

2.1 Action 1 – Modify Stock Status Determination Criteria for Penaeid Shrimp Stocks (Brown, White, and Pink)

Action 1.1 – Modify the Maximum Sustainable Yield (MSY) for Penaeid Shrimp

Alternative 1. No Action. The MSY values for the penaeid shrimp stocks fall within the range of values defined by the lowest and highest landings taken annually from 1990-2000 that does not result in recruitment overfishing as defined herein:

Brown shrimp: MSY is between 67 and 104 MP of tails

White shrimp: MSY is between 35 and 71 MP of tails

Pink shrimp: MSY is between 6 and 19 MP of tails

Alternative 2. The MSY values for the penaeid shrimp stocks are values produced by the stock synthesis model approved by the SSC. Species specific MSY values will be recomputed during updated assessments, but only among the years 1984-2012. The values for each species will be updated every 5 years through the framework procedure, unless changed earlier by the Gulf of Mexico Fishery Management Council.

Currently, the stock synthesis model produces the following values:

Brown shrimp: MSY is 146,923,100 pounds of tails

White shrimp: MSY is 89,436,907 pounds of tails

Pink shrimp: MSY is 17,345,130 pounds of tails

Action 1.2 – Modify the Overfishing Threshold for Penaeid Shrimp

Alternative 1: No Action – The overfishing threshold is defined as a rate of fishing that results in the parent stock number being reduced below the maximum sustainable yield (MSY) minimum levels listed below:

- Brown shrimp- 125 million individuals, age 7+ months during the November through February period
- White shrimp- 330 million individuals, age 7+ months during the May through August period
- Pink shrimp- 100 million individuals, age 5+ months during the July through June period

Preferred Alternative 2: The maximum fishing mortality threshold (MFMT) for each penaeid shrimp stock is defined as the maximum apical fishing mortality rate (F) computed for the fishing years 1984 to 2012 plus the 95% confidence limits. Species specific MFMT values will be recomputed during updated assessments, but only among the years 1984-2012. The values for each species will be updated every 5 years through the framework procedure, unless changed earlier by the Gulf of Mexico Fishery Management Council.

Currently, the values are:

- Brown shrimp: the apical F value of the model output (3.54) plus the confidence limit (0.14); effective F: 3.68
- White shrimp: the apical F value of the model output (0.76) plus the confidence limit (0.01); effective F: 0.77
- Pink shrimp: the apical F value of the model output (0.20) plus the confidence limit (0.03); effective F: 0.23

Alternative 3: The maximum fishing mortality threshold (MFMT) for each penaeid shrimp stock is defined as the maximum apical fishing mortality rate (F) computed for the fishing years 1984 to 2012. Species specific MFMT values will be recomputed during updated assessments, but only among the years 1984-2012. The values for each species will be updated every 5 years through the framework procedure, unless changed earlier by the Gulf of Mexico Fishery Management Council.

Currently, the values are:

- Brown shrimp: 3.54
- White shrimp: 0.76
- Pink shrimp: 0.20

Alternative 4. The maximum fishing mortality threshold (MFMT) for each penaeid shrimp stock is defined as the F_{msy} . Species specific F_{msy} values will be recomputed during the updated assessments, but only among the fishing years 1984-2012. The values for each species will be updated every 5 years through the framework procedure, unless changed earlier by the Gulf of Mexico Fishery Management Council.

Currently, the values are:

- Brown shrimp: 9.12
- White shrimp: 3.48
- Pink shrimp: 1.35

*NOTE: it is not appropriate to compare values from Alternatives 2 and 3 with those presented in Alternative 4. Alternative 4 is MSY based and is derived from an *annual* computation. Alternatives 2 and 3 are model based that are derived from the apical *monthly* computation. Further, it is not appropriate to multiply values from Alternatives 2 and 3 by twelve and compare with Alternative 4 because the apical F is not a mean. Therefore the methods of calculation should be compared, rather than the resulting numbers.

Action 1.3 – Modify the Overfished Threshold for Penaeid Shrimp

Alternative 1: No Action - An overfished condition would result when a parent stock number falls below one-half of the overfishing definition listed below.

- Brown shrimp - 63 million individuals, age 7+ months during the November through February period
- White shrimp - 165 million individuals, age 7+ months during the May through August period

- Pink shrimp - 50 million individuals, age 5+ months during the July through June period

Preferred Alternative 2: The minimum sustainable stock threshold (MSST) for each penaeid shrimp stock is defined as the minimum total annual spawning biomass minus the 95% confidence limit for the fishing years 1984 to 2012. Species specific MSST values will be recomputed during the updated assessments, but only among the fishing years 1984-2012. The values for each species will be updated every 5 years through the framework procedure, unless changed earlier by the Gulf of Mexico Fishery Management Council.

Currently, the values are:

- Brown shrimp: the MSST value of the model output (11,166) minus the confidence limit (222); effective MSST value: 10,944 metric tons of tails
- White shrimp: the MSST value of the model output (125,535) minus the confidence limit (306); effective MSST value: 125,229 metric tons of tails
- Pink shrimp: the MSST value of the model output (17,502) minus the confidence limit (3,467); effective MSST value: 14,035 metric tons of tails

Alternative 3: The minimum sustainable stock threshold (MSST) for each penaeid shrimp stock is defined as the minimum total annual spawning biomass for the fishing years 1984 to 2012. Species specific MSST values will be recomputed during the updated assessments, but only among the fishing years 1984-2012. The values for each species will be updated every 5 years through the framework procedure, unless changed earlier by the Gulf of Mexico Fishery Management Council.

Currently, the values are:

- Brown shrimp: 11,166 metric tons of tails
- White shrimp: 125,535 metric tons of tails
- Pink shrimp: 17,502 metric tons of tails

Alternative 4: The overfished threshold for each penaeid shrimp stock is defined as MSY. MSY values for the penaeid shrimp stocks are values produced by the stock assessment model approved by the SSC. Species specific MSY values will be recomputed during the updated assessments, but only among the fishing years 1984-2012. The values for each species will be updated every 5 years through the framework procedure, unless changed earlier by the Gulf of Mexico Fishery Management Council. Currently, the stock synthesis model produces the following values:

- Brown shrimp: MSY is 146,923,100 pounds of tails
- White shrimp: MSY is 89,436,907 pounds of tails
- Pink shrimp: MSY is 17,345,130 pounds of tails

*NOTE: it is not appropriate to compare values from Alternatives 2 and 3 with those presented in Alternative 4. Alternative 4 is MSY based and is derived from an *annual* computation. Alternatives 2 and 3 are model based that are derived from the minimum *monthly* computation. Further, it is not appropriate to multiply values from Alternatives 2 and 3 by twelve and compare with Alternative 4 because the minimum MSST is not a mean. Therefore the methods of calculation should be compared, rather than the resulting numbers.