

AMENDMENT 2 TO THE FISHERY MANAGEMENT PLAN FOR U.S. WEST COAST  
FISHERIES FOR HIGHLY MIGRATORY SPECIES:  
REVISED NATIONAL STANDARD 1 GUIDELINES (ANNUAL CATCH LIMITS)  
PROPOSED ALTERNATIVES

HIGHLY MIGRATORY SPECIES MANAGEMENT TEAM REPORT

## 1 Introduction

This report describes alternatives for consideration by the Council in order to address new Magnuson-Stevens Act (MSA) requirements, as amended through 2007, and the 2009 revisions of the revised National Standard 1 Guidelines (50 CFR 660.310). The Highly Migratory Species Management Team (HMSMT) met February 23-25, 2010, to further refine proposed alternatives presented at the November 2009 Council meeting, based on Council guidance. The Council is scheduled to adopt a range of alternatives for public review at their April 10-15, 2010 meeting. The alternatives are to be organized around the following topics:

- 1) Classification of stocks in the FMP as either management unit species (MUS) or ecosystem component (EC) species
- 2) Application of the MSA international exception to annual catch limits (ACLs) and accountability measures (AMs) for MUS
- 3) Determining the Primary fishery management plan (FMP) for MUS also addressed by the Western Pacific Fishery Management Council's (WPFMC) Pelagics FMP
- 4) Establishing Reference Points and Accountability Measures

Options for dealing with these four issues are discussed in the following sections of the report.

The HMSMT intends to provide additional recommendations on these issues in a supplemental report.

## 2 Reclassifying HMS FMP Management Unit Species and Monitored Species to Meet Revised National Standard 1 Guidelines

### Classification Criteria in the Original HMS FMP

The HMS FMP identifies both **managed species** and **monitored species**. Section 3.1 of the original HMS FMP discusses classification criteria. The list of criteria for classification as a MUS included:

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

The originally proposed HMS FMP stipulated that any species meeting the first three criteria on the list of MUS classification criteria would be strongly considered for inclusion. The Council chose to adopt the proposed action alternative, which was to include species “that are at least moderately important or of special conservation concern in West Coast HMS fisheries, and also managed by the WPFMC,” leading to the current list of 13 HMS FMP MUS. Tunas, swordfish, striped marlin and HMS sharks were deemed variously important to commercial and sports interests, dorado (dolphinfish) was noted to be of growing importance in the Southern California recreational fishing industry, and all were mentioned to be of concern to conservationists, particularly the HMS sharks.

The criteria for inclusion in the original FMP for monitoring purposes included the following:

1. species having a record of being caught in an HMS fishery and not covered by another FMP or state management regime
2. otherwise of special concern (e.g. elasmobranches, which have relatively low productivity)

The original FMP noted that these species “often comprise a fishery’s bycatch,” and stated that they should be “monitored on a consistent and routine basis to the extent practicable. Sampling and coverage fraction will depend on the take rates of the species that are of the most concern. This monitoring is needed to evaluate the impact of HMS fisheries on incidental and bycatch species (as well as MUS) and to track the effectiveness of bycatch reduction methods.”

### **Revised National Standard 1 Classification Criteria**

The Guidelines introduce the concept of species “in the fishery,” for which catch limits must be considered, and **ecosystem component (EC) species**, an optional stock classification category in an FMP; EC species do not require active management. The current FMP monitored species category seems to be very similar in concept to the EC category. The HMSMT decided that this FMP amendment provides an opportunity to take a comprehensive look at the current list of MUS and monitored species to determine which should be considered “in the fishery” and subject to management and which are more appropriately classified as EC species, and whether some of the species currently listed as monitored species in the FMP should be dropped altogether, because they are rarely if ever caught in current west coast HMS fisheries.

According to revised National Standard 1 Guidelines (600.310(d)(1)) all stocks in an FMP are considered to be “in the fishery” by default unless they are identified as ecosystem component (EC) species. There are several criteria that should be met for a species to be included in the EC category (§660.310(d)(5)). These are:

- Be a non-target stock/species;
- Not be subject to overfishing, approaching overfished, or overfished and not likely to become subject to overfishing or overfished in the absence of conservation and management measures; and,
- Not generally retained for sale or personal use, although “occasional” retention is not by itself a reason for excluding a species from the EC category.

One of the reasons given for including EC species in an FMP is for data collection purposes, which is consistent with the intent presented in the HMS FMP. EC species are not considered “in the fishery” but Councils should consider measures to minimize bycatch of these species consistent with National Standard 9. OY and reference points (MSY, OFL, SDC, ABC, ACL, ACT) do not need to be specified for EC species.<sup>1</sup> One of the essential purposes behind monitored species in the FMP and the EC species

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<sup>1</sup> See Section 5.

in the Guidelines is similar: to track species over time, periodically evaluate their status, and assess whether any management is needed under the FMP, in which case a monitored/EC species could be reclassified as MUS that is “in the fishery.” Other purposes for identifying EC species are to allow Councils to consider measures “to minimize bycatch and bycatch mortality of EC species consistent with National Standard 9, and to protect their associated role in the ecosystem.”

Many of the monitored species are also currently WPFMC Pelagics Plan FMP MUS. Inclusion in another FMP could also be used as a criterion for determining whether a stock should be classified as an EC or in the fishery, if both Pelagics FMP fisheries and HMS FMP fisheries are catching the same stock. If a species is actively managed in that FMP, this would lend additional support to classifying it as an EC species if there is low susceptibility to HMS FMP fisheries. However, the WPFMC is considering reclassifying some of their MUS as EC species.

If a monitored/EC species is reclassified as a MUS in the fishery, then it should be determined:

- If the international exception should be applied, and
- If it is also an MUS in the Pelagics FMP, which FMP should be designated the primary FMP.

## **2.1 Proposed Reclassification of HMS FMP Management Unit Species and Monitored Species**

The current tuna and billfish MUS should not be considered for reclassification as EC species. Even though west coast landings are small for some of these species, they are commercially important internationally, recreationally important domestically, or there are management concerns (overfishing or potential overfishing or overfished condition). Of the remaining species, the HMS FMP established harvest guidelines for common thresher and shortfin mako sharks, reflecting their importance in west coast commercial and recreational fisheries. Blue sharks, while not targeted and of low market value, are taken in large numbers in HMS fisheries; recent analyses indicate that the North Pacific population may be approaching MSY. This indicates that these species also should not be considered for reclassification.

The following current MUS are proposed for reclassification as EC species:

- Bigeye thresher shark
- Pelagic thresher shark

The following monitored species is proposed for reclassification as MUS:

- Opah

Opah is considered for MUS status because, although landings declined from 1998 to 2005 to less than 20 mt/year, they have been stable since 2006 at roughly 60 mt/yr (see Figure 1). Table 2 shows the distribution of landings by gear type for the period 1996-2009. (Note that 2009 data should be considered provisional.)

Table 1 presents commercial landings and estimated recreational catch information for the two shark MUS that may be considered for reclassification as EC species and the current list of monitored species. A number of these species may be appropriately dropped from the FMP as noted in the table. Only four species show average annual commercial landings for this recent time period over 1 mt: bat ray, escolar, louvar, and opah. However, further investigation shows that bat rays were landed by purse seine (an HMS gear) vessels targeting non-HMS species, so these landings should be discounted in terms of susceptibility to HMS fisheries. Opah landings are substantial; given the amount it is likely inappropriate to classify opah as an EC species. In addition, observer records from the drift gillnet (DGN) fishery show a high bycatch of common mola (ocean sunfish), generally exceeding target species catch (see Table 3

below). This species is almost universally discarded and observer information shows a very high proportion discarded alive, providing indication that bycatch mortality may be relatively low. Based on the criteria above, common mola seems to fit in the EC category.

The species listed to be dropped from the FMP are covered by other FMPs and are rarely landed by west coast HMS fisheries. A more focused list will allow more effective monitoring.

**Table 1. Selected MUS and monitored species commercial landings and estimated recreational catch with reclassification recommendations.**

Species	Other FMP Coverage	Average Annual Commercial Landings (mt) 2000-2008	Average Annual Recreational Dead Catch (mt) 2004-2008	Possible Reclassification
<b>Selected MUS</b>				
Bigeye thresher shark, <i>Alopias superciliosus</i>	WP Pelagics	4.80	**	Reclassify: EC
<b>Pelagic thresher shark, <i>A. pelagicus</i></b>	WP Pelagics	1.76	**	Reclassify: EC
<b>Monitored Species, commercial landings reported</b>				
Opah, <i>Lampris guttatus</i>	WP Pelagics	37.56	0.1	Reclassify: MUS
Louvar, <i>Luvarus imperialis</i>		1.98	0.0	Reclassify: EC
Escolar, <i>Lepidocybium flavobrunneum</i>	WP Pelagics	1.58	0.0	Reclassify: EC
Bat ray, <i>Myliobatis californica</i>		1.43 <sup>‡</sup>	1.0	Drop
Leopard shark, <i>Triakis semifasciata</i>	P Groundfish	0.63	4.4	Drop
Pelagic stingray, <i>Pteroplatytrygon violacea</i>		0.33	0.0	Reclassify: EC
Wahoo, <i>Acanthocybium solandri</i>	WP Pelagics	0.26	0.0	Reclassify: EC
Hammerhead sharks, Sphyrnidae	WP Pelagics	0.10	0.0	Reclassify: EC
Oilfish, <i>Ruvettus pretiosus</i>	WP Pelagics	0.26	0.0	Reclassify: EC
Pacific pomtret, <i>Brama japonica</i>	WP Pelagics	0.02	0.0	Reclassify: EC
Black skipjack, <i>Euthynnus lineatus</i>	WP Pelagics	0.02	0.5	Reclassify: EC
<b>Monitored Species, commercial landings not reported</b>				
Black marlin, <i>Makaira indica</i>	WP Pelagics	†	0.0	Drop
Blacktip shark, <i>Carcharhinus limbatus</i>		–	0.0	Drop
Blue marlin, <i>Makaira nigricans</i>	WP Pelagics	–	0.0	Drop
Bullet mackerel (tuna), <i>Auxis rochei</i>	WP Pelagics	–	0.0	Reclassify: EC
Common mola, <i>Mola mola</i>		–	0.0	Reclassify: EC
Dusky shark, <i>C. obscurus</i>		–	0.0	Drop
Lancetfishes, Alepisauridae		–	0.0	Drop
Manta/Mobula rays, Mobulidae		†	0.0	Drop
Oarfish, <i>Regalecus glesne</i>		†	0.0	Drop
Oceanic whitetip shark, <i>C. longimanus</i>	WP Pelagics	†	0.0	Drop
Pacific bonito, <i>Sarda chiliensis</i>		–	4.2	Reclassify: EC
Pacific moonfish, <i>Selene peruviana</i>		†	0.0	Drop
Pacific sailfish, <i>Istiophorus platypterus</i>	WP Pelagics	–	0.0	Drop
Pacific saury, <i>Cololabis saira</i>		–	0.0	Drop
Prickly shark, <i>Echinorhinus cookei</i>		†	0.0	Drop
Rainbow runner, <i>Elagetus bipinnulata</i>		†	0.0	Drop

Species	Other FMP Coverage	Average Annual Commercial Landings (mt) 2000-2008	Average Annual Recreational Dead Catch (mt) 2004-2008	Possible Reclassification
Salmon shark, <i>Lamna ditropis</i>	AK Groundfish	‡	0.0	Drop
Shortbill spearfish, <i>Tetrapturus angustirostris</i>	WP Pelagics	†	0.0	Drop
Silky shark, <i>C. falciformis</i>	WP Pelagics	‡	0.0	Drop
Six gill shark, <i>Hexanchus riseus</i>	AK Groundfish	–	0.0	Drop
Soupin shark, <i>Galeorhinus galeus</i>	AK & P Groundfish	–	0.0	Drop
Spiny dogfish, <i>Squalus acanthias</i>	AK & P Groundfish	–	0.1	Drop
Whale shark, <i>Rincodon typus</i>		†	0.0	Drop

Sources:

PacFIN ft and ffl tables; only landings by HMS gear types.

Average annual RecFIN HMS A+B1 catch (dead catch) weight estimates in metric tons for private and rental.

Notes:

\*RecFIN does not separately report "black skipjack"; average for all skipjack catch is shown.

‡ Although bat ray was landed with purse seine, a HMS gear, examination of species composition shows that the sets were made on CPS.

\*\*RecFIN does not appear to separately report the different thresher shark species; total thresher

‡ Excluded because less than 3 vessels made landings during the time period.

† This species not separately identified in PacFIN.

–No landing record for this time period.

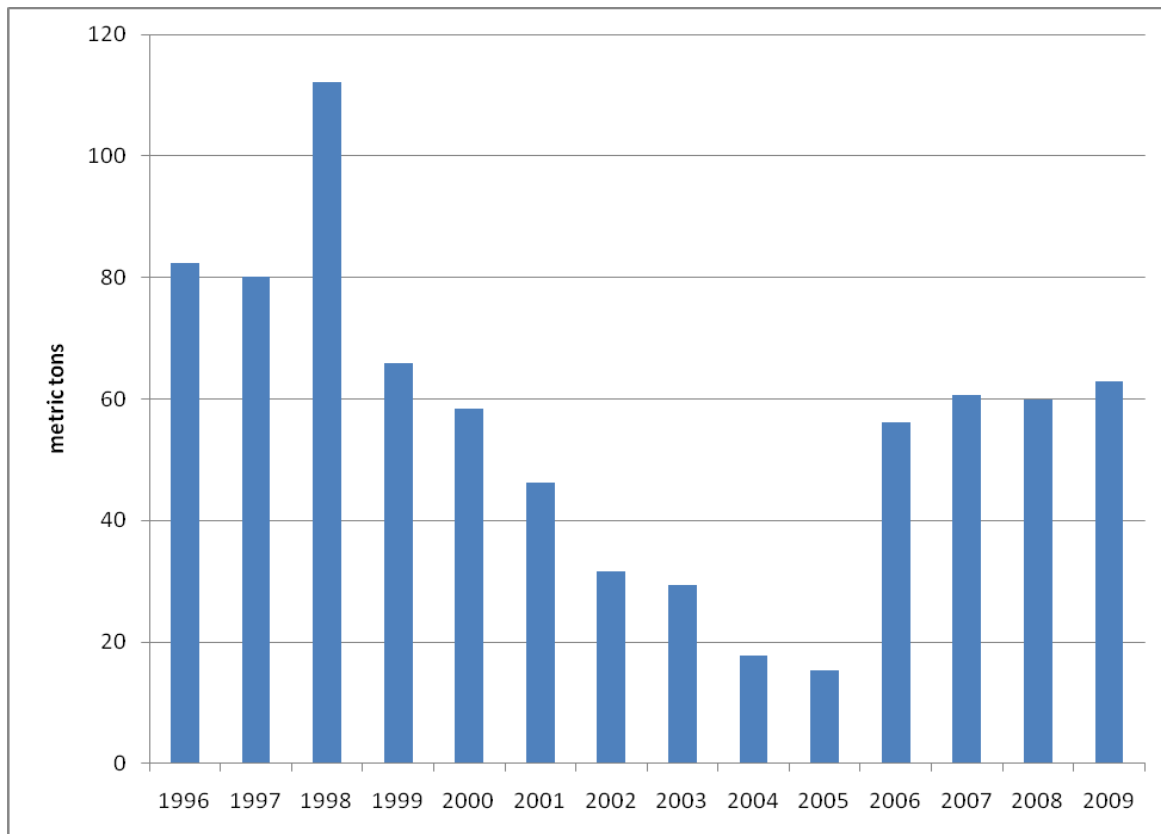


Figure 1. Landings of opah with HMS gear types, 1996-2009. (Source PacFIN 2/26/10)

**Table 2. Opah landings by gear type, 1996-2009. (Source: PacFIN 3/2/10)**

HMS Gear Type	Landings as percent of all opah landings with HMS gear	Vessels as percent of all HMS vessels with opah landings
Surface hook-and-line	0.4%	4.2%
Drift gillnet	92.7%	86.0%
Harpoon	0.1%	0.9%
Longline	6.8%	8.6%
Purse seine	<0.1%	0.2%

Table 3 shows the estimated numbers of MUS and monitored species from Table 1 above which were caught per year in the California drift gillnet fishery over the period from 2000-2008. The drift gillnet fishery can be considered the most informative west coast HMS fishery to currently use for observed finfish catch analysis since only a single vessel has been operating in the pelagic longline fishery for the past several years and the data cannot be presented here for reasons of confidentiality, and the other HMS gears that have significant effort (albacore troll, hook and line, purse seine) have limited selectivity and low bycatch.

Annual catch estimates provided in Table 3 represent the observed catch, some of which may have been landed, and thus should not be considered additions to the landings data in table 1. These estimates were developed from the observed catch drift gillnet catch counts over the calendar years 2000 through 2008. For each species, the total observed catch over this period was divided by the number of years, nine, to obtain an average observed catch per year. This average was multiplied by the ratio of the total number of drift gillnet sets fished over the 2000-2008 seasons (12,245) to the total number of observed sets over these seasons (2,457) to estimate the catch per year over the period. These data do not indicate post-release mortality; some species included in the table (e.g. common mola) are known to have a very high live discard rate, mitigating concerns about high estimated annual catch rates.

Among monitored species with commercial landings, opah stood out as a marketable species with an estimated catch of nearly 1,000 per year. Its commercial value and relatively higher catch support the case for reclassifying opah as an MUS while reclassifying most of the other monitored species with commercial landings as ecosystem component species. Bat ray and leopard shark might be candidates for species to drop from the FMP. The small amount of bat ray landings are believed to occur as bycatch in the CPS purse seine fishery, while observed DGN bycatch is negligible. Leopard shark had no observed catch and is covered in the PFMC's Groundfish Management Plan.

Among monitored species with no reported commercial landings, only bullet mackerel, common mola, and Pacific bonito had estimated catch over fifteen per season. Absent evidence of significant catch (bycatch) in other HMS gears besides drift gillnet, this data supports the case for reclassifying these three species as ecosystem components and dropping the remaining monitored species with no reported commercial landings and negligible observed bycatch from the FMP. The Council might more generally consider establishing a threshold level of observed catch below which a species could be excluded from the FMP as either an MUS or as an ecosystem component species.

**Table 3. Selected MUS and monitored species estimated annual observed California drift gillnet catches (number of fish) and reclassification recommendations. Species in bold italics proposed for consideration of reclassification.**

Species	Estimated Catch Per Year, 2000-2008	Possible Reclassification
<b>Selected MUS</b>		
Blue shark, <i>Prionace glauca</i>	2,271	Keep as MUS

Species	Estimated Catch Per Year, 2000-2008	Possible Reclassification
<i>Bigeye thresher shark, Alopias superciliosus</i>	123	Reclassify: EC
Pelagic thresher shark, <i>A. pelagicus</i>	1	Reclassify: EC
<b>Monitored Species, commercial landings reported</b>		
Opah, <i>Lampris guttatus</i>	997	Reclassify: MUS
Louvar, <i>Luvarus imperialis</i>	137	Reclassify: EC
Escolar, <i>Lepidocybium flavobrunneum</i>	1	Reclassify: EC
Bat ray, <i>Myliobatis californica</i>	6	Drop
Leopard shark, <i>Triakis semifasciata</i>	0	Drop
Pelagic stingray, <i>Pteroplatytrygon violacea</i>	80	Reclassify: EC
Wahoo, <i>Aathocybium solandri</i>	0	Reclassify: EC
Hammerhead sharks, <i>Sphyrnidae</i>	7	Reclassify: EC
Oilfish, <i>Ruvettus pretiosus</i>	5	Reclassify: EC
Pacific pomfret, <i>Brama japonica</i>	73	Reclassify: EC
Black skipack, <i>Euthynnus lineatus</i>	0	Reclassify: EC
<b>Monitored Species, commercial landings not reported</b>		
Black marlin, <i>Makaira indica</i>	0	Drop
Blacktip shark, <i>Carcharhinus limbatus</i>	0	Drop
Blue marlin, <i>Makaira nigricans</i>	8	Drop
Bullet mackerel (tuna), <i>Auxis rochei</i>	116	Reclassify: EC
Common mola, <i>Mola mola</i>	12,738	Reclassify: EC
Dusky shark, <i>C. obscurus</i>	0	Drop
Lancetfishes, <i>Alepisauridae</i>	1	Drop
Manta/Mobula rays, <i>Mobulidae</i>	2	Drop
Oarfish, <i>Regalecus glesne</i>	0	Drop
Oceanic whitetip shark, <i>C. longimanus</i>	0	Drop
Pacific bonito, <i>Sarda chiliensis</i>	412	Reclassify: EC
Pacific moonfish, <i>Selene peruviana</i>	0	Drop
Pacific sailfish, <i>Istiophorus platypterus</i>	0	Drop
Pacific saury, <i>Cololabis saira</i>	0	Drop
Prickly shark, <i>Echinorhinus cookei</i>	1	Drop
Rainbow runner, <i>Elagatis bipinnulata</i>	0	Drop
Salmon shark, <i>Lamna ditropis</i>	15	Drop
Shortbill spearfish, <i>Tetrapturus angustirostris</i>	0	Drop
Silky shark, <i>C. falciformis</i>	0	Drop
Six gill shark, <i>Hexanchus riseus</i>	1	Drop
Soufina shark, <i>Galeorhinus galeus</i>	1	Drop
Spiny dogfish, <i>Squalus acanthias</i>	1	Drop
Whale shark, <i>Rincodon typus</i>	0	Drop

## 2.2 Vulnerability Analyses to Inform Reclassification Decisions

Vulnerability analyses were conducted using the methods developed by the NMFS Vulnerability Evaluation Work Group (VEWG).<sup>2</sup> The vulnerability of a stock to becoming overfished is defined in the NS1 guidelines as a function of its productivity (“the capacity of the stock to produce MSY and to recover if the population is depleted”) and its susceptibility to the fishery (“the potential for the stock to be impacted by the fishery, which includes direct captures, as well as indirect impacts to the fishery”). The guidelines note that the “vulnerability” of fish stocks should be considered when: 1) differentiating between stocks “in the fishery” and “ecosystem components”; 2) assembling and managing stock complexes; and 3) creating management control rules. The analysis uses a semi-quantitative method to rate both the productivity of the stock, based on life history characteristics, and the susceptibility of the stock to the fishery of interest based on catchability and the overall impact of the fishery to the stock and its habitat.

Analyses were conducted for the pelagic sharks, opah, and two west coast HMS target species for comparison. Susceptibility of these species to the drift gillnet fishery, which with the exception of albacore, is the west coast HMS fishery catching these species in the greatest number, was examined.

The results demonstrate that the pelagic sharks have very low productivity and all species fall in a relatively narrow range of susceptibility to the drift gillnet fishery. This is not surprising. Sharks have slow growth, low fecundity, and a high trophic level contributing to a low overall productivity. Because all species are highly migratory and utilize a large portion of the water column including the depths at which the drift gillnet fishes, and the large mesh drift gillnet gear operates as an entangling net and captures a broad range of species, susceptibility differs among the species only by the extent to which they overlap with the fishery area (e.g. pelagic threshers are generally distributed farther south and are rarely taken in the fishery with the exception of during el Niño years), the relative distribution of the stock (e.g., common threshers in the EPO are distributed along the west coast of the U.S. and Baja and not as widely ranging as the other species), or the value to the fishery (e.g., blue sharks are not desirable). The overall scores reflect some of these differences, but because the gillnet gear is not terribly selective, all can be considered somewhat susceptible. The HMSMT feels that the results of the vulnerability analysis alone do not particularly help in determining whether reclassification is warranted. In combination with the catch history, bigeye and pelagic threshers appear to be the least susceptible of the pelagic sharks to the drift gillnet fishery. While the overall vulnerability score for opah is lower than for the pelagic sharks, there is also the greatest uncertainty about the species as indicated by the higher data quality scores. In addition, as stated above, opah catch has been relatively high and stable for the past 4 years. Observer records also indicate that nearly all opah are either landed or discarded dead.

**Table 4. Results of the vulnerability analysis. Productivity scores can range from 1 (low productivity and low susceptibility) to 3 (high productivity and high susceptibility). Data quality scores can range from 1 (best quality data) to 5 (no data).**

PFMC DGN Fishery	Productivity		Susceptibility		Vulnerability
	Weighted Attribute Score	Weighted Data Quality Score	Weighted Attribute Score	Weighted Data Quality Score	
Common thresher	1.200	2.100	2.000	2.667	2.059
Shortfin mako	1.250	2.100	1.800	2.750	1.924

<sup>2</sup> Patrick, W. S., P. Spencer, O. Ormseth, J. Cope, J. Field, D. Kobayashi, T. Gedamke, E. Cortés, K. Bigelow, W. Overholtz, J. Link, and P. Lawson. 2009. Use of productivity and susceptibility indices to determine stock vulnerability, with example applications to six U.S. fisheries. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-F/SPO-101, 90 p.

Pelagic thresher	1.200	2.200	1.611	3.167	1.901
Bigeye thresher	1.300	2.200	1.667	2.917	1.826
Blue shark	1.400	1.800	1.750	2.000	1.767
Opah	1.500	3.700	1.889	3.000	1.744
Swordfish	1.750	2.000	1.833	1.917	1.502
Albacore	1.800	2.200	1.833	1.750	1.461

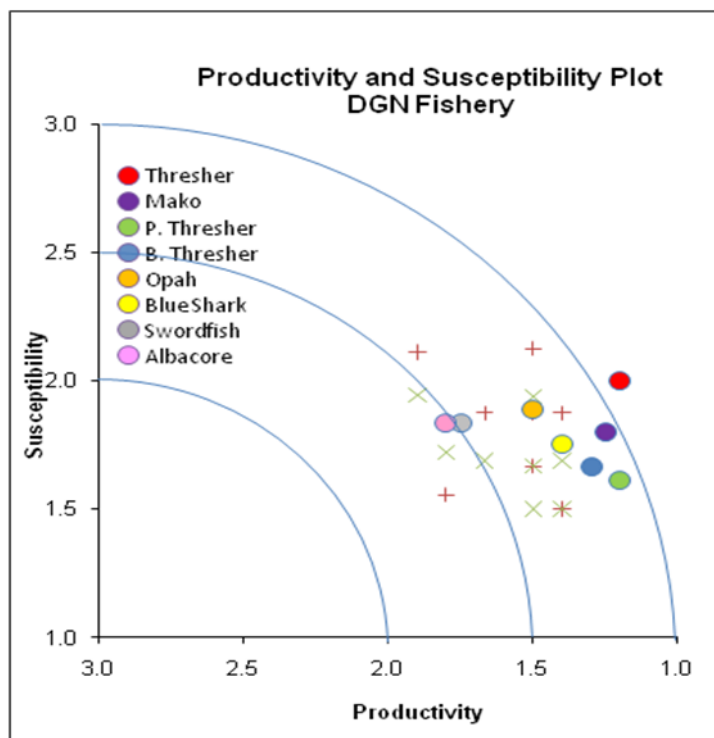


Figure 2. Vulnerability plot for the species under consideration and two commercially important species (swordfish and albacore). Susceptibility scores are based on the drift gillnet fishery that targets swordfish. The range of values for the same species for the HI tuna (+) and HI swordfish (x) longline fisheries are also shown for comparison.

### 3 Application of the International Exception to Management Unit Species

Once any changes to the list of HMS FMP MUS are determined, the Council would need to decide which of these would be subject to the MSA “international exception.” Section 660.310(h)(2)(ii) of the revised National Standard 1 Guidelines, relating to international fishing agreements, applies to stocks or stock complexes subject to management under an international agreement, which is defined as “any bilateral or multilateral treaty, convention, or agreement which relates to fishing and to which the United States is a party.” For stocks that meet this exception, only MSY, OY, and SDCs have to be defined. ABC, ACLs, and AMs are not required.

#### 3.1 Proposed Alternatives

In November 2009 the Council indentified the following alternatives for consideration for determining to which MUS this exception could apply.

Opah, the monitored species reclassified as an MUS, would be subject to the international exception as well.

### 1. Apply the international exception to all of the HMS MUS

The rationale for this alternative is that both the IATTC and WCPFC (the two RFMOs that manage HMS stocks in the Pacific at the international level) include general statements in their charter documents asserting broad management authority over all HMS species. Article 1 of the IATTC Antigua Convention, which enters into force August 24, 2010, defines fish stocks covered by this Convention as “stocks of tunas and tuna-like species and other species of fish taken by vessels fishing for tunas and tuna-like species in the Convention Area.” Article 2 of the WCPFC Convention states “The objective of this Convention is to ensure, through effective management, the long-term conservation and sustainable use of highly migratory fish stocks in the western and central Pacific ...” Article 1 defines highly migratory fish stocks as “all fish stocks of the species listed in Annex 1 of the 1982 Convention occurring in the Convention Area, and such other species of fish as the Commission may determine.” All of the HMS MUS are found on the referenced Annex 1 list.

Furthermore, the WPFMC has indicated that it is considering applying the international exception to all MUS in their Pelagics FMP after reclassifying selected MUS as EC species (personal communication from Paul Dalzell, Senior Staff Scientist, WPFMC). Since all HMS FMP MUS are also Pelagics FMP MUS applying the international exception to all HMS FMP MUS would be consistent with the WPFMC’s approach. The two Councils should ensure consistency in their treatment of these stocks with respect to the international exception and, as necessary, agree upon which will become the primary FMP (see Section 4 below).

The RFMOs regularly conduct stock assessments for tuna and billfish species in the HMS FMP. Conservation measures have been adopted, or are under consideration for many of the species in the HMS FMP. Table 5 summarizes information on stock assessments and RFMO activities.

**Table 5. Summary of stock assessments and RFMO conservation measures for HMS FMP MUS.**

Species (stocks)	Assessment and conservation measures
<b>Tunas</b>	
Albacore tuna, <i>Thunnus alalunga</i> (NPO)	Regularly assessed by the ISC. IATTC and WCPFC conservation measures in place
Bigeye tuna, <i>T. obesus</i> (EPO, WCPO)	Regularly assessed by WCPFC and IATTC and both RFMOs have conservation measures in place
Skipjack tuna, <i>Katsuwonus pelamis</i> (EPO, WCPO)	Regularly assessed by the WCPFC and IATTC; no specific conservation measure in place but both RFMOs are addressing purse seine fleet capacity
Bluefin tuna, <i>T. orientalis</i> (NPO)	Occasionally assessed by the ISC; the WCPFC adopted a conservation measure in 2009
Yellowfin tuna, <i>T. albacares</i> (EPO, WCPO)	Regularly assessed by WCPFC and IATTC and both RFMOs have conservation measures in place
<b>Billfish</b>	
Striped marlin, <i>Tetrapturus audax</i> (NPO, EPO)	Occasionally assessed by the ISC and IATTC; WCPFC considered conservation measure in 2009 to be developed further in 2010
Swordfish, <i>Xiphias gladius</i> (NPO, SEPO)	Occasionally assessed by the ISC and IATTC;

	WCPFC has conservation measure for SP stock
<b>Sharks</b>	
Bigeye thresher shark, <i>Alopias superciliosus</i>	NMFS has occasionally assessed selected species; IATTC and WCPFC adopted conservation measures for sharks (C-05-03, CMM-2008-06). The WCPFC identifies “key shark species” as blue shark, oceanic whitetip shark, mako sharks, silky sharks, and thresher sharks
Blue shark, <i>Prionace glauca</i>	
Common thresher shark, <i>A. vulpinus</i>	
Pelagic thresher shark, <i>A. pelagicus</i>	
Shortfin mako shark, <i>Isurus oxyrinchus</i>	
<b>Other</b>	
Dorado (dolphin), <i>Coryphaena hippurus</i>	IATTC has consolidated bycatch resolution referencing dorado (C-04-05); WCPFC has nonbinding resolution on bycatch species
<b>Possible Additional MUS</b>	
Opah, <i>Lampris guttatus</i>	IATTC has consolidated bycatch resolution (C-04-05); WCPFC has nonbinding resolution on bycatch species

**2. Apply the international exception to all MUS except for common thresher shark and shortfin mako shark**

Under this alternative the international exception would be applied to all MUS except for common thresher shark and shortfin mako shark, because of their significance in west coast EEZ fisheries. In addition to tuna and billfish MUS, the international exception would cover bigeye thresher shark, blue shark, pelagic thresher shark, and dorado. The HMS FMP established harvest guidelines for common thresher and shortfin mako sharks, to which the international exception would not apply. This reflects the fact that west coast fisheries catch these species in more than negligible quantities. Thus, even though there is evidence that RFMOs are managing shark species included in the HMS FMP, it may be appropriate to consider adopting ACLs (and perhaps reevaluating the current harvest guidelines) for these two species.

**3. Apply the international exception for all MUS except for common thresher shark**

Apply the international exception to all MUS except for common thresher shark, based on the broader range of blue and shortfin mako sharks outside the West Coast EEZ versus the relatively more coast bound range of the common thresher shark (see next section). Although a large portion of the common thresher shark stock appears to inhabit Mexico waters and they are taken in large numbers in near shore fisheries there, the HMSMT heard at their February 2010 meeting from Dr. Sosa-Nishizaki, an scientist of Mexico’s Pacific HMS fisheries, that the fisheries there may be declining. He also believes the Mexico catch of common threshers has probably been in decline over the past decade.

### 3.2 Information Regarding the Range of HMS Shark Species in Current FMP

Figures 3, 4 and 5 shown below display recapture locations for tagged specimens of three HMS shark MUS which is indicative of their ranges (NMFS SWFSC unpublished data): blue shark (Figure 3), shortfin mako shark (Figure 4) and common thresher shark (Figure 5). The three plots suggest a pronounced difference with respect to the ranges of the three species, with some tagged blue shark and shortfin mako sharks recaptured in the Western Pacific Ocean; by contrast, the tagged common thresher sharks were almost all recaptured within close proximity of the West Coast, with only one of the tagged thresher sharks recovered as far as 250 km off shore. The recapture data indicate that the ranges of blue shark and shortfin mako shark cover a far broader longitudinal range of the Pacific Basin than the common thresher shark range. The recapture data for common thresher shark also provides evidence of a shared stock between U.S. and Mexico coastal waters whereas mako and blue shark stocks go well beyond the national EEZs into international waters.

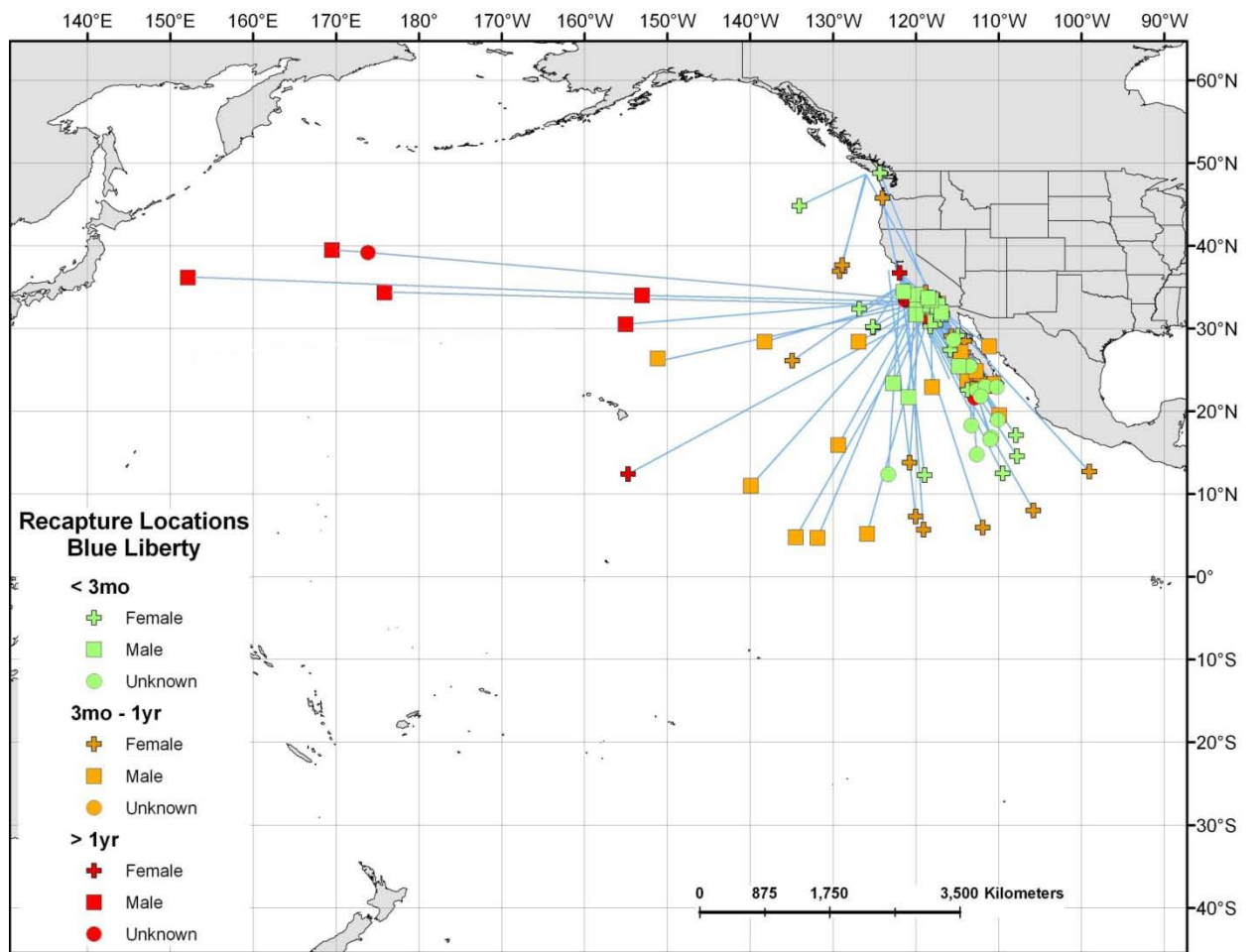


Figure 3. Tagged blue shark recapture locations.

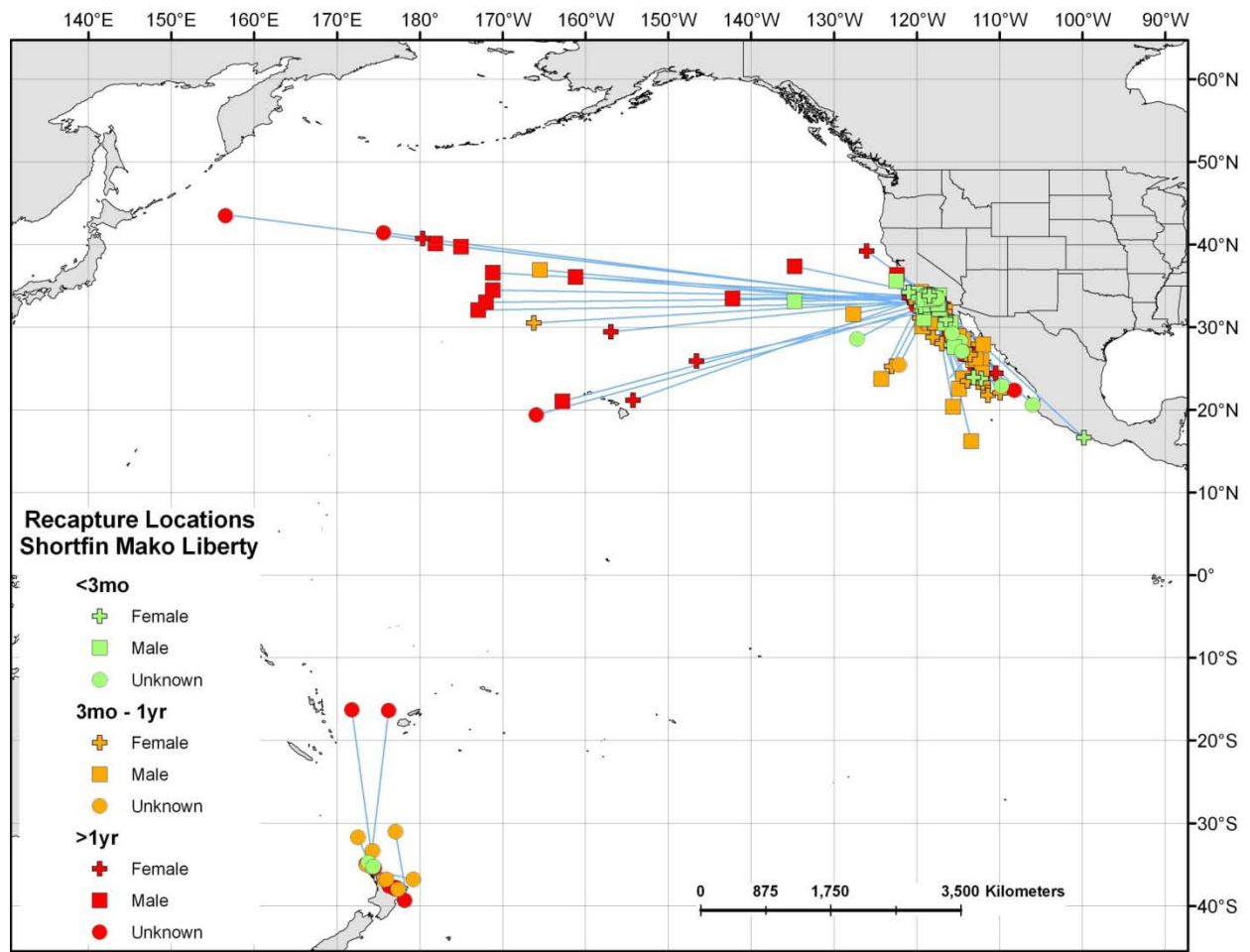


Figure 4. Tagged shortfin mako shark recapture locations.

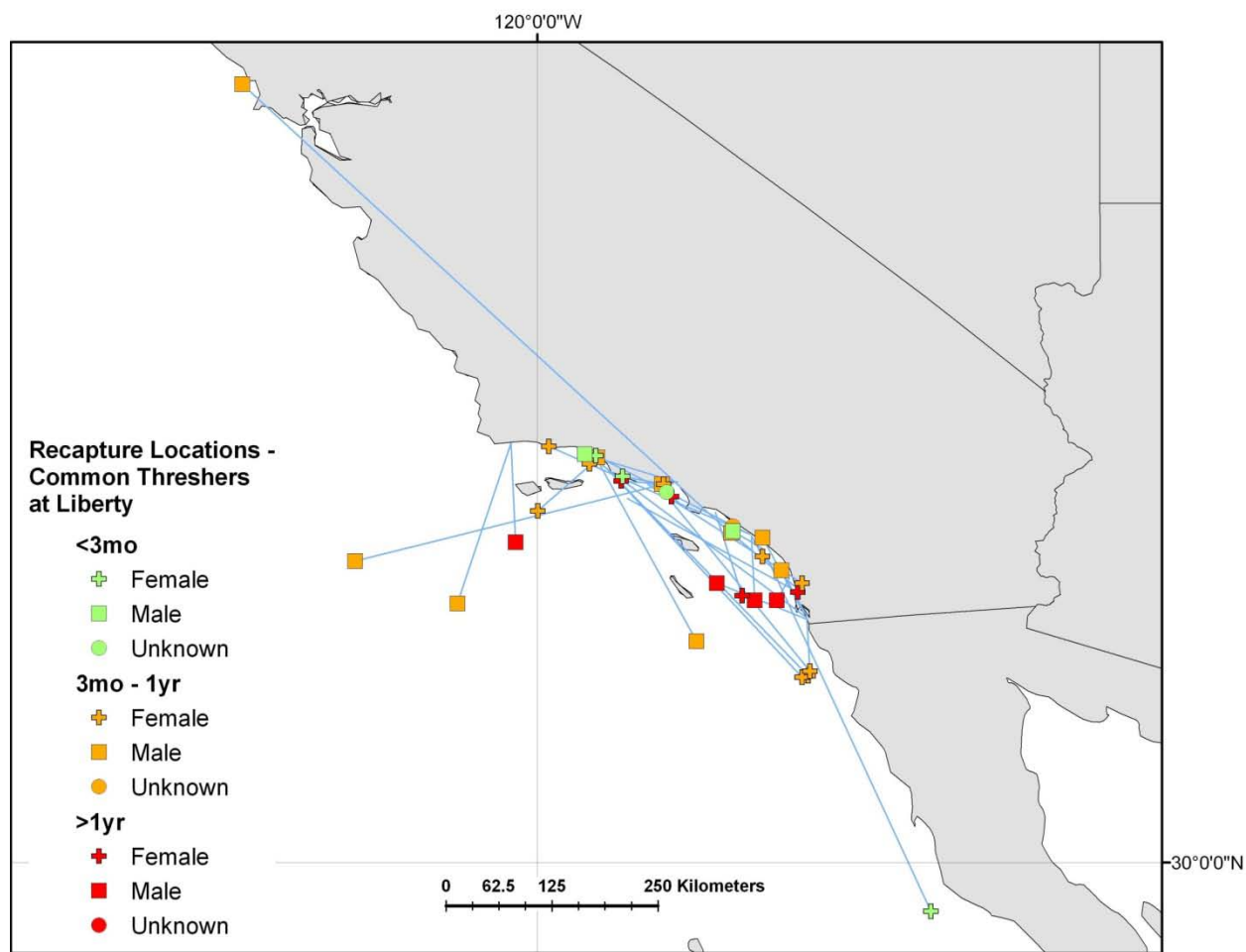


Figure 5. Tagged common thresher shark recapture locations.

#### 4 Determining the Primary FMP for Management Unit Species

Because HMS FMP MUS are also currently MUS in the WPFMC’s Pelagics FMP, coordination between the two councils is necessary. Section 600.310(d)(7) of the Guidelines states that Councils *should* choose which FMP will be the primary FMP in which management objectives and other requirements of the Guidelines will be established in cases where a stock or species is identified in more than one FMP. Thus, it may be necessary to decide which FMP will address the requirements of the Guidelines, with the other FMP incorporating those measures in parallel.

In November 2009 the HMSMT proposed basing this decision on assessed stocks rather than species. For the tropical tunas (bigeye, skipjack, and yellowfin) the WCPFC produces stock assessments based on the stock for the Western Pacific while the IATTC does the same for the Eastern Pacific.<sup>3</sup> The Pelagics FMP Annual Report (SAFE document) reports SDCs for Pelagics FMP MUS; generally WCPO stocks (or NPO/SPO stocks) are reported, but not EPO stocks. In addition, at the NMFS regional level there has been an informal division of responsibility at the stock level, so that SWR/SWFSC assumes responsibility

<sup>3</sup> Although these stocks may not be separate from a biological or population genetics standpoint, there may be relevance to the division from a management standpoint.

for EPO stocks (and some NPO stocks like albacore) while PIRO/PIFSC covers the WCPO stocks, SPO stocks, and some NPO stocks (lead responsibility for interfacing with the RFMOs is similarly divided). NMFS is currently discussing a formalization of these arrangements.

After an initial proposal made by the HMSMT in November 2009 and guidance from the Council, PFMC and WPFMC staffs met in December 2009 to discuss this issue. During their February 23-25, 2010, meeting, the HMSMT spoke with Paul Dalzell, WPFMC Staff Scientist and Keith Bigelow, Chair of the Pelagics Plan Team. Table 6 summarizes proposed identification of the primary FMP that has been made to date based on these discussions. The WPFMC' SSC and the Pelagics Plan Team will be meeting in April to further address classification of FMP stocks and related issues. Results of those discussions will inform further decisions on this issue.

Since most or all stocks may be subject to the international exception under both FMPs it would be necessary only to identify MSY, SDCs, and OY. Both Councils could rely on RFMO sponsored stock assessments to identify these reference points. As discussed further below, the HMS FMP includes methods for determining MSY or an MSY proxy, SDCs and OY. OY may be set equal to MSY or to 0.75MSY for vulnerable stocks.

Although MUS would be identified at the stock level for the purpose of identifying reference points in the respective FMPs, the PFMC would continue to maintain a Pacific-wide management interest in the species and therefore report reference points for WCPO stocks based on what is reported by the WPFMC.

**Table 6. Proposed primary FMP for HMS MUS.**

Species	Proposed Primary FMP Designations
<b>Tunas</b>	
Albacore tuna, <i>Thunnus alalunga</i> (NPO)	HMS FMP
Bigeye tuna, <i>T. obesus</i> (EPO, WCPO)	EPO: HMS FMP / WCPO: Pelagics FMP
Skipjack tuna, <i>Katsuwonus pelamis</i> (EPO, WCPO)	EPO: HMS FMP / WCPO: Pelagics FMP
Bluefin tuna, <i>T. orientalis</i> (NPO)	HMS FMP
Yellowfin tuna, <i>T. albacares</i> (EPO, WCPO)	EPO: HMS FMP / WCPO: Pelagics FMP
<b>Billfish</b>	
Striped marlin, <i>Tetrapturus audax</i> (NPO, EPO)	Pelagics FMP (NPO) / HMS FMP (EPO)
Swordfish, <i>Xiphias gladius</i> (NPO) <sup>4</sup>	Pelagics FMP (NPO) / HMS FMP (EPO) <sup>4</sup>
<b>Sharks</b>	
Bigeye thresher shark, <i>Alopias superciliosus</i>	May be classified as EC species under Pelagics FMP & HMS FMP
Blue shark, <i>Prionace glauca</i>	May be classified as EC species under Pelagics FMP, MUS in HMS FMP
Common thresher shark, <i>A. vulpinus</i>	HMS FMP
Pelagic thresher shark, <i>A. pelagicus</i>	May be classified as EC species under Pelagics FMP & HMS FMP
Shortfin mako shark, <i>Isurus oxyrinchus</i>	HMS FMP
<b>Other</b>	
Dorado (dolphin), <i>Coryphaena hippurus</i>	Not determined
<b>Possible Additional MUS</b>	
Opah, <i>Lampris guttatus</i>	Not determined

## 5 Establishing Reference Points, Annual Catch Limits, and Accountability Measures

### 5.1.1 The National Standard 1 Guidelines identify the various reference points

The National Standard 1 Guidelines identify the various reference points (see Section 5.3 below) that must be specified for stocks “in the fishery,” which will include the HMS FMP’s MUS. As noted above, although the MSA international exception to ACLs and AMs may be applied to some HMS FMP MUS, MSY, OY, and SDCs must nevertheless be specified for these stocks. The stocks “in the fishery” (i.e., HMS MUS) for which this exception does not apply are required to have all of the reference points described in Table 7 specified, and ACLs and AMs as well. However, as mentioned above, because HMS FMP MUS are also in the WPFMC Pelagics FMP, identification of a primary FMP at the stock level

<sup>4</sup> The HMS FMP identified EPO swordfish as the managed stock. IATTC conducts stock assessments on EPO swordfish. Recent genetics studies, fishery and demographics data conclude that the NEPO and SEPO stocks may be distinct. The latest IATTC swordfish assessment was conducted for the SEPO only. Due to uncertainty about stock structure, the HMSMT proposes that the primary FMP for the NPO stock be the Pelagics FMP while responsibility for reporting on EPO assessments would be covered under the HMS FMP.

could be made. In cases where the Pelagics FMP is the primary FMP the WPFMC would identify reference points and the application of the international exception for those stocks (see Table 6).

## 5.2 Current Reference Points in the HMS FMP

The HMS FMP identifies values for MSY and OY for the MUS.

The HMS FMP also defines default formulas for the maximum fishing mortality threshold (MFMT) and the minimum stock size threshold (MSST), which are status determination criteria (SDC). MFMT is equal to  $F_{MSY}$ . MSST is defined as:

- $0.5B_{MSY}$  when natural mortality ( $M$ )  $> 0.5$
- $(1-M)B_{MSY}$  when  $M \leq 0.5$

The FMP also describes an alternative approach for setting a proxy OY value for vulnerable species at 75 percent of MSY. According to the FMP, all the managed shark species are considered vulnerable as is bluefin tuna and striped marlin.

The revised Guidelines introduce a new reference point, the overfishing limit (OFL) that may be used as an alternative reference point in determining the overfishing status of a stock. The Guidelines explain that overfishing may be determined as either  $F > MFMT$  or annual catch  $> OFL$ .

## 5.3 Reference Points for Stocks Subject to the International Exception

### 5.3.1 Assessed Stocks

The HMSMT, in consultation with the SSC, would identify MSY (and OY) and SDCs for those assessed stocks for which the HMS FMP is considered the primary FMP (see Section 4), while the WPFMC Pelagics Plan Team would identify MSY and SDCs for stocks where the Pelagics FMP is the primary FMP.

The current default formula for SDCs (MFMT and MSST) in the HMS FMP would be used until RFMOs formally adopt reference points for a stock. Consistent with U.S. obligations under international agreements, these reference points would then be incorporated into the HMS FMP as part of regular reporting in the HMS SAFE, discussed below.

Of the current or proposed MUS, assessments of the following species are conducted on a regular (at 1 to 5 year intervals) basis or have recently been assessed providing some information on updated MSYs and SDCs:

- Albacore (NPO)
- Bluefin tuna (NPO)
- Bigeye tuna (EPO and WCPO)
- Skipjack tuna (EPO and WCPO)
- Yellowfin tuna (EPO and WCPO)
- Swordfish (NPO)
- Striped marlin (NPO and EPO)
- Blue shark (NWPO)

### 5.3.2 Unassessed Stocks

The HMSMT, in consultation with the SSC, would identify proxy MSYs and SDCs for those unassessed stocks for which the HMS FMP is considered the primary FMP (see Section 4), while the WPFMC Pelagics Plan Team would identify proxy MSYs and SDCs for unassessed stocks where the Pelagics FMP is the primary FMP. Stock assessments are not routinely or have never been conducted on the following MUS or proposed MUS stocks:

- Common thresher shark
- Pelagic thresher shark
- Bigeye thresher shark
- Shortfin mako shark
- Dorado
- Opah

For these stocks MSY proxies would be determined based on the best available information on the status of the stock and sustainable catch levels. In many cases, if stock structure is unknown, a subset of the Pacific-wide stock is selected and regional catch and demographic information is used to develop a regional MSY proxy. During the development of the FMP, a number of methods were used to determine MSY proxies for the unassessed stocks. These included:

- Common thresher shark: A production function analysis was conducted to determine a direct estimate of sustainable productivity based on the life history characteristics of thresher sharks. A regional sustainable catch (LMSY) was then calculated for a time in the fishery when the west coast catch had stabilized and the CA/OR drift gillnet fishery CPUE was beginning to increase (1992-1993).
- Pelagic thresher shark: LMSY proxy was calculated as average catch during strong El Niño years (here 1983, 1984, and 1997) when species presence became significant.
- Bigeye thresher shark: Average catch 1982-99.
- Shortfin mako shark: LMSY proxy as average 1981-1999 west coast catch; is a minimal estimate of MSY
- Dorado: Mean of 1995-99 stock-wide (EPO) catches.

The HMSMT has identified a few potential methods for determining MSY for unassessed species that may be used instead of or in conjunction with catch history and the methods used at the time of plan development, including the Depletion Corrected Average Catch Method of Alec McCall.<sup>5</sup> The team will discuss these potential methods with the SSC on April 9, 2010, and report to the Council in a supplemental report.

### 5.4 Determining Annual Catch Limits for Species not Subject to the International Exception

As indicated above, the majority of HMS FMP MUS stocks may fall under the International Exception in which case ACLs will not be developed independently by the PFMC. Management measures will be imposed by the RFMOs with the Councils providing guidance and input based on the activities of the domestic fisheries as specified under the reauthorized Magnuson-Stevens Act.

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<sup>5</sup> McCall, A. D. 2009. Depletion-corrected average catch: a simple formula for estimating sustainable yields in data-poor situations. ICES J. Mar. Sci. 66: 2267–2271.

In the event that some species will not fall under the International Exemption, the HMSMT has considered a number of potential methods for determining ACLs. Specifically, the range of alternatives presented here include the possibility that common thresher shark, or both common thresher and shortfin mako sharks do not fall under the international exemption. For these two species a regional annual harvest guideline was established based on the LMSY calculated at the time of FMP development. These were equal to the OY, or 0.75MSY. Once updated reference points, including MSY and OY are recalculated for the MUS, the ACL could be set to equal OY.

The HMSMT will be taking up determining ACLs for species not subject to the International Exemption with the HMS subcommittee of the SSC on April 9, 2010, and will report more details to the PFMC in a supplemental report.

## **5.5 Identifying Accountability Measures for Stocks Subject to Annual Catch Limits**

Accountability measures are management controls to prevent ACLs from being exceeded and to respond to a situation where an ACL has been exceeded. Inseason AMs include monitoring and management measures to prevent catch from exceeding ACLs, and may include annual catch targets (ACTs). If an ACL is exceeded more than once every four years then the system of ACLs and AMs should be re-evaluated and modified as necessary.

Chapter 5 in the HMS FMP describes a framework for the periodic specification of quotas, harvest guidelines, and an array of management measures. In section 6.1.7, describing quotas and harvest guidelines, the FMP authorizes the following procedure:

The HMS Management Team, at its annual meeting in May or June, will review the catches from the previous statistical year (April 1-March 31) and compare those catches with the established harvest guidelines; evaluate the status of the stocks; and develop recommendations for management measures, as appropriate. These management measures will be presented to the Council as part of the SAFE document at its June and/or September meetings to be reviewed and approved for public review. Final action on management measures would be scheduled for the Council's November meeting.<sup>6</sup>

The specification process operates on a 2-year, or biennial, schedule. The fishing year is defined as April 1-March 31 and the current biennial period ends on March 31, 2011. The Council has considered implementation or adjustment of management measures for two biennial periods since implementation of the HMS FMP (2007-2009 and 2009-2011). For the first cycle the Council adopted new recreational bag limits for albacore tuna and modified vessel marking requirements for CPFV vessels. For the second cycle the Council considered measures to constrain the recreational catch of common thresher shark (time/area closures, bag limits) but ultimately did not recommend new regulatory measures.

This framework provides flexibility to respond to changing conditions in fisheries. It is very similar to the specifications framework authorized by the Groundfish FMP. As part of the biennial process, routine management measures can be identified. These can be implemented or modified inseason through a single Council meeting and one Federal Register notice ("notice actions") or two Council meetings and one Federal Register notice ("abbreviated rulemaking"). To date the Council has not done any inseason management under the HMS FMP, because no pressing resource conservation issues have arisen that can be dealt with unilaterally (without international action).

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<sup>6</sup> Although this paragraph uses the term "management measures," given the context it may be assumed that the specific reference would be to quotas or harvest guidelines.

This framework is readily adaptable to the requirements of the Guidelines. The FMP would still need to be amended to explain how the AMs would be related to the ACLs in terms of their function in preventing an ACL from being exceeded or addressing situations where post-season accounting shows an ACL has been exceeded.

If ACLs were established for any MUS, perhaps the more pressing issue would be whether current catch monitoring systems are sufficient to ensure that an ACL would not be exceeded. Specifically, if the ACL is developed as a limit on total removals (catch and dead discards) then appropriate monitoring of bycatch would need to be ensured. Some components of the recreational fishery may be poorly monitored. For some species many fishermen practice catch-and-release, and post-release mortality rates are not well estimated.<sup>7</sup> Finally, data availability and analysis of total removals would need to be timely if inseason measures are needed to prevent an ACL from being exceeded.

**Table 7. Items to include in FMPs consistent with the NS1 Guidelines. Definitions and descriptions summarize text in the Guidelines.**

Reference Point	Description	Required under International Exception?
Maximum Sustainable Yield (MSY) <i>600.310(e)(1)</i>	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 technology characteristics (e.g., gear selectivity)	Yes
Optimum Yield (OY) <i>600.310(e)(3) and (e)(3)(iv)</i>	A decisional mechanism to address MSA and FMP objectives. OY definition(s) must account for the need to prevent overfishing. A long-term average amount of desired yield that accounts for economic, social, and ecological factors... an FMP must contain ACLs and AMs to achieve OY. See (e)(3)(iii) and (iv) for factors to be considered in determining OY.	Yes
Status Determination Criteria (SDC): <i>600.310(e)(2)</i>	The FMP must describe which one of two methods will be used to determine overfishing status: (1) $F > MFMT$ or reasonable proxy or (2) $Catch > OFL$ ; in both cases exceeds the threshold for 1 year or more	Yes
Maximum Fishing Mortality Threshold (MFMT)	The level of fishing mortality (F), on an annual basis, above which overfishing is occurring	
Overfishing Limit (OFL)	Annual amount of catch that corresponds to the estimate of MFMT applied to a stock or stock complex's abundance expressed in terms of numbers or weight of fish	
Minimum Stock Size Threshold (MSST)	The level of biomass below which the stock or stock complex is considered overfished	

<sup>7</sup> NMFS SWFSC has been conducting ongoing research to improve estimates of post-release mortality for recreational caught sharks.

Acceptable Biological Catch (ABC) / ABC Control Rule <i>600.310(f)</i>	ABC is a level of a stock or stock complex's annual catch that accounts for the scientific uncertainty in the estimate of OFL and any other scientific uncertainty and should be based on the ABC control rule. ABC control rule means a specified approach to setting ABC for a stock or stock complex as a function of the scientific uncertainty in the estimate of OFL and any other scientific uncertainty. Councils should develop a process for receiving scientific information and advice used to establish ABC including the body that will apply the ABC control rule (calculate the ABC) and the review process. The SSC must recommend the ABC to the Council.	No
Annual Catch Limit (ACL); mechanisms for specifying ACLs <i>600.310(f)</i>	The level of annual catch of a stock or stock complex that serves as the basis for invoking AMs. ACL cannot exceed ABC but may be divided into sector-specific ACLs	No
Accountability Measures (AMs) <i>600.310(g)</i>	Management controls to prevent ACLs from being exceeded and to correct or mitigate overages of the ACL if they occur. There are two categories: inseason AMs and AMs for when the ACL is exceeded.	No
Annual Catch Target (ACT) (optional) <i>600.310(f)(6) &amp; (g)(2)</i>	An optional AM. An amount of annual catch that is the management target of the fishery, and accounts for management uncertainty in controlling catch at or below the ACL.	Optional in all cases