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**AMENDMENT 2 TO THE FISHERY MANAGEMENT
PLAN FOR U.S. WEST COAST FISHERIES FOR
HIGHLY MIGRATORY SPECIES TO ADDRESS
REVISED NATIONAL STANDARD 1 GUIDELINES**

**PROPOSED CHANGES TO THE FMP
TEXT**

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INTRODUCTION

In order to comply with revised National Standard 1 Guidelines revisions to Chapters 3-5 of the HMS FMP are proposed as outlined below.

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3.0 SPECIES IN THE MANAGEMENT UNIT

Numerous species are caught in HMS fisheries. Those to be actively managed are the Management Unit Species (MUS) listed in Section 3.1. Other species, caught incidentally to targeted species, will be were originally classified in the FMP as monitored; under revised National Standard 1 Guidelines, some of those species have been reclassified as ecosystem component (EC) species.

HMS fishing gears catch an assortment of tunas, billfish, sharks and other fishes, and some protected species as well. Important species, which meet certain criteria described below, are designated as management unit species, that is, they are subject to active management by the FMP. The management unit species are addressed in Section 3.1.

In addition to management unit species, over the incidental catch of at least fifty other fish species are caught has been recorded. It is recommended that data be collected for these and any others caught by HMS gears to assess the amount and type of bycatch as required by the Magnuson-Stevens Act.

EC Species included for monitoring purposes are discussed in Section 3.23. One or more Any of these species could be added to the management unit through a plan amendment, if warranted by changes in west coast HMS fisheries by action of the Council. This requires a plan amendment.

A few sSpecies are designated by this FMP as prohibited because of their special status are addressed in Section 3.4. These species, if intercepted, must be released immediately, unless there are other provisions for their disposition, or unless permits are held for their capture. Prohibited species are addressed in Section 3.3.

Protected species caught incidentally to HMS fisheries include various species of seabirds, sea turtles and marine mammals. Protected species are addressed in Appendix D by HMS fishery type, and in Section 6.1.5.

3.1 Management Unit Species (Actively Managed)

The Plan Development Team and the Council examined a number of different criteria and alternatives for species to be included in the management unit. Public testimony covered a wide range of alternatives, from a relatively short list of target species in West Coast HMS fisheries, to a long list of species harvested by HMS fisheries. The Council assumed that species placed in the management unit would be candidates for active management, i.e., the fisheries for these species may need to be managed through the Council process resulting in Federal regulations to implement adopted management measures regulated by the federal government. The Council also understood that maximum sustainable or optimum yield (bio-analytically-based or proxy) is the basis of management and would have to be specified for each species in the management unit, and that a definition of overfishing is required. The Council considered various combinations of the following criteria for including species in the management unit, with the stipulation that any species that met the first three criteria would be strongly considered for inclusion:

1. the species occurs in the Pacific Council management area
2. the species occurs in west coast HMS fisheries

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3. the species is defined as highly migratory in the Magnuson-Stevens Act 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 ~~Region Fishery Management~~ Council
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 occurs in fisheries which the Pacific Council wants to actively manage
8. the species possesses special biological characteristics (e.g., low productivity)

The Magnuson-Stevens Act defines highly migratory species as tuna species, marlin (*Tetrapturus* spp. and *Makaira* spp.), oceanic sharks, sailfishes (*Istiophorus* spp.) and swordfish (*Xiphias gladius*). The term “tuna species” includes albacore tuna (*Thunnus alalunga*), bigeye tuna (*T. obesus*), bluefin tuna (*T. thynnus* and *T. orientalis*), skipjack tuna (*Katsuwonus pelamis*), and yellowfin tuna (*T. albacares*). The inclusion of these definitions establishes the authority of the Secretary of Commerce to manage directly the above species in the Atlantic Ocean and Gulf of Mexico, without the need for a regional fishery management council FMP.

The United Nations Convention on the Law of the Sea, Annex I, defines “highly migratory species” to include: albacore tuna, bluefin tuna, bigeye tuna, skipjack tuna, yellowfin tuna, blackfin tuna (*Thunnus atlanticus*), little tuna (*Euthynnus alletteratus*; *E. affinis*), southern bluefin tuna (*T. maccoyii*), frigate mackerel (*Auxis thazard*; *A. rochei*), pomfrets (family Bramidae), marlins (*Tetrapturus angustirostris*; *T. belone*; *T. pfluegeri*; *T. albidus*; *T. audax*; *T. georgei*; *Makaira mazara*; *M. indica*; *M. nigricans*), sailfishes (*Istiophorus platypterus*; *I. albicans*), swordfish, sauries (*Scomberesox saurus*; *S. saurus scombroides*; *Cololabis saira*; *C. adocetus*), dorado (*Coryphaena hippurus*; *C. equiselis*), oceanic sharks (*Hexanchus griseus*; *Cetorhinus maximus*; *Rhincodon typus*; family Alopiidae; family Carcharhinidae; family Sphyrnidae; family Lamnidae), cetaceans (family Physeteridae; family Balaenopteridae; family Balaenidae; family Eschrichtiidae; family Monodontidae; family Ziphiidae; family Delphinidae).

Species in the management unit of the Pelagic Fisheries FMP adopted by the Western Pacific Region Fishery Management Council are listed in Section 1.7.6.

The management unit includes:

Tunas:

- North Pacific albacore (*Thunnus alalunga*)
- yellowfin tuna (*Thunnus albacares*)
- bigeye tuna (*Thunnus obesus*)
- skipjack tuna (*Katsuwonus pelamis*)
- northern bluefin tuna (*Thunnus orientalis*)

Sharks:

- common thresher shark (*Alopias vulpinus*)
- ~~pelagic thresher shark (*Alopias pelagicus*)~~
- ~~bigeye thresher shark (*Alopias superciliosus*)~~
- shortfin mako or bonito shark (*Isurus oxyrinchus*)

Comment [KRD1]: Moved under Alternative 4

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blue shark (*Prionace glauca*)

Billfish/Swordfish:

striped marlin (*Tetrapturus audax*)

swordfish (*Xiphias gladius*)

Other:

dorado or dolphinfish (*Coryphaena hippurus*)

Opah, *Lampris guttatus*

Comment [KRD2]: Moved under Alternatives 3 and 4

The management unit includes all five species of tuna which are important to commercial and recreational fisheries in the north Pacific (albacore, bluefin) and eastern tropical Pacific (yellowfin, bigeye, skipjack). Striped marlin is included because of its importance to the recreational fishery in California. Swordfish is a major target in commercial drift gillnet, harpoon and longline fisheries, and is pursued by anglers. Blue shark is an abundant bycatch species in drift gillnet and longline fisheries. It has been the target of some directed shark fisheries in the past, and currently is caught by anglers. Common thresher shark and shortfin mako shark are important species in the drift gillnet fishery and also are targeted by recreational fishers. ~~Bigeye and pelagic thresher sharks are landed by the drift gillnet fishery but in small amounts compared to common thresher and mako sharks. They are included in the management unit largely because of concern that they have poor resilience to fishing.~~ Dorado is an important component of the suite of species targeted by recreational fishers, especially in southern California.

Comment [KRD3]: Text moved under Alternative 4 (see revisions below).

The species are to be managed aiming for consistency in both regional and international management. Since the MUS tunas and billfishes are fished ocean-wide and are already assessed or reviewed regularly at international forums, the Council's main task would be to ensure that their local management is neither inconsistent with, nor is abrogated by, international management. The more regionally distributed sharks not currently under international management require more direct, regional or local assessments of stock status and possibly regional management (common thresher and shortfin mako sharks). Where production potentials cannot be estimated accurately (e.g., because only small fractions of the stocks are taken), the species, as MUS, will still be regularly reviewed under Council guidance (e.g., pelagic and bigeye thresher sharks; dorado).

3.2 Determining the Primary FMP for Managed Stocks

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National Standard 1 Guidelines state if a stock is identified in more than one fishery, Councils should choose which FMP will be the primary FMP in which management objectives and reference points (see Chapter 4) will be established. Conservation measures in the FMP that is not the primary FMP should be consistent, to the extent practicable, with those established in the primary FMP. Since, as discussed above, a criterion for choosing the managed species in this FMP is their management by the WPFMC, the PFMC and WPFMC will coordinate to identify the primary FMP for Pacific stocks of the managed species. Generally, the WPFMC's FMPs will be primary for stocks occurring in the Western and Central Pacific Ocean and this FMP will be the primary FMP for stocks occurring in the Eastern Pacific Ocean (with the jurisdictional boundaries of the WCPFC and IATTC serving to define these regions). Another important criterion in considering the primary FMP is the relative importance of the stock to fisheries managed under the respective FMPs. This consideration is especially important for stocks where stock structure is poorly understood or the stock is considered a single stock across the North Pacific. Identification of the primary FMP does not preclude either Council from developing recommendations and participating in international forums related to the management in the Pacific Ocean of the species herein.

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3.23 ~~Species Included in the FMP for Monitoring Purposes~~ Ecosystem Component Species

~~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.~~

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~~One of the reasons given for including EC species in an FMP is for data collection purposes. EC species are not considered “in the fishery” but Councils should consider measures to mitigate and minimize bycatch of these species, to the extent practicable, consistent with National Standard 9. MSY, OY and other reference points (see Chapter 4) do not need to be specified for EC species. Identification of EC species will help the Council to track these species over time, periodically evaluate their status, and assess whether any management is needed under the FMP, in which case an EC species could be reclassified as a managed species. Identification of EC species also allows the Council to consider measures to minimize bycatch and bycatch mortality of EC species and to protect their associated role in the ecosystem.~~

~~The criteria for species included in the FMP for monitoring purposes are:~~

- ~~• species having a record of being caught in an HMS fishery~~
- ~~• not covered by another FMP or state management regime, or~~
- ~~• of special concern (e.g., elasmobranchs, which have relatively low productivity).~~

~~These species, which often comprise a fishery’s bycatch, should be monitored on a consistent and routine basis to the extent practicable. Sampling periodicity and coverage fraction will depend upon the take rates of the species that are of 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 (see Section 6.1.3). Monitored species EC species other than the MUS and prohibited species (see below and Section 6.1.6) are:[†]~~

~~Billfishes and Swordfish~~

~~Black marlin, *Makaira indica*~~

~~Blue marlin, *Makaira nigricans*~~

~~Pacific sailfish, *Istiphorus platypterus*~~

~~Shortbill spearfish, *T. angustirostris*~~

Comment [KRD4]: Deletions indicated species dropped from the FMP under Alternatives 3 and 4

~~Sharks and Rays~~

~~Bat ray, *Myliobatis californica*~~

~~Blacktip shark, *C. limbatus*~~

[†] ~~Note: This list of monitored species was incorrect in the FMP as originally published in revised form pursuant to Amendment 1. The FMP with the corrected list was produced in August 2009.~~

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Dusky shark, *C. obscurus*
Hammerhead sharks, Sphyrnidae
Leopard shark, *Triakis semifasciata*
Manta/Mobula rays, Mobulidae
Oceania whitetip shark, *C. longimanus*
Pelagic sting ray, *Dasyatis violacea*
Prickly shark, *Echinorhinus cookei*
Salmon shark, *Lamna ditropis*
Silky shark, *Carcharhinus falciiformis*
Six gill shark, *Hexanchus risius*
Soupfin shark, *Galeorhinus galeus*
Spiny dogfish, *Squalus acanthias*
Whale shark, *Rincodon typus*
Pelagic thresher shark (*Alopias pelagicus*)
Bigeye thresher shark (*Alopias superciliosus*)

Tunas and Mackerels

Black skipjack, *Euthynnus lineatus*
Bullet mackerel (tuna), *Auxis rochei*
Pacific bonito, *Sarda chiliensis*
Wahoo, *Acanthocybium solandri*

Jacks and Pomfrets

Pacific moonfish, *Selene peruviana*
Pacific pomfret, *Brama japonica*
Rainbow runner, *Elagatis bipinnulata*

Other Fishes

Common mola, *Mola mola*
Escolar, *Lepidocybium flavobrunneum*
Lancetfishes, *Alepisauridae*
Louvar, *Luvarus imperialis*
Oarfish, *Regalecus glesne*
Oilfish, *Ruvettus pretiosus*
Opah, *Lampris guttatus*
Pacific saury, *Cololabis saira*

Bigeye and pelagic thresher sharks are landed by the drift gillnet fishery but in small amounts compared to common thresher and mako sharks. They originally included in the FMP as managed species are included in the management unit—largely because of concern that they have poor resilience to fishing. Under Amendment 2 they were reclassified as EC species.

As outlined in Section 4.3 of this FMP, each year the HMS Management Team will deliver one combined SAFE report for all species in this FMP to the Council. The SAFE report will follow the guidelines specified in National Standard 2 ~~(of 10)~~ and will be used by the Council and NMFS to develop and evaluate regulatory adjustments, if necessary, under the framework procedure or the FMP amendment process. ~~It~~ The SAFE will document-track and report on significant trends or changes in monitored-EC species over time, and assess the relative success of existing state and federal fishery management programs. The SAFE report will also make recommendations to the Council concerning conservation and management of bycatch and incidental catch.

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Comment [KRD5]: Moved from MUS under Alternative 4

Comment [KRD6]: Moved to managed species under Alternatives 3 and 4

Comment [KRD7]: Revision applicable under Alternative 4

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3.34 Prohibited Species

A few species are considered for inclusion under the category Prohibited Species in this Plan. In general, prohibited species must be released immediately if caught, unless other provisions for their disposition are established, including for scientific study. Striped marlin, now allowed for sport-only and not commercial fishing by California, is prohibited by specific allocation and is discussed separately in Section 6.2.4. Pacific halibut and salmon are managed separately from this Plan, but are important in some HMS fisheries and so are provided for here with respect to how they can be caught. Prohibited species in HMS fisheries are:

Great white shark (*Carcharodon carcharias*)
Basking shark (*Cetorhinus maximus*)
~~mega~~Mega mouth shark (*Megachasma pelagio*)
Pacific halibut (*Hippoglossus stenolepis*)
Pink salmon (*Onchorhynchus gorbuscha*)
Chinook salmon (*O. tshawytscha*)
Chum salmon (*O. keta*)
Sockeye salmon (*O. nerka*)
Coho salmon (*O. kisutch*)

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4.0 PREVENTING OVERFISHING AND ACHIEVING OPTIMUM YIELD

The concepts of control rules and status determination criteria for management and the default and alternative management control rules for this FMP, are discussed below. Control rules for managing MUS are required under the Magnuson-Stevens Act.

4.1 ~~Control Rules and Preventing Overfishing~~ Reference Points Including MSY, OY, and Status Determination Criteria

These ~~criteria-reference points~~ are guideposts for managing exploited stocks and require being able to determine and monitor the effects of fishing. But such effects are not always clear, e.g., catch per unit of effort trends may not only reflect the abundance of HMS, but also how fishing success is affected by schooling or wide-ranging behaviors, fishing efficiency, and environmental effects on the availability of species. Estimated population status of management unit species is discussed in Section 4.8 and summarized in Tables 4-4 and 4-5. The SAFE Report (see Section 4.3), produced annually, provides periodic updates to the information found in this FMP.

Many of the more productive HMS species support large and widespread international fisheries that are best managed cooperatively with other nations. In particular, rebuilding programs, required unilaterally by the Magnuson-Stevens Act for overfished stocks, would be ineffective without international cooperation, especially if domestic catches are only small fractions of the stock-wide harvest (see Table 4-5 for West Coast catch fractions). For such species, regional remedial actions must be to the extent practicable, concurrent with recommendations/resolutions adopted at international forums for cooperative action (see Section 4.5 on stock rebuilding).

Still other HMS species possess life histories characterized by low productivity, thus supporting smaller fisheries that tend to be more regional than international. They have more localized distributions and life stage needs, often within the EEZ. Not only are they more easily overfished, but recovery takes longer, i.e., the species are less resilient to overfishing. Their management should be more conservative, and may require stronger proactive and targeted regional leadership.

Managing conservatively means being precautionary, especially when there are large uncertainties in how a stock is being affected by fishing. Besides lowering the threshold for taking remedial action, it could mean preventing rapid growth of fisheries to prevent overshooting of management goals, or taking steps to protect the reproductive potential of stocks.

The goal of the Magnuson-Stevens Act, as amended by the Sustainable Fisheries Act of 1996 and Magnuson-Stevens Reauthorization Act of 2006, is to ensure the long term sustainability of fisheries and fish stocks by halting or preventing overfishing and by rebuilding overfished stocks. The Act requires developing fishery management plans for exploited species of U.S. seas including shelf, anadromous, and highly migratory species whose ranges extend beyond the EEZ. By its National Standard 1, optimum yield is the ultimate goal for each fishery.

National Standard 1 Guidelines, ~~as required by the Magnuson-Stevens Act and published in the Federal Register (Code of Federal Regulations, 50 CFR 600.3-305 et. seq.10)~~ were developed to assist in implementing the Act. The Guidelines state that the following items should be included in the FMP:

Maximum sustainable yield (MSY): MSY is the largest long-term average catch or yield that can be taken from a stock or stock complex under prevailing ecological, environmental conditions and fishery technological characteristics (e.g., gear selectivity), and the distribution of catch among fleets.

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MSY fishing mortality rate (Fmsy): The fishing mortality rate that, if applied over the long term, would result in MSY.

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MSY stock size (Bmsy): The long-term average size of the stock or stock complex, measured in terms of spawning biomass or other appropriate measure of the stock's reproductive potential that would be achieved by fishing at Fmsy.

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Status determination criteria (SDC): Quantifiable factors or their proxies, that are used to determine if overfishing has occurred, or if the stock or stock complex is overfished. "Overfished" relates to biomass of a stock or stock complex, and "overfishing" pertains to a rate or level of removal of fish from a stock or stock complex. SDC are:

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Maximum fishing mortality threshold (MFMT): The level of fishing mortality (F), on an annual basis, above which overfishing is occurring. The MFMT or reasonable proxy may be expressed either as a single number (a fishing mortality rate or F value), or as a function of spawning biomass or other measure of reproductive potential.

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Overfishing limit (OFL): The annual amount of catch that corresponds to the estimate of MFMT applied to a stock or stock complex's abundance and is expressed in terms of numbers or weight of fish. The OFL is an estimate of the catch level above which overfishing is occurring.

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Minimum stock size threshold (MSST): The level of biomass below which the stock or stock complex is considered to be overfished.

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Optimum yield (OY): The amount of fish that will provide the greatest overall benefit to the Nation, particularly with respect to food production and recreational opportunities and taking into account the protection of marine ecosystems.

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Acceptable biological catch (ABC): 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 specified based on the ABC control rule.

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ABC control rule: A specified approach to setting the ABC for a stock or stock complex as a function of the scientific uncertainty in the estimate of OFL and any other scientific uncertainty (see paragraph (f)(4) of this section).

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Annual catch limit (ACL): The level of annual catch of a stock or stock complex that serves as the basis for invoking AMs. ACL cannot exceed the ABC, but may be divided into sector-ACLs.

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Annual catch target (ACT): An amount of annual catch of a stock or stock complex that is the management target of the fishery, and accounts for management uncertainty in controlling the actual catch at or below the ACL. ACTs are recommended in the system of accountability measures so that ACL is not exceeded.

ACT control rule: A specified approach to setting the ACT for a stock or stock complex such that the risk of exceeding the ACL due to management uncertainty is at an acceptably low level.

~~and introduced the terms "Control Rule" and "Status Determination Criteria" (SDC) relative to the requirements of National Standard 1 (NS 1). The control rule specifies how a fishery is to be managed depending upon stock status relative to the SDCs, which are biological benchmarks or thresholds. There are two SDCs: the Maximum Fishing Mortality Threshold (MFMT) and the Minimum Stock Size~~

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~~Threshold (MSST). By control rule definition, overfishing occurs when fishing mortality F is greater than the MFMT mortality. Similarly, a stock is overfished when its size falls below the MSST stock biomass. The Magnuson Stevens Act (1304,e) requires NMFS to notify Congress when the stock is approaching the overfished condition (i.e., if there is overfishing and the stock is expected to be overfished within two years) and when it is overfished. Fishery managers must then take appropriate remedial action: in the case of approach to being overfished, harvest rates must be reduced below MFMT; in the case of being overfished, a rebuilding plan must be prepared within one year to rebuild the stock. The rebuilding plan must bring the stock back to the level producing maximum (or optimal) sustainable yield within a specified time period. The Guidelines call for precautionary management, i.e., use of conservative control rules with remedial action to begin even if the overfishing/overfished status cannot be established with certainty.~~

4.1.1 ~~Default MSY, SDC, and Determining Overfishing and Overfished Control Rules~~

4.1.1.1 MSY

Because MSY is a long-term average, it need not be estimated annually, but it must be based on the best scientific information available, and should be re-estimated as required by changes in long-term environmental or ecological conditions, fishery technological characteristics, or new scientific information.

MSY is estimated based on the amount of information available about the stock. The following categories show the relationship between available information and the estimation of MSY:

Stocks with Quantitative Assessments, Category 1: These are stocks for which a recent stock assessment has been conducted, containing MSY-based estimates. For these stocks the HMSMT would summarize the results of the stock assessment and estimated reference points and present the summary to the SSC. If the SSC considered the assessment results to be robust, the MSY and OFL would be recommended to the Council for management. These quantities would be reported in the annual SAFE document

Stocks with Estimates of Stock-wide Catch, Category 2: If the stock has not been recently or ever assessed, the HMSMT would compile the best available data on stockwide catch and use some part of the time series to estimate a sustainable catch limit. Catch-based models that incorporate some stock productivity parameters and methods to account for uncertainty, such as DCAC or DB-SRA, may prove useful for estimating MSY. Alternatively, if justified, catch levels from select years when the stock was believed to be fished sustainably could be used to come up with a proxy MSY.

Stocks with Estimates of Local Catch Only, Category 3: If a time series of stockwide catch is not available, then it may be necessary to use a time series of only regional (U.S. west coast) catch and apply a catch-based estimation model (as above) or select levels of sustainable catch to serve as a proxy local MSY.

4.1.1.2 MFMT and OFL

~~The general model for a control rule is the default **Maximum Sustainable Yield Control Rule** suggested in the Technical Guidance by Restrepo et al. (1998), and it is the model for this FMP. This control rule is a procedure for maintaining MSY, and is like that being considered by the Western Pacific Region Fishery Management Council. It is illustrated schematically in Figure 4-1, where the x and y axes are in relative measure, the biomass and fishing mortality ratios B/B_{MSY} and F/F_{MSY} , respectively. Here, F the MFMT mortality threshold is the ratio $F_{MFMT}/F_{MSY} = 1.0$; it is the mortality threshold for all stock levels~~

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above the MSST threshold (described below). It is illustrated schematically in Figure 4-1, where the x and y axes are in relative measure, the biomass and fishing mortality ratios B/B_{MSY} and F/F_{MSY} , respectively. With this MFMT ceiling emplaced, a stock would not be reduced to levels any lower than B_{MSY} that produces MSY (on average). It is to be noted, however, that the Technical Guidance for precautionary compliance with NS 1 (Restrepo, *et al.* 1998) allows that MFMT can be occasionally and temporarily exceeded at some level of probability that depends upon the variability of fishing mortality. The OFL is the annual amount of catch that corresponds to the estimate of MFMT applied to a stock or stock complex's abundance and is expressed in terms of numbers or weight of fish. The OFL is an estimate of the catch level above which overfishing is occurring.

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4.1.1.3 MSST

The **MSST biomass threshold**, the minimum biomass at which recovery measures are to begin, is the ratio B_{MSST}/B_{MSY} . It specifies a lower biomass level that allows remedial action not to be triggered each time B drops below B_{MSY} , simply from natural variation. In terms of B_{MSY} , the recommended level of B_{MSST} is:

$$B_{MSST} = (1-M)B_{MSY} \text{ when } M \text{ (natural mortality)} \leq 0.5, \text{ and}$$

$$B_{MSST} = 0.5B_{MSY} \text{ when } M > 0.5$$

(i.e., whichever is greater). B_{MSST} must not be less than $B_{MIN} = 0.5B_{MSY}$ and should allow recovery back to B_{MSY} within 10 years when F is reduced to zero (to the extent possible).

4.1.1.4 OY Control Rule

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and introduced the terms “Control Rule” and “Status Determination Criteria” (SDC) relative to the requirements of National Standard 1 (NS 1). The MSY control rule specifies how a fishery is to be managed depending upon stock status relative to the SDCs, which are biological benchmarks or thresholds. There are two SDCs: the Maximum Fishing Mortality Threshold (MFMT) and the Minimum Stock Size Threshold (MSST). By control rule definition, overfishing occurs when fishing mortality F is greater than the MFMT mortality. Similarly, a stock is overfished when its size falls below the MSST stock biomass. The Magnuson-Stevens Act (MSA Section 304(c) and 304(i) describe required responses requires NMFS to notify Congress when the a stock is subject to overfishing, approaching the overfished condition (i.e., if there is overfishing and the stock is expected to be overfished within two years), and when it is overfished. Fishery managers must then take appropriate remedial action: in the case of approach to being overfished, harvest rates must be reduced below MFMT; in the case of being overfished, a rebuilding plan must be prepared within one year to rebuild the stock. The rebuilding plan must bring the stock back to the level producing maximum (or optimal) sustainable yield within a specified time period. The Guidelines call for precautionary management, i.e., use of conservative control rules with remedial action to begin even if the overfishing/overfished status cannot be established with certainty.

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4.1.1.4 Determining if Overfishing is Occurring or a Stock is Overfished

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The Council will monitor each managed HMS stock and determine annually, if possible, if overfishing is occurring and whether the stock is overfished. Overfishing is occurring if the fishing mortality rate exceeds MFMT or catch exceeds the OFL for 1 year or more.

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The MSST or a reasonable proxy must be expressed in terms of spawning biomass or other reproductive potential. Should the estimated size of an HMS stock in a given year fall below this threshold, the stock is considered overfished.

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 cannot 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).

An example of The Council may establish an Optimum Yield (OY) Control Rule is also shown in Figure 4-1, it being (after the Restrepo et al. (1998) recommended. This control rule uses a precautionary default of 0.75MFMT of the MSY control rule (the lower dashed horizontal and slope line in the figure). This rule is for maintaining catch at or below 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 The Minimum Biomass Flag (B_{FLAG}) is similar to the MSST and may be set 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} .

4.1.2.3 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.

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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 or OY proxy is may be defined according to vulnerability, starting with consideration of a value of $0.75*(MSY \text{ or } MSY(\text{proxy}))$. ~~as follows:~~

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

~~OY(proxy) = $0.75*(MSY \text{ or } MSY(\text{proxy}))$ — for species considered vulnerable~~

The rationale for using this approach to set the OY 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. Starting from this consideration of an alternative OY specification, the Council may take into account other factors relating to the stock’s vulnerability (biological productivity and susceptibility to fisheries) in determining an appropriate OY for the stock.

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).~~

4.1.4 ABC, ACLs, ACTs, and Accountability Measures

According to the National Standard 1 Guidelines an ABC and a related ACL must be set for stocks managed under an FMP. However, the Guidelines include an exception to this requirement for stocks 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” (50 CFR 600.310(h)(2)(ii)). The Council has determined that all the managed stocks in this FMP meet this criterion, except for common thresher shark and shortfin mako shark.

The ABC is a level of a stock’s annual catch that accounts for scientific uncertainty in the estimate of OFL and any other scientific uncertainty. The ABC may not exceed the OFL. The HMSMT will develop ABC control rules for those managed stocks for which they are required. The ABC control rule will be reviewed by the Council’s SSC. Based on that review the Council will adopt the ABC control rule judged

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suitable by the SSC. Through this process the ABC control rule may be revised from time to time based on the best scientific information available. The ABC will be expressed in terms of catch, or landings if the ABC control rule incorporates an estimate of bycatch or other sources of fishing mortality.

The Council will establish ACLs for those managed stocks for which they are required. ACTs and ACT control rules may be established if they would help ensure the ACL is not exceeded. The ACL may not exceed the ABC. ACLs will be established for each year in the biennial management cycle (see Chapter 5). ACLs are established, reviewed, and may be adjusted as part of the periodic management cycle described in Section 5.2. No “sector ACLs” are identified (see 50 CFR 660.310(f)(5)(ii)) in this FMP, but may be established as part of the biennial management process.

The biennial management process will be used to implement accountability measures (AMs) should they be required. AMs are management controls to prevent ACLs from being exceeded and to correct or mitigate overages of the ACL if they occur.

Annually, the HMSMT will gather the requisite information needed to determine whether an ACL has been exceeded as soon as possible after the end of the fishing year (March 31). If catch exceeds the ACL more than once in the last four years, the system of ACLs and AMs will be reevaluated and modified if necessary. For the purposes of this evaluation a 3-year moving average or other multi-year approach may be used, if there are insufficient data to conduct the evaluation based on a single year’s catch.

4.1.3 Adopted Control Rules

This FMP adopts the default MSY (or MSY proxy) control rule (Section 4.4.1), but additionally uses an OY (instead of MSY) target for vulnerable species (Section 4.1.2). The default MSY control rule was chosen because it is the standard recommended in technical guidance for implementing National Standard 1 of the Magnuson-Stevens Act, and it is consistent with the WPRFMC’s rule for pelagic fisheries. The vulnerable species OY control rule is applied to sharks because of their low productivity, and to bluefin tuna and striped marlin because of uncertainties concerning total catches and stock structures.

To be precautionary, the OY for vulnerable species is set for now at 0.75MSY (from the relationship shown in Figure 4-1). Any harvest guideline for vulnerable species is set equal to that OY.

The status of the MUS in this FMP is discussed in terms of this default control rule in Section 3.3.

4.1.45 Stock Rebuilding Council Response to Overfishing

If a stock is subject to overfishing, approaching being overfished, or overfished fishery managers must then take appropriate remedial action.

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4.1.5.1 International Overfishing

If the Secretary determines that a stock is overfished or approaching the condition of being overfished due to excess international fishing pressure, and for which there are no measures (or no effective measures) to end overfishing under an international agreement to which the United States is a party, then the Council will respond according to the procedures described in Section 304(i) of the MSA (and 50 CFR 600.310(j)(4)(iv)).

4.1.5.2 Rebuilding Stocks when International Fishing Pressure is not the Cause

When stock size B falls below its MSST level, F must be reduced below its fishing mortality threshold to

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allow stock rebuilding at least back to B_{MSY} . The amount of mortality reduction would depend upon the severity of stock depletion below MSST, the stock's capacity to rebound, and the desired recovery time of the stock. In rebuilding according to the default MSY control rule (Figure 4-1), F is reduced linearly by the amount that B is determined to be below MSST. After the stock has been rebuilt back to MSST, maintaining F at the MFMT level will allow the stock to continue its increase until at equilibrium at B_{MSY} . With the OY Control Rule, the decrease from F_{OY} is shown beginning at B_{MSY} , rather than at B_{FLAG} , to enable faster rebuilding back to B_{OY} .

Under NMFS's National Standard Guidelines, a number of factors enter into the specification of the time period for rebuilding. The lower limit of the specified time period for rebuilding is determined by the status and biology of the stock or stock complex and its interactions with other components of the marine ecosystem, and is defined as the amount of time that would be required for rebuilding if fishing mortality were eliminated entirely. If the lower limit is less than 10 years, then the specified time period for rebuilding may be adjusted upward to the extent warranted by the needs of fishing communities and recommendations by international organizations in which the United States participates, except that no such upward adjustment can result in the specified time period exceeding 10 years, unless management measures under an international agreement in which the United States participates dictate otherwise. If the lower limit is 10 years or greater, then the specified time period for rebuilding may be adjusted upward to the extent warranted by the needs of fishing communities and recommendations by international organizations in which the United States participates, except that no such upward adjustment can exceed the rebuilding period calculated in the absence of fishing mortality plus one mean generation time or equivalent period based on the species' life-history characteristics. Overfishing restrictions and recovery benefits must also be fair and equitable among fishery sectors. Rebuilding of internationally managed fisheries must reflect traditional U.S. participation in those fisheries relative to that of other nations.

Fishery management councils actually have considerable latitude in how they rebuild depleted stocks. The rebuilding rules illustrated in Figure 4-1 and also Figures 4-2 and 4-3 (the F ramps) are examples of just some of the possible approaches to F -reduction. Actual rebuilding could proceed through a combination of ways, e.g. a series of stepped increases in F or series of increasing catch quotas as the biomass rebuilds back toward B_{MSY} (such quotas can be shown only indirectly in terms of the F and B dimensions of Figure 4-1).

Rebuilding of overfished stocks is a unilateral requirement by the Magnuson-Stevens Act, but, as already noted, internationally fished stocks require cooperative catch reductions among the fishing nations for this rebuilding to be effective. U.S. responsibility in the rebuilding, however, will be greater the more localized the stock and the greater the domestic take of the stock's production (see unilateral/international management, Section 2.2).

In general, rebuilding is to remedy stock depletion, but there can also be rebuilding to remedy **local depletion**. The latter rebuilding could be domestic and unilateral. Local depletion occurs when localized catches are in excess of replacement from local and external (via net immigration) sources of production. As such, it can occur independently of the status of the overall stock. The local depletion of abundance can be stronger than the concurrent stock-wide decrease (Squire and Au 1990). In all cases, the degree and extent of this depletion must be assessed relative to the health of the overall stock and the resiliency of the species.

4.2 Assessment of Stock Status

National Standard 2 requires using the best scientific information in managing management unit species. This requires periodic updating of stock status for comparing against their control rules. Status updating

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will be through Stock Assessment and Fishery Evaluation (SAFE) reports (Section 4.3). In the case of species under international management, the control rule approach must be promoted so that status in terms of SDCs (e.g., F/F_{MSY} , B/B_{MSY}) can be described (see also Section 2.1).

The control rule approach implies an ability to determine the level of biomass B relative to its initial level B_0 and (at least conceptually) relative to B_{MSY} , and to determine the level of mortality F relative to some target level like F_{MSY} . Relative biomass level could be estimated by the decline in catch rate (CPUE) or, with sufficient information on stock and recruitment, by percent spawning potential ratio (SPR), or proxies based on SPR, e.g., $B_{50\%}$ or $F_{50\%}$. Non-empirical MSY levels of B or F can be estimated as fractions of B_0 or multiples of M , respectively, e.g., $B_{MSY}=0.5B_0$ or $F_{MSY}=1.0M$.

In many cases estimates of MSY or OY themselves are the only information available for management, and the F/F_{MSY} and B/B_{MSY} ratios must be derived from those estimates. This does not abrogate the control rule, because MSY and OY *are* the management goals. Where MSYs have not been determined, average stock-wide catch levels over appropriate time periods can be proxies.

Both MSY and OY refer to a species' sustainable catch, stock-wide. For some species there is no stock-wide catch information, and some (e.g., pelagic thresher shark, mako shark, dorado) occur within the management area as the edges of wider distributions, so even their maximum, regional catch levels are unlikely to reflect stock production. While MSYs remain unknown for those species, the local catches can be used to estimate a local or regional level of MSY.

4.3 Stock Assessment and Fishery Evaluation Report

National Standard 2 of the Magnuson-Stevens Act requires that the best scientific information available be used in developing FMPs and implementing regulations. For HMS, except dorado and sharks, NMFS and the Pacific Council rely on analyses and assessments adopted by various international bodies (of which U.S. is an active participant), such as the Inter-American Tropical Tuna Commission (IATTC), Interim Scientific Committee for Tuna and Tuna-like Species in the North Pacific (ISC), Standing Committee on Tuna and Billfish (SCTB) and others. For other species such as dorado and sharks, the HMS Management Team and NMFS develops stock and fishery assessments, provides peer reviews and presents the results to the Council. The guidelines for implementation of NS 2 require preparation of an annual Stock Assessment and Fishery Evaluation (SAFE) report. The SAFE report will largely rely on international body assessments, NMFS directed assessments, and any new fishery information. The NS 2 guidelines for a SAFE report, adapted for this FMP, are below.

The SAFE report is a document or set of documents that provides the Council with a summary of information concerning the most recent biological condition of stocks and the marine ecosystems in the management unit and the social and economic condition of the recreational and commercial fishing interests, fishing communities, and the fish processing industries. It summarizes, on a periodic basis, the best available scientific information concerning the past, present, and possible future condition of the stocks, marine ecosystems, and fisheries being managed under federal regulation.

The Secretary of Commerce has the responsibility to assure that a SAFE report or similar document is prepared, reviewed annually, and changed as necessary. The Secretary or Council may utilize any combination of talent from Council, state, Federal, university, or other sources to acquire and analyze data and produce the SAFE report.

The SAFE report provides information to the Council and Southwest Region of NMFS for determining annual harvest levels from each stock, documenting significant trends or changes in the resource, marine ecosystems, and fishery over time, and assessing the relative success of existing state and Federal fishery

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management programs. Information on bycatch and safety for each fishery should also be summarized. In addition, the SAFE report may be used to update or expand previous environmental and regulatory impact documents, and ecosystem and habitat descriptions.

Each SAFE report must be scientifically based, and cite data sources and interpretations.

Each SAFE report should contain information on which to base harvest specifications, including ABCs, ACLs, and ACTs, if appropriate.

Each SAFE report should contain a ~~description of the maximum fishing mortality threshold and the minimum stock size threshold~~ threshold estimate of the MFMT or OFL, and MSST for each stock or stock complex, along with information by which the Council may determine:

- Whether overfishing is occurring with respect to any stock or stock complex; if any stock or stock complex is overfished; if the rate or level of fishing mortality applied to any stock or stock complex is approaching the maximum fishing mortality threshold, and if the size of any stock or stock complex is approaching the minimum stock size threshold.
- Any management measures necessary to provide for rebuilding an overfished stock or stock complex (if any) to a level consistent with producing the maximum sustainable yield in such fishery.

Each SAFE report may contain additional economic, social, community, essential fish habitat, and ecological information pertinent to the success of management or the achievement of objectives of each FMP.

Each year, in June and September, the HMS Management Team will deliver one combined SAFE report for all species in this FMP to the Council. The SAFE report will follow the guidelines specified in NS 2 and will be used by the Council and NMFS to develop and evaluate regulatory adjustments under the framework procedure or the FMP amendment process. This information will provide the basis for determining annual harvest levels from each stock, documenting significant trends or changes in the resource, the bycatch, and the fishery over time, and assessing the relative success of existing state and federal fishery management programs. In addition, the SAFE report will be used to update or expand previous environmental and regulatory impact documents, and ecosystem and habitat descriptions, including EFH. The SAFE report will also make recommendations to the Council on matters concerning bycatch and incidental catch.

4.4 Status of Management Unit Stocks at the Time of FMP Adoption

... (no changes proposed to this section)

4.5 Measures Adopted by the Council to End of Overfishing and Rebuild Overfished Stocks

... (no changes proposed to this section)

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Table 4–1. Demographic and productivity comparisons of highly migratory MUS and selected prohibited species.

Species (yrs)	Age at Maturity (yr ⁻¹)	Fecundity (yr ⁻¹)	M ^{1/} (yrs)	Max. Age (yr ⁻¹)	Productivity (r) at B _{MSY} ^{2/} (yr ⁻¹)	PGR _{MAX} ^{3/} (yrs)	T _D ^{4/}
TUNAS							
Skipjack	1	Millions (eggs)	1.50	5	0.16-0.34	0.68	2.1
Yellowfin	2.5	"	0.90	8	0.11-0.18	0.34	3.4
Bigeye	3	"	0.40	10	0.10-0.16	0.30	3.7
Albacore	4.5	"	0.30	12	0.07-0.11	0.20	5.2
Bluefin	5	"	0.25	20	0.07-0.10	0.19	5.6
BILLFISHES							
Str. Marlin	4	"	0.47	9	0.08-0.13	0.23	4.6
Swordfish	5	"	0.21	20	0.07-0.10	0.18	5.8
SHARKS							
Com.Thresh.	5	4 (pups)	0.234	19	0.04-0.07	0.12	9.2
S.F. Mako	7	6	0.160	14	0.04-0.06	0.10	10.2
Blue	6	23	0.223	20	0.04-0.06	0.10	10.4
Pel.Thresh.	9	2	0.155	29	0.02-0.04	0.07	15.0
White	9	7	0.126	36	0.02-0.04	0.07	15.8
B.E.Thresh.	13	2	0.223	20	0.02-0.03	0.05	22.7
Basking	18	3	0.136	50	0.01-0.02	0.04	27.4
OTHER							
Dorado	0.6	240K+ (eggs)	1.060	4	>0.34	0.97	1.4

Footnotes:

1. M is instantaneous natural mortality. All life history parameters are from Smith et al. (1998), Smith et al. (*In press* 2003), Au et al. (*In press*).
2. Productivity *r* is the potential per-capita rate of population growth per year, here at B_{MSY}. Estimated for Tunas and Billfishes assuming that at B_{MSY}, F_{MSY} = 1.0M and initial fecundity increases by factor 1.00-1.25 [after Au et al. (*In press*)]; for Sharks assuming that at B_{MSY}, F_{MSY} = 0.5M-1.0M with fecundity not increased [after Smith et al. (*In press*)]. All figures are rounded.
3. PGR is the fractional Population Growth Rate per year. PGR_{MAX} is the maximum rate calculated as (e^{2r} - 1). Exploitation of the population (fraction of total population caught) greater than PGR_{MAX} should bring population collapse, hence PGR_{MAX} estimates maximum sustainable exploitation. The logistic model is assumed. Based on range of *r*.
4. T_D is the doubling time for populations depleted to 50% of B_{MSY} (hence the recovery time), calculated as (ln 2)/1.5r (the *r* is assumed to have increased linearly with the depletion, as per the logistic model). Based on range of *r*.

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Table 4-2. Summary of population status of management unit species at the time of FMP adoption (see text under species descriptions for details).

Species (Stock)	F/F _{MSY}	Over-fishing? (>1.0?)	B _{MSST} / B _{MSY} (1-M)	B/B _{MSY}	Over-fished? (<1-M?)	MinBiomass Flag Ratio (1.25(B _{MSST} /B _{MSY}))	NeedAction? (B/B _{MSY} <FlagRatio?)
TUNAS							
Albacore (NP)	0.50	N	0.70	1.10	N	0.88	N ^{1/}
Bluefin (NP)	Unkn	n	0.75	Unkn	n	0.94	n ^{2/}
Bigeye (EPO)	1.11	y	0.60	1.11	N	0.75	N ^{3/}
Skipjack (EPO)	Unkn	n	0.50	2.50 ^{4/}	N	0.63	N
Yellowfin (EPO)	~1.30 ^{5/}	Y	0.50	~0.86 ^{5,6/}	N	0.63	N
BILLFISHES							
Str. Marlin (EPO)	0.70	N	0.50	1.07	N	0.63	N ^{7/}
Swordfish (EPO)	<1.00	N	0.70	>1.00	N	0.88	N ^{8/}
SHARKS							
C.Thresher(EPO)	<1.00 ^{9/}	N	0.77	~1.10 ^{9/}	N	0.96	N ^{10/}
P.Thresher(EPO)	Unkn	?	0.85	Unkn	?	1.05	? ^{11/}
BE Thresh.(EPO)	Unkn	?	0.78	Unkn	?	0.97	? ^{12/}
Mako (EPO)	<1.00	N	0.71	>1.00	N	0.88	N ^{13/}
Blue (EPO)	<0.50	N	0.78	>1.00	N	0.97	N ^{14/}
OTHER							
Dorado (EPO)	Unkn	Unlikely	0.50	Unkn	Unlikely	0.63	N ^{15/}

Note: Overfishing, Overfished, and Need Action columns ask if previous column value meets criterion; e.g., under Overfishing, is the previous fraction >1.0? Less certain Y/N is y/n.

Footnotes:

- Note that stock is now in high productivity period (NPALW 2000).
- No evidence of stock ill health, but abundance indexes are inconclusive (Bayliff 2001).
- Assuming a stock-recruitment relationship (Maunder and Harley 2002). See text for caveats.
- Boggs et al. 2000.
- From production model (Tomlinson 2001, IATTC 2000).
- Assuming a stock-recruitment relationship, B/B_{MSY} for 2001 could be 1.09 (Maunder 2002).
- EPO stock has recovered (Hinton and Bayliff 2002a).
- Per cpue patterns in EPO (Hinton and Bayliff 2002b).
- Work in progress, D.W. Au and C. Show, SWFSC/NMFS, La Jolla, CA
- Stock in recovery with positive population growth since 1992-94.
- Status unknown, but catches incidental and on edge of species' broad range.
- Status unknown, but catches incidental and possibly on edge of species' habitat.
- Fishery takes mostly juveniles on edge of range; adults largely unavailable.
- See text re Kleiber et al. stock assessment.
- Highly productive and widely distributed throughout tropical/subtropical Pacific.

Comment [KRD9]: This table may be deleted from the FMP with this information periodically updated in the SAFE.

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Table 4-3. Stockwide and regional (CA, OR, WA) catches in thousand (K) mt for management unit species at the time of FMP adoption, with respect to MSY, sustainability, and regional harvest guidelines.

Species (Stock)	MSY (or proxy)	OY (or proxy)	Catches (K mt round wgt, 1995-99 period)			Status		
			Stock-wide	Regional		Regional Catch		Harvest Guideline
Comm'l	Rec'l	Fract'n		Sust'l?				
1. TUNAS								
Albacore (NP)	120 ^{1/}	(120)	67-128 ^{2/}	10-18	<0.05-1.31	0.16	Y	
Bluefin (NP)	(20) ^{3/}	(15)	13-24 ^{4/}	<1-5	<0.05	0.10	Y	
Bigeye (EPO)	79 ^{5/}	(79)	64-94 ^{4/}	#0.1		<0.01	Y	
Yellowfin (EPO)	270 ^{6/}	(270)	244-306 ^{4/}	1-6	0.12-0.84	0.01	Y	
Skipjack (EPO)	(190) ^{3/}	(190)	137-295 ^{4/}	4-7	<0.1	0.03	Y	
2. BILLFISHES								
Str. Marlin (EPO)	4.5 ^{7/}	(3.4)	2-4 ^{2/}	<0.02	0.03	0.01	Y	
Swordfish (EPO)	(12.5) ^{8/}	(12.5)	8-15 ^{4/}	1-2	<0.01	0.12	Y	
3. SHARKS								
Cm Thresher(Reg'l)	(0.45) ^{9/}	(0.34)	Unkn	0.27-0.33	0.01-0.06	?	Y	0.34 ^{10/}
PI Thresher(Reg'l)	(0.020) ^{11/}	(0.015)	Unkn	0.004 ^{12/}		?	y	
BE Thresher(Reg'l)	(0.04) ^{13/}	(0.03)	Unkn	0.01-0.03		?	y	
Mako/Bonito(Reg'l)	(0.20) ^{14/}	(0.15)	Unkn	0.06-0.13	0.01-0.08	?	Y	0.15 ^{15/}
Blue (NP)	~120 ^{15/}	(90)	>50 ^{16/}	0.08-0.17 ^{17/}	<0.03	<0.01	Y	
4. OTHER								
Dorado (EPO)	(0.45) ^{3/}	(0.45)	0.22-0.56 ^{18/}	<0.01-0.04	<0.01-0.08	0.04	Y	

MSY: from catch-effort relationships, unless a proxy. **Proxy MSY:** average stock-wide catches over appropriate years or (minimal) local (West Coast) MSYs (LMSY) including local average levels of catch. **OY:** equal to MSY or to 0.75MSY (bluefin tuna, str. marlin, sharks). **Stock-wide Catch:** 1995-99 catches. **Regional Commercial Catches:** 1995-99 West Coast catches from PacFIN data base (Table 2-1); also drift gillnet catches (str. marlin, blue shark) extrapolated from SWFSC Observer Records, 1995-99. Except for albacore, these catches are mainly from within the EEZ. **Regional Recreational Catch:** CPFV (Table 2-57) and RECFIN (Table 2-58) data, and assuming 12.9kg/bluefin, 7.1kg/yellowfin, 2.4kg/skipjack, 7.3kg/albacore, 6.5kg/dorado, 113kg/swordfish, 16.7kg/mako, and 28.1kg/thresher; also, assuming 59kg/str. marlin, 300 sport-caught fish/yr. **Status:** Less certain Y/N is y/n re sustainability. **Harvest Guideline:** for shark species of regional/local concern; equal to the OY proxy.

Footnotes

1. Average MSY over low and high productivity periods (Bartoo and Shiohama 1985, NPALW 2000). See text.
2. NPALW 2000
3. Mean of 1995-99 stock-wide catches.
4. IATTC 2001
5. MSY between 66 and 92 K mt from production models (IATTC 2000).
6. From production model (Tomlinson 2001, IATTC 2000).
7. MSY and catches from Hinton and Bayliff (2002a).
8. Average of 1995-99 catches; an analytically derived MSY is pending.
9. LMSY proxy by Population Growth Rate (PGR) method; is a minimal estimate of MSY (see text).
10. The OY proxy = 0.75MSY.
11. LMSY proxy as average catch during strong El Niño years (here 1983, 1984, and 1997) when species presence became significant.
12. Average catch 1995-99 excluding 1997 (strong El Niño year).
13. Average catch 1982-99.
14. LMSY proxy as average 1981-1999 regional catch; is a minimal estimate of MSY (see text).
15. After Kleiber et al. (see text).
16. Estimated N. Pacific catches after Nakano and Seki (MS) (see text).

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- 17. Catches from SWFSC DGN observer data base, plus other fisheries landings (Tables 2-1,2-40, 2-42). No data on LL bycatches.
- 18. FAO Area 77 catches.

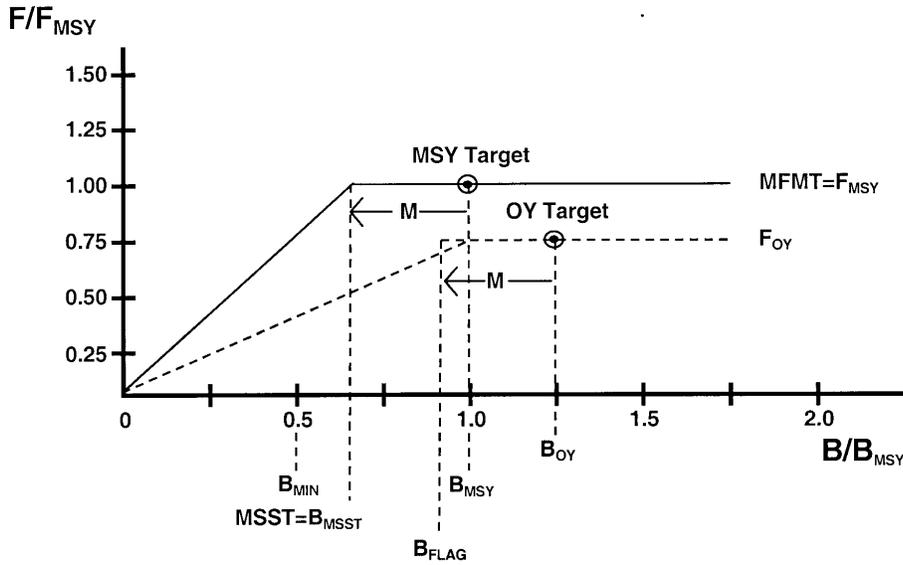
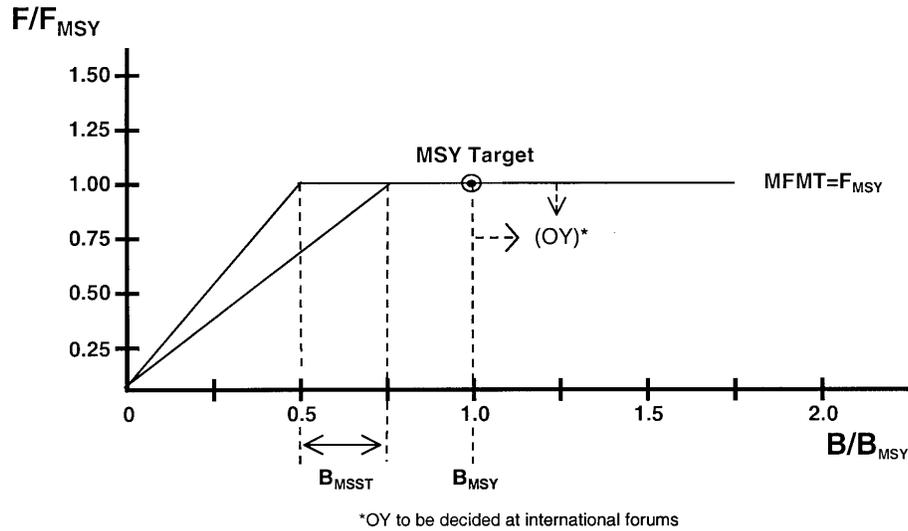


Figure 4-1. General model of maximum sustainable yield and optimum yield control rules, according to Restrepo et al. (1998).



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Figure 4-2. MSY control rules for tunas and billfishes.

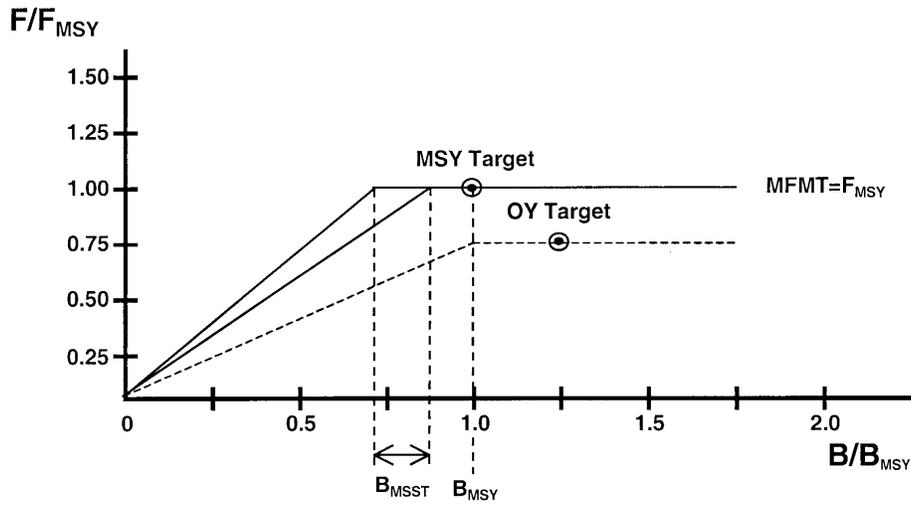


Figure 4-3. General MSY control rule for sharks, with an OY example.

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5.0 PERIODIC SPECIFICATION OF MANAGEMENT MEASURES

5.1 Framework Procedures

Many fishery management plans under the Magnuson-Stevens Act use framework procedures by which flexible management, within the scope and criteria established by the FMP and implementing regulations, can be implemented without amending the FMP. Framework actions can usually be implemented more quickly than FMP amendments, allowing for more timely management response.

Such flexible management measures may be imposed, adjusted, or removed at any time during the year, or according to an established management cycle. Management measures may be imposed for resource conservation, or social or economic reasons consistent with FMP procedures, goals and objectives.

Analyses of biological, ecological, social, and economic impacts will be considered when a particular change is proposed. As a result, the time required to take action will vary depending on the type of action, its impacts on the fisheries, resources, and environment, and the review of these impacts by interested parties. Satisfaction of legal requirements under other applicable laws (e.g., Administrative Procedure Act, National Environmental Policy Act, Regulatory Flexibility Act, Executive Order 12866, etc.) for actions taken under framework procedures generally requires analysis and public comment before the measures may be implemented by the Secretary of Commerce.

Types of Framework Actions

Under most framework procedures, management measures may be established, adjusted or removed using the following categories of actions:

- § “Automatic” actions such as quota closures, which are nondiscretionary and must have already been analyzed in advance. Automatic actions may be made effective immediately in a single *Federal Register* notice, if there are adequate grounds for appropriate waivers of prior opportunity for public notice and comment, and the cooling-off period, as provided in the Administrative Procedure Act.
- § “Notice” actions requiring at least one Council meeting and one *Federal Register* notice. These are management actions other than “automatic” actions that are either nondiscretionary or within the scope of a previous analysis. An example of a “notice” action might be a change in the incidental catch allowance per trip for non-HMS gears. Notice actions may be made effective immediately in a single *Federal Register* notice, if there are adequate grounds for appropriate waivers of prior opportunity for public notice and comment, and the cooling-off period, as provided in the Administrative Procedure Act.
- § “Abbreviated Rulemaking” actions normally requiring at least two Council meetings and one *Federal Register* notice. Abbreviated rulemaking would be used only when time is insufficient to use the full rulemaking process. Abbreviated rulemaking actions may be made effective immediately in a single *Federal Register* notice, if there are adequate grounds for appropriate waivers of prior opportunity for public notice and comment, and the cooling-off period, as provided in the Administrative Procedure Act.
- § “Full Rulemaking” (regulatory amendments or adjustments to change management rules) requiring at least two Council meetings and two *Federal Register* notices consisting of proposed and final rules. These include any proposed management measures not falling within the other categories, including measures that are highly controversial or that directly allocate a resource.

These procedures would not affect the authority of the Secretary of Commerce to take emergency regulatory action under Section 305(c) or (d) of the Magnuson-Stevens Act.

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Framework Process for Rulemaking Actions

New measures or changes to measures may be implemented for one or more fisheries for HMS in the Pacific Council area through the framework procedures. The objective is efficiency and timeliness in management.

Reasons for adopting these framework measures may include, but are not limited to, the following:

- to implement U.S. obligations under an international agreement;
- to achieve optimum yield and prevent overfishing;
- to respond to a determination that overfishing is occurring;
- to minimize adverse impacts of fishing on EFH;
- to minimize bycatch and bycatch mortality;
- to reduce adverse effects of fisheries on protected resources and promote the recovery of any species listed under ESA.
- to promote vessel safety;
- to reduce conflict and provide for orderly fisheries;
- to allocate among domestic HMS fisheries;
- to address social or economic issues;
- to facilitate management of the fisheries;
- to meet goals and objectives of the FMP;
- to respond to changes in management of HMS in other areas of the Pacific.

The following types of measures are authorized to be established, adjusted, or removed using this framework process, without amending the FMP:

- time/area restrictions;
- reporting requirements;
- permits or licenses (for commercial harvesters or vessels, for recreational harvesters or vessels, and for processors) and endorsements for individual fisheries;
- ABCs, ACLs, ACTS, quotas, or harvest guidelines;
- fish length limits;
- recreational daily catch (bag) limits;
- trip limits;
- gear restrictions;
- changes to definition of legal gear;
- allocations among U.S. West Coast fisheries;
- at-sea observers;
- vessel monitoring systems (VMS);

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- adjustments to descriptions of EFH and designation of habitat areas of particular concern;
- measures to minimize bycatch or minimize mortality of bycatch;
- measures to minimize interactions with protected species, including, but not limited to, implementation of federal biological opinions and court rulings.

General Procedure. Following an established management cycle which includes production of an annual Stock Assessment and Fishery Evaluation (SAFE) report, the HMS Management Team, HMS Advisory Subpanel, or other Council advisory body, or a member of the public, may identify a problem and request regulatory action. If the Council agrees that regulations may be necessary, it will direct the HMS Management Team and/or staff to prepare a draft document which includes a description of the problem, alternative management actions and analysis of the impacts of the alternatives. The document will be in the form of an environmental impact statement or environmental assessment/regulatory impact review/regulatory flexibility analysis which meets the analytical requirements of NEPA, Executive Order 12866, the Regulatory Flexibility Act, the Magnuson-Stevens Act and other applicable law.

Upon completion, the draft document will be made available to the interested public and will be addressed by the Council at a subsequent meeting. The issue will be placed on the subsequent meeting agenda, which will be distributed to the media and interested public and published in the *Federal Register*. The Council will seek to identify all interested persons and organizations and solicit their involvement in discussion and resolution of this problem through the Council process. If the action involves a fishery that extends beyond the EEZ, the Council shall invite comments from the Western Pacific and North Pacific Fishery Management Councils on the action that may affect those councils' fisheries. After receipt of comment from its advisory entities and the public, the Council will decide whether or not to adopt the draft document for public comment.

If the Council decides to proceed with the issue, it will revise the draft document as necessary and make it available for public comment. The issue will be placed on the agenda for a subsequent meeting, which will be distributed to the media and interested public and published in the *Federal Register*. At this meeting, after receipt of comment from its advisory entities and the public, the Council will adopt a measure or package of measures for submission to NMFS for approval. A final document including the Council action and rationale will be prepared and submitted to NMFS. The document will specifically indicate whether there will be any impacts on HMS fishery interests in areas of concern of other fishery management councils. If another council has commented on the proposed action, a copy of those comments will be included in the submission.

Point-of-Concern Framework Procedure. The point-of-concern procedure is an additional tool for the Council's use in exercising resource stewardship. The process is intended to foster continuous and vigilant review of Pacific HMS stocks and fisheries. Point-of-concern criteria are intended to assist the Council in determining when a focused review of a particular species is warranted and if management measures are required. The Council has the authority to act solely on a point-of-concern. The point-of-concern framework is intended to be complementary to the work by the HMS Management Team to monitor the fisheries throughout the year. A point-of-concern must be raised to the Chair of the Council in writing, including rationale, background and supporting data.

A point-of-concern occurs when one or more of the following is found or expected:

- Catch has exceeded an ACL based on annual or multi-year average data
- Catch is projected to exceed, within two years, the current ACLs, harvest guidelines, or quotas based on current exploitation rates;

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- Developments in a foreign fishery or actions required under an international management framework affect the likelihood of overfishing HMS domestically;
- Estimated bycatch of a species or species group increases significantly above previous estimates, or there is information that abundance of a bycatch species has declined significantly;
- New information is discovered on the biological characteristics of one or more species, or on the characteristics of a stock, indicating that current management measures are inadequate;
- An error in data or stock assessment is detected that significantly changes the estimates of impacts of current management;
- MSY control rule parameters or approach require modification;
- Projected catches for a non-management unit HMS species increase substantially such that applying the default control rule to that species would show catches exceeding the Allowable Biological Catch. This could require moving a species into the management unit;
- Changes in ecological relationships, such as significant shifts in predator-prey interactions or declines in forage species, indicate that an HMS population may be in decline.

If a point-of-concern is raised to Chair of the Council, the Council shall decide if the HMS Management Team (HMSMT) should proceed to address the concern, and/or if any additional actions are warranted by the Council at that time. Notwithstanding, if an ACL is exceeded the Council must implement accountability measures as soon as possible to correct the operational issue that caused the ACL overage.

If so directed by the Council, the HMSMT will prepare a report including recommendations, rationale, and analysis for appropriate management measures to resolve the point-of-concern. After receiving the HMSMT report, the Council will hear public testimony and, if appropriate, recommend management measures to the NMFS Regional Administrator accompanied by supporting rationale and analysis of impacts. The Council analysis will include a description of (a) resource conservation or ecological issues consistent with FMP objectives; (b) likely impacts on other management measures, other fisheries, and bycatch; and (c) socioeconomic impacts to commercial and recreational segments of the HMS fishery. The recommendation will also explain the urgency of the measure(s), if any.

The NMFS Regional Administrator will review the Council's recommendation and supporting information and will follow the appropriate implementation process. If the NMFS Regional Administrator does not concur with the Council's recommendation, the Council will be notified in writing of the reasons for the rejection.

The same framework procedures would be used during the management cycle for changing conservation and management measures, except there would be no point-of-concern criteria for raising conservation concerns to the Council.

5.2 Management Cycle

The management cycle is a pre-determined regular schedule for council management actions with respect to HMS fisheries. Cycle differences affect the time available for fishery assessments, the timeliness of available data and of management response, and the degree to which fishers can participate in the management process.

Future developments in the fisheries do not ordinarily bring need for change in the management cycle schedule, and the management cycle is thus a fixed element of the FMP. However, should there be need

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to change the management schedule, e.g., because of marked changes in fishery practices, the Council can do so by vote and without a plan amendment, provided the Council gives six-month notice.

The FMP establishes a *biennial* management cycle with regulatory/statistical year *April 1 to March 31*. The schedule would be as follows:

Year 1

- | | |
|-----------|---|
| June | Provide update to the Council on status of the HMS fisheries; preliminary SAFE report. If necessary, Council directs HMSMT to prepare draft regulatory analysis to implement harvest levels and/or management measures. |
| September | Annual SAFE document presented to Council. If necessary, Council directs HMSMT to prepare a draft regulatory analysis to implement new harvest levels and/or management measures. Council adopts for public review proposed actions addressing concerns from current and previous SAFE reports. |
| November | Council adopts final action and submits to NMFS for approval. |

Year 2

- | | |
|-------|---|
| April | Measures become effective, and stay in effect for at least two years. |
|-------|---|

This schedule allows at least minimally sufficient time for data analysis, provides for timely response to fishery problems, and allows most fishers adequate access to the management process, as scheduled.

The cycle is repeated biennially, with new actions considered in September and becoming effective in April every other year. The Council would schedule HMS for the June, September, and November Council meetings.

Under this biennial cycle (or any cycle), the HMS management team would still conduct ongoing reviews of the fisheries and status of stocks and prepare an annual SAFE document for the Council. The Council would still have to prepare a stock rebuilding plan within one year of notification by the Secretary of Commerce that a stock has been declared overfished, as called for under the Magnuson-Stevens Act (Section 2.3).

5.3 Procedure for Making Recommendations to Regional Fishery Management Organizations

The Council may develop an Operating Procedure to facilitate effective coordination and communication of management advice, in concert with the WPFMC and through the appropriate U.S. delegation, between the Councils and RFMOs involved in HMS management in the Pacific Ocean. The Operating Procedure may include specific decision-making schedules and criteria in order to harmonize PFMC, WPFMC, and RFMO processes.