relation to the EPO and fish in the western and central Pacific is uncertain. Furthermore, the assumptions and constraints used in future assessment models may change.

The analysis indicates that a group of relatively strong cohorts entered the fishery in 2002-2003 (but not as strong as those of 1998) and that these cohorts increased the biomass and catches during 2003. There is an indication the most recent recruitments are average, which may lead to lower biomasses and catches.

There is considerable variation in SBR for skipjack tuna in the EPO. In 2003 the SBR was at a high level (about 0.61). Estimates based on AMSY and yield-per-recruit indicate that maximum yields are achieved with infinite fishing mortality, because the critical weight is less than the average weight at recruitment to the fishery. However, this is uncertain because of uncertainties in the estimates of natural mortality and growth.

The SBR has been used to define reference points in many fisheries. Various studies suggest that some fish populations can produce the AMSY when the SBR is somewhere in the range 0.3 to 0.5, and that some fish populations are not able to produce the AMSY if the spawning biomass ratio during a period of exploitation is less than about 0.2. Unfortunately, the SBR level that would give rise to AMSY (SBR_{AMSY}) cannot be estimated for skipjack, so it is not possible to relate the SBR to the SBR_{AMSY}.

The current assessment assumes that there is no stock-recruitment relationship for skipjack tuna, so the relative yield curve is equal to the relative yield-per-recruit curve. Therefore, AMSY is achieved by an infinite fishing mortality. As this is not achievable in reality, no quantities based on AMSY are available.

5.3.5 Yellowfin Tuna (EPO)

From Maunder and Harley 2004b.

Historically, the SBR of yellowfin tuna in the EPO has been below the level that will support the AMSY, but above that level for most of the last 19 years. The increase in the SBR is attributed to a regime change in the productivity of the population. The two different productivity regimes may support two different AMSY levels and associated SBR levels. The effort levels are estimated to be less than those that would support the AMSY (based on the current distribution of effort among the different fisheries). However, due to the large number of recruits entering the fishery in 1998 to 2000, the catch levels are greater than the corresponding values at AMSY. Because of the flat yield curve, the average equilibrium yield at current effort levels is only slightly less than AMSY.

If a stock-recruitment relationship is assumed, the results are more pessimistic, and current biomass is estimated to be below the level that would support AMSY for most of the model period, except for the last few years (excluding the end of 2002 and 2003).

The current average weight of yellowfin in the catch is much less than the critical weight, and, therefore, from a yield-per-recruit standpoint, yellowfin in the EPO are probably growth overfished. The AMSY calculations indicate that catches could be greatly increased if the fishing effort were directed toward longlining and purse-seine sets on yellowfin associated with dolphins. This would also increase the SBR levels.

5.3.6 Striped Marlin (EPO)

From Hinton and Maunder 2003.

Analyses of stock status were made using two production models taking into account the time period when billfish were targeted by longline fishing in the EPO. The results from a Pella-Tomlinson model yielded estimates of MSY in the range of 3,700 to 5,000, with a current depletion ratio, or ratio of current biomass (B) to the estimated unfished population biomass (B_0), of about 0.47. The ratio of B to the biomass which may be expected to yield maximum sustained yield (B_{MSY}) ranged from about 1.0 to 1.9. The results from analyses using the Deriso-Schnute delay difference population model yielded estimates of MSY on the range of 8,700 to 9,200 mt, with current depletion ratios on the range of 0.68 to 0.70, and B to B_{MSY} ratios of about 1.2 to 1.6.

The current analysis of updated catch rate data using new models and methods presents results consistent with those presented in the previous assessment of striped marlin. Landings and standardized fishing effort for striped marlin decreased in the EPO from 1990-1991 through 1998, and this general decline has continued, reaching new lows in preliminary estimates of retained catch in 2000 and 2001 of about 1,500 mt, which are well below estimated MSY harvest levels. This may result in a continued increase in the biomass of the stock in the EPO.

Based on the analyses and hypotheses herein, it is considered that the striped marlin stocks in the EPO are in good condition, with current and near-term anticipated fishing effort less than F_{MSY}.

5.3.7 Swordfish

5.3.7.1 Swordfish (NWPO)

From ISC 2004b.

Assessments of the status of swordfish stocks were presented for a region of the North Pacific (north of 10° N and west of 130° W). New analyses (GLM and Habitat-based Standardization) of catch-per-unit-effort (CPUE) indices based on data from Japanese longline vessels now show declining trends mainly driven by declines in CPUE in the northwest portion of the study area (north of 10° N and west of 170° E). The cause of the decline is not known at present (e.g., stock abundance, environmental variability, changes in fishing practices). An independent analysis based on a MULTIFAN-CL model also detected such a decline in the northwest region of the fishery. However, the MULTIFAN-CL trends in predicted biomass were very sensitive to details of the model structure, creating uncertainty in the model outputs. In all cases, the model showed fisheries as playing no more than a modest role in causing declines in abundance. It is unclear whether observed changes in indices are a result of fluctuations in abundance, or the preliminary nature of both the CPUE and MULTIFAN-CL analyses. However, what is clear is that the fishery should be monitored closely. Research should be continued and data collection improved to ensure that means are available to address management decisions as they arise.

5.3.7.2 Swordfish (EPO)

From Hinton et al. 2004.

The CPUEs obtained have been found to be greater than those that correspond to the AMSY, and trends in relative abundance obtained in the standardizations of CPUE of longline fisheries in the region do not indicate declining abundances. The lack of contrast in the standardized catch and effort series in the northern and southern regions of the EPO suggests that the fisheries that have been taking swordfish in these regions have not been of a magnitude sufficient to cause significant responses in the populations. As well, catches in the region have been fairly stable since 1989, averaging about 3,700 mt in the northern region and 8,400 mt in the southern region annually. Based on these considerations, it appears that swordfish are not overfished in the northern and southern regions of the EPO. However, given the changing nature of the fisheries for swordfish in these regions, particularly those gillnet and longline fisheries that are increasingly targeting swordfish, the stocks should be monitored closely for changes in these trends. Furthermore, this conclusion is tentative, due particularly to the current uncertainty regarding stock structure.

Table 5-1 Recent stock status with respect to management criteria.

Note that for most of these species the scientific bodies developing the assessments do not have a consensus biological reference point for use in the context of managing fisheries.

Species (stock)	F_{Recent}/F_{MSY}[1]	Overfishing? ($F/F_{MSY}>1.0$)	B_{Recent}/B_{MSY}	B_{MSST}/B_{MSY}[1]	Overfished? ($B_{Recent}<B_{MSST}$)	B_{FLAG}[2] ($1.25B_{MSST}/B_{MSY}$)	Assessment
TUNAS							
Albacore (NPO)	1.02-2.26[3]	Unknown[3]	0.67-1.07[3]	0.7	Unknown[3]		Nineteenth NPALBW, Stocker 2005
Bluefin (NPO)	>1.0[4]	Unknown[4]	Unknown	0.75	Unknown	0.94	ISC 2004a
Bigeye (EPO)	1.61[5]	Y	0.57	0.6	Y		IATTC, Harley and Maunder 2004
Bigeye (WCPO)	0.89-1.02[6]	Possibly[6]	1.75-2.28[6]		N		SCTB, Hampton et al. 2004
Skipjack (EPO)	Unknown[7]	Unlikely	Unknown	0.5	Unlikely		IATTC, Maunder and Harley 2004a
Yellowfin (EPO)	0.89[5]	N	0.79	0.5	N		IATTC, Maunder and Harley 2004b
BILLFISHES							
Striped Marlin (EPO)	<1.0[8]	N	≥1.0	0.5	N	0.63	IATTC, Hinton and Maunder 2003
Swordfish (NWPO)	Unknown[9]	Unlikely	Unknown		Unlikely		ISC 2004b
Swordfish (EPO)	<1.0[10]	N	>1.0	0.61-0.8	N		IATTC, Hinton et al. 2004
SHARKS							
C. Thresher (CA,OR,WA)	<1.0[11]	N	~1.10	0.77	N	0.96	NMFS, PFMC HMS plan development team 2002
Pelagic Thresher	Unknown[12]	Unknown	Unknown	0.85	Unknown	1.06	
Bigeye Thresher	Unknown[13]	Unknown	Unknown	0.78	Unknown	0.97	
Shortfin Mako	<1.0[14]	N	>1.0	0.71	N	0.89	NMFS, PFMC HMS plan development team 2002
Blue	<0.5[15]	N	>1.0	0.78	N	0.97	NMFS and NRIFSF Japan, Kleiber et al. 2001
OTHER							
Dorado	Unknown[16]	Unknown	Unknown	0.5	Unknown		

Notes:

1. Measures of F_{MSY} and B_{MSY} are not available. Various proxies for these values have been used in the preparation of this table. However, PFMC has not adopted the use of a particular proxy and hence the designations of Overfished and Overfishing should be considered preliminary.
2. For vulnerable species managed under the OY control rule only: bluefin tuna, striped marlin and pelagic sharks.
3. Albacore results are based on a suite of F_{MSY} proxies ($F_{40\%}$, $F_{30\%}$ and $F_{0.1}$), two estimated levels of recent fishing pressure (F=0.43 and F=0.68), and two scenarios of productivity (high R = 31 million recruits and low R = 22.5 million recruits). However, "Unknown" is indicated because of the lack of a PFMC reference point for management.
4. Bluefin analyses indicated that F_{Recent} exceeded F_{Max}. However, "Unknown" is indicated because of the lack of a PFMC reference point for management.
5. EPO bigeye and yellowfin results are based on base case assessments assuming no stock-recruitment relationships.
6. WCPO bigeye results are based on 4 models where longline catchability was assumed constant over time. The probability that $F_{Recent}/F_{MSY} > 1$ was greater than or equal to 0.67.
7. Because of uncertainties in the estimates of growth and natural mortality, MSY-proxy reference points could not be calculated for skipjack, however the IATTC does not consider there to be a need for management due to low fishing mortalities and high biomass estimates relative to historical levels.
8. Two production models demonstrate that the EPO striped marlin population is in good condition with fishing effort and landings in decline since the early 1990s.
9. Standardized CPUEs from swordfish fisheries indicate declining trends in the northwest Pacific, however the fisheries are causing, at worst, modest declines in abundance.
10. Standardized CPUEs are greater than those corresponding to AMSY (average maximum sustainable yield) and do not indicate declining abundances, although there is concern over increased fishing pressure in the southern EPO area.
11. U.S. west coast EEZ regional catch and CPUE demonstrated the population increasing from estimated low levels in the early 1990s. Recent (2000-03) U.S. west coast commercial landings average 318 mt, which is less than 0.75 × MSY proxy (MSY proxy = LMSY from the Population Growth Rate method; see HMS Fishery Management Plan).
12. Status unknown, but catches are incidental and occur on the edge of the species' range, predominately during warm water years.
13. Status unknown, but catches are incidental and occur on the edge of the species' range.
14. Tentative results based on commercial landings and CPUE calculations. Recent (2000-03) U.S. west coast commercial landings average 70 mt, which is less than 0.75 × MSY proxy (MSY proxy = average landings 1981-1999).
15. Analyses demonstrated that for north Pacific blue shark, fishing pressure is 2-15 times below F_{MSY}. U.S. west coast catch levels are poorly documented because the fish are not landed.
16. Status unknown, but dorado are highly productive and widely distributed throughout tropical/subtropical Pacific. Recent U.S. west coast landings average 16 mt.

Table 5-2. Stockwide and regional catches for HMS management unit species, 1999-2003. Values are in thousand mt round weight.

Species (stock)	Stockwide Catch	U.S. West Coast Catch		Fractional Catch
		Commercial	Recreational	
TUNAS				
Albacore (NPO)	85 - 121[1]	9 - 17	0.9 - 2.3	0.13
Bluefin (NPO)	14 - 26[2]	<0.4	0.3 - 0.5	0.03
Bigeye (EPO)	88 - 142[3]	<0.2	≤0.01	<0.01
Skipjack (EPO)	146 - 276[3]	<0.1 - 3.8	<0.01 - 0.08	<0.01
Yellowfin (EPO)	282 - 436[3]	<0.5 - 1.4	0.13 - 0.61	<0.01
BILLFISHES				
Striped Marlin (EPO)	1.9 - 2.6[3]	<0.01[4]	0.02[5]	<0.01
Swordfish (EPO)	10 - 19[3]	1.7 - 2.7	<0.01	0.16
SHARKS				
Common Thresher	Unknown	0.3 - 0.4	0.04 - 0.06	
Pelagic Thresher	Unknown	≤0.01		
Bigeye Thresher	Unknown	<0.01		
Shortfin Mako	Unknown	<0.05 - 0.08	0.02 - 0.09	
Blue (NPO)	Unknown	<0.01 - 0.06[4]	<0.01	
OTHER				
Dorado	1.0 - 13.5[6]	<0.01 - 0.04	<0.1	

Notes:
Data are from updated commercial (Table 4-3.b), CPFV (Table 4-27), and private recreational (Table 4-19) catches with weight conversions of 7.3 kg/albacore, 12.9 kg/bluefin, 10.0 kg/bigeye tuna, 2.4 kg/skipjack, 7.1 kg/yellowfin, 59 kg/striped marlin, 113 kg/swordfish, 28.1 kg/common thresher, 16.7 kg/mako, 8 kg/blue shark, and 6.5 kg/dorado.
1. Nineteenth North Pacific Albacore Workshop.
2. ISC catch table extracted 8/20/05.
3. IATTC catch tables extracted 8/20/05.
4. Striped marlin and blue shark commercial catches include estimates from the DGN observed catch.
5. Striped marlin recreational catch is estimated at 300 fish/year based on club records, in addition to CPFV recorded catch.
6. FAO Area 77 catch extracted 8/20/05.

6.0 RESEARCH AND DATA NEEDS AND MONITORING REPORTS

6.1 Research and Data Needs

6.1.1 Stock Status and Distribution

There is substantial uncertainty on the status of stocks and estimates of MSY for many HMS species. Basic biological and life history data are unknown for some species, and understanding of distribution, abundance, and reproductive behaviors of most is poor. There is insufficient understanding of stock structures relative to the extent of fisheries, on the interchange between stocks, and on survival and fecundity schedules for investigating exploitation effects and species' resiliency to exploitation. There is also a lack of fishery independent indexes of abundance.

Species-specific stock information needs include:

All tunas
- The distribution of adults in the north Pacific by season and age, including within the West Coast Exclusive Economic Zone (EEZ)

Albacore tuna
- Whether there are multiple sub-stocks with juveniles having different migratory behaviors (i.e., juveniles from different spawning localities with different migration routes and timetables)

All thresher sharks
- The stock structures and boundaries of the species and relationships to other populations
- The pattern of seasonal migrations for feeding and reproduction, and where and when life stages may be vulnerable
- Aging and growth rate, including comparisons of growth rates in other areas
- Maturity and reproductive schedules

Shortfin mako shark
- Distribution, abundance, and size in areas to the south and west of West Coast EEZ
- Age and growth rates (current growth estimates differ widely)

Blue shark
- Sex and size composition of catches (unknown because of high discard rate)
- Migratory movements of maturing fish from EEZ to high seas

Swordfish
- Age and growth data from locally caught fish
- Distribution by season and age within the outer portions of the EEZ and high seas

Striped marlin
- Age and growth data from locally caught fish
- Stock structure differences between populations to south and west of EEZ
- Season migration differences by size, age, and sex (archival tagging)

Dorado
- Stock structure of eastern Pacific population

6.1.2 Management Unit Species Catch Data

Total catch data is likely inaccurate for most HMS fisheries due to a lack of at-sea data collection programs, logbook programs, and shoreside sampling programs for West Coast fisheries and unreported catch by international fisheries. Catch data needs include:

1. Total catch information (including incidental and bycatch) and protected species interactions for surface hook-and-line, purse seine, and recreational fisheries, and additional at-sea sampling of drift gillnet fisheries
2. Catch composition data for harpoon gear
3. Size composition of bycatch in drift gillnet fisheries
4. Condition (e.g., live, dead, good, poor) of discarded catch in all HMS fisheries

Additional work needs to be done to develop ways to adequately sample recreational fisheries, particularly shore-based anglers and private vessels. There is a need to develop methods for sampling private marinas and boat ramps to determine catch, and the level of bycatch and protected species interactions, as well as sample the catch for length and weight of fish caught to convert catches reported in numbers to catches by weight.

6.1.3 Survivability of Released Fish

Little is known of the long-term survivorship of hooked fishes after release, to assess the effectiveness of recreational tag-and-release methods on big game fishes (pelagic sharks, tunas and billfishes) and of methods to reduce bycatch mortality in longline fishing. Controlled studies of the survivability of hooked and released pelagic sharks and billfishes are needed to determine the physiological responses to different fishing gears, and the effects of time on the line, handling, methods of release, and other factors. Appropriate discard mortality rates, by species, need to be identified in order to quantify total catch (including released catch).

6.1.3 Essential Fish Habitat (EFH)

There is very little specific information on the migratory corridors and habitat dependencies of these large mobile fishes, how they are distributed by season and age throughout the Pacific and within the West Coast EEZ, and how oceanographic changes in habitat affect production, recruitment, and migration. Research is needed to better define EFH and to identify specific habitat areas of particular concern (HAPCs), such as pupping grounds, key migratory routes, feeding areas, and where adults aggregate for reproduction. A particularly important need is to identify the pupping areas of thresher and mako sharks, which are presumed to be within the southern portion of the West Coast EEZ, judging from the occurrence of post-partum and young pups in the areas (e.g., NMFS Driftnet Observer data). Areas where pregnant females congregate may be sensitive to perturbation, and the aggregated females and pups there may be vulnerable to fishing. Species-specific EFH information needs include:

<u>All tunas</u>

- How oceanographic changes affect stock production, recruitment success, and migratory patterns
- Whether certain prey species are key for survivability and/or reproductive success

<u>Bigeye, Skipjack, and Yellowfin tunas and dorado</u>

- The significance of floating objects and other-species associations relative to life history

Common thresher shark

- The extent of pupping and nursery grounds off northern Mexico, and their relationship to those of southern California

Bigeye and Pelagic thresher sharks

- How the different ecologies of these species compare with that of common thresher shark

Shortfin mako shark

- Pupping areas off southern California and northern Mexico, and whether any are critical for stock health

6.1.4 Interactions with Protected Species and Prohibited Species

More complete catch information and data on interactions with protected and prohibited species are needed for most HMS fisheries. There is inadequate understanding of the fisheries on some HMS stocks that are shared with Mexico (e.g., species composition of shark catches in Mexican fisheries), and inadequate data exchange with Mexico. More work is also needed to investigate the hooking survivorship of protected species, such as turtles and seabirds that are caught as bycatch in the HMS fisheries. More work is also required on turtle migration seasonality and routes and genetic structures of populations by species in order to better understand likely periods of interaction with fisheries and turtle life histories. More work on the sizes and structures of turtle populations by species would also enable improved application of the Endangered Species Act and other laws and regulations to HMS fisheries.

6.1.5 Effects of Management Measures

For sharks, the size/age groups contributing most to population growth and maintenance need to be determined by demographic studies in order to determine how best to apply management measures, such as season and area closures, and "slot" size limits. Additionally, the U.S. Congress identified the following data needs for sharks in the Shark Finning Prohibition Act (PL 106-557) (see also the U.S. National Plan of Action for Sharks):

- The collection of data to support stock assessment of shark populations subject to incidental or directed harvesting by commercial vessels, giving priority to species according to vulnerability of the species to fishing gear and fishing mortality, and its population status.
- Research to identify fishing gear and practices that prevent or minimize incidental catch of sharks in commercial and recreational fishing.
- Research on fishing methods that will ensure maximum likelihood of survival of captured sharks after release.
- Research on methods for releasing sharks from fishing gear that minimize risk of injury to fishing vessel operators and crews.
- Research on methods to maximize the utilization of, and funding to develop the markets for, sharks not taken in violation of a fishing management plan approved under the Magnuson-Stevens Act.
- Research on the nature and extent of the harvest of sharks and shark fins by foreign fleets and the international trade in shark fins and other shark products.

6.1.6 Economic Information

There is a general need for more and improved economic information for HMS fisheries, particularly the pelagic longline, harpoon, purse seine, and recreational fisheries.

6.2 Monitoring Reports

The HMS FMP specifies Management Unit Species (MUS), which are those species actively managed under the FMP. The Council considered many combinations of the following criteria in their selection of MUS, with the stipulation that any species that met the first three criteria would be included:

1. The species occurs in the Pacific Council management area.
2. The species occurs in West Coast HMS fisheries.
3. The species is defined as highly migratory in the Magnuson-Stevens Act or the Law of the Sea Convention.
4. The species is important (moderate to high value) in the landings or to the fishery.
5. The species is managed by the Western Pacific Fishery Management Council.
6. Sufficient data exists to calculate a bio-analytically based MSY, including a reasonable MSY proxy that is based on catches and yields that are stable over time.
7. The species occurs in fisheries which the Pacific Council wants to actively manage.
8. The species possesses special biological characteristics (e.g., low productivity).

The MUS are listed in Table 1-1.

The HMS FMP also lists species that are included for monitoring purposes. The criteria for species included in the FMP for monitoring are those species that: 1) have a record of being caught in an HMS fishery; 2) are not covered by another FMP or state management regime; and 3) are of special concern (e.g., elasmobranches, which have relatively low productivity). The HMS FMP notes that these species, which often occur as bycatch in an HMS fishery, should be monitored on a consistent and routine basis to the extent practicable. Sampling periodically and coverage fraction will depend upon the take rates of the species that are of most concern. This monitoring is needed to evaluate the impact of HMS fisheries on incidental and bycatch species (as well as MUS), and to track the effectiveness of bycatch reduction methods. A list of monitored species is contained in the FMP, in Chapter 3, Table 3-2.

According to the FMP, the HMSMT will deliver a SAFE report that follows guidelines specified in National Standard 2 and will be used by the Council and NMFS to develop and evaluate regulatory adjustments under the framework procedure or the FMP amendment process. This information will document significant trends or changes in monitored species over time, and assess the relative success of existing state and federal fishery management programs. The SAFE report will also make recommendations to the Council concerning bycatch and incidental catch.

Since the drafting of the FMP through 2004, the only HMS fishery to have routine federal observer coverage has been the drift gillnet fishery. Lists of MUS and monitored species caught in the drift gillnet fishery from May 1, 2001, through January 31, 2005, by year, are contained in Tables 6-1 – 6-4. Tables 6-5 – 6-7 provide similar data for the pelagic longline fishery.

With regard to bycatch and incidental catch monitoring, in June 2005, the HMSMT reviewed and discussed the conclusions presented in the report entitled, *Recommendations for U.S. West Coast Highly Migratory Species Observer Programs with Options for Levels of Significance*, which was developed by an independent contractor at the request of NMFS Southwest Fisheries Science Center. The report authors reviewed the available data for West Coast HMS fisheries, and provide recommendations on the administration, oversight, and coverage levels for HMS observer programs. The proposed pilot observer programs were developed to provide statistically reliable indices of bycatch to assist managers in selecting coverage levels based on effort, fishery characteristics, and costs; the programs also include

alternatives to stratify coverage proportional to fleet effort across port, vessel class, fishing area, season and fishing gear.

The HMSMT had a thorough discussion about the administrative recommendations in the report. The HMSMT agrees with the recommendations presented in the report with regard to program administration, funding, observer assignment, and vessel selection; it is our understanding that these recommendations have been adopted and implemented by NMFS:

1. Program Administration – Establish a program utilizing the services of an outside contractor.
2. Program Funding – Observers are supplied by a federal contractor through NMFS.
3. Observer Assignment – Observers are assigned by contractor based on sampling plan.
4. Vessel Selection – The program administrator (NMFS) will randomly select vessels from those not yet observed and assign observers to those vessels until the desired level of coverage for a given fishing season is achieved or maintained.

With regard to program administration, the HMSMT notes that there are some state observer programs currently in place (e.g., CRFS coverage of the California CPFV fleet) and recommends that these programs be used to supplement the HMS observer programs as much as possible.

Regarding the duration of observer coverage, it is our understanding that vessels will be required to carry an observer on a per trip basis. However, we want to ensure that the observed trip is as representative of effort occurring in non-observed trips as much as possible. To minimize changes in vessel effort when observed, a minimum number of sets (five) was used to determine the duration of individual vessel coverage in the drift gillnet fishery. The HMSMT recommends a similar approach for other HMS fisheries, based on an average number of sets per trip (which can be calculated using logbook and/or previous observer information).

With regard to coverage levels, the HMSMT agrees with the recommended coverage levels proposed in the report, with the exception of the pelagic longline fishery. The report recommends a 20% coverage level of the longline fishery; however, currently, this fishery is covered at 100%. The HMSMT recommends keeping the current coverage level in effect for both pelagic longline (100%) and drift gillnet (20%), and approving the proposed coverage levels for coastal purse seine (100%), albacore troll (5%), CPFV in southern California (10%), and albacore charterboats coastwide (20%) as coverage level goals. The HMSMT recognizes that, particularly at the outset of these programs, optimum coverage levels may not be achieved due to funding constraints. The HMSMT also agrees with the stratification recommendations in the report.

Table 6-1. NMFS California/Oregon Drift Gillnet Observer Program observed catch, May 1, 2001–January 31, 2002.

	Total		Returned			Number Damaged	Catch per Set
	Caught	Kept	Alive	Dead	Unknown		
Management Unit Species							
Swordfish	364	353		11		51	1.127
Striped Marlin	15			15		1	0.046
Unidentified Billfish	1			1			0.003
Albacore Tuna	1214	1070		143		170	3.759
Bluefin Tuna	32	23		9		15	0.099
Skipjack Tuna	109	60		49		33	0.337
Yellowfin Tuna	189	159		30		48	0.585
Unidentified Tuna	3			3		3	0.009
Common Thresher Shark	316	313	1	2		6	0.978
Bigeye Thresher Shark	5	4		1			0.015
Shortfin Mako Shark	347	303	11	33		2	1.074
Blue Shark	553	17	218	315	3	28	1.712
Monitored Species							
Blue Marlin	9			9			0.028
Megamouth Shark	1		1				0.003
Salmon Shark	15	1	3	11		2	0.046
Bullet Mackerel	21	1	1	19		2	0.065
Common Mola	2459		2265	180	14	4	7.613
Louvar	37	32		5		14	0.115
Opah	235	224		11		35	0.728
Pacific Bonito	6	2		4			0.019
Pacific Pomfret	19	10		9		1	0.059
Pelagic Stingray	13		11	2			0.040
Marine Mammals, Turtles, and Seabirds							
Short-Beaked Common Dolphin	8			8			0.025
Long-Beaked Common Dolphin	1			1			0.003
Northern Right Whale Dolphin	6			6			0.019
Pacific White-sided Dolphin	2			2			0.006
California Sea Lion	8			8			0.025
Northern Elephant Seal	1			1			0.003
Loggerhead Sea Turtle	1		1				0.003

The above table summarizes the total catch and final disposition, by species, of all fish, marine mammals, sea turtles, and seabirds observed caught in the California/Oregon drift gillnet fishery during the 2001/02 fishing season. Data were collected at sea by contract observers, and represents a total of 323 sets. Estimated total fishing effort for the season is 1,486 sets.

Table 6-2. NMFS California/Oregon Drift Gillnet Observer Program observed catch, May 1, 2002–January 31, 2003.

	Total		Returned			Number Damaged	Catch per Set
	Caught	Kept	Alive	Dead	Unknown		
Management Unit Species							
Swordfish	535	521		14		83	1.434
Striped Marlin	22			22		5	0.059
Albacore Tuna	290	203		87		87	0.777
Bluefin Tuna	120	94		26		40	0.322
Skipjack Tuna	8	5		3		3	0.021
Yellowfin Tuna	5	5				1	0.013
Unidentified Tuna	29	5		24		29	0.078
Common Thresher Shark	236	232	4			2	0.633
Bigeye Thresher Shark	5	5					0.013
Shortfin Mako Shark	626	593	13	20		10	1.678
Blue Shark	478	3	144	313	18	19	1.282
Monitored Species							
Blue Marlin	2			2			0.005
Basking Shark	1		1				0.003
Prickly Shark	1		1				0.003
Salmon Shark	8			8			0.021
Bat Ray	3		3				0.008
Bullet Mackerel	18	16		2		2	0.048
Common Mola	2805	2	2769	27	7	15	7.520
Longnose Lancetfish	1		1				0.003
Louvar	65	61		4		22	0.174
Opah	223	203		20		33	0.598
Pacific Bonito	100	78		22		16	0.268
Pacific Pomfret	28	15	1	12		2	0.075
Pelagic Stingray	23		17	4	2		0.062
Marine Mammals, Turtles, and Seabirds							
Short-Beaked Common Dolphin	8		1	7			0.021
Northern Right Whale Dolphin	2			2			0.005
Pacific White-sided Dolphin	1			1			0.003
California Sea Lion	12			12			0.032
Northern Elephant Seal	1			1			0.003
Northern Fulmar	1		1				0.003
Unidentified Bird	1			1			0.003

The above table summarizes the total catch and final disposition, by species, of all fish, marine mammals, sea turtles, and seabirds observed caught in the California/Oregon drift gillnet fishery during the 2002/03 fishing season. Data were collected at sea by contract observers, and represents a total of 373 sets. Estimated total fishing effort for the season is 1,673 sets.

Table 6-3. NMFS California/Oregon Drift Gillnet Observer Program observed catch, May 1, 2003–January 31, 2004.

	Total		Returned			Number Damaged	Catch per Set
	Caught	Kept	Alive	Dead	Unknown		
Management Unit Species							
Swordfish	309	301		8		46	1.047
Striped Marlin	27			27		1	0.092
Unidentified Billfish	2			2		1	0.007
Albacore Tuna	163	154		9		41	0.553
Bluefin Tuna	219	209		10		34	0.742
Skipjack Tuna	1093	470	25	598		240	3.705
Yellowfin Tuna	17	17				3	0.058
Unidentified Tuna	50			50		50	0.169
Common Thresher Shark	192	192					0.651
Bigeye Thresher Shark	41	27		14			0.139
Shortfin Mako Shark	529	471	15	43		1	1.793
Blue Shark	373		132	229	12	16	1.264
Monitored Species							
Prickly Shark	1			1			0.003
Salmon Shark	3	2		1			0.010
Smooth Hammerhead Shark	2	1		1			0.007
Bat Ray	1		1				0.003
Bullet Mackerel	5	1		4			0.017
Common Mola	1720		1486	231	3	1	5.831
Louvar	37	34		3		9	0.125
Mobula	1		1				0.003
Opah	172	168		4		9	0.583
Pacific Bonito	46	9	15	22		1	0.156
Pacific Pomfret	3	2		1			0.010
Pelagic Stingray	22		15	6	1		0.075
Marine Mammals, Turtles, and Seabirds							
Short-Beaked Common Dolphin	19			19			0.064
Northern Right Whale Dolphin	1			1			0.003
Risso's Dolphin	4			4			0.014
Short-Finned Pilot Whale	1			1			0.003
Unidentified Whale	1		1				0.003
California Sea Lion	4			4			0.014
Northern Elephant Seal	1			1			0.003
Northern Fulmar	14		13	1			0.047
Cassin's Auklet	1			1			0.003

The above table summarizes the total catch and final disposition, by species, of all fish, marine mammals, sea turtles, and seabirds observed caught in the California/Oregon drift gillnet fishery during the 2003/04 fishing season. Data were collected at sea by contract observers, and represents a total of 295 sets. Estimated total fishing effort for the season is 1,474 sets.

Table 6-4. NMFS California/Oregon Drift Gillnet Observer Program observed catch, May 1, 2004–January 31, 2005.

	Total		Returned			Number Damaged	Catch per Set
	Caught	Kept	Alive	Dead	Unknown		
Management Unit Species							
Swordfish	561	513		48		145	2.516
Striped Marlin	2			2		1	0.009
Albacore Tuna	163	147		16		33	0.731
Bluefin Tuna	108	105		3		26	0.484
Skipjack Tuna	492	190		302		128	2.206
Yellowfin Tuna	6	6					0.027
Unidentified Tuna	3			3		3	0.013
Common Thresher Shark	90	89	1				0.404
Bigeye Thresher Shark	19	7		12			0.085
Unidentified Thresher Shark	1	1					0.004
Shortfin Mako Shark	188	172	7	8	1		0.843
Blue Shark	250		80	168	2	3	1.121
Monitored Species							
Smooth Hammerhead Shark	1	1					0.004
Bat Ray	4		4				0.018
Bullet Mackerel	7	7					0.031
Common Mola	2787		2704	83		2	12.498
Escolar	1			1			0.004
Louvar	6	5		1		4	0.027
Oilfish	2			2			0.009
Opah	103	100		3		14	0.462
Pacific Bonito	263	54	5	204		20	1.179
Pacific Pomfret	5	3		2			0.022
Pelagic Stingray	12		10		2		0.054
Marine Mammals, Turtles, and Seabirds							
Short-Beaked Common Dolphin	4			4			0.018
Grey Whale	1			1			0.004
Humpback Whale	1		1				0.004
California Sea Lion	7		1	6			0.031

The above table summarizes the total catch and final disposition, by species, of all fish, marine mammals, sea turtles, and seabirds observed caught in the California/Oregon drift gillnet fishery during the 2004/05 fishing season. Data were collected at sea by contract observers, and represents a total of 223 sets. Estimated total fishing effort for the season is 1,022 sets.

Table 6-5. NMFS California Pelagic Longline Observer Program, October 2001–June 2002.

	Total Caught	Number Kept	Number Returned					Catch per 1,000 Hooks
			Alive	Dead	Injured	Finned	Unknown	
Management Unit Species								
Swordfish, Broadbill	504	445	17	39			3	10.25
Albacore Tuna	59	54	1	4				1.20
Bigeye Tuna	6	6						0.12
Bluefin Tuna	8	8						0.16
Bigeye Thresher Shark	1	1						0.02
Blue Shark	459		426	21			12	9.34
Shortfin Mako Shark	30	4	19	7				0.61
Unidentified Shark	1		1					0.02
Dolphinfish	9	9						0.18
Monitored Species								
Escolar	132	120	3	7			2	2.69
Longnose Lancetfish	50		2	47			1	1.02
Striped Marlin	1		1					0.02
Common Mola	16		15				1	0.33
Oilfish	30		17	11			2	0.61
Opah	4	4						0.08
Pacific Pomfret	10	8		2				0.20
Pelagic Stingray	15		11	4				0.31
Wahoo	1	1						0.02
Marine Mammals, Turtles, and Seabirds								
Loggerhead Sea Turtle	7				7			0.14
Olive Ridley Sea Turtle	1				1			0.02
Black-Footed Albatross	14			12	2			0.28

In July 2001, the Southwest Region of the National Marine Fisheries Service established a voluntary observer program to monitor the U.S. West Coast pelagic longline fishery. Observers completed three trips between October 2001 and June 2002. All trips targeted swordfish, using four to five hooks per float, squid bait, lightsticks, and no line shooter. Observers collected data on 59 sets during 110 days at sea. This table summarizes the total catch and final disposition, by species, of all sea turtles, seabirds, marine mammals, and fish observed caught in the California pelagic longline fishery during the 2001/2002 fishing season. Total hooks observed equals 49,150.

Table 6-6. NMFS California Pelagic Longline Observer Program, September 2002–May 2003.

	Total Caught	Number Kept	Number Returned					Catch per 1,000 Hooks
			Alive	Dead	Injured	Finned	Unknown	
Management Unit Species								
Broadbill Swordfish	4163	3363	97	677			26	25.82
Blue Marlin	4		2	2				0.02
Unidentified Billfish	6		3	3				0.04
Common Thresher Shark	1		1					0.01
Bigeye Thresher Shark	2		1	1				0.01
Blue Shark	2930	18	2126	369			417	18.18
Shortfin Mako Shark	115	49	43	17			6	0.71
Albacore Tuna	167	69	44	51			3	1.04
Bigeye Tuna	115	99	8	7			1	0.71
Bluefin Tuna	2	2						0.01
Skipjack Tuna	9	9						0.06
Yellowfin Tuna	11	7	2	1			1	0.07
Unidentified Tuna	2		1	1				0.01
Unid. Mako Shark	1	1						0.01
Unid. Mako Shark	13		6	6			1	0.08
Unidentified Shark	441		185	9			247	2.74
Dolphinfish	313	57	136	86			34	1.94
Monitored Species								
Escolar	170	51	44	66			9	1.05
Longnose Lancetfish	227		11	208			8	1.41
Striped Marlin	7	1	2	3			1	0.04
Common Mola	22		21	1				0.14
Oilfish	30		10	19			1	0.19
Opah	10	8		1			1	0.06
Pacific Pomfret	26	21	1	4				0.16
Salmon Shark	4			4				0.02
Pelagic Stingray	69	16	33	18			2	0.43
Wahoo	6	6						0.04
Marine Mammals, Turtles, and Seabirds								
Risso's Dolphin	1				1			0.01
Loggerhead Sea Turtle	17				17			0.11
Leatherback Sea Turtle	2				2			0.01
Black-Footed Albatross	44			40	4			0.27
Laysan Albatross	4			4				0.02

In July 2001, the Southwest Region of the National Marine Fisheries Service established a voluntary observer program to monitor the U.S. West Coast pelagic longline fishery. The program became mandatory in August 2002. Observers completed ten trips between September 2002 and May 2003. All trips targeted swordfish, using four to five hooks per float, squid bait, lightsticks, and no line shooter. Observers collected data on 221 sets during 439 days at sea. This table summarizes the total catch and final disposition, by species, of all sea turtles, seabirds, marine mammals, and fish observed caught in the California pelagic longline fishery during the 2002/2003 fishing season. Total hooks observed equals 161,210.

Table 6-7. NMFS California Pelagic Longline Observer Program, August 2003–February 2004.

	Total Caught	Number Kept	Number Returned					Catch per 1,000 Hooks
			Alive	Dead	Injured	Finned	Unknown	
Management Unit Species								
Broadbill Swordfish	2843	2330	84	379			50	20.52
Unidentified Billfish	6		4	2				0.04
Common Thresher Shark	1		1					0.01
Bigeye Thresher Shark	5	3	2					0.04
Blue Shark	2185	10	1212	221		3	739	15.77
Shortfin Mako Shark	104	24	52	9			19	0.75
Unid. Mako Shark	20		12	5			3	0.14
Unidentified Shark	556	3	347	14			192	4.01
Albacore Tuna	234	184	16	23			11	1.69
Bigeye Tuna	102	80	11	5			6	0.74
Bluefin Tuna	1	1						0.01
Skipjack Tuna	1	1						0.01
Yellowfin Tuna	7	7						0.05
Unidentified Tuna	3		2	1				0.02
Dolphinfish	18	15	1				2	0.13
Monitored Species								
Escolar	126	55	31	32			8	0.91
Longnose Lancetfish	180		4	159			17	1.30
Black Marlin	1			1				0.01
Striped Marlin	4		1	3				0.03
Common Mola	31		31					0.22
Oilfish	90	9	39	29			13	0.65
Opah	31	24		7				0.22
Pacific Pomfret	4	4						0.03
Salmon Shark	1	1						0.01
Pelagic Stingray	93	19	43	12			19	0.67
Marine Mammals, Turtles, and Seabirds								
Unidentified Dolphin	1			1				0.01
Loggerhead Sea Turtle	32			2	30			0.23
Leatherback Sea Turtle	1				1			0.01
Black-Footed Albatross	14			13	1			0.10
Laysan Albatross	3			3				0.02

In July 2001, the Southwest Region of the National Marine Fisheries Service established a voluntary observer program to monitor the U.S. West Coast pelagic longline fishery. The program became mandatory in August 2002. Observers completed ten trips between August 2003 and February 2004. All trips targeted swordfish, using four to five hooks per float, squid bait, lightsticks, and no line shooter. Observers collected data on 189 sets during 413 days at sea. This table summarizes the total catch and final disposition, by species, of all sea turtles, seabirds, marine mammals, and fish observed caught in the California pelagic longline fishery during the 2003/2004 fishing season. Total hooks observed equals 138,554.

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8.0 COMMONLY-USED ACRONYMS IN HMS MANAGEMENT

ABC	allowable biological catch
AIDCP	Agreement on the International Dolphin Conservation Program
AMSY	average maximum sustainable yield
ATCA	Atlantic Tunas Convention Act
B	biomass
B_0	initial (unfished) bimoass
B_x	biomass under condition x, where x may be year or some type of reference point (e.g. MSY, Recent, FLAG, etc.)
BO	Biological Opinion
CalCOFI	California Cooperative Oceanic Fisheries Investigations
CDFG	California Department of Fish and Game
CEQ	Council on Environmental Quality
CFGC	California Fish and Game Commission
CFR	Code of Federal Regulations
Council	Pacific Fishery Management Council
CPFD	catch per fishing day
CPFV	commercial passenger fishing vessel
CPS	coastal pelagic species
CPUE	catch per unit of effort
CRFS	California Recreational Fisheries Survey
CWP	central-western Pacific
CYRA	Commission (IATTC) yellowfin regulatory area
CZMA	Coastal Zone Management Act
DAH	domestic annual harvest
DAP	domestic annual processing
DEIS	draft environmental impact statement
DGN	drift gillnet
DML	dolphin mortality limit
DOS	U.S. Department of State
EA	environmental assessment
EEZ	exclusive economic zone
EFH	essential fish habitat
EFL	eye-to-fork length
EFP	exempted fishing permit
EIS	environmental impact statement
EPO	eastern Pacific Ocean
EPOTFA	Eastern Pacific Ocean Tuna Fishing Agreement
ESA	Endangered Species Act
ESU	evolutionarily significant unit
ETP	eastern tropical Pacific
F	fishing mortality

$F_{x\%}$	fishing mortality rate producing x% of the maximum spawning potential in the absence of fishing
$F_{0.1}$	F_{MSY} proxy reference point defined by a line having a slope 0.1 times that of the yield per recruit curve near the origin
F_x	fishing mortality under condition x, where x may be year or some type of reference point (e.g. MSY, Recent, 2003, etc.)
F_{Max}	fishing mortality rate producing the maximum yield per recruit
FAD	fish aggregating devices
FAO	Food and Agriculture Organization of the United Nations
FEAM	Fishery Economic Assessment Model
FFA	(South Pacific) Forum Fishery Agency
FL	fork length
FMP	fishery management plan
FY	fiscal year
GIS	geographic information system
GLM	general linear model
HAPC	habitat area of particular concern
HMS	highly migratory species
HMS FMP	Highly Migratory Species Fishery Management Plan
HMSAS	Highly Migratory Species Advisory Subpanel
HMSMT	Highly Migratory Species Management Team
HSFCA	High Seas Fishing Compliance Act
IATTC	Inter-American Tropical Tuna Commission
ICCAT	International Commission for the Conservation of Atlantic Tunas
IDCPA	International Dolphin Conservation Program Act
IPOA	International Plan of Action
ISC	International Scientific Committee for Tuna and Tuna-like Species in the North Pacific
ITQ	individual transferable quota
ITS	incidental take statement
IUCN	World Conservation Union
JFL	jaw-to-fork length
JVP	joint venture processing
LMSY	local MSY
LOS	Law of the Sea
M	natural mortality
MBTA	Migratory Bird Treaty Act
MFMT	maximum fishing mortality threshold
MHLC	Multi-Lateral High Level Conference for Conservation and Management of Highly Migratory Species of the Central and Western Pacific
MMC	Marine Mammal Commission
MMPA	Marine Mammal Protection Act
MRFSS	Marine Recreational Fisheries Statistics Survey

MSA	Magnuson-Stevens Act, Magnuson-Stevens Fishery Conservation and Management Act
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
MSST	minimum stock size threshold
MSY	maximum sustainable yield
MT	metric ton
MUS	management unit species
NAICS	North American Industry Classification System
NEPA	National Environmental Policy Act
NMFS	National Marine Fisheries Service
NNB	net national benefits
NOAA	National Oceanic and Atmospheric Administration
NPALBW	North Pacific Albacore Workshop
NPDES	national pollutant discharge elimination system
NPFMC	North Pacific Fishery Management Council
NPO	North Pacific Ocean
NPOA	National Plan of Action
NPTZ	North Pacific transition zone
NRIFSF	National Research Institute of Far Seas Fisheries
NS	National Standards (of the Magnuson-Stevens Act)
NWI	National Wetlands Inventory
NWPO	northwest Pacific Ocean
ODFW	Oregon Department of Fish and Wildlife
OMB	Office of Management and Budget
OY	optimum yield
PacFIN	Pacific Fisheries Information Network
PBF	Pacific bluefin tuna
PBR	potential biological removal
PFMC	Pacific Fishery Management Council
PGR	population growth rate
POCTRP	Pacific Offshore Cetacean Take Reduction Plan
POCTRT	Pacific Offshore Cetacean Take Reduction Team
POFI	Pacific Oceanic Fishery Investigations
PRA	Paperwork Reduction Act
PRBO	Point Reyes Bird Observatory
PSMFC	Pacific States Marine Fisheries Commission
RA	Regional Administrator (of NMFS)
RecFIN	Recreational Fisheries Information Network
RFA	Regulatory Flexibility Act
RIR	Regulatory Impact Review
RPA	reasonable and prudent alternative
SAC	Sportfishing Association of California
SAFE	stock assessment and fishery evaluation

SBR	spawning biomass ratio (ratio of spawning biomass to that of the unfished stock)
SBR_{AMSY}	spawning biomass ratio supporting the average maximum sustainable yield
SCB	Southern California Bight
SCTB	Standing Committee on Tuna and Billfish
SDC	status determination criteria
SFA	Sustainable Fisheries Act of 1996 (amendment to the Magnuson-Stevens Act)
SHBS	statistical habitat based standardization
SIC	Standard Industrial Classification
SPC	Secretariat of the Pacific Community
SPTT	South Pacific Tuna Treaty
SSB	spawning stock biomass
SSB_0	initial (unfished) spawning stock bimoass
SSB_x	spawning stock biomass under condition x, where x may be year or some type of reference point (e.g. MSY, Recent, 2004, etc.)
SSC	Scientific and Statistical Committee
SST	sea surface temperature
SWFSC	Southwest Fisheries Science Center (NMFS)
TALFF	total allowable level of foreign fishing
TRP	(Pacific Offshore Cetacean) Take Reduction Plan
TRT	(Pacific Offshore Cetacean) Take Reduction Team
UNIA	United Nations Implementing Agreement on the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks
USCG	U.S. Coast Guard
USFWS	U.S. Fish and Wildlife Service
VMS	vessel monitoring system
WCBA	Westport Charter Boat Association
WCPFC	Western and Central Pacific Fisheries Commission
WCPO	western and central Pacific Ocean
WDFW	Washington Department of Fish and Wildlife
WPRFMC	Western Pacific Regional Fishery Management Council
YPR	yield per recruit
ZMRG	zero mortality rate goal