

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

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 National Standard 1 Guidelines (50 CFR 660.310). The Highly Migratory Species Management Team (HMSMT) met on June 12, and September 14, 2009; the second occasion was a joint meeting with the SSC's HMS Subcommittee. This document presents an overview of the topics recommended by the HMSMT for the Council to address:

- 1) Classification of stocks in the FMP
- 2) Application of the MSA international exception to annual catch limits (ACLs) and accountability measures (AMs) for Management Unit Species (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
- 5) Accountability Measures

The HMSMT also presents recommended approaches and criteria to use for developing alternatives under these topics.

Three factors make the exercise of classifying species an important first step before decisions are taken on establishing ACLs as required in the National Standard 1 Guidelines. First, the HMS FMP identifies both **managed species** and **monitored species**. 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 management unit species 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. As part of this exercise it may become apparent that some of the species currently listed in the FMP should be dropped altogether, because they are rarely if ever caught in current west coast HMS fisheries.

Once species have been classified as managed ("in the fishery") or ecosystem components a second evaluation exercise must be conducted for the managed species, relating to the MSA "international exception" from specification of ACLs and accountability measures (AMs), as described at section 660.310(h)(2)(ii) of the Guidelines.

Third, because HMS FMP management unit species are also part of the WPFMC's Pelagics FMP, coordination between the two councils is necessary. Section 600.310(d)(7) 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 will likely be necessary to decide which FMP will address the requirements of the Guidelines, with the other FMP incorporating those measures in parallel. Once these three classification decisions are made a list of species may remain for which the Pacific Council would establish ACLs.

Three preliminary sets of alternatives are outlined below that relate to the reclassification of species in the HMS FMP as discussed above. This followed by a discussion about establishing reference points in line with the Guidelines. It should be noted that NEPA requires the no action alternative; although not listed in the alternatives below it would be included in the NEPA document supporting the Council's decision-making process.

1 **Classifying HMS FMP Management Unit Species and Monitored Species as “in the Fishery” or Ecosystem Component Species**

The Council considered various criteria for determining the list of management unit species in the HMS FMP (HMS FMP EIS pages 3-2 – 3-4). Their preferred alternative used the following criteria:

- Occur in the Pacific Council's management area, and
- Occur in west coast HMS fisheries, and
- Are defined as HMS in the Magnuson-Stevens Fishery Conservation and Management Act or the Law of the Sea Annex I, and
- Have importance (moderate to high value) in the landings or to a fishery, and
- **Are managed by the Western Pacific Fishery Management Council** (emphasis in the original)

Since the FMP was implemented in 2004, HMS fisheries and the pattern of landings have changed somewhat on the west coast. For example, at that time there was an active pelagic longline fishery, principally composed of vessels based in Hawaii but delivering to the west coast seasonally. The west coast based fishery subsequently closed on the west coast (although Hawaii longline vessels continue to make occasional landings on the west coast). Furthermore, participation in the California drift gillnet (DGN) fishery has shown steady decline. For these reasons, it may be advisable to assess the list of managed species to determine if any may be more appropriately classified as EC species. For example, the FMP notes that bigeye and pelagic thresher sharks are included as managed species because, although they are landed in small amounts by the DGN fishery, they have poor resilience to fishing. It may be with the decline in participation in the DGN fishery that the susceptibility of these species to the current fishery is so low that their status should be reconsidered.

As described above, the HMS FMP also includes both management unit species and monitored species. The list of monitored species was compiled based on the following criteria:

- Species recorded as caught in an HMS fishery;
- Not covered by another FMP or state management regime; and/or,
- Of special concern (e.g., elasmobranchs, which have relatively low productivity)

These monitored species are distinguished from the list of management unit species in the FMP but “should be monitored on a consistent and routine basis to the extent practicable” (HMS FMP FEIS, page 3-6).

According to 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. However, 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 Council’s 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.¹ One of the essential purposes behind monitored species in the FMP and the EC species 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 management unit species 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.”

The Guidelines also reference the concept of **vulnerability**. NMFS recently published a Technical Memo describing a semi-quantitative methodology for assessing the vulnerability of stocks.² Vulnerability, which “is a combination of [a stock’s] productivity, which depends upon its life history characteristics, and its susceptibility to the fishery” (600.310(d)(10)), could be used to evaluate both managed and monitored species for reclassification. For many species the decision may be clear-cut because, for example, they are highly susceptible to west coast HMS fisheries. The formal methodology could then be applied to those species where classification is less clear-cut.

Many of the monitored species are also currently Pelagics FMP management unit species. 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. It would seem that 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. Potential management concerns would be addressed through the Pelagics FMP, which would be the primary FMP per §600.310(d)(7) in the Guidelines.

If a monitored/EC species is reclassified as a management unit species 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.

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 and 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. This indicates that these species also should not be considered for reclassification. Table 1 shows commercial landings and recreational catches of selected MUS and monitored species that could be used in such an assessment.

¹ See Table 5 for definitions of reference point acronyms. Note that the ACT is an optional reference point.

² Patrick, W. S., P. Spencer, O. Ormseth, and others. [2009]. Use of productivity and susceptibility indices to determine the vulnerability of a stock: with example applications to six U.S. fisheries. Vulnerability Evaluation Working Group Report.

Table 1. Selected MUS and monitored species commercial landings. Species in bold italics proposed for consideration of reclassification.

Species	Other FMP Coverage	Average Annual Commercial Landings (mt) 2000-2008	Average Annual Recreational Dead Catch (mt) 2004-2008
Selected MUS			
Common thresher shark, <i>A. vulpinus</i>	WP Pelagics	230.93	14.3
Shortfin mako shark, <i>Isurus oxyrinchus</i>	WP Pelagics	54.73	9.2
<i>Dorado (dolphin), Coryphaena hippurus</i>	WP Pelagics	8.18	17.2
Blue shark, <i>Prionace glauca</i>	WP Pelagics	6.34	0.3
<i>Bigeye thresher shark, Alopias superciliosus</i>	WP Pelagics	4.80	**
<i>Pelagic thresher shark, A. pelagicus</i>	WP Pelagics	1.76	**
Monitored Species, commercial landings reported			
<i>Opah, Lampris guttatus</i>	WP Pelagics	41.39	0.1
<i>Louvar, Luvarus imperialis</i>		2.18	0.0
<i>Escolar, Lepidocybium flavobrunneum</i>	WP Pelagics	1.72	0.0
Bat ray, <i>Myliobatis californica</i>		1.38	1.0
Leopard shark, <i>Triakis semifasciata</i>	P Groundfish	0.63	4.4
Pelagic sting ray, <i>Dasyatis violacea</i>		0.33	0.0
Wahoo, <i>Acanthocybium solandri</i>	WP Pelagics	0.28	0.0
Hammerhead sharks, Sphyrnidae	WP Pelagics	0.18	0.0
Oilfish, <i>Ruvettus pretiosus</i>	WP Pelagics	0.29	0.0
Pacific pomfret, <i>Brama japonica</i>	WP Pelagics	0.02	0.0
Black skipack,* <i>Euthynnus lineatus</i>	WP Pelagics	0.02	0.5
Monitored Species, commercial landings not reported			
Black marlin, <i>Makaira indica</i>	WP Pelagics	†	0.0
Blacktip shark, <i>C. limbatus</i>		–	0.0
Blue marlin, <i>Makaira nigricans</i>	WP Pelagics	–	0.0
Bullet mackerel (tuna), <i>Auxis rochei</i>	WP Pelagics	–	0.0
<i>Common mola, Mola mola</i>		–	0.0
Dusky shark, <i>C. obscurus</i>		–	0.0
Lancetfishes, Alepisauridae		–	0.0
Manta/Mobula rays, Mobulidae		†	0.0
Oarfish, <i>Regalecus glesne</i>		†	0.0
Oceanic whitetip shark, <i>C. longimanus</i>	WP Pelagics	†	0.0
Pacific bonito, <i>Sarda chiliensis</i>		–	4.2
Pacific moonfish, <i>Selene peruviana</i>		†	0.0
Pacific sailfish, <i>Istiphorus platypterus</i>	WP Pelagics	–	0.0
Pacific saury, <i>Cololabis saira</i>		–	0.0
Prickly shark, <i>Echinorhinus cookei</i>		†	0.0
Rainbow runner, <i>Elagatis bipinnulata</i>		†	0.0
Salmon shark, <i>Lamna ditropis</i>	AK Groundfish	‡	0.0
Shortbill spearfish, <i>T. angustirostris</i>	WP Pelagics	†	0.0
Silky shark, <i>Carcharhinus falciformis</i>	WP Pelagics	‡	0.0
Six gill shark, <i>Hexanchus riseus</i>	AK Groundfish	–	0.0

Species	Other FMP Coverage	Average Annual Commercial Landings (mt) 2000-2008	Average Annual Recreational Dead Catch (mt) 2004-2008
Soupsfin shark, <i>Galeorhinus galeus</i>	AK & P Groundfish	–	0.0
Spiny dogfish, <i>Squalus acanthias</i>	AK & P Groundfish	–	0.1
Whale shark, <i>Rincodon typus</i>		†	0.0

Sources:

PacFIN ft and ftl 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.

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

**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.

As can be seen in Table 1 landings for most of the HMS FMP monitored species are negligible. 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. This species is almost universally discarded and observer information shows a very high proportion discarded alive, which could mean that bycatch mortality is relatively low.

Figure 1 shows commercial landings trends for dorado, bigeye thresher, and pelagic thresher for consideration of whether these MUS should be reclassified as EC species. It can be seen that commercial landings of dorado declined substantially after 2001, but this species is still an important recreational target (which likely precludes it from EC classification). Bigeye thresher shark was landed in small but relatively stable amounts over the 2000-2008 time period. Pelagic thresher shark shows a possible declining trend in terms of commercial landings.

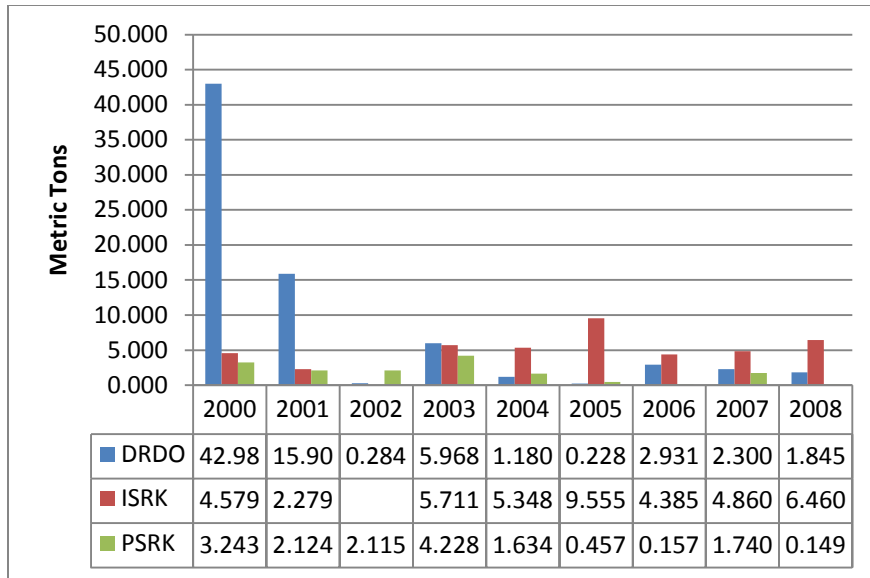


Figure 1. Commercial landings trends for selected HMS MUS (DRDO: dorado, ISRK: bigeye thresher, PSRK: pelagic thresher).

In summary, addressing National Standard 1 Guidelines offers an opportunity to make an assessment of both selected management unit and monitored species to consider classification in either of these two categories, or deletion from the FMP altogether. This assessment would include some of the current management unit species where overall vulnerability is low and monitored species where landings (or bycatch as indicated by observer data) are high and/or have increased from a lower baseline in recent years. In either case the species could be reclassified to the other category. The following options are proposed:

1. Reclassify selected MUS as EC species; potential candidates are dorado, bigeye thresher, and pelagic thresher.
2. Reclassify selected monitored species as MUS; potential candidates are opah, louver, and escolar.
3. Eliminate selected monitored species from the FMP entirely. Those monitored species for which no HMS commercial landings are recorded, and recreational catch is rare, could be considered for elimination from the FMP, especially if they are an MUS in another Federal FMP.
4. The remaining monitored species would then be designated EC species.

A vulnerability analysis would be conducted to support any formal reclassification of a species. Thus, if the Council identifies which species to consider for reclassification the vulnerability analyses could focus on these species.

2 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 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. The HMSMT identified the following alternatives for Council consideration for determining to which management unit species this exception could apply.

- 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. The 1949 Convention establishing the IATTC states “The United States of America and the Republic of Costa Rica considering their mutual interest in maintaining the populations of yellowfin and skipjack tuna and of *other kinds of fish taken by tuna fishing vessels* in the eastern Pacific Ocean...” (emphasis added). Article 1 of the Antigua Convention, which succeeds the 1949 Convention and will enter into force August 24, 2010, defines fish stocks covered by this Convention as “stocks of tunas and tuna-like species and other species.” 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 will apply the international exception to all MUS in their Pelagics FMP (personal communication from Paul Dalzell, Senior Staff Scientist, WPFMC) and all HMS FMP MUS are also Pelagics FMP MUS. As discussed above, §660.310(d)(7) of the Guidelines addresses situations where a species appears in two or more FMPs. 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 3 below).

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 excluded shark species are landed in small quantities by west coast commercial HMS fisheries, as are dorado. It should be noted that both the IATTC and WCPFC have adopted conservation measures related to sharks (C-05-03, CMM-2008-06). The WCPFC identifies “key shark species” as blue shark, oceanic whitetip shark, mako sharks and thresher sharks.³ 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 to tunas and billfish but not to sharks and other species (after any reclassification)

This alternative would define the term “internationally managed” more rigorously based on whether an RFMO regularly assesses the stock. Regular assessment indicates that the RFMO may have an interest in actively managing harvest. In addition, the HMS FMP explicitly states that these species are not managed internationally (see Chapter 3 of the 2003 HMS FMP FEIS). On the other hand, the lack of active management (i.e., conservation measures) for a particular species (such as dorado) may indicate that the

³ Silky shark was also intended to be included but was omitted from the conservation measure due to an editorial error.

RFMO has concluded that the stock is not currently overexploited and specific measures are unnecessary rather than that they have no intention of managing the stock. As noted in Table 2 below, blue shark has been assessed, but not under the auspices of an RFMO. However, the Northern Committee of the WCPFC has included in their work plan a request for assessment by the ISC of selected shark species. Under this alternative, the international exception would be applied to the tuna and billfish MUS but not to shark MUS or dorado. Table 2 shows HMS FMP MUS and the organizations conducting stock assessments.

Table 2. Summary of RFMO stock assessments of HMS FMP MUS.

Species	Assessed by (date of most recent)
Tunas	
Albacore tuna, <i>Thunnus alalunga</i> (NPO)	ISC (2007)
Bigeye tuna, <i>T. obesus</i> (EPO, WCPO)	WCPFC, IATTC (2009, 2008)*
Skipjack tuna, <i>Katsuwonus pelamis</i> (EPO, WCPO)	WCPFC, IATTC (2009, 2008)*
Bluefin tuna, <i>T. orientalis</i> (NPO)	ISC (2008)
Yellowfin tuna, <i>T. albacores</i> (EPO, WCPO)	WCPFC, IATTC (2009, 2007)*
Billfish	
Striped marlin, <i>Tetrapterus audax</i> (NPO, EPO)	ISC, IATTC (2007, 2003)
Swordfish, <i>Xiphias gladius</i> (NPO, SEPO)	ISC, IATTC (2009, 2006)
Sharks	
Bigeye thresher shark, <i>Alopias superciliosus</i>	
Blue shark, <i>Prionace glauca</i>	NMFS (2009)
Common thresher shark, <i>A. vulpinus</i>	NMFS (2002)
Pelagic thresher shark, <i>A. pelagicus</i>	
Shortfin mako shark, <i>Isurus oxyrinchus</i>	
Other	
Dorado (dolphin), <i>Coryphaena hippurus</i>	

*These stocks are generally assessed annually. Stock assessments by the IATTC are typically reviewed in May of each year at their Stock Assessment Workshop. The WCPFC Scientific Committee reviews stock assessments typically in August. Assessments for tropical tunas are conducted by the SPC Oceanic Fisheries Program on behalf of the WCPFC.

Table 3. Summary of alternatives for applying the international exception.

Species	Alternative 1	Alternative 2	Alternative 3
Tunas			
Albacore tuna, <i>Thunnus alalunga</i>	X	X	X
Bigeye tuna, <i>T. obesus</i>	X	X	X
Skipjack tuna, <i>Katsuwonus pelamis</i>	X	X	X
Bluefin tuna, <i>T. orientalis</i>	X	X	X
Yellowfin tuna, <i>T. albacares</i>	X	X	X
Billfish			
Striped marlin, <i>Tetrapterus audax</i>	X	X	X
Swordfish, <i>Xiphias gladius</i>	X	X	X
Sharks			
Bigeye thresher shark, <i>Alopias superciliosus</i> *	X	X	
Blue shark, <i>Prionace glauca</i>	X	X	
Common thresher shark, <i>A. vulpinus</i>	X		
Pelagic thresher shark, <i>A. pelagicus</i> *	X	X	
Shortfin mako shark, <i>Isurus oxyrinchus</i>	X		
Other			
Dorado (dolphin), <i>Coryphaena hippurus</i> *	X	X	
MUS Candidate Species			
Opah	X	X	
Common Mola	X	X	
Louvar	X	X	
Escolar	X	X	

*Considered for reclassification as EC species, in which case reference points, including ACLs, are not required.

3 Determining the Primary FMP for Management Unit Species

As noted above, §600.310(d)(7) in the Guidelines state that “Councils should choose which FMP should be the primary FMP in which management objectives, SDC, the stock’s overall ACL and other reference points for the stock are established.” Since all the HMS FMP management unit species and many of the monitored species are managed species in the WPFMC’s Pelagics FMP coordination to identify the primary FMP may be needed. One approach would be to base 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.⁴ 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 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). If management unit species are identified at the stock level then the determination of which should be designated the lead FMP could be made to parallel the current informal division of assessment responsibility between the two NMFS regions and be based on the separate stock assessments conducted by the RFMOs. Table 4 suggests possible primary FMP assignments based on these considerations. In any case, for those species subject to the international exception there seems little risk of conflict even if a primary FMP is not identified at the stock level, because both Councils are likely to rely on the same

⁴ 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.

RFMO sponsored stock assessments to identify MSY and SDCs, and determination of the ABC and ACL would be unnecessary. Perhaps the only requirement where coordination would be necessary would be the identification of OY since this is a policy rather than strictly science question.

Table 4. Possible division of lead FMP responsibility.

Species	Possible Primary FMP based on Science Center Responsibility
Tunas	
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)	Pelagics FMP
Yellowfin tuna, <i>T. albacores</i> (EPO, WCPO)	EPO: HMS FMP / WCPO: Pelagics FMP
Billfish	
Striped marlin, <i>Tetrapterus audax</i> (NPO, EPO)	Pelagics FMP / HMS FMP (EPO)
Swordfish, <i>Xiphias gladius</i> (NPO, SEPO)	Pelagics FMP
Sharks	
Bigeye thresher shark, <i>Alopias superciliosus</i>	H Pelagics FMP
Blue shark, <i>Prionace glauca</i>	Pelagics FMP
Common thresher shark, <i>A. vulpinus</i>	HMS FMP
Pelagic thresher shark, <i>A. pelagicus</i>	Pelagics FMP
Shortfin mako shark, <i>Isurus oxyrinchus</i>	HMS FMP
Other	
Dorado (dolphin), <i>Coryphaena hippurus</i>	HMS FMP* or Pelagics FMP

*Potential candidate for reclassification as EC species under HMS FMP.

4 Establishing Reference Points and Accountability Measures

The National Standard 1 Guidelines identify the various reference points (see Table 5 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 5 specified. However, as mentioned above, because HMS FMP MUS are also in the WPFMC Pelagics FMP, identification of a primary FMP at the stock level 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 4).

4.1 Current Reference Points in the HMS FMP

The HMS FMP identifies values for MSY and OY for the MUS. These are listed in Table 6. These values should be reviewed to determine if they remain consistent with more recent stock assessments. Also, if the approach of assigning FMP responsibility by stock is used, then the MSY, OY and OFL values should be stock-specific rather than Pacific-wide. It may be advisable to regularly report these values (along with the OFL) in the HMS SAFE document.

The HMS FMP also defines default formulas for the maximum fishing mortality threshold (MFMT) and the minimum stock size threshold (MSST), which are status determine 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 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 $> OFL$. Recognizing that Pacific RFMOs have begun to consider establishing formal reference points for stocks that they actively manage,⁵ these default SDCs could be retained in the FMP until such time as RFMOs formally adopt reference points for a stock. The RFMO reference points could then be either evaluated for inclusion into the HMS FMP or a mechanism could be established under this FMP amendment whereby they would be automatically incorporated into the FMP when adopted. The FMP also describes a default control rule for setting fishing mortality according to stock biomass (or that of the spawning stock) in order to retain it at or above B_{MSY} or return it to this level if below. The FMP also describes an alternative approach for setting a proxy OY value for vulnerable species, which would be 75 percent of MSY. According to the FMP, all the managed shark species are considered vulnerable.

Table 5. Items to include in FMPs consistent with the NSI Guidelines. Definitions and descriptions summarize text in the Guidelines.

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)
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.
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
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

⁵ For example, the WCPFC Northern Committee is planning a 2-day workshop in 2010 to discuss reference points for stocks under their purview (albacore, bluefin, and swordfish in the North Pacific).

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.
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
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.
Annual Catch Target (ACT) (optional) <i>600.310(f)(6) & (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.

Table 6. MSY estimates and OYs from the HMS FMP EIS (2003), Table 3-5 (estimates in mt x 1,000).

Species	MSY (or proxy)	OY (or proxy)	Source of MSY estimate
Tunas			
Albacore tuna, <i>Thunnus alalunga</i> (NPO)	120	(120)	Average MSY over low and high productivity periods (Bartoo and Shiohama 1985, NPALW 2000).
Bluefin tuna, <i>T. orientalis</i> (NPO)	(20)	(15)	Mean of 1995-99 stock-wide catches.
Bigeye tuna, <i>T. obesus</i> (EPO, WCPO)	79	(79)	MSY between 66 and 92 K mt from production models (IATTC 2000).
Yellowfin tuna, <i>T. albacores</i> EPO, WCPO)	270	(270)	From production model (Tomlinson 2001, IATTC 2000).
Skipjack tuna, <i>Katsuwonus pelamis</i> (EPO, WCPO)	(190)	(190)	Mean of 1995-99 stock-wide catches.
Billfish			
Striped marlin, <i>Tetrapterus audax</i> (NPO, EPO)	4.5	(3.4)	MSY and catches from Hinton and Bayliff (2002).
Swordfish, <i>Xiphias gladius</i> (NPO, SEPO)	(12.5)	(12.5)	Average of 1995-99 catches; an analytically derived MSY is pending.
Sharks			
Common thresher shark, <i>A. vulpinus</i>	(0.45)	(0.34)	LMSY proxy by Population Growth Rate (PGR) method; is a minimal estimate of MSY
Pelagic thresher shark, <i>A. pelagicus</i>	(0.020)	(0.015)	LMSY proxy as average catch during strong El Niño years (here 1983, 1984, and 1997) when species presence became significant.
Bigeye thresher shark, <i>Alopias superciliosus</i>	(0.04)	(0.03)	Average catch 1982-99.
Shortfin mako shark, <i>Isurus oxyrinchus</i>	(0.20)	(0.15)	LMSY proxy as average 1981-1999 regional catch; is a minimal estimate of MSY

Blue shark, <i>Prionace glauca</i>	~120	(90)	After Kleiber et al.
Other			
Dorado (dolphin), <i>Coryphaena hippurus</i>	(0.45)	(0.45)	Mean of 1995-99 stock-wide catches.

Note: The HMS FMP FEIS did not provide references for the citations listed above.

4.2 Information on Stock Status for Selected MUS

Chapter 3 in the 2004 HMS FMP FEIS provides information on the status and biology of HMS MUS. This offers a starting point for determining how ACLs might be identified for those MUS for which the international exception may not be applied. Summaries are provided below, generally in descending order of commercial fishery importance and overall knowledge about the status of the stock.

4.2.1 Common Thresher Shark

The HMS FMP established a harvest guideline of 340 mt. That value represents a precautionary reduction from local MSY (LMSY). The FMP FEIS states:

A harvest guideline is proposed here based on estimates of local maximum sustainable yield (LMSY), i.e., as obtained from the stock portion presently accessed by the West Coast drift gillnet fishery (LMSYs necessarily underestimate stock-wide MSY). The LMSY, as estimated here (Au and Show, SWFSC, La Jolla, work in progress), is actually a proxy for true LMSY, as the method does not use exploitation rate based on mortality rates (yet undetermined) to estimate size of the locally exploited population from the catch. Rather, it uses the population growth rate (PGR) as determined from the thresher=s rebound potential r (Smith et al. *In press*). PGR is less than true local exploitation rate $(= (F/Z)(1-e^{-Z}))$ (A.E. Punt, Univ. Washington, pers. comm. 11/9/01), as it refers to the total population rather than the exploited ages only, and it is specifically the *sustainable* rate. It is thus a conservative estimate of exploitation rate. The PGR method estimates sustainable production in terms of potential surplus population growth.

The harvest guideline is the proxy OY equal to 75 percent of the mid-point LMSY, 450 mt. It is less than the 578 mt coast-wide guideline adopted by the Pacific States Marine Fisheries Commission in 1990.

4.2.2 Shortfin Mako Shark

The shortfin mako is widely distributed in pelagic waters, and the population fished off the west coast is likely part of a stock that extends considerably to the south and west. West coast HMS fisheries take mainly juveniles, of unknown proportion to the overall stock. Clear effects of exploitation have not been shown, and the local stock is tentatively taken to be not overfished ($B/B_{MSY} > 1.0$; $F/F_{MSY} < 1.0$). But it is important to protect critical life stages of sharks, and so a harvest guideline of 150 mt, 75 percent of the 1981-99 average catch in the EEZ, was adopted as part of the HMS FMP pending better information, especially from the fisheries off Mexico.

4.2.3 Blue Shark

The blue shark is probably the most commonly caught shark in the west coast EEZ and Pacific-wide; however, it is usually not landed because of low market value. Observer records show that it is the third most commonly caught species in the drift gillnet fishery, after common mola and the target species, swordfish. A stock assessment was published in February 2009 by the Pacific Islands Fisheries Science

Center.⁶ This stock assessment presumes separate north and south Pacific stocks. The study area for this stock assessment extends to 130° W longitude to encompass Japanese and Hawaiian longline fisheries, but it generally does not encompass fisheries occurring in the west coast EEZ. However, catches in the EEZ likely represent a small portion of stock-wide catch, so the results of the stock assessment could be considered if it were decided to set an ACL for west coast HMS fisheries. Two stock assessment models were used, a Bayesian surplus production model and one using MULTIFAN-CL which integrated data sources from multiple fisheries. The results were then compared. The study concluded:

The trends in abundance in the production model, and all alternate runs of the integrated model, show the same pattern of decline in the 1980s followed by recovery to above the level at the start of the time series. It must be acknowledged that the base-case results by the integrated model analyses indicates some probability (around 30%) that biomass is less than *BMSY* (overfished) and that there is a lesser probability that fishing mortality is greater than *FMSY* (overfishing is occurring). There was a slight increasing trend in the recent total effort expended by longline, and this trend may have continued thereafter. It would be prudent to assume that the population is at least close to *MSY* level and fishing mortality may be approaching the *MSY* level in the future.

As discussed above, it may be more appropriate to assign lead responsibility for blue shark to the WPFMC and NMFS Pacific Islands Region, in which case the HMS FMP would reflect any reference points incorporated in the WPFMC's Pelagics FMP.

4.2.4 Dorado

The HMS FMP FEIS provided the following status summary for dorado:

The dorado is a fast-growing, widespread species of tropical seas that occurs seasonally in the SCB. Regional populations are not regularly reviewed by the IATTC or SPC and presently there is no management and no quotas. The population is presumed to be healthy. The recent average catch level, 450 mt, is taken here as a proxy *MSY* and *OY* for the EPO. Considering that West Coast fishers are accessing only the northern fringe of an extensive regional population, a population that should be able to rebound quickly from exploitation even if significantly reduced, and that its West Coast fishing is primarily recreational, no harvest guideline is recommended at this time.

Figure 2 shows dorado catches in the EPO according to the United Nations Food and Agriculture Organization's Fishstat Plus program. According to this data set overall landings by the U.S. averaged 372 mt for the 1998-2005 time period, or about 3 percent of region-wide catches; region-wide catch according to these data averaged 11,892 mt. Note that this is considerably larger than the estimated contained in the HMS FMP and noted above of 450 mt for stock-wide catch.⁷ Information from NMFS's Office of Science & Technology commercial landings database shows that most U.S. landings in the Pacific are in Hawaii: California landings for the 2000-2008 time period averaged 8 mt while Hawaii's averaged 520 mt. For this reason, it may be appropriate to consider giving primary FMP status to the WPFMC's Pelagics FMP for this species as well.

⁶ Kleiber, P., Clarke, S., Bigelow, K., Nakano, H., McAllister, M., and Takeuchi, Y. 2009. North Pacific Blue Shark Stock Assessment. Feb. 2009. NOAA Tech. Memo. NMFS-PIFSC-17.

⁷ The current HMS SAFE document contains an updated estimate for stock-wide catch of 4,000-11,000 mt per year. The SAFE used catches from FAO Area 77 while all eastern Pacific areas in Fishstat Plus were used to arrive at the data presented here. This likely encompasses a larger region than Area 77.

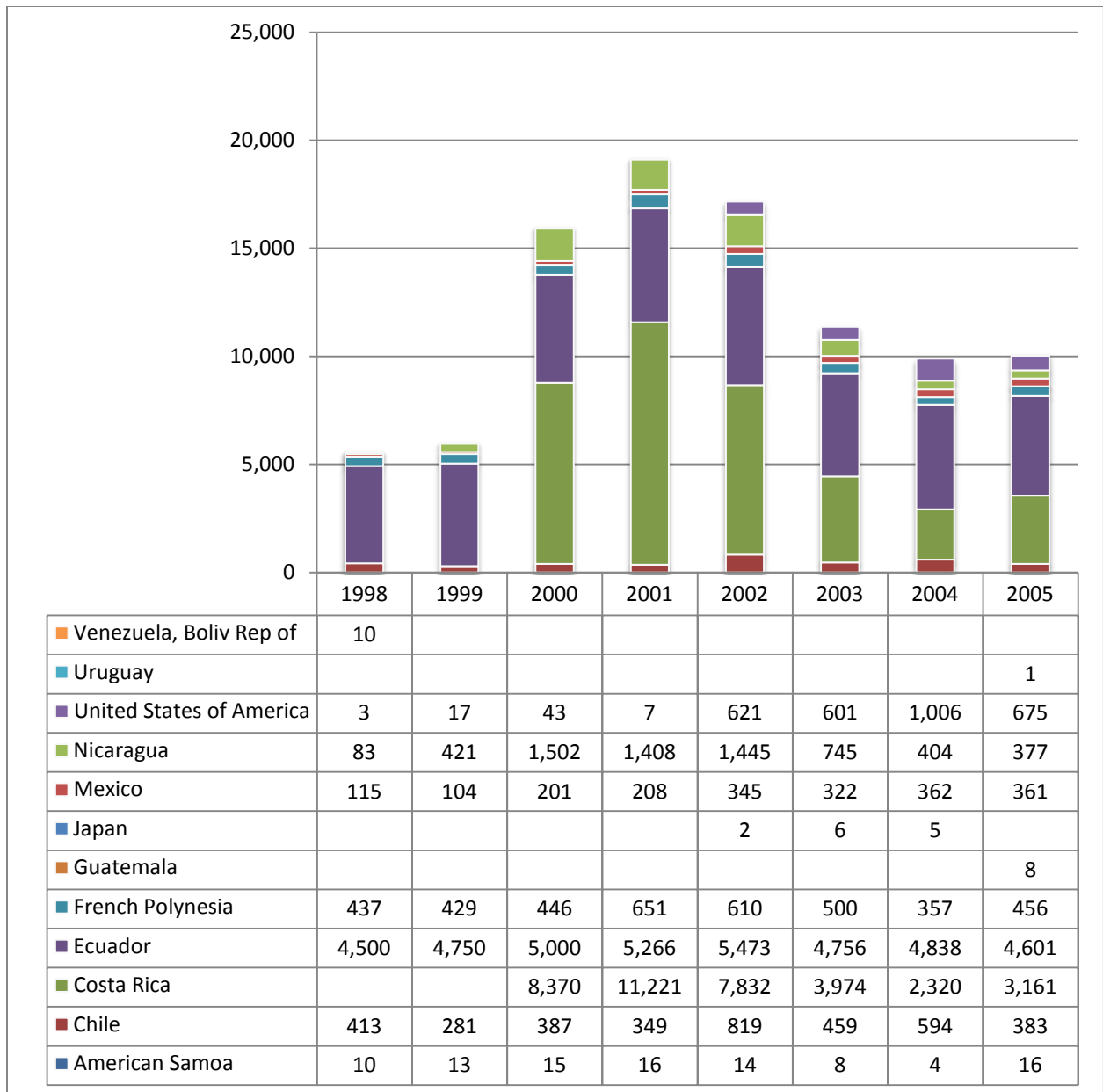


Figure 2. Dorado catches in the Eastern Pacific by nation (source: UN FAO Fishstat Plus).

4.2.5 Bigeye and Pelagic Thresher Sharks

The HMS FMP FEIS provides the following information for these two stocks:

Little is known of the biology and status of these sharks, and especially of their reproductive requirements. Individuals taken within the management area are thought to be on the edges of their habitat ranges, including depth-wise for the bigeye thresher which ranges into mesopelagic waters. They are minor components of West Coast fisheries, taken incidentally and presumably not overexploited, at least locally. The bigeye thresher occurs regularly but in low numbers (~9% of common thresher catch) in drift gillnet catches, whereas the pelagic thresher is taken mainly in warm-water years. Both species are caught off Mexico, and the pelagic thresher is reported to be

an important component of Mexican shark catches. These species appear to have thin or semi-isolated populations Pacific-wide. Present West Coast catches total under 50 mt/yr.

Pelagic and bigeye thresher populations occur throughout the tropical and temperate Pacific but are not managed internationally, and there are no quotas. They are thought to be more vulnerable to overfishing than the common thresher shark. Little is known of their abundance and stock structure. Considering their minor importance in West Coast catches and their proxy LMSYs (average catch levels are 20 and 40 mt respectively) that are likely substantial underestimates of stock-wide MSYs, no harvest guidelines are recommended at this time.

As discussed above, it is recommended that these two species be considered for re-designated as EC species. If additional information (such as a vulnerability analysis) indicates such as designation would be appropriate, then setting an ACL would be unnecessary (as would be the case if the international exception were applied).

4.3 Considerations for Developing ACLs

There is little or no stock assessment information for most of the stocks for which ACLs might be considered, because of their wide distribution, lack of importance for major commercial HMS fisheries, and, as a result, limited data on catches. In these instances, the general approach for setting an ACL could be similar to how the OYs were identified in the HMS FMP. For these stocks (all except common thresher) either historical stock-wide or regional average catch is used as a proxy for MSY and OY in the HMS FMP. Setting ACLs requires a more explicit accounting for scientific uncertainty: the reduction from the OFL (which corresponds to MSY) to the ABC depends on how scientific uncertainty is accounted for in the ABC control rule. The ACL would normally be set equal to the ABC, but may be set lower for various reasons similar to those considered when OY is reduced from MSY (biological, socioeconomic, ecological, etc.). The ACT, which is optional, is explicitly a tool to take into account management uncertainty (e.g., poor catch accounting, limited catch control tools). For these un-assessed stocks the OFL could be set equal to historical average catch, but a relatively large reduction from ABC would be implicated because of the high level of uncertainty about the actual MSY value. This could put an unnecessary constraint on harvests if, for example, historical catches are in fact well below MSY.

4.4 Current Accountability Measures in the HMS FMP

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.⁸

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).

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. One example would be if common mola was reclassified as an MUS and an ACL applied to the stock. This species occurs as bycatch in the DGN fishery, so landings information cannot be used to monitor catches. The DGN fishery is subject to partial observer coverage so it would be necessary to determine whether a statistically robust estimate of total catch can be derived given the level and pattern of observer coverage. Similarly, recreational catch is an important component of total catch for almost all HMS MUS. 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.⁹ Finally, the timeliness of data availability could be an issue, for example, if there were a need to constrain catch inseason to prevent an ACL from being exceeded.

⁸ 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.

⁹ NMFS SWFSC has been conducting ongoing research to improve estimates of post-release mortality for recreational caught sharks.