HIGHLY MIGRATORY SPECIES MANAGEMENT TEAM REPORT ON FISHERY MANAGEMENT PLAN AMENDMENT 2, ANNUAL CATCH LIMITS AND ACCOUNTABILITY MEASURES

This Highly Migratory Species Management Team (HMSMT) Report provides information which may be helpful to the Council regarding adoption of alternatives under Highly Migratory Species Fishery Management Plan (HMS FMP) Amendment 2 (Item E.2) to address requirements under the revised National Standard 1 Guidelines. This report includes the following sections:

1) Criteria for classifying stocks as management unit species (MUS), ecosystem component (EC) species or not in the FMP
2) Applying the international exception
3) Guidance on determining maximum sustainable yield (MSY), optimum yield (OY) and status determination criteria (SDC) for the MUS
4) Possible approaches to setting ACLs for stocks not subject to the international exception
5) Overview of proposed alternatives
6) HMSMT Recommendation for New Alternative 5
7) Additional changes to the proposed FMP Amendment 2 text

1. Criteria for classification of stocks in the FMP as management unit species, ecosystem component species or not in the FMP

The HMSMT proposed a reclassification scheme for species in the HMS FMP in the April 2010 HMSMT Report and Supplemental HMSMT Report, and in the draft HMS FMP Amendment 2 in the June 2010 Council briefing book. Since then, the HMSMT strengthened the rationale for reclassifying species in the original HMS FMP. The following criteria were identified to support the reclassification of non-MUS as either EC species or not in the HMS FMP:

1. Reclassify as EC species any species with less than 1 mt average annual landings between 2000-2008 but with appreciable catch in observer data.

2. Absent other overriding factors, reclassify species with more than 1 mt and less than 5 mt of landings as EC species and species with less than 1 mt average landings from 2000-2008 as not in the HMS FMP.

Under criterion 1 pelagic stingray and lancetfishes are reclassified as EC species, because both showed appreciable catch observer data.

Based on criterion 2 (fewer than 1 mt of landings), the HMSMT proposes dropping the following additional five currently monitored species from the HMS FMP:

1. Black skipjack
2. Bullet mackerel (tuna)

3. Hammerhead sharks
4. Oilfish
5. Pacific pomfret

The HMSMT discussed reclassification of Pacific bonito to meet National Standard 1 (NS1) guidelines. Bonito was a monitored species under the original HMS FMP. The HMSMT does not believe bonito qualifies as an EC species since it is targeted and landed commercially in significant quantities by west coast small purse seine vessels. Furthermore, bonito does not appear on the United Nations Convention on the Law of the Sea Annex 1 or on the Magnuson-Stevens Act (MSA) list of HMS, and it is not believed to be caught on trips targeting HMS MUS. The HMSMT believes the species does not meet the criteria for classification as either an HMS MUS or an EC species, and given that California Department of Fish and Game (CDFG) manages bonito with port sampling and size limits, recommends it be dropped from the HMS FMP.

There were no additional changes with respect to alternatives for MUS based on these revised classification criteria.

2. Applying the international exception

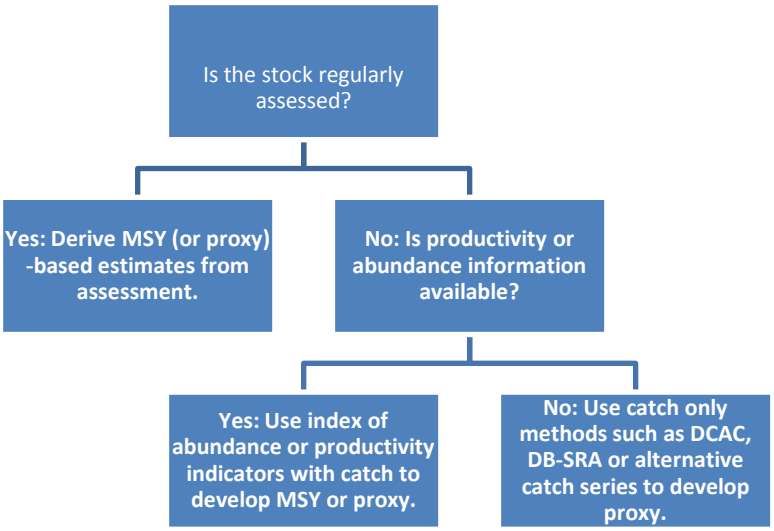
The HMSMT proposes the following basis for applying the international exception to managed species. For most of the HMS FMP MUS, the relative proportion of the stockwide catch made by U.S. west coast fisheries is small; the majority of catch occurs outside the U.S. Exclusive Economic Zone (EEZ) by foreign nations. For this reason, and because their management is within the authority of international Regional Fishery Management Organizations (RFMOs), the HMSMT believes there is sufficient reason for wide application of the international exception. The HMSMT notes that the Council has established harvest guidelines for some species and may choose to set ACLs regardless of whether the international exception is adopted.

The HMSMT believes that management and conservation goals, strategies, and measures consistent with the Magnuson Stevens Act and NS1 guidelines are best achieved when they apply throughout the range and to all the fisheries for a HMS MUS and therefore, recommends continuing to work through international RFMOs to do so and apply the international exception to all HMS MUS.

3. Guidance on determining MSY, OY and SDCs for MUS for which the PFMC is the lead

The HMSMT recommends that the Council consider specifying of MSY (or proxies), OY, SDCs, overfishing limit (OFL), and ACLs if required for each MUS during the HMS biennial process for routine management measures, similar to the process outlined for groundfish in Chapter 5, Section 5 in the proposed Groundfish FMP Amendment 23. Chapter 5 of the HMS FMP, Periodic Specification of Management Measures, should be amended to incorporate comparable language making it clear that the biennial process will also be used to establish or adjust estimates of the aforementioned parameters.

The April 2010 Supplemental HMSMT Report proposed a decision-making framework to determine the method to estimate these reference points for each MUS species. Decisions are based upon whether or not a stock assessment with MSY-based estimates is available and whether or not a time series of stockwide catch is available. All additional information on stock productivity should also be taken into consideration when determining MSY and the other reference points. The framework is generally described in section 2.5.1.1 of the HMS FMP Amendment 2 EA included in the June 2010 Council briefing book. We provide the following decision making flow chart to help clarify the proposed framework.



Note that under the revised NS1 Guidelines, the overfishing threshold can be expressed as a mortality rate (the maximum fishing mortality rate; MFMT) or as an OFL which is the catch produced at F_{MSY}. No change in how the minimum stock size threshold (MSST) is defined in the FMP is proposed.

OY is discussed in Section 2.5.1.3 of the draft EA. A key element in the definition of OY is that any difference between MSY and OY must be expressed as a reduction from MSY in the direction of a lower yield. The HMSMT notes that the NS1 guidelines include a provision for setting OY at a lower level than MSY. In the original FMP, such an approach was taken for species that were considered vulnerable by setting OY = 0.75 FMSY. In the FMP Amendment, OY will be determined on a case-by-case basis, re-evaluated as part of the biennial process and updated in the Stock Assessment Fishery Evaluation (SAFE) report.

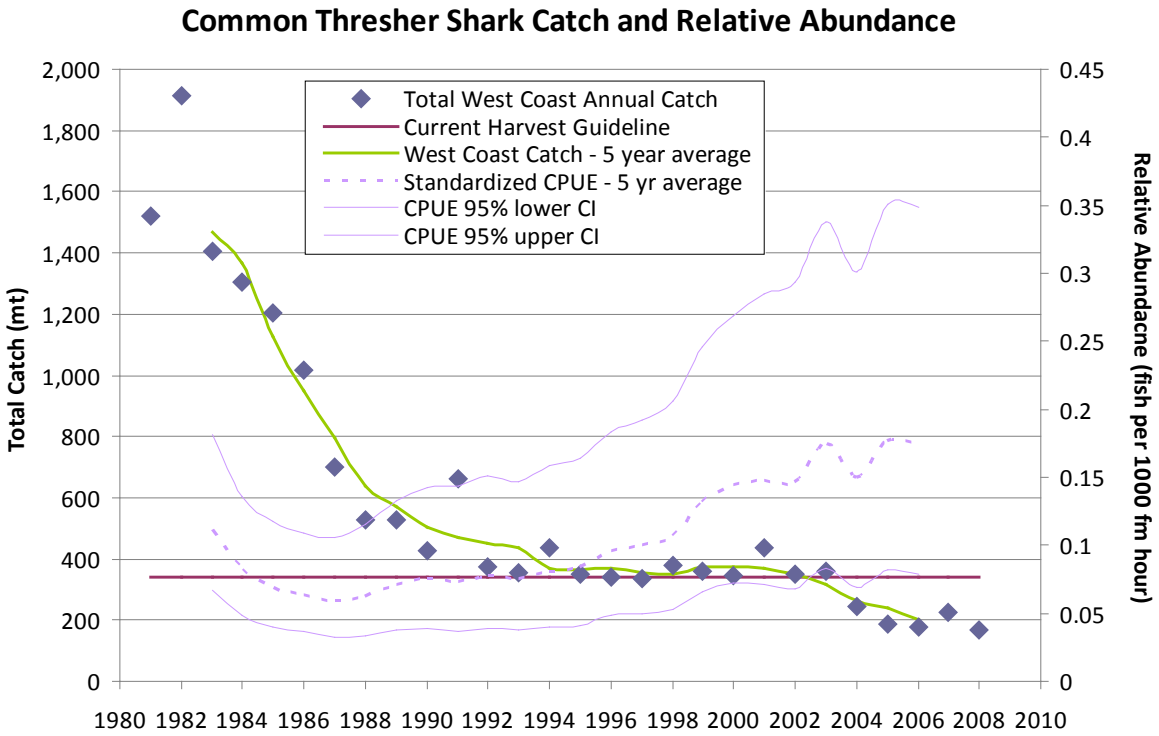
<u>For regularly assessed stocks: e.g. yellowfin tuna of the EPO assessed by the IATTC</u>[1]
As part of the biennial process, as discussed above, the HMSMT will review recent stock assessments each year when preparing the annual SAFE document. The team will summarize the results and present the estimated MSY-based reference points to the SSC. If the SSC finds the assessment results robust, the values will be recommended to the Council as appropriate MSY-based reference points for the stock. In the event that the SSC finds the reference points

[1] Maunder, M.N. and Aires-Da-Silva, A. 2010. Status of yellowfin tuna in the Eastern Pacific Ocean in 2008 and outlook for the future. IATTC Document SARM-10-06a.

undesirable for management purposes, the SSC may recommend that the Council ask the RFMOs to include further sensitivities or analyses in future assessments. Because the HMS assessments are generally conducted by working groups outside of the PFMC, under the revised MSA NS1 Guidelines, the Council provides recommendations regarding international management through the U.S. delegations to the RFMOs.

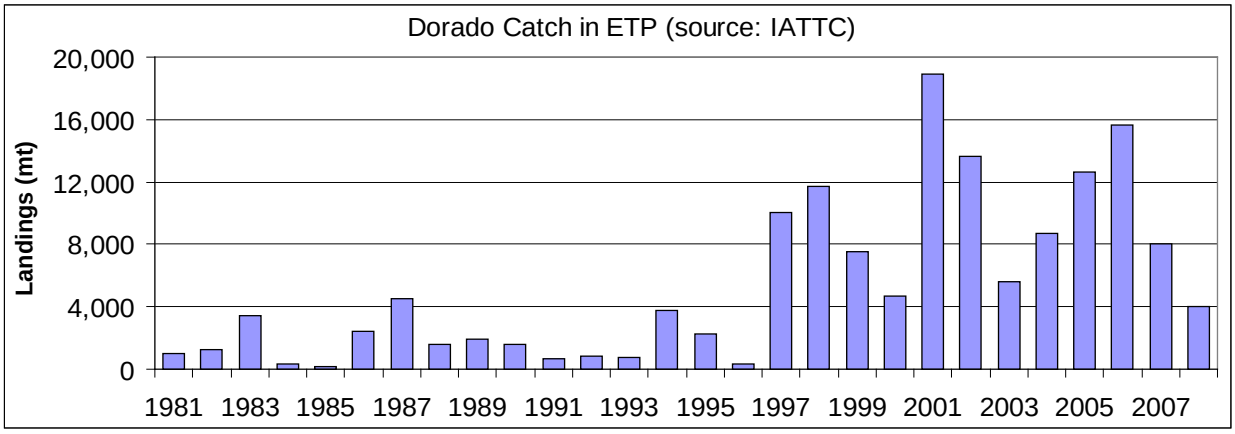
<u>For unassessed stocks with catch history and additional information on relative abundance or stock productivity: e.g. common thresher shark</u>

The HMSMT will compile the best available stockwide catch data, or if not available, regional catch data and all additional information on a stock's productivity including relative abundance or catch/effort data if available. MSY or proxy estimates will be developed based on the catch time series and additional information. The relative impact of U.S. West Coast fisheries may help to inform decisions on selecting appropriate reference points. As part of the biennial process, the HMSMT will propose a MSY or proxy and justification to the SSC for recommendation to the Council. As an example, the figure below shows the U.S. West Coast total landings of common thresher shark between 1981-2008 and a delta-general linear model (GLM) derived abundance index for the drift gillnet fishery (NMFS Southwest Fisheries Science Center, preliminary results). The catch history reflects declines in effort as a consequence of time and area restrictions imposed to protect pupping thresher sharks and protected species. Based on the declining catches, and increasing trend in catch per unit of effort (CPUE), a potential MSY could be calculated as the average catch landed during the period when the CPUE was beginning to increase after the population decline in the mid 1980s, such as 1988-1994 in this example.



For unassessed stocks with catch history but lacking further information on relative stock abundance or productivity: e.g. dorado of the EPO

For each species, the HMSMT will compile the best available stockwide, or if not available, regional catch data. A catch-based method such as the Depletion Corrected Average Catch (DCAC), Depletion Based Stock Reduction Analysis (DB-SRA), or in the case of a relatively stable catch history without indications of stock depletion, an average of selected catch levels may be chosen to represent a proxy MSY. As an example, at the time of the HMS FMP development, an average of the annual catch for FAO area 77 between 1995-1999 (450 mt) was considered a reasonable MSY proxy for dorado. A potential updated MSY proxy for dorado, that also reflects catch for a larger part of the stock's range, could be an average of the annual Eastern Pacific Ocean (EPO) catch for the past 5 years (9829 mt; see figure below).



4. Approaches to setting ACLs for stocks not subject to the international exception

The same framework proposed for setting MSY and SDCs for MUS can be applied to establish reference points for managed stocks not subject to the international exception. Under the revised NS1 Guidelines, for MUS for which the Council FMP is the lead and which are not subject to international exception, the Council must establish an OFL, ABC, ACL and Accountability Measures. Under the tiered decision-making framework described above, OFL would be determined from an assessment, or developed from stockwide or regional catch history with or without additional information regarding a stock's productivity. For common thresher shark, as an example, the regional MSY proxy may be set at some catch level based on historical or recent fishing informed by any productivity or abundance trends. ABC could be equal to or reduced from OFL based on scientific uncertainty (σ) as established by the SSC, and the Council's value for risk associated with the potential for overfishing (often referred to as P*). Management uncertainty should be further considered in order to establish an ACL less than or equal to ABC. The establishment of SDCs would follow the framework above.

OFL	STOCK SPECIFIC MSY OR MSY PROXY
ABC	OFL * Scientific Uncertainty BUFFER
ACL	Equal to ABC or reduced for management uncertainty

The HMSMT believes that the methodology described in the NS1 guidelines to define an OFL as a reference point to ensure that MFMT (= F_{MSY}) is not exceeded, then as necessary scaling OFL down to the ABC to account for scientific uncertainty and further reducing the ABC down to the ACL to account for management uncertainty suggests that the ACL serves the same purpose in the NS1 guidelines as OY = 0.75 MSY served in the original HMS FMP. For consistency with the definition of OY in the original HMS FMP, the HMSMT recommends the Council consider defining OY as MSY for species which do not require an ACL, and as the ACL level of catch for cases where one is applicable.

If necessary the biennial process would be used to invoke additional accountability measures (AMs). The process the Council went through in 2008 for the 2009-2011 period presents and example. Concern was raised that increased recreational catch of common thresher shark, combined with commercial catch, could mean that total catch was approaching or exceeding the harvest guideline. The HMSMT both proposed potential recreational management measures and gathered information to estimate total catch. Based on this information the Council decided that additional measures were not necessary at that time. However, the process demonstrates how the biennial process can be used to establish or adjust AMs to avoid exceeding an ACL.

5. Overview of proposed alternatives

Section 2.7 of the draft EA outlines the proposed alternatives, which are summarized in Table 6:

1. Alternative 1 is the No Action alternative required under NEPA; it does not address the requirements of the NS1 guidelines.

2. Alternative 2 retains the list of species in the current HMS FMP, but reclassifies monitored species as ECS; the international exception is applied to all MUS in the HMS FMP.

3. Alternative 3 adds opah as an additional MUS; the international exception would apply to all MUS except common thresher shark and shortfin mako shark.

4. In addition to including opah as a new MUS, Alternative 4 reclassifies bigeye thresher shark and pelagic thresher shark from MUS to ECS; the international exception would apply to all MUS except common thresher shark.

6. **HMSMT Recommendation for New Alternative 5**

Alternative 5 reflects the HMSMT's preferred choices from the full range of alternatives based on the background presented in this and previous HMSMT reports.

a) Classification of Stocks in the FMP

Select a list of species for reclassification as MUS and ECS as described under Alternative 4 in the draft EA, but replace the list of 13 ECS shown under Alternative 4 with the following revised list of eight ECS which reflects the criteria in Section 1) above:

1. Bigeye thresher shark
2. Common mola
3. Escolar
4. Lancetfishes
5. Louvar
6. Pelagic stingray
7. Pelagic thresher shark
8. Wahoo

b) Applying the International Exception

Apply the international exception to setting ABCs and ACLs described at 660.310(h)(2)(ii) to all managed species (Same as Alternative 2).

c) Determining the Primary FMP: Same as Alternative 2.

d) Establishing Reference Points, ACLs, and Accountability Measures: Same as Alternative 2.

HMSMT's recommended Alternative 5 is summarized in the following table (comparable to Table 6 (page 23) in Attachment 1, Agenda Item E.2.a)

Issue	Alternative 5
a) Classification of stocks	12 MUS (bigeye and pelagic thresher to EC, add opah) 8 EC species (drop selected per criteria in Section 1 of this HMSMT Report)
b) Application of the international exception	Applied to all stocks
c) Primary FMP designation	Designation at stock level in consultation with WPFMC; flexibility to change based on new information
d) Specification of MSY and SDC	• MSY or MSY proxies estimated using methods consistent with data availability category • MSY and SDCs reported in SAFE
d) Specification of OYs	Flexible framework to determine OY on stock basis, based on criteria in Guidelines
d) Specification of ABCs	Not Specified
d) Specification of ACLs	Not Specified
d) Accountability measures	Measures and processes as described in Chapters 5 & 6 of the FMP

7. Additional changes to the proposed FMP Amendment 2 text

Based on advice from the SSC and NMFS, the HMSMT proposes additional revisions to the FMP text.

- The HMS FMP should explicitly state that changes to quantitative estimates of reference points should be frameworked, i.e., not require an FMP amendment to change. Section 2.4 on the HMS FMP currently suggests that any change to reference points are considered fixed elements of the FMP. A revision to Section 2.4 is proposed to make clear that the FMP contains the procedures for determining reference points, which would require an amendment to change, but estimates of the actual values could be periodically revised based on the new information and reported in the SAFE document.
- The entirety of Section 4.1.1.4, OY Control Rule should be deleted.
- Section 4.1.2, Optimum Yield, and Section 4.1.3, Optimum Yield for Vulnerable Species, should be further revised as outlined below
- Figures 4-1 through 4-3 should be revised to be consistent with revised NS1 Guidelines

Section 2.4 Fixed Elements of the Fishery Management Plan

Fixed elements are the long-standing elements of a fishery management program that direct how it is applied and for what purpose. FMP amendments are required when fixed elements of the FMP are changed, as well as for major or controversial actions outside the scope of the original FMP.

Examples of fixed element actions that would require an FMP amendment include:

$ changes to management objectives;
$ changes to the species in the management unit (actively managed species);
$ changes to the ~~control rules (definition of overfishing)~~ methods for determining MSY, OY and SDC;[1]
$ amendments to any procedures required by the FMP;
$ implementation of limited entry programs. This FMP does not propose a federal limited entry program for any HMS fishery at this time. The Council adopted a control date of March 9, 2000 for commercial and party/charter fisheries for HMS, in anticipation that a limited access program may be needed in the near future. Meanwhile, existing state limited entry programs for HMS fisheries will remain in effect when the FMP is implemented; and
$ allowing a longline fishery in the EEZ (other than through approved activities under an EFP).

...

4.1.2 Optimum Yield

OY is defined as MSY reduced by relevant socioeconomic factors, ecological considerations, and fishery-biological constraints so as to provide the greatest long-term benefits to the Nation. Therefore, OY may ~~can~~not be set greater than MSY, and must take into account the need to prevent overfishing and rebuild overfished HMS stocks. To the extent possible, the relevant social, economic, and ecological factors used to establish OY for an HMS stock or fishery should be quantified and reviewed in historical, short-term, and long-term contexts. National Standard 1 Guidelines includes examples of factors that may be considered when determining OY. ~~OY should not be greater than the ABC or ACL, if identified (see below).~~

[1] Numerical ~~estimates~~ determination of these reference points ~~may~~ should be periodically revised, based on the best scientific information, without requiring an FMP amendment. Any such revised ~~estimates~~ determinations, after approval by NMFS, will be published in the annual SAFE report (see Section 4.3).

The OY specifications in Table 4-3 of the FMP [Stockwide and regional (CA,OR, WA) catches in thousand (k) mt for management unite species at the time of adoption] shall remain in effect until changed by recommendation of the Council, after considering recommendations of the SSC, and approval by NMFS. The OY for any management unit species not listed in Table 4-3, shall be determined preferably concurrently with addition to the management unit, or as soon as possible thereafter by recommendation of the Council, after considering input by the SSC, and approval by NMFS.

~~*An example of an **Optimum Yield (OY) Control Rule** is also shown in Figure 4–1, it being the Restrepo et al. (1998) recommended, precautionary default of 0.75MFMT of the MSY control rule (the lower dashed horizontal and slope line). This rule is for maintaining OY, which is defined as MSY reduced by relevant socioeconomic factors, ecological considerations, and fishery-biological constraints so as to provide the greatest long-term benefits to the Nation. Simulation studies have indicated that management according to the OY default rule will often allow biomasses (B_{OY}) to be maintained at about 1.25B_{MSY} (as shown), with yields of about 95% of MSY. Like for MSST of the MSY Control Rule, there is a **Minimum Biomass Flag (B_{FLAG})** for the OY Control Rule equal to (1-M)B_{OY} or 0.5B_{OY} (whichever is greater)(Boggs et al. 2000). B_{FLAG}, which would then be equivalent to 1.25(B_{MSST}/B_{MSY}), serves as a warning call to halt biomass reduction that would jeopardize obtaining OY on average.*~~

~~*The OY control rule has a more conservative range of restraints that may be appropriate for more vulnerable species. The more vulnerable a species is to being overfished, the more conservative should management be. And since the maximum value of OY is MSY, then the more should the catch ratio OY/MSY be reduced from unity (while B_{OY}/B_{MSY} is increased from unity).*~~

~~*These control rules involve the concept of target and limit reference points. It can be seen that B_{MSY} and B_{OY} are target reference points for the long term management goals of MSY or OY. But B_{MSST} and B_{FLAG} are limit thresholds for the respective control rules that should not be exceeded, or exceeded only at some level of probability. A stock that is reduced below those biomass limits would normally require remedial action, because the target goals would then be jeopardized. Similarly, F_{OY} is a target reference point. However, F_{MSY} could be a target reference point or a limit threshold; it could be the target point for the MSY control rule or it could be the limit threshold for the OY control rule. If B < B_{FLAG} is expected with the latter rule, remedial action may be recommended even though the stock could still be far above B_{MSST}.*~~

4.1.23 Alternative ~~Management Control Rule~~Specification of OY for Vulnerable Species

A stock's vulnerability is a combination of its productivity, which depends upon its life history characteristics, and its susceptibility to the fishery. Productivity refers to the capacity of the stock to produce MSY and to recover if the population is depleted, and susceptibility is the potential for the stock to be impacted by the fishery, which includes direct captures, as well as indirect impacts to the fishery (e.g., loss of habitat quality). In consultation with the SSC, the HMSMT may analyze the vulnerability of HMS stocks from time to time.

Since the management unit species vary from vulnerable to very productive, an alternative OY specification may be considered for vulnerable species. ~~the default MSY control rule applies to MUS, but additionally, an alternative OY target control rule is used for "vulnerable" species.~~

~~Vulnerability of species can stem from many reasons, and any species that has been depleted to 50% below B_{MSY} (for the logistic production model, to 25% of unfished level B_0) that is incapable of recovering back to that B_{MSY} level within 10 years (with fishing removed) is to be considered vulnerable in this FMP. The productivities (potential per capita rates of population increase *r*) of such species would have to be 5% or less per year, assuming recovery time is determined by a linear compensatory increase in *r* with population decline (logistic model). Only the sharks among the MUS, including common thresher, are likely to have such low rates and long recovery times (see Table 4-1), and they are therefore considered vulnerable by this criterion. Vulnerable OYs are also appropriate for other fish species for other reasons of stock health concern (see bluefin tuna, Section 4.8.1, and striped marlin, Section 4.8.3).~~

~~In this FMP, where OY is not determined analytically, an OY proxy is defined according to vulnerability, as follows:~~

~~OY(proxy) = MSY or MSY(proxy) for species not considered vulnerable~~

~~OY(proxy) = 0.75*(MSY or MSY(proxy)) for species considered vulnerable~~

~~The rationale for the vulnerable species OY follows from the recommended $F_{OY} = 0.75F_{MSY}$ (see Figure 4-1). Then since $MSY = F_{MSY}B_{MSY}$, $OY=0.75F_{MSY}B_{MSY}= 0.75MSY$ when estimated from the same B_{MSY} biomass.~~

~~Since the default alternative rule is defined with MFMT and MSST as ratios relative to MSY (as in Figure 4-1), its resulting generality allows management according to specific criteria even without estimates of the absolute biomass or exploitation status of a stock. This allows all the MUS, diverse with respect to productivity, scientific understanding, and stock status, to be managed by the same rule and in accordance with the requirements of the Magnuson-Stevens Act. This control rule is the most straight-forward of the possible rules discussed by Restrepo et al. (1998) and is the one they recommend. The reduction in fishing mortality it calls for to rebuild depleted populations is intermediate with respect to the degree of depletion that can be remedied at acceptable rates of recovery. It is the same rule being considered for the Western Pacific Region Fishery Management Council's FMP for pelagic fisheries (but with the additional stipulation for vulnerable species).~~