

**Action 9 Biological Reference Points and Status Determination Criteria**

**Alternative 1. No Action. Do not establish biological reference points (maximum sustainable yield [MSY], optimum yield [OY]) or status determination criteria (maximum fishing mortality threshold [MFMT], minimum stock size threshold [MSST]) specific to aquaculture in the Gulf of Mexico EEZ.**

**Alternative 2. Establish the following new biological reference points and status determination criteria for aquaculture in the Gulf of Mexico EEZ:**

**The proxy for MSY is:**

- a) the total yield harvested by all aquaculture operations in a given year within the management regime established in this amendment.**
- b) equal to the maximum amount of cultured product that can be sustainably produced on an annual basis:**
  - i) 4 million pounds.**
  - ii) 8 million pounds.**
  - iii) 16 million pounds.**
  - iv) 32 million pounds.**
  - v) X million pounds.**

**No individual, corporation, or other entity can produce more than:**

- a) 5 percent of MSY.**
- b) 10 percent of MSY.**
- c) 20 percent of MSY.**
- d) X percent of MSY**

**If planned aquaculture production exceeds the preferred MSY specified in Alternative 2(c) than the Council would initiate review of the MSY proxy and aquaculture program, and NOAA Fisheries Service would publish a control date, after which entry into the aquaculture industry may be limited or restricted.**

**The proxy for OY is equal to MSY.**

**The existing overfished and overfishing definitions contained in the various FMPs to manage wild stocks will be used as proxies for assessing the status of those wild stocks potentially affected by excessive production in aquaculture operations.**

Discussion:

The Magnuson Stevens Act (MSA) was written in part to establish the legal framework for managing wild fisheries resources of the United States, not for managing at sea fish farming or aquaculture operations. Many of the principles and concepts that guide wild stock management under the MSA are either of little utility or are not generally applicable to the management of aquaculture operations. Despite this lack of conceptual similarity, offshore aquaculture falls within the realm of activities subject to regulatory control under the MSA and therefore must be

accommodated within the existing legal framework. Many MSA legal requirements do not fit well or are difficult to satisfy with respect to aquaculture, thereby making them seem less useful or even unnecessary. This is particularly true for yield targets and stock status parameters around which management of wild fisheries is based. Regardless, they are legal requirements, and until additional legal authority specifically suited for management of at sea aquaculture operations is established, all such requirements must be satisfied.

**Alternative 1** would not establish biological reference points or status determination criteria for aquaculture in the Gulf of Mexico. Biological reference points and status criteria would continue to be specified for wild species managed by the Council, but similar criteria and reference points would not be established for aquaculture. This alternative would not satisfy MSA legal requirements, making NOAA Fisheries Service vulnerable to legal challenges.

**Alternative 2** would establish biological reference points and status determination criteria for aquaculture in the Gulf of Mexico. MSY would either be equivalent to the total annual production capacity of all aquaculture operations in the Gulf of Mexico EEZ, or estimated as a proxy based on several factors, including the expected number of Gulf of Mexico EEZ aquaculture operations over the next ten years, the relative size of each operation, and the production capacity of cages and other grow-out systems used by each operation. Setting MSY equivalent to the annual production capacity of all aquaculture operations in the Gulf of Mexico EEZ will involve some uncertainty. Theoretically, there will be some maximum capacity of the Gulf of Mexico to produce cultured fish that does not adversely affect wild stocks or the marine environment (e.g., water quality, habitat, etc.). As with other fisheries, the MSY specification may be modified based on new information developed as this component of the fishery proceeds.

Establishing a proxy for MSY based on several productivity factors allows the Council to take a more precautionary approach to management while the aquaculture industry develops and more becomes known about offshore aquaculture. The MSY proxies summarized in **Alternatives 2(c)(i-iv)** are likely substantially less than the yield that can be achieved by aquaculture operations over the long-term. The proxies are based on an estimated 5-15 operations starting business in the Gulf of Mexico over the next ten years and are considered reasonable estimates for future demand of aquaculture permits (see Table 4.9.1). The MSY proxies also assume the operations will use 6 to 12 cages approximately 3,000 to 6,000 m<sup>3</sup> in size and that the production capacity of each cage is 22 to 44 pounds per m<sup>3</sup>. These MSY estimates are considered short-term proxies (next 10 years or until MSY estimates are reviewed by the Council) for MSY until more is known about the number and size of operations, potential environmental impacts resulting from aquaculture, economic sustainability of aquaculture, and the production capacity of various marine aquaculture systems.

Table 4.9.1 MSY estimates for offshore aquaculture in the Gulf of Mexico based on 5-15 aquaculture operations, different amounts of cage productivity (22 vs. 44 pounds per m<sup>3</sup>), different size cages (3,000 vs. 6,000 m<sup>3</sup>) and different amounts of cages used per aquaculture operation (6 vs. 12 cages).

Productivity	# operations	# of cages <sup>1</sup>	cage size <sup>2</sup> (m <sup>3</sup> )	production/cage (lbs)	total production (mp)
low productivity 22 lbs/m <sup>3</sup>	5	6	3,000	66139	1.98
	10	6	3,000	66139	3.97
	15	6	3,000	66139	5.95
	5	12	3,000	66139	3.97
	10	12	3,000	66139	7.94
	15	12	3,000	66139	11.90
	5	6	6,000	132277	3.97
	10	6	6,000	132277	7.94
	15	6	6,000	132277	11.90
	5	12	6,000	132277	7.94
	10	12	6,000	132277	15.87
	15	12	6,000	132277	23.81
high productivity <sup>1</sup> 44 lbs/m <sup>3</sup>	5	6	3,000	132277	3.97
	10	6	3,000	132277	7.94
	15	6	3,000	132277	11.90
	5	12	3,000	132277	7.94
	10	12	3,000	132277	15.87
	15	12	3,000	132277	23.81
	5	6	6,000	264554	7.94
	10	6	6,000	264554	15.87
	15	6	6,000	264554	23.81
	5	12	6,000	264554	15.87
	10	12	6,000	264554	31.75
	15	12	6,000	264554	47.62

<sup>1</sup> Posadas and Bridger 2004

<sup>2</sup> cage size based on two different sized SeaStation™ aquaculture cages

If the planned production level exceeds the preferred MSY then the Council would initiate review of the MSY proxy and aquaculture program, and determine whether a cap on aquaculture production is necessary or whether MSY should be increased or some other action is appropriate. Any cap or change to MSY should be based on the extent and magnitude of any adverse environmental and economic impacts that may result from the existing aquaculture management regime. During review of the program and MSY proxy, NOAA Fisheries Service would publish a control date after which entry into the aquaculture industry may be limited. Any permits issued after the control date may be subject to revocation. No individual, corporation, or other entity will be issued a permit authorizing the production of more than 5 to 20 percent of MSY. This provision is necessary to ensure entities do not obtain an excessive share of the allowable yield (see National Standard 4: 50 CFR 600.325(a)(3)). The level selected by the Council for capping production must ensure against possible anti-competitive effects resulting from a small number of entities accounting for most or all of the offshore aquaculture production.

**Alternative 2** would also establish a definition for OY. OY would either remain undefined for aquaculture in the Gulf of Mexico EEZ or set OY equal to MSY. Guidance in 50 CFR 600.310 states OY should be based on MSY, or on MSY as it may be reduced by social, economic, and ecological factors. Since aquaculture is essentially a farming operation, all animals cultured are intended for harvest. Unlike wild stock management, there is no need to leave cultured animals in offshore aquaculture grow-out systems to support future generations. Accordingly, there are currently no social, economic, or ecological factors supporting a reduction from MSY. To the extent that harvesting MSY would result in adverse impacts to resources in the Gulf, OY may be reduced to a level where such adverse impacts do not occur. However, given the precautionary MSY established above, and the fact that these operations are currently not anticipated to result in significant adverse environmental impacts, there is no need to reduce OY from the MSY level at this time.

Aquaculture operations will harvest all cultured fish and invertebrates produced, excluding losses due to natural mortality. Because the harvest and yield of cultured animals is separate from that of wild stocks, it would not be possible to overharvest the animals. Therefore, thresholds for determining overfishing and overfished status are not directly applicable to the cultured fish themselves. However, it is conceivable that some level of aquaculture in the Gulf could result in adverse impacts to wild stocks, which could result in overfishing and depletion of such stocks. Therefore, the most logical way to assess impacts of overharvest in aquaculture operations is not on the cultured fish actually harvested, but the wild stocks remaining in the surrounding environment. Overfishing and overfished thresholds for wild stocks have been approved by the Council for evaluating the status of managed stocks and stock complexes. These thresholds will be used by NOAA Fisheries Service to determine if offshore aquaculture in the Gulf of Mexico EEZ is adversely affecting wild populations, causing them to become overfished or undergoing overfishing.

Adverse impacts related to offshore aquaculture, such as those described in Section 6.1, all have the potential to negatively affect wild populations. If NMFS identifies that such impacts to wild stocks are occurring, resulting in wild stock populations falling below the established thresholds or becoming subject to excessive fishing mortality, as a consequence of impacts from aquaculture operations (reduced biomass levels resulting in increased F), the appropriate overfished or overfishing determination will be triggered. The causal link from the adverse environmental impacts to the aquaculture operations will be based on data collected via the ongoing monitoring of permitted operations. If there is a reasonable basis to tie aquaculture operations to adverse environmental impacts, which are in turn resulting in reduced abundance (depletion) of wild stocks, appropriate action will be taken by NMFS (e.g., aquaculture operation production may be reduced, cultured fish transmitting disease may be removed, facility siting may be reevaluated to avoid habitat degradation, etc.).