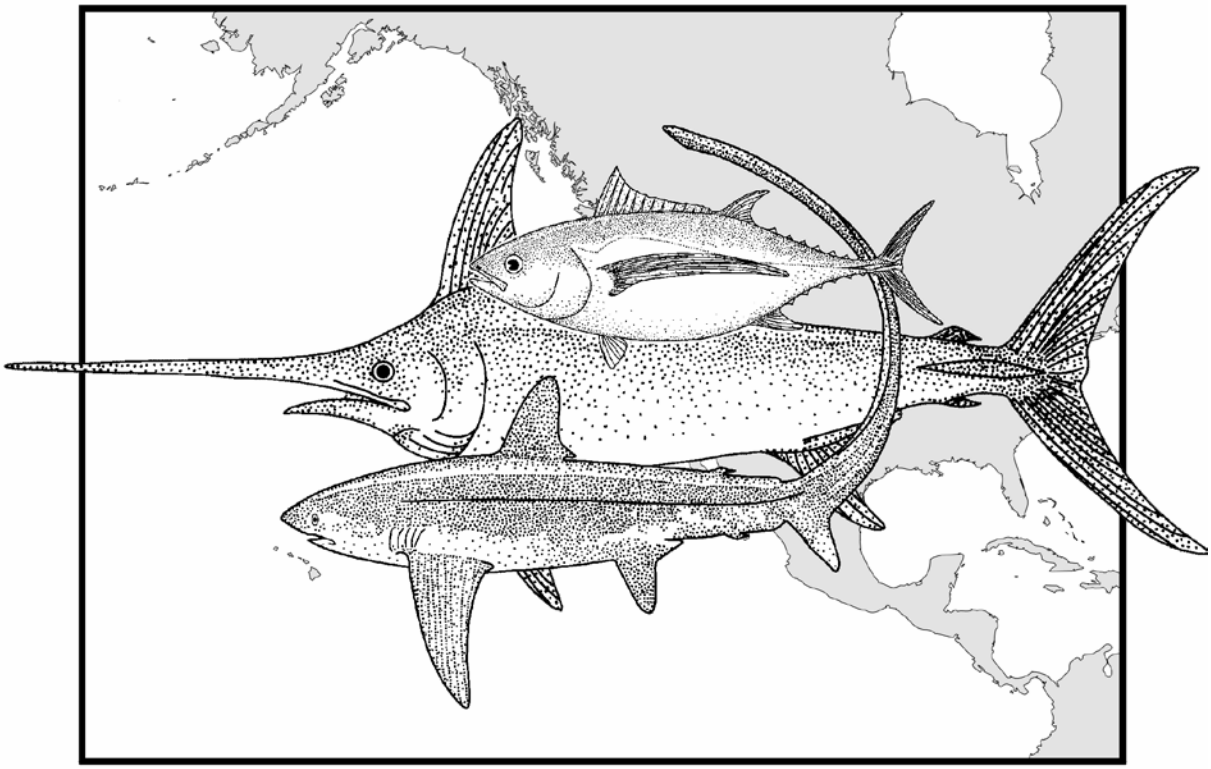
STATUS OF THE U.S. WEST COAST FISHERIES FOR HIGHLY MIGRATORY SPECIES THROUGH 2012



STOCK ASSESSMENT AND FISHERY EVALUATION

SEPTEMBER 2013

PACIFIC FISHERY MANAGEMENT COUNCIL
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Acronyms

ACL	annual catch limit
AFRF	American Fishermen's Research Foundation
B	biomass
B_0	initial (unfished) biomass
BO	Biological Opinion
BREP	Bycatch Reduction Engineering Program
CDFG	California Department of Fish and Game
CFR	Code of Federal Regulations
CMM	Conservation and Management Measure
Council	Pacific Fishery Management Council
CPFV	commercial passenger fishing vessel
CPUE	catch per unit of effort
CRFS	California Recreational Fisheries Survey
DGN	drift gillnet
EEZ	exclusive economic zone
EFH	essential fish habitat
EPO	eastern Pacific Ocean
ESA	Endangered Species Act
F	fishing mortality rate
FL	fork length
FMP	fishery management plan
FR	Federal Register
HAPC	Habitat Area of Particular Concern
HMS	highly migratory species
HMS FMP	Fishery Management Plan for U.S. West Coast Fisheries for Highly Migratory Species
HMSAS	Highly Migratory Species Advisory Subpanel
HMSMT	Highly Migratory Species Management Team
IATTC	Inter-American Tropical Tuna Commission
ISC	International Scientific Committee for Tuna and Tuna-like Species in the North Pacific
IUU	illegal, unregulated, and unreported fishing
LOF	List of Fisheries
MFMT	maximum fishing mortality threshold
MMPA	Marine Mammal Protection Act
MRIP	Marine Recreational Information Program
MSA	Magnuson-Stevens Act, Magnuson-Stevens Fishery Conservation and Management Act
MSST	minimum stock size threshold
MSY	maximum sustainable yield
mt	metric ton
MUS	management unit species
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPO	North Pacific Ocean
NRIFSF	National Research Institute of Far Seas Fisheries (Japan)
ODFW	Oregon Department of Fish and Wildlife
OMB	Office of Management and Budget
OSP	Washington Ocean Sampling Program
OY	optimum yield
PacFIN	Pacific Fisheries Information Network

PIER	Pfleger Institute of Environmental Research
PIFSC	NMFS Pacific Islands Fisheries Science Center
PIRO	NMFS Pacific Islands Regional Office
PSAT	pop-off satellite archival tag
PSMFC	Pacific States Marine Fisheries Commission
RecFIN	Recreational Fisheries Information Network
RFMO	regional fishery management organization
SAC	IATTC Scientific Advisory Committee
SAFE	stock assessment and fishery evaluation
SBR	spawning biomass ratio
SCB	Southern California Bight
SEPO	Southeast Pacific Ocean
SLUTH	Swordfish and Leatherback Use of Temperate Habitat (Workshop)
SPOT Tag	smart position and/or temperature tag
SSB	spawning stock biomass
SST	sea surface temperature
SWFSC	Southwest Fisheries Science Center (NMFS)
SWR	Southwest Regional Office (NMFS)
WCPFC	Western and Central Pacific Fisheries Commission
WCPO	western and central Pacific Ocean
WDFW	Washington Department of Fish and Wildlife

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1 INTRODUCTION

1.1 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 in response to the need to coordinate state, Federal, and international management. The National Marine Fisheries Service (NMFS), on behalf of the U.S. Secretary of Commerce, partially approved the HMS FMP on February 4, 2004. The majority of HMS FMP implementing regulations became effective on April 7, 2004. Reporting and recordkeeping provisions became effective on February 10, 2005.

The HMS FMP has been amended twice since its implementation. Amendment 1, approved by NMFS on June 7, 2007, incorporates recommended international measures to end overfishing of the Pacific stock of bigeye tuna (*Thunnus obesus*). Amendment 2, approved by NMFS on June 27, 2011, makes the FMP consistent with revised National Standard 1 Guidelines.
Amendment 2 made the following changes to the HMS FMP:

- Two management unit species, bigeye thresher shark and pelagic thresher shark, are reclassified as ecosystem component (EC) species.
- Of the current 34 species identified in the FMP for monitoring purposes, six are retained as EC species.
- The international exception to setting allowable biological catches (ABCs) and ACLs are applied to the remaining 11 managed species.
- The FMP describes a process for determining the primary FMP for the purpose of identifying management reference points. Because all the managed species in the HMS FMP are also part of the Western Pacific Fishery Management Council's Pelagics Fishery Ecosystem Plan, coordination between the two councils in setting reference points is needed.
- The process described in the HMS FMP for establishing and adjusting management measures on a biennial basis also will be used to recommend changes in maximum sustainable yield (MSY), optimum yield (OY), and status determination criteria (SDC) for stocks managed under the FMP. Council-recommended changes will be reviewed by NMFS.
- The current description in the FMP of methods for determining MSY, OY, and SDC is modified slightly to more clearly specify that stock-specific considerations could be used when proposing changes to these estimates.

The HMS currently managed under the FMP are:

- Striped marlin (*Kajikia audax*[*])
- Swordfish (*Xiphias gladius)*
- Common thresher shark (*Alopias vulpinus)*
- Shortfin mako shark (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)*
- Pacific bluefin tuna (*Thunnus orientalis)*
- Dorado, a.k.a. mahi mahi or dolphinfish (*Coryphaena hippurus)*

[*] The scientific name for this species was previously *Tetrapturus audax.*

In addition, Amendment 2 added eight EC species to the FMP. The EC category is identified in the revised National Standard 1 Guidelines. The list was compiled from monitored species previously identified in the plan and by moving two management unit species to the EC category. The EC species are:

- Bigeye thresher shark *(Alopias superciliosus*)
- Common mola (*Mola mola*)
- Escolar (*Lepidocybium flavobrunneum*)
- Lancetfishes (Alepisauridae)
- Louvar (*Luvarus imperialis*)
- Pelagic sting ray (*Dasyetis violacea*)
- Pelagic thresher shark (*Alopias pelagicus*)
- Wahoo (*Acathocybium solandri*)

EC species are not considered "in the fishery" but Councils should consider measures to mitigate and minimize bycatch of these species, to the extent practicable, consistent with National Standard 9. MSY, OY, and other reference points do not need to be specified for EC species. Identification of EC species will help the Council to track these species over time, periodically evaluate their status, and assess whether any management is needed under the FMP, in which case an EC species could be reclassified as a managed species.

1.2 The Management Cycle

The HMS FMP also establishes an annual process 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. NMFS implements the Council's recommended management measures through the Federal regulatory process, if they are found to be consistent with the MSA and other applicable law. 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 unless action is taken to modify the action. 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–March 31, 2009 biennium. In 2010 the Council considered management changes for the third biennial period, April 1, 2011–March 31, 2013.

1.3 Highly Migratory Species Management Team

Current members of the HMSMT may be found in the Roster. In 2011 Mr. Kirt Hughes replaced Ms. Carol Henry as the Washington Department of Fish and Wildlife member of the HMSMT. In addition to the HMSMT, the following people contributed to the production of the 2012/2013 HMS SAFE:

- Mr. John Childers (logbook program, research and data needs)
  Supervisory IT Specialist, NMFS Southwest Fisheries Science Center
- Dr. Kit Dahl (project management, introductory material)
  Staff Officer, Pacific Fishery Management Council
- Mr. Craig D'Angelo (HMS permit program information)
  Business and Industry Specialist, NMFS Southwest Region
- Ms. Donna Dealy (commercial fisheries data)
  Computer Specialist, NMFS Southwest Fisheries Science Center
- Ms. Elizabeth Petras (protected species regulations affecting HMS fisheries)

Natural Resources Specialist, NMFS Southwest Region Protected Resources Division

1.4 Pacific Council Highly Migratory Species Activities in 2012

In 2012 the Pacific Council and its advisory Highly Migratory Species Management Team (HMSMT) and Highly Migratory Species Advisory Subpanel (HMSAS) took up HMS issues at the March, June, and November Council meetings. Written materials distributed at Pacific Council meetings (the "briefing book") and summaries of decisions taken at these meetings may be consulted for additional information.

1.4.1 North Pacific Albacore Tuna Conservation and Management

At its March, June, and November meetings the Council made recommendations on negotiations for a fishing regime for 2012 and 2013 allowing reciprocal access to each country's Exclusive Economic Zone (EEZ) pursuant to the US-Canada albacore treaty. At the March meeting the Council recommended continuation of the U.S.-Canada Albacore Treaty but with suspension of the fishing regime at least through 2012. At the June meeting the Council reaffirmed its position against a fishing regime for 2012, but recommended bilateral negotiations with Canada on a fishing regime for the 2013 fishing season. At the November meeting the Council reiterated its June recommendation that bilateral negotiations over a fishing regime for 2013 should occur. The Council made specific recommendations on issues subject to negotiations including catch attribution, sharing of data, and port access. The Council also recommended any renewed fishing regime should be based on pre-1998 levels of Canadian effort in U.S. waters.

At the March meeting the Council directed the HMSMT and HMSAS to meet with the Scientific and Statistical Committee HMS Subcommittee and others to further develop information to allow the Council to provide input on the development of a management framework for North Pacific albacore at the international level.

1.4.2 Recommendations to Regional Fishery Management Organizations

At its March meeting the Council reaffirmed their previous recommendations to the U.S. delegation to the Eighth Regular Session of the Western and Central Pacific Fishery Commission (WCPFC), which was rescheduled from December 2011 to March 2012.

At its June meeting the Council made recommendations to the US delegation to the WCPFC Northern Committee (NC) on the adoption of biological reference points under the proposed management framework for North Pacific albacore tuna as described in the Agenda Item E.2.b, HMSMT Report. The Council recommended the US delegation request the NC conduct a management strategy evaluation to support development of the management framework.

At its September meeting the Council was briefed by NMFS about the outcomes of the September 3-6, 2012, Northern Committee meeting and the July 18-23, 2012, meeting of the International Scientific Committee for Tuna and Tuna-Like Species in the North Pacific Ocean (ISC).

At its November meeting the Council made several specific recommendations to the U.S. delegation to the Ninth Regular Session of the WCPFC. These are itemized in the Decision Summary Document.

1.4.3 Management of the West Coast Swordfish Fishery

At its March meeting, as a follow-up to the NMFS sponsored U.S. West Coast Swordfish Workshop, the Council directed its HMS advisory bodies to determine if any changes can be made to the closure dates for, and/or the southern boundary of, the Pacific Leatherback Conservation Area (PLCA) in order to

enhance the economic viability of the California drift gillnet fishery. In addition, they requested NMFS to determine the feasibility for establishing hard take caps for Endangered Species Act-listed sea turtles in the drift gillnet fishery to mitigate bycatch impacts. The Council requested a progress report on this task at its March 2013 meeting.

1.4.4 Biennial Management

No proposals were forwarded for changes to HMS management measures for the April 1, 2013 to March 31, 2015 biennial management period. The Council also decided not to reevaluate or revise current management reference point estimates at this time as described in the HMS FMP.

2 FISHERY MANAGEMENT REGULATONS

2.1 Regulations Currently In Place

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, five HMS FMP regulatory amendments have been prepared and finalized since the original final rule was put in place along with the recent implementation of regulatory measures in support of the HMS FMP Amendment 2.

Table 2-1. History of HMS FMP domestic 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
Establishment of an HMS Permit Fee	74 FR 37177	7/28/09	08/27/09
Amendment 2 to the HMS FMP, Annual Catch Limits and Accountability Measures	76 FR 56327	9/13/11	10/13/11

- For a description of these HMS regulations see previous SAFE documents
- 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 (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.

The HMS FMP identified 13 highly migratory species as management unit species and defines the legal gear types and management measures used to harvest them. The final rule implementing FMP Amendment 2 modified the suite of management unit species (MUS) from 13 species to 11 species. The final rule also modifies the process for revising and seeking NMFS approval for numerical estimates of maximum sustainable yield and optimal yield, and specifies status determination criteria so that overfishing and overfished determinations can be made for stocks and stock complexes that are part of a fishery. The 11 MUS will fall under the international exception for setting annual catch limits (ACLs), as described at §660.310(h)(2)(ii).

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 and for Western Pacific longline permitted vessels landing into West Coast ports.

Regulations for HMS in Washington, Oregon, and California vary from state to state. The HMS FMP contains Federal measures for HMS fisheries, which provide a region-wide management regime applicable to all vessels landing in West Coast ports. State regulations not superseded by the initial Federal regulations will continue to remain in effect until such time as the Pacific 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 Pacific 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 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 framework procedures of the HMS FMP.

2.1.1 HMS Commercial Gear

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

Surface Hook-and-Line: One or more hooks attached to one or more lines (includes troll, rod and reel, handline, albacore jig, live bait, and bait boat; excludes pelagic longline and mousetrap gear[1]). 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.

[1] 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.

2.1.2 HMS Recreational Gear

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

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

Hook-and-Line: One or more hooks attached to one or more lines (excludes mousetrap gear, see footnote 1).

2.1.3 Landings and Gear Use Regulations

At this time there are no quotas for HMS species, although there are harvest guidelines. A quota is a specified numerical harvest objective, the attainment of which triggers the closure of the fishery or fisheries for that species. A harvest guideline is a numerical harvest level that is a general objective and is not a quota. If 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.

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 while targeting HMS, unless other provisions for their disposition are established in accordance with HMS FMP guidelines.

Table 2-2. 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*

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. (See also Small Entity Compliance Guide Outlining the Regulations to Implement Shark Finning Prohibition Act.) 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.

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.

2.1.4 Incidental Landings

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

Small-mesh drift gillnetters and bottom set net gillnetters are not 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% of total landings by weight of HMS sharks, whichever is greater.

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

A drift gillnet vessel with a stretched mesh size less than 14 inches may not 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, swordfish or other HMS species for commercial purposes with gillnets in State waters. It is also unlawful, based on a 2009 Oregon State regulation change, to land any of these species in Oregon if taken with gillnets, including fish taken outside State waters. However, thresher shark, swordfish, or other HMS species taken with authorized commercial gear (i.e., approved gear other than gillnet) may be landed in Oregon provided that the gear and catch are in compliance with all other applicable regulatory measures.

2.2 Monitoring and Enforcement

2.2.1 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 HMS within the U.S. EEZ 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 2.2-1 shows the number of HMS permits active by year. The permit data presented reflects valid permits and does not necessarily reflect total number of active vessels (i.e., vessels with catch and effort history in a given fishery year).

Table 2-3. 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
2008	826	569	331	84	1,810
2009	903	650	381	54	1,988
2010	887	620	383	80	1,970
2011	862	650	340	106	1,958
2012	826	625	348	113	1,912

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.

2.2.2 Compliance Check

During 2012 there were 73 commercial fishing vessels identified as having landed HMS without a valid permit. In addition, 21 CPFV vessels were identified as having targeted HMS without a permit. Vessels which appeared to be in noncompliance with regulations were sent a certified warning letter or referred to the NOAA Fisheries Office for Law Enforcement.

2.2.3 HMS Fisheries Data Collections

Catch, effort, size composition, and landings data are critical for monitoring HMS fisheries and assessing the status of HMS stocks. The SWFSC monitors seven Pacific Ocean HMS fisheries. Logbook, observer, landing, and size composition data from these fisheries come from various sources, as shown in Table 2.2-2.

Table 2-4. Summary of HMS Pacific Ocean fisheries monitored by SWFSC and monitoring methods..

Fishery	Logbooks	Observer	Landings	Size Composition
North Pacific Albacore Troll	F		P/S/I	D
Large Mesh Drift Gillnet	S	F	P	O
Harpoon	S		P	
EPO Purse Seine	I	I	C/P	D
California Longline	F	F	H	H
California HMS Sport	S			D (PBF)
Albacore Sport (OR/WA)	F			

LEGEND F – federal P – PacFIN O – observer
S – state C – cannery D – dock-side
I – international H - Hawaii

All HMS permit holders, 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 fishing trip must be submitted to NMFS within 30 days of the end of each trip. Each form must be signed and dated by the fishing vessel operator.

Logbooks from a total of 1,968 North Pacific albacore trips (including both albacore troll and pole-and-line gears) were submitted to the SWFSC in 2012 compared to 1,647 logbooks that were submitted in 2011. A total of 14,137 mt of albacore was landed by albacore troll and pole-and-line vessels in 2012 compared to 11,037 mt in 2011. A total of 12,228 mt of albacore were recorded as catch in mandatory logbook submissions for 2012 compared to 8,560 mt in 2011. This equates to an 86% logbook coverage rate estimate for 2012 based on landing weights. (Note that these catch estimates match those submitted by NMFS to RFMOs, but may not match data in relevant tables elsewhere in this report. The estimation process for RFMO submissions uses other data such as state port sampling reports and foreign fishing agency reports, in addition to PacFIN landings.) In 2012 port samplers collected 852 length-frequency (LF) samples and measured 82,807 fish compared to 670 samples collected and 69,756 fish measured in 2011.

The CDFW implemented a harpoon logbook and permit program in 1974 (see section 3.1). Logbooks are submitted to CDFW and forwarded to SWFSC for editing and keypunching. According to logbooks provided to SWFSC, in 2012 11 vessels fished 125 days compared to 14 vessels that fished 211 days in 2011. Comparisons of logbooks to landings data indicate that logbook coverage is not 100%.

The gillnet logbook program was implemented in 1980 by the CDFW (see section 3.1). Logbooks are submitted to CDFW and forwarded to SWFSC for editing and keypunching. In 2012, 16 vessels submitted logbooks resulting in 277 vessel-days of effort. In 2011, 21 vessels submitted logbooks resulting in 399 vessel-days of effort. Comparisons of logbooks to landings data indicate that logbook coverage is not 100%.

Purse-seine vessels based on the west coast primarily target CPS but occasionally target HMS (albacoreor bluefin tuna) when they are available and market conditions are favorable (see section 3.1). Logbook data are required to be submitted to NMFS when these vessels target HMS.

Participants in the west-coast based longline fisheries submit logbook data to SWFSC. Logbook data are maintained at SWFSC and are combined with Hawaii longline data for international reporting. PacFIN data are not used in the estimation of total annual catch estimates for Pacific HMS pelagic longline fisheries.

CPFV vessel owners based in California submit logbook data to CDFW who in turn make the data available to SWFSC. SWFSC staff extracts and summarize the HMS component of the data for reporting purposes. CPFV fisheries in Washington and Oregon occasionally target albacore during the summer months when fish are close enough to shore. When targeting albacore, CPFV vessel owners complete a CPFV logbook and submit the data to SWFSC where the data are maintained and combined with summarized CPFV data from California.

2.2 Protected Resources Regulations

2.2.1 HMS FMP Protected Species Measures

Longline and drift gillnet vessels on rare occasions encounter endangered and threatened species of sea turtles and marine mammals while targeting HMS. HMS longline vessels also infrequently encounter a number of sea birds. Endangered and threatened marine species are protected through a number of

Federal laws, including the ESA and the MMPA. The HMS FMP final rule (69 FR 18444) adopted measures to minimize interactions of HMS gears with protected species and to ensure that the HMS fisheries are operating consistent with Federal laws. 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 of the HMS FMP on ESA-listed protected resources (including marine mammals and sea turtles) were analyzed as part of the section 7 consultation and 2004 biological opinion (BO). 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 fish species (see Table 2.3-1). Except where noted, the anticipated mortalities are annual estimates. The BO considered the impacts of the proposed shallow-set longline fishery and found that the fishery was likely to jeopardize the continued existence of threatened loggerhead sea turtles. As a result, the shallow-set longline HMS fishery was prohibited.

Table 2-5. Anticipated incidental takes of ESA-listed marine mammal and sea turtle species in the drift gillnet HMS fishery.

Species	Estimated Entanglements*	Estimated Mortalities*	Typical 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

Notes: SST – sea surface temperature.

*Except where noted, the numbers below are annual estimates. For species like green, olive ridley, or loggerhead sea turtles, the number is applied over a calendar year when the environmental conditions conducive to expected takes in the CA/OR drift gillnet fishery have been present.

In early 2011, NMFS completed a BO on the deep-set longline component of the HMS fishery. When the 2004 BO was completed, there was no deep-set longline fishing effort, so there was no analysis done. However, since 2005 there has been deep-set longline fishing in the high seas, and NMFS was required to complete an Environmental Assessment and BO. The take of ESA-listed species in the deep-set longline fishery is rare, and the fishery is observed at 100%. The anticipated incidental take is shown in Table 2.3-2. No ESA-listed marine mammals are expected to be taken in the deep-set longline fishery.

Table 2-6. Anticipated number of turtle entanglements and associated mortality from the deep-set longline HMS fishery during 2011-2013.

Species	Estimated entanglements (mortality) in three years
Green turtle	1
Leatherback turtle	1
Olive Ridley turtle	3
Loggerhead turtle	1

2.2.2 Sea Turtles

Takes of green, olive ridley and loggerhead sea turtles are uncommon in the California drift gillnet fishery 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. Takes of leatherbacks are also rare, likely due to the time/area closure which has been in effect since the 2001 season and subsequent reductions in fishing effort. Since 2001, only two leatherbacks have been observed taken (released alive) in the drift gillnet fishery, one in 2009 and another in October 2012.

On January 29, 2012 NMFS published a final rule that designates areas off the U.S. west coast as critical habitat for endangered leatherback sea turtles (77 FR 4170). The final rule designates as critical habitat an area of approximately 41,914 square miles from Point Arguello to Point Arena, California, and from Cape Blanco in Oregon to Cape Flattery, Washington.

On September 22, 2011, NMFS and the U.S. Fish and Wildlife Service published a final rule to list nine distinct population segments (DPSs) of the loggerhead turtle (*Caretta caretta*) pursuant to the ESA. The next step in the listing process is to consider designation of critical habitat for the two DPSs that occur within the EEZ of the United States: the North Pacific DPS (listed as endangered) and the Northwest Atlantic DPS (listed as threatened). A loggerhead critical habitat review team was formed in late 2011, met January 24-26, 2012, and are currently preparing documents associated with a critical habitat designation, if warranted. Under section 4(b)(2) of the ESA, NMFS and the U.S. Fish and Wildlife Service shall designate critical habitat on the basis of the best scientific data available and after taking into consideration the economic impact, the impact to national consideration, and any other relevant impact. The proposed rule is expected to publish in 2013.

2.2.3 Marine Mammals

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. The last 101(a)(5)(E) permit was completed in September 2007 with a Federal Register Notice published on October 26, 2007 (72 FR 60816). The three-year permit expired on October 26, 2010. The Southwest Regional Office's Protected Resources Division is in the process of evaluating the estimated takes of ESA-listed marine mammals (fin whales, blue whales, and humpback whales) in the California drift gillnet fishery. A draft negligible impact determination was under review in 2012.

The MMPA requires that all commercial fisheries in the U.S. be categorized and included on an annual List of Fisheries. 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:

- **I.** **frequent** incidental mortality or serious injury of marine mammals
- **II.** **occasional** incidental mortality or serious injury of marine mammals
- **III.** **remote likelihood of/no known** incidental mortality or serious injury of marine mammals

The final 2012 LOF was published on November 29, 2011 (76 FR 73912). The drift gillnet HMS fishery is listed as a Category II fishery. The tuna purse seine fishery and pelagic longline fishery are listed as Category III fisheries. The 2013 LOF was delayed and was published in 2013.

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 are available on the NOAA Fisheries website. Owners of vessels in Category I or II 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.

2.3 International Management

2.3.1 IATTC Outcomes

The following summary is excerpted from a letter from Mr. Rodney McInnis to Council Chair Mr. Don Wolford on June 19, 2013, describing the outcomes of the 85th Meeting of the Inter-American Tropical Tuna Commsion (IATTC) held in Veracruz, Mexico, June 13-14, 2013.

The United States was represented at this meeting by three of the four U.S. Commsioners, which included Don Hansen, Ed Stockwell, and Mr. Rodney McInnis. The Department of State was represented by two staff members including Council member David Hogan. The rest of the U.S. delegation was comprised of NOAA and NMFS staff as well as members of the U.S. fishing industry. Both Pacific Council and Western Pacific Council staff were also part of the U.S. delegation. Other U.S. observers of the meeting included Pew Chariatable Trusts, Defenders of Wildlife, and the International Sustainable Seafood Foundation.

A Resolution on the Conservation and Management of Tropical Tunas

A proposal was adopted that amends Resolution C-12-01 on tuna conservation. This Resolution extends the current conservation measures for yellowfin, bigeye, and skipjack tunas for both purse seine and longline fisheries for three additional years; unless stock assessment results indicate that an earlier change is needed.

Specifically, the IATTC agreed for 2014 through 2016 to: 1) a closure for all purse seine vessels for a period of 62 days; 2) a 30-day closure for all purse seine fishing in the area known as the Corralito for additional bigeye tuna protection; 3) a continuation of the annual bigeye tuna catch limits for large scale longline fleets including 500 metric ton bigeye tuna limit in the U.S. longline fishery in the eastern Pacific Ocean for vessels over 24 meters in length from; and (3) renewal of the tuna retention program that requires all bigeye, skipjack, and yellowfin tuna caught by a purse seine vessel of class sizes 4-6 (i.e., larger than 182 cubic meters carrying capacity) be retained on board and landed, except fish deemed unfit for human consumption for reasons other than siz e and the single exemption of this would be during the final set of a trip, when there may be insufficient well space remaining to accommodate all of the tuna caught in that set.

The proposed and final rulemaking implementing these measures will take place over the next several months and is anticpated to be in effect by early January 2014. This rulemaking amends regulations governing the longline and purse seine fisheries targeting tuna and tuna-like species in the eastern Pacific Ocean (EPO), and will be issued under authority of the Tuna Conventions Act of 1950.

Measures for the Conservation and Management of North Pacific Blue/in Tuna in the EPO

A Resolution for the conservation and management' of Pacific bluefin tuna was jointly submitted by Japan, Korea and Mexico and was adopted by the IATTC. The measure is effective for 2014 only, and inludes a catch limit of 5,000 metric tons for commercial fleets in the EPO. As is currently the case, there is a provision for 500 metric tons for nations that have historically fished Pacific bluefin tuna in the EPO. Because the effect of fisheries in the western and central Pacific ocean (WCPO) is much greater than in the EPO, this Resolution contains a strong message to the Western and Central Pacific Fisheries Commission (WCPFC) that they should take effective measures to reduce fishing mortality in the WCPO. The Resolution indicates that continuation of conservation measures in the EPO beyond 2014 will be contingent upon effective action in the WCPFC. NMFS is currently undertaking

rulemaking under the Tuna Conventions Act and antipates that this measure will be effective in early January 2014.

Resolution for the Collection and Analyses of Data on Fish Aggregating Devices (FADs)

A resolution requiring the identification/marking of FADs and reporting of the deployment, use, catch, bycatch, shark and turtle entanglements, retrieval,and design of FADs was adopted. The provision requires that each member nation begin collecting data on FADs by January 1of 2015. The data could be collected via logbooks or other domestic reporting requirments and NMFS is currently evaluating how to proceed. By the annual meeting of the IATIC in 2016, the scientific staff must analyze the data collected and make recommendations for managing FADs. This resolution also prohibits intentional setting of purse seines around whale sharks and requires release of whale sharks that are encircled non-intentionally.

Supplemental Resolution on North Pacific Albacore

A joint Canada and U.S. proposal was adopted that requires reporting of catch and effort in fisheries that target albacore and fisheries that land albacore that were caught incidentally to other target species. This Resolution supplements existing Resolution C-05-02 that calls on IATIC Members to not allow their fishing effort on albacore to increase beyond current effort levels. The new data reporting requirement for this supplemental Resolution will be completed by December 2013.

Additional Information

Many additional resolutions were considered, including a hammerhead shark catch prohibition, a more general shark conservation measure, port state measures, IUU identification procedure clarification, catch documentation scheme proposal, and data confidentiality changes. Although progress toward consensus on many of these proposals occurred, they were ultimately objected to by at least one party and will need to be resubmitted prior to next year's meeting. The United States supports many of the provisions within those proposals not adopted and therefore plans to work intersession ally with particular nations in the hopes of moving toward future consensus on the conservation and management of marine resources in the EPO.

Reference Points Recommended by IATTC Staff

As an interim measure, IATIC staff recommended that the Commission adopt specific target and limit reference points that were approved by the Indian Ocean Tuna Commission (IOTC). Many nations could not support this recommendation noting that there is not enough of a scientific basis to adopt these interim measures and any measures that are adopted should be specific to EPO fisheries. The U.S. and other nations encouraged the IATTC to prioritize this issue for their scientific staff and Scientific Advisory Committee, and that by next year's meeting develop specific target and limit reference points to be discussed. Further, member nations noted that any such target and limit reference points should be developed in conjunction with other tuna RFMOs.

Appointment of IATTC Director

Unfortunately, the IATIC was not able to agree upon a process for appointing a new Director or reappointing the current Director. The term of the current Director is defined in the Antigua Convention as four years. That term expires in August 2014. lntersessional work will need to be done if the IATIC is to avoid a lapse in the Directorship.

Meeting of the Working Group for the Review of Implementation of Measures Adopted by the Commission

During the review by all Parties of the progress in implementing the measures adopted by IATIC, the United States noted that it has not yet completed domestic regulations to require all vessels 24 meters in length or greater {subject to Resolution C-04-06, on Vessel Monitoring Systems (VMS)) to carry a VMS. The U.S. noted that we are currently pursuing rulemaking for those vessels not yet covered. Unfortunately, Mexico continued to press the issue questioning if U.S. vessels 24 meters or greater in length that are not now carrying VMS are IUU fishing. In developing the new VMS regulations, NMFS will make use of VMS equipment that is already required on U.S. vessels and will attempt to integrate this requirement with other VMS requirements.

Cooperating Non-Member Appointments

Four cooperating non-member applications were approved for 2013 (Bolivia, Cook Islands, Honduras, and Indonesia). Bolivia and Cook Islands were renewed while Honduras and Indonesia were new applications.

86th Meeting of the IA ITC

The 2014 IATIC annual meeting will be held in Lima, Peru. Dates were not confirmed during this meeting, but preliminary discussions focused on holding the meeting during the first two weeks of July.

2.3.2 WCPFC Outcomes

The following summary is excerpted from a December 18, 2012, letter from Mr. Michael Tosatto to Council Chair Dan Wolford describing the outcomes of the Ninth Regular Session of the Western and Central Pacific Fisheries Commission (WCPFC or Commission), held in Manila, December 2-6, 2012.

Conservation and management measure for tropical tunas

The Commission adopted CMM 2012-01, "Conservation and Management Measure for Bigeye, Yellowfin and Skipjack Tuna in the Western and Central Pacific Ocean" as a successor to the existing measure for tropical tunas. Under the new measure, WCPFC Members, Cooperating Non-members and Participating Territories (CCMs) are obligated to implement specific provisions for the year 2013 only. For the United States, those obligations include a number of requirements for the purse seine fishery that are similar to those under CMM 2011-01, and for the longline fishery, a bigeye tuna catch that is identical to the annual limits for the years 2009- 2012 (3,763 mt).

NMFS intends to promulgate regulations under the authority of the Western and Central Pacific Fisheries Convention Implementation Act (WCPFC IA) to implement both the purse seine and longline elements of the new management measure for 2013. Since the Western Pacific Fishery Management Council's Amendment 7 to the Fishery Ecosystem Plan for Pelagic Fisheries of the Western Pacific, regarding arrangements with the U.S. territories will soon be transmitted for Secretarial review, we will need to consider that amendment and implementing regulations.

Conservation and management measure for whale sharks

The Commission adopted a conservation and management measure that prohibits the intentional setting of purse seines on whale sharks. NMFS intends to implement this prohibition through regulations under the authority of the WCPFC Implementation Act.

Conservation and management measure for seabirds

The Commission revised its management measure for seabirds (currently CMM 2007-04). The main changes in the new measure relate to mitigation measures required to be used by longline vessels in the Convention Areas south of 30° South. The United States does not have any seabird mitigation requirements that apply in that area, but as we have advised the Councils in the past, the Councils could consider developing such measures if warranted by anticipated changes in longline fishing grounds. The new management measure also includes minor revisions to the mitigation requirements required to be used north of 23° North. NMFS does not intend to take any regulatory action to implement those revisions, but we encourage the Councils to review the revised measure and assess whether changes to our domestic requirements would be appropriate.

Conservation and management measure for Pacific bluefin tuna

The Commission adopted a revised management measure for Pacific bluefin tuna. The main provisions of the measure, which call for effort and catch limits in fisheries that target Pacific bluefin tuna, are applicable only in 2013. Since the United States does not have any fisheries in the Convention Area that target Pacific bluefin tuna, NMFS does not intend to take any regulatory action to implement the revised measure.

IATIC-WCPFC area of overlap

The Commission adopted a plan for management of the area of overlap between the Inter- American Tropical Tuna Commission's (IATTC) and WCPFC's respective Convention Areas, including an interim approach that calls for each CCM that is a member of both organizations to choose to apply in the overlap area the decisions of one organization or the other for a period of not less than three years. As the United States is a member of both the WCPFC and the IATIC, this decision could lead to regulatory implications for the United States. Although the majority of the provisions in the decision were recommended to the WCPFC by the IATIC through recommendations adopted at an extraordinary meeting of the IATIC in October, NMFS will confirm with the IATIC that their action is also final. NMFS is analyzing this decision and its impacts on the regulations for both Convention Areas. Regulatory action may be needed to implement this decision.

Vessel Monitoring System (VMS)

The Commission agreed on terms and conditions for the application of the Commission VMS to the national waters of CCMs. This decision will allow NMFS to exchange VMS data with the Commission VMS program and to receive notification when non-U.S. vessels on the Commission VMS enter the U.S. EEZ. The Commission also adopted a specific date for application of VMS requirements to vessels operating in the northwest quadrant of the Convention Area.

Other decisions

In addition to the measures described above, the Commission made a number of decisions that dealt with

procedural and other matters that require no regulatory action by the United States. These decisions included extending the Commission's compliance monitoring scheme for another year, extending the Commission's charter notification scheme for another three years, adopting a specific date for application of vessel observer requirements to fresh-fish vessels operating in the area north of 20° North, forming a working group to develop a Commission catch documentation scheme, and adopting a road map for developing management objectives and associated reference points.

3 DESCRIPTON OF FISHERIES AND STATISTICAL SUMMARIES OF CATCH, REVENUE AND EFFORT

3.1 Commercial Fisheries

3.1.1 Surface Hook-and-Line Fishery for Albacore

Albacore is an economically valuable fishery in all three West Coast states and has been a target of commercial fishermen for more than 100 years. Troll and bait boat (live bait) are the principal commercial gears, although some albacore is caught using purse seine, longline, and drift gillnet gear as well. The fishing season varies from year to year, depending on oceanographic conditions, which strongly influence the occurrence of fish within range of the West Coast fleet, and economics. A typical season runs July through October, with landings peaking in August-September. 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, from 3–200 nautical miles from the West Coast) and for U.S. vessels that pursue HMS on the high seas (seaward of the EEZ) and land their catch in California, Oregon, or Washington.

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 or frozen, then exported to overseas markets for processing. Comparing the 1980s to the 2000s, participation in California (measured by the number of surface hook-and-line vessels annually landing albacore) declined by 64% while participation in Oregon and Washington increased by 62% and 130% respectively. Overall, the coastwide decline was 13% based on this metric. In 2012 815 surface hook-and-line vessels landed albacore in West Coast ports, generating $13.85 million in ex-vessel revenue. Albacore landings by weight were 26% higher in 2012 compared to 2011.

These trends likely reflect a shift in fishing effort into waters off Oregon and Washington where albacore have been more available due to favorable oceanographic conditions. In recent years lower operating costs and better landing facilities in Oregon and Washington compared to California may also have contributed to this shift.

3.1.2 Drift Gillnet Fishery for Swordfish and Shark

California's swordfish fishery transformed from primarily a harpoon fishery to a drift gillnet fishery in the early 1980s; landings soared to a historical high of 2,198 mt by 1985. 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, with 228 vessels landing more than 1,000 mt of shark in 1985. Following 1985, swordfish replaced thresher shark as the primary target species because there was a greater demand for swordfish which commanded a higher price-per-pound and possibly also due to the 1986 establishment of a shark conservation measure. 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.

The drift gillnet fishery is managed by a limited entry permit system, with mandatory gear standards and seasonal area closures used to address various conservation concerns. The permit is linked to an individual fisherman, not a vessel, and is only transferable under very restrictive conditions; thus the value of the vessel does not become artificially inflated. 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 for U.S. vessels that pursue HMS on the high seas (seaward of the EEZ) and land their catch in California, Oregon, or Washington. About 150 permits were initially issued when the limited entry program was established in 1980 and peaked at 251 permits in 1986. In recent years the number of extant permits has declined below 50.

Historically, the California drift gillnet fleet operated within EEZ waters adjacent to the state and as far north as the Columbia River, Oregon, during El Niño years. In addition some Oregon-based vessels participated in this fishery. In Oregon, the DGN fishery for swordfish had been managed under the Developmental Fisheries Program, which authorized up to ten annual permits to fish for swordfish with DGN gear. For the past several years, the fishery was inactive and no one applied for permits. As part of a substantial reduction in the Developmental Fisheries Program, the Oregon Fish and Wildlife Commission removed swordfish from the program, beginning in 2009. Consequently, state permits to fish with DGN gear off Oregon are no longer allowed.

Fishing activity is highly dependent on seasonal oceanographic conditions that create temperature fronts which concentrate feed for swordfish. Because of the seasonal migratory pattern of swordfish and seasonal fishing restrictions, over 90% of the fishing effort in recent years has occurred from August 15 through January 31.

The drift gillnet fishery has been subject to a number of seasonal closures over the years. Since 1982, the drift gillnet fishery has been closed inside the entire West Coast EEZ from February 1 to April 30. In 1986, a closure was established within 75 miles of California mainland from June 1 through Aug 14 to conserve common thresher sharks; this closure was extended to include May in 1990 and later years. 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 EEZ 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 leatherback sea turtles. A smaller closure was implemented to protect Pacific loggerhead turtles from drift gillnet gear during a forecasted or concurrent 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 the leatherback closure was enacted the number of active participants in the drift gillnet fishery declined by nearly half, from 78 vessels in 2000 to 40 in 2004, and has remained under 50 vessels since then.

As indicated above, both participation and fishing effort (measured by the number of sets) have declined over the years. Industry representatives attribute the decline in vessel participation and annual effort to regulations implemented to protect marine mammals, endangered sea turtles, and seabirds. In addition, if oceanic or other conditions are unfavorable for swordfish, permittees may concentrate on more favorable fisheries, such as albacore; however, permittees may return to swordfish fishing once conditions improve.

3.1.3 Harpoon Fishery for Swordfish

California’s modern 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 gillnet fishery was authorized by the State Legislature and soon afterward drift gillnets

replaced harpoons as the primary method for catching swordfish. The number of harpoon permits subsequently decreased from a high of 1,223 in 1979 to a low of 25 in 2001. Fishing effort typically occurs in the Southern California Bight 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 plane, but at higher operating cost.

A state permit and logbook are required to participate in the harpoon fishery 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 for U.S. vessels that pursue HMS on the high seas (seaward of the EEZ) and land their catch in California, Oregon, or Washington.

3.1.4 High Seas Longline Fishery for Swordfish and Tuna

California prohibits pelagic longline fishing within the EEZ and the retention of striped marlin. Both these prohibitions are incorporated in the Council's HMS FMP. Longline vessels fishing outside the West Coast EEZ intermittently land swordfish and tuna in West Coast ports.

Vessels operating outside of the EEZ can land fish in West Coast ports if the operator has the necessary state and Federal permits. 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, or Washington.

With implementation of the HMS FMP in 2004, federal regulations were promulgated to protect endangered sea turtles east and west of 150° W longitude and north of the equator, prohibiting West Coast-based shallow-set longline fishing to target swordfish. Vessels permitted under the Western Pacific Fishery Management Council's Pelagics FMP may use shallow-set longline gear to target swordfish and may land their catch on the West Coast. West Coast swordfish landings by Hawaii-based vessels have trended upward since the fishery reopened in 2004. Landings have occurred almost exclusively in California ports.

Targeting tunas with deep-set longline gear is permitted outside the EEZ under the HMS FMP. Currently only one vessel on the west coast participates in the tuna longline fishery.

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

U.S. West Coast catch of yellowfin, skipjack, and bluefin tuna represents a relatively minor component of overall eastern Pacific Ocean (EPO) tuna catch, on average equaling approximately less than 1% of EPO-wide landings. More than 90% of the catch for these species in the U.S. EEZ EPO 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, typically during periodic El Niño episodes, bring these species within range of the coastal purse seine fleet. Similarly, purse seine vessel operators will target the higher-valued temperate water bluefin tuna when they enter the coastal waters of the SCB. The number of purse seine vessels that landed tuna in California averaged 197 annually 1981-90 but subsequently declined substantially to an annual average of 4 in the 2003-2012 period.

The decline in the number of domestic vessels is correlated with the relocation of large cannery operations. Increased labor costs for cannery operations contributed to these facilities being moved overseas, where labor costs are less. Currently there are no canneries in California functioning as primary offloaders of tuna.

The HMS FMP requires a logbook and federal permit with a purse seine gear endorsement for all U.S. vessels that use purse seine gear to fish for HMS within the West Coast EEZ and for U.S. purse seine vessels that pursue HMS on the high seas (seaward of the EEZ) and land their catch in California, Oregon, or Washington.

3.1.6 Commercial Fishery Landings and Revenue Tables

NMFS staff, Council staff, and the HMSMT are in the process of revising the HMS SAFE PacFIN table series. These revisions include changes to fishery definitions within the PacFIN database and table production methods. Production of the new table series (through 2013) is targeted for mid 2014. In the interim an abbreviated set of tables has been produced.

Notes

- PacFIN species codes (sp.spid), see Table 3-11, and state gear codes (ft.agid||ft.gear), see Table 3-12, were used to compile the data in these tables.
- Landings in pounds were converted to round weight in metric tons by multiplying landed weights by the conversion factors in each fish ticket line, then dividing by 2204.6. Values were rounded to one decimal in database extraction and rounded to whole metric tons in post processing.
- Except as noted, 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. Dollar values are divided by 1,000 and rounded to one decimal place in data extraction and rounded to $1,000 in post processing. To compute real (inflation adjusted) revenues were adjusted to 2012 values during post processing using the US Bureau of Economic Analysis Table 1.1.9 (Implicit Price Deflators for Gross Domestic Product). See Table 3-13.
- Nominal revenues computed without adjusting for inflation.
- Vessel counts determined by counting unique vessel identifier values (drvid); all dummy ids (usually assigned to tribal vessels) counted as a single vessel.
- Aquaculture fish ticket / fish ticket line information is excluded from the data.
- Tribal landings are included.
- Only landings to West Coast (California, Oregon, and Washington) ports are included.
- Data extracted from PacFIN on December 26, 2013.
- To obtain these tables in Excel Workbook format visit the Council website at www.pcouncil.org.

Table 3-1. West Coast commercial HMS landings (round mt), nominal revenue ($1,000s), and average prices ($/lb) by species, 2011-2012.

		2011			2012		
Species		Landings (mt)	Ex-vessel revenue ($1000)	Average price ($/lb)	Landings (mt)	Ex-vessel revenue ($1000)	Average price ($/lb)
Tunas	Albacore	11,050	$43,390	$1.78	13,904	$45,745	$1.49
	Bigeye Tuna	46	$327	$3.23	49	$367	$3.39
	Bluefin Tuna	118	$247	$0.95	43	$96	$1.02
	Skipjack Tuna	1	$2	N.A.	1	$2	N.A.
	Unspecified Tuna	*	*	N.A.			N.A.
	Yellowfin Tuna	4	$14	N.A.	2	$13	N.A.
Swordfish		619	$3,353	$2.46	403	$2,092	$2.36
Sharks	Blue	<0.5	<$1	N.A.	<0.5	<$1	N.A.
	Common Thresher	76	$105	$0.63	70	$114	$0.74
	Shortfin Mako	19	$38	$0.90	27	$53	$0.89
Dorado		3	$11	N.A.	10	$36	$1.60
Total HMS		11,937	$47,488		14,509	$48,518	

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

Blank cells indicate null value (no data exist for that stratum).

If landings less than 5 mt average price per pound not reported.

Revenues are not adjusted for inflation.

Average prices are estimated as revenue divided by round pounds

Table 3-2. West Coast commercial HMS landings (round mt), nominal revenue ($1,000s), and average prices by fishery, 2011-2012.

	2011			2012		
Fishery	Landings (mt)	Ex-vessel revenue ($1000)	Average price ($/lb)	Landings (mt)	Ex-vessel revenue ($1000)	Average price ($/lb)
Surface hook and line	10,968	$43,123	$1.78	13,877	$45,614	$1.49
Drift gillnet	219	$981	$2.03	200	$986	$2.23
Harpoon	26	$255	$4.49	5	$60	N.A.
Longline	573	$2,816	$2.23	361	$1,724	$2.17
Purse Seine	140	$293	$0.95	38	$68	$0.80
Not HMS gear	11	$20	$0.81	27	$66	$1.10
Total	**11,937**	**$47,488**		**14,508**	**$48,518**	**N.A.**

If landings less than 5 mt average price per pound not reported.

Revenues are not adjusted for inflation.

Average prices are estimated as revenue divided by round pounds.

Data for Canadian surface hook-and-line vessels fishing in the U.S. EEZ are excluded from the table

Table 3-3. West Coast commercial landings (round mt) of HMS by all HMS and non-HMS gears, 1981-2012.

	Tunas								Sharks				
Year	No. Vessels	Albacore	Bluefin Tuna	Yellowfin Tuna	Bigeye Tuna*	Skipjack Tuna*	Unspecified Tuna*	Swordfish	Blue Shark	Common Thresher Shark	Shortfin Mako Shark	Dorado*	Total
1981	2,231	13,712	868	76,091	1,168	57,869	40	749	92	1,521	182	4	152,298
1982	1,266	5,410	2,405	61,769	968	41,904	51	1,112	27	1,849	351	1	115,846
1983	2,058	9,578	764	55,741	21	44,995	56	1,763	7	1,331	217	1	114,474
1984	1,553	12,654	636	35,063	126	31,252	1,015	2,890	2	1,279	160	4	85,078
1985	1,248	7,301	3,254	15,025	7	2,977	469	3,418	1	1,190	149	<0.5	33,790
1986	926	5,243	4,732	21,517	29	1,361	143	2,530	2	974	312	2	36,843
1987	990	3,160	823	23,201	50	5,724	129	1,803	2	562	403		35,855
1988	964	4,912	804	19,520	6	8,863	11	1,636	3	501	322	<0.5	36,577
1989	730	2,215	1,019	17,615	1	4,505	77	1,358	6	504	255	<0.5	27,555
1990	769	3,028	925	8,509	2	2,256	46	1,236	20	357	373	1	16,752
1991	500	1,676	104	4,178	7	3,407	12	1,029	1	584	219	<0.5	11,217
1992	963	4,902	1,087	3,350	7	2,586	10	1,546	1	292	142	3	13,926
1993	931	6,166	559	3,795	26	4,539	16	1,767	1	275	122	17	17,281
1994	984	10,752	916	5,056	47	2,111	33	1,700	12	330	128	41	21,124
1995	738	6,530	714	3,038	49	7,037	1	1,162	5	270	95	5	18,906
1996	949	14,173	4,688	3,347	62	5,455	3	1,198	1	319	96	10	29,352
1997	1,405	11,292	2,251	4,775	83	6,070	11	1,459	1	320	132	5	26,398
1998	1,068	13,915	1,949	5,799	53	5,846	12	1,408	3	361	101	3	29,449
1999	993	9,770	186	1,353	108	3,759	12	2,033	<0.5	320	63	18	17,622
2000	961	9,074	313	1,159	86	780	1	2,645	1	296	80	43	14,478
2001	1,130	11,192	196	655	53	58	1	2,195	2	373	46	16	14,785
2002	890	10,029	11	544	10	236	2	1,725	42	301	82	<0.5	12,982
2003	1,037	16,671	36	465				2,135	1	301	70	6	20,069
2004	931	14,540	10	488				1,186	1	115	55	1	16,733
2005	716	9,055	207	286				297	1	179	33	<0.5	10,591
2006	782	12,786	1	77				542	<0.5	160	46	3	13,697
2007	798	11,586	45	104	282	1,243	12	550	10	204	45	2	12,564
2008	669	11,131	1	65				531	<0.5	148	35	2	11,944
2009	806	12,307	415	45				409	2	107	30	1	13,332
2010	771	11,856	1	1				370	<0.5	96	22	4	12,384
2011	795	11,050	118	4				619	<0.5	76	19	3	11,937
2012	922	13,904	43	2				403	<0.5	70	27	10	14,509

*Consecutive years are grouped to avoid revealing confidential data.

Table 3-4. West Coast real commercial ex-vessel revenues (inflation adjusted, 2012, $1,000s) from HMS landings by all HMS and non-HMS gears, 1981-2012.

	Tunas							Sharks				
Year	Albacore	Bluefin Tuna	Yellowfin Tuna	Bigeye Tuna*	Skipjack Tuna*	Unspecified Tuna*	Swordfish	Blue Shark	Common Thresher Shark	Shortfin Mako Shark	Dorado*	Total
1981	57,339	2,678	213,416	3,394	143,393	157	7,253	128	3,190	351	6	431,305
1982	16,351	5,476	151,578	2,459	82,452	201	10,413	38	4,031	690	2	273,693
1983	23,972	2,081	116,463	90	71,770	187	13,316	9	2,887	450	1	231,226
1984	32,542	1,711	70,042	330	46,881	4,899	21,977	5	3,106	359	8	181,860
1985	15,196	5,166	26,919	32	3,881	1,885	24,582	4	3,330	353	1	81,350
1986	11,097	8,328	32,474	162	1,625	356	22,859	2	3,037	769	2	80,712
1987	8,981	3,604	48,830	309	7,753	785	19,470	3	2,074	1,253		93,063
1988	15,429	3,504	45,742	44	15,653	136	16,448	4	1,658	1,100	1	99,720
1989	6,167	2,072	33,922	4	6,426	207	13,454	6	1,538	900	1	64,695
1990	8,830	1,806	14,740	14	2,983	89	11,227	16	1,003	1,161	3	41,871
1991	4,293	177	6,076	65	4,093	32	9,642	1	1,473	631	2	26,486
1992	17,068	1,679	5,466	66	2,097	32	11,247	3	690	343	9	38,699
1993	16,983	1,092	7,000	307	4,766	106	12,999	1	666	321	61	44,302
1994	28,699	2,380	6,429	437	2,489	78	13,641	23	831	351	106	55,464
1995	16,115	1,473	4,240	360	6,618	7	9,148	4	665	230	8	38,868
1996	37,227	5,519	4,418	356	5,451	39	8,292	1	825	229	13	62,369
1997	26,788	3,729	6,711	484	7,401	29	8,266	<0.5	795	306	15	54,524
1998	25,132	3,944	7,797	362	6,934	82	7,956	8	832	234	14	53,296
1999	23,305	1,392	1,925	862	3,604	79	11,075	<0.5	810	146	63	43,261
2000	22,040	745	1,705	740	620	3	15,071	1	755	171	81	41,930
2001	25,923	594	584	402	42	4	10,901	2	746	95	24	39,318
2002	17,601	54	727	108	158	8	7,905	23	622	154	1	27,359
2003	29,576	92	546				9,503	<0.5	590	140	13	40,972
2004	32,295	45	526				5,697	1	232	116	7	39,287
2005	23,768	156	360				2,168	<0.5	310	66	1	27,234
2006	26,330	4	194				3,044	<0.5	334	88	20	30,289
2007	23,337	63	161	2,160	721	80	3,378	2	364	85	11	27,509
2008	30,530	3	133				2,511	<0.5	297	71	10	33,780
2009	28,964	465	175				2,034	3	209	57	4	32,019
2010	30,683	7	7				2,289	<0.5	163	38	16	33,463
2011	44,148	251	14				3,412	<0.5	107	39	11	48,318
2012	45,745	96	13				2,092	<0.5	114	53	36	48,518

Blank cells indicate null value (no data exist for that stratum).

*Consecutive years are grouped to avoid revealing confidential data.

Table 3-5. Number of vessels and commercial landings (round mt) in the West Coast albacore surface hook-and-line (troll and baitboat) fishery, 1981-2012, Canadian vessels included.

Year	No. Vessels	Albacore	Other HMS
1981	1,832	13,493	14
1982	761	4,988	10
1983	1,627	9,341	19
1984	1,126	8,912	43
1985	792	7,010	16
1986	419	4,980	4
1987	486	2,891	8
1988	525	4,630	20
1989	338	2,167	17
1990	366	2,926	3
1991	172	1,641	3
1992	606	4,816	16
1993	608	5,800	121
1994	708	10,629	2
1995	476	6,474	2
1996	724	14,075	43
1997	1,191	11,223	9
1998	862	13,685	123
1999	822	9,506	40
2000	760	8,986	24
2001	979	11,015	12
2002	734	9,995	4
2003	885	16,608	4
2004	779	14,523	1
2005	597	9,028	1
2006	634	12,772	1
2007	672	11,500	<0.5
2008	523	11,128	7
2009	680	12,263	8
2010	651	11,824	<0.5
2011	686	10,964	1
2012	815	13,855	17

Table 3-6. Real commercial ex-vessel revenues (inflation adjusted, 2012, $1,000s) for the West Coast albacore surface hook-and-line (troll and baitboat) fishery, 1981–2011, Canadian vessels included.

Year	Albacore	Other HMS
1981	56,396	40
1982	14,990	45
1983	23,336	45
1984	22,977	232
1985	14,650	75
1986	10,540	25
1987	8,216	66
1988	14,469	170
1989	6,014	77
1990	8,506	22
1991	4,197	19
1992	16,675	90
1993	15,859	911
1994	28,399	12
1995	15,988	6
1996	37,032	57
1997	26,637	29
1998	24,745	214
1999	22,821	258
2000	21,850	132
2001	25,580	41
2002	17,543	22
2003	29,515	14
2004	32,250	4
2005	23,699	2
2006	26,280	2
2007	23,187	2
2008	30,524	54
2009	28,906	13
2010	30,601	1
2011	43,861	2
2012	45,545	44

Table 3-7. Number of vessels and commercial landings (round mt) in the West Coast drift gillnet fishery, 1981-2012.

Year	Vessels	Swordfish	Common Thresher	Shortfin Mako	Tunas
1981	149	469	606	154	10
1982	185	930	867	325	29
1983	211	1,651	798	201	125
1984	244	2,632	674	132	163
1985	257	3,011	390	129	160
1986	242	2,108	194	250	155
1987	235	1,526	195	208	100
1988	199	1,373	223	106	61
1989	176	1,239	248	117	26
1990	168	1,126	146	229	26
1991	146	936	230	125	29
1992	136	1,350	102	118	56
1993	135	1,409	152	87	213
1994	146	801	152	80	80
1995	125	768	115	79	66
1996	124	738	119	85	108
1997	121	700	190	118	109
1998	115	880	226	87	108
1999	97	597	117	52	115
2000	89	650	124	64	72
2001	80	371	112	31	65
2002	68	301	93	69	19
2003	55	216	111	57	30
2004	53	182	51	38	22
2005	48	220	121	25	14
2006	50	444	78	38	7
2007	52	490	113	37	6
2008	52	405	56	27	2
2009	45	253	34	25	6
2010	40	61	38	17	5
2011	39	119	51	14	21
2012	31	113	42	15	12

Number of drift gillnet vessels (see Table 27) landing swordfish, common thresher shark, mako shark, or blue shark.

Table 3-8. Real commercial ex-vessel revenues (inflation adjusted, 2012, $1,000s) for the West Coast drift gillnet fishery, 1981-2012.

Year	Swordfish	Common Thresher	Shortfin Mako	Tunas
1981	4,273	1,310	300	40
1982	8,635	1,914	650	103
1983	12,532	1,780	421	383
1984	20,081	1,739	302	411
1985	21,734	1,111	302	301
1986	18,903	654	622	358
1987	16,393	698	639	323
1988	13,520	764	335	245
1989	12,309	754	383	87
1990	10,111	445	681	105
1991	8,858	636	352	116
1992	9,610	245	281	207
1993	10,092	372	230	634
1994	6,909	393	221	330
1995	6,476	270	196	204
1996	5,488	313	204	323
1997	4,479	460	272	467
1998	5,150	507	200	378
1999	3,698	291	121	259
2000	3,658	302	138	254
2001	2,093	236	62	131
2002	1,897	198	127	39
2003	1,371	243	114	105
2004	1,126	108	80	74
2005	1,367	203	48	45
2006	2,232	168	70	13
2007	2,747	187	66	21
2008	1,816	105	52	5
2009	1,142	61	44	18
2010	416	51	28	17
2011	787	59	28	91
2012	769	71	29	51

Table 3-9. Number of vessels, commercial landings (round mt), and real commercial ex-vessel revenues from swordfish (inflation adjusted, 2012, $1,000s) for swordfish in the West Coast harpoon fishery, 1981-2012.

Year	Vessels	Landings	Revenue
1981	187	272	2,965
1982	159	156	1,710
1983	88	58	623
1984	114	105	1,103
1985	101	275	2,347
1986	114	296	3,227
1987	100	237	2,886
1988	83	199	2,501
1989	45	62	815
1990	52	65	847
1991	33	20	273
1992	48	75	872
1993	42	169	1,645
1994	48	157	1,810
1995	40	97	1,058
1996	31	81	866
1997	32	84	919
1998	27	48	536
1999	29	81	799
2000	26	90	962
2001	23	52	587
2002	29	90	838
2003	35	107	1,016
2004	29	69	789
2005	24	77	810
2006	24	72	753
2007	28	59	645
2008	32	48	485
2009	28	50	490
2010	26	37	380
2011	17	24	257
2012	9	5	60

Table 3-10. Number of vessels, commercial landings (round mt), and real commercial ex-vessel revenues (inflation adjusted, 2012, $1,000s) from HMS tunas in the West Coast purse seine fishery, 1981-2012.

Year	Vessels	Landings	Revenue
1981	134	131,606	352,072
1982	124	104,317	237,181
1983	110	95,227	179,075
1984	78	68,537	127,888
1985	53	20,812	36,169
1986	51	26,867	41,485
1987	47	27,901	57,503
1988	42	26,797	60,672
1989	38	20,783	38,507
1990	32	11,565	19,378
1991	18	6,555	8,818
1992	28	3,825	4,901
1993	26	3,128	3,912
1994	25	5,813	8,121
1995	21	9,146	10,548
1996	23	12,421	13,930
1997	34	12,820	17,011
1998	33	11,069	14,703
1999	14	5,274	6,008
2000	14	2,160	2,655
2001	14	882	1,050
2002	4	778	872
2003	3	3,479	3,381
2004	11		
2005	8		
2006	1		
2007	2		
2008	1		
2009	6		
2010	1		
2011	3		
2012	2		

Only landings where the weight of tuna species on the fish ticket is greater than CPS are included. Vessel counts also based on this criterion.

Consecutive years are grouped to avoid revealing confidential data.

Table 3-11. PacFIN species codes (SPID) in the HMSP management group used to extract commercial fishery data for this SAFE Report.

PacFIN species codes in the HMSP management group used to extract commercial fisheries data				
AGID	**CATEGORY**	**SPID**	**MGRP**	**DESCRIPTION**
C	5	ALBC	HMSP	TUNA, ALBACORE
O	375	ALBC	HMSP	TUNA, ALBACORE
W	101	ALBC	HMSP	ALBACORE TUNA THUNNUS ALALUNGA
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	4	BTNA	HMSP	TUNA, BLUEFIN
O	378	BTNA	HMSP	TUNA, BLUEFIN
W	102	BTNA	HMSP	BLUEFIN TUNA (THUNNUS THYNNUS)
C	481	DRDO	HMSP	DOLPHINFISH
O	292	DRDO	HMSP	DOLPHINFISH
C	8	ETNA	HMSP	TUNA, BIGEYE
O	377	ETNA	HMSP	TUNA, BIGEYE
C	151	MAKO	HMSP	SHARK, BONITO (MAKO)
O	026	MAKO	HMSP	SHARK, SHORTFIN MAKO
C	2	STNA	HMSP	TUNA, SKIPJACK
O	372	STNA	HMSP	TUNA, SKIPJACK
W	104	STNA	HMSP	SKIPJACK TUNA
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	6	UTNA	HMSP	TUNA, UNSPECIFIED
C	1	YTNA	HMSP	TUNA, YELLOWFIN
O	376	YTNA	HMSP	TUNA, YELLOWFIN
Species codes in the HMSP management group for Ecosystem Component (EC) species and species excluded from queries for commercial fishery tables				
AGID	**CATEGORY**	**SPID**	**MGRP**	**DESCRIPTION**
C	92	MRLN	HMSP	MARLIN, STRIPED
O	388	MRLN	HMSP	MARLIN, STRIPED
C	97	ISRK	HMSP	SHARK, BIGEYE THRESHER*
C	98	PSRK	HMSP	SHARK, PELAGIC THRESHER*

*Ecosystem component species

Table 3-12. PacFIN gear codes used to extract commercial fisheries data for this HMS SAFE report.

AGID	GEAR	GRID	GRGROUP	DESCRIPTION
Surface hook and line				
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				
C	065	DGN	NET	GILL NET, DRIFT
O	140	GLN	NET	OCEAN GILLNET
Harpoon				
C	012	OTH	MSC	HARPOON/SPEAR
Longline				
C	005	LGL	HKL	LONG LINE, SET
O	150	LGL	HKL	PELAGIC LONGLINE
W	43	LGL	HKL	SET LINE/LONG LINE
Purse Seine				
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

Table 3-13. Adjustments to compute inflation adjusted (2012) dollars. Derived from Bureau of Economic Analysis Table 1.1.9, Implicit Price Deflators for Gross Domestic Product; Last Revised on: December 20, 2013 [Index numbers, 2009=100].

Year	Gross Domestic Product	Inflation Adjuster
1981	48.572	2.16178045
1982	51.586	2.03547474
1983	53.623	1.95815229
1984	55.525	1.89107609
1985	57.302	1.83243168
1986	58.458	1.79619556
1987	59.949	1.75152213
1988	62.048	1.6922705
1989	64.46	1.62894818
1990	66.845	1.57082804
1991	69.069	1.52024787
1992	70.644	1.48635411
1993	72.325	1.45180781
1994	73.865	1.42153929
1995	75.406	1.39248866
1996	76.783	1.36751625
1997	78.096	1.34452469
1998	78.944	1.33008208
1999	80.071	1.31136117
2000	81.891	1.2822166
2001	83.766	1.25351575
2002	85.054	1.23453336
2003	86.754	1.21034189
2004	89.132	1.17805053
2005	91.991	1.14143775
2006	94.818	1.10740577
2007	97.335	1.0787692
2008	99.236	1.05810391
2009	100	1.05002
2010	101.211	1.0374564
2011	103.199	1.0174711
2012	105.002	1

3.2 Recreational Fisheries

3.2.1 Albacore

Recreational anglers fishing from private vessels and from commercial passenger fishing vessels (CPFVs)

target albacore in all three West Coast states. Albacore is targeted almost exclusively with rod-and-reel gear, and success is highly dependent upon the distance from port to the fish, weather and ocean conditions, and fuel prices.

In recent years albacore have typically begin to show up within range of the recreational fishery in California in late spring, migrating northward and appearing off Oregon and Washington in mid to late June, and are available through late September or early October in most years.

3.2.2 Other HMS (Southern California)

Recreational anglers in California take the entire suite of management unit species (MUS) included within the HMS FMP using rod-and-reel gear almost exclusively; in addition, a nominal amount of fish, primarily tunas and dorado, are taken by free divers using spear guns. In Oregon and Washington anglers only occasionally take HMS species other than albacore, such as blue sharks.

CPFVs also make trips from Southern California ports (primarily San Diego) into Mexican waters. Yellowfin, bluefin, and albacore tunas as well as dorado are the most commonly caught HMS species.

Coastwide fishery statistics are available from both PSMFC, through their Recreational Fisheries Information Network (RecFIN) website. The RecFIN provides estimates based on fieldsampling of catch and a telephone survey for effort.

California data are provided by the California Recreational Fisheries Survey (CRFS) program while the state's logbook program provides a record of fishing activity for most CPFVs. The fact that a much higher overall percentage of highly migratory MUS catches are represented in logbook data than in CRFS samples is why logbooks are preferred over CRFS 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, CRFS data are the best available for making catch estimates of anglers fishing from private boats. Statistics for the CPFV fishery are also available from the federal charter logbook program. In Oregon statistics for recreational fisheries, including private, CPFV, and tournament fisheries, are available from the ODFW Ocean Recreational Boat Survey Program. Beginning in 2005, a mandatory charter boat tuna logbook program was implemented in Washington to provide additional information on location and effort in the charter albacore fishery.

3.2.3 Recreational Fishery Figures and Tables

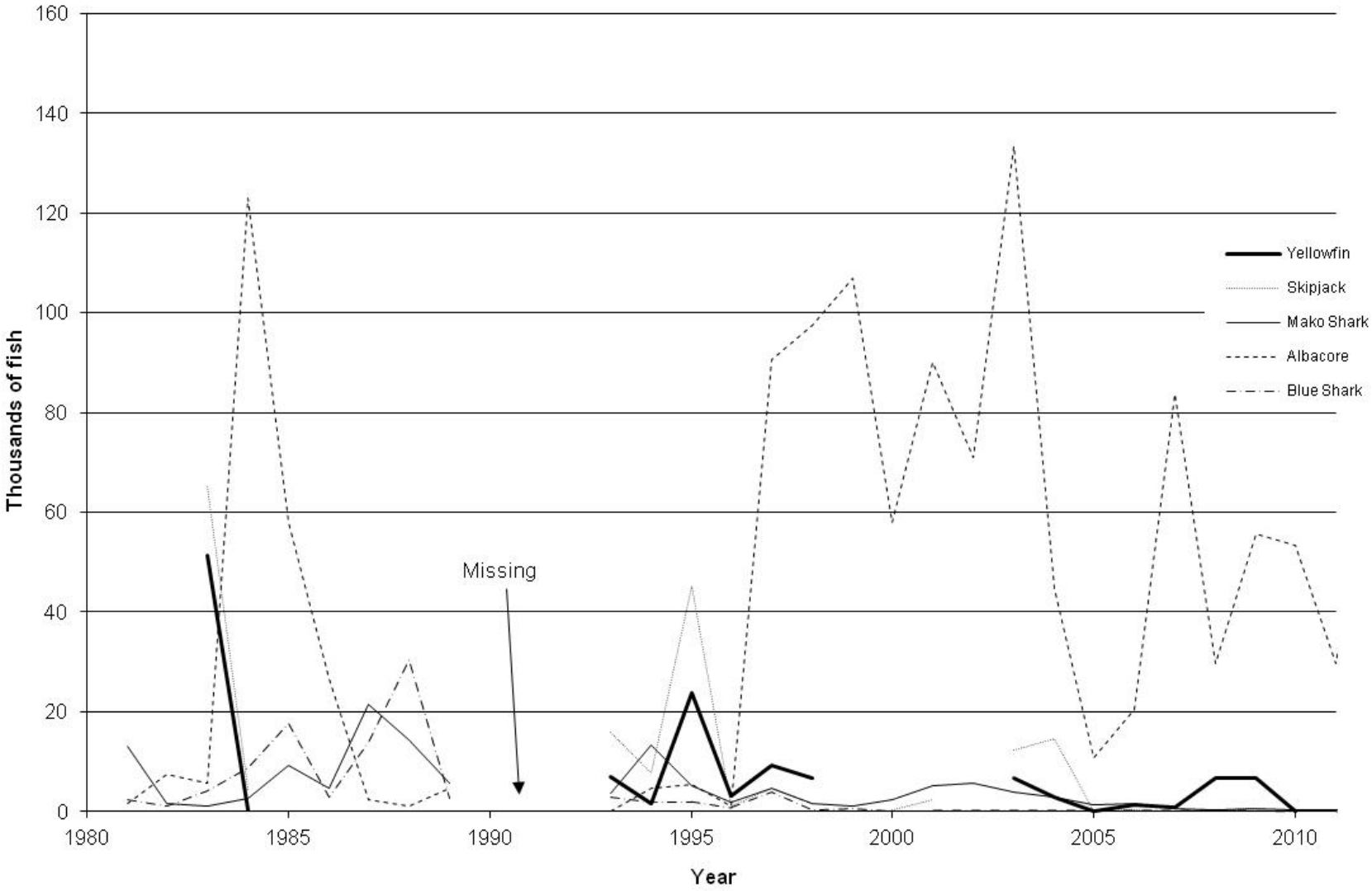

Figure 3-1. Catches by species (thousands of fish) for the West Coast recreational private sport fishing fleet, 1981-2012.

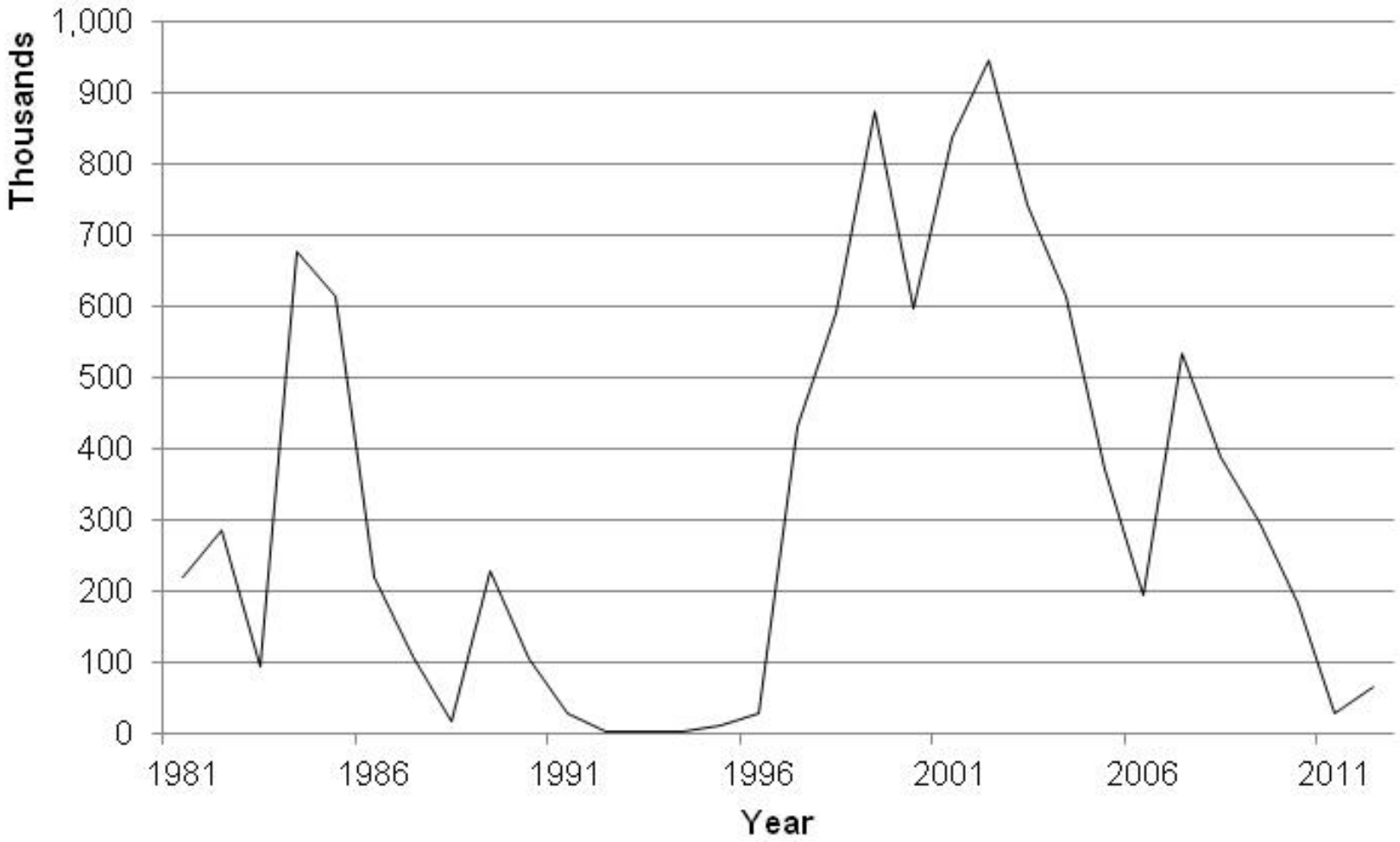

Figure 3-2. Albacore fishing hours for the California CPFV fleet, 1981-2012.

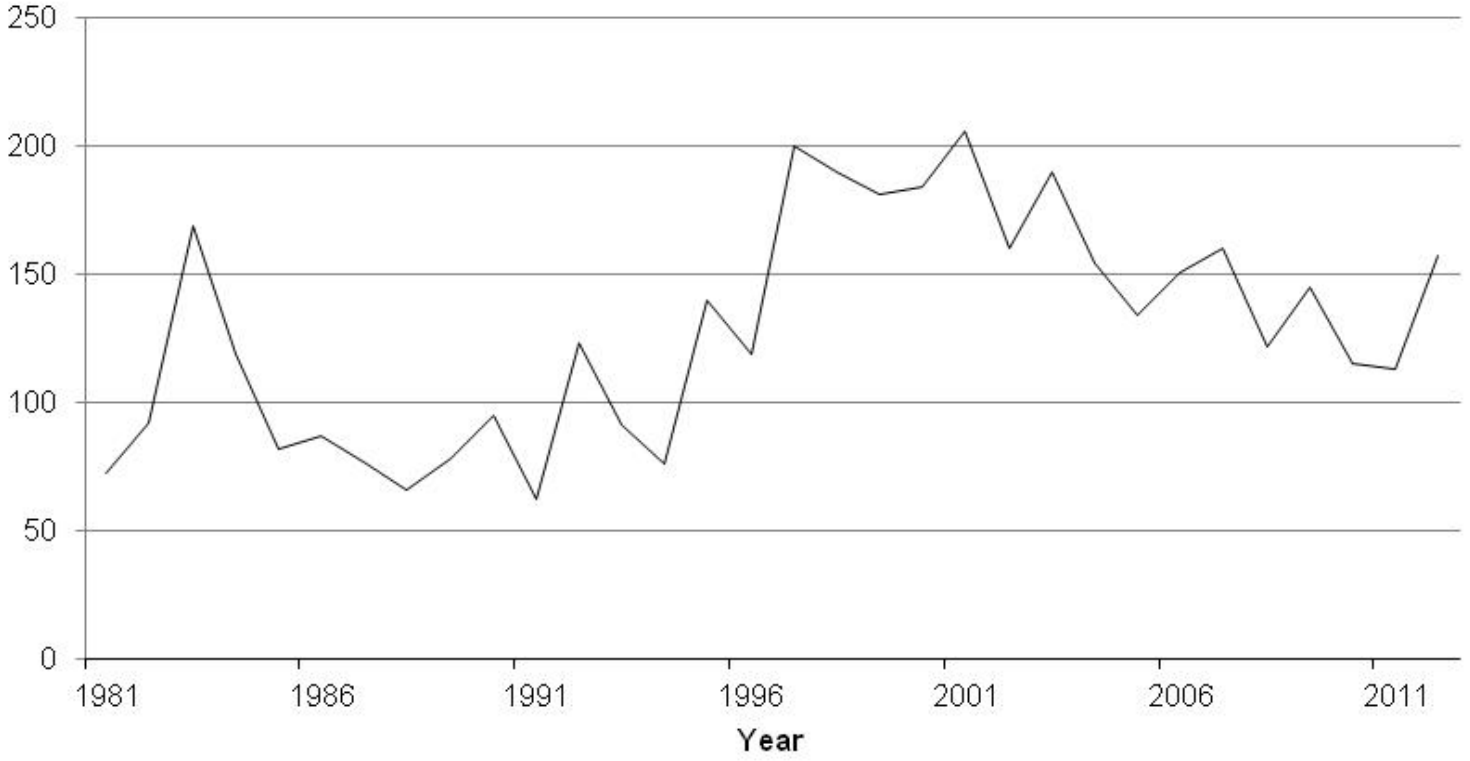

Figure 3-3. Annual numbers of CPFV vessels targeting HMS in California waters, 1981-2012.

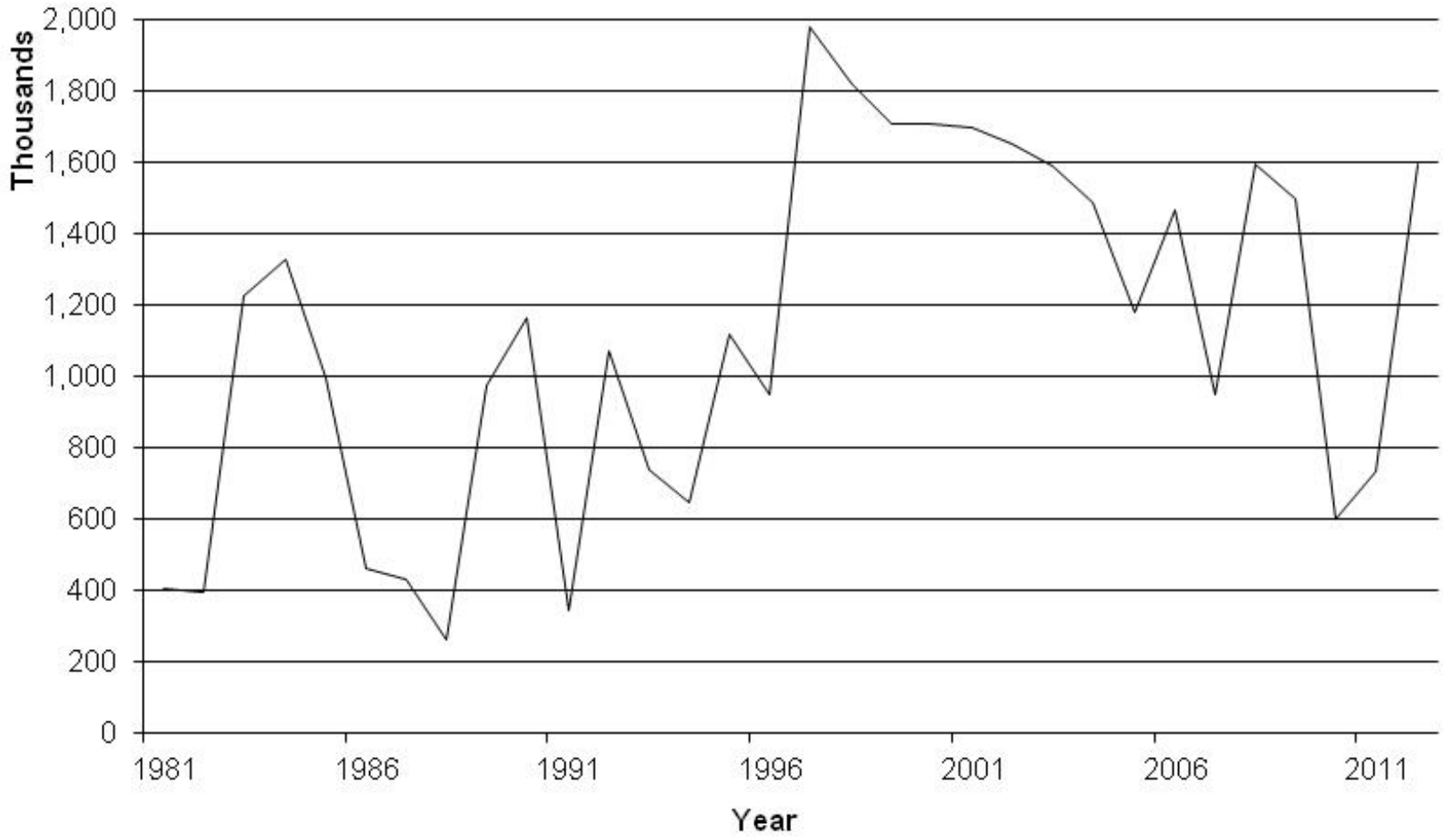

Figure 3-4. Numbers of angler hours for the California CPFV fleet, 1981-2012.

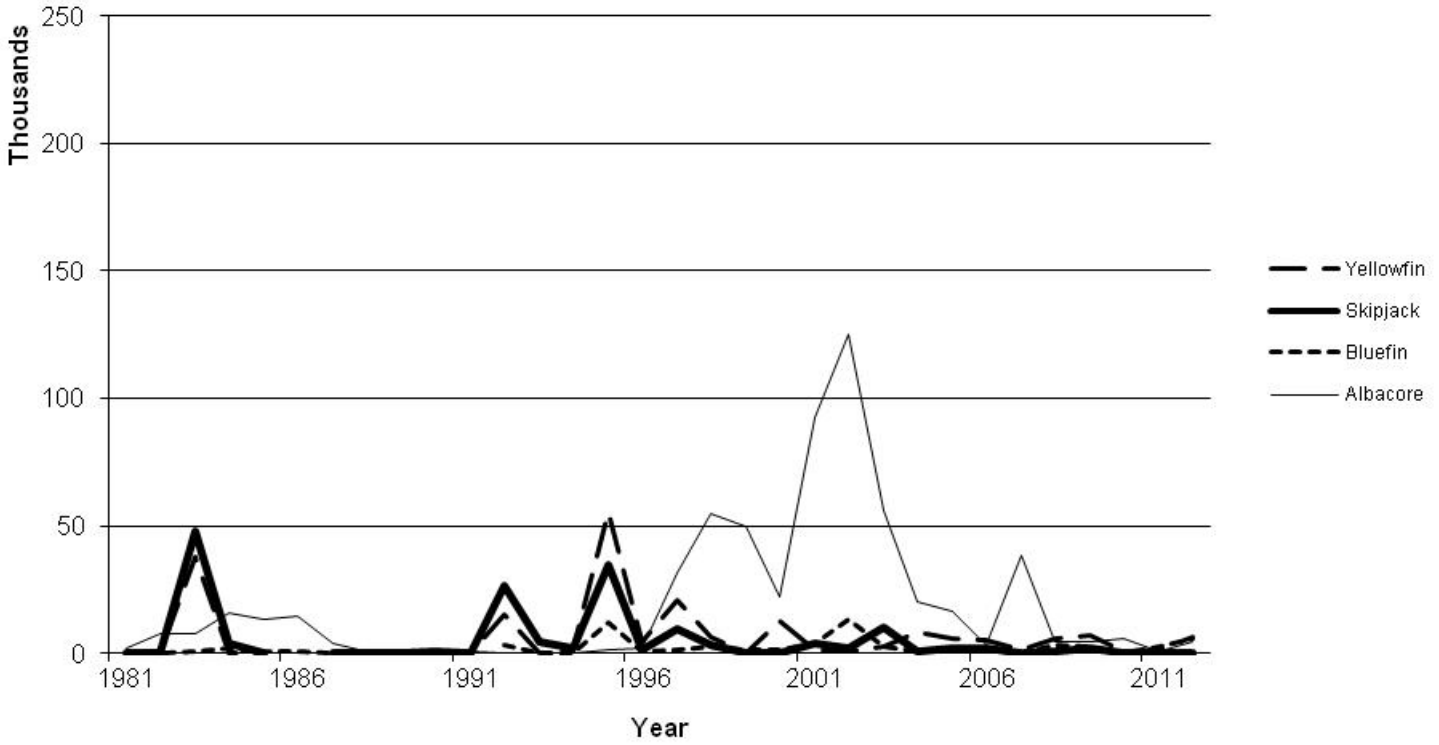

Figure 3-5. Catch in numbers of fish by species for the California CPFV fleet in California waters, 1981-2012.

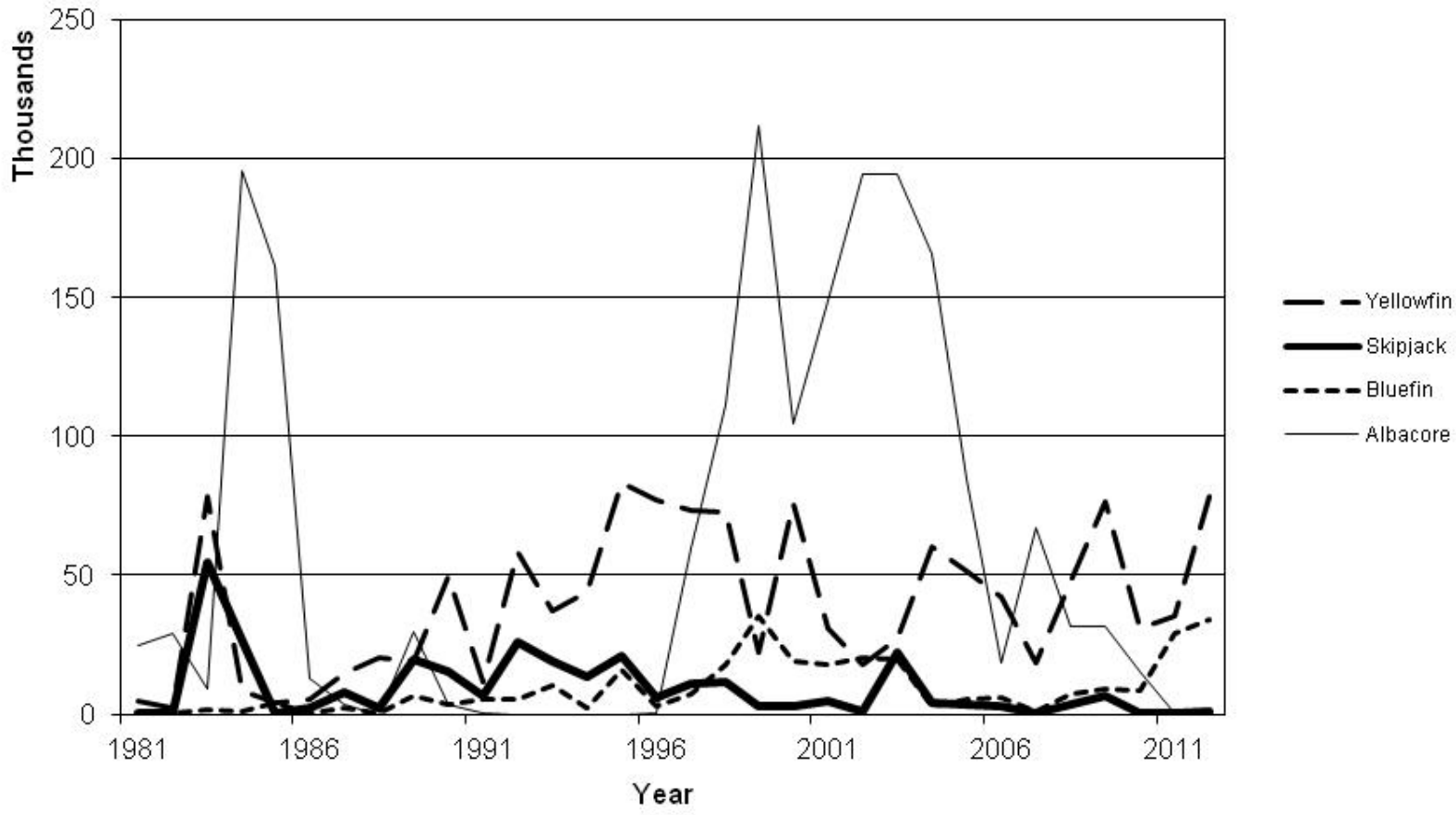

Figure 3-6. Catch in numbers of fish by species for the California CPFV fleet in Mexico waters, 1981-2012.

Table 3-14. Catches by species (thousands of fish) for the West Coast recreational private sport fishing fleet, 1981-2012.

Year	Yellowfin	Skipjack	Bluefin	Albacore	Bigeye	Swordfish	Striped Marlin	Mako Shark	Thresher Shark	Blue Shark	Dorado
1981				1.7				13.0		2.4	
1982				7.6	2.5		0.8	1.5	2.2	1.1	
1983	51.3	65.0	0.6	5.7	0.6		0.4	1.1	2.4	4.2	4.7
1984	0.3	4.4	0.6	123.0	0.6		1.2	2.6	0.8	8.8	4.5
1985				57.9			0.7	9.3	0.4	17.6	
1986				26.7				4.8	1.4	3.0	
1987		0.5		2.3			0.9	21.6	4.8	13.9	
1988				1.0			0.8	14.3	0.9	30.3	
1989	7.0	5.8		4.7				5.8	0.8	2.6	
1990											
1991											
1992											
1993	6.9	16.0		0.0			0.3	3.6	2.6	2.9	6.2
1994	1.7	7.7		4.8			0.4	13.3	3.6	1.8	1.0
1995	23.7	45.2		5.5			0.3	5.3	2.7	1.9	
1996	3.2	1.0		1.0				1.9	0.7	0.8	2.7
1997	9.2	4.7		90.5			0.4	4.8	0.5	3.9	19.8
1998	6.7	1.5	1.6	97.5				1.7	0.6	0.4	11.1
1999				106.9				1.1	1.3	0.5	1.1
2000	36.8	0.4		57.9	0.4			2.3	1.7	0.0	61.0
2001		2.5	1.0	90.1				5.1	2.2	0.1	
2002			0.9	70.9				5.6	1.6	0.1	0.2
2003	6.8	12.4		133.5	0.2			3.9	2.0	0.2	0.2
2004	2.9	14.5	0.1	44.6	0.0		0.0	3.0	4.5	0.3	3.2
2005	0.1	0.0	0.1	10.8			0.0	1.3	0.3	0.1	0.2
2006	1.3	0.3	0.2	20.6			0.0	1.5	0.5	0.1	12.9
2007	0.8	0.1	0.0	83.8		0.0		0.7	0.7	0.3	0.3
2008	6.7	0.3	0.4	29.6				0.4	0.8	0.1	16.9
2009	6.6	0.5	0.2	55.7			0.0	0.6	1.1	0.1	2.4
2010	0.2		0.0	53.4			0.0	0.4	0.7	0.0	0.0
2011			0.1	29.7				0.3	1.0	0.0	
2012	1.0		0.0	82.3				0.6	0.4	0.1	8.8

Data were extracted from RecFin by going to the link entitled "Tabulate Historical Estimates (1980-2003)."
Blank cells indicate no data exist.
Extracted Sept 10, 2013. Data for the most recent year is preliminary.
Any calculated or derived zeros are due to rounding of summarized data to less than half of the unit shown.
No private recreational vessel catch data were available for the years 1990 to 1992.

Table 3-15. Albacore fishing hours for the California CPFV fleet, 1981-2012.

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	102,966
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	596,074
2001	835,089
2002	943,300
2003	740,230
2004	612,312
2005	370,636
2006	192,692
2007	533,560
2008	388,011
2009	296,411
2010	180,632
2011	27,613
2012	64,383

Source: CPFV Logbook Database.
Extracted September 27, 2013.

Table 3-16. Numbers of CPFV vessels targeting HMS in California waters, 1981-2012.

Year	Vessels
1981	72
1982	92
1983	169
1984	119
1985	82
1986	87
1987	77
1988	66
1989	78
1990	95
1991	62
1992	123
1993	91
1994	76
1995	140
1996	119
1997	200
1998	190
1999	181
2000	184
2001	206
2002	160
2003	190
2004	154
2005	134
2006	151
2007	160
2008	122
2009	145
2010	115
2011	113
2012	157

Source: CPFV Logbook Database.
Extracted September 27, 2013.

Table 3-17. Numbers of angler hours for the California CPFV fleet, 1981-2012.

Year	Angler Hours
1981	405,099
1982	393,176
1983	1,223,843
1984	1,324,407
1985	991,372
1986	458,013
1987	430,320
1988	262,745
1989	975,264
1990	1,161,415
1991	343,586
1992	1,068,365
1993	739,688
1994	646,909
1995	1,115,514
1996	947,722
1997	1,980,572
1998	1,821,462
1999	1,707,337
2000	1,703,873
2001	1,693,622
2002	1,651,586
2003	1,590,361
2004	1,488,369
2005	1,178,691
2006	1,465,366
2007	948,954
2008	1,593,863
2009	1,494,834
2010	600,222
2011	732,774
2012	1,594,487

Source: CPFV Logbook Database.
Extracted September 27, 2013.

Table 3-18. Catch in numbers of fish by species for the California Commercial Passenger Fishing Vessel fleet in California waters, 1981–2012.

Year	Yellowfin	Skipjack	Bluefin	Albacore	Bigeye	Swordfish	Striped Marlin	Mako Shark	Common Thresher Shark	Blue Shark	Dorado
1981	81	17	419	2,127	25		37	34	7	100	35
1982	129	8	392	7,352	9		13	18	36	83	
1983	37,725	48,126	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	29	19	5
1986			443	14,706	37		13	58	13	217	11
1987	1	167	5	3,580	7		8	295	15	645	
1988	9	2	147	547	2	2	2	115	15	882	1
1989	17	165	88	367	2		7	302	45	4,469	1
1990	216	1,008	198	275	5		7	231	51	2,675	7,147
1991	60	18		741			1	128	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	163	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	59	521	1,354
1996	4,203	1,199	439	1,826			5	237	31	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	12,802	190	1,564	22,144	60		2	83	40	149	4,361
2001	1,385	4,080	3,829	92,519	2	1		193	14	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	26	47	74
2004	8,330	735	485	20,197	63	2	1	250	18	6	671
2005	5,634	2,224	723	16,426	2		4	121	23	26	668
2006	5,407	1,765	1,349	3,402	4	3	2	178	27	18	11,329
2007	1,171	67	187	38,304			93	108	40	19	72
2008	5,600	824	3,159	4,705		2	1	77	45	17	5,674
2009	7,259	1,883	2,788	4,777			4	43	39	11	1,825
2010	1,033	7	306	5,712				32	68	140	3
2011	1,236	222	2,743	681				52	133	6	166
2012	6,421	66	5,642	4,338			2	138	36	15	6,357

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: CPFV Logbook Database, extracted September 27, 2013.

Table 3-19. Catch in numbers of fish by species for the California Commercial Passenger Fishing Vessel fleet in Mexico waters, 1981–2012.

Year	Yellowfin	Skipjack	Bluefin	Albacore	Bigeye	Swordfish	Striped Marlin	Mako Shark	Common Thresher Shark	Blue Shark	Dorado
1981	4,478	417	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	1,476		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	3,557	3,567	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	83,372	20,731	15,925	1	37	1	32	34		37	5,313
1996	77,365	5,945	2,655	365	132		16	55	1	55	24,577
1997	73,382	10,929	6,984	59,529	254		12	19	2	32	24,242
1998	72,952	11,298	17,638	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	75,767	2,834	19,100	104,400	503		1	36		68	11,301
2001	31,134	4,649	18,078	148,994	9			49		72	3,448
2002	18,085	1,113	20,153	194,089	6		1	24			2,409
2003	27,267	22,189	19,433	194,550	66	2	4	37			3,143
2004	60,348	3,934	2,906	165,570	400		3	54			7,669
2005	51,314	3,682	5,034	84,657	37		14	41			6,033
2006	42,027	2,969	6,124	18,145	7		13	66		7	35,363
2007	18,136	375	841	67,025			1	27			6,653
2008	47,491	3,472	7,028	31,421	1		4	52			23,879
2009	76,308	6,745	9,350	31,535	4		3	8			17,231
2010	30,798	374	8,147	15,317				12	2		1,994
2011	35,138	490	28,751	254			3	12			8,426
2012	78,536	691	34,230	1,690			3	82	2		28,744

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

Source: CPFV Logbook Database, extracted September 27, 2013.

3.3 State Summaries

3.3.1 Washington

2012 Washington Albacore Season Summary

Total WA landings: 19,925,775 lbs; an increase from the total of 13,287,358 lbs landed in 2011.

Number of vessels/trips: 350 vessels and 1316 trips; compared to the 2011 totals of 230 vessels and 778 trips.

Average catch/landing: Ilwaco – 11,965 lbs per trip
Westport – 20,409 lbs per trip
Other WA ports – 5,724 lbs per trip
Statewide average – 15,141 lbs per trip

Ports sampled in 2012: Ilwaco, July 1- Oct 30; Westport July 1- Oct 30; LFs in both ports

Distribution of 2012 catch by port: Ilwaco - 33%
Westport - 63%
Other ports – 4%

Recreational fishery: 50,465 fish landed, an increase from the 15,422 landed in 2011.
62% of total catch from private vessels, 89% of total boat effort from private vessels.
2,119 boat trips taken, compared to 741 boat trips in 2011.
Average catch of 24 fish per boat trip, compared to 21 fish per boat trip in 2011.

SAMPLING SUMMARY

	COMMERCIAL			RECREATIONAL		
	Ilwaco	Westport	Other Ports	Ilwaco	Westport	Other Ports
No. logs issued	15	8	N/A	N/A	N/A	N/A
Total landings (lbs)*	6,556,947	12,470,096	898,732	20,536 FISH	27,221 FISH	2,708 FISH
Estimated no. trips†	548	611	157	4,444	4,128	476
Estimated no. vessels	176	158	78	N/A	N/A	N/A
Lengths Collected	31,297	26,010	N/A	N/A	N/A	N/A

As of January 12, 2013:

Blank logbooks remaining in WA inventory: 9
Unused logbook return envelopes in WA inventory: 34

* Recreational catches are available by numbers of fish landed only.
† Recreational trips are estimated angler trips.

4 UPDATED STATUS OF THE HIGHLY MIGRATORY SPECIES MANAGEMENT UNIT SPECIES

This chapter contains a brief review of the stock status for each managed species with respect to the Council-adopted Control Rules. Stock structure is not fully understood for many of the species that range throughout the Pacific, thus some assessments for WCPO and SEPO populations are also included, although those populations and their fisheries are not specifically managed under the HMS FMP.

4.1 Determining Stock Status

Stock status is most reliably determined from stock assessments that integrate fishery and life history information across the range of the stock. In the case of HMS in the Pacific, most stock assessments are conducted by several international organizations.

- In the Eastern Pacific Ocean (EPO) scientific staff employed by the Inter-American Tropical Tuna Commission (IATTC) conduct stock assessments mainly for tropical tunas (bigeye, yellowfin, and skipjack) and some billfish (striped marlin, swordfish). Their report Tuna and Billfishes in the Eastern Pacific Ocean in 2011 summarizes fisheries and stock status.
- In the Western and Central Pacific Ocean (WCPO), the Secretariat of the Pacific Community Oceanic Fisheries Program (SPC-OFP) conducts stock assessments as the science provider to the Western and Central Pacific Fisheries Commission (WCPFC). Like the IATTC, they tend to focus on the tropical tunas, but have also completed stock assessments for South Pacific albacore tuna and striped marlin. Their stock assessments may be accessed here.
- In the North Pacific Ocean (NPO) the International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC) conducts stock assessments, also as a science provider for the WCPFC, and specifically that organization's Northern Committee. The ISC has formed working groups for North Pacific albacore, Pacific bluefin tuna, billfish (marlins and swordfish), and sharks. The shark working group was formed in 2010 and has just begun to work on stock assessments. Shark species of interest include blue, shortfin, mako, bigeye thresher, pelagic thresher, silky, oceanic whitetip, and hammerhead species. ISC annual Plenary Reports provide stock status updates and conservation recommendations.

Under the Magnuson-Stevens Act, Councils must identify *status determination criteria* which can be used to decide whether overfishing is occurring (fishing mortality is above a maximum fishing mortality threshold) or the stock is overfished (biomass is less than a minimum stock size threshold). Chapter 4 in the HMS FMP describes how these status determination criteria may be determined. They are derived from an estimate of maximum sustainable yield (MSY), "the largest long-term average catch or yield that can be taken from a stock or stock complex under prevailing ecological, environmental conditions and fishery technological characteristics (e.g., gear selectivity), and the distribution of catch among fleets." Frequently MSY is difficult to estimate for HMS stocks, either due to stock dynamics or the lack of sufficient information to conduct a stock assessment. In those cases, proxy values may be determined for MSY and related status determination criteria. In general, the Council considers the biological reference points, or proxies approved by regional fishery management organizations to be the 'best available science'.

4.2 Recent and Projected Assessment Schedule

Table 4-1. Schedule of recent and next anticipated assessments for FMP MUS and the organizations responsible for the assessments as of December 31, 2012.

Species - (Stock)	Most Recent (Next Anticipated)	Organization Responsible for the Assessment
TUNAS		
Albacore	2011 (2014)	ISC (ISC)
Bluefin (NPO)	2012 (2014)	ISC (ISC)
Bigeye (EPO)	2012 (2014)	IATTC (IATTC)
Bigeye (WCPO)	2011 (2013)	WCPFC (WCPFC)
Skipjack (EPO)	2012 (2014)	IATTC (IATTC)
Skipjack (WCPO)	2011 (2013)	WCPFC (WCPFC)
Yellowfin (EPO)	2012 (2014)	IATTC (IATTC)
Yellowfin (WCPO)	2011 (2013)	WCPFC (WCPFC)
BILLFISHES		
Striped marlin (WCPO)	2012	ISC
Striped marlin (EPO)	2010	IATTC
Swordfish (NPO)	2009 (2014)	ISC (ISC)
SHARKS		
Blue shark (NPO)	2013 (?)	ISC (ISC)
Common Thresher Shark (EPO)	2001 (2014)	NMFS (NMFS-CICSE)
Shortfin Mako Shark (NPO)	(2014)	(ISC)
OTHERS		
Dorado		

Note: Text in parentheses indicates the year the next assessment is anticipated and the organization expected to conduct the assessment. Boldface indicates the 2012 assessments summarized below. The acronyms listed in this table are defined near the front of this document.

4.3 Conclusions from 2012 Pacific HMS Stock Assessments

The summaries provided below 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 HMSMT 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 2012 to compare to past and future work.

Assessments of stock status always involve assumptions, uncertainty, 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 many of these species, the fishery management organizations 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. Table 5-2 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.

Throughout the summaries below quoted text is taken directly from the referenced assessment document.

4.3.1 *Pacific Bluefin Tuna (Thunnus orientalis) – NPO* (Assessment Report)

An assessment of Pacific bluefin tuna in the NPO was completed by the ISC Pacific Bluefin Tuna Working Group (PBFWG or WG) in November 2012 and accepted at an inter-sessional meeting of the ISC Plenary in December 2012. An integrated statistical age-structured stock assessment model (Stock Synthesis Version 3.23b) was used to fit catch, size composition and catch-per-unit of effort (CPUE) data from 1952 to 2011, with life history parameters including a length-at-age relationship from otolith-derived ages and natural mortality estimates from a tag-recapture study.

"The PBFWG recognized uncertainties in standardized CPUE series, the procedures used to weight data inputs (catch, CPUE, size composition) relative to each other in the model and the methods used to estimate selectivity patterns. The influence of these uncertainties on the stock dynamics was assessed by constructing 20 different models, each with alternative data weightings and structural assumptions. While no single model scenario provided a good fit to all sources of data deemed reliable, there was general agreement among all scenarios in terms of the key model results; long-term fluctuations in spawning stock biomass (SSB) occurred throughout the assessment period (1952-2011) and SSB in recent years has been declining for over a decade, however, there is no evidence of reduced recruitment. Age-specific fishing mortality has increased 8-41% in the recent period (2007-2009) relative to the baseline period (2002-2004) used in recent CMMS by the WCPFC and the IATTC."

"Based on the trajectory of the base-case model stock biomass (age 0+) and SSB are estimated to be 53,216 mt and 22,606 mt, respectively, in 2010. The recent 5-year average level of recruitment (2006-2010, calendar year) was 15.6 million fish. Estimated age-specific fishing mortalities on the stock in the recent period (2007-2009) relative to 2002-2004 (the base period for the current WCPFC conservation and management measure 2010-04) show 4, 17, 8, 41 and 10% increases for ages 0, 1, 2, 3 and 4+, respectively. Although no target or limit reference points have been established for the Pacific bluefin tuna stock under the auspices of the WCPFC and IATTC, the current F (average 2007-2009) is above all target and limit biological reference points (BRPs) commonly used by fisheries managers, and the ratio of SSB in 2010 relative to unfished SSB is low."

"The current (2010) PBF biomass level is near historically low levels and experiencing high exploitation rates above all biological reference points (BRPs) commonly used by fisheries managers. Based on projection results, extending the status quo (2007-2009) fishing levels is unlikely to improve stock status. Recently WCPFC (entered into force in 2011) and IATTC (entered into force in 2012) conservation and management measures combined with additional Japanese voluntary domestic regulations aimed at reducing mortality, if properly implemented and enforced, are expected to contribute to improvements in PBF stock status. Based on those findings, it should be noted that implementation of catch limits is particularly effective in increasing future SSB when strong recruitment occurs. It is also important to note that if recruitment is less favorable, a reduction of F could be more effective than catch limits to reduce the risk of the stock declining."

"In summary, based on the reference point ratios, overfishing is occurring and the stock is overfished. Model estiamtes of 2010 spawning stock biomass (SSB) are at or near their lowest level and SSB has been declining for over a decade; however, there is no evidence of reduced recruitment."

Recent (2007-2011) catch of Pacific bluefin tuna by U.S. West Coast fisheries constitutes approximately 1% of the North Pacific-wide catch.

4.3.2 *Bigeye Tuna (Thunnus obesus) - EPO* (Assessment Report)

Stock status of bigeye tuna in the Eastern Pacific is assessed every 1–2 years by the IATTC. An integrated statistical age-structured stock assessment (Stock Synthesis Version 3.23b) was conducted in 2012, with the same structure as the base case in the previous assessment, but with fishery data updated through 2011.

"Since the start of 2005, when the spawning biomass ratio (the ratio of the spawning biomass at that time to that of the unfished stock; SBR) was at its historic low level of 0.16, the bigeye stock has shown a recovery trend, to an SBR of 0.24 at the end of 2010. This recent recovery trend is subsequent to the IATTC tuna conservation resolutions initiated in 2004. The SBR is estimated to have declined slightly since the beginning of 2011 to a level of 0.23 at the start of 2012. According to the base case model, this most recent SBR is about 12% higher than the maximum sustainable yield (MSY) level. Recent catches are estimated to have been 8% less than those corresponding to the MSY levels. If fishing mortality (F) is proportional to fishing effort, and the current patterns of age-specific selectivity are maintained, the level of fishing effort corresponding to the MSY is about 95% of the current (2009-2011) level of effort. According to the base case results, the two most recent estimates indicate that the bigeye stock in the EPO is probably not overfished (S>SMSY), but that fishing mortality slightly exceeds the level corresponding to the MSY (overfishing is taking place, F>FMSY). This interpretation, however, is subject to uncertainty as indicated by the approximated confidence intervals around the most recent estimate"

Recent (2007-2011) catch of bigeye tuna in the EPO by U.S. West Coast fisheries constitutes less than 1% of the stock-wide catch.

4.3.3 *Skipjack Tuna (Katsuwonus pelamis) – EPO* (Assessment Report)

Several alternative methods are used to assess the status of skipjack tuna: a) fishery and biological indicators; b) analysis of tag data; c) a length-structured stock assessment model; d) a Spatial Ecosystem and Population Dynamic Model (SEAPODYM). The results of all four of these methods are compared when evaluating the status of skipjack in the EPO from 1975-2011.

"Biomass, recruitment, and fishing mortality are estimated to be highly variable over time. The estimates are uncertain and differ among the alternative assessment methods. A large recruitment appears to have entered the population in 1999, and led to increased biomass in that year, but the increase was temporary, due to the short-lived nature of skipjack. Biomass appears to have been above average in recent years, but this may differ among regions, as indicated by differences in CPUE. SEAPODYM estimates annual biomass of skipjack 30cm or larger cycling between 1,800,000 t and 2,350,000 t from 1998 to 2008, but the quality of these estimates has yet to be determined."

"Maintaining tuna stocks at levels that will permit the MSY is the management objective specified by the IATTC Convention. The IATTC has not adopted any target or limit reference points for the stocks that it manages. Previous assessments have found that yield per recruit is maximized by catching skipjack at the smallest size observed in the catch. In combination with the lack of evidence of a stock-recruitment relationship, this indicates that very high fishing mortality rates and very low biomass levels would be associated with MSY."

"Key Results

1. There is uncertainty about the status of skipjack tuna in the EPO
2. There may be differences in the status of the stock among regions
3. There is no evidence that indicates a credible risk to the skipjack stock(s)."

Recent (2007-2011) catch of skipjack tuna in the EPO by U.S. West Coast fisheries constitutes less than 1% of the stock-wide catch.

4.3.4 *Yellowfin Tuna (Thunnus albacares) – EPO* (Assessment Report)

An integrated statistical age-structured stock assessment model (Stock Synthesis Version 3.23b) was used in the assessment, which is based on the assumption that there is a single stock of yellowfin in the EPO. The model is the same as that used in the previous assessment, beginning in 1975, but with updated data for 2011.

"Historically, the spawning biomass ratio (the ratio of the spawning biomass to that of the unfished population; SBR) of yellowfin in the EPO was below the level corresponding to the maximum sustainable yield (MSY) during 1977-1983, coinciding with the low productivity regime, but above that level during most of the following years, except for the recent period (2005-2007 and 2010-2011). The 1984 increase in the SBR is attributed to the regime change, and the recent decrease may be a reversion to an intermediate productivity regime. The different productivity regimes may support different MSY levels and associated SBR levels. The SBR at the start of 2012 was estimated to be 0.26, above the level corresponding to the MSY (0.25). The recent SBR levels (2010-2011) predicted by the current assessment are more optimistic than those produced by the previous assessment, which indicated a sharp decline in the levels of spawning biomass since 2009. This result is due to a decline in the fishing mortality levels for middle-age and older yellowfin tuna since 2009, which is estimated by the current assessment. The effort levels are estimated to be less than those that would support the MSY (based on the current distribution of effort among the different fisheries, and recent catches are below MSY. It is important to note that the curve relating the average sustainable yield to the long-term fishing mortality is very flat around the MSY level. Therefore, moderate changes in the long-term levels of effort will change the long-term catches only marginally, while changing the biomass considerably. Reducing fishing mortality below the level at MSY would result in only a marginal decrease in the long-term average yield, with the benefit of a relatively large increase in the spawning biomass. In addition, if management is based on the base case assessment (which assumes that there is no stock-recruitment relationship), when in fact there is such a relationship, there would be a greater loss in yield than if management is based on assuming a stock-recruitment relationship when in fact there is no relationship."

"Key Results

1. There is uncertainty about recent and future levels of recruitment and biomass. There have been two, and possibly three, different productivity regimes, and the levels of MSY and the biomasses corresponding to the MSY may differ among the regimes. The population may have recently switched from a high to an intermediate productivity regime.
2. The recent fishing mortality rates are lower than those corresponding to the MSY, and the recent levels of spawning biomass are estimated to be at about that level. As described in IATTC Stock Assessment Report 12 and previous assessments, these interpretations are uncertain, and highly sensitive to the assumptions made about the steepness parameter of the stock-recruitment relationship, the average size of the older fish, and the assumed levels of natural mortality. The results are more pessimistic if a stock-recruitment relationship is assumed, if a higher value is assumed for the average size of the older fish, and if lower rates of natural mortality are assumed for adult yellowfin;

3. The recent levels of spawning biomass predicted by the current assessment are more optimistic than those from the previous assessment (IATTC Stock Assessment Report 12). This result is due to a recent decline in the fishing mortality levels for middle-age and older yellowfin tuna since 2009 which is estimated by the current assessment.
4. Increasing the average weight of the yellowfin caught could increase the MSY."

Recent (2007-2011) catch of yellowfin tuna in the EPO by U.S. West Coast fisheries constitutes less than 1% of the stock-wide catch.

4.3.5 *Striped Marlin (Kajikia audax) – WCNPO* (Assessment Report)

An integrated statistical age-structured stock assessment model (Stock Synthesis Version 3.20b) was used in the assessment of striped marlin the WCPO region north of the equator from 1975-2010.

"Estimates of population biomass of the WCNPO striped marlin stock exhibit a long-term decline. Population biomass (age-1 and older) averaged roughly 18,200 mt, or 42% of unfished biomass during 1975-1979, the first 5 years of the assessment time frame, and declined to 6625 mt, or 15% of unfished biomass in 2010. Spawning biomass (SB) is estimated to be 938 mt in 2010 (35% of SB_{MSY}, the spawning biomass to produce MSY). Fishing mortality on the stock (average F on ages 3 and older) is currently high and averaged roughly F = 0.76 during 2007-2009, or 24% above F_{MSY}. The predicted value of spawning potential ratio (SPR, the predicted spawning output at current F as a fraction of unfished spawning output) is currently $SPR_{2007-2009}$ = 14% which is 19% below the level of SPR required to produce MSY. Recruitment averaged about 328 thousand recruits during 1994-2008, which was roughly 30% below the 1975-2010 average. No target or limit reference points have been established for the WCNPO striped marlin stock under the auspices of the WCPFC. Compared to MSY-based reference points, the current (2010) spawning biomass is 65% below SB_{MSY} and the current fishing mortality (average F for 2007-2009) exceeds F_{MSY} by 24%. Therefore, overfishing is currently occurring relative to MSY and the stock is in an overfished state."

"Reducing fishing mortality would likely increase spawning stock biomass and would improve the chances of higher recruitment. If one uses the median to measure the central tendency of the distributions of projected spawning biomass, then the projection results suggest that fishing at F_{MSY} would lead to spawning biomass increases of roughly 45% to 72% from 2012 to 2017. Fishing at a constant catch of 2,500 mt would lead to potential increases in spawning biomass of 133% to 223% by 2017. Fishing at a constant catch of 3,600 mt would lead to potential increases in spawning biomass of 48% to 120% by 2017. In comparison, fishing at the current fishing mortality rate would lead to spawning biomass increases of 14% to 29% by 2017, while fishing at the average 2001-2003 fishing mortality rate would lead to a spawning biomass decrease of 2% under recent recruitment to an increase of 6% under the stock-recruitment curve assumption by 2017."

"Reference points based on maximum sustainable yield (MSY) were estimated in the Stock Synthesis assessment model. The point estimate of maximum sustainable yield (± 1 standard error) was MSY = 5378 mt ± 144. The point estimate of the spawning biomass to produce MSY (adult biomass) was SB_{MSY} = 2713 mt ± 72. The point estimate of F_{MSY}, the fishing mortality rate to produce MSY (average fishing mortality on ages 3 and older) was F_{MSY} = 0.61 ± 0.01 and the corresponding equilibrium value of spawning potential ratio at MSY was SPR_{MSY} = 17.8% ± 0.1%."

Recent (2007-2011) catch of striped marlin by U.S. West Coast fisheries constitutes less than 1% of the stock-wide catch.

Table 4-2. Stockwide and West Coast catches for HMS management unit species (x1000 mt round weight), 2007-2011.

Species (stock)	Stockwide Catch	US West Coast Catch		Average Annual Fractional Catch
		Commercial	Recreational	
Tunas				
Albacore (NPO)	58-96[1]	11.1-12.3	0.01-0.92	0.17
Bluefin (NPO)	17-21[1]	<0.01-0.42	0.01-0.27	0.01
Bigeye (EPO)	224-262[2]	0.03-0.05	<0.01	<0.01
Skipjack (EPO)	149-298[2]	<0.01	<0.01-0.03	<0.01
Yellowfin (EPO)	180-259[2]	<0.01-0.1	0.09-0.41	<0.01
Billfishes				
Striped marlin (EPO)	0.04-2.4[2]	<0.01	<0.01	<0.01
Swordfish (EPO)	0.5-21.34[2]	0.37-0.62	<0.01	0.04
Sharks				
Blue (NPO)	33.8-42.0[1]	<0.1-0.1	<0.01	<0.01
Shortfin mako	Unknown	0.02-0.05	<0.01	
Common thresher	Unknown	0.08-0.2	<0.01	
Other				
Dorado	Unknown	<0.1	0.04-0.26	

[1] International Scientific Committee for Tuna and Tuna-like Species catch tables from 2013 Plenary

[2] IATTC public domain data: http://www.iattc.org/Catchbygear/IATTC-Catch-by-species1.htm

Data for US West Coast catch are from commercial, CPFV and private recreational catches, assuming average weights for CPFV and recreational catches of: 8.7kg/albacore, 8.7kg/bluefin, 10kg/bigeye, 3.0kg/skipjack, 4.9kg/yellowfin, 57.9kg/ striped marlin, 113kg/swordfish, 8kg/blue shark, 29.2kg/common thresher, 16.8kg/mako shark, 5.6kg/dorado

Table 4-3. Stock status indicators from assessments conducted in 2012.

Species (stock)	F_{Recent}/F_{MSY}	Overfishing? ($F/F_{MSY} > 1.0$)	B_{Recent}/B_{MSY}	B_{MSST}/B_{MSY}	Overfished? ($B_{Recent}<B_{MSST}$)	Assessment
Tunas						
Albacore (NPO)*	0.71	N	Unknown	0.7	Unlikely	ISC 2011
Bluefin (NPO)	2.13 [1]	Y	0.36 [2]	0.75	Y	ISC 2012
Bigeye (EPO)	1.05 [3]	Unknown [4]	1.06 [3]	0.5 [5]	N	IATTC, Aires-da-Silva and Maunder 2012
Bigeye (WCPO)*	1.46	Y	1.25	0.6	N	WCPFC, Davies et al 2011
Skipjack (EPO)	Unknown [5]	Unlikely	Unknown [5]	0.5 [5]	Unlikely	IATTC, Maunder 2012
Skipjack (WCPO)*	0.37	N	2.68	0.5	N	WCPFC, Hoyle et al 2011
Yellowfin (EPO)	0.87 [3]	N	1.0 [3]	0.5 [5]	Unlikely	IATTC, Aires-da-Silva and Maunder 2012
Yellowfin (WCPO)*	0.77	Y	1.33	0.5	N	WCPFC, Langley et al 2011
Billfishes						
Striped marlin (NEPO)*	0.16	N	≥1	0.5	N	IATTC, Hinton and Maunder 2011
Striped marlin (WCNPO)	1.24	Y	0.35 [6]	0.62	Y	ISC, Lee et al 2012
Swordfish (NEPO)*	0.59	N	2.1	0.61-0.8	N	ISC, Brodiak 2010
Swordfish (NWPO)*	0.54	N	1.31	0.61-0.8	N	ISC 2009
Swordfish (SEPO)*	<0.5	N	≥5	0.61-0.8	N	IATTC, Hinton and Maunder 2012
Sharks						
Blue (NPO)*	0.86	N	1.11	0.78	N	NMFS and NRIFSF, Kleiber et al 2009
Shortfin mako (NPO)*	<1.0	N	>1.0	0.71	N	NMFS, PFMC HMS plan and development team 2002
Common thresher (EPO)*	<1.0	N	~1.10	0.77	N	NMFS, PFMC HMS plan and development team 2002
Other						
Dorado*	Unknown	Unknown	Unknown	0.5	Unknown	

* Most recent information pre-dates 2012 assessment cycle, indicators were extracted from Table 5-2 of 2012 SAFE report

[1] Based on $F_{2007\text{-}2009} / F_{20\%}$

[2] Based on depletion ratio of SSB_{2010} to unfished SSB

[3] Recent is based on 2009-2011 and assumes no stock recruitment relationship

[4] Considered unknown due to uncertainty in the stock recruitment relationship and other demographic relationships to stock productivity.

[5] Carried over from previous report, however natural mortality is considered unknown

[6] Based on fish 1 year old and older

Table 4-4. Most recent Pacific HMS Stock Assessments through August 2013.

Species (Stock)	Responsible Organization	Link to Assessment Report
Blue shark (NPO)	ISC	http://isc.ac.affrc.go.jp/pdf/ISC13pdf/Annex%2011-%20Blue%20shark%20assessment%20-%20Final%20(new%20coverpage.pdf

5 RESEARCH AND DATA NEEDS

This section is intended to explicitly link HMS research and data needs to the Council's current management priorities. These priorities should be considered in light of two central characteristics of HMS research and data needs. First, the two regional fishery management organizations (RFMOs) involved with management of HMS FMP stocks—the Inter-American Tropical Tuna Commission (IATTC) and Western and Central Pacific Fisheries Commission (WCPFC)—coordinate and conduct their own 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° 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/or estimates of MSY for many HMS species. Basic biological and life history data are unknown for some species, and understanding of distribution, abundance, and reproductive behaviors of most HMS species 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 MSA revised National Standard 1 guidelines.

5.1 Highest Priority Issues

5.1.1 North Pacific Albacore

Fisheries Statistics: Timely 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 monitor the submission of these data, to provide adequate database management, and to adequately document the entire database system, including metadata catalogs. Electronic reporting systems increase data entry convenience for industry participants, reduce processing time and costs for data managers, and significantly improve the quality of data being collected through validation checks. Following examples set in Alaska and on the east coast, the implementation of an electronic fish ticket system on the West Coast would greatly improve the availability, timeliness and accuracy of fishery landings data. The development of a coastwide, multi-fisheries electronic logbook system would provide similar results for logbook data.

Biological Studies: Biological information is a critical building block for stock assessments and should be reviewed and updated regularly to capture changes in population parameters as they occur. Unfortunately, these updates have not been accomplished for North Pacific albacore because of limited resources for biological studies. Consequently, the stock assessment models used by the ISC Albacore WG still rely on some biological information that was developed largely in the 1950s and 1960s,although updated length-weight schedules have been applied and a recent age and growth study has provided new information.

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

- age and growth with the goal of updating growth rates and identifying regional differences in growth rates;
- reproductive biology with the goal of updating the maturity schedule and identifying regional differences;
- migration and habitat utilization, with the goal of determining migration and habitat use patterns, improving fishery catch-effort standardization and fishery selectivity/catchability estimates;
- stock structure with the goal of identifying possible sub-stocks in the EPO;
- natural mortality with the goal of estimating natural mortality rates using well-designed tagging experiments;
- influence of environmental conditions on albacore biological parameters, including recruitment, growth, migration, habitat use, and catchability of albacore; and
- albacore age and length data through port and biological sampling.

Stock Assessment and Management Studies: Demand for more frequent and more precise information on the status of the stock and the sustainability of albacore fisheries is likely to increase. With this in mind, the albacore stock assessment needs improvement in several areas:

- evaluate effects of changes to assessment model structure and assumptions, by challenging the assessment model with data generated by a simulation model tuned to albacore biology;
- develop simulations to assist fishery managers in selecting appropriate biological reference points for albacore;
- development and improvement of abundance indices from commercial and recreational fisheries;
- stock-recruitment relationship, with the goal of improving current assumptions of the stock-recruitment relationship;
- development of models that include tagging data from a variety of tags, e.g., conventional, electronic, and biological tags; and
- development of environmental indices that strongly influence albacore population dynamics and evaluate effects of including these environmental indices in assessment models.

5.1.2 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. In addition, complementary studies using tools ranging from otolith microchemistry to electronic tagging are needed to characterize the stock dynamics of swordfish in the California Current region.

Economic Studies: Explore economic viability of harpoon and longline gear as an alternative to DGN gear for swordfish. Research the best options to promote developing and testing novel gear (e.g., deep-set buoy gear or deep-set daytime longlining) to reduce protected species interactions and increase swordfish catch. Gauge the impact on global swordfish production and trade of unilateral measures to limit West Coast fishing effort.

5.1.3 Sharks

Most of the tunas covered in the HMS FMP are being assessed on a regular basis, with varying degrees of completeness and sophistication. 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. 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 HMS shark species are likely to be more vulnerable to overfishing than other HMS. The Pacific RFMOs have begun to prioritize shark stock assessments. The WCPFC, IATTC and ISC have each developed plans to assess some shark stocks over the next several years, but given the fact that many species are not targeted and fishery data are scant, there will be many challenges.

As with the other trans boundary 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 and shortfin mako shark). Others are more coastal—with a substantial portion of their habitat shoreward of the U.S. EEZ—but exhibit north-south migrations with significant catches in Mexican waters (e.g., common thresher shark). 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, non-profit, 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, effort, and the corresponding size samples, stock assessment efforts and concomitant management by the Council will be problematic.

The following specific research priorities have been identified for the two sharks species of greatest priority to the Council with respect to 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;
- improved recreational catch estimates which adaptively sample the pulse nature of fishing effort;
- improved commercial fishery monitoring in Mexican waters;
- age 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;
- stock structure and boundaries of the species and relationships to other populations; and
- age and growth rates (current growth estimates differ widely).

5.1.4 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 post-release 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 turtle life histories and likely periods of interaction with fisheries. 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 habitat use of leatherback turtles and other species of concern, including target species, 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 regarding places with potentially high interaction risks;
- Explore how regulating the U.S. West Coast Pacific swordfish fishery affects international trade in swordfish and the potential unintended consequences for protected species interactions in foreign fisheries;
- 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; and
- Develop probability-based estimates of unobserved bycatch for observer programs with less than 100% observer coverage.

5.2 High Priority Issues

5.2.1 Blue shark

As noted above, relatively little assessment and research activity is focused on shark species compared to the existing work being done on other HMS such as tunas. Blue shark catch was relatively high in the California CPFV fishery of the late 1980s, but has steeply declined. Blue sharks are encountered in relatively small numbers coastwide in commercial and recreational fisheries. Three specific research needs identified for blue sharks are to: 1) monitor sex and size composition of catches; 2) determine the migratory movements of juvenile and maturing fish from the EEZ to high seas; and 3) examine the Pacific-wide stock structure and interactions among populations using genetics and other techniques.

5.2.2 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.

5.2.3 Pacific Bluefin Tuna

Fisheries Statistics: The timeliness of data reporting, as outlined for albacore above, is equally important for bluefin tuna. Additionally 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 biological studies listed above for albacore are also needed for bluefin tuna.
Additionally, 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;
- estimate natural mortality rates since previous assessment results were highly sensitive to the assumed mortality rates; and
- estimate age-specific migration rates of bluefin tuna from the WCPO to the EPO and understand the factors that influences those rates, since this in turn strongly influences the availability of bluefin in the EPO.

Stock Assessment and Management Studies: All of stock assessment and management studies listed above for albacore are also needed for bluefin tuna. In
addition:

- there is a need for improvements to standardization of abundance indices;
- development of an abundance index from spotter plane data from the EPO; and
- incorporating tagging data and environmental indices into the assessment model.

5.3 Other Priority Stocks and Issues

5.3.1 Management Unit Species Catch Data

Total catch data are likely inaccurate for most HMS stocks due to an inadequate at-sea data collection programs, logbook programs, and shoreside sampling programs for commercial West Coast fisheries and unreported catch by international fisheries. Commercial catch data needs include:

- Total catch information (including incidental and bycatch) and protected species interactions for surface hook-and-line, purse seine, and additional at-sea sampling of drift gillnet fisheries;
- Catch composition data for harpoon gear;
- Size composition of bycatch in drift gillnet fisheries; and
- 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 shortfin mako sharks.

5.3.2 Archival PacFIN Data Cleanup

Some progress has been made to address coding issues with the gear codes for drift gillnet records in the PacFIN data base. The results of the recoding are reflected in drift gillnet landings and revenues summaries provided in Chapters 2 and 4 of this HMS SAFE Report; however, issues remain for PacFIN archived longline records.

Review and subsequent revision of archival PacFIN data is needed to improve the accuracy of historical commercial landings and revenues for longline landings.

5.3.3 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 commercial fisheries. Controlled studies of the survivability of caught 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 and commercially caught fish and to minimize unwanted bycatch in fisheries should be identified.

5.3.4 Essential Fish Habitat (EFH)

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 within the pelagic environment 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 more vulnerable to fishing pressure.

5.3.5 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.

5.3.6 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. West Coast 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
- Investigate the significance of floating objects and other-species associations relative to life history.

5.3.6.1 Pelagic and Bigeye Thresher Sharks

These species occur in far lower frequency than common thresher sharks in U.S. West Coast fisheries. Nevertheless, they are taken in Council-managed fisheries and studies of their life history and ecology, and temporal and spatial catch monitoring will help inform management along the West Coast and in other areas.

6 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/

Regional Fishery Management Councils with HMS Plans

Pacific Fishery Management Council	http://www.pcouncil.org/
Western Pacific Regional 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
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://californiasportfishing.org/
United Anglers of Southern California	http://www.unitedanglers.com
Western Fishboat Owner's Association	http://www.wfoa-tuna.org