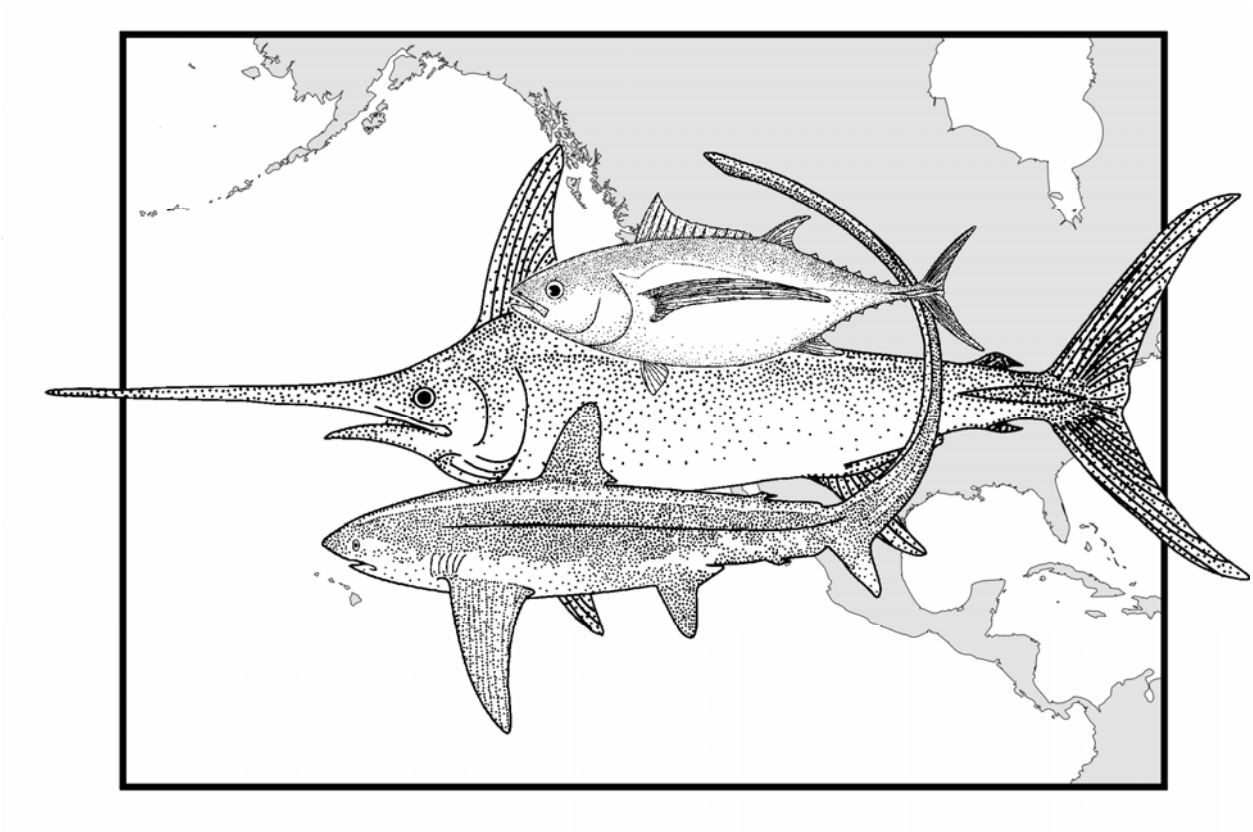
STATUS OF THE U.S. WEST COAST FISHERIES FOR HIGHLY MIGRATORY SPECIES THROUGH 2007



STOCK ASSESSMENT AND FISHERY EVALUATION

SEPTEMBER 2008

PACIFIC FISHERY MANAGEMENT COUNCIL
7700 NE AMBASSADOR PLACE, SUITE 101
PORTLAND, OREGON 97220
WWW.PCOUNCIL.ORG

Cover illustration by Roy Allen, Southwest Fisheries Science Center, National Marine Fisheries Service, La Jolla, California

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Acronyms Used In Highly Migratory Species Management

ABC	allowable biological catch
ADAPT	an age-disaggregated virtual population stock assessment model
AIDCP	Agreement on the International Dolphin Conservation Program
AMSY	average maximum sustainable yield
A-SCALA	age-structure catch-at-length analysis
ASPIC	a non-equilibrium surplus production stock assessment model
ATCA	Atlantic Tunas Convention Act
B	biomass
$\widetilde{B}$	equilibrium biomass
B_0	initial (unfished) biomass
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 rate
$F_{x\%}$	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 rate 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 device
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
FR	Federal Register
FY	fiscal year
GIS	geographic information system
GLM	general linear model
h	steepness of the stock-recruitment relationship
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	International Union for the Conservation of Nature and Natural Resources or the World Conservation Union
IUU	Illegal, Unreported, and Unregulated fisheries
JFL	jaw-to-fork length
JVP	joint venture processing
LMSY	local MSY
LOF	List of Fisheries
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
ORBS	Ocean Boat Recreational Survey
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
RFMO	regional fishery management organization
RIR	Regulatory Impact Review
RPA	reasonable and prudent alternative
SAC	Sportfishing Association of California
SAFE	stock assessment and fishery evaluation
SAR	stock assessment report (for marine mammal stocks)
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
SEB	Shore and Estuary Boat sampling program
SEPO	southeast Pacific Ocean
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 biomass

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)
SWR	Southwest Regional Office (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
VPA	virtual population analysis
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
WPFMC	Western Pacific Fishery Management Council
YPR	yield per recruit
ZMRG	zero mortality rate goal

1.0 INTRODUCTION

1.1 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 Federal, and international management of the stocks listed in Table 1–1.[1] The National Marine Fisheries Service (NMFS), on behalf of the Secretary of Commerce, partially approved the HMS FMP on February 4, 2004. The majority of HSM FMP implementing regulations became effective on April 7, 2004. Reporting and recordkeeping provisions became effective on February 10, 2005.

On June 7, 2007, NMFS approved Amendment 1 to the HMS FMP. The FMP was amended to incorporate recommended international measures to end overfishing of the Pacific stock of bigeye tuna (*Thunnus obesus*) in response to formal notification from NMFS that overfishing was occurring on this stock. Amendment 1 also served as a means to substantially reorganize the original combined FMP and Final Environmental Impact Statement, published in August 2003. Much of the descriptive material in the combined document was moved to a series of appendices, substantially shortening the body of the FMP. An electronic copy of the current FMP is available on the Council's Web site at http://www.pcouncil.org/hms/hmsfmp.html.

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 orientalis*
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:

[1] Throughout this document "west coast" is used to denote the geographic region comprising the coastal areas of Washington, Oregon, and California.

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.

1.3 The Management Cycle

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. National Marine Fisheries Service (NMFS) implements Council recommended management measures through the Federal regulatory process. Any such measures become effective at the start of the next fishing year, April 1 of the following year, or when the rulemaking process is complete, and stay in effect for at least two years.

Council meetings in 2006 initiated the first biennial management cycle under the HMS FMP with consideration of measures to be implemented during the April 1, 2007, to March 31, 2009, biennium. Two changes were proposed by the Council. First, the Council recommended exempting commercial passenger fishing vessels (CPFVs) from the requirement at 50 CFR 660.704 requiring subject vessels to display their official number. The second set of changes incorporates recreational bag limits for albacore and bluefin tuna into Federal regulations. For albacore tuna the Council recommended a daily bag limit of 10 fish in Federal waters south of Point Conception (34° 27’ N. latitude) to the U.S.-Mexico border and a daily bag limit of 25 fish in Federal waters north of Point Conception to the California-Oregon border. This differential bag limit is intended to accommodate differences in fishing opportunity in the two regions. In addition, the 25 fish bag limit north of Point Conception is consistent with the current albacore tuna bag limit established by the State of Oregon for recreational fisheries in its waters. For bluefin tuna the Council identified a 10-fish daily bag limit for Federal waters off of California.

1.4 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 (September 2008), and their primary responsibilities in preparing the report, are listed below.

Mr. Lyle Enriquez (Chapter 3, observer requirements)
Fishery Biologist, NMFS Southwest Region

Mr. Craig Heberer, Team Chair (chapter 3, description of FMP management measures and regulations, international regulatory issues)
Fisheries Biologist, NMFS Southwest Region

Dr. Suzanne Kohin (chapter 5, chapter 6, research updates, chapter 8)
Research Fishery Biologist, NMFS Southwest Fisheries Science Center

Ms. Leeanne M. Laughlin (chapter 2, description of California fisheries)
Associate Marine Biologist, California Department of Fish and Game

Mr. Corey Niles (chapter 2 description of Washington fisheries, chapter 6, research and data needs)
Marine Resources Policy Coordinator, Washington Department of Fish and Wildlife

Ms. Cyreis Schmitt (chapter 2 description of Oregon fisheries)
Oregon Department of Fish and Wildlife representative

Dr. Stephen Stohs (chapter 4)
Industry Economist, NMFS Southwest Fisheries Science Center

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

Dr. Kit Dahl (chapter 1, compilation of the report)
Staff Officer, Pacific Fishery Management Council

Ms. Donna Dealy (chapter 4)
Computer Specialist, NMFS Southwest Fisheries Science Center

Omar Mansour (chapter 4)
Economics Research Assistant, Southwest Fisheries Science Center

1.5 Council Highly Migratory Species Activities, January 2007-June 2008

Exempted Fishing Permit for Longline Fishing in the West Coast Exclusive Economic Zone

At the March and April 2007 meetings the Council considered an application for an exempted fishing permit (EFP) to allow one vessel to fish in the west coast EEZ with shallow-set longline gear, which is currently prohibited. The Council recommended that NMFS issue the EFP with various terms and conditions attached to minimize adverse environmental impacts. However, NMFS was unable to issue the EFP in 2007 because the California Coastal Commission did not concur with NMFS's finding that the proposal was consistent with the enforceable policies of the state's coastal zone management program. The requirement for a consistency determination is part of the Coastal Zone Management Act of 1972, as amended.

The Council again considered the EFP proposal at their March and April 2008 meetings for issuing the permit in 2008. They again recommended that the permit be issued and that it apply to the time period through 2009. The length of this time period is intended to account for any delays related to the consistency determination issue.

Recommendations to Regional Fishery Management Organizations

At their April 2007 and April 2008 meetings the Council drafted recommendations to the U.S. delegation to the Inter-American Tropical Tuna Commission (IATTC) in advance of the IATTC's annual June meetings. In both instances the Council underscored their concern about continued overfishing of bigeye and yellowfin tuna stocks and made general recommendations on conservation measures the IATTC should adopt to end overfishing. In 2008 the Council also noted the depleted status of North Pacific striped marlin and recommended that IATTC complete a new stock for the Eastern Pacific segment of the stock.

Albacore Fishing Effort Characterization

At the April 2007 meeting the Council adopted a methodology for characterizing historical fishing effort on the North Pacific albacore stock. The methodology was developed by the HMSMT with input from the Highly Migratory Species Advisory Subpanel (HMSAS) and responds to resolutions adopted by the IATTC and the WCPFC calling on member countries to not increase their fishing effort on the stock from current levels. Based on the information provided, the Council concluded that U.S. West Coast effort on North Pacific albacore is not increasing.

At their September 2007 meeting the Council directed their Scientific and Statistical Committee to review a stock assessment of North Pacific albacore tuna conducted under the auspices of the International Scientific Committee for Tuna and Tuna-like species. The Western and Central Pacific Fisheries Commission's Northern Committee is the principal forum for developing international conservation recommendations for North Pacific albacore. However, the Northern Committee met during the same week as the Council's September meeting in both 2007 and 2008, hampering the Council's ability to make recommendations on conservation of this stock.

Yellowfin Tuna Overfishing

In order to address the requirements of Magnuson-Stevens Fishery Conservation and Management Act Section 304(i), the Council adopted the following recommendations.

For domestic regulations to address the relative impact of U.S. fishing vessels on the stock, the Council recommends that no new conservation measures are needed. For international actions that will end overfishing, taking into account the relative impact of vessels of other nations and vessels of the U.S.:

1. Set a total allowable catch (TAC) of 200,000 metric tons for yellowfin taken by purse seine in the eastern Pacific Ocean (EPO) to reduce fishing mortality to a level sufficient to end overfishing on the stock.
2. Reduce capacity in the purse seine fishery, consistent with Inter-American Tropical Tuna Commission (IATTC) resolutions C-00-10 and C-02-03 to control total fishing capacity.
3. Design and implement an IATTC program to collect information on fish aggregating devices and assess their impacts on target stocks, especially juvenile tunas.
4. Implement time-area closures consistent with measures identified by the IATTC scientific staff.

Council Operating for Making Highly Migratory Species Recommendations to Regional Fishery Management Organizations

In 2007 the Council adopted an Operating Procedure specifying how they would receive information on

the activities of regional fishery management organizations and how they would make recommendations to the delegations to these organizations. (See http://www.pcouncil.org/operations/cop/cop21.pdf)

Amendment 2 to the HMS FMP

In 2007 the Council initiated work on an FMP amendment to authorize a shallow-set longline fishery, targeting swordfish, in waters outside the west coast EEZ. The portion of the HMS FMP authorizing this fishery was disapproved by NMFS because of a finding under the Endangered Species Act that it could jeopardize the continued existence of threatened loggerhead sea turtles. However, new fishing gear, successfully tested elsewhere, has demonstrated substantial decreases in the take of sea turtles. In March 2008 they adopted a range of alternatives for public review. In addition to requiring various mitigation measures to reduce sea turtle takes, the alternatives include establishing a limited entry license program for participation in the fishery.

Biennial Harvest Specifications

In June 2008 the Council initiated the second cycle for adopting biennial harvest specifications and management measures since the HMS FMP was implemented. At the HMSMT's recommendation, the Council decided to pursue management measures for the recreational thresher shark fishery in Southern California. This fishery has rapidly expanded in the last few years and occurs in an area that is reproductively important to the stock. Although data are limited, there is concern that the fishery, if unchecked, could result in local depletion. According to the management cycle, the Council takes final action in November 2008 to adopt management measures, which will be in place when the regulatory process is complete.

2.0 DESCRIPTION OF THE FISHERIES

2.1.1 California

2.1.1.1 Surface Hook-and-Line Fishery for Albacore

Albacore is an economically valuable fishery in California and has been a target of commercial fishermen for more than 100 years. Troll and live bait are the principal commercial gears, although some albacore is caught using purse seine, longline, and drift gillnet gear as well. Since 1980, the number of surface hook-and-line vessels landing albacore in California ports has ranged annually from a high of 1,312 in 1981 to a low of 78 in 2006. The fishing season varies from year to year, depending on oceanographic conditions, which strongly influence the occurrence of fish within range of the California-based fleet, and economics; however, a typical season runs July through October, with landings peaking in the fall. 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. Additionally, the HMS FMP requires a Federal permit with a surface hook-and-line gear endorsement for all U.S. commercial and recreational charter fishing vessels that fish for HMS within the west coast exclusive economic zone (EEZ, 3–200 nautical miles) and to U.S. vessels that pursue HMS on the high seas (seaward of the EEZ) and land their catch in California, Oregon, and Washington.

In 2007, 153 commercial surface hook-and-line vessels landed 771 mt of albacore compared to 76 vessels that landed 184 mt in 2006 (Table 2–1). The volume and number of landings varied throughout ports in California with Eureka receiving a majority of the catch (Table 2–1). Nominal landings occurred June though August, increasing in September, and peaking in October (Table 2–2). The exvessel revenue was about $1.5 million in 2007, increasing threefold compared to about $0.5 million in 2006.

Table 2-1. Annual commercial landings (round mt) and number of deliveries for albacore landed in California's major port complexes by the surface hook-and-line fleet, 2006–07.

	2006 Landings		2007 Landings	
Port Complex[1]	(mt)[2]	(number)	(mt)[2]	(number)
Eureka	89	145	458	143
Fort Bragg	6	31	8	23
Bodega Bay	11	20	3	7
San Francisco	10	33	25	99
Monterey	25	36	106	50
Morro Bay	5	21	14	23
Santa Barbara	*	*	2	8
Los Angeles	33	3	151	14
San Diego	5	6	4	24
Total	184	295	771	391

Source: California's Commercial Fisheries Information System (CFIS), market receipt data, extracted July 2, 2008.
Additional processing information:
[1]- Port Complex: composed of two or more ports within one of the nine geographic statistical reporting areas.
[2]-Landings in pounds are converted to round weight mt by dividing the landed weights by 2000 for short ton (ST), and then multiplying the conversion factor of 0.9072 for MT.
* -Withheld for data confidentiality reasons.

In 2001, the last operational cannery in the Port of Los Angeles closed its doors, ending a west coast tuna-canning dynasty. Changing global market conditions and a dynamic raw material/finished goods supply environment forced the plants to close. Without domestic-based cannery operations, a majority of the albacore are landed fresh and frozen and exported to overseas markets for processing. There were 542 mt of fresh and frozen albacore valued at over $1 million exported from California in 2007, more than doubling from 232 mt valued at $0.5 million in 2006.

Table 2-2. Monthly commercial landings (round mt) and ex-vessel revenue for albacore landed in California ports by the surface hook-and-line fleet, 2006–07.

	2006		2007	
Month	Landings (mt)[1]	Ex-vessel (dollar)[2]	Landings (mt)[1]	Ex-vessel (dollar)[2]
January	0	0	19	46,949
February	0	0	0	0
March	0	0	0	0
April	0	0	0	0
May	0	0	0	0
June	>1	2,321	3	6,036
July	39	81,523	18	43,450
August	10	24,654	40	79,699
September	54	136,521	166	325,608
October	80	193,602	525	1,009,656
November	5	16,701	0	0
December	*	*	*	*
Total	196	455,322	771	1,502,398

Source: California's Commercial Fisheries Information System (CFIS), market receipt data, extracted July 2, 2008.
Additional processing information:
[1]-Landings in pounds are converted to round weight mt by dividing the landed weights by 2000 for ST, and then multiplying the conversion factor of 0.9072 for MT.
[2]-Ex-vessel revenues are nominal (not adjusted for inflation).
* -Withheld for data confidentiality reasons.

Landings for 2007 are reminiscent of the late 1980s and early 1990s totals when they were also below the 1,000 mt bench mark (Table 4-35 and Table 4-36). 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. Additionally, industry representatives have indicated that in recent years lower operating cost and better landing facilities outside of California have resulted in a decrease in California landings.

2.1.1.2 Coastal Purse Seine Fishery for Yellowfin, Skipjack, and Bluefin Tunas

In the U.S. EEZ portion of the EPO more than 90 percent of the yellowfin, skipjack, and bluefin tuna catch is made by small coastal purse seine vessels operating in the Southern California Bight (SCB) from May to October. These vessels primarily target small pelagic species, especially Pacific mackerel, Pacific sardine, anchovy, and market squid. However, they will target the tropical yellowfin and skipjack tunas when intrusions of warm water from the south bring fish within range of the coastal fleet. Similarly, vessel operators will switch to the higher-valued temperate water bluefin tuna when they enter the coastal waters of the SCB. Since 1981, the number of purse seine vessels that have landed tuna in California has ranged from a high of 228 in 1986 to a low of one in 2003. In general, the decline in vessels can be attributed to the relocation of large cannery operations overseas to offset declining revenues, due to the cost of domestic production compared to foreign production. Currently there are no canneries operating in California. 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. Additionally, the HMS FMP requires a logbook and Federal permit with a purse seine gear endorsement for all U.S. vessels that fish for HMS within the west coast EEZ and to U.S. vessels that pursue HMS on the high seas (seaward of the EEZ) and land their catch in California, Oregon, and Washington.

Yellowfin Tuna: Less than three boats landed yellowfin tuna in 2007, similar to 2006. Landings and revenue for yellowfin tuna for 2006-07 could not be reported because of Federal data confidentiality rules that do not allow reporting information unless aggregated for three or more vessels. However, the annual landing trend has been one of decline since 1976, when more than 125,000 mt of fish were landed in California ports.

In 2007, California landings of yellowfin tuna in January through May originated from waters outside the US EEZ, while that caught in December came from outside the EEZ of Mexico; however most of the catch July through November originated within the EEZ off San Diego. Exports of fresh yellowfin from California went to fresh fish markets in Canada; and frozen products also went to Mexico, Indonesia, and South Korea for processing in 2007.

Skipjack Tuna: In 2007, less than three vessels landed skipjack, similar to 2006. Landings and revenue for yellowfin tuna for 2006-07 could not be reported because of Federal data confidentiality rules that do not allow reporting information unless aggregated for three or more vessels. However, the annual landings trend has been one of decline following the historic high of 79,111 mt in 1980. Annual landings and exvessel revenues have been relatively flat since 1985, averaging 2,641 mt and $2.7 million. Skipjack landed in California are caught primarily in the SCB and seaward of the Mexican EEZ. There were 53 mt of exports of fresh and frozen skipjack tuna valued at about $56 thousand from California were reported in 2007, most of which went to Mexico, increasing from 19 mt valued at about $28 thousand in 2006.

Bluefin Tuna: In 2007, less than three vessels landed bluefin, compared to no purse seine landings in 2006. Landings and revenue for bluefin tuna for 2006-07 could not be reported because of Federal data confidentiality rules that do not allow reporting information unless aggregated for three or more vessels. Similar to 2006, all exports of fresh bluefin tuna from California went to Japan in 2007, while frozen went to Canada.

2.1.1.3 Harpoon Fishery for Swordfish

California's harpoon fishery for swordfish developed in the early 1900s. Prior to 1980, harpoon and hook-and-line were the only legal gears for commercially harvesting swordfish. At that time, harpoon gear accounted for the majority of swordfish landings in California ports. In the early 1980s, a limited entry drift gill net fishery was authorized by the State Legislature and soon afterward drift gillnets replaced harpoons as the primary method for catching swordfish, and the number of harpoon permits decreased from a high of 1,223 in 1979 to a low of 23 in 2001. Fishing effort typically occurs in the SCB from May to December, peaking in August, depending on weather conditions and the availability of fish in coastal waters. Some vessel operators work in conjunction with a spotter airplane to increase the search area and to locate swordfish difficult to see from the vessel. This practice tends to increase the catch-per-unit-effort compared to vessels that do not use a spotter plan. To participate in the harpoon fishery a state permit and logbook are required in addition to a general resident or non-resident commercial fishing license and a current CDFG vessel registration. Additionally, the HMS FMP requires a Federal permit with a harpoon gear endorsement for all U.S. vessels that fish for HMS within the west coast EEZ and to U.S. vessels that pursue HMS on the high seas (seaward of the EEZ) and land their catch in California, Oregon, and Washington.

Table 2-3. Annual commercial landings (round mt) and number of deliveries for swordfish landed in California's major port complexes by the harpoon fleet, 2006–07.

Port Complex[1]	2006 Landings (mt)[2]	2006 Landings (number)	2007 Landings (mt)[2]	2007 Landings (number)
Santa Barbara	*	*	1	13
Los Angeles	38	222	23	208
San Diego	10	89	16	81
Total	48	311	40	302

Source: California's Commercial Fisheries Information System (CFIS), market receipt data, extracted July 2, 2008.
Additional processing information:
[1]- Port Complex: composed of two or more ports within one of the nine geographic statistical reporting areas.
[2]-Landings in pounds are converted to round weight mt by dividing the landed weights by 2000 for ST, and then multiplying the conversion factor of 0.9072 for MT. A conversion factor of 1.45 was multiplied by the reported dressed weight to obtain a round weight.
* -Withheld for data confidentiality reasons.

Table 2-4. Monthly commercial landings (round mt) and ex-vessel revenue (dollars) for swordfish landed in California by the harpoon fleet, 2006–07.

Month	2006 Landings (mt)[1]	2006 Ex-vessel (dollar)[2]	2007 Landings (mt)[1]	2007 Ex-vessel (dollar)[2]
January	*	*	0	0
February	0	0	0	0
March	0	0	0	0
April	0	0	0	0
May	0	0	0	0
June	3	61,289	3	48,212
July	8	135,590	10	155,461
August	6	103,624	20	288,982
September	10	142,071	6	85,261
October	15	170,231	1	16,477
November	6	59,873	*	*
December	*	*	0	0
Total	48	672,678	0	0

Source: California's Commercial Fisheries Information System (CFIS), market receipt data, extracted July 2, 2008.
Additional processing information:
[1]-Landings in pounds are converted to round weight mt by dividing the landed weights by 2000 for ST, and then multiplying the conversion factor of 0.9072 for mt. A conversion factor of 1.45 was multiplied by the reported dressed weight to obtain a round weight.
[2]-Ex-vessel revenues are nominal (not adjusted for inflation).
* -Withheld for data confidentiality reasons.

In 2007, 28 harpoon vessels landed 40 mt of swordfish compared to 23 vessels that landed 49 mt in 2006 (Table 2-3). Fishing effort was concentrated in coastal waters off San Diego and Orange Counties in the SCB, especially from blocks southeast of Santa Catalina and San Clemente Islands. Landings occurred June through November, peaking in August (Table 2-4).

The exvessel revenue for 2007 was $594,393 compared to $679,654 in 2006 (Table 2-4). Because harpoon vessels spend less time on the water and are a low-volume fishery, their catch is often fresher than drift-gillnet-caught fish, so markets tend to pay more for harpooned fish. The average exvessel

price-per-pound for harpooned fish was $6.15 compared to $2.89 for drift gillnet caught fish in 2006. Harpooned swordfish support domestic seafood restaurant businesses and is advertised as a bycatch-free fishery, although some mako and thresher shark is taken as well.

2.1.1.4 Drift Gillnet Fishery for Swordfish and Shark

Swordfish: California's swordfish fishery transformed from primarily a harpoon fishery to a drift gillnet fishery in the early 1980s and landings soared to a historical high of 2,371 mt by 1985. The drift gillnet fishery is a limited entry program, managed with gear, season, and area closures. A limited entry program was established in 1980 and about 150 permits were initially issued. The permit is transferable under very limited conditions and it is linked to an individual fisherman, not a vessel; thus the value of the vessel does not become artificially inflated, allowing permittees to buy new vessels as needed. Since 1984, the number of permits has declined from a high of 251 in 1986 to a low of 86 in 2007; however, only 46 vessels participated in the swordfish fishery in 2007 (Table 2-5). Annual fishing effort has also decreased from a high of 11,243 sets in the 1986 fishing season to 1,043 sets in 2005. Industry representatives attribute the decline in vessel participation and annual effort to regulations implemented to protect threatened and endangered marine mammals, sea turtles, and seabirds. 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 drift gillnet 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 drift gillnet gear. A logbook is also required. The HMS FMP requires a Federal permit with a drift gillnet gear endorsement for all U.S. vessels that fish for HMS within the west coast EEZ and to U.S. vessels that pursue HMS on the high seas (seaward of the EEZ) and land their catch in California, Oregon, and Washington.

Table 2-5. Annual drift gillnet permits issued and number of active vessels, 1981–2007.

Year	Active[1] Vessels	Permits Issued	Year	Active[1] Vessels	Permits Issued
1980	100	*	1994	138	162
1981	118	*	1995	117	185
1982	166	*	1996	111	167
1983	193	*	1997	108	120
1984	214	226	1998	98	148
1985	228	229	1999	84	136
1986	204	251	2000	78	127
1987	185	218	2001	69	114
1988	154	207	2002	50	106
1989	144	189	2003	43	100
1990	134	183	2004	40	96
1991	114	165	2005	42	90
1992	119	149	2006	45	88
1993	123	117	2007	46	86

Source: CDFG License and Revenue Branch (LRB), extracted August 24, 2007.
Additional processing information:
[1]-some vessels only land thresher and/or swordfish from year to year so the highest number of active vessels for both components of the fishery were reported for this gear.
*-actual number of permits issued by LRB not available but the California State Legislature set a cap of 150 in 1982.

Historically, the California drift gillnet 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, over 90 percent of the fishing effort occurs August 15 through January 31.

Table 2-6. Annual commercial landings (round mt) and number of deliveries for swordfish landed in California's major port complexes by the drift gillnet fleet, 2006–07.

	2006 Landings		2007 Landings	
Port Complex[1]	(mt)[2]	(number)	(mt)[2]	(number)
San Francisco	*	*	0	0
Monterey	*	*	3	7
Morro Bay	5	8	6	19
Santa Barbara	12	75	44	127
Los Angeles	16	34	48	51
San Diego	64	165	65	180
Total	97	282	166	384

Source: California's Commercial Fisheries Information System (CFIS), market receipt data, extracted July 2, 2008, Additional processing information:
[1]- Port Complex: composed of two or more ports within one of the nine geographic statistical reporting areas.
[2]-Landings in pounds are converted to round weight mt by dividing the landed weights by 2000 for ST, and then multiply the conversion factor of 0.9072 for MT. A conversion factor of 1.45 was multiplied by the reported dressed weight to obtain a round weight.
* -Withheld for data confidentiality reasons.

Table 2-7. Monthly commercial landings (round mt) and ex-vessel revenue for swordfish landed in California by the drift gillnet fleet, 2006–07.

	2006		2007	
Month	Landings (mt)[1]	Ex-vessel (dollar)[2]	Landings (mt)[1]	Ex-vessel (dollar)[2]
January	19	32,875	17	36,654
February	3	750	>1	766
March	0	0	>1	674
April	0	0	0	0
May	7	11,155	0	0
June	5	9,601	7	12,418
July	1	2,336	2	3,471
August	2	4,286	6	12,020
September	21	40,899	11	20,661
October	10	18,943	41	75,069
November	14	29,636	50	61,694
December	16	30,703	32	35,353
Total	98	181,184	166	258,780

Source: California's Commercial Fisheries Information System (CFIS), market receipt data, extracted July 2, 2008.
Additional processing information:
[1]-Landings in pounds are converted to round weight mt by dividing the landed weights by 2000 for ST, and then multiplying the conversion factor of 0.9072 for MT. A conversion factor of 1.45 was multiplied by the reported dressed weight to obtain a round weight.
[2]-Ex-vessel revenues are nominal (not adjusted for inflation).
* -Withheld for data confidentiality reasons.

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 turtles. The larger of the two closures spans the EPO north of Point Conception, California (34°27' N. latitude) to mid-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 sea turtles. A smaller closure was implemented to protect Pacific loggerhead turtles from drift gillnet gear during a forecasted or occurring El Niño event, and is located south of Point Conception, California and west of 120° W. longitude from June 1-August 31 (72 FR 31756). Since 2000, the number of vessels participating in the swordfish fishery has decreased from 69 in 2001 to 38 in 2006.

In 2007, 39 drift gillnet vessels landed 474 mt of swordfish compared to 38 vessels that landed 444 mt in 2006 (Table 2-6). Landings occurred at ports from San Diego to Monterey and the majority occurred from October to December. Over 73 percent of the reported effort occurred in the SCB.

The ex-vessel revenue was nearly $2.4 million in 2007 compared to about $2 million in 2006 (Table 2-7). Most of the swordfish landed in California supports domestic seafood restaurant businesses.

Thresher Shark: Initial development of the drift gillnet fishery in the late 1970s was founded on catches of common thresher shark. The thresher shark fishery rapidly expanded, peaking in 1985, when 228 vessels landed more than 1,000 mt of shark. Following 1985, swordfish replaced thresher shark as the primary target species because there was a greater demand for swordfish and it commands a higher price-per-pound. Annual thresher shark landings declined in subsequent years because of the switch to swordfish to maximize economic returns and the implementation of management measures to protect the thresher shark resource.

Table 2-8. Annual commercial landings (round mt) and number of deliveries for common thresher shark landed in California's major port complexes by the drift gillnet fleet, 2006–07.

	2006 Landings		2007 Landings	
Port Complex[1]	(mt)[2]	(number)	(mt)[2]	(number)
San Francisco	*	*	0	0
Monterey	*	*	3	8
Morro Bay	9	6	6	19
Santa Barbara	12	76	44	127
Los Angeles	18	44	50	59
San Diego	66	180	70	209
Total	105	306	173	422

Source: California's Commercial Fisheries Information System (CFIS), market receipt data, extracted July 2, 2008. Additional processing information:
[1]- Port Complex: comprised of two or more ports within one of the nine geographic statistical reporting areas.
[2]-Landings in pounds are converted to round weight mt by dividing the landed weights by 2000 for ST, and then multiplying the conversion factor of 0.9072 for MT. A conversion factor of 1.70 was multiplied by the reported dressed weight to obtain a round weight.
* -Withheld for data confidentiality reasons.

In 2007, 46 drift gillnet vessels landed 173 mt of common thresher shark compared to 41 vessels that landed 105 mt in 2006 (Table 2-8). Landings occurred throughout the open season but a majority occurred October through December at ports from San Diego to Monterey (Table 2-8). Fishing effort was focused in the SCB.

The ex-vessel revenue for 2007 was $265,409 compared to $185,307 in 2006 (Table 2-9). Fresh thresher shark support domestic seafood restaurant businesses.

Table 2-9. Monthly commercial landings (round mt) and ex-vessel revenue for common thresher shark landed in California ports by the drift gillnet fleet, 2006–07.

	2006		2007	
Month	Landings (mt)[1]	Ex-vessel (dollar)[2]	Landings (mt)[1]	Ex-vessel (dollar)[2]
January	19	32,875	19	39,382
February	3	750	>1	766
March	0	0	>1	674
April	0	0	0	0
May	7	11,155	0	0
June	5	9,601	7	12,418
July	1	2,336	2	3,471
August	3	4,840	6	12,508
September	22	41,415	12	21,873
October	10	19,315	43	77,189
November	16	31,545	50	61,775
December	17	31,475	32	35,353
Total	103	185,307	171	265,409

Source: California's Commercial Fisheries Information System (CFIS), market receipt data, extracted July 2, 2008.
Additional processing information:
[1]-Landings in pounds are converted to round weight mt by dividing the landed weights by 2000 for ST, and then multiplying the conversion factor of 0.9072 for MT. A conversion factor of 1.70 was multiplied by the reported dressed weight to obtain a round weight.
[2]-Ex-vessel revenues are nominal (not adjusted for inflation).

2.1.1.5 High Seas Longline Fishery for Swordfish

California prohibits 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. Federal regulations current prohibit targeting swordfish with shallow-set longline gear outside of the EEZ unless in possession of a Hawaii limited entry longline permit. The operator must comply with the High Seas Fishing Compliance Act, which requires U.S. vessel operators to maintain logbooks if they fish beyond the EEZ. Additionally, the HMS FMP requires a Federal permit with a pelagic longline gear endorsement for all U.S. vessels that pursue HMS on the high seas (seaward of the EEZ) and land their catch in California, Oregon, and Washington.

In recent years, Federal regulations promulgated to protect endangered sea turtles east and west of 150° W longitude and north of the equator have impacted the number of landings of swordfish in California ports. In 2006, three longline vessels landed 25 mt; landings in 2005 could not be reported because of Federal data confidentiality rules that do not allow reporting information unless aggregated for three or more vessels (Table 2–13). The relatively low landings reported in 2005 and 2006 are reminiscent of the 1980s when only three vessels participated in the high seas fishery and landings ranged from 0 to 12 mt.

Annual landings and ex-vessel revenues have been declining since 2000 when landings and exvessel revenue totaled 1,885 mt and $8.1 million, respectively (Table 4-13 and Table 4-19).

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 3,700 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).

Commercial landings of albacore into Oregon totaled 4,742 mt in 2007, 23 percent more than the 3,864 mt landed in 2006 (Table 2-10) but near the long-term average. Favorable ocean conditions, persistent warm weather and poor salmon fishing contributed to the increase. Short traveling distance to the fishing grounds during the peak of the fishery gave some relief from high fuel prices.

Landings of albacore into Oregon ports began with two small landings in mid June. The main fishery began in early July and continued through October with a few landings made in November. The peak of landings occurred in early August (Table 2-10). Rough ocean conditions in mid-September caused a brief decline in landings and cold water upwelling in mid-October pushed albacore well offshore. A total of 409 vessels made an estimated 1,368 landings in 2007, up from 932 landings in 2006.

Newport received the majority of Oregon deliveries in 2007 with 46 percent of the total landings, followed by Astoria with 27 percent and Charleston with 21 percent, with nine other ports also receiving deliveries (Table 2-11). The average landing in 2007 was 3.4 mt; lower than the average for 2006 and 2005, of 4 mt and 3.7 mt respectively.

Table 2-10. Oregon commercial albacore landings (mt) by month, 2005-2007.

Month	2005	2006	2007
May	0	0	0
June	23.5	6.7	45.3
July	498.6	704.7	1522.1
August	1612.3	1261.5	1805.8
September	857.7	1043.3	1006.2
October	664.6	816.4	336.6
November	7.8	17.1	25.7
Total	**3664.5**	**3864.2**	**4741.7**

Data source: ODFW fish ticket landings data, extracted June 2008.

Table 2-11. Oregon commercial albacore landings (mt) by port, 2005-2007.

Port	2005	2006	2007
Astoria	1260.2	1795.0	1290.0
Garibaldi	89.8	97.2	186.1
Pacific City	0.5	1.2	2.8
Depoe Bay	1.2	0.6	5.4
Newport	1364.1	1307.2	2175.4
Florence	10.3	19.9	20.2
Winchester Bay	70.9	89.3	52.6
Charleston	847.6	532.1	975.4
Bandon	0	1.0	1.5
Port Orford	2.0	15.3	12.1
Gold Beach	0	0.4	4.6
Brookings	17.6	4.6	12.6
Total	**3664.5**	**3864.2**	**4741.7**

Data source: ODFW fish ticket landings data, extracted June, 2008.

Albacore markets were fairly stable during the 2007 season for vessels selling to fish plants and fish buying stations. The blast/bled market was slow early in the season with the ex-vessel price averaging $0.90/lb. Prices increased to $1.00/lb in September and $1.20/lb in October, along with higher, more desirable fat content in the fish. Fresh fish averaged between $0.65/lb to $1.00/lb throughout the majority of the season (Table 2-12).

Table 2-12. Ex-vessel1 price-per-pound for albacore tuna in Oregon, 2005-2007.

Product Form	2005	2006	2007
frozen	$1.10 to $1.45	$0.60 to $1.00	$0.90 to $1.20
fresh	$0.75 to $1.50	$0.60	$0.65 to $1.00
off-vessel (whole)	$1.75 to $1.90	$1.75 to $2.00	$1.75 to $2.00
off-vessel (loins)		$4.00	

[1] Ex-vessel revenues are nominal values (not adjusted for inflation).
Data source: ODFW fish ticket landings data, extracted June, 2008.

2.1.2.2 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, no permits were issued and no landings were made in 2007 (Table 2-13).

Table 2-13. Oregon landings (mt) with drift gillnet gear, 2005-2007.

Species	2005	2006	2007
swordfish			
thresher shark			
bluefin tuna			
shortfin mako			
opah			
Total	**0**	**0**	**0**

Data source: ODFW developmental fisheries permits, June 2008.

2.1.3 Washington

The commercial and recreational highly migratory species fisheries 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 generally 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 commercial fishing license requirement for albacore tuna in Washington. The state began requiring a recreational fishing license for albacore in June 2006.

Ilwaco and Westport are the two Washington ports with the highest HMS landings of albacore from the commercial surface hook-and-line fishery and account for more than 90 percent of the annual landings into the state (Table 2-14). Several other ports along the coast and in Puget Sound receive albacore landings as well.[1] Landings at these ports 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.

Table 2-14. Washington commercial albacore landings (mt) by port group, 2004–07 (listed in order of annual average).

Port Group	2004	2005	2006	2007
Ilwaco & Columbia River	4,267.1	1,658.1	5,534.3	2,698.0
Westport & Grays Harbor	3,213.3	2,842.9	2,673.9	3,119.3
North Puget Sound[a]	753.8	298.6	334.4	85.4
South Puget Sound[b]	7.8	5.8	63.2	9.4
Willapa Bay & Pacific County	29.8	14.0	22.3	7.0
Neah Bay & La Push	1.3	3.9	7.2	36.5
Total	8,309.7	4,904.3	8,707.1	5,980.4

Data source: WDFW fish ticket landings data, extracted July 2008.
(a) Port Angeles to Anacortes.
(b) Everett to Olympia.

Large amounts of albacore tuna have been landed into Washington in recent years and, in general, the tuna fishery has remained stable since the early 1990s. 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.

As provided for under the U.S.–Canada albacore treaty, some Washington ports also receive albacore landings from Canadian vessels. The portion of Canadian landings into the state has fallen considerably in recent years, dropping from 10.5 percent in 2004 to 1.25 percent in 2007 (Table 2-15). Anecdotal evidence suggests this drop is attributable to new rules implemented by U.S. Customs and Border Protection under the U.S. Trade Act of 2002 rather than to any shift in Canadian catch or effort.

[1] In Washington, port of landing is not directly recorded on the marine fish receiving ticket and so must be indirectly assigned based on the address of the fish dealer or buyer. Therefore some landings may be wrongly attributed. Table 2-19 has been reorganized from past reports to better reflect the resolution of Washington's landings data.

Table 2-15. U.S. and Canadian albacore landings into Washington, 2004–07.

	U.S. Vessels		Canadian Vessels		Total	
	mt	$	mt	$	mt	$
2004	7,433.8	13,437,940	875.9	2,367,778	8,309.7	15,805,718
2005	4,520.8	9,786,500	383.5	1,069,562	4,904.3	10,856,062
2006	8,542.6	14,758,745	164.5	355,611	8,707.1	15,114,357
2007	5,905.4	10,277,642	75.0	168,055	5,980.4	10,445,697

Data source: WDFW fish ticket landings data, extracted July 2008.
Note: U.S. landings include landings by tribal fishers and landings of albacore caught by U.S. vessels in Canadian waters.

2.2 Description of West Coast Recreational Fisheries

2.2.1 California

Recreational anglers in California take all of the management unit species (MUS) included within the HMS FMP using rod-and-reel gear almost exclusively; a nominal amount of fish, primarily tunas, are taken by free divers using spear guns. Fishing occurs in the EEZ waters of the U.S. as well as Mexico aboard commercial passenger fishing vessels (CPFVs) and private boats. A fishing season is dependent on oceanographic conditions, which strongly influence the occurrence of fish within range of the California-based fleet, but a typical season begins in late spring and runs through fall. Anglers 16 years and older must have a resident or non-resident annual or short-term recreational fishing license to catch and land any ocean fish in California, and an Ocean Enhancement Stamp is required if fishing within ocean waters south of Point Arguello, southern California. California does not have size or slot limit restrictions but it does have daily possession limits for some of the MUS. Table 2-16 shows the daily possession limits for MUS for California recreational anglers for 2007.

Table 2-16. California's recreational daily possession limits for highly migratory MUS included within the fishery management plan.

Species	No limit[1]	1-Fish	2-fish	10-fish[2]	25-fish
Tunas					
Albacore[3]				X	X
Bigeye				X	
Bluefin[3]				X	
Skipjack		X			
Yellowfin				X	
Billfishes					
Striped Marlin			X		
Swordfish				X	
Sharks					
Blue				X	
Common Thresher				X	
Mako				X	
Other Fish					
Dorado				X	

[1]-In general, no more than 20 finfish in combination of all species, with not more than 10 of any one species, may be taken or possessed by any one person, unless otherwise authorized, e.g. skipjack tunas (CCR, Title 14, 27.60).
[2]-California authorizes boat limits for two or more persons that are licensed to fish in ocean waters off California (CCR, Title 14, Section 27.60). This authorization does not apply to fishing trips originating in California where fish are taken in other jurisdictions.
[3]- Prior to November, these species had no limit, however new regulations as of November: albacore south of Point Conception – 10 fish, albacore north of Point Conception – 25 fish; bluefin tuna - 10 fish. These limits are in addition to the general 20 fish bag limit.

Vessel operators that charge a fee to passengers to sport fish from any vessel must have a CPFV license, a current CDFG vessel registration, and the operator must submit a monthly log of their fishing activity. Additionally, the HMS FMP requires a Federal permit with a recreational gear endorsement for all U.S. CPFVs that fish for HMS within the west coast EEZ and that pursue HMS on the high seas and land their catch in California, Oregon, and Washington.

Fishery statistics are available from both PSMFC, through their Recreational Fisheries Information Network (RecFIN) website (www.psmfc.org/recfin), and the CDFG CPFV logbook program. The RecFIN provides estimates based on field sampling of catch and a telephone survey for effort, while the state's logbook program provides a record of fishing activity for most CPFVs. The fact that catches of highly migratory MUS constitute a relatively rare event is why logbooks are preferred over RecFIN in determining the catch of these species by anglers fishing from CPFVs. Logbooks also have the advantage of supplying catch information on MUS taken in Mexico. However, RecFIN data are the best available for making catch estimates of anglers fishing from private boats.

Table 2-17. Annual number of highly migratory MUS kept and thrown back by recreational anglers fishing from commercial passenger fishing vessels (CPFV) in U.S. EEZ waters, 2006–07.

	2006 Number of Fish		2007 Number of Fish	
Species	**(kept)**	**(thrown back[2])**	**(kept)**	**(thrown back[2])**
Tunas				
Albacore	3,365	3	35,823	260
Bigeye	4	0	0	0
Bluefin	1,349	7	175	0
Skipjack	1,765	504	65	11
Yellowfin	5407	71	1,041	6
Billfishes				
Striped Marlin	2	3	93	6
Swordfish	3	1	0	0
Sharks				
Blue	18	204	19	215
Common Thresher[1]	33	4	40	14
Shortfin Mako	177	106	108	67
Other Fish				
Dorado	11,329	281	70	0
Total	23,452	1184	37,434	579

Source: California's Commercial Fisheries Information System (CFIS), CPFV logbook data, extracted June 27, 2008
Additional Processing Information:
[1]-The annual totals for common thresher shark included 6 bigeye thresher kept in 2006.
[2]-The condition (live or dead) of fish thrown back fish is not available; includes "lost to seals."

With the exception of sharks, most HMS MUS are caught by anglers fishing from CPFVs in the Mexican EEZ (Table 4-51). But for some species reported catches from the U.S. EEZ can sometimes reach 100 percent of the yearly total for the fleet. In 2007, approximately 154 CPFVs logged 1,181 days at-sea within the U.S. EEZ compared to 149 CPFVs that logged 1,222 days at-sea in 2006. The total number of MUS kept by anglers increased from 23,452 fish in 2006 to 37,434 fish in 2007 (Table 2-17), although the focus changed from dorado in 2006 to albacore in 2007. Albacore formed 96 percent of the numbers of HMS MUS caught by CPFV vessels in 2007, followed by yellowfin and bluefin. Dorado decreased from the most numerous caught in 2006, to less than one percent of that amount in 2007.

In recent years, the CPFV fleet experienced some of the best fishing ever for several MUS species when

the U.S. and Mexican EEZ catches are combined (Table 4-51). 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 for this species.

Catch estimates for private boats are presented in Table 2-18. The estimates are for vessels fishing exclusively in the U.S. EEZ. Many private vessels fish in the EEZ of Mexico but the number and catch of these vessels is unknown. In 2007, about 35,000 MUS were caught by private boaters compared to 33,000 MUS caught in 2006 (including released and thrown back fish). In 2007, 67 percent of the total shorfin makos captured were released alive, while in 2006, 54 percent were. Blue sharks were released alive at a much higher rate, although decreasing slightly from 97 percent in 2006 to 91 percent in 2007, presumably because they are not usually the target species. 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. Private boat catch estimates 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 2-18. Estimated number of highly migratory MUS kept and thrown back alive by recreational anglers fishing from private vessels in U.S. EEZ waters, 2006–07.

	2006 Number of Fish			2007 Number of Fish		
Species	(kept[1])	(reported dead[2])	(released alive[2])	(kept[1])	(reported dead[2])	(released alive[2])
Tunas						
Albacore	7,781	332	144	20,952	6,250	761
Bigeye	0	0	0	0	0	0
Bluefin	105	111	22	25	0	0
Skipjack	128	160	1,278	39	43	96
Yellowfin	619	669	163	262	499	10
Billfishes						
Striped Marlin	10	0	88	0	0	126
Swordfish	0	0	0	6	0	0
Sharks						
Blue	64	22	2,685	186	4	1,917
Common Thresher	458	56	620	701	54	532
Shortfin Mako	947	525	1,714	520	204	1,446
Other Fish						
Dorado	7,230	5,598	1,157	210	96	71
Total	17,342	7,473	7,871	22,901	7,150	4,959

Source: Pacific States Marine Fisheries Commission, Recreational Fisheries Information System, California Recreational Fisheries Survey data, extracted July 25, 2008.
Additional Processing Information:
[1]-Examined by sampler.
[2]-The angler reported the fish as dead or thrown back alive after capture.

2.2.2 Oregon

In 2007, the recreational albacore fishery off Oregon increased from 2006, both in number of trips (Table

2-19) and in number of fish (Table 2-20). Overall, catch and effort continue to increase after 2003, especially in the private boat sector. Catch per unit of effort rose in 2007 (6.8 fish/trip) from 2006 (3.5 fish/trip) (Table 2-21). During 2007, recreational anglers in Oregon had a record breaking year with an estimated 58,922 albacore tuna landed. Private boats accounted for approximately 81 percent of the total recreational landings. Newport accounted for 32 percent of the trips and 33 percent of the catch.

Table 2-19. Oregon albacore fishing effort (angler trips) for charter and private boats, and combined, by year and port, 2005-2007.

Port	Charter			Private			Combined		
	2005	2006	2007	2005	2006	2007	2004	2005	2007
Astoria	72	108	312	175	188	339	247	296	651
Garibaldi	80	36	111	120	642	1264	200	678	1375
Pacific City	5	0	9	57	80	209	62	80	218
Depoe Bay	151	94	683	405	385	1645	556	479	2328
Newport	611	646	1463	587	646	2414	1198	1292	3877
Winchester Bay	77	0	12	14	12	367	91	12	379
Coos Bay		10	69	19	145	1711	19	155	1780
Bandon	14	83	231		76	133	14	159	364
Port Orford		0	0		0	0		0	0
Gold Beach		0	30		6	12		6	42
Brookings	12	0	57	39	179	933	51	179	990
Total	**1022**	**977**	**2977**	**1416**	**2359**	**9057**	**2438**	**3336**	**12004**
Private boat (%)							**58.1%**	**70.7%**	**75.4%**

Data Source: ODFW Ocean Recreational Boat Survey, extracted February 2007.

Table 2-20. Oregon albacore catch (number of fish) for charter and private boats, and combined, by year and port, 2005-2007.

Port	Charter			Private			Combined		
	2005	2006	2007	2005	2006	2007	2005	2006	2007
Astoria	275	231	907	317	804	1832	592	1035	2739
Garibaldi	170	204	628	155	3160	4943	325	3364	5571
Pacific City	3		70	53	92	1910	56	92	1980
Depoe Bay	186	113	2139	943	1413	9100	1129	1526	11239
Newport	1043	1653	4920	1472	1875	14825	2515	3528	19745
Winchester Bay	327		36	8	0	1571	335	0	65
Coos Bay		50	301	12	816	8370	12	866	1607
Bandon	46	398	1607		517	624	46	915	8671
Port Orford									
Gold Beach			256		0	210		0	466
Brookings	3		319	2	303	4289	5	303	4608
Total	**2053**	**2649**	**11183**	**2962**	**8980**	**47739**	**5015**	**11629**	**58922**
Private boat (%)							**59.1%**	**77.2%**	**81%**

Data Source: ODFW Ocean Recreational Boat Survey, extracted February 2007.

Table 2-21. Oregon albacore catch per unit of effort (number of fish/angler trip), for charter and private boats, and combined, by year, by port, 2005-2007.

Port	Charter			Private			Combined		
	2005	2006	2007	2005	2006	2007	2005	2006	2007
Astoria	3.8	2.1	2.9	1.8	4.3	5.4	2.4	3.5	4.2
Garibaldi	2.1	5.7	5.7	1.3	4.9	3.9	1.6	5.0	4.1
Pacific City	0.6		7.8	1.0	1.2	9.1	0.9	1.2	9.1
Depoe Bay	1.2	1.2	3.1	2.3	3.7	5.5	2.0	3.2	4.8
Newport	1.7	2.6	3.4	2.5	2.9	6.1	2.1	2.7	5.1
Winchester Bay	4.2		3	0.6	0.0	4.3	3.7	0.0	0.2
Coos Bay		5.0	4.4	0.6	5.6	4.9	0.6	5.6	0.9
Bandon	3.3	4.8	7.0		6.8	4.7	3.3	5.8	23.8
Gold Beach			8.5		0.0	17.5		0.0	11.1
Brookings	0.2		5.6	0.1	1.7	4.6	0.1	1.7	4.7
Total	**2.0**	**2.7**	**4.7**	**2.1**	**3.8**	**6.6**	**2.1**	**3.5**	**6.8**

Data Source: ODFW Ocean Recreational Boat Survey, extracted February 2007.

2.2.3 Washington

The recreational albacore fishery continued to grow in Washington with the total number of trips increasing 63 percent between 2006 and 2007 (Table 2-22). Catch per unit effort dropped slightly in the charter fleet and increased slightly in the private boat fleet resulting in an overall drop back to 2005 levels (Table 2-23). However, with the increase in trips taken, the overall estimated catch increased 18.4 percent to just over 29,000 fish (Table 2-24).

Table 2-22. Washington albacore fishing effort (angler trips) for charter and private boats, and combined, by year and port area, 2005–07.

Port Area	Charter			Private			Combined		
	2005	2006	2007	2005	2006	2007	2005	2006	2007
North Coast	40	44	63	64	101	305	104	145	368
Westport	817	1,207	1,026	163	199	456	980	1,406	1,482
Ilwaco	185	556	637	240	540	1,105	425	1,096	1,742
Total	1,042	1,807	1,726	467	840	1,866	1,509	2,647	3,592
Private boat (%)	—	—	—	—	—	—	30.9%	31.7%	51.9%

Data source: WDFW Ocean Sampling Program, extracted July 2008.

Table 2-23. Washington albacore catch per unit of effort (number of fish/angler trip) for charter and private boats, and combined, by year and port, 2005–07.

Port Area	Charter			Private			Combined		
	2005	2006	2007	2005	2006	2007	2005	2006	2007
North Coast	3.3	5.3	3.5	2.4	4.4	3.5	2.8	4.7	3.5
Westport	12.5	15.3	12.3	2.8	3.7	4.3	10.9	13.7	9.9
Ilwaco	3.8	4.3	4.8	2.2	4.2	5.5	2.9	4.2	5.3
Total	10.6	11.7	10.4	2.4	4.1	6.0	8.1	9.3	8.1

Data source: WDFW Ocean Sampling Program, extracted July 2008.

Table 2-24. Washington albacore catch (number of fish) for charter and private boats, and combined, by year and port area, 2005–07.

Port Area	Charter			Private			Combined		
	2005	2006	2007	2005	2006	2007	2005	2006	2007
North Coast	133	234	223	155	445	1,064	288	679	1,287
Westport	10,198	18,517	12,688	450	734	1,971	10,648	19,251	14,639
Ilwaco	711	2,395	3,029	516	2,254	6,127	1,227	4,649	9,156
Total	11,042	21,146	17,927	1,121	3,433	11,169	12,163	24,579	29,096
Private boat (%)	—	—	—	—	—	—	9.2%	14.0%	38.4%

Data source: WDFW Ocean Sampling Program, extracted July 2008.

There was a considerable increase in the private boat participation this year with the number of trips more than doubling in all port areas (Table 2-22). The private boat sector's proportion of the overall albacore catch also increased substantially, jumping from 14.0 percent to 38.4 percent in 2007 (Table 2-24).

Beginning in 2005, a mandatory charter boat tuna logbook program was implemented to provide additional information on location and effort in the charter albacore fishery.[2] Average catch per angler reported in the 2005 logbook data was 12 fish while the 2006 logbook data reported a slightly higher average of 12.8 fish per angler. The average weight of albacore reported in the logbooks was 19.1 lbs in 2005 and 16.1 lbs in 2006. In 2007, the logbook average weight increased slightly to 19.8 lbs and the average catch per angler remained steady at 12.8 fish per angler.

2.3 Highly Migratory Species taken in Non-HMS Fisheries

2.3.1 California

In California, HMS MUS are occasionally taken by fisheries targeting other species (Table 2-25). In 2007, less than 1 mt of albacore were taken incidentally to salmon trolling, with much smaller amount taken incidentally to groundfish trolling for sablefish and rockfish. Less than 90 kg of thresher shark was taken incidentally to trawling for halibut and other groundfish. However, 1 mt was taken in set longline gear, and nearly 22 tons was taken in set gillnet and small mesh drift gill net fisheries.

Table 2-25. Landings (mt) of HMS Species with non-HMS gear in California in 2007.

	Salmon Troll	Troll – Other Fish	Trawl	Set Longline	Set Gillnet	Small Mesh Drift Gillnet
Albacore tuna	0.1	0.7				
Thresher Shark			<0.1	1.3	16.0	5.8

2.3.2 Oregon

In Oregon, most Highly Migratory Species (MUS) are rarely landed by gears targeting other species (Table 2-26). During 2007, less than 1 mt of these HMS species, consisting of small amounts of blue shark, thresher shark and dorado were landed by non-HMS fisheries. Blue sharks were mostly taken incidentally by bottom longline gear targeting sablefish and by midwater trawls for Pacific whiting. Thresher sharks were taken incidentally in midwater trawls for Pacific whiting and in baitfish nets for Pacific sardine.

[2] This logbook data does not factor into Washington's official catch of record, which is calculated from data collected and analyzed by the Ocean Sampling Program (OSP).

Table 2-26. Landings (mt) of HMS with non-HMS gear in Oregon in 2007.

Species	Troll	Bottom Longline	Midwater Trawl	Baitfish Net	Total
Blue Shark	0.06	0.19	0.15	0	0.40
Thresher Shark	0	0	0.10	0.15	0.25
Dorado	0.01	0	0	0	0.01

2.4 Bluefin Tuna Net Pen Operations in Mexico

In the late 1990s, increased market demand in Japan for high quality North Pacific bluefin tuna (NPB), *Thunnus orientalis*, and the advent of new capture-based tuna aquaculture (CBTA) in the Mediterranean and Australia, led to the first experiments with CBTA along Pacific Coast of Baja California, Mexico (Packard Foundation, 2008). CBTA is among the fastest growing forms of aquaculture in the world (FAO, 2006). The explosive growth of the CBTA facilities in Baja California, Mexico can be attributed to several factors: 1) ideal climate and lack of any consistent adverse weather systems; 2) abundant feed (pacific sardine and mackerel); 3) low cost of labor and a supportive business/regulatory climate; and 4) the proximity to major transportation hubs in Mexico and the United States. Almost all of the wild-caught NPB destined for the net pens are captured by Mexican flag purse seine vessels fishing within the Mexican EEZ and adjacent high seas areas. The typical fishing season lasts from May through September. The 2006 catch of north NPB in the eastern tropical Pacific Ocean was roughly 10,000 mt. Of this total, approximately 4,350 mt were diverted to net pen operations in Mexico (Packard Foundation, 2008). A majority of the catch comprised juvenile tuna in the 1-3 year old age classes.

The first Mexican tuna net pen operation, Atuna Nair, was established around 1996. Located near Cedros Islands, Baja California Sur, Mexico, the company produced less than 100 mt in its first years of operation. One of the most successful operations in existence today began in 1997 when Mexican businessman Philippe Charat established Maricultura del Norte. As of 2008, the Mexican government has licensed, via "concessions," 11 tuna net pen operations but it is believed that no more than nine are in operation.

On May 20, 2008, NMFS denied an application requesting permits for five Mexican flag towing vessels to transport live NPB tuna captured by U.S. flag purse seine vessels operating inside the U.S. EEZ to an aquaculture facility located in Baja California, Mexico (73 FR 29112). The application was denied because the transshipment of purse seine-caught tuna is prohibited in the EPO under 50 CFR 300.24(d) and 50 CFR 300.25(d).

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 approved provisions of the HMS FMP (69 FR 18444), with the exception of the Reports and Record Keeping requirements, which were granted a delayed effectiveness pending collection-of-information clearance by the Office of Management and Budget (OMB). Clearance of these delayed requirements, which covers logbooks, permits, vessel monitoring systems, and pre-trip notifications, was received by OMB and became effective on February 10, 2005 (70 FR 7022). In addition, four HMS FMP regulatory amendments have been prepared and finalized since the original final rule was put in place (Table 3-1).

Table 3-1. History of HMS FMP regulatory amendments.

Title of Regulation	Federal Register Number	Date Published	Date Effective
Revised Method for Renewing and Replacing Permits Issued under the HMS FMP.	72 FR 10935	6/12/07	4/11/07
Amended Regulatory Text Governing Closures of the Swordfish Drift Gillnet Fishery in the Pacific Loggerhead Sea Turtle Conservation Area during an El Niño Event	72 FR 31756	6/8/07	7/9/07
Amended Vessel Identification Regulations for HMS Recreational Charter Vessels	72 FR 43563	8/6/07	9/5/07
Daily Bag Limits for Sport Caught Albacore and Bluefin Tuna in the EEZ off California	72 FR 58258	10/15/07	11/14/07

3.1.1 Summary of the Regulatory Changes to the HMS FMP

The revised method for renewing and replacing permits issued under the HMS FMP modifies the renewal process by substituting the last day of the month corresponding to the last digit of the vessel's identification number with the last day of the vessel owner's birth month as the expiration date. The rule also requires that vessel owners requesting a duplicate permit must submit a completed application form to NMFS. These regulations are needed to improve the efficiency and timeliness of the permit system.

The amendment to the regulatory text governing closures of the large-mesh Swordfish/Thresher Shark Drift Gill Net fishery in the Loggerhead Conservation Area was implemented to avoid jeopardizing loggerhead sea turtles, which are listed as threatened under the Endangered Species Act, by clarifying the time period in which the area is to be closed and the methods that NMFS will use to determine if an El Niño event is occurring or forecast to occur. The rule also corrected an inaccurate cross-reference in the regulations governing special requirements for fishing activities to protect threatened and endangered sea turtles under the HMS FMP.

The amendment to vessel identification regulations for HMS recreational charter vessels exempted these vessels from complying with the vessel identification requirements. The regulation is intended to relieve a restriction for which the costs outweigh the benefits. Current state and Federal (U.S. Coast Guard) marking requirements are sufficient for law enforcement personnel to adequately identify HMS recreational charter vessels at-sea and the added burden to vessel owners of additional vessel marking requirements was deemed unnecessary.

The establishment of daily bag limits for sport caught albacore and bluefin tuna in the EEZ off California was implemented as a conservation measure as part of the 2007–09 biennial management cycle as

established in the HMS FMP Framework provisions for changes to routine management measures. The rule establishes a daily bag limit of 10 albacore per day south of Point Conception and 25 albacore per day north of Point Conception. This differential limit was granted in recognition of the reduced window of opportunity for sport fishermen targeting tunas north of Point Conception, due in part to the rougher weather typically encountered in that zone. The final rule does not establish daily bag limits in Federal waters of Oregon or Washington as it was determined that additional regulatory measures were not needed at this time given the comparatively minimal level of effort and reduced weather-related fishing opportunities. The state of California implemented companion regulations for the establishment of daily bag limits for albacore and bluefin tuna to cover nearshore waters under their jurisdiction (0-3 nm).

Copies of the current suite of HMS FMP regulations, along with an HMS FMP Compliance Guide, 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 regulations are necessary for Federal management of U.S. fishing vessels targeting HMS within the 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 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[2] and for Western Pacific longline permitted vessels landing into west coast ports.[3]

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 Pacific Council, serves as a mechanism to cooperate with other regional and international management bodies to work towards consistent management of U.S. fisheries in the Pacific Ocean. Federal measures impacting these fisheries, which arise from several different Federal laws, may 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 to determine how recommendations of international bodies should be applied to domestic fisheries of the 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 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

[1] 50 CFR part 660 is available online at http://www.access.gpo.gov/nara/cfr/waisidx_03/50cfr660_03.html
[2] http://www.nmfs.noaa.gov/ia/services/highseas.htm
[3] http://www.wpcouncil.org/pelagic.htm

framework procedures of the HMS FMP.

3.1.2 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[4]). 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.

3.1.3 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).[4]

3.1.4 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 a harvest guideline has been reached, NMFS will initiate a review of the species in question 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.

Recent commercial and recreational catches of common thresher shark may be approaching or exceeding the established harvest guideline for this species. The recreational component of the catch is interacting with pregnant female sharks causing further concern for the sustainability of the resource. As a result, the Council at its June, 2008 meeting directed the HMSMT to develop a series of proposed management

[4] 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.

measures to address the harvest of thresher shark in the recreational fishery. The HMSMT will present the proposed management measures at the September, 2008 Council meeting at which time a suite of alternative(s) will be selected for public review. Final adoption of preferred management measures is slated for the November, 2008 Council meeting at which time a recommendation, if warranted, will be transmitted to NMFS for proposed and final rulemaking on needed conservation and management measures.

The HMS FMP final rule prohibits the retention of the species listed below in Table 3-2. In general, prohibited species must be released immediately if caught, unless other provisions for their disposition are established in accordance with HMS FMP guidelines.

Table 3-2. 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*

An Exempted Educational Activity (EEA) permit was granted by NMFS SWR to the Monterey Bay Aquarium for the capture, handling, transport, and display of great white sharks taken in the EEZ off California during 2007. A total of eight great white sharks were handled by the Aquarium under this permit during 2007. The majority of these animals were incidentally captured by bottom set net fishermen and transported to the Aquarium's holding pen located off the Malibu, California coastline. The Aquarium tagged and released all of these sharks save for one individual which was successfully transferred and displayed at the Aquarium facility in Monterey. That animal was tagged and released back to the wild in early 2008. The Aquarium applied for and received an EEA permit for similar activities during the 2008 field season.

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 2000.[5] 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. The Act requires an annual report to Congress detailing progress made in addressing the elements of the Act. The report highlights work being conducted by NMFS to monitor and conserve HMS shark populations under Pacific Council management. A copy of the Shark Finning Report to Congress for 2007 can be viewed at: www.nmfs.noaa.gov/by_catch/docs/SharkFinningReport07.pdf

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.

[5] 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.

3.1.5 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.

Small-mesh drift gillnetters and bottom 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.

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

For trawl, pot gear, and other non-HMS gear, a maximum of 1 percent 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.

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 U.S.-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.

3.1.6 Status of HMS Permits

The reporting and recordkeeping requirements of the HMS FMP became effective February 10, 2005, and formalized the requirement for an HMS permit. Title 50, Section 660.707 of the Code of Federal Regulations outlines the required HMS permit with an endorsement for a specific gear for all U.S. commercial and recreational charter fishing vessels fishing for and/or landing HMS off the States of California, Oregon, and Washington. The permit requirements also apply for U.S. commercial fishing vessels that land or transship HMS shoreward of the outer boundary of the U.S. EEZ off the States of California, Oregon, and Washington. The permit must be on board the vessel and available for inspection by an authorized officer.

Table 3-3 shows the number of HMS permits issued to date. Keep in mind that the permit data presented reflects valid permits at the time of SAFE publication and does not necessarily reflect total number of active vessels (i.e., vessels with catch and effort history in a given fishery year).

Table 3-3. HMS permits recorded in the permit database for each year since the regulation became effective on February 10, 2005.

Year	California	Oregon	Washington	Other	Total
2005	677	626	298	135	1,736
2006	800	684	339	152	1,975
2007	785	561	318	108	1,772

Notes: The permits are issued to the vessel owner(s) not to the vessels themselves. The totals indicate the number of permits outstanding in each year and cannot be added across years. "Other" column includes non-west coast home ports/states and permits issued with no home port/state designated.

3.1.7 HMS 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 operations conducted with HMS FMP approved gear, including HMS 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.

A total of 2,052 albacore logbooks from 391 vessels were submitted to the NMFS Southwest Fisheries Science Center (SWFSC) in La Jolla, California, in 2007 compared to 1,246 logbooks from 392 vessels in 2006. A total of 11,436 mt of albacore was landed for 2007 compared to 12,524 mt in 2006. A total of 7,130 mt of albacore were recorded as catch in mandatory logbook submissions for 2007 compared to 8,825 mt in 2006. This equates to a 62 percent logbook compliance rate estimate for 2007 using the landed catch versus logbook reported catch methodology.

CDFG implemented a harpoon logbook and permit program in 1974. The logbook has been modified over time, but the primary focus has been to document catch, effort, and oceanographic conditions on the fishing grounds. According to logbook and market receipt data, 23 of 28 active vessels submitted logbooks and logged 1,001 days at-sea in 2007 compared to 21 of 24 active vessels that logged 1,056 days at-sea in 2006. CDFG will be looking into logbook compliance in the near future.

The gillnet logbook program was implemented in 1980 to study the development of the drift gillnet shark fishery to determine the effects of the fishery on swordfish and striped marlin. According to logbook records, 39 drift gillnet vessels made 1,022 sets for swordfish and/or thresher shark in 2007 compared to 40 drift gillnet vessels that made 1,239 sets in 2006.

Washington recreational charter fishing vessels began completing and submitting logbooks for albacore tuna trips in 2005. According to the logbooks received for 2007, 20 charter vessels completed a total of 222 trips and landed 24,788 albacore. This was an increase in effort and catch from 2005 and 2006 (18 vessels/120 trips/11,999 fish for 2005 and 25 vessels/181 trips/19,793 fish in 2006). While logbook data are providing additional information on location, effort, and landings in Washington's charter albacore fishery, the official record of catch for albacore comes from dockside sampling by the Washington Ocean Sampling Program (OSP). Results from the OSP data are reported in chapter 2 for 2004–07.

Oregon recreational charter fishing vessels began completing and submitting logbooks for albacore tuna trips in 2005. According to the logbooks received for 2007, 10 charter vessels completed a total of 81 trips and landed 3,937 albacore. For 2006, three charter vessels completed 28 trips and landed 956 albacore and in 2005 eight vessels completed 56 trips and landed 1,176 albacore. The average weight for

the landed albacore was 18.8 lb. in 2007 compared to 17.0 lb in 2006 and 20.5 lb in 2005.

Based on logbooks received to date, 154 California Commercial Passenger Fishing Vessels (CPFVs) logged 1,181 days at-sea within the U.S. EEZ in 2007 compared to 149 CPFVs that logged 1,222 days at-sea in 2006. In addition to the CPFV logbook program, CDFG implemented its California Recreation Fishery Survey (CRFS) in 2004 to provide catch and effort estimates for marine recreational finfish fisheries. It is a collaborative effort between the CDFG and the PSMFC, and is funded by state and Federal sources. In 2007, CRFS field samplers interviewed 20 CPFV tuna anglers compared to 226 in 2006. (from Recfin, extracted July 25, 2008).

3.1.8 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. Pre-season informational letters were sent out to the various HMS fleets explaining the requirements for carrying an observer, which includes, among other things, providing bunk space and food equivalent to that given crew members.

During 2007, the NMFS Southwest Region Observer Program observed the following HMS fisheries:

Drift gillnet: 34 trips and 204 sets for a coverage rate of approximately 16.4 percent.

Albacore troll: Albacore trips did not carry Federal observers in 2007 due to funding limitations.

Tuna Purse Seine: No tuna directed trips were conducted by the west coast-based coastal purse seine fleet in 2007.

Pelagic tuna longline: Five trips and 60 sets, 100 percent coverage.

HMS CPFV: California CPFV trips did not carry Federal observers in 2007 due to funding limitations. Selected Washington and Oregon charter recreational trips did carry observers in 2007 with 7 trips and 9 days of fishing effort observed for Washington and 4 trips and 4 days of effort observed for Oregon.

3.1.9 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 has implemented a summary settlement penalty program to increase compliance with logbook reporting requirements, and is developing a civil administrative penalty schedule for the HMS FMP Final Rule, which will be available to the public at: http://www.gc.noaa.gov/enforce-office3.html.

The NOAA Summary Penalty Program for the west coast HMS fishery can be found at 50 CFR 660, Subpart K. The Program focuses on the reporting compliance for logbooks and sets the penalty schedule for failure to timely complete, or timely submit, a logbook as required by regulation as follows: 1–5 days late, $500; 6 or more days late, $100/day.

3.1.9.1 U. S. Pacific Albacore Logbook Compliance Check for 2007

The NMFS SWR Sustainable Fisheries Division has undertaken an effort to estimate the level of compliance with the HMS FMP regulations, including HMS logbooks. An HMS logbook compliance check was performed for U.S. West Coast commercial vessels that landed albacore during 2007. The purpose of the compliance check was to identify commercial vessels that landed albacore but did not

submit a logbook or logbooks for either some or all of their trips. PacFIN landings were cross-referenced with albacore logbook submissions received by staff at the SWFSC to identify vessels that landed albacore but failed to submit a logbook for one or more trips. Albacore landings by troll, hook and line, and bait boat gears were selected from the PacFIN database since logbooks are only required for vessels fishing with these gear types.

There were a total of 714 commercial vessels that landed albacore with HMS approved gear in 2007. A total of 323 vessels made albacore landings without submitting logbooks for some or all of their trips during 2007. An estimated 225 of these vessels that made albacore landings did not submit a logbook for any trips in 2007. Annual albacore landings for these vessels ranged from 17 lb to over 135,000 lb, with the majority of annual vessel landings falling below 6,000 lb (160 vessels or ~ 70percent). However, 45 vessels or 20 percent of the 225 vessels had landings in excess of 12,000 lb. An estimated 98 vessels submitted logbooks for some trips during 2007, but failed to submit logbooks for others within the same year. Logbook submissions for these vessels were grouped into two categories: 1) vessels that submitted logbooks for most of their trips during 2007 (>50 percent), and 2) those that submitted logbooks for fewer trips (<50 percent). From those 98 vessels 88 submitted logbooks for most trips, while 10 submitted logbooks for fewer than 50 percent of their annual vessel trips.

3.1.9.2 HMS Permits Compliance Check for 2007

The NMFS SWR Sustainable Fisheries Division has undertaken an effort to estimate the level of compliance with the HMS FMP regulations, including HMS permits. An HMS permit compliance check was performed for U.S. West Coast commercial and recreational charter vessels that landed HMS during 2007 to identify vessels that landed HMS without a valid HMS permit. Commercial landings as reported to PacFIN were used to cross-reference the HMS permits database. State agencies (CDFG, ODFW, and WDFW) provided HMS landings data for recreational charter vessels which were then cross-referenced with our HMS permits database to identify recreational charter vessels that landed HMS without a permit.

The output of HMS vessels that made landings without a permit was split into two categories: 1) major landings of HMS without a permit, and 2) minor landings of HMS without a permit. Major landings were defined as those with greater than 250 lbs. of albacore and those with greater than 400 lb of HMS sharks. Since recreational charter vessel landings are reported in numbers of fish, not weights, major landings were defined as those consisting of greater than 15 albacore and greater than 4 HMS sharks. Anything less than or equal to the above mentioned quantities were grouped as minor landings for both commercial and recreational charter vessels.

There were a total of 1,772 distinct vessels with a valid HMS permit for 2007. An additional 149 vessels landed HMS species with HMS approved gear (91 commercial, 58 recreational) without possessing a valid HMS permit. The 58 recreational vessels that landed HMS without a permit were all from California. Oregon has 44 registered recreational charter vessels, and of the 44 there were 11 that did not have a valid HMS permit. All 20 recreational vessels that landed HMS in Washington during 2007 had a valid HMS permit.

3.1.10 Changes in State HMS Regulations

Since implementation of the HMS FMP in 2004, an HMS-related change, described below, 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, rockfish, and cabezon. In 2003, tuna, surfperch, and sanddab were put into one category with a 25 fish in aggregate

limit, and rockfish, greenling, flounder, 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. The 2007 Oregon sport fishing pamphlet is available online at http://www.dfw.state.or.us/resources/fishing/.

Regulations for "offshore pelagic species" are on page 91 of the pamphlet.

There were no changes to HMS state regulations in California or Oregon for 2006. Washington did have one significant change that instituted a recreational license requirement for albacore effective June 7, 2006. Washington law requires a recreational license to fish for, take, or harvest fish, shellfish, and seaweed except for specific exemptions provided for in statute (*see* Wash. Rev. Code § 77.32.010). The Washington State Legislature removed albacore for the list of exempted species during its 2006 Regular Session (*see* Washington State Legislature, Senate Bill 6159.SL).

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 ESA and the 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, and 720 and 50 CFR 229.31 and 223.206 for the complete list and text of the regulations.

Impacts to ESA-listed protected resources were analyzed as part of the section 7 consultation and 2004 biological opinion (BO) on the HMS FMP. The BO included an Incidental Take Statement with anticipated mortalities and entanglements of ESA-listed marine mammals and sea turtles that are likely to interact with the drift gillnet vessels targeting HMS species (see Table 3-4). The BO considered the impacts of the then proposed shallow-set longline fishery and found that the fishery would result in jeopardy to threatened loggerhead sea turtles. As a result, this component of the proposed HMS fishery was prohibited.

Table 3-4. 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, consistent with the MMPA permit required under section 101(a)(5)(E) for incidental take of ESA-listed marine mammals in fisheries. 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.

The MMPA requires that all commercial fisheries in the U.S. be categorized and included on an annual List of Fisheries (LOF). The fisheries are placed in one of three categories based upon the level of serious injury and mortality of marine mammals that occurs incidental to each fishery. The current 2007 LOF was published March 28, 2007 (72 FR 14466). The drift gillnet fishery is listed as a category I fishery; the pelagic longline fishery and tuna purse seine fishery are both listed at category II fisheries. Owners of vessels in these fisheries are required to register with NMFS and obtain a marine mammal authorization to lawfully incidentally take marine mammals. They may also be required to accommodate an observer aboard the vessel upon request by NMFS. Other HMS fisheries are listed under category III. Any incidental injuries or mortalities of marine mammals occurring during fishing operations must be reported to NMFS. Injury/mortality report forms and instructions for submitting forms to NMFS can be downloaded from: http://www.nmfs.noaa.gov/pr/interactions/mmap/.

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 15 to November 15 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 east of the 120° W longitude during forecasted or declared El Niño events to protect loggerhead sea turtles. See 50 CFR 660.713(c) for specific areas and terms of the closures. A final rule correcting text in the HMS FMP related to the loggerhead closure became effective on June 8, 2007 (72 FR 31756). Drift gillnet fishing is also prohibited north of 46°16' N latitude (off Washington) to address bycatch of sea turtles and marine mammals, and to minimize incidental catch of thresher shark.

In October 2006, a loggerhead was observed taken in the drift gillnet fishery. The animal was released alive and reportedly uninjured. This take was consistent with the terms of the incidental take statement since it occurred during a declared El Niño event.

In April 2007, the Pacific Offshore Cetacean Take Reduction Team (POCTRT) met for the first time since 2003. The team met for two days in Long Beach, California, and developed recommendations related to the drift gillnet fishery that focused primarily on compliance with the take reduction plan regulations and enhancing enforcement, data gathering, and continued research on pingers (e.g., testing different pinger frequencies to more effectively reduce marine mammal entanglement and/or entanglements of sea turtles and large whales). The tentative date of the next POCTRT meeting is April 2008.

3.2.2 Shallow-set Longline Fishery

The HMS FMP final rule prohibits the use of shallow-set longline gear targeting HMS west of 150° W longitude. A separate rule, promulgated under the ESA, prohibits this gear type east of 150° W longitude

in order to protect threatened loggerhead sea turtles. The HMS FMP rule includes regulations for longline fisheries. These regulations include details on proper handling and release requirements for incidentally-captured sea turtles and seabirds, require vessel monitoring systems (VMS) on vessels if requested to carry one by NMFS Office of Law Enforcement, and require 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.

3.2.3 Deep-set Tuna Longline Fishery

A single west coast-based U.S. longline vessel was active in 2006 using deep-set tuna longline gear. The vessel operated in the high seas zone outside of the U.S. EEZ. NMFS policy on data confidentiality precludes release of catch and landing information for this single vessel.

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 (RFMOs) 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 Inter-American Tropical Tuna Commission (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. Currently, there are 16 member nations to the IATTC Convention: Colombia, Costa Rica, Ecuador, El Salvador, France, Guatemala, Japan, Mexico, Nicaragua, Panama, Peru, Republic of Korea, Spain, United States, Vanuatu, and Venezuela. Belize, Canada, China, Cook Islands, the European Union, 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 EPO. 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 in domestic waters.

At this annual meeting, June 2008, the IATTC failed to adopt any conservation and management measures for the tuna fisheries in the EPO for 2008 and beyond. This means thus far no multilateral rules have been put in place for tuna fishing this year, and any conservation measures will rely on action by individual nations to regulate vessels of their flag. The Resolution on Tuna Conservation Measures was originally 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. Pole-and-line and sportfishing vessels are not subject to this resolution. In June 2006, the

IATTC adopted a *Resolution for a Program on the Conservation of Tuna in the Eastern Pacific Ocean for 2007*. The June 2006 resolution was a 1-year program on the conservation of tuna in the EPO for 2007.

3.3.1.1 An Update of IATTC Resolutions

Full texts of IATTC Resolutions may be accessed at http://www.iattc.org/ResolutionsENG.htm.

Resolutions Adopted at the June 2008 IATTC Meeting

Financing FY 2009 – adopted for 2009. The resolution approves the IATTC operating budget for 2009. The finance resolution itemizes what each member nation must pay in 2009.

Transshipments - In June 2006, the IATTC adopted the current resolution on transshipment (Resolution C-06-04). The resolution developed out of concern that organized tuna laundering operations were being conducted, and a significant amount of catches by illegal, unregulated and unreported (IUU) tuna longline fishing were being transshipped under the names of duly licensed fishing vessels. The IATTC adopted the resolution, which provided a mechanism for monitoring the transshipment activities of large-scale tuna longline fishing vessels in the Convention Area, in order to combat IUU fishing activities that were undermining the effectiveness of the management regime already adopted by IATTC. The general rules are: 1) except under the special conditions for transshipment operations at-sea outlined in the resolution, all transshipment operations of tuna and tuna-like species in the IATTC Convention Area must take place in port; 2) each IATTC Party, Cooperating Non-party, fishing entity or regional economic integration organization shall take the necessary measures to ensure that large-scale tuna fishing vessels flying its flag comply with specific reporting obligations set out in the resolution when transshipping in port; and 3) this resolution does not apply to troll vessels, pole-and-line vessels, or vessels engaged in the transshipment of fresh fish at-sea.

Other Items of Interest

IATTC and WCPFC Consultative Meeting on Data Sharing - This consultative meeting was postponed repeatedly. When this meeting finally met, no memorandum of understanding regarding data sharing was agreed to or solidified.

Clarification in the minutes on the definition "transshipping" in regards to transfer of live bluefin tuna – For the minutes the United States stated "Our understanding is that as used in Resolutions C-06-02, C-06-04, C-98-05, and C-98-10, the restrictions on transshipment at-sea do not apply to the transfer of live bluefin tuna from the control of one purse seine vessel to the control of another vessel."

Other Discussions and Unresolved Issues

Seabirds - The U.S. delegation, in cooperation with the European Union, presented a proposal on mitigation measure to prevent/reduce sea bird bycatch in longline fisheries. The proposal was modeled after the technical specifications the WCPFC adopted last year. The proposal therefore included a controversial mitigation technique referred to as the "light flier tori line," preferred by Japanese fishers and an important element of any measure if Japan was to join consensus. The proposal appeared to have general support and was briefly discussed in plenary where the delegation from Mexico voiced their opposition to the measure based on the area of application covering waters adjacent to Mexico. As it was the final day of the meeting and consensus was not going to be reached quickly, the Commission agreed to discuss the proposal again at a later date, and to review the operational matters in the IATTC's Bycatch Working Group.

IUU Vessel List - Prior to the start of the June 2008 IATTC meeting, the U.S. delegation circulated to all Members a proposal to revise the IATTC measure that establishes a list of vessels presumed to have engaged in illegal, unregulated and unreported (IUU) fishing activities. The current measure adopted by the Commission lacks necessary details to provide clear guidance to the Secretariat on the creation and management of the IUU list and does not ensure due process for the vessels and their flag states. The proposal received support and many Parties submitted comments to further revise the proposal. There was significant concern about waters under jurisdictional disputes and whether or not vessels fishing in these areas would be considered IUU. The proposal was presented and initially discussed in an ad hoc working group but could not be called for a decision during the Commission meeting due to time constraints.

IATTC Resolution C-05-02 on Northern Albacore Tuna

The Resolution on Northern Albacore Tuna was agreed to at the June 2005 IATTC meeting in Lanzarote, Spain, and calls upon nations to not increase the total level of fishing effort for North Pacific albacore tuna in the EPO. Resolution C-05-02 on northern albacore tuna calls upon all Parties (CPCs) to take the necessary measures to ensure that the level of fishing effort by their vessels fishing for North Pacific albacore tuna is not increased. It also calls upon all CPCs to report all catches of North Pacific albacore, by gear type, to the IATTC every six months. In regards to compliance, Canada, Chinese Taipei, Japan, Korea, and the United States submitted the required catch reports for 2007. The United States and Chinese Taipei reported their catch for the entire North Pacific stock of albacore, whereas other CPCs reported catches from the EPO only. The IATTC reports that it is very difficult, if not impossible, to monitor compliance with this resolution because of the way that it is structured and given the requirement to limit effort without effort data being available whereas catch data are available. Another complicating factor is that the resolution calls for limiting effort to "current" levels, but to date "current" has not been defined. The IATTC Secretariat asked the Parties to include a definition of "current effort" for albacore tuna under resolution C-05-02 Northern Albacore Tuna. This request from the Secretariat was introduced during the Eighth Meeting of the Permanent Working Group on Compliance at which point the U.S. indicated it had begun formulating a definition; however, the task has proved to be complex. At the June 2008 IATTC 78th Meeting, on the agenda the IATTC Secretariat asked the Parties to include a definition of "current effort" for albacore tuna under resolution *C-05-02 Northern Albacore Tuna*. At the 78th Meeting of the IATTC, time ran out, this issue was not addressed on the agenda, and therefore no action was taken.

For up-to-date reporting compliance by nations Party to the IATTC under this Resolution, please refer to http://www.iattc.org/CatcheReportNorthernAlbacoreENG.htm.

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 Lanzarote, 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.

Resolution C-05-03 on the conservation of sharks caught in association with fisheries in the EPO includes the following reporting requirements: "each CPC shall annually report data for catches, effort by gear

type, landing and trade of sharks by species, where possible, in accordance with IATTC reporting procedures, including available historical data. CPCs shall send to the Director, by May 1, at the latest, a comprehensive annual report of the implementation of this Resolution during the previous year." At the 9th Meeting of the IATTC Permanent Working Group on Compliance held in June, 2008, the Compliance Committee reported that only the United States of America met the annual reporting requirement of this resolution.

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 objective of the Convention is "to ensure, through effective management, the long-term conservation and sustainable use of highly migratory fish stock in the western and central Pacific Ocean …." There are 25 Contracting Parties to the Convention. The United States signed the Convention in 2000 and ratified it in 2007, thereby becoming a member of the 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 Fisheries Commission. The U.S. territories of American Samoa and Guam and the Commonwealth of the Northern Mariana Islands also participate in the Commission as "Participating Territories."

The Convention and subsequent decisions of the Commission establish a number of monitoring, control and surveillance schemes, including a regional observer program and electronic vessel monitoring system (neither of which has been fully implemented yet), maintenance of a list of vessels engaged in IUU fishing, and precedent-setting procedures that allow Contracting Parties to board and inspect the fishing vessels of other Contracting Parties on the high seas in the Convention Area. These procedures will be implemented for the first time in mid-2008.

The Commission has adopted conservation and management measures for bigeye tuna and yellowfin tuna (limiting bigeye longline catches to recent levels, limiting purse seine effort to recent levels, and limiting fishing capacity in other fleets to recent levels), albacore in the North Pacific (limiting fishing effort to recent levels), albacore in the South Pacific (limiting vessel numbers to recent levels), swordfish in the South Pacific (limiting vessel numbers to recent levels), striped marlin in the South Pacific (limiting vessel numbers to recent levels), sharks (restricting finning practices), and seabirds (requiring the use of mitigation methods on longline vessels). Details on these measures and others can be found at the Commission's website: http://www.wcpfc.int.

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 pursuant to 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.

The preliminary estimate of North Pacific albacore tuna caught by the Canadian troll fishery in 2007 is 6,040 mt, which is a 3.6 percent increase over the 2006. The total catch of North Pacific albacore tuna by the Canadian troll fishery has ranged from 1,763 mt in 1995 to 7,856 mt in 2004 and averaged 4,673 mt for the 1995 to 2007 period. The Canadian albacore tuna troll fleet consisted of 196 unique vessels in 2007, representing an 11 percent increase in the size of the troll fleet operating in the Pacific Ocean since 2006. All but one Canadian vessel targeted the North Pacific albacore tuna stock exclusively. The Canadian troll fleet has ranged in size from 174 vessels in 2006 to 292 vessels in 1996 and has averaged 225 vessels in size since 1995.

More than 99 percent of the North Pacific albacore tuna caught by the Canadian fleet in 2007 was caught within the EEZs of Canada and the United States and only 5 mt, representing less than 1 percent of the catch was caught in the high seas area. The majority of Canadian catch (79 percent by weight) occurred in the United States EEZ, particularly in the coastal waters of Oregon, which accounted for 54.5 percent of the catch (by weight).

The U.S./Canada Albacore Tuna Treaty consultation occurred in Vancouver, British Columbia, in April 2008, under anxious circumstances as U.S. harvesters had earlier informed the Department of State of their request that the Treaty be terminated. The meeting centered on key topics introduced by both sides. The Canadians requested that the current fishing regime, currently set at the default level of the Treaty that allows either 94 Canadian vessels in U.S. waters for four months or 375 vessel months, and what occurred during the 2007 fishing season and is currently operating for 2008, be increased. The Canadians sought to increase the number of vessels allowed to fish in the U. S. EEZ for 2009 and beyond to 125. The U.S. harvesters also expressed their concerned with Canadian vessels reallocating their vessel months to other vessels and thereby increasing the total number of vessels fishing at any one time within the U. S. EEZ. The U.S. harvesters also stated their interest in getting credit for Canadian caught albacore in U.S. waters should the Treaty be extended. While no definitive solutions were resolved, both countries agreed to meet again after the 2008 fishing season. Topics to be further discussed include: vessel leasing months, catch history credit, U.S. barriers for Canadian landings in U.S. ports, stronger conservation language in the Treaty, latent capacity issues, joint marketing of fish, and the duration of the next fishing regime.

3.4 Bycatch and Other Monitored Species

NMFS monitors catch and bycatch in HMS fisheries through onboard observer programs. During the 2007/2008 fishing year, observers were placed on deep-set pelagic longline and drift gillnet fishing vessels. Less than three vessels participated in the deep-set pelagic longline fishery, so data confidentiality rules prevent those observations from being reported here. Observer coverage in this fishery was 100 percent. The drift gillnet fishery for swordfish and sharks has been observed by NMFS since 1990. Observed catch and bycatch from the 2007–08 fishing year are summarized below. Data were collected at-sea by contract observers and represent a total of 158 sets. Observer coverage was between 16 percent and 17 percent of total fishing effort. Previous summaries can be found at

http://swr.nmfs.noaa.gov/psd/codgftac.htm.

Table 3-5. NMFS California/Oregon Drift Gillnet Observer Program observed catch, 2007–08 fishing season (May 1, 2007, through January 31, 2008).

Species	Total Caught	Number Kept	Number Returned			Number Damaged	Catch per 100 Sets
			Alive	Dead	Unknown		
Swordfish	546	533		13		75	192.3
Striped Marlin	11			11		4	3.9
Albacore	86	82		4		23	30.3
Bluefin Tuna	12	12				5	4.2
Skipjack Tuna	194	91		103		70	68.3
Yellowfin Tuna	13	7		6		6	4.6
Unidentified Tuna	2			2		2	0.7
Common Thresher Shark	144	144				4	50.7
Bigeye Thresher Shark	15	10		5			5.3
Shortfin Mako Shark	241	230	8	3		1	84.9
Longfin Mako Shark	1	1					0.4
Blue Shark	418	1	116	296	5	15	147.2
Bat Ray	1			1			0.4
Common Mola	2,039	1	1,999	35	4	6	718.0
Louvar	8	5		3		4	2.8
Opah	324	314		10		51	114.1
Pacific Bonito	24	15		9		4	8.5
Pacific Mackerel	38	1	3	34			13.4
Pacific Pomfret	8	7		1		2	2.8
Pelagic Stingray	3		3				1.1
Remora	3		3				1.1
Unidentified Fish	2		1	1		1	0.7
Yellowtail	1	1					0.4
Escolar	1	1					0.4
Pacific Sardine	4	1			3		1.4
Jack Mackerel	2	2					0.7
Jumbo (Humboldt) Squid	1	1					0.4
Pelagic Tunicates	128,860			232	128,628		45,373.2
Unidentified Invertebrate	50		30	20			17.6
Short-Beaked Common Dolphin	7			7			2.5
Unidentified Common Dolphin	1			1			0.4
Dolphin, Pacific White-sided	3			3			1.1
Dolphin, N. Right Whale	1			1			0.4
California Sea Lion	7			7			2.5
Seal, Northern Elephant	1			1			0.4

4.0 STATISTICAL SUMMARIES OF CATCH, REVENUE, AND EFFORT

4.1 Commercial Fisheries

Table 4-1. West coast commercial HMS landings, revenues, and average price by species, 2006–2007.

	2006			2007		
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	12,757	$23,780	$0.85	11,582	$21,554	$0.84
Yellowfin	77	$175	$1.03	104	$150	$0.65
Skipjack	48	$40	$0.38	5	$4	$0.36
Bigeye	35	$206	$2.67	13	$95	$3.31
Bluefin	1	$4	$1.81	45	$58	$0.58
Unspecified Tuna	1	$2	$0.91	<0.5	<$0.5	NA
Tunas subtotal	**12,919**	**$24,207**	**$0.85**	**11,749**	**$21,861**	**$0.84**
Swordfish	**540**	**$2,702**	**$2.27**	**549**	**$3,126**	**$2.58**
Sharks						
Common Thresher	160	$300	$0.85	200	$332	$0.75
Pelagic Thresher	<0.5	$0	NA	2	$3	$0.68
Bigeye Thresher	4	$5	$0.57	5	$4	$0.36
Shortfin Mako	46	$79	$0.78	45	$79	$0.80
Blue	<0.5	<$0.5	NA	10	$2	$0.09
Sharks subtotal	**210**	**$384**	**$0.83**	**262**	**$420**	**$0.73**
Dorado	**3**	**$18**	$2.72	**2**	**$10**	**$2.27**
Total HMS	**13,672**	**$27,311**	**$0.91**	**12,562**	**$25,417**	**$0.92**

Interpretation: The total west coast commercial HMS catch was 12.6 thousand mt in 2007, down 8 percent from 13.7 thousand mt in 2006. Tunas represented 94 percent of the total catch by weight. Albacore tuna catch was down 9 percent from the catch observed in the previous year, and was once again the largest component of tuna catch representing about 99 percent of the total by weight. Yellowfin was the next largest component of tuna catch at 104 mt.

Swordfish was the category with the next largest share of landings behind tuna at 4 percent of the total weight. Swordfish landings by weight were up by 2 percent (9 mt) from 2006 to 2007. The common thresher shark comprised the largest component of commercial shark landings by weight in 2007. Total commercial shark landings by weight increased by 25 percent (52 mt) from 2006 to 2007.

Total current dollar west coast commercial HMS ex-vessel revenue of $25.4 million decreased from $27.3 million in the previous year, for a decrease of 7 percent ($1.9 million). Tunas comprised 86 percent of the 2007 revenue total. Albacore generated by far the most important component of revenue for any single species, at $21.6 million. Swordfish was the next highest contributor to total revenue at $3.1 million.

The average price for tuna was 1 percent lower in 2007 than in 2006. The overall average west coast

commercial HMS fish price decreased from $0.92 in 2006 to $0.91 in 2007, or roughly one percent.

Source and Calculations: The data were extracted from PacFIN on July 24, 2008 (landings and revenues), and represent the latest two years of current dollar revenues and landings data in Tables 4-4 and 4–5. 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 2204.6. 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 2204.6. Estimated averages are subject to rounding error for categories with small revenues or landings.

Table 4-2. West coast commercial highly migratory species landings, revenues, and average prices by fishery, 2006-2007.

	2006			2007		
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*	12,348	$22,843	$0.84	11,141	$20,700	$0.84
Drift Gillnet	697	$2,549	$1.66	821	$3,197	$1.77
Harpoon	74	$642	$3.94	59	$599	$4.61
Pelagic longline	107	$489	$2.07	42	$214	$2.31
Purse seine	**	**	**	364	$243	$0.30
Total HMS	**13,226**	**$26,523**	**$0.91**	**12,427**	**$24,953**	**$0.91**

** Not reported due to data confidentiality requirements (fewer than three vessels).

Interpretation: Table 4–2 shows the total west coast commercial HMS catch for the indicated fisheries was 12.4 thousand mt in 2007, down 6 percent (8 hundred metric tons) from 2006. The surface hook-and-line fishery represented 90 percent of the total catch.

Total current dollar west coast commercial HMS ex-vessel revenue for these fisheries of $25 million decreased from $26.5 million in the previous year, for a percentage decrease of 5.9 percent ($1.6 million). The overall average west coast commercial HMS fish price for these fisheries remained approximately the same in 2007 as it was in 2006 at $0.91.

Source and Calculations: The data were extracted from PacFIN in July-August 2008, and represent the latest two years of current dollar revenues and landings data in Tables 4-9 through 4–20. 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 2204.6. 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 2204.6. Estimated averages are subject to rounding error for categories with small revenues or landings. Data for Canadian surface hook-and-line vessels fishing in the U.S. EEZ are excluded from the table.

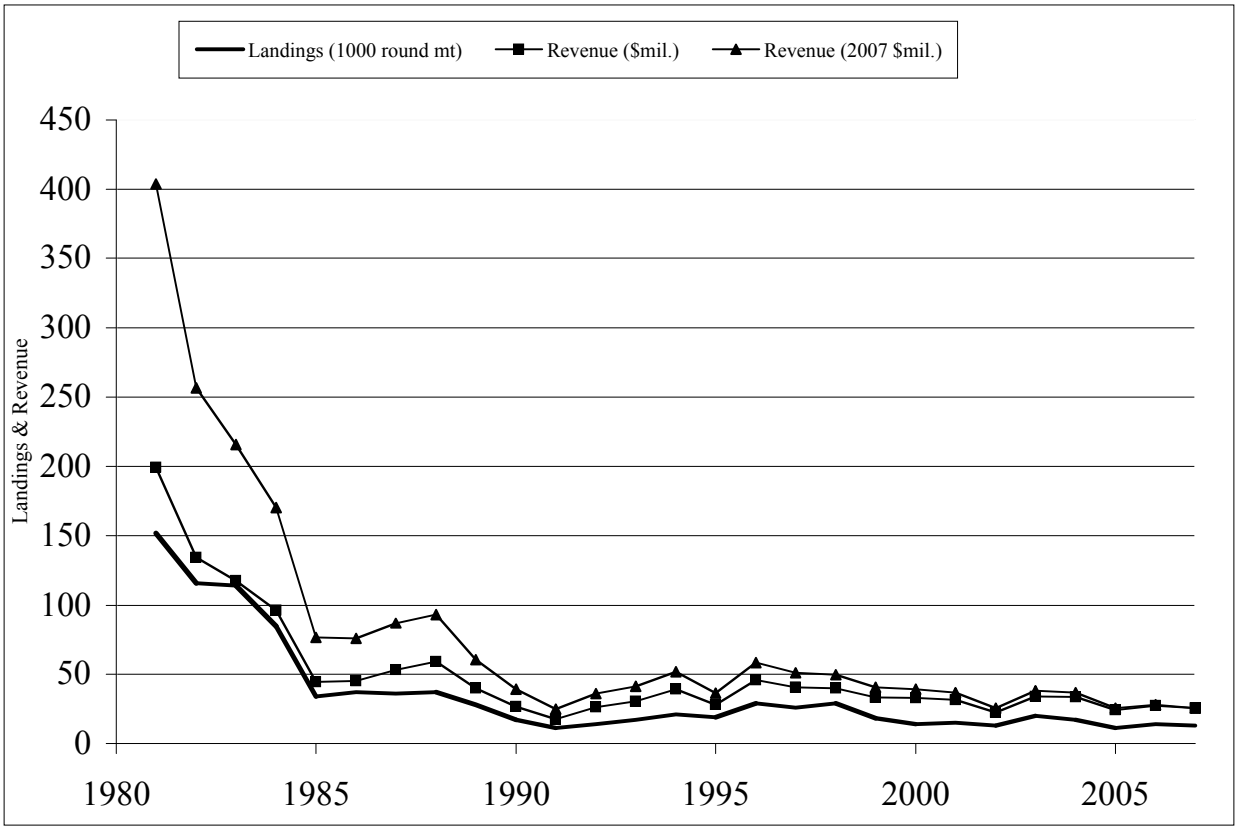

Figure 4-1. West coast commercial HMS landings and revenues, 1981–2007.

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 2007 dollars from 1981 through 2007, and the accompanying tables below (Tables 4–3 through 4–6) show commercial landings and revenues by species. Data for the graph are displayed in the far right columns of the three accompanying tables.

The most striking feature of the graph 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 mt in 1981 to a level which remained permanently below 50,000 mt from 1985 onwards. Revenues in real (2007) dollars fell from $392 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.

The drop in tuna landings for other species than albacore reflects a decline in purse seine landings and revenues, which is largely explained by structural changes in the tuna purse seine fishing industry after 1980. In 1980, there were 20 U.S. tuna processing plants in operation, declining to seven in 1990, while the U.S. fleet of purse seiners in the EPO declined from approximately 144 vessels in 1979 to only 10 vessels by 1999.

Source and Calculations: The data were extracted from PacFIN on July 24, 2008 (landings and revenues). 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 2204.6. 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 2007 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. West coast commercial HMS landings and revenues, 1981–2007.

Year	Landings (1000 round mt)	Revenue ($mil.)	Revenue (2007 $mil.)
1981	152	$200	$404
1982	116	$134	$257
1983	114	$117	$216
1984	85	$96	$170
1985	34	$44	$76
1986	37	$45	$76
1987	36	$53	$87
1988	37	$59	$93
1989	28	$40	$61
1990	17	$27	$39
1991	11	$17	$25
1992	14	$26	$36
1993	17	$31	$41
1994	21	$39	$52
1995	19	$28	$36
1996	29	$46	$58
1997	26	$41	$51
1998	29	$40	$50
1999	18	$33	$40
2000	14	$33	$39
2001	15	$31	$37
2002	13	$22	$26
2003	20	$34	$38
2004	17	$33	$37
2005	11	$24	$25
2006	14	$27	$28
2007	13	$25	$25

Table 4-4. West coast commercial landings of HMS by all HMS and non-HMS gears, 1981–2007.

	Landings (round mt)													
	Tunas							Sharks						
Year	Albacore	Yellowfin	Skipjack	Bigeye	Bluefin	Unspecified	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	9,578	55,482	44,591	21	764	55	1,761	1,331	9	96	217	7	1	113,913
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	3,252	468	3,418	1,190	<0.5	95	149	1	<0.5	33,883
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	1,358	504	<0.5	17	255	6	<0.5	27,571
1990	3,028	8,509	2,256	2	925	46	1,236	357	1	31	373	20	1	16,785
1991	1,676	4,178	3,407	7	104	11	1,029	584		32	219	1	<0.5	11,248
1992	4,902	3,350	2,586	7	1,087	10	1,546	292	<0.5	22	142	1	3	13,948
1993	6,151	3,795	4,539	26	559	16	1,767	275	1	44	122	<0.5	17	17,312
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	1,162	270	5	31	95	5	5	18,940
1996	14,173	3,347	5,455	62	4,688	3	1,198	319	1	20	96	1	10	29,373
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	9,770	1,353	3,759	108	186	12	2,033	320	10	5	63	<0.5	17	17,636
2000	9,074	1,159	780	86	313	1	2,645	296	3	5	80	1	43	14,486
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	1,725	301	2		82	41	<0.5	12,983
2003	16,671	465	349	35	36	<0.5	2,135	301	4	6	70	1	6	20,079
2004	14,540	488	307	22	10	9	1,186	115	2	5	54	1	1	16,740
2005	9,055	285	523	10	207	<0.5	297	179	<0.5	10	33	1	<0.5	10,600
2006	12,757	77	48	35	1	1	540	160	<0.5	4	46	<0.5	3	13,672
2007	11,582	104	5	13	45	<0.5	549	200	2	5	45	10	2	12,562

Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.
Source: PacFIN, extracted July 24, 2008.
Additional processing info:
Landings in lbs 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 2204.6.
Aquaculture fish ticket/fish ticket line info is excluded.

Table 4-5. West coast nominal commercial ex-vessel revenues from HMS landings by all HMS and non-HMS gears, 1981–2007.

	Revenues ($)													
	Tunas							Sharks						
Year	Albacore	Yellowfin	Skipjack	Bigeye	Bluefin	Unspecified	Swordfish	Common Thresher	Pelagic Thresher	Bigeye Thresher	Shortfin Mako	Blue	Dorado	Total
1981	26,524,145	98,722,280	66,331,030	1,569,755	1,239,005	72,694	3,355,010	1,475,634			162,347	59,064	2,801	199,513,765
1982	8,033,073	74,468,306	40,507,405	1,208,147	2,690,102	98,923	5,115,995	1,980,592		15,168	339,209	18,826	956	134,476,702
1983	12,240,375	59,190,758	36,248,835	45,946	1,062,909	95,490	6,794,263	1,474,213	8,449	91,455	229,826	4,645	695	117,487,859
1984	17,208,633	37,038,204	24,790,704	174,405	904,956	2,590,391	11,621,524	1,642,178	7,723	47,119	189,794	2,470	4,272	96,222,373
1985	8,293,123	14,690,108	2,118,170	17,693	2,817,610	1,028,867	13,415,105	1,817,135	716	96,433	192,129	2,132	377	44,489,598
1986	6,178,085	18,079,443	904,609	90,227	4,636,698	198,248	12,726,490	1,690,483	194	66,647	428,259	1,320	757	45,001,460
1987	5,127,832	27,878,667	4,426,717	176,504	2,057,402	448,231	11,115,940	1,183,866	1,840	22,123	715,138	1,853	357	53,156,470
1988	9,110,214	27,030,132	9,249,827	26,156	2,070,411	80,548	9,719,489	979,905	821	9,764	649,799	2,258	527	58,929,851
1989	3,785,598	20,824,242	3,944,894	2,415	1,271,718	127,320	8,259,204	944,159	149	24,711	552,576	3,465	485	39,740,936
1990	5,619,553	9,383,584	1,898,875	8,771	1,149,381	56,750	7,146,946	638,630	1,682	34,628	739,193	10,303	1,943	26,690,239
1991	2,823,937	3,996,935	2,692,345	42,810	116,371	21,161	6,342,361	968,877		25,179	415,168	894	1,167	17,447,205
1992	11,483,392	3,677,441	1,410,546	44,731	1,129,626	21,228	7,566,616	464,018	602	14,629	231,063	1,810	6,247	26,051,949
1993	11,667,651	4,821,735	3,282,778	211,513	752,369	72,678	8,953,927	458,513	462	28,190	221,401	608	42,223	30,514,048
1994	20,070,706	4,522,321	1,751,209	307,147	1,674,099	55,245	9,596,037	584,318	42	33,478	247,088	16,057	74,889	38,932,636
1995	11,570,364	3,044,670	4,752,641	258,727	1,057,948	5,136	6,569,507	477,755	8,777	24,896	165,215	2,796	5,479	27,943,911
1996	27,222,294	3,230,957	3,986,113	260,306	4,035,455	28,296	6,063,794	603,006	1,557	17,745	167,111	587	9,815	45,627,036
1997	19,924,121	4,991,131	5,504,526	359,780	2,773,705	21,895	6,147,707	591,268	62,496	34,768	227,426	278	10,858	40,649,959
1998	18,733,488	5,861,959	5,213,131	271,919	2,965,485	61,688	5,981,719	625,489	2,584	9,428	176,313	5,977	10,492	39,919,672
1999	17,767,485	1,468,209	2,748,208	657,121	1,061,233	60,572	8,445,728	617,691	18,424	5,876	111,119	73	47,854	33,009,593
2000	17,203,982	1,329,357	483,242	576,919	580,722	2,298	11,753,472	589,033	2,738	4,636	133,621	918	63,293	32,724,231
2001	20,716,101	465,558	33,633	320,855	473,557	3,069	8,696,689	595,548	2,767	8,428	75,799	1,822	19,397	31,413,223
2002	14,299,676	588,677	128,245	87,304	43,477	6,325	6,403,254	503,487	1,946		124,521	18,726	725	22,206,363
2003	24,477,280	451,273	159,961	262,768	76,106	21	7,851,693	487,796	2,814	3,779	115,728	832	10,370	33,900,421
2004	27,479,776	446,577	109,254	147,696	38,312	54,879	4,835,731	197,240	2,500	4,060	98,827	489	5,637	33,420,978
2005	20,957,923	315,699	292,193	60,141	136,847	913	1,899,245	271,767	588	6,234	57,788	426	1,290	24,001,054
2006	23,780,278	174,912	40,350	205,677	3,790	1,895	2,702,084	300,393	271	4,509	79,336	309	17,945	27,311,749
2007	21,553,670	149,568	4,361	94,734	58,106	46	3,125,892	331,821	2,903	4,334	78,569	1,984	10,092	25,416,080

Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.
Source: PacFIN, extracted July 24, 2008.
Additional processing info:
Landed weights in lbs are multiplied by the prices per pound in each fish ticket line.
Aquaculture fish ticket/fish ticket line info is excluded.

Table 4-6. West coast real commercial ex-vessel revenues (2007 $) from HMS landings by all HMS and non-HMS gears, 1981–2007.

	Revenues (2007 $)													
	Tunas							Sharks						
Year	Albacore	Yellowfin	Skipjack	Bigeye	Bluefin	Unspecified	Swordfish	Common Thresher	Pelagic Thresher	Bigeye Thresher	Shortfin Mako	Blue	Dorado	Total
1981	53,692,602	199,842,673	134,273,340	3,177,641	2,508,108	147,153	6,791,518	2,987,113			328,638	119,562	5,670	403,874,018
1982	15,327,368	142,087,973	77,289,458	2,305,183	5,132,804	188,748	9,761,486	3,779,035		28,941	647,222	35,920	1,824	256,585,962
1983	22,467,649	108,646,766	66,536,040	84,335	1,951,008	175,276	12,471,114	2,705,971	15,509	167,869	421,854	8,526	1,276	215,653,193
1984	30,441,594	65,519,555	43,854,067	308,517	1,600,843	4,582,330	20,558,153	2,904,967	13,661	83,351	335,740	4,370	7,557	170,214,705
1985	14,237,120	25,219,070	3,636,344	30,374	4,837,099	1,766,296	23,030,224	3,119,545	1,230	165,550	329,836	3,659	646	76,376,993
1986	10,378,103	30,370,305	1,519,585	151,565	7,788,843	333,023	21,378,280	2,839,716	326	111,955	719,400	2,218	1,271	75,594,590
1987	8,384,291	45,583,170	7,237,928	288,595	3,363,966	732,882	18,175,180	1,935,686	3,008	36,172	1,169,291	3,030	584	86,913,783
1988	14,403,501	42,735,387	14,624,233	41,354	3,273,377	127,348	15,366,782	1,549,257	1,298	15,437	1,027,350	3,569	832	93,169,725
1989	5,767,212	31,724,927	6,009,894	3,679	1,937,413	193,967	12,582,578	1,438,390	227	37,646	841,828	5,279	740	60,543,780
1990	8,243,440	13,764,976	2,785,499	12,867	1,686,051	83,248	10,484,004	936,820	2,467	50,796	1,084,338	15,114	2,850	39,152,470
1991	4,002,179	5,664,590	3,815,682	60,672	164,926	29,990	8,988,607	1,373,125		35,684	588,389	1,267	1,654	24,726,765
1992	15,909,382	5,094,820	1,954,206	61,972	1,565,012	29,409	10,482,982	642,862	834	20,267	320,120	2,507	8,654	36,093,027
1993	15,799,121	6,529,092	4,445,197	286,410	1,018,780	98,414	12,124,478	620,870	625	38,173	299,798	823	57,174	41,318,955
1994	26,611,914	5,996,183	2,321,942	407,248	2,219,701	73,249	12,723,464	774,752	56	44,388	327,616	21,290	99,296	51,621,099
1995	15,034,257	3,956,173	6,175,469	336,183	1,374,673	6,674	8,536,261	620,784	11,405	32,349	214,677	3,633	7,119	36,309,657
1996	34,713,459	4,120,068	5,083,031	331,938	5,145,951	36,082	7,732,458	768,944	1,985	22,629	213,098	748	12,516	58,182,907
1997	24,992,625	6,260,826	6,904,825	451,305	3,479,309	27,465	7,711,625	741,681	78,394	43,612	285,281	349	13,621	50,990,918
1998	23,239,658	7,272,000	6,467,102	337,327	3,678,805	76,526	7,420,567	775,945	3,206	11,696	218,724	7,415	13,015	49,521,986
1999	21,728,611	1,795,535	3,360,900	803,621	1,297,826	74,076	10,328,639	755,401	22,531	7,185	135,892	90	58,523	40,368,830
2000	20,591,241	1,591,092	578,387	690,508	695,059	2,751	14,067,590	705,007	3,277	5,549	159,929	1,099	75,754	39,167,243
2001	24,212,367	544,131	39,309	375,006	553,479	3,586	10,164,433	696,059	3,234	9,850	88,592	2,130	22,671	36,714,847
2002	16,426,968	676,251	147,324	100,291	49,945	7,266	7,355,835	578,388	2,235		143,046	21,512	832	25,509,893
2003	27,530,402	507,562	179,914	295,544	85,599	24	8,831,057	548,640	3,164	4,251	130,163	936	11,664	38,128,920
2004	30,045,677	488,276	119,455	161,486	41,890	60,003	5,287,264	215,657	2,733	4,439	108,055	535	6,163	36,541,633
2005	22,196,487	334,356	309,461	63,696	144,934	966	2,011,486	287,827	623	6,602	61,203	451	1,366	25,419,458
2006	24,415,070	179,581	41,427	211,167	3,892	1,945	2,774,213	308,411	278	4,630	81,453	317	18,424	28,040,808
2007	21,553,670	149,568	4,361	94,734	58,106	46	3,125,892	331,821	2,903	4,334	78,569	1,984	10,092	25,416,080

Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.
Source: PacFIN, extracted July 29, 2008.
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 2007.
Landed weights in lbs are multiplied by the prices per pound in each fish ticket line and then divided by the corresponding deflator.
Aquaculture fish ticket/fish ticket line info is excluded.

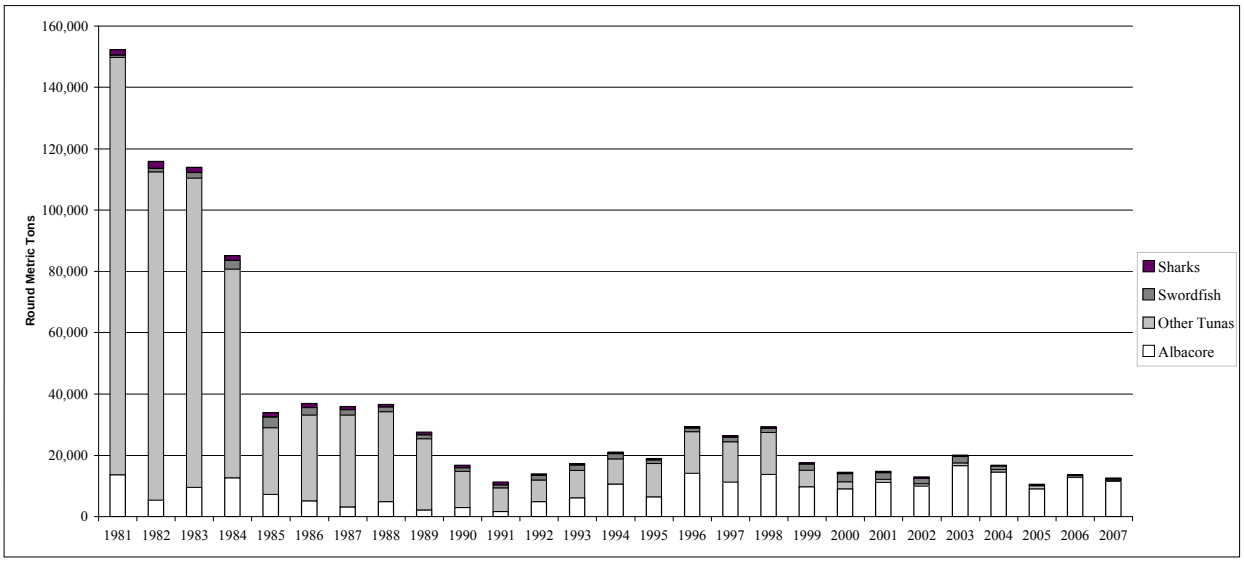

Figure 4-2. West coast commercial landings of albacore, other tunas, swordfish, and sharks, 1981–2007.

Interpretation: Figure 4–2 shows West coast HMS commercial landings in round metric tons grouped into categories of similar species. The accompanying table 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 2007. Swordfish, followed by sharks, comprise a far smaller share of recent total landings, with a steadily declining share over time.

The most striking feature of the graph 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 on July 24, 2008. They represent a portion of the table of West coast commercial landings of HMS by species displayed in Table 4–4. 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 and then dividing by 2204.6. Aquaculture fish ticket / fish ticket line information is excluded from the data.

Table 4-7. West coast commercial landings of albacore, other tunas, swordfish, and sharks, 1981–2007.

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	9,578	100,913	1,761	1,660	113,912
1984	12,654	68,089	2,890	1,507	85,140
1985	7,301	21,729	3,418	1,435	33,883
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	1,358	782	27,571
1990	3,028	11,738	1,236	782	16,784
1991	1,676	7,707	1,029	836	11,248
1992	4,902	7,040	1,546	457	13,945
1993	6,151	8,935	1,767	442	17,295
1994	10,686	8,163	1,700	507	21,056
1995	6,528	10,839	1,162	406	18,935
1996	14,173	13,555	1,198	437	29,363
1997	11,292	13,189	1,459	520	26,460
1998	13,801	13,659	1,408	477	29,345
1999	9,770	5,418	2,033	398	17,619
2000	9,074	2,339	2,645	385	14,443
2001	11,194	963	2,195	425	14,777
2002	10,029	803	1,725	426	12,983
2003	16,671	885	2,135	382	20,073
2004	14,540	836	1,186	177	16,739
2005	9,055	1,025	297	223	10,600
2006	12,757	162	540	210	13,669
2007	11,582	167	549	262	12,560

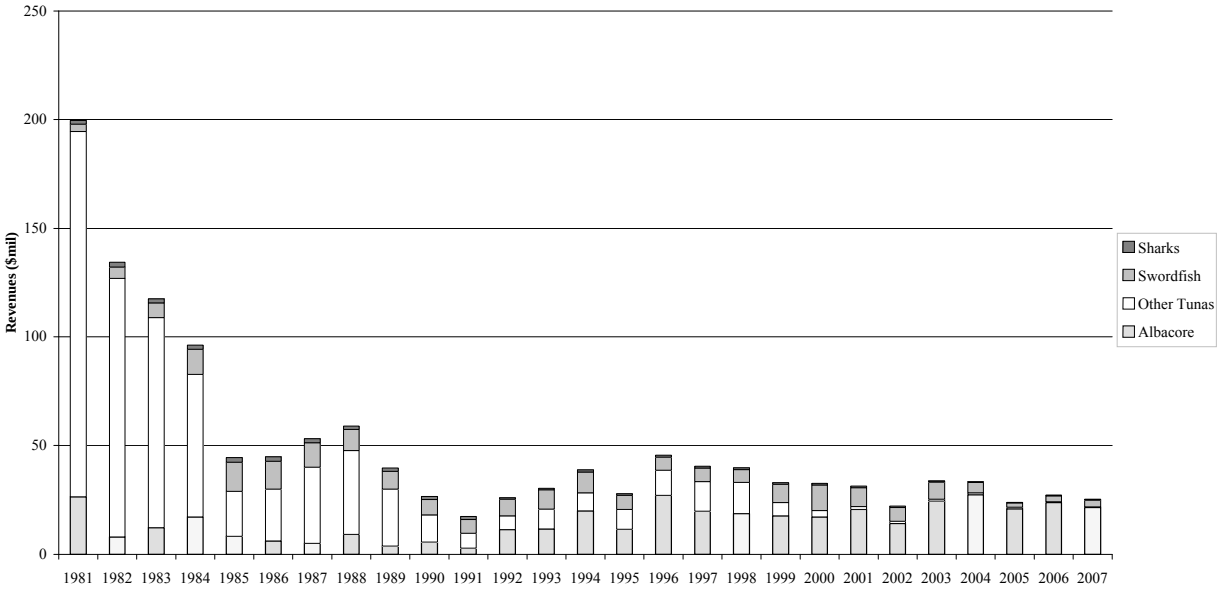

Figure 4-3. West coast commercial revenues for albacore, other tunas, swordfish, and sharks, 1981–2007.

Interpretation: Figure 4–3 shows West coast HMS commercial revenues in current dollars grouped into categories of similar species. Table 4–8 shows the numeric values for the revenues. Tables 4–9 through 4–26 show landings and nominal and real ex-vessel revenue by fishery.

The principal component of revenues is the tunas, with albacore gradually supplanting other tunas as a share of the revenues over the period from 1981 through 2007.

Source and Calculations: The data were extracted from PacFIN on July 24, 2008. Aquaculture fish ticket / fish ticket line information is excluded from the data. Data were obtained by copying from or summing across applicable columns of Table 4–5. 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 4-8. West coast commercial revenues for albacore, other tunas, swordfish, and sharks, 1981–2007.

Year	Revenues ($)				
	Albacore	Other Tunas	Swordfish	Sharks	Total
1981	26,524,145	167,934,764	3,355,010	1,697,045	199,510,964
1982	8,033,073	118,972,883	5,115,995	2,353,795	134,475,746
1983	12,240,375	96,643,938	6,794,263	1,808,588	117,487,164
1984	17,208,633	65,498,660	11,621,524	1,889,284	96,218,101
1985	8,293,123	20,672,448	13,415,105	2,108,545	44,489,221
1986	6,178,085	23,909,225	12,726,490	2,186,903	45,000,703
1987	5,127,832	34,987,521	11,115,940	1,924,820	53,156,113
1988	9,110,214	38,457,074	9,719,489	1,642,547	58,929,324
1989	3,785,598	26,170,589	8,259,204	1,525,060	39,740,451
1990	5,619,553	12,497,361	7,146,946	1,424,436	26,688,296
1991	2,823,937	6,869,622	6,342,361	1,410,118	17,446,038
1992	11,483,392	6,283,572	7,566,616	712,122	26,045,702
1993	11,667,651	9,141,073	8,953,927	709,174	30,471,825
1994	20,070,706	8,310,021	9,596,037	880,983	38,857,747
1995	11,570,364	9,119,122	6,569,507	679,439	27,938,432
1996	27,222,294	11,541,127	6,063,794	790,006	45,617,221
1997	19,924,121	13,651,037	6,147,707	916,236	40,639,101
1998	18,733,488	14,374,182	5,981,719	819,791	39,909,180
1999	17,767,485	5,995,343	8,445,728	753,183	32,961,739
2000	17,203,982	2,972,538	11,753,472	730,946	32,660,938
2001	20,716,101	1,296,672	8,696,689	684,364	31,393,826
2002	14,299,676	854,028	6,403,254	648,680	22,205,638
2003	24,477,280	950,129	7,851,693	610,949	33,890,051
2004	27,479,776	796,718	4,835,731	303,116	33,415,341
2005	20,957,923	805,793	1,899,245	336,803	23,999,764
2006	23,780,278	426,624	2,702,084	384,818	27,293,804
2007	21,553,670	306,815	3,125,892	419,611	25,405,988

Table 4-9. Commercial landings (round mt) in the West coast albacore surface hook-and-line (troll and baitboat) fishery, with Canadian vessels excluded, 1981–2007.

Year	Albacore	Other Tunas	Swordfish	HMS Sharks	Dorado	Groundfish	Coastal Pelagics	Salmon	Other	Total
1981	13,493	14		<0.5	<0.5	4	2	37	1	13,551
1982	4,977	4	4	2	1	4	<0.5	3	<0.5	4,995
1983	9,309	16	3	1	<0.5	23	34	14	1	9,401
1984	8,909	13	25	5	<0.5	5	2	1	4	8,964
1985	7,010	2	11	4	<0.5	4	<0.5	2	2	7,035
1986	4,980	2	1	<0.5		20	<0.5	2	1	5,006
1987	2,891	<0.5	5	2		2	1	1	1	2,903
1988	4,625	<0.5	18	2		1	<0.5	2	1	4,649
1989	2,167	1	7	8	<0.5	10	<0.5	2	2	2,197
1990	2,926	<0.5	2	<0.5	<0.5	3	<0.5	1	1	2,933
1991	1,641	<0.5	2	1		<0.5		1	<0.5	1,645
1992	4,754	1	13	2	<0.5	7		1	<0.5	4,778
1993	5,763	18	90	5	9	4		3	1	5,893
1994	10,541	<0.5	1	<0.5	<0.5	1		<0.5	<0.5	10,543
1995	6,405	1	1	<0.5	<0.5	<0.5	<0.5	8	<0.5	6,415
1996	13,263	42	<0.5	<0.5		<0.5		10	2	13,317
1997	10,825	8	1	1	<0.5	5	<0.5	12	2	10,854
1998	12,611	116	4	3	<0.5	2	<0.5	5	1	12,742
1999	8,793	24	15	1	<0.5	1	<0.5	2	4	8,840
2000	8,098	2	22	<0.5	<0.5	1	<0.5	3	1	8,127
2001	10,223	10	<0.5	1	<0.5	3	<0.5	9	6	10,252
2002	9,293	2	2	<0.5	<0.5	<0.5	<0.5	7	4	9,308
2003	13,488	3		<0.5	<0.5	1	<0.5	4	1	13,497
2004	13,393	1		<0.5	<0.5	<0.5	<0.5	4	3	13,401
2005	8,217	<0.5		<0.5		1		3	1	8,222
2006	12,346	1		<0.5	<0.5	<0.5	<0.5	<0.5	1	12,348
2007	11,139	<0.5			<0.5	<0.5	<0.5	1	1	11,141

Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.
Source: PacFIN, extracted August 13, 2008.
Additional processing info:
Only fish tickets where at least 1 lb of albacore was landed for the albacore surface hook-and-line (troll and baitboat) fishery were used.
Landings in lbs 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 2204.6.
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 4-10. Commercial landings (round mt) in the West coast albacore surface hook-and-line (troll and baitboat) fishery, 1981–2007.

Year	Albacore	Other Tunas	Swordfish	HMS Sharks	Dorado	Groundfish	Coastal Pelagics	Salmon	Other	Total
1981	13,493	14		<0.5	<0.5	4	2	37	1	13,551
1982	4,988	4	4	2	1	4	<0.5	3	<0.5	5,006
1983	9,341	16	3	1	<0.5	23	34	14	1	9,433
1984	8,912	13	25	5	<0.5	5	2	1	4	8,967
1985	7,010	2	11	4	<0.5	4	<0.5	2	2	7,035
1986	4,980	2	1	<0.5		20	<0.5	2	1	5,006
1987	2,891	<0.5	5	2		2	1	1	1	2,903
1988	4,626	<0.5	18	2		1	<0.5	2	1	4,650
1989	2,167	1	7	8	<0.5	10	<0.5	2	2	2,197
1990	2,926	<0.5	2	<0.5	<0.5	3	<0.5	1	1	2,933
1991	1,641	<0.5	2	1		<0.5		1	<0.5	1,645
1992	4,815	1	13	2	<0.5	7		1	<0.5	4,839
1993	5,785	18	90	5	9	4		3	1	5,915
1994	10,564	<0.5	1	<0.5	<0.5	1		<0.5	<0.5	10,566
1995	6,473	1	1	<0.5	<0.5	<0.5	<0.5	8	1	6,484
1996	14,075	42	<0.5	<0.5		<0.5		10	1	14,128
1997	11,223	8	1	1	<0.5	5	<0.5	12	3	11,253
1998	13,571	116	4	3	<0.5	2	<0.5	5	2	13,703
1999	9,506	24	15	1	<0.5	1	<0.5	2	5	9,554
2000	8,986	2	22	<0.5	<0.5	1	<0.5	3	2	9,016
2001	11,018	10	<0.5	1	<0.5	3	<0.5	9	6	11,047
2002	9,995	2	2	<0.5	<0.5	<0.5	<0.5	7	4	10,010
2003	16,608	3		<0.5	<0.5	1	<0.5	4	2	16,618
2004	14,523	1		<0.5	<0.5	<0.5	<0.5	4	3	14,531
2005	9,028	<0.5		<0.5		1		3	1	9,033
2006	12,743	1		<0.5	<0.5	<0.5	<0.5	<0.5	1	12,745
2007	11,496	<0.5			<0.5	<0.5	<0.5	1	2	11,499

Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.
Source: PacFIN, extracted August 22, 2008.
Additional processing info:
Only fish tickets where at least 1 lb of albacore was landed for the albacore surface hook-and-line (troll and baitboat) fishery were used.
Landings in lbs 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 2204.6.
Aquaculture fish ticket/fish ticket line info is excluded.

Table 4-11. Commercial landings (round mt) in the West coast drift gillnet fishery, 1981–2007.

		Sharks					Tunas									
Year	Sword-fish	Common Thresher	Pelagic Thresher	Bigeye Thresher	Shortfin Mako	Blue	Albacore	Yellow-fin	Bigeye	Bluefin	Other	Dorado	Ground-fish	Coastal Pelagics	Other	Total
1981	270	808			91	9		1	1	<0.5	4		6	7	88	1,285
1982	208	634		13	125	1	5	1	1	<0.5	8		5	2	14	1,017
1983	242	150		17	38		6	3	1	1	6		<0.5	7	20	491
1984	286	95		2	11		10	2	<0.5	1	1		5	<0.5	13	426
1985	197	110		2	15		7	<0.5		<0.5	<0.5		1	<0.5	13	345
1986	78	455		2	21		8	1	<0.5	1			<0.5	<0.5	10	576
1987	6	94	<0.5	1	2		1			<0.5			2	<0.5	4	110
1988	1	81					4						<0.5		<0.5	86
1989		*														*
1990																
1991	51	8		4	2		<0.5	<0.5		<0.5	<0.5				2	67
1992	60	2		<0.5	5		1	<0.5	<0.5	<0.5	<0.5			<0.5	4	72
1993	162	16	<0.5	7	11		15			6	1		<0.5		10	228
1994	762	268	<0.5	32	71	<0.5	52	<0.5	<0.5	24	2	<0.5	4	2	113	1,330
1995	701	202	5	29	75	<0.5	31	1	<0.5	17	12	<0.5	2	2	93	1,170
1996	734	241	1	20	80	<0.5	63	1	<0.5	38	2		1	6	131	1,318
1997	664	249	34	27	114	<0.5	43	3	2	51	2	<0.5	1	4	109	1,303
1998	906	281	2	9	81	1	63	1	4	36	4	<0.5	2	2	151	1,543
1999	597	152	7	4	46	<0.5	94	<0.5	1	16	1		1	<0.5	106	1,025
2000	635	155	3	3	52	<0.5	40	1	2	26	<0.5	<0.5	2	2	87	1,008
2001	351	273	1	<0.5	26		51	3	<0.5	13	<0.5		2	1	64	785
2002	298	216	2		59		14	1		3	<0.5		3	1	71	668
2003	199	241	4	6	50	<0.5	8	<0.5	6	9	7		1	1	54	586
2004	182	68	<0.5	5	23		10	<0.5		9	<0.5		2	1	45	345
2005	220	155		9	19		8	1		5	<0.5	<0.5	1	<0.5	52	470
2006	443	99	<0.5	4	35		3	<0.5		1	3	<0.5	1	2	106	697
2007	474	163	2	4	33	<0.5	3	<0.5		2	<0.5		2	<0.5	138	821

* Not reported due to data confidentiality requirements (fewer than three vessels).
Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.
Source: PacFIN, extracted August 18, 2008.
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 lb of swordfish or any HMS shark was landed for the drift gillnet fishery were used.
Landings in lbs 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 2204.6.
Aquaculture fish ticket/fish ticket line info is excluded.

Table 4-12. Commercial landings (round mt) in the West coast harpoon fishery, 1981–2007.

Year	Swordfish	HMS Sharks	Tunas		Dorado	Other	Total
			Albacore	Other			
1981	272	10	2	<0.5		4	288
1982	156	2		<0.5		1	159
1983	58	1				44	103
1984	105	7	<0.5	<0.5		1	113
1985	275	1	<0.5	<0.5		1	277
1986	296	1	<0.5	<0.5		1	298
1987	237	3	1	1		40	282
1988	199	3	1			<0.5	203
1989	62	1	<0.5	<0.5		<0.5	63
1990	65	3		<0.5		<0.5	68
1991	20	1				<0.5	21
1992	75	3	<0.5	<0.5		1	79
1993	169	1	1			1	172
1994	157	1	<0.5			<0.5	158
1995	97	2				<0.5	99
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
2005	76	1				1	78
2006	71	3				<0.5	74
2007	59	<0.5					59

Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.
Source: PacFIN, extracted August 20, 2008.
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 lbs 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 2204.6.
Aquaculture fish ticket/fish ticket line info is excluded.

Table 4-13. Commercial landings (round mt) in the west coast pelagic longline fishery, 1981–2007.

		Sharks					Tunas									
Year	Sword-fish	Common Thresher	Pelagic Thresher	Bigeye Thresher	Shortfin Mako	Blue	Albacore	Yellow-fin	Bigeye	Bluefin	Other	Dorado	Ground-fish	Coastal Pelagics	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	2	1		<0.5	<0.5	<0.5	<0.5	7	19
1984	12	3		<0.5	2		2	<0.5	<0.5	1	<0.5	3	2	<0.5	5	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	<0.5	2	<0.5	<0.5	<0.5	3		18	73
1992	63	2		<0.5	2	<0.5	1			<0.5	<0.5		21	<0.5	2	91
1993	27	<0.5			1	<0.5	<0.5	2	3	<0.5		1	1	1	2	38
1994	722	19		3	20	12	49	4	40	6	5	32	4	<0.5	16	932
1995	271	11		1	7	5	4	5	48	4		5	8	2	5	376
1996	346	2			5	<0.5	3	4	59	3	2	9	6	<0.5	5	444
1997	663	4		2	3	<0.5	6	2	77	2	2	1	32	<0.5	2	796
1998	418	3			4	<0.5	9	2	48	38	9	1	9	1	19	561
1999	1,325	5			7		66	4	103	44	11	17	1		3	1,586
2000	1,873	5	<0.5	<0.5	7	<0.5	23	<0.5	83	16		41	12		10	2,070
2001	1,749	20		1	7	2	22	16	52	5	<0.5	15	7	<0.5	53	1,949
2002	1,331	2			3	41	1	2	10	1		<0.5	12	<0.5	1	1,404
2003	1,810	<0.5			3		2	<0.5	29	<0.5	<0.5	1	4		4	1,853
2004	898	1		<0.5	2		2	<0.5	22		9	1	13	<0.5	3	951
2005	**	**			**		**	**	**		**	**	**		**	**
2006	**	**			**		**	**	**	**	**	**	**	**	**	**
2007	**	**		**	**		**	**	**	**	**	**	**	**	**	**

** Not reported due to data confidentiality requirements based on non-PacFIN data sources (mandatory logbooks, permits, etc.)
Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.
Source: PacFIN, extracted August 5, 2008.
Additional processing info:
Only fish tickets where at least 1 lb of any highly migratory species (except striped marlin) was landed for the longline fishery were used.
Landings in lbs 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 2204.6.
Aquaculture fish ticket/fish ticket line info is excluded.

Table 4-14. Commercial landings (round mt) in the west coast purse seine fishery, 1981–2007.

	Tunas						Sword-	HMS		Ground-	Coastal		
Year	Albacore	Yellowfin	Skipjack	Bigeye	Bluefin	Unspecified	fish	sharks	Dorado	fish	Pelagics	Other	Total
1981	181	75,063	54,338	1,156	854	28					203	2	131,825
1982	367	60,665	39,905	962	2,400	27					29		104,355
1983	11	51,960	41,787		754	12	1	<0.5			25	<0.5	94,550
1984	3,552	33,326	29,941	117	624	1,011	23	1			268	2	68,865
1985	22	14,609	2,504	1	3,240	467	1	<0.5			308	<0.5	21,152
1986	54	21,018	977	8	4,698	136	41	2			65	1	27,000
1987	43	21,527	5,353	42	820	122		3			13	8	27,931
1988	151	18,470	7,391	<0.5	795	7					63		26,878
1989	24	16,118	3,565		1,007	70	1	<0.5	<0.5		29	<0.5	20,814
1990	71	8,354	2,244		876	39					137		11,721
1991		3,497	2,957		100	8					94	3	6,659
1992	8	1,721	1,159	1	1,064	3	10	2	1	<0.5	323	7	4,299
1993	1	951	1,619	2	497	<0.5	17	1	<0.5	<0.5	91	11	3,190
1994		3,566	1,283		880	8					66	123	5,926
1995		2,795	5,616		689						38	39	9,177
1996	11	2,683	5,049		4,639						244	53	12,679
1997	2	4,659	5,926		2,189	7	1	1	1		33	73	12,892
1998	136	3,753	5,310		1,739						256	159	11,353
1999	48	1,297	3,742		99						56	89	5,331
2000	4	1,152	775		255						218		2,404
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
2005		283	522		201						19		1,026
2006		*	*										*
2007	77	99	5		42						140	1	364

* Not reported due to data confidentiality requirements (fewer than three vessels).
Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.
Source: PacFIN, extracted August 20, 2008.
Note: There is no purse seine gear for Washington.
Additional processing info:
Only fish tickets where at least 1 lb of any HMS tuna was landed for the purse seine fishery were used.
Landings in lbs 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 2204.6.
Aquaculture fish ticket/fish ticket line info is excluded.

Table 4-15. Nominal commercial ex-vessel revenues ($) for the west coast albacore surface hook-and-line (troll and baitboat) fishery, with Canadian vessels excluded, 1981–2007.

Year	Albacore	Other Tunas	Swordfish	HMS Sharks	Dorado	Groundfish	Coastal Pelagics	Salmon	Other	Total
1981	26,087,739	17,982		173	72	2,508	991	133,177	1,406	26,244,048
1982	7,349,782	5,500	13,219	2,771	557	5,676	13	13,834	535	7,391,887
1983	11,877,767	14,586	7,531	1,597	33	20,309	15,495	36,075	3,880	11,977,273
1984	12,147,062	20,053	96,217	6,080	706	6,947	928	6,422	4,278	12,288,693
1985	7,995,264	4,278	30,921	7,017	6	6,384	239	10,802	2,311	8,057,222
1986	5,867,829	7,248	6,427	180		19,050	160	9,451	660	5,911,005
1987	4,690,640	1,150	33,310	3,440		2,305	657	6,838	436	4,738,776
1988	8,539,846	952	96,331	3,566		766	614	11,362	538	8,653,975
1989	3,692,144	1,833	34,556	11,295	31	18,112	1	8,305	2,504	3,768,781
1990	5,413,557	79	13,332	560	74	6,163	85	2,792	1,529	5,438,171
1991	2,760,714	71	11,721	602		189		3,479	1,084	2,777,860
1992	11,073,621	2,195	55,452	2,361	281	6,144		6,120	670	11,146,844
1993	10,852,169	154,056	442,687	7,992	23,216	4,992		10,385	1,806	11,497,303
1994	19,817,924	603	6,797	302	180	590		537	344	19,827,277
1995	11,355,237	914	3,260	173	21	152	16	22,290	3,029	11,385,092
1996	25,588,951	38,596	2,608	295		440		26,524	997	25,658,411
1997	19,093,866	14,949	4,390	1,628	371	11,951	89	37,637	3,725	19,168,606
1998	17,341,958	138,138	17,122	5,018	525	4,788	279	16,340	5,263	17,529,431
1999	16,133,740	115,448	77,899	2,623	1,413	4,347	455	9,742	7,708	16,353,375
2000	15,359,743	4,497	97,814	252	298	1,889	522	9,445	5,233	15,479,693
2001	18,779,553	27,752	2,037	2,210	544	7,801	178	33,018	12,398	18,865,491
2002	13,211,127	6,838	9,996	664	170	915	1,241	21,884	7,984	13,260,819
2003	19,664,116	11,045		62	567	2,764	558	14,013	5,747	19,698,872
2004	24,389,902	2,513		520	655	1,834	1,241	22,741	3,332	24,422,738
2005	18,641,996	1,437		181		1,587		12,332	3,318	18,660,851
2006	22,835,896	1,575		252	167	985	124	3,480	992	22,843,471
2007	20,689,885	1,222			223	1,942	1,335	3,975	1,454	20,700,036

Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.

Source: PacFIN, extracted August 14, 2008.

Additional processing info:

Only fish tickets where at least 1 lb of albacore was landed for the albacore surface hook-and-line (troll and baitboat) fishery were used.

Landed weights in lbs 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 4-16. Nominal commercial ex-vessel revenues ($) for the west coast albacore surface hook-and-line (troll and baitboat) fishery, 1981–2007.

Year	Albacore	Other Tunas	Swordfish	HMS Sharks	Dorado	Groundfish	Coastal Pelagics	Salmon	Other	Total
1981	26,087,739	17,982		173	72	2,508	991	133,177	1,406	26,244,048
1982	7,364,640	5,500	13,219	2,771	557	5,676	13	13,834	535	7,406,745
1983	11,915,817	14,586	7,531	1,597	33	20,309	15,495	36,075	3,879	12,015,322
1984	12,150,346	20,053	96,217	6,080	706	6,947	928	6,422	4,278	12,291,977
1985	7,995,264	4,278	30,921	7,017	6	6,384	239	10,802	2,311	8,057,222
1986	5,867,829	7,248	6,427	180		19,050	160	9,451	660	5,911,005
1987	4,690,640	1,150	33,310	3,440		2,305	657	6,838	436	4,738,776
1988	8,542,696	952	96,331	3,566		766	614	11,362	538	8,656,825
1989	3,692,144	1,833	34,556	11,295	31	18,112	1	8,305	2,504	3,768,781
1990	5,413,557	79	13,332	560	74	6,163	85	2,792	1,529	5,438,171
1991	2,760,714	71	11,721	602		189		3,479	1,084	2,777,860
1992	11,218,614	2,195	55,452	2,361	281	6,144		6,120	670	11,291,837
1993	10,893,637	154,056	442,687	7,992	23,216	4,992		10,385	1,806	11,538,771
1994	19,859,543	603	6,797	302	180	590		537	345	19,868,897
1995	11,479,040	914	3,260	173	21	152	16	22,290	3,029	11,508,895
1996	27,080,019	38,596	2,608	295		440		26,524	997	27,149,479
1997	19,811,178	15,026	4,390	1,628	484	11,951	89	37,637	3,725	19,886,108
1998	18,442,370	138,138	17,122	5,018	525	4,788	279	16,340	5,264	18,629,844
1999	17,398,920	115,448	77,899	2,623	1,413	4,347	455	9,742	7,708	17,618,555
2000	17,056,182	4,497	97,814	252	298	1,889	522	9,445	5,233	17,176,132
2001	20,442,146	27,752	2,037	2,210	544	7,801	178	33,018	12,398	20,528,084
2002	14,253,046	6,838	9,996	664	170	915	1,241	21,884	7,984	14,302,738
2003	24,427,159	11,045		62	567	2,764	558	14,085	5,747	24,461,987
2004	27,441,311	2,513		520	655	1,834	1,241	22,741	3,331	27,474,146
2005	20,897,418	1,437		181		1,587		12,332	3,319	20,916,274
2006	23,734,990	1,575		252	167	985	124	3,480	991	23,742,564
2007	21,514,601	1,222			223	1,942	1,335	3,975	1,454	21,524,752

Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.

Source: PacFIN, extracted August 22, 2008.

Additional processing info:

Only fish tickets where at least 1 lb of albacore was landed for the albacore surface hook-and-line (troll and baitboat) fishery were used.

Landed weights in lbs are multiplied by the prices per pound in each fish ticket line.

Aquaculture fish ticket/fish ticket line info is excluded.

Table 4-17. Nominal commercial ex-vessel revenues ($) for the west coast drift gillnet fishery, 1981–2007.

		Sharks					Tunas									
Year	Sword-fish	Common Thresher	Pelagic Thresher	Bigeye Thresher	Shortfin Mako	Blue	Albacore	Yellow-fin	Bigeye	Bluefin	Other	Dorado	Ground-fish	Coastal Pelagics	Other	Total
1981	1,110,316	766,185			78,538	5,109		2,611	1,422	779	7,379		6,569	4,419	144,187	2,127,514
1982	1,000,168	675,288		6,837	116,517	653	7,330	2,454	1,950	304	13,142		5,820	904	19,749	1,851,116
1983	952,577	166,931		25,634	37,715		11,115	6,611	1,469	1,404	8,749		714	5,677	20,152	1,238,748
1984	1,096,570	144,390		2,427	13,638		15,242	3,440	671	1,445	466		8,410	293	9,482	1,296,474
1985	793,604	181,145		2,456	19,129		7,399	597		84	230		1,151	126	12,258	1,018,179
1986	377,053	673,561		2,756	29,629		8,793	2,954	240	1,584			311	65	10,565	1,107,511
1987	37,173	160,473	104	1,649	3,517		1,710			82			4,792	122	5,242	214,864
1988	3,324	134,924					7,092						444		140	145,924
1989		*														*
1990																
1991	361,574	11,891		1,849	3,238		851	540		249	416				707	381,315
1992	241,122	2,748		74	7,744		1,080	1,004	270	1,236	49			310	3,498	259,135
1993	918,433	25,086	118	5,221	21,315		23,922			22,230	1,281		1,019		10,951	1,029,576
1994	4,536,655	489,369	42	27,214	128,789	7	91,871	1,004	2,332	119,757	9,234	40	5,531	851	155,818	5,568,514
1995	4,190,568	347,696	8,681	22,921	131,822	105	49,903	2,423	2,794	72,431	9,663	13	1,961	1,654	137,014	4,979,649
1996	3,919,232	448,255	1,557	16,802	138,997	56	106,175	2,393	1,246	117,324	2,928		1,084	2,557	205,989	4,964,595
1997	3,166,095	438,184	61,815	24,976	192,721	6	69,147	11,359	18,445	227,816	2,196	494	2,268	3,506	143,234	4,362,262
1998	3,967,255	484,999	2,440	7,744	139,393	4,810	76,514	3,765	19,454	178,318	7,335	2,457	3,411	1,761	212,564	5,112,220
1999	2,785,199	277,240	13,704	3,899	80,790	19	101,957	909	9,899	76,870	1,655		1,304	122	188,600	3,542,167
2000	2,750,462	287,592	2,143	2,999	86,543	164	66,123	943	17,921	103,172	732	545	1,298	2,253	139,054	3,461,944
2001	1,541,152	449,885	465	402	42,706		70,729	4,040	673	33,467	516		1,273	399	107,926	2,253,633
2002	1,499,163	368,415	1,725		86,811		19,518	1,517		9,662	88		2,429	833	199,253	2,189,414
2003	1,032,796	390,859	2,676	3,577	81,652	11	13,466	517	36,417	26,316	3,824		825	279	133,917	1,727,132
2004	944,192	111,421	227	3,795	40,804		23,390	697		31,074	144		2,024	386	120,036	1,278,190
2005	1,184,545	225,273		6,094	30,020		17,819	4,188		16,488	105	90	1,182	9	198,205	1,684,018
2006	1,996,530	184,337	218	3,828	56,998		4,079	1,755		2,959	2,970	87	1,346	1,951	292,126	2,549,184
2007	2,440,385	253,760	2,870	3,758	53,724	157	7,129	102		11,602	79		2,349	349	420,650	3,196,914

* Not reported due to data confidentiality requirements (fewer than three vessels).
Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown
Source: PacFIN, extracted August 19, 2008.
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 lb of swordfish or any HMS shark was landed for the drift gillnet fishery were used.
Landed weights in lbs are multiplied by the prices per pound in each fish ticket line.
Aquaculture fish ticket/fish ticket line info is excluded.

Table 4-18. Nominal commercial ex-vessel revenues ($) for the west coast harpoon fishery, 1981–2007.

Year	Swordfish	HMS Sharks	Tunas		Dorado	Other	Total
			Albacore	Other			
1981	1,371,646	10,204	3,952	385		12,029	1,398,216
1982	839,886	1,988		146		1,233	843,253
1983	318,044	1,962				9,752	329,758
1984	583,079	8,473	330	150		2,026	594,058
1985	1,280,993	1,721	225	247		1,751	1,284,937
1986	1,796,277	2,433	53	337		1,203	1,800,303
1987	1,647,710	5,053	4,150	2,076		84,568	1,743,557
1988	1,477,860	6,429	8,552			882	1,493,723
1989	500,435	1,527	2,106	65		1,256	505,389
1990	539,322	5,869		108		811	546,110
1991	179,949	2,025				70	182,044
1992	586,740	6,126	1,236	133		1,336	595,571
1993	1,132,762	1,890	7,730			1,000	1,143,382
1994	1,273,087	1,613	2,490			2,888	1,280,078
1995	760,108	4,078				1,752	765,938
1996	633,027	3,217	216			652	637,112
1997	683,211	5,567	200		90	675	689,743
1998	402,914	1,603				766	405,283
1999	608,982	811				5,851	615,644
2000	750,533	798	302			8,381	760,014
2001	468,289	1,152			50	2,748	472,239
2002	678,934	1,259				1,141	681,334
2003	839,197	562				1,768	841,527
2004	670,001	2,457				1,643	674,101
2005	709,760	1,229				1,921	712,910
2006	636,273	5,013				709	641,995
2007	597,707	1,305					599,012

Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.
Source: PacFIN, extracted August 20, 2008.
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 lbs are multiplied by the prices per pound in each fish ticket line.
Aquaculture fish ticket/fish ticket line info is excluded.

Table 4-19. Nominal commercial ex-vessel revenues ($) for the west coast pelagic longline fishery, 1981–2007.

		Sharks					Tunas									
Year	Sword-fish	Common Thresher	Pelagic Thresher	Bigeye Thresher	Shortfin Mako	Blue	Albacore	Yellow-fin	Bigeye	Bluefin	Other	Dorado	Ground-fish	Coastal Pelagics	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	4,580	2,038		1,239	13	204	35	2,882	24,823
1984	62,804	3,979		334	3,325		2,831	1,533	1,872	3,625	537	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		286			6,950	396	164						72,173		5,921	85,890
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	345	12,198	1,679	2,504	36	4,576		80,015	293,471
1992	298,852	3,302		365	3,348	184	1,790			5,191	13		29,917	2	2,760	345,724
1993	153,383	63			1,350	20	545	10,047	22,551	4,482		1,937	4,110	951	2,993	202,432
1994	3,401,896	14,328		3,532	31,969	15,812	81,097	23,125	243,157	54,001	19,126	57,737	11,850	120	18,662	3,976,412
1995	1,064,427	17,409		360	6,685	2,318	5,351	25,720	255,427	30,058		5,365	17,114	7,223	7,224	1,444,681
1996	1,319,868	4,255			6,349	44	3,702	12,414	247,126	25,364	25,850	9,077	12,759	88	5,709	1,672,605
1997	2,115,438	8,211		7,342	3,992	6	10,507	9,848	332,874	10,264	14,018	2,707	110,693	140	2,819	2,628,859
1998	1,454,529	5,286			9,372	116	21,315	5,870	247,283	233,639	53,410	3,995	24,087	1,010	62,470	2,122,382
1999	4,893,372	7,067			11,204		133,630	17,355	603,992	510,766	56,655	44,608	2,317		6,667	6,287,633
2000	8,028,596	8,318	404	655	9,751	105	38,081	551	550,115	125,444		53,566	52,268		13,924	8,881,778
2001	6,527,196	20,572		7,380	9,680	1,466	39,876	39,410	318,716	32,897	1,125	17,425	14,344	997	69,995	7,101,079
2002	4,190,669	3,024			5,068	18,256	1,882	9,169	87,304	4,694		555	43,730	24	9,071	4,373,446
2003	5,879,612	621			5,415		3,685	290	225,967	822	4	1,556	12,944		10,294	6,141,210
2004	3,160,052	2,315		65	4,816		4,363	1,226	147,696		53,958	3,224	53,520	360	7,078	3,438,673
2005	**	**			**		**	**	**		**	**	**		**	**
2006	**	**			**		**	**	**	**	**	**	**	**	**	**
2007	**	**		**	**		**	**	**	**	**	**	**	**	**	**

** Not reported due to data confidentiality requirements based on non-PacFIN data sources (mandatory logbooks, permits, etc.)
Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.
Source: PacFIN, extracted August 12, 2008.
Additional processing info:
Only fish tickets where at least 1 lb of any highly migratory species (except striped marlin) was landed for the longline fishery were used.
Landed weights in lbs are multiplied by the prices per pound in each fish ticket line.
Aquaculture fish ticket/fish ticket line info is excluded.

Table 4-20. Nominal commercial ex-vessel revenues ($) for the west coast purse seine fishery, 1981–2007.

	Tunas						Sword-	HMS		Ground-	Coastal		
Year	Albacore	Yellowfin	Skipjack	Bigeye	Bluefin	Unspecified	fish	Sharks	Dorado	fish	Pelagics	Other	Total
1981	362,636	97,391,144	62,318,736	1,552,545	1,219,984	54,643					119,029	1,456	163,020,173
1982	575,736	73,205,578	38,822,258	1,196,824	2,680,401	54,040					5,155		116,539,991
1983	15,349	55,696,219	33,973,771		1,042,089	24,989	1,796	261			6,638	586	90,761,698
1984	4,822,262	35,503,573	23,741,980	143,266	878,031	2,580,939	87,097	651			60,118	6,054	67,823,971
1985	28,953	14,191,940	1,713,118	810	2,797,571	1,026,024	7,080	460			50,191	956	19,817,103
1986	64,622	17,655,730	643,905	13,335	4,575,913	182,575	182,606	2,595			8,204	2,452	23,331,937
1987	69,499	26,028,704	4,116,606	150,602	2,049,722	427,505		900			2,005	8,980	32,854,523
1988	266,685	25,754,782	7,772,435	680	2,037,504	67,724					25,342		35,925,150
1989	45,978	19,139,726	3,113,729		1,231,363	112,194	6,955	270	128		6,300	138	23,656,781
1990	139,859	9,225,983	1,889,065		1,069,829	32,343					43,459		12,400,537
1991		3,399,732	2,298,693		98,226	7,985					36,458	3,315	5,844,409
1992	19,291	1,686,917	551,315	2,927	1,087,353	2,936	51,873	3,524	2,597	220	62,091	11,397	3,482,441
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		3,135,039	1,078,217		1,463,167	3,393					36,342	125,354	5,841,512
1995		2,811,700	3,801,888		943,602						15,670	20,463	7,593,323
1996	875	2,669,391	3,643,203		3,865,969						69,959	25,249	10,274,646
1997	3,654	4,795,089	5,326,959		2,504,396	4,195	6,666	1,909	1,425		17,321	51,754	12,713,368
1998	162,925	3,808,379	4,717,085		2,294,031						165,275	109,262	11,256,957
1999	33,416	1,397,578	2,732,409		360,132						5,340	59,908	4,588,783
2000	6,615	1,306,040	475,592		296,687						24,484		2,109,419
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
2005		304,037	291,183		119,162						1,708		716,090
2006		*	*										*
2007	19,067	119,395	3,958		45,267						55,587		243,273

* Not reported due to data confidentiality requirements (fewer than three vessels).
Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.
Source: PacFIN, extracted August 20, 2008.
Note: There is no purse seine gear for Washington.
Additional processing info:
Only fish tickets where at least 1 lb of any HMS tuna was landed for the purse seine fishery were used.
Landed weights in lbs are multiplied by the prices per pound in each fish ticket line.
Aquaculture fish ticket/fish ticket line info is excluded.

Table 4-21. Real commercial ex-vessel revenues (2007 $) for the west coast albacore surface hook-and-line (troll and baitboat) fishery, with Canadian vessels excluded, 1981–2007

Year	Albacore	Other Tunas	Swordfish	HMS Sharks	Dorado	Groundfish	Coastal Pelagics	Salmon	Other	Total
1981	52,809,187	36,401		350	145	5,076	2,007	269,588	2,850	53,125,604
1982	14,023,625	10,494	25,223	5,286	1,063	10,831	24	26,396	1,021	14,103,963
1983	21,802,069	26,772	13,823	2,932	61	37,278	28,441	66,217	7,122	21,984,715
1984	21,487,815	35,474	170,206	10,755	1,249	12,289	1,641	11,361	7,567	21,738,357
1985	13,725,775	7,344	53,083	12,047	11	10,959	411	18,545	3,965	13,832,140
1986	9,856,928	12,175	10,796	302		32,001	269	15,876	1,108	9,929,455
1987	7,669,456	1,880	54,463	5,625		3,768	1,074	11,180	717	7,748,163
1988	13,501,732	1,504	152,302	5,638		1,211	970	17,964	852	13,682,173
1989	5,624,839	2,793	52,645	17,207	46	27,592	2	12,652	3,816	5,741,592
1990	7,941,260	116	19,557	821	109	9,041	125	4,095	2,243	7,977,367
1991	3,912,576	100	16,612	853		268		4,931	1,536	3,936,876
1992	15,341,674	3,042	76,824	3,271	390	8,512		8,479	928	15,443,120
1993	14,694,880	208,607	599,441	10,822	31,436	6,760		14,062	2,446	15,568,454
1994	26,276,748	800	9,013	400	239	783		712	456	26,289,151
1995	14,754,726	1,188	4,236	224	27	197	21	28,963	3,937	14,793,519
1996	32,630,644	49,217	3,325	376		561		33,823	1,272	32,719,218
1997	23,951,161	18,752	5,507	2,042	466	14,991	112	47,212	4,672	24,044,915
1998	21,513,408	171,366	21,240	6,225	651	5,940	346	20,270	6,530	21,745,976
1999	19,730,634	141,186	95,265	3,207	1,728	5,316	556	11,914	9,429	19,999,235
2000	18,383,893	5,382	117,072	302	357	2,261	625	11,304	6,264	18,527,460
2001	21,948,986	32,435	2,380	2,583	635	9,118	208	38,591	14,492	22,049,428
2002	15,176,481	7,855	11,483	762	195	1,051	1,426	25,140	9,173	15,233,566
2003	22,116,878	12,422		70	638	3,109	628	15,761	6,463	22,155,969
2004	26,667,289	2,748		568	716	2,005	1,357	24,864	3,643	26,703,190
2005	19,743,694	1,522		192		1,680		13,061	3,515	19,763,664
2006	23,445,479	1,617		259	171	1,011	127	3,573	1,018	23,453,255
2007	20,689,885	1,222			223	1,942	1,335	3,975	1,454	20,700,036

Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.

Source: PacFIN, extracted August 14, 2008.

Additional processing info:

Only fish tickets where at least 1 lb 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 2007.

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

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 4-22. Real commercial ex-vessel revenues (2007 $) for the west coast albacore surface hook-and-line (troll and baitboat) fishery, 1981–2007.

Year	Albacore	Other Tunas	Swordfish	HMS Sharks	Dorado	Groundfish	Coastal Pelagics	Salmon	Other	Total
1981	52,809,187	36,401		350	145	5,076	2,007	269,588	2,850	53,125,604
1982	14,051,974	10,494	25,223	5,286	1,063	10,831	24	26,396	1,021	14,132,312
1983	21,871,911	26,772	13,823	2,932	61	37,278	28,441	66,217	7,121	22,054,556
1984	21,493,624	35,474	170,206	10,755	1,249	12,289	1,641	11,361	7,567	21,744,166
1985	13,725,775	7,344	53,083	12,047	11	10,959	411	18,545	3,965	13,832,140
1986	9,856,928	12,175	10,796	302		32,001	269	15,876	1,108	9,929,455
1987	7,669,456	1,880	54,463	5,625		3,768	1,074	11,180	717	7,748,163
1988	13,506,238	1,504	152,302	5,638		1,211	970	17,964	852	13,686,679
1989	5,624,839	2,793	52,645	17,207	46	27,592	2	12,652	3,816	5,741,592
1990	7,941,260	116	19,557	821	109	9,041	125	4,095	2,243	7,977,367
1991	3,912,576	100	16,612	853		268		4,931	1,536	3,936,876
1992	15,542,552	3,042	76,824	3,271	390	8,512		8,479	927	15,643,997
1993	14,751,032	208,607	599,441	10,822	31,436	6,760		14,062	2,445	15,624,605
1994	26,331,932	800	9,013	400	239	783		712	455	26,344,334
1995	14,915,592	1,188	4,236	224	27	197	21	28,963	3,937	14,954,385
1996	34,532,031	49,217	3,325	376		561		33,823	1,273	34,620,606
1997	24,850,951	18,848	5,507	2,042	607	14,991	112	47,212	4,672	24,944,942
1998	22,878,514	171,366	21,240	6,225	651	5,940	346	20,270	6,530	23,111,082
1999	21,277,877	141,186	95,265	3,207	1,728	5,316	556	11,914	9,429	21,546,478
2000	20,414,342	5,382	117,072	302	357	2,261	625	11,304	6,263	20,557,908
2001	23,892,176	32,435	2,380	2,583	635	9,118	208	38,591	14,492	23,992,618
2002	16,373,401	7,855	11,483	762	195	1,051	1,426	25,140	9,173	16,430,486
2003	27,474,029	12,422		70	638	3,109	628	15,842	6,463	27,513,201
2004	30,003,620	2,748		568	716	2,005	1,357	24,864	3,643	30,039,521
2005	22,132,407	1,522		192		1,680		13,061	3,514	22,152,376
2006	24,368,573	1,617		259	171	1,011	127	3,573	1,019	24,376,350
2007	21,514,601	1,222			223	1,942	1,335	3,975	1,454	21,524,752

Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.
Source: PacFIN, extracted August 22, 2008.
Additional processing info:
Only fish tickets where at least 1 lb 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 2007.
Landed weights in lbs are multiplied by the prices per pound in each fish ticket line and then divided by the corresponding deflator.
Aquaculture fish ticket/fish ticket line info is excluded.

Table 4-23. Real commercial ex-vessel revenues (2007 $) for the west coast drift gillnet fishery, 1981–2007.

		Sharks					Tunas									
Year	Sword-fish	Common Thresher	Pelagic Thresher	Bigeye Thresher	Shortfin Mako	Blue	Albacore	Yellow-fin	Bigeye	Bluefin	Other	Dorado	Ground-fish	Coastal Pelagics	Other	Total
1981	2,247,604	1,550,982			158,984	10,343		5,286	2,879	1,576	14,937		13,298	8,945	291,874	4,306,708
1982	1,908,353	1,288,472		13,045	222,318	1,246	13,987	4,683	3,721	580	25,076		11,105	1,725	37,679	3,531,990
1983	1,748,490	306,407		47,052	69,226		20,402	12,135	2,697	2,576	16,059		1,310	10,421	36,992	2,273,767
1984	1,939,801	255,422		4,293	24,125		26,962	6,086	1,187	2,555	824		14,877	519	16,776	2,293,427
1985	1,362,411	310,979		4,216	32,839		12,702	1,025		145	395		1,976	217	21,042	1,747,947
1986	633,383	1,131,464		4,629	49,772		14,771	4,961	403	2,661			523	109	17,749	1,860,425
1987	60,780	262,383	170	2,697	5,750		2,796			134			7,835	200	8,570	351,315
1988	5,255	213,318					11,212						702		223	230,710
1989		*														*
1990																
1991	512,435	16,852		2,620	4,589		1,206	765		353	590				1,002	540,412
1992	334,056	3,807		103	10,728		1,496	1,391	374	1,712	68			429	4,848	359,012
1993	1,243,647	33,968	160	7,069	28,862		32,393			30,101	1,735		1,379		14,831	1,394,145
1994	6,015,188	648,859	56	36,083	170,763	9	121,812	1,331	3,092	158,786	12,244	53	7,333	1,128	206,602	7,383,339
1995	5,445,125	451,787	11,280	29,783	171,286	136	64,843	3,149	3,631	94,115	12,556	17	2,548	2,149	178,033	6,470,438
1996	4,997,745	571,607	1,985	21,426	177,247	71	135,392	3,052	1,588	149,610	3,733		1,382	3,260	262,679	6,330,777
1997	3,971,519	549,654	77,540	31,329	241,747	7	86,737	14,249	23,138	285,770	2,755	620	2,844	4,398	179,672	5,471,979
1998	4,921,543	601,661	3,027	9,607	172,923	5,967	94,919	4,670	24,134	221,211	9,099	3,048	4,231	2,184	263,693	6,341,917
1999	3,406,137	339,048	16,759	4,768	98,802	24	124,687	1,111	12,106	94,008	2,024		1,595	149	230,649	4,331,867
2000	3,291,995	344,215	2,565	3,589	103,582	196	79,142	1,128	21,450	123,485	876	652	1,553	2,696	166,435	4,143,559
2001	1,801,253	525,812	544	469	49,914		82,666	4,722	787	39,115	603		1,488	466	126,141	2,633,980
2002	1,722,186	423,223	1,982		99,726		22,421	1,742		11,099	101		2,790	956	228,896	2,515,122
2003	1,161,620	439,612	3,010	4,023	91,837	12	15,146	581	40,960	29,598	4,301		928	313	150,621	1,942,562
2004	1,032,355	121,825	248	4,149	44,614		25,574	762		33,976	158		2,213	422	131,244	1,397,540
2005	1,254,549	238,586		6,454	31,794		18,872	4,435		17,462	111	95	1,252	9	209,921	1,783,540
2006	2,049,826	189,258	223	3,930	58,519		4,188	1,802		3,038	3,049	89	1,382	2,003	299,925	2,617,232
2007	2,440,385	253,760	2,870	3,758	53,724	157	7,129	102		11,602	79		2,349	349	420,650	3,196,914

* Not reported due to data confidentiality requirements (fewer than three vessels).
Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.
Source: PacFIN, extracted August 19, 2008.
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 lb 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 2007.
Landed weights in lbs are multiplied by the prices per pound in each fish ticket line and then divided by the corresponding deflator.
Aquaculture fish ticket/fish ticket line info is excluded.

Table 4-24. Real commercial ex-vessel revenues (2007 $) for the west coast harpoon fishery, 1981–2007.

Year	Swordfish	HMS Sharks	Tunas		Dorado	Other	Total
			Albacore	Other			
1981	2,776,611	20,657	8,000	780		24,348	2,830,396
1982	1,602,530	3,793		279		2,353	1,608,955
1983	583,781	3,601				17,901	605,283
1984	1,031,450	14,988	584	265		3,584	1,050,871
1985	2,199,129	2,955	387	424		3,005	2,205,900
1986	3,017,431	4,087	89	566		2,021	3,024,194
1987	2,694,097	8,262	6,786	3,394		138,274	2,850,813
1988	2,336,537	10,165	13,520			1,395	2,361,617
1989	762,394	2,326	3,209	99		1,912	769,940
1990	791,143	8,609		158		1,190	801,100
1991	255,030	2,870				99	257,999
1992	812,885	8,488	1,713	184		1,849	825,119
1993	1,533,868	2,560	10,466			1,356	1,548,250
1994	1,687,996	2,138	3,302			3,830	1,697,266
1995	987,667	5,299				2,276	995,242
1996	807,227	4,102	275			832	812,436
1997	857,013	6,984	250		113	847	865,207
1998	499,832	1,988				950	502,770
1999	744,750	992				7,155	752,897
2000	898,305	955	361			10,030	909,651
2001	547,322	1,346			58	3,213	551,939
2002	779,935	1,447				1,310	782,692
2003	943,873	632				1,989	946,494
2004	732,562	2,686				1,797	737,045
2005	751,706	1,302				2,033	755,041
2006	653,258	5,146				729	659,133
2007	597,707	1,305					599,012

Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.
Source: PacFIN, extracted August 20, 2008.
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 2007.
Landed weights in lbs are multiplied by the prices per pound in each fish ticket line and then divided by the corresponding deflator.
Aquaculture fish ticket/fish ticket line info is excluded.

Table 4-25. Real commercial ex-vessel revenues (2007 $) for the west coast pelagic longline fishery, 1981–2007.

		Sharks					Tunas									
Year	Sword-fish	Common Thresher	Pelagic Thresher	Bigeye Thresher	Shortfin Mako	Blue	Albacore	Yellow-fin	Bigeye	Bluefin	Other	Dorado	Ground-fish	Coastal Pelagics	Other	Total
1981	3,125				34,159	96,424	97,585	2,571					5,220	231	2,336	241,651
1982	584	2,714			10,383	23,054	140,078		3,734			598	45	39	445	181,674
1983	928	81			1,611	798	21,969	8,406	3,741		2,275	23	374	65	5,292	45,563
1984	111,098	7,039		592	5,882		5,009	2,712	3,311	6,413	950	4,763	3,281	5	9,290	160,345
1985	1,290	3,300			43	151	1,270						14,982		282	21,318
1986		6,456			2,745	175							9,321	56	17,304	36,057
1987		468			11,363	648	268						118,006		9,682	140,435
1988	2,532	3,670			508,951	857				625			71,079	39	8,755	596,508
1989					17,812	678							46			18,536
1990		784			45,701	3,417	66				5,894		285	7	288	56,442
1991	207,348	282			63,395	503	748	489	17,287	2,380	3,548	51	6,486		113,400	415,917
1992	414,037	4,574		506	4,638	255	2,481			7,192	17		41,448	3	3,823	478,974
1993	207,695	85			1,828	27	738	13,605	30,536	6,069		2,622	5,565	1,288	4,054	274,112
1994	4,510,602	18,997		4,683	42,388	20,965	107,527	30,662	322,404	71,600	25,359	76,554	15,712	159	24,746	5,272,358
1995	1,383,091	22,621		468	8,687	3,012	6,953	33,420	331,896	39,056		6,971	22,238	9,385	9,386	1,877,184
1996	1,683,075	5,425			8,096	55	4,721	15,830	315,132	32,344	32,963	11,575	16,270	112	7,282	2,132,880
1997	2,653,585	10,300		9,210	5,007	7	13,180	12,353	417,554	12,875	17,584	3,396	138,853	175	3,536	3,297,615
1998	1,804,403	6,558			11,627	144	26,442	7,282	306,765	289,839	66,257	4,956	29,881	1,253	77,495	2,632,902
1999	5,984,312	8,643			13,702		163,422	21,224	738,647	624,637	69,286	54,553	2,834		8,153	7,689,413
2000	9,609,331	9,955	484	783	11,671	125	45,579	660	658,427	150,142		64,113	62,558		16,666	10,630,494
2001	7,628,794	24,044		8,625	11,314	1,714	46,606	46,061	372,506	38,449	1,315	20,366	16,765	1,165	81,807	8,299,531
2002	4,814,094	3,474			5,822	20,972	2,162	10,532	100,291	5,392		638	50,235	27	10,424	5,024,063
2003	6,612,992	699			6,090		4,144	326	254,152	925	4	1,750	14,559		11,580	6,907,221
2004	3,455,119	2,531		71	5,265		4,770	1,340	161,486		58,996	3,524	58,518	394	7,742	3,759,756
2005	**	**			**		**	**	**	**	**	**	**		**	**
2006	**	**			**		**	**	**	**	**	**	**	**	**	**
2007	**	**		**	**		**	**	**	**	**	**	**	**	**	**

** Not reported due to data confidentiality requirements based on non-PacFIN data sources (mandatory logbooks, permits, etc.)
Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.
Source: PacFIN, extracted August 12, 2008.
Additional processing info:
Only fish tickets where at least 1 lb of any highly migratory species (except striped marlin) was landed for the 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 2007.
Landed weights in lbs are multiplied by the prices per pound in each fish ticket line and then divided by the corresponding deflator.
Aquaculture fish ticket/fish ticket line info is excluded.

Table 4-26. Real commercial ex-vessel revenues (2007 $) for the west coast purse seine fishery, 1981–2007.

	Tunas						Sword-	HMS		Ground-	Coastal		
Year	Albacore	Yellowfin	Skipjack	Bigeye	Bluefin	Unspecified	fish	Sharks	Dorado	fish	Pelagics	Other	Total
1981	734,082	197,148,065	126,151,287	3,142,804	2,469,604	110,614					240,950	2,944	330,000,350
1982	1,098,524	139,678,646	74,074,142	2,283,580	5,114,292	103,109					9,835		222,362,128
1983	28,174	102,232,413	62,360,080		1,912,792	45,868	3,296	479			12,185	1,076	166,596,363
1984	8,530,448	62,804,835	41,998,904	253,434	1,553,212	4,565,609	154,072	1,151			106,347	10,710	119,978,722
1985	49,704	24,363,846	2,940,974	1,390	4,802,698	1,761,415	12,155	789			86,164	1,643	34,020,778
1986	108,553	29,658,542	1,081,648	22,400	7,686,735	306,693	306,746	4,358			13,781	4,122	39,193,578
1987	113,634	42,558,378	6,730,880	246,242	3,351,409	698,995		1,472			3,278	14,684	53,718,972
1988	421,636	40,719,023	12,288,434	1,074	3,221,350	107,074					40,066		56,798,657
1989	70,045	29,158,632	4,743,646		1,875,934	170,923	10,595	411	195		9,598	211	36,040,190
1990	205,162	13,533,788	2,771,108		1,569,355	47,444					63,751		18,190,608
1991		4,818,214	3,257,785		139,209	11,316					51,669	4,699	8,282,892
1992	26,726	2,337,098	763,806	4,055	1,506,446	4,068	71,866	4,882	3,598	305	86,022	15,790	4,824,662
1993	1,627	1,423,514	1,417,792	5,726	770,977	1,192	133,679	2,165	237	19	22,794	14,432	3,794,154
1994		4,156,774	1,429,616		1,940,026	4,499					48,186	166,208	7,745,309
1995		3,653,457	4,940,083		1,226,094						20,361	26,589	9,866,584
1996	1,116	3,403,967	4,645,757		4,929,825						89,211	32,197	13,102,073
1997	4,583	6,014,914	6,682,087		3,141,491	5,262	8,362	2,395	1,787		21,727	64,918	15,947,526
1998	202,115	4,724,450	5,851,737		2,845,839						205,031	135,543	13,964,715
1999	40,866	1,709,157	3,341,579		440,420						6,530	73,265	5,611,817
2000	7,918	1,563,184	569,230		355,101						29,305		2,524,738
2001	73,447	480,520	33,421		393,678						5,952		987,018
2002	411	663,773	147,150				3,013					51	814,398
2003	18,516	497,548	171,171		16,729								703,963
2004	1,681	475,711	119,017										596,408
2005		322,005	308,391		126,204						1,809		758,409
2006		*	*										*
2007	19,067	119,395	3,958		45,267						55,587		243,273

* Not reported due to data confidentiality requirements (fewer than three vessels).
Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.
Source: PacFIN, extracted August 20, 2008.
Note: There is no purse seine gear for Washington.
Additional processing info:
Only fish tickets where at least 1 lb 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 2007.
Landed weights in lbs are multiplied by the prices per pound in each fish ticket line and then divided by the corresponding deflator.
Aquaculture fish ticket/fish ticket line info is excluded.

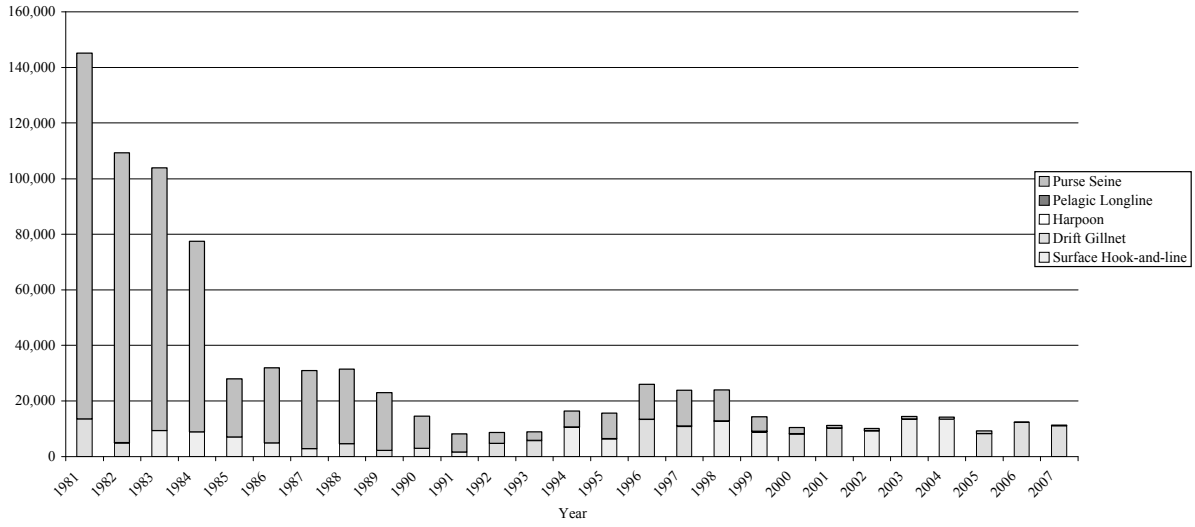

Figure 4-4. West coast commercial tuna landings by fishery, 1981–2007.

Interpretation: Figure 4–4 and Table 4–27 display west coast commercial tuna landings by fishery over the years 1981–2007 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 on various dates in August 2008. 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 and then dividing by 2204.6. Aquaculture fish ticket / fish ticket line information is excluded from the data. Canadian surface hook-and-line fishery data are also excluded.

Table 4-27. West coast commercial tuna landings by fishery, 1981–2007.

Year	Landings (round mt)					
	Surface Hook-and-line	Drift Gillnet	Harpoon	Pelagic Longline	Purse Seine	Total
1981	13,507	6	2	26	131,620	145,161
1982	4,981	15	<0.5	43	104,326	109,365
1983	9,325	17	<0.5	9	94,524	103,875
1984	8,922	14	<0.5	3	68,571	77,510
1985	7,012	7	<0.5	<0.5	20,843	27,862
1986	4,982	10	<0.5	<0.5	26,891	31,883
1987	2,891	1	1	<0.5	27,907	30,801
1988	4,625	4	1	<0.5	26,814	31,444
1989	2,168	<0.5	<0.5	<0.5	20,784	22,952
1990	2,926	<0.5	<0.5	1	11,584	14,511
1991	1,641	<0.5	<0.5	2	6,562	8,205
1992	4,755	1	<0.5	1	3,956	8,713
1993	5,781	22	1	5	3,070	8,879
1994	10,541	78	<0.5	104	5,737	16,460
1995	6,406	61	<0.5	61	9,100	15,628
1996	13,305	104	<0.5	71	12,382	25,862
1997	10,833	101	<0.5	89	12,783	23,806
1998	12,727	108	<0.5	106	10,938	23,879
1999	8,817	112	<0.5	228	5,186	14,343
2000	8,100	69	<0.5	122	2,186	10,477
2001	10,233	67	<0.5	95	886	11,281
2002	9,295	18	<0.5	14	777	10,104
2003	13,491	30	<0.5	31	863	14,415
2004	13,394	19	<0.5	33	791	14,237
2005	8,217	14	<0.5	**	1,006	9,254
2006	12,347	7	<0.5	**	*	12,520
2007	11,139	5	<0.5	**	223	11,385

** Not reported do to data confidentiality requirements based on non-PacFIN data sources (mandatory logbooks, permits, etc).
* Not reported due to data confidentiality requirements (fewer than three vessels).
Source: PacFIN, extracted July and August, 2008 (various dates).

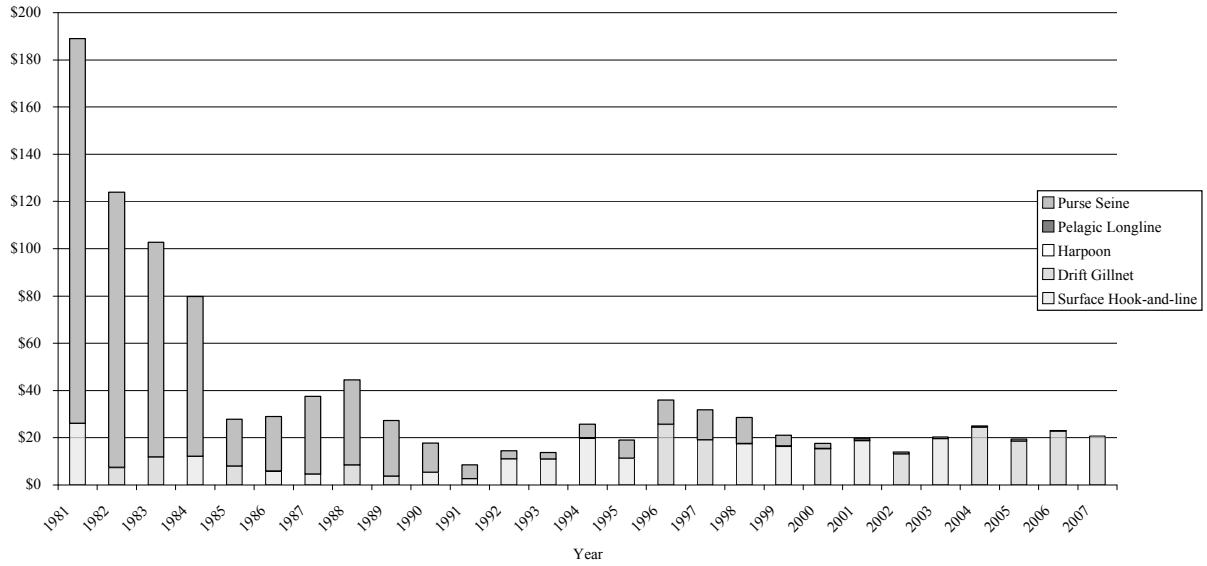

Figure 4-5. West coast commercial tuna revenues by fishery, 1981–2007.

Interpretation: Figure 4–5 and Table 4–28 display west coast commercial tuna revenues by fishery over the years 1981–2007 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 on various dates in August, 2008. Aquaculture fish ticket / fish ticket line information is excluded from the data. Canadian surface hook-and-line fishery data are also excluded.

Table 4-28. West coast commercial tuna revenues by fishery, 1981–2007.

	Revenues ($)					
Year	Surface Hook-and-line	Drift Gillnet	Harpoon	Pelagic Longline	Purse Seine	Total
1981	26,105,721	12,191	4,337	49,477	162,899,688	189,071,414
1982	7,355,282	25,180	146	75,372	116,534,837	123,990,817
1983	11,892,353	29,348		19,826	90,752,417	102,693,944
1984	12,167,115	21,264	480	10,398	67,670,051	79,869,308
1985	7,999,542	8,310	472	740	19,758,416	27,767,480
1986	5,875,077	13,571	390		23,136,080	29,025,118
1987	4,691,790	1,792	6,226	164	32,842,638	37,542,610
1988	8,540,798	7,092	8,552	395	35,899,810	44,456,647
1989	3,693,977	*	2,171		23,642,990	27,339,138
1990	5,413,636		108	4,063	12,357,079	17,774,886
1991	2,760,785	2,056		17,254	5,804,636	8,584,731
1992	11,075,816	3,639	1,369	6,994	3,350,739	14,438,557
1993	11,006,225	47,433	7,730	37,625	2,673,982	13,772,995
1994	19,818,527	224,198	2,490	420,506	5,679,816	26,145,537
1995	11,356,151	137,214		316,556	7,557,190	19,367,111
1996	25,627,547	230,066	216	314,456	10,179,438	36,351,723
1997	19,108,815	328,963	200	377,511	12,634,293	32,449,782
1998	17,480,096	285,386		561,517	10,982,420	29,309,419
1999	16,249,188	191,290		1,322,398	4,523,535	22,286,411
2000	15,364,240	188,891	302	714,191	2,084,934	18,352,558
2001	18,807,305	109,425		432,024	839,400	20,188,154
2002	13,217,965	30,785		103,049	706,266	14,058,065
2003	19,675,161	80,540		230,768	625,894	20,612,363
2004	24,392,415	55,305		207,243	545,475	25,200,438
2005	18,643,433	38,600		**	714,382	19,396,415
2006	22,837,471	11,763		**	*	22,849,234
2007	20,691,107	18,912		**	187,687	20,897,706

* Not reported due to data confidentiality requirements (fewer than three vessels).

** Not reported do to data confidentiality requirements based on non-PacFIN data sources (mandatory logbooks, permits, etc).

Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.

Source: PacFIN, extracted July 24, 2008.

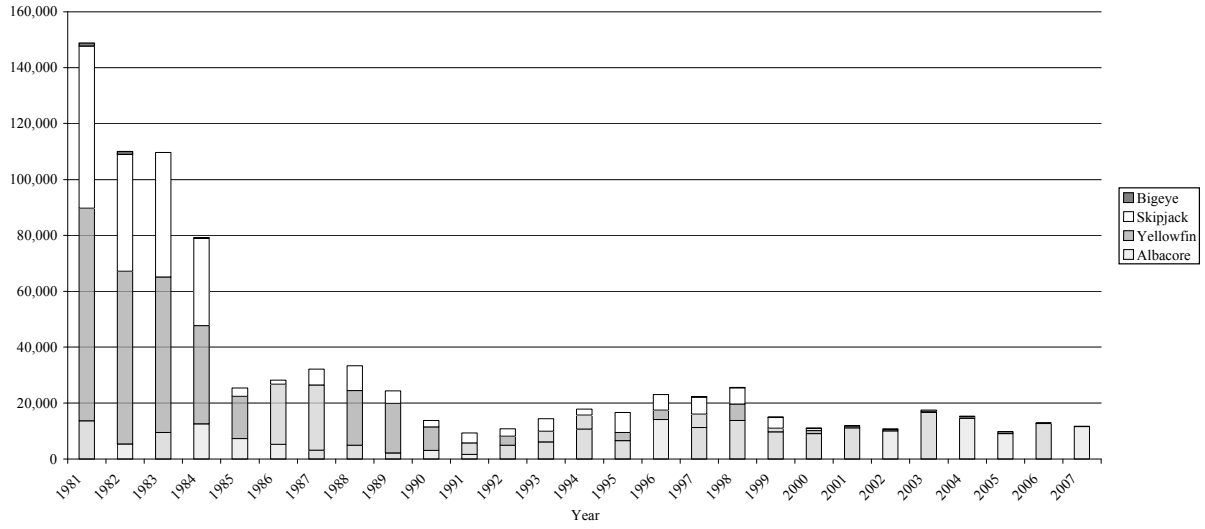

Figure 4-6. Species composition of coastwide commercial tuna landings, 1981–2007.

Interpretation: Figure 4–6 shows west coast HMS commercial tuna landings in round metric tons for all gear types from 1981 through 2007 for the four principal species. The landings of these species and other tuna species, which comprise a smaller part of the catch, are shown in the accompanying table.

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 on July 24, 2008. They represent a portion of the table of west coast commercial landings by species in Table 4–4. 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 and then dividing by 2204.6. Aquaculture fish ticket / fish ticket line information is excluded from the data.

Table 4-29. Species composition of coastwide commercial tuna landings, 1981–2007.

	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	9,578	55,482	44,591	21	764	55	110,491
1984	12,654	35,063	31,251	126	635	1,014	80,743
1985	7,301	15,025	2,977	7	3,252	468	29,030
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	3,028	8,509	2,256	2	925	46	14,766
1991	1,676	4,178	3,407	7	104	11	9,383
1992	4,902	3,350	2,586	7	1,087	10	11,942
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	9,770	1,353	3,759	108	186	12	15,188
2000	9,074	1,159	780	86	313	1	11,413
2001	11,194	655	58	53	196	1	12,157
2002	10,029	544	236	10	11	2	10,832
2003	16,671	465	349	35	36	<0.5	17,556
2004	14,540	488	307	22	10	9	15,376
2005	9,055	285	523	10	207	<0.5	10,080
2006	12,757	77	48	35	1	1	12,919
2007	11,582	104	5	13	45	<0.5	11,749

Source: PacFIN, extracted July 24, 2008.

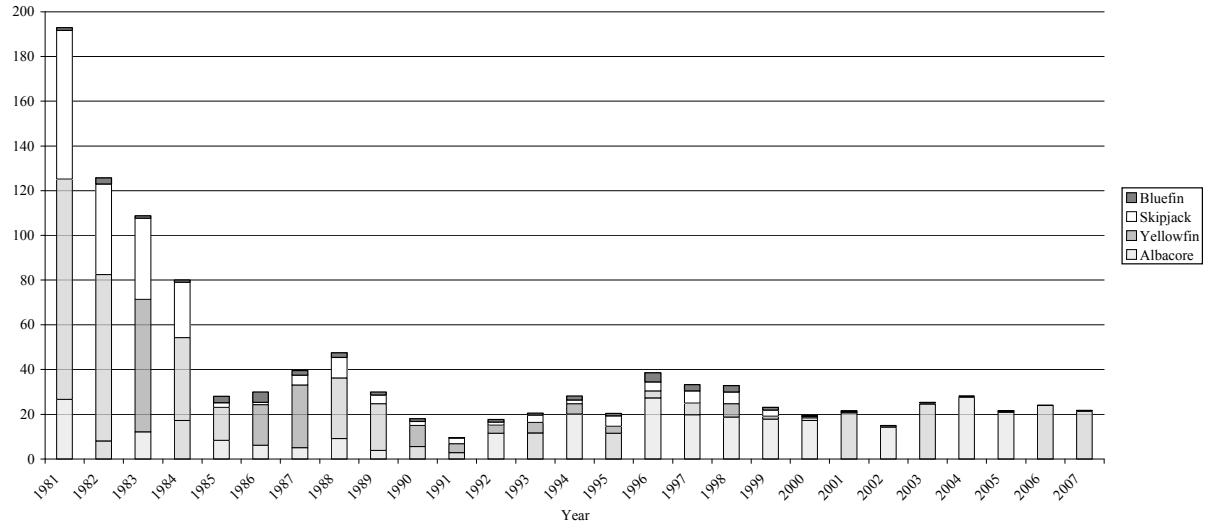

Figure 4-7. Species composition of coastwide commercial tuna revenues, 1981–2007.

Interpretation: Figure 4–7 shows west coast HMS commercial tuna revenues in current dollars from 1981 through 2007 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 the accompanying table.

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 on July 24, 2008. They represent a portion of Table 4-5, which tabulates west 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 4-30. Species composition of coastwide commercial tuna revenues, 1981–2007.

Year	Revenues ($)						
	Albacore	Yellowfin	Skipjack	Bigeye	Bluefin	Unspecified Tuna	Total
1981	26,524,145	98,722,280	66,331,030	1,569,755	1,239,005	72,694	194,458,909
1982	8,033,073	74,468,306	40,507,405	1,208,147	2,690,102	98,923	127,005,956
1983	12,240,375	59,190,758	36,248,835	45,946	1,062,909	95,490	108,884,313
1984	17,208,633	37,038,204	24,790,704	174,405	904,956	2,590,391	82,707,293
1985	8,293,123	14,690,108	2,118,170	17,693	2,817,610	1,028,867	28,965,571
1986	6,178,085	18,079,443	904,609	90,227	4,636,698	198,248	30,087,310
1987	5,127,832	27,878,667	4,426,717	176,504	2,057,402	448,231	40,115,353
1988	9,110,214	27,030,132	9,249,827	26,156	2,070,411	80,548	47,567,288
1989	3,785,598	20,824,242	3,944,894	2,415	1,271,718	127,320	29,956,187
1990	5,619,553	9,383,584	1,898,875	8,771	1,149,381	56,750	18,116,914
1991	2,823,937	3,996,935	2,692,345	42,810	116,371	21,161	9,693,559
1992	11,483,392	3,677,441	1,410,546	44,731	1,129,626	21,228	17,766,964
1993	11,667,651	4,821,735	3,282,778	211,513	752,369	72,678	20,808,724
1994	20,070,706	4,522,321	1,751,209	307,147	1,674,099	55,245	28,380,727
1995	11,570,364	3,044,670	4,752,641	258,727	1,057,948	5,136	20,689,486
1996	27,222,294	3,230,957	3,986,113	260,306	4,035,455	28,296	38,763,421
1997	19,924,121	4,991,131	5,504,526	359,780	2,773,705	21,895	33,575,158
1998	18,733,488	5,861,959	5,213,131	271,919	2,965,485	61,688	33,107,670
1999	17,767,485	1,468,209	2,748,208	657,121	1,061,233	60,572	23,762,828
2000	17,203,982	1,329,357	483,242	576,919	580,722	2,298	20,176,520
2001	20,716,101	465,558	33,633	320,855	473,557	3,069	22,012,773
2002	14,299,676	588,677	128,245	87,304	43,477	6,325	15,153,704
2003	24,477,280	451,273	159,961	262,768	76,106	21	25,427,409
2004	27,479,776	446,577	109,254	147,696	38,312	54,879	28,276,494
2005	20,957,923	315,699	292,193	60,141	136,847	913	21,763,716
2006	23,780,278	174,912	40,350	205,677	3,790	1,895	24,206,902
2007	21,553,670	149,568	4,361	94,734	58,106	46	21,860,485

Source: PacFIN, extracted July 24, 2008.

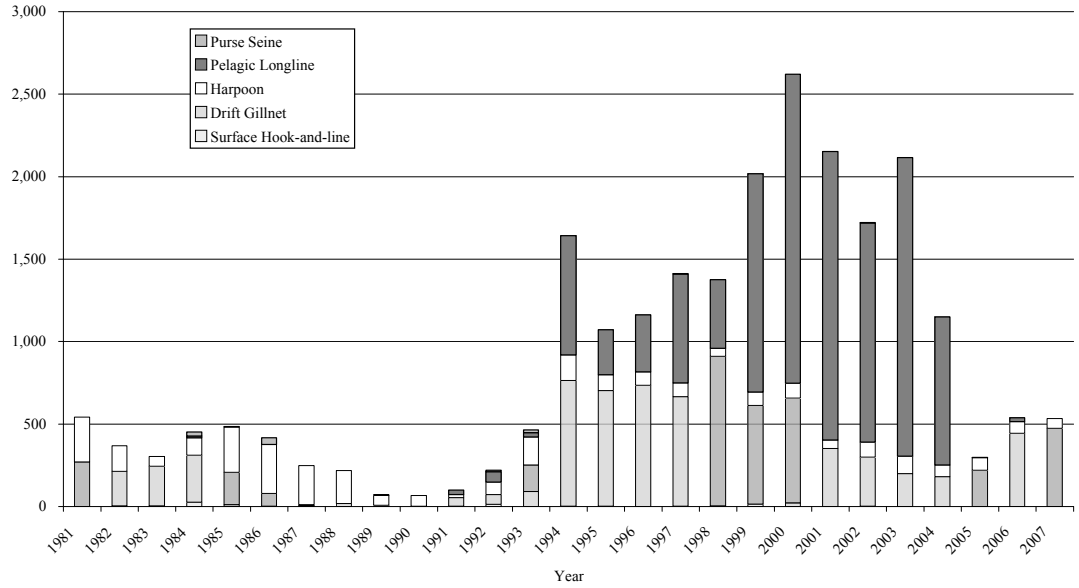

Figure 4-8. West coast commercial swordfish landings by fishery, 1981–2007.

Interpretation: Figure 4–8 and Table 4–31 display west coast commercial swordfish landings by fishery over the years 1981–2007 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 on various dates in July and August, 2008. 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 and then dividing by 2204.6. Aquaculture fish ticket / fish ticket line information is excluded from the data. Canadian surface hook-and-line fishery data are also excluded.

Table 4-31. West coast commercial swordfish landings by fishery, 1981–2007.

	Landings (round mt)					
Year	Surface Hook-and-line	Drift Gillnet	Harpoon	Pelagic Longline	Purse Seine	Total
1981		270	272	<0.5		542
1982	4	208	156	<0.5		368
1983	3	242	58	<0.5	1	304
1984	25	286	105	12	23	451
1985	11	197	275	<0.5	1	484
1986	1	78	296		41	416
1987	5	6	237			248
1988	18	1	199	<0.5		218
1989	7		62		1	70
1990	2		65			67
1991	2	51	20	27		100
1992	13	60	75	63	10	221
1993	90	162	169	27	17	465
1994	1	762	157	722		1,642
1995	1	701	97	271		1,070
1996	<0.5	734	81	346		1,161
1997	1	664	84	663	1	1,413
1998	4	906	48	418		1,376
1999	15	597	81	1,325		2,018
2000	22	635	90	1,873		2,620
2001	<0.5	351	52	1,749		2,152
2002	2	298	90	1,331	1	1,722
2003		199	107	1,810		2,116
2004		182	69	898		1,149
2005		220	76	**		296
2006		443	71	**		514
2007		474	59	**		533

** Not reported do to data confidentiality requirements based on non-PacFIN data sources (mandatory logbooks, permits, etc).

Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.

Source: PacFIN, extracted July and August, 2008 (various dates).

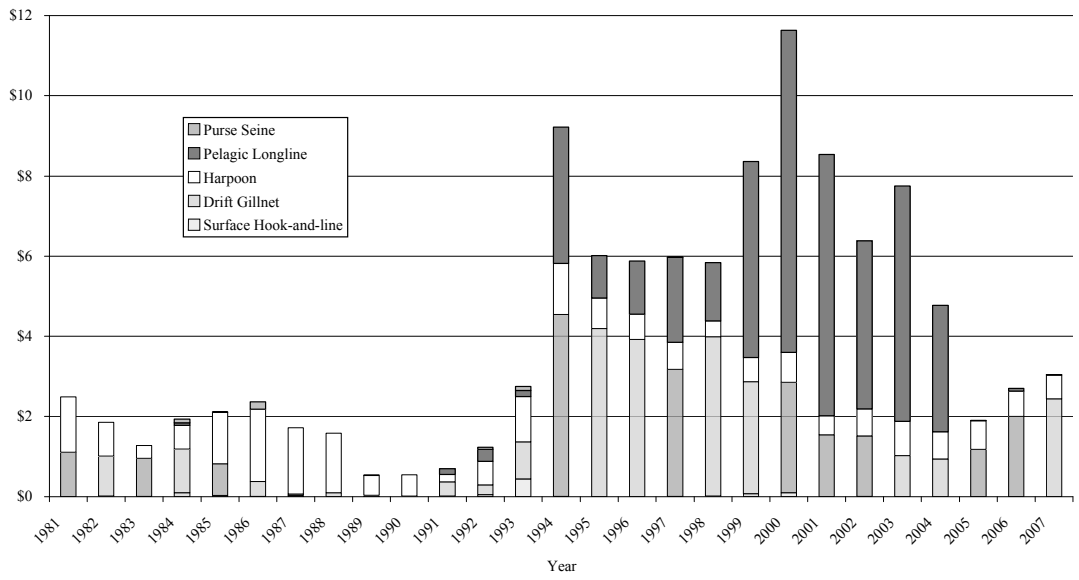

Figure 4-9. West coast commercial swordfish revenues by fishery, 1981–2007.

Interpretation: Figure 4–9 and Table 4–32 display west coast commercial swordfish revenues by fishery in current dollars over the years 1981–2007 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 on various dates in July and August, 2008. Aquaculture fish ticket / fish ticket line information is excluded from the data. Canadian surface hook-and-line fishery data are also excluded.

Table 4-32. West coast commercial swordfish revenues by fishery, 1981–2007.

	Revenues ($)					
Year	Surface Hook-and-line	Drift Gillnet	Harpoon	Pelagic Longline	Purse Seine	Total
1981		1,110,316	1,371,646	1,544		2,483,506
1982	13,219	1,000,168	839,886	306		1,853,579
1983	7,531	952,577	318,044	506	1,796	1,280,454
1984	96,217	1,096,570	583,079	62,804	87,097	1,925,767
1985	30,921	793,604	1,280,993	752	7,080	2,113,350
1986	6,427	377,053	1,796,277		182,606	2,362,363
1987	33,310	37,173	1,647,710			1,718,193
1988	96,331	3,324	1,477,860	1,601		1,579,116
1989	34,556		500,435		6,955	541,946
1990	13,332		539,322			552,654
1991	11,721	361,574	179,949	146,305		699,549
1992	55,452	241,122	586,740	298,852	51,873	1,234,039
1993	442,687	918,433	1,132,762	153,383	98,722	2,745,987
1994	6,797	4,536,655	1,273,087	3,401,896		9,218,435
1995	3,260	4,190,568	760,108	1,064,427		6,018,363
1996	2,608	3,919,232	633,027	1,319,868		5,874,735
1997	4,390	3,166,095	683,211	2,115,438	6,666	5,975,800
1998	17,122	3,967,255	402,914	1,454,529		5,841,820
1999	77,899	2,785,199	608,982	4,893,372		8,365,452
2000	100,831	2,750,462	750,533	8,028,596		11,630,422
2001	2,037	1,541,152	468,289	6,527,196		8,538,674
2002	9,996	1,499,163	678,934	4,190,669	2,623	6,381,385
2003		1,032,796	839,197	5,879,612		7,751,605
2004		944,192	670,001	3,160,052		4,774,245
2005		1,184,545	709,760	**		1,894,305
2006		1,996,530	636,273	**		2,632,803
2007		2,440,385	597,707	**		3,038,092

** Not reported do to data confidentiality requirements based on non-PacFIN data sources (mandatory logbooks, permits, etc).

Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.

Source: PacFIN, extracted August 2008 (various dates).

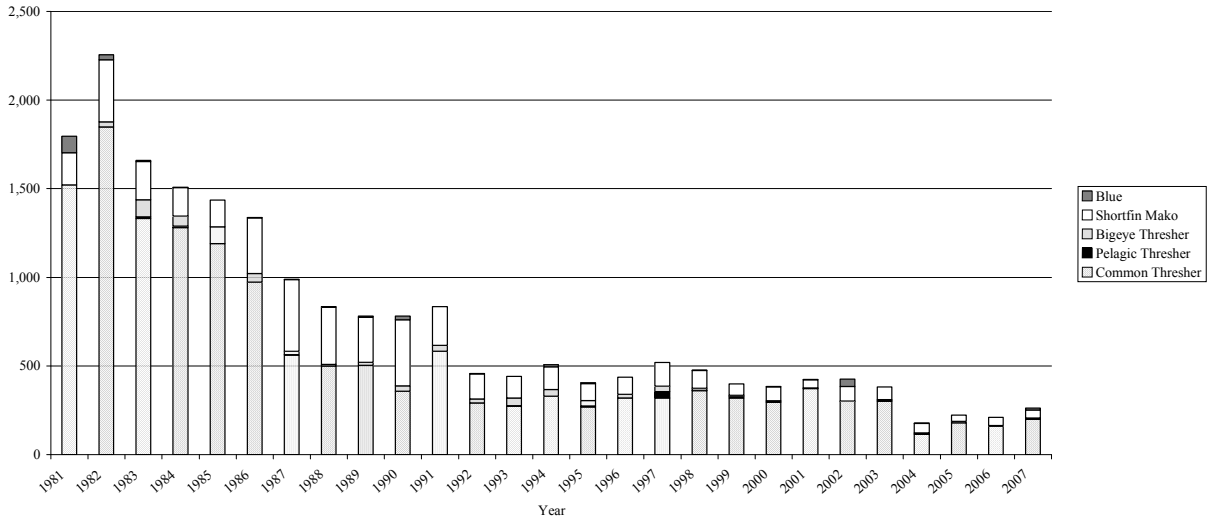

Figure 4-10. Species composition of coastwide commercial shark landings, 1981–2007.

Interpretation: Figure 4–10 shows west coast commercial shark landings in round metric tons for all gear types from 1981 through 2007. The numeric data used to produce the graph are shown below in Table 4–33.

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 2004–05 total west coast commercial shark landings were below 250 mt in each year. In a broader sense, the decline in landings reflects fewer drift gillnet vessels.

Source and Calculations: The data were extracted from PacFIN on July 24, 2008. They represent a portion of the Table 4–4, which displays west coast commercial landings by species. 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 and then dividing by 2204.6. Aquaculture fish ticket / fish ticket line information is excluded from the data.

Table 4-33. Species composition of coastwide commercial shark landings, 1981–2007.

Year	Landings (round mt)					
	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	0	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	296	3	5	80	1	385
2001	373	2	2	46	2	425
2002	301	2	0	82	41	426
2003	301	4	6	70	1	382
2004	115	2	5	54	1	177
2005	179	<0.5	10	33	1	223
2006	160	<0.5	4	46	<0.5	210
2007	200	2	5	45	10	262

Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.
Source: PacFIN, extracted July 24, 2008.

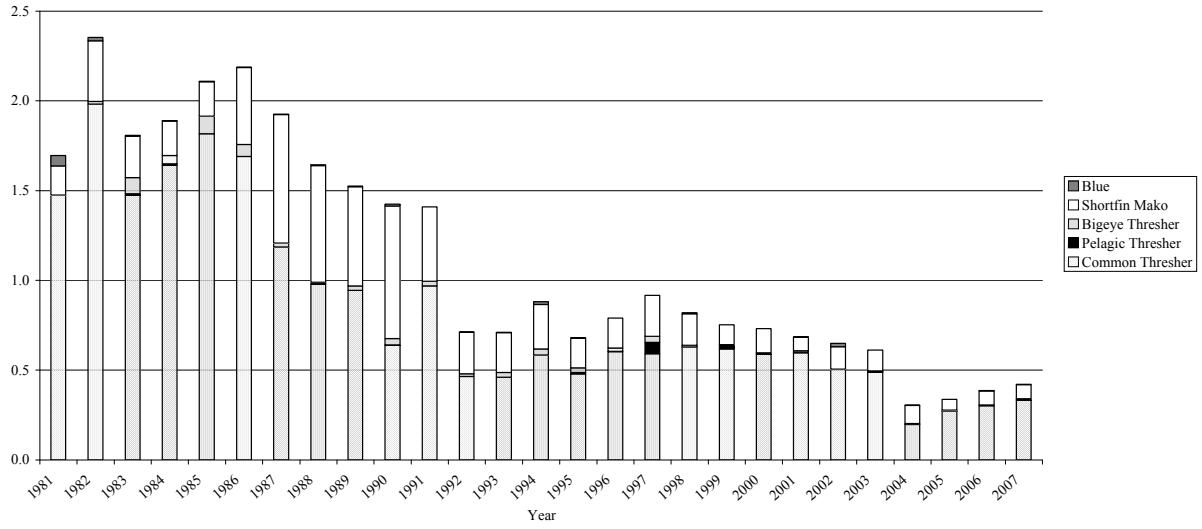

Figure 4-11. Species composition of coastwide commercial shark revenues, 1981–2007.

Interpretation: Figure 4–11 shows west coast commercial shark revenues in current dollars by species for all gear types from 1981 through 2007. The numeric data used to produce the graph are shown in Table 4–34.

The graph shows a long-term downward trend in commercial shark revenues from levels approaching $2.5 million in the early 1980s to a level below $500 thousand after 2004. The decline was primarily driven by a downward trend in bigeye 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 on July 24, 2008. They represent a portion of the Table 4–5, which displays west 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 4-34. Species composition of coastwide commercial shark revenues, 1981–2007.

Year	Revenues ($)					
	Common Thresher	Pelagic Thresher	Bigeye Thresher	Shortfin Mako	Blue	Total
1981	1,475,634			162,347	59,064	1,697,045
1982	1,980,592		15,168	339,209	18,826	2,353,795
1983	1,474,213	8,449	91,455	229,826	4,645	1,808,588
1984	1,642,178	7,723	47,119	189,794	2,470	1,889,284
1985	1,817,135	716	96,433	192,129	2,132	2,108,545
1986	1,690,483	194	66,647	428,259	1,320	2,186,903
1987	1,183,866	1,840	22,123	715,138	1,853	1,924,820
1988	979,905	821	9,764	649,799	2,258	1,642,547
1989	944,159	149	24,711	552,576	3,465	1,525,060
1990	638,630	1,682	34,628	739,193	10,303	1,424,436
1991	968,877		25,179	415,168	894	1,410,118
1992	464,018	602	14,629	231,063	1,810	712,122
1993	458,513	462	28,190	221,401	608	709,174
1994	584,318	42	33,478	247,088	16,057	880,983
1995	477,755	8,777	24,896	165,215	2,796	679,439
1996	603,006	1,557	17,745	167,111	587	790,006
1997	591,268	62,496	34,768	227,426	278	916,236
1998	625,489	2,584	9,428	176,313	5,977	819,791
1999	617,691	18,424	5,876	111,119	73	753,183
2000	589,033	2,738	4,636	133,621	918	730,946
2001	595,548	2,767	8,428	75,799	1,822	684,364
2002	503,487	1,946		124,521	18,726	648,680
2003	487,796	2,814	3,779	115,728	832	610,949
2004	197,240	2,500	4,060	98,827	489	303,116
2005	271,767	588	6,234	57,788	426	336,803
2006	300,393	271	4,509	79,336	309	384,818
2007	331,821	2,903	4,334	78,569	1,984	419,611

Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.

Source: PacFIN, extracted July 24, 2008.

Table 4-35. Commercial landings (round mt) of the albacore surface hook-and-line (troll and baitboat) fishery in California, with Canadian vessels excluded, 1981–2007.

Year	Albacore	Other Tunas	Swordfish	HMS Sharks	Dorado	Groundfish	Coastal Pelagics	Salmon	Other	Total
1981	9,113	14		<0.5	<0.5	1	2	3	2	9,135
1982	3,859	3	4	2	1	4	<0.5	2	<0.5	3,875
1983	7,270	16	3	1	<0.5	20	34	4	1	7,349
1984	8,109	13	25	5	<0.5	5	2	<0.5	4	8,163
1985	6,147	2	11	4	<0.5	4	<0.5	2	1	6,171
1986	3,019	2	1	<0.5		20	<0.5	2	<0.5	3,044
1987	1,324	<0.5	5	2		2	1	1	<0.5	1,335
1988	931	<0.5	17	2		<0.5		<0.5	1	951
1989	823	1	7	8	<0.5	10	<0.5	2	1	852
1990	758	<0.5	2	<0.5	<0.5	3	<0.5	<0.5	2	765
1991	642	<0.5	2	1		<0.5			1	646
1992	1,184	<0.5	13	2	<0.5	6		<0.5	2	1,207
1993	1,461	18	89	5	9	3			1	1,586
1994	3,055	<0.5	1	<0.5	<0.5	1		<0.5	<0.5	3,057
1995	777	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	3	780
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	2	3,307
1998	2,232	116	4	3	<0.5	1	<0.5	1	2	2,359
1999	5,339	6	15	1	<0.5	1	<0.5	<0.5	5	5,367
2000	1,798	2	22	<0.5	<0.5	1	<0.5	1	2	1,826
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	1,336	1		<0.5	<0.5	<0.5	<0.5	2	2	1,341
2005	455	<0.5				1		<0.5	1	457
2006	194	1		<0.5	<0.5	<0.5	<0.5	<0.5	1	196
2007	771	<0.5			<0.5	<0.5	<0.5	<0.5	1	772

Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.
Source: PacFIN, extracted August 22, 2008.
Additional processing info:
Only fish tickets where at least 1 lb of albacore was landed for the albacore surface hook-and-line (troll and baitboat) fishery were used.
Landings in lbs 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 2204.6.
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 4-36. Commercial landings (round mt) of the albacore surface hook-and-line (troll and baitboat) fishery in California, 1981–2007.

Year	Albacore	Other Tunas	Swordfish	HMS Sharks	Dorado	Groundfish	Coastal Pelagics	Salmon	Other	Total
1981	9,113	14		<0.5	<0.5	1	2	3	2	9,135
1982	3,859	3	4	2	1	4	<0.5	2	<0.5	3,875
1983	7,270	16	3	1	<0.5	20	34	4	1	7,349
1984	8,109	13	25	5	<0.5	5	2	<0.5	4	8,163
1985	6,147	2	11	4	<0.5	4	<0.5	2	1	6,171
1986	3,019	2	1	<0.5		20	<0.5	2	<0.5	3,044
1987	1,324	<0.5	5	2		2	1	1	<0.5	1,335
1988	931	<0.5	17	2		<0.5		<0.5	1	951
1989	823	1	7	8	<0.5	10	<0.5	2	1	852
1990	758	<0.5	2	<0.5	<0.5	3	<0.5	<0.5	2	765
1991	642	<0.5	2	1		<0.5			1	646
1992	1,184	<0.5	13	2	<0.5	6		<0.5	2	1,207
1993	1,461	18	89	5	9	3			1	1,586
1994	3,055	<0.5	1	<0.5	<0.5	1		<0.5	<0.5	3,057
1995	777	<0.5	<0.5	<0.5		<0.5	<0.5	<0.5	3	780
1996	5,047	42	<0.5	<0.5		<0.5		<0.5	2	5,091
1997	3,290	7	1	1	<0.5	5	<0.5	3	1	3,308
1998	2,232	116	4	3	<0.5	1	<0.5	1	2	2,359
1999	5,360	6	15	1	<0.5	1	<0.5	<0.5	5	5,388
2000	1,798	2	22	<0.5	<0.5	1	<0.5	1	2	1,826
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	1,336	1		<0.5	<0.5	<0.5	<0.5	2	2	1,341
2005	455	<0.5				1		<0.5	1	457
2006	194	1		<0.5	<0.5	<0.5	<0.5	<0.5	1	196
2007	771	<0.5			<0.5	<0.5	<0.5	<0.5	1	772

Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.
Source: PacFIN, extracted August 22, 2008.
Additional processing info:
Only fish tickets where at least 1 lb of albacore was landed for the albacore surface hook-and-line (troll and baitboat) fishery were used.
Landings in lbs 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 2204.6.
Aquaculture fish ticket/fish ticket line info is excluded.

Table 4-37. Commercial landings (round mt) of the albacore surface hook-and-line (troll and baitboat) fishery in Oregon, with Canadian vessels excluded, 1981–2007.

Year	Albacore	Other Tunas	Swordfish	HMS Sharks	Dorado	Groundfish	Coastal Pelagics	Salmon	Other	Total
1981	3,505					1		25	<0.5	3,531
1982	853	<0.5				<0.5		1	<0.5	854
1983	1,509	<0.5				3	<0.5	5	<0.5	1,517
1984	733	<0.5				<0.5		1	<0.5	734
1985	692					<0.5		<0.5	<0.5	692
1986	1,116	<0.5				<0.5		1	<0.5	1,117
1987	1,038							1	<0.5	1,038
1988	1,794					<0.5		2	<0.5	1,796
1989	490					<0.5		<0.5	<0.5	490
1990	943					<0.5	<0.5	1	<0.5	944
1991	571							1	<0.5	572
1992	1,719			<0.5		<0.5		1	<0.5	1,720
1993	2,147					1		3	<0.5	2,151
1994	2,131			<0.5				<0.5	<0.5	2,131
1995	2,283	1			<0.5	<0.5		6	<0.5	2,290
1996	3,595	<0.5				<0.5		10	1	3,606
1997	3,867	<0.5			<0.5	1		9	<0.5	3,877
1998	4,292			<0.5		1		4	<0.5	4,296
1999	1,632	6		<0.5		<0.5		2	<0.5	1,640
2000	3,282	<0.5		<0.5		<0.5		2	<0.5	3,284
2001	3,572	<0.5		<0.5		<0.5		6	1	3,579
2002	1,924							3	<0.5	1,927
2003	3,807	<0.5						1	1	3,809
2004	4,632	<0.5		<0.5		<0.5	<0.5	2	1	4,635
2005	3,258			<0.5		<0.5		1	1	3,260
2006	3,688	<0.5		<0.5		<0.5	<0.5		1	3,689
2007	4,469				<0.5	<0.5	<0.5	<0.5	1	4,470

Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.
Source: PacFIN, extracted August 22, 2008.
Additional processing info:
Only fish tickets where at least 1 lb of albacore was landed for the albacore surface hook-and-line (troll and baitboat) fishery were used.
Landings in lbs 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 2204.6.
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 4-38. Commercial landings (round mt) of the albacore surface hook-and-line (troll and baitboat) fishery in Oregon, 1981–2007.

Year	Albacore	Other Tunas	Swordfish	HMS Sharks	Dorado	Groundfish	Coastal Pelagics	Salmon	Other	Total
1981	3,505					1		25	<0.5	3,531
1982	863	<0.5				<0.5		1	1	865
1983	1,540	<0.5				3	<0.5	5	1	1,549
1984	736	<0.5				<0.5		1	<0.5	737
1985	692					<0.5		<0.5	<0.5	692
1986	1,116	<0.5				<0.5		1	<0.5	1,117
1987	1,038							1	<0.5	1,038
1988	1,795					<0.5		2	<0.5	1,797
1989	490					<0.5		<0.5	<0.5	490
1990	943					<0.5	<0.5	1	<0.5	944
1991	571							1	<0.5	572
1992	1,767			<0.5		<0.5		1	<0.5	1,768
1993	2,157					1		3	<0.5	2,160
1994	2,131			<0.5				<0.5	<0.5	2,131
1995	2,283	1			<0.5	<0.5		6	<0.5	2,290
1996	4,059	<0.5				<0.5		10	<0.5	4,069
1997	4,158	<0.5			<0.5	1		9	1	4,169
1998	4,810			<0.5		1		4	<0.5	4,814
1999	2,065	6		<0.5		<0.5		2	<0.5	2,073
2000	3,972	<0.5		<0.5		<0.5		2	<0.5	3,974
2001	4,064	<0.5		<0.5		<0.5		6	<0.5	4,070
2002	1,978							3	1	1,982
2003	4,118	<0.5						1	1	4,120
2004	4,878	<0.5		<0.5		<0.5	<0.5	2	<0.5	4,880
2005	3,668			<0.5		<0.5		1	1	3,670
2006	3,872	<0.5		<0.5		<0.5	<0.5		1	3,873
2007	4,748				<0.5	<0.5	<0.5	<0.5	1	4,749

Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.
Source: PacFIN, extracted August 22, 2008.
Additional processing info:
Only fish tickets where at least 1 lb of albacore was landed for the albacore surface hook-and-line (troll and baitboat) fishery were used.
Landings in lbs 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 2204.6.
Aquaculture fish ticket/fish ticket line info is excluded.

Table 4-39. Commercial landings (round mt) of the albacore surface hook-and-line (troll and baitboat) fishery in Washington, with Canadian vessels excluded, 1981–2007.

Year	Albacore	Other Tunas	Swordfish	HMS Sharks	Dorado	Groundfish	Coastal Pelagics	Salmon	Other	Total
1981	875				N.A.	1		9	<0.5	885
1982	266				N.A.				<0.5	266
1983	530				N.A.	1		4	<0.5	535
1984	67				N.A.				<0.5	67
1985	172				N.A.				<0.5	172
1986	845				N.A.				<0.5	845
1987	529				N.A.				<0.5	529
1988	1,900		1		N.A.	<0.5	<0.5	<0.5	1	1,902
1989	855				N.A.	<0.5			<0.5	855
1990	1,225				N.A.				<0.5	1,225
1991	428	<0.5			N.A.	<0.5		<0.5	<0.5	428
1992	1,850	<0.5			N.A.	<0.5			<0.5	1,850
1993	2,155		1	<0.5	N.A.	<0.5		<0.5	1	2,157
1994	5,355				N.A.				<0.5	5,355
1995	3,344		<0.5		N.A.			1	<0.5	3,345
1996	4,630				N.A.				<0.5	4,630
1997	3,670				N.A.	<0.5			<0.5	3,670
1998	6,087				N.A.				<0.5	6,087
1999	1,821	12			N.A.				<0.5	1,833
2000	3,017				N.A.				<0.5	3,017
2001	3,854	1			N.A.	1		<0.5	<0.5	3,856
2002	4,710				N.A.	<0.5		1	1	4,712
2003	7,984				N.A.				<0.5	7,984
2004	7,425				N.A.				<0.5	7,425
2005	4,504				N.A.			1	<0.5	4,505
2006	8,463				N.A.				<0.5	8,463
2007	5,898				N.A.			<0.5	1	5,899

Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.
Source: PacFIN, extracted August 22, 2008.
Additional processing info:
Only fish tickets where at least 1 lb of albacore was landed for the albacore surface hook-and-line (troll and baitboat) fishery were used.
Landings in lbs 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 2204.6.
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 4-40. Commercial landings (round mt) of the albacore surface hook-and-line (troll and baitboat) fishery in Washington, 1981–2007.

Year	Albacore	Other Tunas	Swordfish	HMS Sharks	Dorado	Groundfish	Coastal Pelagics	Salmon	Other	Total
1981	875				N.A.	1		9	<0.5	885
1982	266				N.A.				<0.5	266
1983	530				N.A.	1		4	<0.5	535
1984	67				N.A.				<0.5	67
1985	172				N.A.				<0.5	172
1986	845				N.A.				<0.5	845
1987	529				N.A.				<0.5	529
1988	1,900		1		N.A.	<0.5	<0.5	<0.5	1	1,902
1989	855				N.A.	<0.5			<0.5	855
1990	1,225				N.A.				<0.5	1,225
1991	428	<0.5			N.A.	<0.5		<0.5	<0.5	428
1992	1,864	<0.5			N.A.	<0.5			<0.5	1,864
1993	2,167		1	<0.5	N.A.	<0.5		<0.5	1	2,169
1994	5,377				N.A.				<0.5	5,377
1995	3,413		<0.5		N.A.			1	<0.5	3,414
1996	4,969				N.A.				<0.5	4,969
1997	3,775				N.A.	<0.5			<0.5	3,775
1998	6,530				N.A.				<0.5	6,530
1999	2,081	12			N.A.				<0.5	2,093
2000	3,216				N.A.				<0.5	3,216
2001	4,158	1			N.A.	1		<0.5	<0.5	4,160
2002	5,358				N.A.	<0.5		1	<0.5	5,359
2003	10,793				N.A.			<0.5	<0.5	10,793
2004	8,310				N.A.				<0.5	8,310
2005	4,904				N.A.			1	<0.5	4,905
2006	8,677				N.A.				<0.5	8,677
2007	5,977				N.A.			<0.5	<0.5	5,977

Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.
Source: PacFIN, extracted August 22, 2008.
Additional processing info:
Only fish tickets where at least 1 lb of albacore was landed for the albacore surface hook-and-line (troll and baitboat) fishery were used.
Landings in lbs 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 2204.6.
Aquaculture fish ticket/fish ticket line info is excluded.

Table 4-41. Percentages of commercial catch and effort by fishing areas for U.S. albacore troll vessels, 1995-2007.

	Catch			Effort		
Year	U.S. EEZ	Canada EEZ	High-Seas	U.S. EEZ	Canada EEZ	High-Seas
1995	5	6	89	16	10	73
1996	14	0	86	27	0	73
1997	17	4	80	30	4	66
1998	15	0	85	26	0	74
1999	65	1	34	62	1	37
2000	70	0	30	69	1	31
2001	57	0	43	67	1	33
2002	64	2	34	73	2	25
2003	86	1	13	87	1	12
2004	93	1	6	89	2	9
2005	92	2	6	89	3	8
2006	82	1	17	90	1	9
2007	99	1	0	97	2	2

Source: Childers and Sakagawa, SWFSC, April 24-25, 2008.
Note: Data for 2006 and 2007 are preliminary.

Table 4-42. Percentages of commercial catch and effort by fishing areas for U.S. albacore troll vessels, 1995–2007.

	Catch			Effort		
Year	U.S. EEZ	Canada EEZ	High-Seas	U.S. EEZ	Canada EEZ	High-Seas
1995	5	6	89	16	10	73
1996	14	0	86	27	0	73
1997	17	4	80	30	4	66
1998	15	0	85	26	0	74
1999	65	1	34	62	1	37
2000	70	0	30	69	1	31
2001	57	0	43	67	1	33
2002	64	2	34	73	2	25
2003	86	1	13	87	1	12
2004	93	1	6	89	2	9
2005	92	2	6	89	3	8
2006	82	1	17	90	1	9
2007	99	1	0	97	2	2

Source: Childers and Sakagawa, SWFSC, April 24-25, 2008.
Note: Data for 2006 and 2007 are preliminary.

Table 4-43. Number of vessels with west coast commercial HMS landings by fishery (HMS gear & species), 1981-2007.

Year	Albacore Surface Hook-and-Line	Swordfish & HMS Shark[1]	Any Species Harpoon[2]	HMS Species Longline	HMS Tuna Purse Seine[3]	Any HMS Fishery
1981	1,837	130	190	27	135	2,170
1982	761	130	162	28	124	1,113
1983	1,629	121	93	19	111	1,887
1984	1,126	103	114	14	78	1,310
1985	792	97	101	12	53	994
1986	419	64	114	6	51	621
1987	486	36	101	8	47	655
1988	532	6	84	14	43	671
1989	338	*	45	4	38	422
1990	368		52	5	33	453
1991	172	12	33	13	18	240
1992	610	19	48	20	29	704
1993	609	74	42	12	26	725
1994	716	151	51	44	25	904
1995	477	134	43	36	22	657
1996	728	132	31	29	23	872
1997	1,202	121	32	52	34	1,349
1998	868	113	30	70	33	1,022
1999	829	97	33	53	14	925
2000	761	91	36	70	16	893
2001	981	82	25	56	15	1,075
2002	736	63	32	36	4	829
2003	889	54	35	40	3	976
2004	780	46	29	40	11	878
2005	599	45	25	**	8	664
2006	635	44	24	**	*	708
2007	680	50	28	**	4	750

* Not reported due to data confidentiality requirements (fewer than three vessels).

** Not reported due to data confidentiality requirements based on non-PacFIN data sources (mandatory logbooks, permits, etc.)

Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.

Source: PacFIN, extracted July 30, 2008.

[1]There is no drift gillnet gear for Washington. 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.

[2]Only California has harpoon landings. 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.

[3]There is no purse seine gear for Washington.

Additional processing info:

Only fish tickets where at least 1 lb of albacore was landed for the albacore surface hook-and-line (troll and baitboat) fishery were used.

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

Only fish tickets where at least 1 lb of any highly migratory species (except striped marlin) was landed for the longline fishery were used.

Only fish tickets where at least 1 lb of any HMS tuna was landed for the purse seine fishery were used.

Aquaculture fish ticket/fish ticket line info is excluded.

Table 4-44. Number of vessels with commercial HMS landings in California by fishery (HMS gear & species), 1981-2007.

Year	Surface Hook-and-Line	HMS Shark Drift Gillnet[1]	Any Species Harpoon[2]	HMS Species Longline	HMS Tuna Purse Seine	Any HMS Fishery
1981	1,310	130	190	27	135	1,646
1982	602	130	162	28	124	954
1983	1,243	121	93	19	111	1,501
1984	993	103	114	14	78	1,178
1985	724	*	101	6	53	919
1986	344	35	114	*	51	525
1987	289	16	101	*	47	445
1988	149	*	84	*	43	286
1989	180	*	45	4	38	264
1990	103		52	5	33	189
1991	76	12	33	*	18	143
1992	139	19	48	*	29	237
1993	202	74	42	12	26	319
1994	271	151	51	44	25	466
1995	137	134	43	36	22	331
1996	290	132	31	*	23	439
1997	612	121	32	52	34	768
1998	382	112	30	*	33	550
1999	446	95	33	53	14	544
2000	349	*	36	*	16	483
2001	474	82	25	*	15	571
2002	321	63	32	*	4	416
2003	325	*	35	40	*	416
2004	191	*	29	*	11	292
2005	97	45	25	**	8	169
2006	80	44	24	**	*	160
2007	155	50	28	**	4	231

* Not reported due to data confidentiality requirements (fewer than three vessels).

** Not reported due to data confidentiality requirements based on non-PacFIN data sources (mandatory logbooks, permits, etc.)

Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.

Source: PacFIN, extracted July 31, 2008.

[1]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.

[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:

Only fish tickets where at least 1 lb of albacore was landed for the albacore surface hook-and-line (troll and baitboat) fishery were used.

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

Only fish tickets where at least 1 lb of any highly migratory species (except striped marlin) was landed for the longline fishery were used.

Only fish tickets where at least 1 lb of any HMS tuna was landed for the purse seine fishery were used.

Aquaculture fish ticket/fish ticket line info is excluded.

Table 4-45. Number of vessels with commercial HMS landings in Oregon by fishery (HMS gear & species), 1981-2007.

Year	Surface Hook-and-Line	HMS Shark Drift Gillnet	HMS Species Pelagic Longline	HMS Tuna Purse Seine	Any HMS Fishery
1981	681				681
1982	192				192
1983	407				407
1984	177				177
1985	89	*			*
1986	90	33			122
1987	170	20	*		187
1988	262	*			*
1989	134				134
1990	211				211
1991	71				71
1992	352				352
1993	367				367
1994	326				326
1995	230	3			231
1996	385	3			385
1997	498	4			499
1998	373	6			374
1999	309	4			309
2000	375	*			*
2001	473		*		*
2002	269				269
2003	385	*		*	*
2004	450	*			*
2005	383				383
2006	368				368
2007	414				414

* Not reported due to data confidentiality requirements (fewer than three vessels).

Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.

Source: PacFIN, extracted July 31, 2008.

Additional processing info:

Only fish tickets where at least 1 lb of albacore was landed for the albacore surface hook-and-line (troll and baitboat) fishery were used.

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

Only fish tickets where at least 1 lb of any highly migratory species (except striped marlin) was landed for the pelagic longline fishery were used.

Only fish tickets where at least 1 lb of any HMS tuna was landed for the purse seine fishery were used.

Aquaculture fish ticket/fish ticket line info is excluded.

Table 4-46. Number of vessels with commercial HMS landings in Washington by fishery (HMS gear & species), 1981-2007.

Year	Surface Hook-and-Line	HMS Species Longline	Any HMS Fishery
1981	251		251
1982	61		61
1983	157		157
1984	45		45
1985	32	6	38
1986	47	*	*
1987	89	*	*
1988	222	*	*
1989	77		77
1990	103		103
1991	42	*	*
1992	229	*	*
1993	207		207
1994	263		263
1995	206		206
1996	216	*	*
1997	249		249
1998	220	*	*
1999	189		189
2000	179	*	*
2001	205	*	*
2002	241	*	*
2003	325		325
2004	301	*	*
2005	225		225
2006	312		312
2007	221		221

* Not reported due to data confidentiality requirements (fewer than three vessels).
Blank cells indicate no data exists. Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.
Source: PacFIN, extracted July 31, 2008.
Additional processing info:
Only fish tickets where at least 1 lb of albacore was landed for the albacore surface hook-and-line (troll and baitboat) fishery were used.
Only fish tickets where at least 1 lb of any highly migratory species (except striped marlin) was landed for the longline fishery were used.
Aquaculture fish ticket/fish ticket line info is excluded.

4.2 Recreational Fisheries

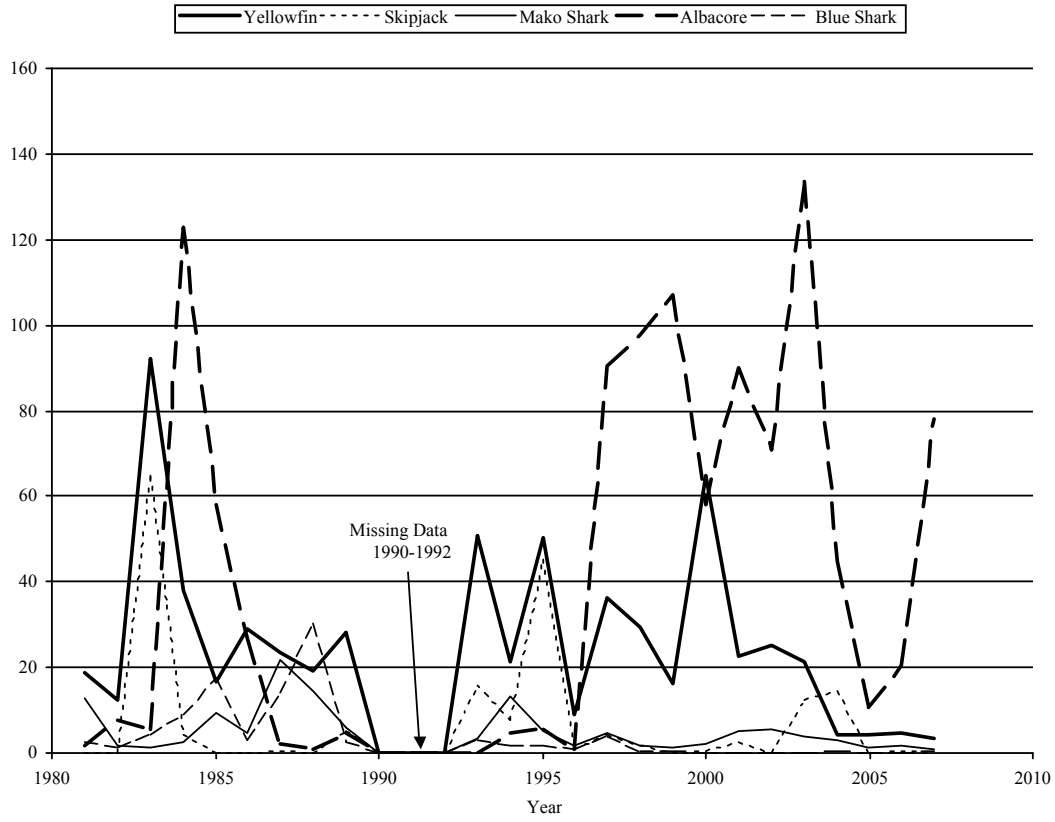

Figure 4-12. Catches by species (thousands of fish) for the west coast recreational private sport fishing fleet, 1981–2007.

Interpretation: Figure 4–12 shows west coast recreational private sport fishing fleet HMS catches by species, in thousands of fish. Table 4–47 shows the numeric values, with added columns for species representing negligible shares of the overall catch (bluefin tuna, bigeye tuna, marlin, common thresher shark, and dorado).

The principal targeted species are the tunas, with albacore and yellowfin comprising the most important components of the catch. Albacore represented by far the largest share of overall private sport fishing boat catch in 2007. Yellowfin tuna was next most important in years 2003 and before, though its importance as a share of recent catch fell sharply after 2003. The common thresher shark was the most important shark species included in the HMS private boat catch in 2007, with the mako shark following closely behind.

Source and Calculations: The data were extracted from RecFIN. The data represent thousands of fish caught for each species. Tables were created for each species by requesting "examined" and "dead" catch types (RecFIN codes A + B1) summed across the range of waves within each year from 1981 through 2007, then copied to a Microsoft Excel notebook where they were compiled. The primary source for the data was the Marine Recreational Fisheries Statistics Survey (MRFSS) survey for years through 2003 and CRFS for 2004–07. MRFSS and CRFS data are generally not comparable due to different sampling methodologies. Blank table entries represent missing values (including the years 1990–92 for which no data is available). No catch records were available in RecFIN for swordfish. Data for 2003–07 are preliminary and may be incomplete.

Table 4-47. Catches by species (thousands of fish) for the west coast recreational private sport fishing fleet, 1981–2007.

Year	Yellowfin	Skipjack	Bluefin	Albacore	Bigeye Tuna	Marlin	Mako	Common Thresher	Blue Shark	Dorado
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	4.7
1984	37.8	4.4	0.6	123.0	0.6	1.2	2.6	0.8	8.8	4.5
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	5.0		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	6.2
1994	21.4	7.7		4.8		0.4	13.3	3.6	1.8	1.0
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	2.7
1997	36.1	4.3		90.5		0.4	4.8	0.5	3.9	19.8
1998	29.5	1.5	1.6	97.5			1.7	0.6	0.4	11.1
1999	16.2			106.9			1.1	1.3	0.5	1.1
2000	64.7	0.4		57.9	0.4		2.3	1.7	0.0	61.0
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	0.2
2003	21.2	12.4		133.5	0.2		3.9	2.0	0.2	0.2
2004	4.1	14.5	0.1	44.6	0.0	0.0	3.0	4.5	0.3	3.2
2005	4.3	0.0	0.1	10.8		0.0	1.2	0.3	0.1	0.2
2006	4.5	0.3	0.2	20.6		0.0	1.5	0.5	0.1	12.8
2007	3.3	0.1	0.0	78.2			0.7	0.8	0.3	0.3

Source: RecFIN (extracted July 2008)
No private recreational vessel catch data were available for the years from 1990-1992.

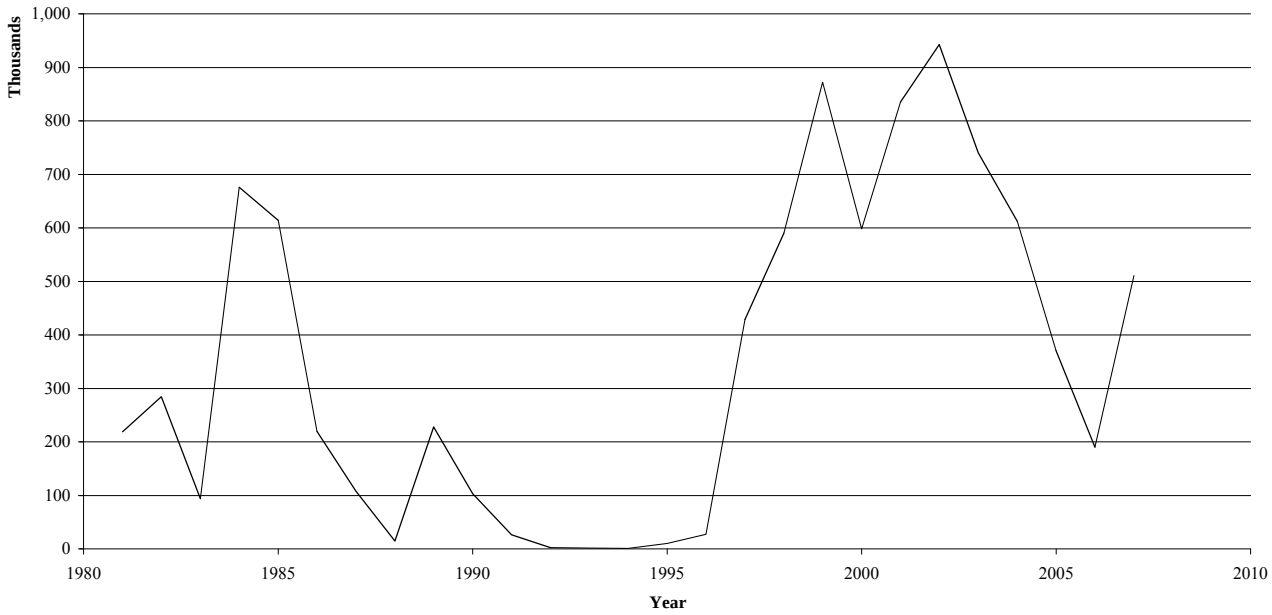

Figure 4-13. Albacore fishing hours (in thousands) for the California CPFV fleet, 1981–2007.

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 1981–2007. Table 4–48 shows the numeric values which are displayed in the graph. The fishing time shows a wide range of variation over the period, from a low of 891 hours recorded in 1994 to a high of 942,626 hours in 2002, with a steady decline from 2002 through 2006. Albacore hours recovered somewhat in 2007 from their recent decline to a level exceeding 500,000 hours.

Source and Calculations: The data were extracted from the CPFV logbook database, by selecting on trip logs with market code indicating that albacore was caught. For the selected records, albacore hours were computed as number of fishing hours multiplied by the number of passengers. The computed albacore hours were summarized in a Microsoft Excel notebook to produce the data shown in the graph above and in the table below.

Table 4-48. Albacore fishing hours for the California CPFV fleet, 1981–2007.

Year	Albacore Hours
1981	219,274
1982	284,584
1983	94,051
1984	675,921
1985	614,060
1986	219,414
1987	108,287
1988	14,775
1989	227,960
1990	103,158
1991	26,487
1992	2,248
1993	1,458
1994	891
1995	10,464
1996	27,148
1997	429,092
1998	590,152
1999	872,207
2000	598,273
2001	835,143
2002	942,758
2003	740,230
2004	612,312
2005	370,636
2006	190,410
2007	510,782

Source: CPFV Logbook Database.
Extracted July 30, 2008.

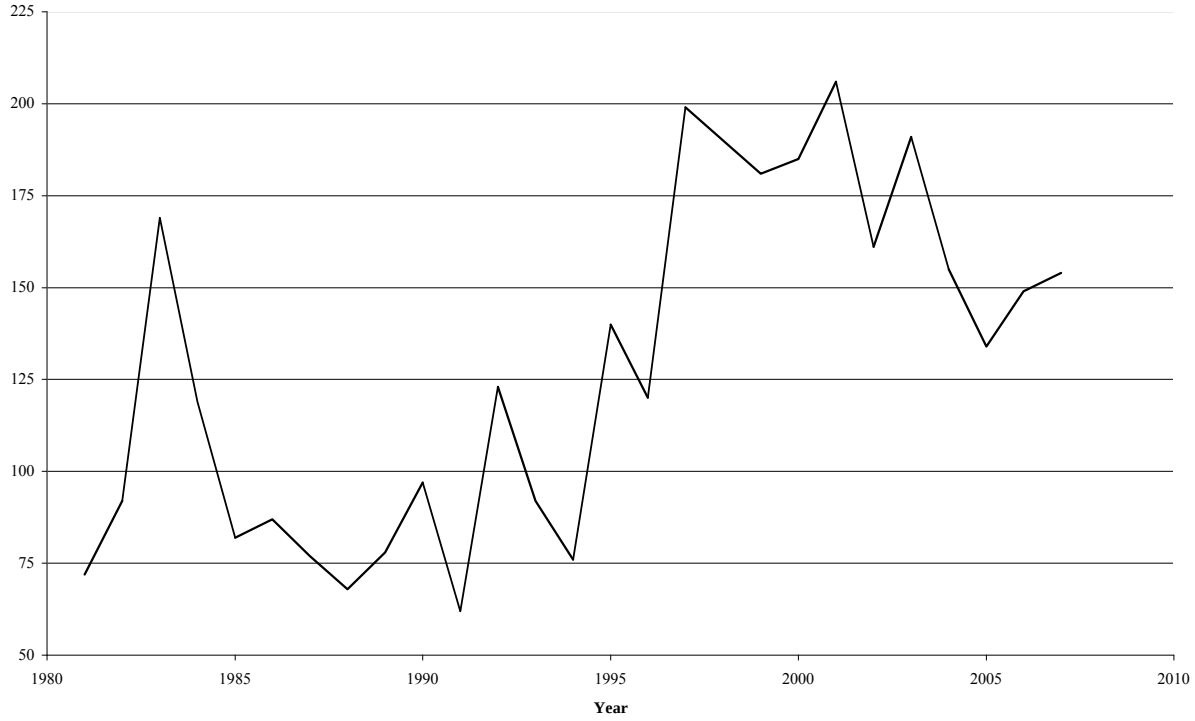

Figure 4-14. Number of vessels targeting HMS in California waters, 1981–2007.

Interpretation: Figure 4–14 shows the number of vessels in the California CPFV fleet which targeted HMS in California waters within each year from 1981 through 2007. The accompanying Table 4–49 displays the numeric values.

The number of vessels targeting HMS in California waters peaked at 206 in 2001 before falling off to a recent level near 150 vessels.

Source and Calculations: The data were extracted from the CPFV logbook database. The raw data were copied to a Microsoft Excel notebook where they were tabulated and graphed.

Table 4-49. Number of vessels targeting HMS in California waters, 1981–2007.

Year	Vessels
1981	72
1982	92
1983	169
1984	119
1985	82
1986	87
1987	77
1988	68
1989	78
1990	97
1991	62
1992	123
1993	92
1994	76
1995	140
1996	120
1997	199
1998	190
1999	181
2000	185
2001	206
2002	161
2003	191
2004	155
2005	134
2006	149
2007	154

Source: CPFV Logbook Database.
Extracted July 16, 2008.

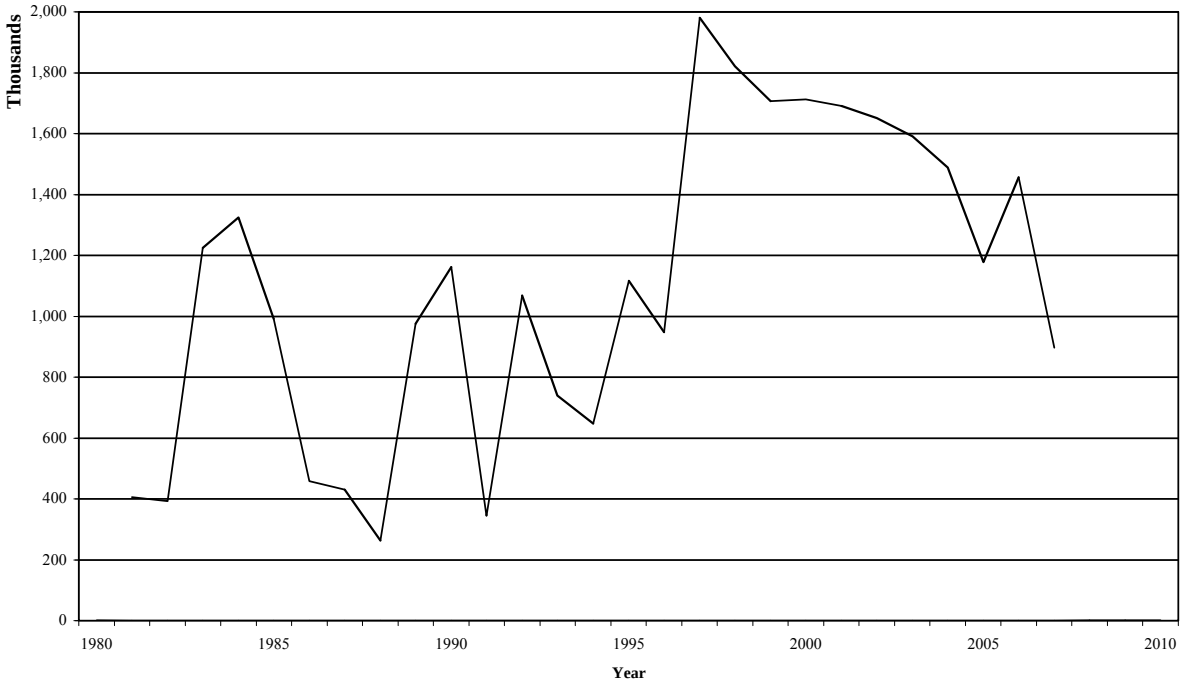

Figure 4-15. Number of angler hours (in thousands) for the California CPFV Fleet, 1981–2007.

Interpretation: Figure 4–15 shows the number of angler hours for the California CPFV fleet which targeted HMS in each year from 1981 to 2007. Table 4–50 displays the numeric values.

The number of angler hours shows a sizable amount of annual variation, from as low as 263,433 in 1988 to as high as 1,980,520 in 1997. The number of CPFV angler hours has declined since 1997 to a 2007 level of about 900 hours. This marked the first year since 1996 when CPFV angler hours were below 1 million.

Source and Calculations: The data were extracted from the CPFV logbook database. The raw data were copied to a Microsoft Excel notebook where they were tabulated and graphed.

Table 4-50. Number of angler hours for the California CPFV Fleet, 1981–2007.

Year	Angler Hours
1981	405,227
1982	393,176
1983	1,224,248
1984	1,324,407
1985	991,618
1986	458,373
1987	430,448
1988	263,433
1989	975,309
1990	1,162,097
1991	343,925
1992	1,068,365
1993	739,969
1994	646,909
1995	1,116,171
1996	947,740
1997	1,980,520
1998	1,821,750
1999	1,707,337
2000	1,713,079
2001	1,690,341
2002	1,650,789
2003	1,591,077
2004	1,488,716
2005	1,178,741
2006	1,456,278
2007	897,170

Source: CPFV Logbook Database.
Extracted July 30, 2008.

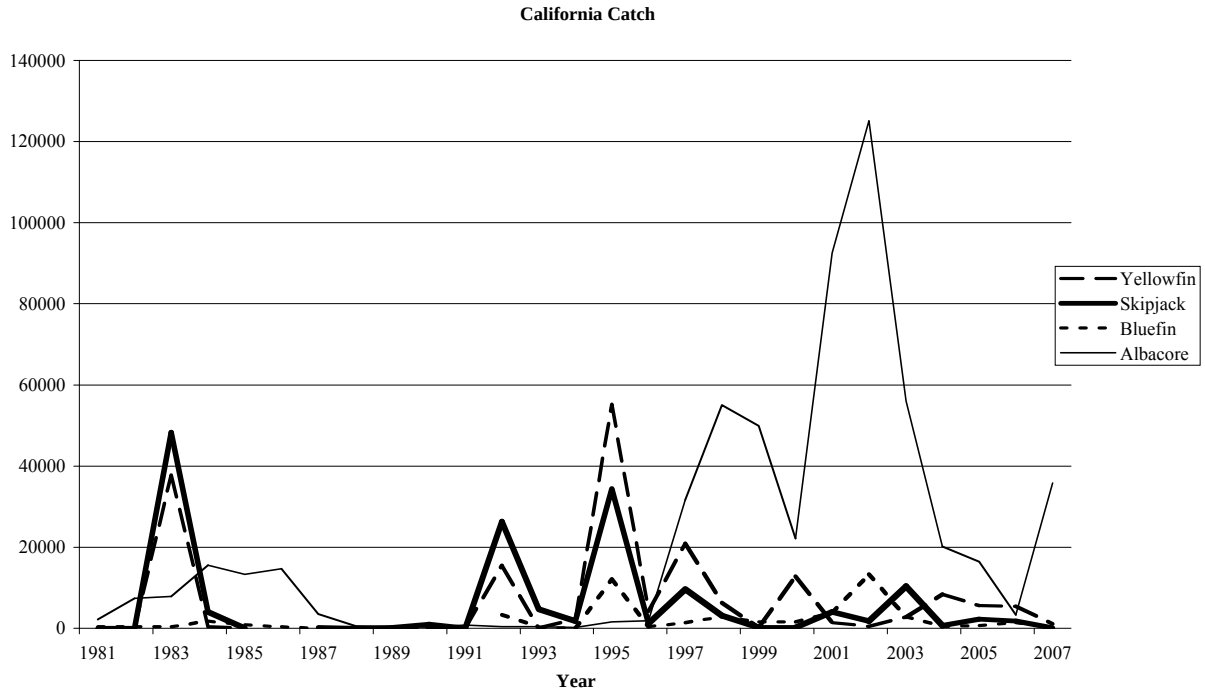

Figure 4-16. Catch by species for the California CPFV fleet in California waters, 1981–2007.

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, all of which are tuna species.

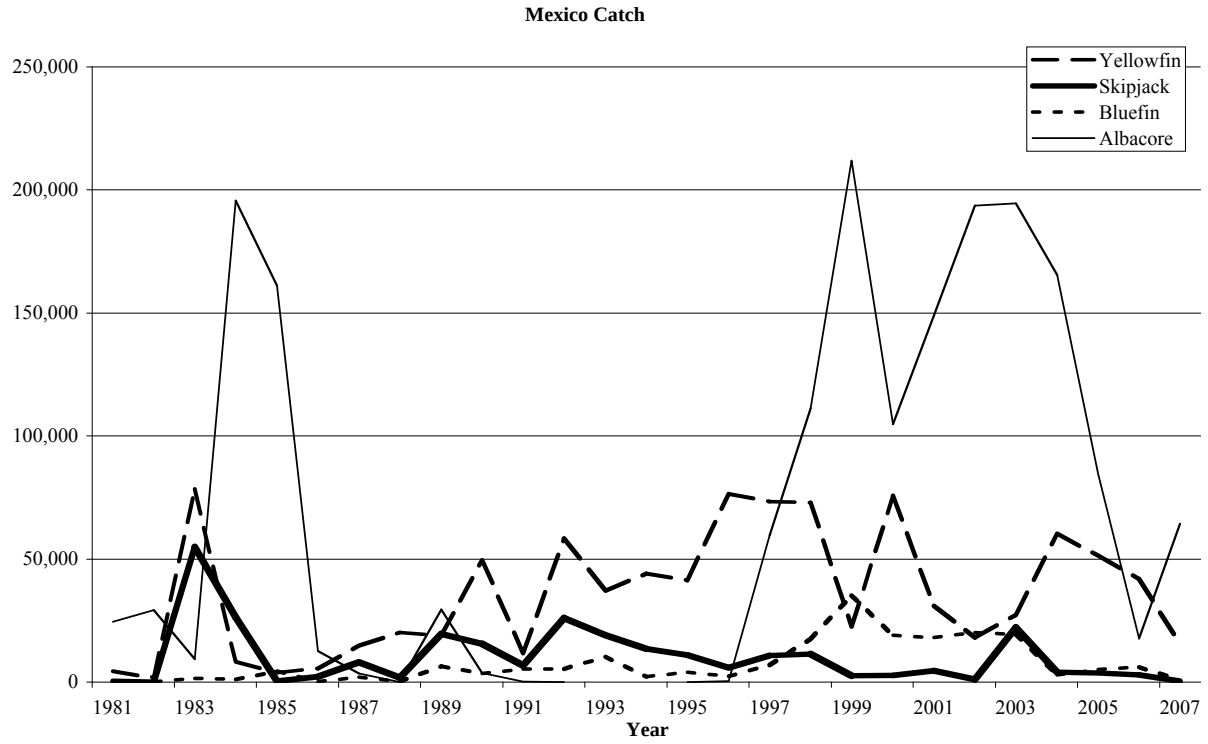

Figure 4-17. Catch by species for the California CPFV fleet in Mexico waters, 1981–2007.

Interpretation: Figure 4–17 shows California CPFV fleet HMS catches by species in Mexico waters. The graph only displays the four most important constituents of the catch, all of which are tuna species.

Table 4–51, shown below, displays the numeric values, with added columns for species representing negligible shares of the overall catch (bluefin tuna, bigeye tuna, marlin, thresher shark, and dorado). The table additionally displays catch data for California CPFVs fishing in Mexican waters. 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. Blank table entries represent year / species combinations for which no catch was recorded.

Table 4-51. Catch by species for the California Commercial Passenger Fishing Vessel fleet in California and Mexico waters, 1981–2007.

Year	Yellowfin	Skipjack	Bluefin	Albacore	Bigeye	Swordfish	Marlin	Mako	Thresher	Blue Shark	Dorado
California											
1981	81	17	419	2,127	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	43	40	850	13,309	10		7	18	30	19	5
1986			443	14,706	37		13	58	13	217	11
1987	1	167	5	3,580	7		8	296	15	645	
1988	9	2	147	547	2	2	2	115	29	882	1
1989	17	165	88	367	2		7	302	46	4,469	1
1990	216	1,008	198	275	5		7	231	78	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	73	4,743	316	393		3	1	297	176	694	707
1994	2,285	1,797	10	171			5	269	30	497	64
1995	55,205	34,368	12,062	1,554	11	1	21	161	62	521	1,354
1996	4,203	1,199	439	1,826			5	237	32	439	646
1997	20,838	9,694	1,354	31,685	33		12	356	47	500	5,715
1998	6,339	3,162	2,828	55,065	27		6	150	28	94	378
1999	230	171	1,623	49,954	14		1	70	47	150	392
2000	12,786	190	1,562	22,150	60		2	83	41	149	4,343
2001	1,385	4,080	3,829	92,519	2	1		193	17	140	755
2002	509	1,817	13,245	125,138	2	2	2	189	11	15	298
2003	2,788	10,363	2,858	56,004				79	29	47	74
2004	8,330	735	485	20,197	63	2	1	250	20	6	671
2005	5,634	2,224	723	16,426	2		4	121	24	26	668
2006	5,407	1,765	1,349	3,365	4	3	2	177	33	18	11,329
2007	1,041	65	175	35,823			93	108	40	19	70
Mexico											
1981	4,478	418	123	24,521	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	20,056	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	49,524	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	41,271	10,904	3,963	1	27		18	17		10	3,971
1996	76,511	5,791	2,300	364	132		16	53	1	55	24,284
1997	73,326	10,804	6,984	59,529	253		12	19	2	32	24,162
1998	72,952	11,298	17,639	111,233	1,939	3	11	34		88	6,372
1999	22,418	2,632	35,174	211,947	1,092	1	2	27		72	3,745
2000	75,660	2,834	19,044	104,738	503		1	36		9	12,101
2001	30,925	4,649	18,078	148,994	9			49		72	3,448
2002	18,085	1,113	20,139	193,655	6		1	24			2,409
2003	27,267	22,189	19,433	194,549	66	2	4	37			3,143
2004	60,338	3,934	2,906	165,570	400		3	54			7,668
2005	51,314	3,682	5,034	84,657	37		14	41			6,033
2006	41,920	2,968	6,047	17,691	7		13	65		7	35,042
2007	15,332	375	828	64,385			1	26			5,591

Extracted from CPFV logbook data base July 30, 2008.

4.3 Species and Gear Codes Used to Extract HMS Fisheries Information from PacFIN Data

PacFIN landings, revenues and number of vessels data for HMS commercial fisheries are identified through a combination of gear and species codes. The five HMS commercial fisheries described in the HMS FMP are harpoon, surface hook-and-line, drift gillnet, purse seine and pelagic longline. Section 3.1.1 provides a brief description of each HMS commercial gear and Table 4-53 lists the actual gear codes used to extract the fisheries data. Gear codes alone cannot identify the HMS fisheries because they can be used for other fisheries as well. For instance, the Oregon and Washington gear codes for troll which are included to summarize the surface hook-and-line fishery are used for both HMS (albacore) and non-HMS (salmon) fisheries. Another example is the California gear code for longline which is used for pelagic longline as well as set longline.

Therefore, with the exception of the harpoon fishery, species codes (Table 4–52) must be used along with gear codes to identify HMS fisheries. These gear and species combinations are used to tag those fish ticket records in the PacFIN database that belong to HMS fisheries. If at least one pound of any HMS species is included on a fish ticket line, then the data for the entire fish ticket line is included in the summarization of HMS fisheries data, even if non-HMS species are also included. This way incidental catches are also included with targeted HMS catches, but targeted non-HMS catches are eliminated or reduced. The gear and species combinations for the HMS fisheries are:

- Surface hook-and-line: Only fish tickets where at least 1 lb of albacore was landed are selected for the albacore surface hook-and-line (troll and baitboat) fishery;
- Drift gillnet: Only fish tickets where at least 1 lb of swordfish or any HMS shark was landed are selected for the drift gillnet fishery;
- Pelagic longline: Only fish tickets where at least 1 lb of any HMS species except striped marlin was landed are selected for the pelagic longline fishery;
- Purse seine: Only fish tickets where at least 1 lb of any HMS tuna was landed are selected for the purse seine fishery.

Nevertheless, in spite of the effort to consider HMS gear and HMS species combinations, other fisheries data may still be included with HMS fisheries data. This is the case for pelagic longline; thus, the word "pelagic" has been struck from "pelagic longline" and HMS longline fishery data has been extracted as specified above for pelagic longline.

In addition, for the number of vessels data, a vessel is counted whether it targets HMS species or not. If a vessel landed at least one pound of a particular HMS species in the albacore surface hook-and-line, swordfish and HMS shark drift gillnet, HMS longline or HMS tuna purse seine fishery, or 1 lb of any species in the harpoon fishery, it is included.

Table 4-52. PacFIN species codes used to extract commercial fisheries data for this HMS SAFE 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
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
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	92	MRLN	HMSP	MARLIN, STRIPED
O	388	MRLN	HMSP	MARLIN, STRIPED

Table 4-53. PacFIN gear codes used to extract commercial fisheries data for this HMS SAFE 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/SPEAR
LONGLINE (HMS)				
C	005	LGL	HKL	LONG LINE, SET
O	150	LGL	HKL	PELAGIC LONGLINE
W	43	LGL	HKL	SET LINE/LONG LINE
PURSE SEINE (TUNA)				
C	070	SEN	NET	ENCIRCLING NETS
C	071	SEN	NET	PURSE SEINE
C	073	SEN	NET	DRUM PURSE SEINE
C	075	SEN	NET	LAMPARA NET
O	160	SEN	NET	TUNA SEINE

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

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. Section 5**.1** summarizes the adopted Control Rules and the Status Determination Criteria. In 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. Section 5**.3** contains summaries or excerpts from the results of stock assessments conducted in 2007. The summaries are derived from 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, they represent the best available information for those species in 2007 to compare to past and future work. 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 highly migratory species. Furthermore, for most of these species, the scientific bodies developing the assessments have not agreed upon appropriate biological reference points for use in the context of managing fisheries. Therefore, explicit definitions for both overfished and sustainable exploitation levels are not currently available. Finally, Section 5.**4** provides some information on assessments that have already been produced in 2008 but may not yet be endorsed by the plenary bodies of the respective RFMOs. This information is provided so that readers can access the most recent publicly available assessments of the management unit species. However, keep in mind that these assessment results are preliminary until endorsed by the respective RFMOs and published in final form. These assessments will be reported on in the 2008 HMS SAFE Report (to be published in September 2009).

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 Control Rules for Management adopted for the HMS FMP.

In general, a default maximum sustainable yield (MSY) control rule was adopted for most 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).

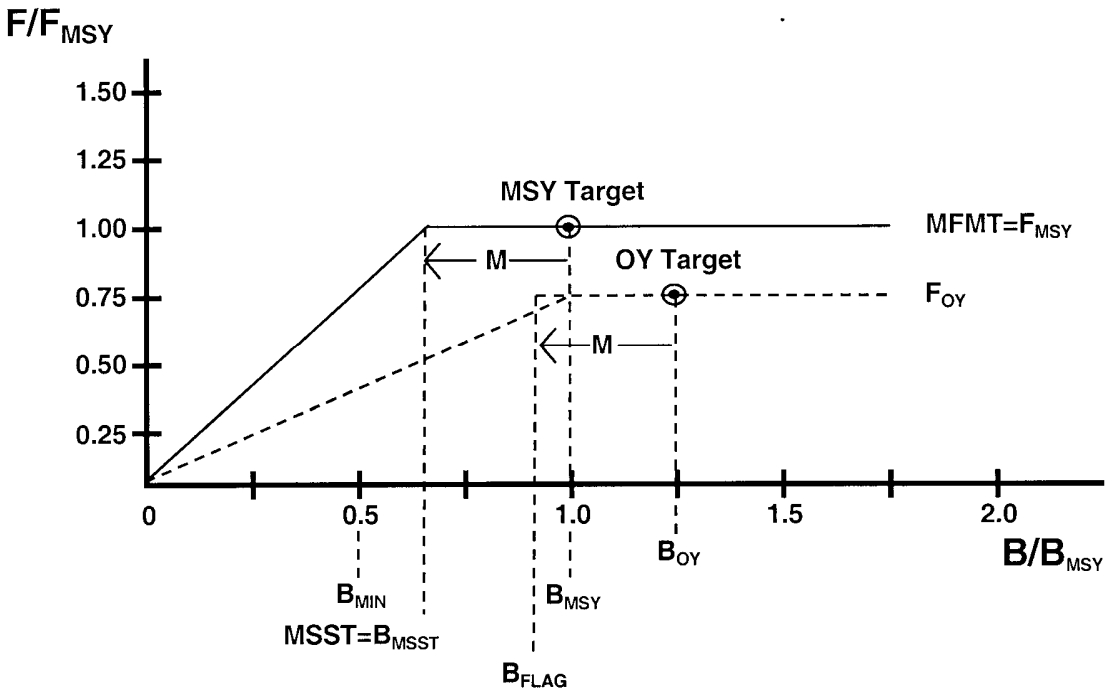

Table 5-1. General model of MSY and OY Control Rules, from Restrepo, et al. 1998.

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 (MSA), 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 (Next Anticipated)	Organization Responsible for the Assessment
TUNAS		
Albacore (NPO)	2007 (2010)	ISC (ISC)
Bluefin (NPO)	2006 (2008)	ISC (ISC)
Bigeye (EPO)	2007 (2008)	IATTC (IATTC)
Bigeye (WCPO)	2006 (2008)	WCPFC (WCPFC)
Skipjack (EPO)	2007 (2008)	IATTC (IATTC)
Skipjack (WCPO)	2005 (2008)	WCPFC (WCPFC)
Yellowfin (EPO)	2007 (2008)	IATTC (IATTC)
Yellowfin (WCPO)	2007 (2009)	WCPFC (WCPFC)
BILLFISHES		
Striped Marlin (EPO)	2003 (2009)	IATTC (IATTC)
Striped Marlin (NPO)	2007 (2010)	ISC (ISC)
Swordfish (SEPO)	2006	IATTC
Swordfish (NPO)	2004 (2009)	ISC (ISC)
SHARKS		
Common Thresher (WA/OR/CA EEZ)	2001	NMFS
Pelagic Thresher		
Bigeye Thresher		
Shortfin Mako		
Blue (NPO)	2001 (2008)	NMFS and NRIFSF Japan (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 near the front of this document..

5.3 Conclusions from 2007 Pacific HMS stock assessments

5.3.1 Albacore

5.3.1.1 Albacore (NPO)

Stock status of North Pacific albacore is reviewed at one- to two-year intervals by the ISC Albacore Working Group with participating members from the United States, Mexico, Canada, Japan, and Taiwan. The latest assessment was completed in December 2006 (ISC 2007a) and finalized by the ISC in July 2007. The assessment report can be downloaded from http://www.pcouncil.org/bb/2007/0907/F4a_ATT2.pdf.

Spawning stock biomass (SSB) estimates for the period 1966-2006 show fluctuations around an estimated time series average of roughly 100,000 mt. The assessment demonstrates a recent increase in SSB from 73,500 mt in 2002 to 153,300 mt in 2006 with a projected further increase to 165,800 mt in 2007. The recent increases are likely due to strong year classes in 2001 and 2003. Despite the high SSB estimates relative to the time series average, fishing mortality rates are high relative to most commonly used reference points. The population is being fished at roughly $F_{17\%}$ (i.e., at a rate resulting in a reduction of the spawning potential ratio to 17 percent of the maximum spawning potential ratio in the absence of fishing). If fishing continues at the current level, and all else being equal, then SSB is projected to decline to an equilibrium level of 92,000 mt by 2015. Considering the high fishing mortality rates, and the fact

that total catch has been in decline since 2002, the ISC recommended that all nations practice precautionary-based fishing practices.

Catch of albacore by U.S. West Coast fisheries constitutes roughly 17 percent of the North Pacific-wide catch.

5.3.2 Bigeye Tuna

5.3.2.1 Bigeye Tuna (EPO)

Stock status of bigeye tuna in the Eastern Pacific is assessed every 1–2 years by the IATTC. An updated assessment was conducted in May 2007 (Aires-da-Silva and Maunder 2007) and is based on the assumption that there is a single stock of bigeye tuna in the EPO. The assessment report can be downloaded from http://www.iattc.org/PDFFiles2/SAR8-BET-ENG.pdf.

The results of the base-case stock assessment, which assumes no stock-recruitment relationship, demonstrate a continuing trend seen in the previous assessments: the biomass of 3 quarter-plus age fish was at a peak level of 614,898 mt in 1986, and has been in decline to a recent low level of 278,962 mt. Current biomass is below that corresponding to AMSY. There was a brief interruption in the biomass decline by above-average recruitment in 2001 and 2002. Recent catches are estimated to have been at about the AMSY level. Under current fishing mortality levels and patterns of age-specific selectivity, the level of fishing effort (F) corresponding to the AMSY is about 83 percent of the current (2004-2006) level of effort.

The floating object fishery that began in 1993 catches small fish below the critical size; however, the AMSY of bigeye in the EPO could be maximized if the age-specific selectivity pattern of the fishery were similar to that for the longline fishery, which catches larger individuals. The two most recent estimates indicate that the bigeye spawning stock biomass in the EPO is below S_{AMSY} and that overfishing is taking place ($F > F_{AMSY}$).

Catch of bigeye tuna by U.S. West Coast fisheries constitutes less than one percent of the Eastern Pacific-wide catch.

5.3.3 Skipjack Tuna

5.3.3.1 Skipjack Tuna (EPO)

Skipjack tuna is a notoriously difficult species to assess due to uncertainties about stock structure, the vulnerabilities of all age classes, and how well fishery CPUE data tracks abundance. Thus, beginning in 2007 the IATTC has developed a simple stock assessment model to evaluate indicators of skipjack biomass, recruitment, and exploitation rate and used simple indicators of stock status based on relative values of fishery data, such as, CPUE, average weight of fish caught, and effort (Maunder and Deriso 2007). The assessment report can be downloaded from http://www.iattc.org/PDFFiles2/SAR8-SKJ-ENG.pdf.

The analyses showed some inconsistencies. Indicators of biomass, recruitment and CPUE for the unassociated purse seine fishery are near the healthy reference levels; whereas, indicators for effort, exploitation rate and average fish weight are near the unhealthy reference levels. Theoretically, average fish weight could be low due to either above average recruitment or high exploitation rates. The indicators have yet to detect any adverse consequences of relatively high exploitation rates. The results of the simple stock assessment model were similar to the 2004 assessment and there still appears to be no

conservation concern for skipjack in the Eastern Pacific.

Catch of skipjack tuna by U.S. West Coast fisheries constitutes less than one percent of the Eastern Pacific-wide catch.

5.3.4 Yellowfin Tuna

5.3.4.1 Yellowfin Tuna (EPO)

Stock status of yellowfin tuna in the Eastern Pacific is assessed every 1–2 years by the IATTC. An updated assessment was conducted in May 2007 (Maunder 2007) and is based on the assumption that there is a single stock of yellowfin tuna in the EPO, although it is likely that there is a continuous stock throughout the Pacific Ocean. Fishing is concentrated in the east and west, making separate consideration of the EPO stock relevant for management purposes. The assessment report can be downloaded from http://www.iattc.org/PDFFiles2/SAR8-YFT-ENG.pdf.

The 2007 base case assessment, which does not include a stock-recruitment relationship, indicates that the spawning stock size was in decline during 2002-2006 from a high point in 2001 to about the level corresponding to the AMSY. The recent fishing mortality rate (F), an average of F for 2004–05, is near to that corresponding AMSY. Recent catches are significantly below AMSY.

In general, the recruitment of yellowfin tuna in the Eastern Pacific has experienced two, or possibly three recruitment regimes: a period of low recruitment during 1975-1982; a period of high recruitment during 1983-2001; and now a period of intermediate or low recruitment during 2000–06. Based on the latest assessment, under the recent lower productivity regime, the spawning biomass ratio is estimated to be below AMSY and effort levels above those which would support AMSY.

Catch of yellowfin tuna by U.S. West Coast fisheries constitutes less than one percent of the Eastern Pacific-wide catch.

5.3.4.2 Yellowfin Tuna (WCPO)

An updated assessment of yellowfin tuna in the WCPO was conducted by the WCPFC's Scientific Committee in August, 2007 (Langley, et al. 2007). Below is a summary of the results excerpted from the Report of the Scientific Committee meeting. The assessment can be downloaded from http://www.wcpfc.int/sc3/pdf/WCPFC-SC3%20SA-SWG%20WP-01.pdf.

The 2007 stock assessment conclusions differ slightly from the 2006 assessment, particularly in relation to the ratio of the current estimate of fishing mortality compared with the fishing mortality at maximum sustainable yield (F/F_{MSY}), with the threshold in the 2007 assessment being slightly more optimistic than that in the 2006 assessment. While the point estimate of F/F_{MSY} remains slightly less than 1.0 (0.95), the probability distribution associated with the fishing mortality-based reference point indicates that there is almost an equal probability that the value of F/F_{MSY} is less than or greater than the reference point. Therefore, the possibility of overfishing is still relatively high (47 percent). The reference points that predict the status of the stock under equilibrium conditions are B/B_{MSY} (1.10) and SB/SB_{MSY} (1.12), which indicate that the long-term average biomass would remain slightly above the level capable of producing MSY at 2002−2005 average fishing mortality. Overall, current biomass exceeds the estimated biomass at MSY (B/B_{MSY} >1.0) indicating that the yellowfin stock in the WCPO is not in an overfished state, although there is a small probability (6.2 percent) that it is in an overfished state. The change in the estimated MSY in 2007 from that in 2006 may reflect changes in the data structure, fishery designations and levels of uncertainty in the assessment, especially in estimating absolute values, and the change in the

scenarios modeled between years.

The WCPO yellowfin tuna fishery can be considered to be fully exploited. Both the 2006 and 2007 assessments indicate that there is a high probability that overfishing is occurring (73 percent for the base case 2006 assessment and 47 percent for the base case 2007 assessment). In order to reduce the likelihood of overfishing, and if the WCPFC wishes to maintain average biomass at levels greater than 5 percent above B_{MSY}, reductions in the fishing mortality rate would be required.

Stock projections for 2007–2011, which attempt to simulate the conservation and management measures already adopted by the WCPFC, indicate that the point estimate of B/B_{MSY} remains above 1.0 throughout the projection period. However, the increasing uncertainty in future projections is likely to result in an increased probability of the biomass declining below B_{MSY} by the end of the projection period.

5.3.5 Striped Marlin

5.3.5.1 Striped Marlin (NPO)

The status of a hypothesized stock of striped marlin spanning the North Pacific was conducted by the ISC Marlin Working Group in 2007 (ISC 2007b). The assessment report can be downloaded from the Council website (http://www.pcouncil.org).

The stock structure of striped marlin in the Pacific Ocean is not well known. A special session of the ISC's Billfish Working Group will be convened in November 2008 to address the uncertainty in stock structure.

The latest stock assessment was an update of the analyses done with *Stock Synthesis II* in 2006. The status is difficult to determine due to a range of uncertainties in the fishery data as well as biological uncertainties. Nonetheless, the results of two models demonstrate that biomass has declined to levels that are 6 to 16 percent of their level in 1952. In addition, landings and indices of abundance have declined markedly, and recruitment has been steadily declining with no evidence that strong year-classes have or are about to enter the fishery. There appears to be inconsistency in the indices developed for the Western Pacific and the Eastern Pacific, and it was recommended that future modeling efforts include spatial segregation. The stock status with respect to MSY was not determined, yet the ISC Plenary recognized that current levels of fishing effort across the North Pacific are not likely to be sustainable, and recommended that fishing effort not be increased above current levels.

Catch of striped marlin by U.S. West Coast fisheries constitutes about one percent of the Eastern Pacific-wide catch.

5.4 Links to Information on Recent Pacific HMS Stock Assessments through August 2008

Species (Stock)	Organization Responsible for Assessment	Link to Assessment Report
TUNAS		
Bluefin (NPO)	ISC	http://isc.ac.affrc.go.jp/isc8/pdf/Annex_7_PBF_May08_ISC8.pdf
Bigeye (EPO)	IATTC	http://www.iattc.org/PDFFiles2/SARM-9-06b-BET-assessment-2007.pdf
Bigeye (WCPO)	WCPFC	http://www.wcpfc.int/sc4/pdf/SC4-SA-WP1-rev.1%20%5BBET%20Assessment%5D.pdf
Yellowfin (EPO)	IATTC	http://www.iattc.org/PDFFiles2/SARM-9-06a-YFT-assessment-2007.pdf
Skipjack (EPO)	IATTC	http://www.iattc.org/PDFFiles2/SAR8-SKJ-ENG.pdf
Skipjack (WCPO)	WCPFC	http://www.wcpfc.int/sc4/pdf/SC4-SA-WP4%20%5BSKJ%20Assessment%5D.pdf

Table 5-2. 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 the fisheries. Levels of *F* and *B* are provided based on the most recent analyses, but in many cases the analyses have not been updated for several years. Thus, those findings should be viewed cautiously for management purposes.

Species (stock)	F_{Recent}/F_{MSY}[1]	Overfishing? ($F/F_{MSY}>1.0$)	B_{Recent}/B_{MSY}[1]	B_{MSST}/B_{MSY}	Overfished? ($B_{Recent}<B_{MSST}$)	B_{FLAG}[2] ($1.25B_{MSST}/B_{MSY}$)	Assessment
TUNAS							
Albacore (NPO)	1.67–2.31[3]	Unknown[3]	Unknown[3]	0.7	Unknown[3]		ISC 2007a
Bluefin (NPO)	>1.0[4]	Unknown[4]	Unknown	0.75	Unknown	0.94	ISC 2006
Bigeye (EPO)	1.30[5]	Y	1.08[5]	0.6	N		IATTC, Aires-da-Silva and Maunder 2007
Bigeye (WCPO)	1.32[6]	Y	1.27[6]		N		WCPFC, Hampton, et al. 2006
Skipjack (EPO)	Unknown[7]	Unlikely[7]	Unknown[7]	0.5	Unlikely[7]		IATTC, Maunder and Deriso 2007
Skipjack (WCPO)	0.17[8]	N	3.01[8]		N		WCPFC, Langley, et al. 2005
Yellowfin (EPO)	1.14[5]	Y	0.96[5]	0.5	N		IATTC, Maunder 2007
Yellowfin (WCPO)	0.95[6]	Y	1.10[6]		N		WCPFC, Langley, et al. 2007
BILLFISHES							
Striped Marlin (NPO)	Unknown[9]	Unknown	Unknown	0.5	Unknown		ISC 2007b
Striped Marlin (EPO)	<1.0[10]	N	≥1.0		N	0.63	IATTC, Hinton and Maunder 2003
Swordfish (NWPO)	Unknown[11]	Unlikely	Unknown	0.61-0.8	Unlikely		ISC 2004
Swordfish (SEPO)	Unknown[12]	Unknown	>1.0		N		IATTC, Hinton and Maunder 2006
SHARKS							
C. Thresher (CA,OR,WA)	<1.0[13]	N	~1.10	0.77	N	0.96	NMFS, PFMC HMS plan development team 2002
Pelagic Thresher	Unknown[14]	Unknown	Unknown	0.85	Unknown	1.06	
Bigeye Thresher	Unknown[15]	Unknown	Unknown	0.78	Unknown	0.97	
Shortfin Mako	<1.0[16]	N	>1.0	0.71	N	0.89	NMFS, PFMC HMS plan development team 2002
Blue	<0.5[17]	N	>1.0	0.78	N	0.97	NMFS and NRIFSF Japan, Kleiber, et al. 2001
OTHER							
Dorado	Unknown[18]	Unknown	Unknown	0.5	Unknown		

Notes:

1 Measures of F_{MSY} and B_{MSY} are not available for all species. Various proxies for these values have been used in preparing this table. However, PFMC has not adopted the use of a particular proxy; hence the designation of Overfishing and Overfished 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 ($F_{40\%}$, $F_{35\%}$, $F_{30\%}$ and $F_{0.1}$), the estimated level of recent (2002-2004) fishing pressure (F=0.75), and constant productivity (R = 27.375 million recruits. However, "Unknown" is indicated because of the lack of a PFMC reference point for management.

[4] Bluefin analyses indicated that F has exceeded F_{Max} 2-fold during the last 2 decades. However, "Unknown" is indicated because of the lack of a PFMC reference point for management.

[5] EPO bigeye and EPO yellowfin results are based on base-case assessments assuming no stock-recruitment relationships and estimated recent (2004-2005) fishing effort.

[6] WCPO bigeye and yellowfin results are based on the base-case assessments.

[7] Because of uncertainties in the estimates of growth and natural mortality, MSY-proxy reference points could not be calculated for EPO skipjack; however, based on a new model examining non-MSY based stock condition indicators, the IATTC does not consider there to be a need for management due increasing CPUE indices and high biomass estimates relative to historical levels.

[8] CWPO skipjack results are from the base-case assessment.

[9] MSY-proxy reference points were not be calculated for NP striped marlin; however, the declining biomass trend and the level of recent fishing effort relative to many commonly used MSY proxy reference points indicates overfishing may be occurring. The ISC recommended that F not be increased.

[10] 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.

[11] Standardized CPUEs from swordfish fisheries indicate declining trends in the northwest Pacific; however, the fisheries are causing, at worst, modest declines in abundance.

[12] Specific values for F/F_{AMSY} and B/B_{AMSY} are not available; however the assessment results indicate that stock biomass is well above the level which would support AMSY.

[13] U.S. west coast EEZ regional catch and CPUE demonstrated the population increasing from estimated low levels in the early 1990s. Recent (2000-03). West coast commercial landings average 318 mt, which is less than 0.75 × MSY proxy (MSY proxy = LMSY from the Population Growth Rate method).

[14] Status unknown, but catches are incidental and occur on the edge of the species' range, predominately during warm water years.

[15] Status unknown, but catches are incidental and occur on the edge of the species' range.

[16] Tentative results based on commercial landings and CPUE calculations. Recent (2000–03) west coast commercial landings average 70 mt, which is less than 0.75 × MSY proxy (MSY proxy = average landings 1981–99).

[17] Analyses demonstrated that for North Pacific blue shark, fishing pressure is 2 to 15 times below F_{MSY}. West coast catch is poorly documented because the fish are not landed.

[18] Status unknown, but dorado are highly productive and widely distributed throughout tropical/subtropical Pacific. Recent west coast landings average 16 mt.

Table 5-3. Stockwide and regional catches for HMS management unit species (x1,000 mt round weight), 2002–06.

Species (stock)	Stockwide Catch	U.S. West Coast Catch		Average Annual Fractional Catch
		Commercial	Recreational	
TUNAS				
Albacore (NPO)	62–105[1]	9–17	0.2–2.8	0.17
Bluefin (NPO)	19–27[1]	<0.2	0.03–0.3	<0.01
Bigeye (EPO)	111–132[2]	<0.05	<0.01	<0.01
Skipjack (EPO)	154–299[2]	0.05-0.5	0.01–0.1	<0.01
Yellowfin (EPO)	177–440[2]	0.08-0.5	0.1–0.3	<0.01
BILLFISHES				
Striped Marlin (EPO)	1.5–2.2[2]	<0.01[3]	0.02[4]	0.01
Swordfish (EPO)	13–20[2]	0.3–2.1	<0.01	0.07
SHARKS				
Common Thresher	Unknown	0.1–0.3	0.01–0.13	
Pelagic Thresher	Unknown	<0.01		
Bigeye Thresher	Unknown	≤0.01		
Shortfin Mako	Unknown	<0.03–0.08	0.02–0.09	
Blue (NPO)	Unknown	<0.06[3]	<0.01	
OTHER				
Dorado	4–11[5]	<0.01	0.02–0.26	0.01

Notes:
Data are from updated commercial (Table 4-4), CPFV (Table 4-51), and private recreational (Table 4-47) catches with weight conversions of 8.7 kg/albacore, 8.7 kg/bluefin, 10.0 kg/bigeye tuna, 3.0 kg/skipjack, 4.9 kg/yellowfin, 57.9 kg/striped marlin, 113 kg/swordfish, 29.2 kg/common thresher, 16.8 kg/mako, 8 kg/blue shark, and 5.6 kg/dorado.

1 International Scientific Committee Eighth Plenary Report Catch Tables, July 2008.

2 IATTC catch tables extracted 8/7/08.

3 Striped marlin and blue shark commercial catches include estimates from the drift gillnet observed catch.

4 Striped marlin recreational catch is estimated at 300 fish/year based on club records plus CPFV logbook recorded catch.

5 FAO Area 77 catch extracted from March 27, 2008 FAO global fishery production dataset.

6.0 RESEARCH AND DATA NEEDS

6.1 Research and Data Needs

This section has been reorganized from previous versions to more explicitly link research and data needs to the Council's management priorities. These priorities should be considered in light of two central characteristics of HMS research and data needs.

First, as with management, there is an international component to research and stock assessment. The two regional fishery management organizations (RFMO) involved with management of HMS FMP stocks—the Inter-American Tropical Tuna Commission (IATTC) and Western and Central Pacific Fisheries Commission (WCPFC)—also coordinate and conduct stock assessments. In addition, a third scientific organization—the International Scientific Committee (ISC) on Tuna and Tuna-like Species in the North Pacific Ocean—provides scientific advice on the status of North Pacific HMS stocks that straddle the 150^{o} W longitude boundary between the RFMOs. Although research and stock assessment of the tunas, billfishes, and pelagic sharks in HMS FMP would ideally consider stocks throughout their entire range; the reality is that not all species in the HMS FMP benefit from international scientific coordination.

Second, there is substantial uncertainty on the status of stocks and estimates of MSY and/or 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. These data gaps will likely need to be considered closely during implementation of the new MSA annual catch limit (ACL) requirements and National Standard 1 guidelines. Species that are subject to management under an international agreement in which the U.S. participates will likely be exempt from the new requirements. Species like bigeye and pelagic thresher sharks—which are not managed internationally—will not likely be exempted.

6.1.1 Highest Priority Issues

6.1.1.1 North Pacific Albacore

Fisheries Statistics: Timely annual submission of national fishery data to the ISC Albacore WG data manager is critical for producing timely and up-to-date stock assessments. Additional resources are needed to oversee the submission of these data, provide database management, and improve documentation of the entire database system including metadata catalogs. An electronic fishticket system on the West Coast would greatly improve the availability and timeliness of fishery data.

Biological Studies: Biological information is a critical building block for stock assessments. It should be reviewed and updated regularly to capture changes in population parameters if they occur. Unfortunately, this process has not been followed for North Pacific albacore because of limited resources for routine biological studies. Consequently, the stock assessment models used by the ISC Albacore WG rely on a patchwork of biological information that was developed largely in the 1950s and 1960s.

There is a critical need to reassess the biological information and to conduct contemporary studies to update this information. More specifically, there is a critical need to conduct studies on:

- age and growth with the goal of updating growth rates and comparing with older studies,
- reproductive biology with the goal of updating the maturity ogive,
- development of new indices of abundance particularly from fisheries that regularly catch recruitment age albacore (age 1), e.g. the U.S. recreational fishery,
- migration and habitat utilization, with the goal of better informing fishery effort standardization and fishery selectivity/catchability assumptions,
- an examination of 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),
- environmental factors, as they relate to recruitment, growth, maturity, and catchability of albacore; and
- albacore length data through port sampling.

Stock Assessment and Management Studies: Recent stock assessment results as well as fishery developments suggest that the North Pacific stock of albacore is at or fast approaching full exploitation. Demand for more frequent and more precise information on status of the stock and the sustainability of the fisheries is therefore likely to increase. With this in mind, the albacore stock assessment needs improvement in several of its facets:

- investigation of competing assessment models using simulation to ascertain each model's strength and weakness when faced with input data generated from a known albacore-like population,
- simulation studies to assist fishery managers in selecting appropriate biological reference points for albacore,
- investigation of CPUE standardization;
- refinement of the VPA-2Box model (the WG's current assessment model);
- investigation of the applicability of SS2 as an alternative assessment model for albacore;
- evaluation of the utility of formally adding tagging data into the assessment; and
- develop new indices of abundance from fisheries that regularly catch recruitment age albacore (age 1), such as the U.S. recreational fishery.

6.1.1.2 Swordfish

Fisheries Statistics: The timeliness of data reporting, as outlined above for albacore, is equally important for swordfish.

Biological Studies: All biological studies listed above for albacore are needed for swordfish as well. In addition, age and growth data from locally caught fish should be examined, and the distribution of swordfish by season and age within the outer portions of the EEZ and high seas should be evaluated.

Stock Assessment and Management Studies: All stock assessment and management studies listed above for albacore are also needed for swordfish. In particular, there is a need for additional work on effort standardization.

Economic Studies: Explore economic viability of harpoon gear as an alternative to DGN and longline gear for swordfish. Research the best options to promote developing and testing novel gear to reduce protected species interactions and increase swordfish catch.

6.1.1.3 Sharks

Most of the tunas covered in the HMS FMP are being assessed—with varying degrees of completeness and sophistication—on a regular basis. Some of the billfishes—particularly striped marlin and swordfish—are either being assessed or have assessments planned in the near future. On the other hand, stock assessments for sharks have been preliminary at best, and few and far between. Furthermore, comprehensive shark assessments do not appear to be on the near-term planning horizon for the RFMOs or for the ISC. This situation should not be taken to imply that sharks are unimportant. Nor should it be inferred that sharks are less vulnerable to the effects of fishing than are the tunas and billfishes. In fact, because of the key vital rates of most sharks (especially reproductive rates that are lower than those for tunas and billfishes), many shark species are likely to be more vulnerable to overfishing than other HMS.

To understand this *prima fascia* inconsistency (i.e., perhaps more vulnerable but not assessed), it is necessary to understand the nature of the fisheries responsible for most of the catch of sharks over the past several decades. Internationally, these fisheries tend to be either 1) tuna-targeting fisheries that caught sharks as bycatch in their tuna fishing operations and discarded them (without recording numbers or mass) over most of their fishing history; or 2) smaller scale directed shark fisheries that tend not to report shark catches in a manner suitable for stock assessment, e.g. catch reports that aggregate the catch of multiple shark species into a single 'shark' category or do not report the catches at all.

As with the other species covered by the HMS FMP, most shark species cannot be assessed or managed unilaterally by the Council. Some species are highly oceanic with ranges similar to that of tunas (e.g., blue shark). Others are more coastal—with perhaps most of their habitat shoreward of the U.S. EEZ—but exhibit north-south migrations with significant catches in Mexican waters (e.g., thresher sharks). The net effect is that accounting for the total catch of sharks over their entire period (several decades) and areas of exploitation is not possible. Furthermore, there is a paucity of the biological samples needed to characterize the size of animals taken from the fisheries that account for most of the catch. Active biological studies (age, growth, maturity, food habits, etc.) are ongoing (NMFS, State, and academic researchers) and understanding of the biological characteristics for at least some shark species is probably sufficient for stock assessment purposes. However, without an accurate history of total catch and the corresponding size samples, stock assessment efforts and concomitant management by the Council will be problematic.

The following species-specific research priorities have been identified for the two highest priority sharks because of their importance in U.S. West Coast commercial and recreational fisheries:

Common thresher shark:

- stock structure 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;

- ageing and growth rates, including comparisons of growth rates in other areas; and
- maturity and reproductive schedules.

Shortfin mako shark:

- distribution, abundance, and size in areas to the south and west of the west coast EEZ; and
- age and growth rates (current growth estimates differ widely).

6.1.1.4 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. These fisheries are likely affecting both protected species and prohibited species of fish.

More work is needed to better understand possible impacts of the HMS fisheries on protected species of sea turtles, birds, and marine mammals. For example, there is a need to investigate the hooking survivorship of protected species, such as turtles and seabirds that are caught as bycatch in the HMS fisheries. In addition, fisheries-independent research is required to better understand distribution and habitat use by turtles and to determine the linkages to ecosystem parameters (oceanographic and biological). This includes data on turtle migration seasonality and routes, genetic stock composition of populations by species, and habitat use in order to better understand likely periods of interaction with fisheries and turtle life histories. Development of predictive models that integrate oceanography, ecosystem parameters (e.g., prey distribution), and habitat use of turtles are needed. More work on the sizes and structures of turtle populations by species would also enable improved application of the ESA and other laws and regulations to HMS fisheries. Continued research on the abundance and distribution of marine mammals is also critical, particularly for HMS fisheries operating within the west coast EEZ.

Some specific research priorities include:

- Research into habitat use of leatherback turtles and other species of concern to better understand the potential for reducing bycatch. Explore whether hotspots or temperature bands can be identified in near-real-time in order to provide information to fishermen on places with potentially high interaction risks.
- Explore how regulating U.S. Pacific swordfish fisheries affects international trade in swordfish and the potential unintended consequences for protected species interactions in foreign fisheries.
- Conduct a cost benefit analysis of various sea turtle conservation measures (e.g. fishery regulations vs. nesting beach protection).

Compare bycatch rates of DGN vs. shallow set longline gear for swordfish, both by mining observer data and conducting gear comparison studies in the fishery areas.

6.1.2 High Priority Issues

6.1.2.1 Blue shark

As noted above, relatively little assessment and research activity is focused on shark species when compared to the existing work being done on other HMS such as tunas. Blue shark was an important shark species in the California CPFV fishery of the late 1980s, but has steeply declined as a share of the catch in recent periods. Blue sharks are encountered in relatively small numbers in commercial and recreational fisheries coastwide. Two specific research needs identified for blue sharks are to: 1) monitor sex and size composition of catches; and, 2) determine the migratory movements of maturing fish from the EEZ to high seas.

6.1.2.2 Striped Marlin

Fisheries Statistics: The timeliness of data reporting, as outlined for albacore, is equally important for striped marlin. Additionally, the official striped marlin catch statistics are considerably less well developed than those for albacore, and significant effort is needed to ensure that the total catch from all nations is well estimated.

Biological Studies: All biological studies listed above for albacore are also needed for striped marlin. In addition,

- Stock structure for striped marlin in the Pacific Ocean is more uncertain than for other HMS species and several stock structure hypotheses are credible. A synoptic, critical review of all available information (fisheries data, icthyoplankton data, and genetic studies) is needed to either resolve the issue or at least to reduce the number of credible hypotheses; and

- Age and growth data from locally caught fish should be examined.

Stock Assessment and Management Studies: All stock assessment and management studies listed above for albacore are also needed for striped marlin. Specific to striped marlin, there is a need for additional work on effort standardization.

6.1.2.3 Pacific Bluefin Tuna

Fisheries Statistics: The timeliness of data reporting, as outlined for albacore above, is equally important for bluefin tuna. Additionally:

- the official bluefin catch statistics need further scrutiny (e.g., there are apparent discrepancies between some of the reported catches and the corresponding Japanese import records); and

- increased port sampling of commercial bluefin length frequencies is needed in the EPO, particularly of the fish destined for the pens in farming operations.

Biological Studies: All of biological studies listed above for albacore are also needed for bluefin tuna. In addition, there is a need to develop seasonal and perhaps area-based weight-length relationships as the bluefin condition factor appears to vary both seasonally and regionally.

Stock Assessment and Management Studies: All of stock assessment and management studies listed above for albacore are also needed for bluefin tuna. In particular, there is a need for additional work on effort standardization if credible indices of abundance are to become available for bluefin tuna.

6.1.3 Other Priority Stocks and Issues

6.1.3.1 Management Unit Species Catch Data

Total catch data are likely inaccurate for most HMS fisheries due to an inadequate 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:

- 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
- Catch composition data for harpoon gear
- Size composition of bycatch in drift gillnet fisheries
- 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. Better catch and effort estimates are also needed for HMS recreational fishing tournaments, in particular those tournaments focusing on common thresher and mako sharks.

6.1.3.2 Survivability of Released Fish

Little is known of the long-term survivorship of hooked fishes after release, the effectiveness of recreational catch-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). Alternative gears and methods to increase survivability of recreationally caught fish and to minimize unwanted bycatch in fisheries should be identified.

6.1.3.3 Essential Fish Habitat

There is very little specific information on the migratory corridors and habitat dependencies of these large mobile fish; 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.

6.1.3.4 Stock Assessment Review

Pacific HMS stock assessments are carried out by the RFMOs and by the ISC. The processes used to conduct the assessments and to have them critically reviewed varies considerably across the organizations and the species being assessed. In none of these cases, however, does the level of critical peer review approach that of the Council's STAR process. This may become an issue for the Council if international management regulations begin to affect U.S. coastal fisheries to a greater extent than they do at present. The Council may want to consider having some member(s) of its SSC participate in these international processes. This will provide the Council with a better perspective on the stock assessments and the ensuing international management advice.

6.1.3.5 Tropical Tuna Species and Dorado

The commercially important tropical tuna species, namely yellowfin, bigeye, and skipjack tuna, are principally harvested in the EPO by vessels from the Central and Latin American fishing fleets. Although a small west coast based U.S. flag purse seine fishery opportunistically harvests these tunas, the U.S. does not have a fleet active in the main EPO fishery at present. The tropical yellowfin, bigeye and skipjack tunas are no longer taken in large numbers by west coast based commercial fisheries.

The California commercial passenger fishing vessel (CPFV) fleet is the principal U.S. fishery for dorado which are often taken in the Mexican EEZ. Dorado can be a significant portion of the total CPFV annual catch and was the leading species in 2006, followed by yellowfin tuna and albacore tuna. Specific recommendations on dorado research include:

- Determine the stock structure of dorado in the eastern Pacific, and
- The significance of floating objects and other-species associations relative to life history

6.1.3.6 Pelagic and Bigeye Thresher Sharks

These species occur with considerably less frequency than common thresher sharks in U.S. west coast fisheries. It is of interest to Council-managed fisheries how the different ecologies of these species compare with that of common thresher shark.

6.2 Research Updates

The following sections summarize some, but not all, of the research projects being conducted during 2007 at the NMFS Southwest Fisheries Science Center and Southwest Regional Office to study HMS MUS, fisheries, and fishery-related species. Research on other MUS not reported here is ongoing at a number of U.S. West Coast research institutions. See chapter 8 for a list of links to websites of research institutions conducting research on HMS.

6.2.1 Albacore

SWFSC scientists are working with the American Fishermen's Research Foundation (AFRF) on monitoring programs and other research efforts to improve knowledge of the biology and migration of North Pacific albacore in the waters off the U.S. Pacific Coast. The cooperative research includes a port and onboard length sampling program, a voluntary logbook program that preceded the mandated logbook program instituted under the FMP, and an archival tagging program.

Port and onboard sampling: The port sampling program has been in place since 1961 for collecting size

data from albacore landings made by the U.S. and Canadian troll fleets at ports along the U.S. Pacific Coast. State fishery personnel collect the biological data from Washington, Oregon and California according to sampling and data processing instructions provided by the SWFSC. Additional fish are measured at-sea by cooperating fishermen in areas where the port sampling coverage is limited. A database has been developed and is maintained at the SWFSC. These data provide the basis for developing catch-at-age-matrices for the U.S. and Canada troll fisheries and are critical for stock assessment purposes. In the last 4 years roughly 1.6 percent of the total landed catch was measured by samplers. During 2007, the average size of 31,086 measured fish was 70.1 cm fork length.

Logbook Program: The logbook sampling program also has been in place through the AFRF since 1961. Fishermen have been voluntarily submitting their fishing records to the SWFSC for decades prior to implementation of the HMS FMP. These data are primarily used to develop relative indices of abundance, which subsequently provide valuable auxiliary information for fine-tuning stock assessment models. A database for logbook data is also maintained at the SWFSC. The logbook coverage rate in 2007 was approximately 62 percent of the landings. In recent years, the SWFSC has also been working with AFRF in the design and testing of an electronic logbook to facilitate submission and data entry for the albacore troll fishery data.

Archival Tagging: The SWFSC and AFRF have been working together since 2001 to use archival tags to study movement patterns and general life history strategies of juvenile (ages 2-5) North Pacific albacore. Archival tag data provide detailed information of North Pacific albacore migratory behavior and distribution. Through August 2008, 552 tags have been deployed in albacore off the U.S. West Coast. To date, 21 archival tags have been recovered with the latest recovery occurring aboard a longline vessel operating out of American Samoa. Overall, the fish recovered have demonstrated a very wide range of behaviors with some staying near the North American continent for a full year following tagging while others migrated out to the central North Pacific and then back to the U.S. West Coast the following season. One fish migrated across the Pacific and was recaptured off Japan. Vertical habitat utilization also varied depending upon the season and water column characteristics. The data are being analyzed and ultimately will help determine stock structure and improve CPUE standardization based on habitat-use patterns, information critical to developing sound stock assessments regarding the status of this valuable marine resource. For more information see http://swfsc.noaa.gov/albacore_tag.aspx.

6.2.2 Common Thresher Shark

Nursery Survey and Pup Abundance Index: In 2003, the SWFSC began a survey to (1) determine the continuity of thresher pup distribution along the coast of the Southern California Bight and (2) develop a pup abundance index. In September 2007, the team worked with the F/V *Outer Banks* to sample in the California Bight from Point Conception to the Mexican border. Forty nine longline sets were made in relatively shallow near shore waters. Over the 18-day cruise, 137 common thresher sharks, 2 shovelnose guitarfish (*Rhinobatos productus*), 2 soupfin sharks (*Galeorhinus galeus*), 1 leopard shark (*Triakis semifasciata*) and 1 bat ray (*Myliobatis californica*) were caught. Roughly 65% of the threshers caught were young of the year (<100 cm FL). Nearly all of the threshers caught were injected with OTC for age and growth studies, tagged with conventional tags and released. In addition, popoff archival tags were deployed on four thresher sharks.

While it is still too early to develop a pre-recruit index, a number of interesting patterns are emerging across years. Depth-stratified sampling revealed that over half of the neonates were caught in shallow waters from 0 to 46 m and almost all individuals are caught shallower than 90 m. The distribution of thresher sharks is very patchy and areas of high abundance are not consistent across years. In all years, a large percentage of the catch has been neonates which were found in all areas surveyed. In addition to providing important information on abundance and distributions, the thresher shark pre-recruit survey

enhances other ongoing research at SWFSC including age and growth, feeding, and habitat utilization studies. Through a collaborative program, scientists from Scripps Institution of Oceanography and CICESE in Ensenada, Mexico, are using the same methods to survey the nearshore areas south of the U.S. border in order to better map the nursery habitat throughout its extent.

Tagging: Nearly all of the threshers caught during the 2007 survey were injected with OTC for age and growth studies, DNA sampled, tagged with conventional tags and released. In addition, popoff archival tags were deployed on four thresher sharks as part of a collaborative project with the Tagging of Pacific Pelagics program (TOPP). Three of the four tags deployed popped up in the Southern California Bight after 6 or 8 months. Preliminary results confirm their preference for coastal waters with occasional forays into offshore areas and to depths exceeding 500 m.

Post-release Survival in the Recreational Fishery: In early 2007, a collaborative study was initiated by the Pfleger Institute of Environmental Research, the Southwest Fisheries Science Center and the NMFS Southwest Region Sustainable Fisheries Division to examine post-release survival of common thresher sharks. In response to the growing recreational fishery for HMS sharks, this pilot project uses pop-up satellite archival transmitters (PSAT) to study the movement patterns and post-release survivability of rod-and-reel caught common thresher sharks. In May 2008, the SWFSC, SWR and Pfleger Institute of Environmental Research continued the study. Two thresher sharks, hooked by the tail by anglers, were fitted with satellite tags and released. One fish did not survive capture and release. Combined with data from last year, preliminary results indicate that mortality often occurs soon after release and is more likely to occur when larger fish are caught that require longer fight times to bring the fish to the boat. Further tagging is planned for the fall in order to increase the sample size and to explore modifications to the gear to reduce tail hooking.

6.2.3 Shortfin Mako and Blue Sharks

***Juvenile Mako and Blue Shark Abundance Survey*:** In 2007, the SWFSC conducted its fourteenth juvenile shark survey since 1994. Working aboard the NOAA R/V *David Starr Jordan*, the team of scientists and volunteers fished a total of 5,759 hooks at 28 sampling stations in seven focal areas in the Southern California Bight. From the catch data, the index of relative abundance for juvenile sharks, defined as catch per 100 hook-hours, was calculated for the seven target survey areas. Survey catch totaled 112 makos, 139 blue sharks, 14 pelagic rays (*Pteroplatytrygon violacea*) and one ocean sunfish (*Mola mola*). The overall survey catch rate was 0.556 per 100 hook-hours for mako and 0.666 per 100 hook-hours for blue sharks. The CPUE for mako sharks has increased slightly since 2003; however, there is a declining trend in CPUE for both species over the time series of the survey. These data now represent the longest time series of fishery-independent data for mako and blue sharks off the West Coast and are currently being analyzed as components in population dynamics models for these species.

An additional 10 days of ship time were used to conduct a hook comparison study in order to determine differences in selectivity with hook type. For this comparison, sets were made with alternating circle and J-hooks in blocks which had high catch rates during the survey. Additional sets were made in other locations as time and conditions allowed. A total of 4,508 hooks were deployed of which 2,252 were 16/0 Circle and 2,256 were 9/0 J-Style hooks. Circle hooks captured 28 blue sharks, and 25 mako sharks while J hooks captured 53 blues and 39 makos.

In addition to obtaining an index of relative abundance, secondary objectives of the cruise were to deploy satellite tags, continue age and growth studies and collect biological samples. Over the course of the cruise, 215 blue sharks and 142 makos were tagged with conventional tags and biopsied for analysis of movement and stock structure. Of those, 166 blue sharks and 128 makos were marked with OTC for age and growth studies. In addition, four blue sharks and 12 makos were tagged with pop-off archival

transmitters (PAT tags) and near real-time satellite-linked radio transmitters (SPOT tags) to define their habitat-use patterns in the California Current System. The ocean sunfish was also tagged with a PAT tag. The satellite tagging is being conducted in collaboration with the Tagging of Pacific Pelagics (TOPP) program. Preliminary analysis of the satellite tagging data demonstrates that these pelagic sharks are extremely wide ranging, particularly the blue sharks; makos tagged in the Southern California Bight show a preference to remain in the productive waters of the California Current system.

Survival of Blue Sharks Released From the Drift Gillnet Fishery: The SWFSC and Southwest Region have been working on a project to determine the survivability of blue sharks caught and released alive by the California drift gillnet fishery. Blue sharks are the second greatest bycatch species in number behind the common mola in this fishery. Roughly 35 percent of the blue sharks caught are released alive, but their fate is unknown. During the 2007-08 fishing season, seven sharks in various conditions at time of release were tagged with PAT tags. The tagged sharks were tracked and preliminary results indicate that survivability is high; all seven survived for at least six weeks following tagging. The study will continue in the 2008–09 season with smaller-sized sharks tagged to determine whether size affects survival rates.

Mako Shark Predation on Jumbo Squid: Stomach content data from recent years reveal that jumbo squid (*Dosidicus gigas*) are an increasingly important component of the mako shark diet. SWFSC scientists have been examining stomachs of mako sharks caught in drift gillnet fishery off Southern California since 2002. Of 228 stomachs examined, 49 contained jumbo squid remains. Quantitative analysis of inter-annual variation in the diet reveals that the occurrence of jumbo squid in the diet has been increasing as jumbo squid become more abundant in the California Current. Mako sharks captured during the juvenile pelagic shark abundance survey are often covered with scars from the toothed suction cups of jumbo squid. Detailed findings have been submitted for publication in CalCOFI Reports.

6.2.4 Bigeye Thresher Shark

Feeding habits: While the bigeye thresher is less frequently encountered in the drift gillnet fishery than the other pelagic shark species, stomachs of 26 bigeye threshers were collected by fishery observers between August 1998 and January 2007. Twenty three of the stomachs contained food representing a total of 20 taxa. The six most important prey species were the barracudinas (*Paralepididae* family), followed by Pacific hake (*Merluccius productus*), Pacific saury (*Cololabis saira*), Pacific mackerel (*Scomber japonicus*), northern anchovy (*Engraulis mordax*), and jumbo squid. Previous studies have suggested that species of the deep scattering layer may be important in the bigeye thresher's diet; however, it appears that off California, midwater and epipelagic species are also important, as are some epi-benthic species. The large number and diverse taxa suggest that the bigeye thresher is an opportunistic feeder that forages over a broad range of habitats to exploit locally abundant prey. Detailed findings have been submitted for publication in CalCOFI Reports.

6.2.5 Sea Turtles

NMFS, in cooperation with researchers around the world, continues to conduct sea turtle research in the Pacific. Due in part to this work, the understanding of Pacific sea turtles has increased substantially over the past several years. The SWFSC has contributed much to the sea turtle literature including a number of papers in the recently published special edition of Chelonian Conservation and Biology (see Volume 6, Number 1) that focused on endangered leatherback sea turtles. While insights have been gained on seasonal habitat use of nearshore foraging areas off Central California, gaps in knowledge remain on fine scale habitat use and distribution in offshore areas (more than 60 miles offshore) from the West Coast. Significant findings include population linkages between breeding sites in Indonesia and foraging areas off the West Coast as a result of genetic studies and satellite telemetry.

6.2.6 Drift Gillnet Electronic Monitoring Pilot Project

During the fall of 2006, electronic monitoring (EM) systems were installed on cooperative drift gillnet (DGN) fishing vessels based out of southern California ports. Archipelago Marine Research Ltd. was contracted by NMFS Southwest Region to evaluate EM as a tool to monitor the DGN fishery in California. EM systems consisted of up to three closed circuit television cameras, a GPS receiver, a hydraulic pressure sensor, winch sensors, and system control box. EM systems and observers were in place on five vessels for 11 trips and 53 fishing events, resulting in over 450 catch items assessed by both methods. EM system performance was high on all participating vessels although data loss occurred from vessels where operators manually powered down EM systems when the vessel was idle. EM sensor data was very useful in detecting vessel location and activities such as transit, standby, and net setting and hauling. In terms of catch, both EM and observer methods were within 4 percent and protected species detection was identical. Catch totals by set were very close for most sets and the major cause for outliers was due to the inability of EM to detect tunas and mackerel. Counts of shark, swordfish, opah and common mola were very similar between EM and observers. Observers typically speciated catch to a higher level than EM viewers as a result of image resolution issues for small catch items and EM viewers being less familiar with DGN catch species as compared to observers. Overall, EM was considered suitable for the DGN fleet, although future work with these vessels should include discussion to improve EM installations and better align deck activities with monitoring needs from EM imagery. A final report is available from NMFS Southwest Region on request.

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ISC 2007b. ANNEX 8 (Report of the Marlin and Swordfish Working Group Joint Workshop, March 19-26, 2007, Taipei, Taiwan) *of* Report of the seventh meeting of the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean, July 25-30, Busan, Korea.

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8.0 COMMONLY-USED WEB LINKS IN HIGHLY MIGRATORY SPECIES MANAGEMENT AND RESEARCH

International Regional Fishery Management Organizations and Scientific Bodies

Inter- American Tropical Tuna Commission	http://iattc.org/
Western and Central Pacific Fisheries Commission	http://www.wcpfc.int/
International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean	http://isc.ac.affrc.go.jp/

U.S. West Coast Regional Fishery Management Councils

Pacific Fishery Management Council	http://www.pcouncil.org/
Western Pacific Fishery Management Council	http://www.wpcouncil.org/

State and Interstate Fisheries Commissions

California Department of Fish and Game	http://www.dfg.ca.gov/
Oregon Department of Fish and Wildlife	http://www.dfw.state.or.us/
Pacific States Marine Fisheries Commission	http://www.psmfc.org
Washington Department of Fish and Wildlife	http://wdfw.wa.gov/

Institutions Conducting HMS Research

American Fishermen's Research Foundation	http://www.afrf.org/
California State University, Long Beach	http://www.csulb.edu
Centro de Investigación Científica y Educación Superior de Ensenada	http://www.cicese.mx/
Inter-American Tropical Tuna Commission	http://www.iattc.org
Monterey Bay Aquarium	http://www.mbayaq.org/
Monterey Bay Aquarium Tuna Research and Conservation Center	http://www.tunaresearch.org
Moss Landing Marine Lab	http://www.mlml.calstate.edu/
NOAA Pacific Islands Fisheries Science Center	http://www.pifsc.noaa.gov
NOAA Southwest Fisheries Science Center	http://swfsc.noaa.gov
NOAA Southwest Regional Office	http://swr.nmfs.noaa.gov
Pfleger Institute of Environmental Research	http://www.pier.org
Scripps Institute of Oceanography	http://www-sio.ucsd.edu
Southern California Elasmobranch Consortium	http://www.sharkbight.com
Tagging of Pacific Pelagics	http://www.toppcensus.org

Sport and Commercial Fishing Industry Related Associations

American Albacore Fishing Association	http://www.americanalbacore.com

Oregon Albacore Commission	http://www.oregonalbacore.org/
Sportfishing Association of California	http://www.sacemup.org
United Anglers of Southern California	http://www.unitedanglers.com
Western Fishboat Owner's Association	http://www.wfoa-tuna.org