8.0 DETERMINATIONS

The Magnuson Act requires that certain determinations be made considering the condition and yield potentials of the stocks, the optimum yield (OY) from the fisheries, the extent to which domestic vessels and processors will harvest and process the OY, and the amount (if any) available for foreign fishing and joint venture processing. Determinations are also required for a FMP's consistency with "other applicable law" (Section 9).

8.1 Maximum Sustainable Yield (MSY)

The International Billfish Stock Assessment Workshop (Shomura, ed., 1980) made initial efforts to estimate MSY's and stock conditions for blue marlin, striped marlin, and swordfish on a Pacific-wide basis using the best data available to the scientists participating at the Workshop. The lack of accurate and sufficiently detailed date on catches, effort, and other principal determinants of population dynamics for black marlin, shortbill spearfish, and sailfish precluded the use of fishery production models for estimating the MSY for these species. The Council concludes that the MSY estimates for black marlin, and for shortbill spearfish and sailfish combined as presented in the PMP are the best scientific estimates of MSY available for these species (Table 8.1).

TABLE 8.1

PACIFIC-WIDE ESTIMATES OF MAXIMUM SUSTAINABLE YIELD (MSY)
FOR THE MANAGEMENT UNIT SPECIES

Species	Maximum Sustainable Yield (MSY)	Probable Stock Condition
Blue Marlin	22,000 MT[1/]	Substantially Overfished
Striped Marlin	24,000 MT[1/]	Fished At Capacity
Black Marlin	1,700 MT[2/]	Fished Near Capacity
Swordfish	20,000 MT[1/]	Good
Shortbill Spearfish and Sailfish (combined)	8,200 MT[2/]	Good
Oceanic Sharks	126,000 MT (all species)[2/]	Unknown
Mahimahi	14,600 MT (two species)[2/]	Unknown
Wahoo	No Information	Unknown

SOURCES: 1/ = Shomura, R.S., 1980.
2/ = PMP.

Total catches of sharks made in the Pacific Ocean were as high as 132,000 MT per year in the mid-1970's (FAO, 1976). Data from FAO Yearbooks of Fishery Statistics lumped together for both nearshore and oceanic species of sharks, thus only a portion of FAO catch statistics covering sharks is on the oceanic species of sharks included in this plan. The maximum sustainable yields of the many species of oceanic sharks are not known because species-specific records of shark catches have never been available in the past and are not available now from the distant water longline and purse seine fisheries. Most of the shark by-catch in these fisheries is discarded at sea, with the exception of the high-value shark fins which are usually kept by longliners.

Very little is known about the stock structure or the abundance of wahoo and the two species of mahimahi. Pacific Ocean-wide mahimahi catches averaged around 14,600 MT per during 1971-1975, but no estimates of wahoo catch are available (U.S. Department of Commerce, June 15, 1979, PMP). Pacific-wide guesses of MSY for oceanic sharks and mahimahi are given in Table 8.1. It is assumed that the catch levels for oceanic sharks and mahimahi given in the PMP are representative of the MSY. It is not possible to reliably estimate Pacific Ocean-wide maximum sustainable yields for wahoo and for the two species of mahimahi covered by this plan. There are, however, no indications that either wahoo or mahimahi are overfished on an oceanwide or a localized basis.

Attempting to finagle meaningful estimates of MYS for each of the management unit species which are specific to the 200-mile zone of each of the widely-scattered American Pacific islands (Figure 3.1) would serve no useful purpose. Doing so would be frustrating and frivolous because of several compelling reasons. While the management unit species are not considered to be highly migratory under the language of the Magnuson Act, billfish species, oceanic sharks, mahimahi, and even wahoo are indeed highly migratory in actuality. Because of this fact, the abundance of the management unit species within the 200-mile zones of American Pacific islands can vary greatly from year to year and does vary greatly from season to season. Annual catches (foreign and domestic) of the management unit species made in the 200-mile zones of American Pacific islands generally make up around 2 to 3% of the total catches of these species made in the Pacific Ocean as a whole. It is, therefore, concluded that the MSY for the management unit species for the U.S. FCZ of the Western Pacific Region is 2 to 3% of the Pacific-wide estimates of MSY given in Table 8.1. MSY will be somewhat higher during some years and lower during other years depending largely on the variations in the abundance of prey in the FCZ, oscillations of water masses, the re-emergence of the El Nino phenomenon, and the like.

8.2 Optimum Yield (OY)

The FCMA defines OY as:

> "the amount of fish (A) which will provide the greatest overall benefit to the nation with particular reference to food production and recreational opportunities; and

(B) which is prescribed as such on the basis of the maximum sustainable yield from such fishery, as modified by any relevant economic, social, or ecological factor." (Section 3(18)).

The MFCMA envisioned that the maximum sustainable yield (MSY), which, in concept, is the greatest average catch of a species that can be made periodically into the future, would serve as a benchmark for determining OY. This apparently reflects Congress' concerns that the Regional Councils should explicitly determine the biological limitations and the health of the stocks in making management decisions. In the context of this FMP, the Council notes this concern and has presented the best and most recent estimates of MSY for stocks of the management unit species throughout their range in the Pacific. The Council also notes that the level of fishing which has occurred and is likely to occur in the FCZ can not appreciably affect the overall condition of the management unit stocks and will not pose a threat of biological overfishing. Therefore, it would not be wise to specify a quantitative definition of OY, and there are good reasons to define OY in non-numeric terms:

a) A numeric OY could be construed as a quota. There is no reason to establish a quota for any of the management unit species in the FCZ since limiting catches will not affect stock conditions.

b) Numerical OYs, if construed as quotas, would have to be enforced, requiring a complex and near real-time data reporting and collection system. This would be very costly and could not be effectuated with existing enforcement resources.

c) The annual availability of management unit species in the FCZ is highly variable and unpredictable. Specifying a numerical OY based on annual averages would almost always be meaningless at best and misleading at worst.

d) At anyone time, an unknown but small fraction of the populations of the management unit species are in the FCZ of each American flag island in the Pacific. A numerical specification of OY under these circumstances would be foolhardy.

e) There are no economic or social objectives or compelling circumstances that warrant a direct allocation of any of the management unit species in a particular amount.

The Council has, therefore, concluded that OY should be defined for each management unit species in non-quantifiable terms as follows:

> OY is that amount of each species in the management unit that will be caught by domestic and foreign vessels fishing in the FCZ in accordance with the measures contained in this plan.

The Council recognizes that it might be useful to present estimates of future catch levels of the management unit species as bases for evaluating the effectiveness of the FMP. However, catches of the highly migratory management unit species made in the past are, at best, only fleeting indicators of the magnitude of catches which may occur in future years. The extent to which actual transfers of the management unit species from foreign to domestic vessels will occur is unknown, as is the extent to which foreign longline vessels will fish in the permitted areas of the FCZ under this plan. Further, there usually are large fluctuations in the abundance and availability of pelagic species in the FCZ. In addition, external factors such as changes in fuel costs may affect both domestic and foreign fishing practices significantly. Because of these factors, the Council cannot estimate with reliability the amounts of each species in the management unit which will be caught in the FCZ under this plan in future years. The Council has, however, provided fairly detailed descriptions of the domestic fisheries for the management unit species (Sections 6.13-6.21) and of the foreign fisheries (Section 6.9-6.12). These sections present information on the catches and effort levels of all of the various fisheries for pelagic species in the FCZ of the Wetern Pacific Region using the best and most recent data available. The information presented in these sections can be used as reference marks for evaluating the effectiveness of this FMP.

Although it is not possible to provide reliable estimates of the amounts of billfish species, oceanic sharks, mahimahi and wahoo which will be caught in the FCZ of the Western Pacific Region, the Council, nevertheless, has provided "benchmarks" of what the harvests of the management unit species (all species combined) might be in 1987 in the 200-mile FCZ of American Pacific islands. Table 8.2 provides OY estimates for the management unit species for each subarea of the FCZ of the Western Pacific Region. The OY for each subarea is defined as the average annual (1973-77) foreign catch added to an estimate of the annual domestic catch of the management unit species. These OY estimates are combined for the management unit species in order to "smooth or average out" the high variability expected in the availability of each management unit species in the FCZ from year to year. There is less variability from year to year in the availability of the management unit species taken together than there is for each individual species in the management unit.

TABLE 8.2

ESTIMATES OF OPTIMUM YIELD FOR THE MANAGEMENT UNIT SPECIES (COMBINED) FOR SUBAREAS OF THE U.S. FCZ OF THE WESTERN PACIFIC REGION

FCZ Area	(A) Foreign Catch (MT)	(B) Domestic Catch (MT)	(A)+(B) = Optimum Yield (OY)
Hawaii	250 1/	1,295 6/	1,545
Guam	15 2/	103 7/	118
CNMI	78 3/	9 8/	87
American Samoa	95 4/	5 9/	100
U.S. Possessions	268 5/	Marginal	268
WESTERN PACIFIC REGION	706	1,412	2,118

1/ Assumes that 75% of the 1973-77 average foreign longline catch of billfish in the entire FCZ of Hawaii (303 MT - Table 6.4) will be made in the open areas of the FCZ. An additional 10% of the billfish by-catch has been added in to account for catches of mahimahi, wahoo, and sharks.

2/ Assumes that 25% of the 1973-77 average foreign longline catch of billfish in the entire FCZ of Guam (54 MT - Table 6.4) will be made in the open area of the FCZ. An additional 10% has been added in to account for catches of mahimahi, wahoo, and sharks.

3/ Assumes that 100% of the 1973-77 average foreign longline catch of billfish in the FCZ of the CNMI (71 MT - Table 6.4) will be made, plus 10% for mahimahi, wahoo, and oceanic sharks.

4/ Assumes that 80% of the 1973-77 average foreign longline catch of billfish in the FCZ of American Samoa (108 MT - Table 6.4) will be made in the open area of the FCZ, plus 10% for mahimahi, wahoo, and sharks.

5/ Assumes that 100% of the 1973-77 average foreign longline catch of billfish in the FCZ of U.S. possessions (244 MT - Table 6.4) will be made, plus 10% for mahimahi, wahoo, and oceanic sharks.

6/ Assumes that twice as much management unit species are caught than were reported sold through major fish dealers in Hawaii. Average annual 1979-83 sales of the management unit species were 647.4 MT (Table 6.29) x 2 = 1,295 MT.

7/ Estimated average annual (FY 1980-85) landings of the management unit species in Guam (Table 6.25).

8/ Average annual (1979-84) landings of the management unit species in the CNMI (Source: Fishery Statistics of the Western Pacific, Vol. 2., NMFS Honolulu Laboratory Adm. Report H-86-4, March 1986).

9/ 1984 Catches + 10%.

8.3 Domestic Annual Harvest (DAH)

Domestic annual harvest capacity can be viewed in terms of fishermen's capability for satisfying the markets for the products which the management unit species provide, satisfying recreational fishing expectations, and in terms of fishing effort needed to achieve certain catches. There are no limits on local fresh fish markets that trade in the management unit species. All fish placed on the market are sold, but at prices that vary greatly from day-to-day in response to supply and demand conditions. The fish products from the management unit species reaching retail markets in each of the island areas in the Council's jurisdiction are supplied by both the commercial and recreational fisheries. Sizeable parts of "recreational" catches are sold in Hawaii, Guam, and American Samoa. Selling of fish is a long ingrained tradition with island fishermen.

Sections 6.13-6.21 describe the domestic fisheries which take the management unit species. It has been noted that certain components of existing data systems result in underreporting of commercial catches in some areas, and reliable estimates of recreational catches by species are few and far between. It is difficult to predict the actual levels of domestic harvests of the management unit species because the presently available statistical information bases are incomplete, especially in regards to fishing effort. Existing tabulations of reported catches and estimates of catches should be read with caution regarding their accuracy and implication of trends. The reasons given for defining OY in non-numeric terms also apply to the definition of the Domestic Annual Harvest (DAH). The Council has concluded that:

> DAH is the amount of each species in the management unit that will be caught by domestic vessels in the FCZ fishing in accordance with the measures contained in this plan.

Numerical estimates of DAH for the management unit species combined are given in column (B) of Table 8.2.

8.4 Domestic Annual Processing (DAP)

There is virtually no processing of the management unit species in the island areas in the industrial meaning of the term "processing". Almost all landings of the management unit species enter local markets in a fresh-fish form. A single fish cake manufacturer in Hawaii uses billfish for about 10% of its production of fishcake products. Other fish cake manufacturers have changed over to imported fish ever since the mercury scare in billfish got started in the 1970's. Several entreprenuers in Hawaii are smoking blue marlin for sale to local markets.

By far, the largest amounts of the management unit species sold in Hawaii are channeled through fish auctions in Honolulu and Hilo, Hawaii, or through regional fish wholesalers supplying island and export markets. Most of the mahimahi and wahoo which are sold by fishermen in Hawaii end up being served at up-scale restaurants catering to well-to-do tourists and island residents. Both Guam and American Samoa export some of their mahimahi catch to the Honolulu auction where it is purchased by wholesalers who supply the restaurant demand for fresh mahimahi. The selection of fresh mahimahi and wahoo in retail stores in Hawaii has become severely limited because of the keen restaurant demand for these two species.

As is the case in Hawaii, the catch of billfish, wahoo, and mahimahi in Guam and American Samoa is processed only to the extent of the normal preparation for fresh-fish markets, restuarants, or for home consumption. Overall, the estimate of DAP for the Western Pacific Region is negligible as almost all of the landings of the management unit species enter local markets in a fresh-fish product form. Although frozen products from the management unit species may become more acceptable in established local markets, there is no reason to believe that DAP will be other than zero (0).

8.5 Joint Venture Processing

A "joint venture" is typically an arrangement where fish harvested by U.S. fishermen are sold and delivered to foreign processing vessels operating within the U.S. FCZ. There is no evidence of any interest in joint venture processing operations with foreign processing vessels, and there is no excess harvest capacity available for joint ventures. The amount of management unit species available for joint venture processing is, therefore, zero (0).

8.6 Total Allowable Level of Foreign Fishing (TALFF)

The Council does not propose any limits on the effort or catch of foreign longliners so long as the areas of the FCZ recommended to be closed to foreign fishing are not fished by foreign fishing fleets. Thus, a non-numerical definition of TALFF is appropriate for this fishery:

> TALFF is the amount of the management unit species which will be taken by foreign longliners in the FCZ fishing in accordance with the measures in this plan.

Numerical estimates of the amounts of the management unit species that might be taken by foreign longliners in the FCZ of American Pacific islands are given in column (A) of Table 8.2. The foreign catch of the management unit species is estimated to be one half of the catch of domestic fishermen.