

APPENDIX 2. OVERFISHING DEFINITIONS CONTAINED IN FEDERAL FISHERY MANAGEMENT PLANS

The following definitions are as contained in the Fishery Management Plans, with minor editing changes to maintain consistency of terms. See **Appendix 5** for definitions of acronyms used in this appendix.

Atlantic Sea Scallop – The following overfishing definitions have been fully approved under SFA guidelines and were used to make the assessments contained in this report. The definitions contain both an F and a B component.

Overfishing occurs when one of the three conditions apply: F exceeds F_{MAX} (proxy for F_{MSY}) when the stock biomass is equal to or greater than B_{MAX} (proxy for B_{MSY}); fishing mortality exceeds the level that has a 50 percent probability of achieving B_{MAX} in 10 years when the stock biomass is below B_{MAX} but above $\frac{1}{2}B_{MAX}$, and in that case overfishing occurs when F is above a level to rebuild in 5 years; or F is greater than zero and the stock biomass is below $\frac{1}{4}B_{MAX}$. The best available estimate of F_{MAX} is 0.24.

The scallop stock is overfished when the scallop biomass is below $\frac{1}{2}B_{MAX}$. The best available estimate of B_{MAX} for the combined scallop resource is 5.6 kg/tow.

Atlantic Salmon - The following overfishing definition has been fully approved under SFA guidelines and was used to make the assessments contained in this report. The definition contains both an F and a B component.

Overfishing is currently not defined (fishing mortality is set equal to zero).

A stock is overfished when the stock biomass falls below B_{MSY} (54,000 spawning salmon is set as a proxy for B_{MSY}). The estimate of B_{MSY} has not been revised since the 1999 report.

Northeast Multispecies

The following overfishing definitions have been fully approved under SFA guidelines and were used to make the assessments contained in this report. The definitions contain both an F and a B component.

Cod - The following overfishing definitions have been fully approved under SFA guidelines and were used to make the assessments contained in this report. The definitions contain both an F and a B component.

(Gulf of Maine) - Overfishing occurs when F exceeds F_{MSY} . The best available estimate of F_{MSY}

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is 0.23.

The stock is overfished when the total stock biomass is less than $\frac{1}{2} B_{MSY}$. The best available estimate of B_{MSY} is 82,800 mt.

(Georges Bank) - Overfishing occurs when F exceeds F_{MSY} . The best available estimate of F_{MSY} is 0.18.

The stock is overfished when the total stock biomass is less than $\frac{1}{2} B_{MSY}$. The best available estimate of B_{MSY} is 216,800 mt.

Haddock – The following overfishing definitions have been fully approved under SFA guidelines and were used to make the assessments contained in this report. The definitions contain both an F and a B component.

(Gulf of Maine) - Overfishing occurs when the relative exploitation index (catch/autumn biomass index) exceeds 0.23 (F_{MSY} proxy).

The stock is overfished when the total stock biomass is less than the survey proxy for $\frac{1}{2}B_{MSY}$ (11.09 kg/tow).

(Georges Bank)- Overfishing occurs when F exceeds $F_{40\%}$ (0.26).

The stock is overfished when the spawning stock biomass is less than $\frac{1}{2} B_{MSY}$ (The best available estimate of B_{MSY} is 250,300 mt.

American Plaice – The following overfishing definition has been fully approved under SFA guidelines and was used to make the assessments contained in this report. The definition contains both an F and a B component.

Overfishing occurs when F exceeds $F_{40\%}$. The best available estimate of the F_{MSY} proxy is 0.17.

The stock is overfished when the spawning stock biomass is less than $\frac{1}{2} B_{MSY}$. The best available estimate of B_{MSY} is 28,600 mt.

Redfish - The following overfishing definition has been fully approved under SFA guidelines and was used to make the assessments contained in this report. The definition contains both an F and a B component.

Overfishing occurs when F exceeds $F_{50\%}$. The best available estimate of the F_{MSY} proxy is 0.04.

The stock is overfished when the spawning stock biomass is less than $\frac{1}{2}B_{MSY}$. B_{MSY} is based on total biomass. The best available estimate of the B_{target} , is 236,700 mt.

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Witch Flounder – The following overfishing definition has been fully approved under SFA guidelines and was used to make the assessments contained in this report. The definition contains both an F and a B component.

Overfishing occurs when F exceeds the F_{MSY} proxy ($F_{40\%}$). The best available estimate of the F_{MSY} proxy is 0.23.

The stock is overfished when the total stock biomass is less than $\frac{1}{2} B_{MSY}$. B_{MSY} is estimated at 25,200 mt

Yellowtail Flounder¹ – The following overfishing definitions have been fully approved under SFA guidelines and were used to make the assessments contained in this report. The definitions contain both an F and a B component.

(Georges Bank) – Overfishing occurs when F exceeds F_{MSY} . The best available estimate of F_{MSY} is 0.25 fully recruited (derived from $F_{40\%}$).

The stock is overfished when the total stock biomass is less than $\frac{1}{2} B_{MSY}$. The best available (current) estimate of B_{MSY} is (58,800 mt).

(Southern New England/Mid-Atlantic) - Overfishing occurs when F exceeds the F_{MSY} proxy ($F_{40\%} = 0.26$).

The stock is overfished when the total stock biomass is less than $\frac{1}{2} B_{MSY}$. The best available estimate of B_{MSY} is 69,500 mt.

(Cape Cod/Gulf of Maine) – Overfishing occurs when F exceeds the F_{MSY} proxy ($F_{40\%} = 0.17$).

The stock is overfished when the total stock biomass is less than $\frac{1}{2} B_{MSY}$. The best available estimate of B_{MSY} is 12,600 mt.

White Hake – The following overfishing definition has been fully approved under SFA guidelines and was used to make the assessments contained in this report. The definition contains both an F and a B component.

Overfishing occurs when F exceeds F_{MSY} . The best available estimate of the F_{MSY} proxy is 0.55.

The stock is overfished when the total stock biomass is less than $\frac{1}{2} B_{MSY}$. The best available estimate of B_{MSY} proxy is 7.70 kg/tow (total stock biomass for fish ≥ 60 cm).

¹Stock definitions for yellowtail flounder were changed as a result of the 36th SAW. The Cape Cod stock is more broadly defined to include areas in the southern Gulf of Maine and is now called the Cape Cod/Gulf of Maine stock. The previously separate Southern New England and Mid-Atlantic stocks are now considered a single stock.

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Pollock – The following overfishing definition has been fully approved under SFA guidelines and was used to make the assessments contained in this report. The definition contains both an F and a B component.

Overfishing occurs when F exceeds the F_{MSY} proxy, a relative exploitation index (catch/survey biomass index). The best available estimate of the F_{MSY} proxy is 5.88.

The stock is overfished when the total stock biomass is less than the survey proxy for $\frac{1}{2} B_{MSY}$. The best available estimate of the B_{MSY} is 3.0 kg/tow.

Ocean Pout – The following overfishing definition has been fully approved under SFA guidelines and was used to make the assessments contained in this report. The definition contains both an F and a B component.

Overfishing occurs when F exceeds the F_{MSY} proxy. The best available estimate of the F_{MSY} proxy is a 0.31 catch/survey index.

The stock is overfished when the total stock biomass is less than the $\frac{1}{2}B_{MSY}$ proxy. The best available estimate of the B_{MSY} proxy is 4.9 kg/tow.

Atlantic Halibut - The following overfishing definition has been fully approved under SFA guidelines and was used to make the assessments contained in this report. The definition contains both an F and a B component.

Overfishing occurs when F exceeds the F_{MSY} catch-YPR proxy, currently estimated at 0.06. Maximum rebuilding time is undefined for this stock. No fishing mortality is permitted ($F = 0$) until the stock is rebuilt (provisional control law).

The stock is overfished when the total stock biomass is less than the biomass threshold of $\frac{1}{2}B_{MSY}$. The best available estimate of B_{MSY} is 5,400 mt (total biomass).

Windowpane Flounder – The following overfishing definitions have been fully approved under SFA guidelines and were used to make the assessments contained in this report. The definitions contain both an F and a B component.

(Gulf of Maine/Georges Bank) - Overfishing occurs when F exceeds the F_{MSY} proxy of a relative exploitation index. The best available estimate of the F_{MSY} proxy is 1.11 catch/survey index.

The stock is overfished when the total stock biomass is less than $\frac{1}{2}B_{MSY}$. The best available estimate of the B_{MSY} proxy is 0.94 kg/tow.

(Southern New England/Middle Atlantic) – Overfishing occurs when F exceeds the F_{MSY}

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proxy of a relative exploitation index. The best available estimate of the F_{MSY} proxy is a 0.98 catch/survey index.

The stock is overfished when the total stock biomass is less than $\frac{1}{2} B_{MSY}$. The best available estimate of the B_{MSY} proxy is 0.92 kg/tow.

Winter Flounder - The following overfishing definitions have been fully approved under SFA guidelines and were used to make the assessments contained in this report. The definitions contain both an F and a B component.

Winter Flounder (Gulf of Maine) - Overfishing occurs when F exceeds F_{MSY} . The best available estimate of F_{MSY} is 0.43.

The stock is overfished when the stock biomass is less than $\frac{1}{2} B_{MSY}$. The best available estimate of B_{MSY} is 4,100 mt.

(Georges Bank) - Overfishing occurs when F exceeds F_{MSY} . The best available estimate of F_{MSY} is 0.22 (biomass weighted).

The stock is overfished when the total stock biomass is less than $\frac{1}{2} B_{MSY}$. The best available estimate of B_{MSY} is 10,136 mt (total biomass).

(Southern New England) - Overfishing occurs when F exceeds F_{MSY} . The best available estimate of F_{MSY} is 0.32.

The stock is overfished when the total stock biomass is less than $\frac{1}{2} B_{MSY}$. The best available estimate of B_{MSY} is 30,100 mt.

Silver Hake - The following overfishing definition has been fully approved under SFA guidelines and was used to make the assessments contained in this report. The definition contains both an F and a B component.

(Gulf of Maine/Northern Georges Bank, Southern Georges Bank/Middle Atlantic) - Overfishing occurs when F exceeds F_{MSY} , proxy exploitation index, 2.57 in the north and 34.39 in the south.

B_{MSY} proxies are estimated at 6.62 kg/tow in the north and 1.785 kg/tow in the south.

Offshore Hake - The following overfishing definition has been fully approved under SFA guidelines and was used to make the assessment contained in this report. The definition contains only a B component.

Offshore hake is in an overfished condition when the 3-year moving average weight per individual in the autumn survey falls below the 25th percentile of the average weight per

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individual from the autumn survey time series 1963-1997 (0.236) *and* when the 3-year moving average of the abundance of immature fish less than 30 cm falls below the median value of the 1963-1997 autumn survey abundance of fish less than 30 cm (0.33).

[Note: The above overfishing definition is the approved definition from Amendment 12 to the NE Multispecies FMP; however, there is an error in this definition that needs to be corrected by the New England Fishery Management Council in the next FMP amendment. The overfishing definition in the FMP should read that “overfishing is occurring when . . .” not that offshore hake is overfished. Thus, the approved overfishing definition contains a B component but not an F component. In this case, overfishing, per se, is undefined. In practice, the correct overfishing definition should contain an F component, leaving the B component undefined.]

Red Hake (Gulf of Maine/Northern Georges Bank) - The following overfishing definition has been fully approved under SFA guidelines and was used to make the assessments contained in this report. The definition contains both an F and a B component.

Overfishing occurs when F exceeds F_{MSY} . The best available estimate of F_{MSY} is 0.65.

A stock is overfished when the biomass is less than $\frac{1}{2}B_{MSY}$ proxy. The best available estimate of B_{MSY} proxy is 1.6 kg/tow.

Red Hake (Southern Georges Bank/Middle Atlantic) - The following overfishing definition has been fully approved under SFA guidelines and was used to make the assessment contained in this report. The definition contains only a B component.

The southern stock of red hake is in an overfished condition when the 3-year moving average weight per individual in the autumn survey falls below the 25th percentile of the average weight per individual from the autumn survey time series 1963-1997 (0.12) *and* when the 3-year moving average of the abundance of immature fish less than 25 cm falls below the median value of the 1963-1997 autumn survey abundance of fish less than 25 cm (4.72).

[Note: The above overfishing definition is the approved definition from Amendment 12 to the NE Multispecies FMP; however, there is an error in this definition that needs to be corrected by the New England Fishery Management Council in the next FMP amendment. The overfishing definition in the FMP should read that “overfishing is occurring when . . .” not that the southern stock of red hake is overfished. Thus, the approved overfishing definition contains a B component but not an F component. In this case, overfishing, per se, is undefined. In practice, the correct overfishing definition should contain an F component, leaving the B component undefined.]

Northeast Skate Complex

The following overfishing definitions have been fully approved under SFA guidelines and were

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used to make the assessments contained in this report. These definitions contain both an F and a B component. For all stocks, the reference points and selected time series may be re-specified through a peer-reviewed process and/or as updated stock assessments are completed.

Winter Skate, Thorny Skate - Overfishing occurs when the 3-year moving average of the autumn survey mean weight per tow declines 20% or more, or when the autumn survey mean weight per tow declines for 3 consecutive years.

The stock is in an overfished condition when the 3-year moving average of the autumn survey mean weight per tow is less than one-half of the 75th percentile of the mean weight per tow observed in the autumn trawl survey from the selected reference time series.

(winter skate $\frac{1}{2}$ Bmsy = 3.23 kg/tow) The most recent 3-year moving average (2002-2004) of the autumn survey mean weight per tow is 4.29 kg/tow.

(thorny skate $\frac{1}{2}$ Bmsy = 2.20 kg/tow) The most recent 3-year moving average (2002-2004) of the autumn survey mean weight per tow is 0.63 kg/tow.

Little Skate - Overfishing occurs when the 3-year moving average of the spring survey mean weight per tow declines 20% or more, or when the spring survey mean weight per tow declines for three consecutive years.

The stock is in an overfished condition when the 3-year moving average of the spring survey mean weight per tow is less than one-half of the 75th percentile of the mean weight per tow observed in the spring trawl survey from the selected reference time series.

(Little skate $\frac{1}{2}$ Bmsy = 3.27 kg/tow) The most recent 3-year moving average (2002-2004) of the autumn survey mean weight per tow is 6.72 kg/tow.

Barndoor Skate - Overfishing occurs when the 3-year moving average of the autumn survey mean weight per tow declines 30% or more, or when the autumn survey mean weight per tow declines for 3 consecutive years.

The stock is in an overfished condition when the 3-year moving average of the autumn survey mean weight per tow is less than one-half of the mean weight per tow observed in the autumn trawl survey from 1963-1966 (currently 0.81 kg/tow).

(Barndoor skate $\frac{1}{2}$ Bmsy = 0.81 kg/tow). The most recent 3-year moving average (2002-2004) of the autumn survey mean weight per tow is 0.88 kg/tow.

Smooth Skate, Clearnose Skate- Overfishing occurs when the 3-year moving average of the autumn survey mean weight per tow declines 30% or more, or when the autumn survey mean weight per tow declines for 3 consecutive years.

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The stock is in an overfished condition when the 3-year moving average of the autumn survey mean weight per tow is less than one-half of the 75th percentile of the mean weight per tow observed in the autumn trawl survey from the selected reference time series.

(Smooth skate $\frac{1}{2}$ Bmsy = 0.16 kg/tow) The most recent 3-year moving average (2002-2004) of the autumn survey mean weight per tow is 0.17 kg/tow.

(Clearnose skate $\frac{1}{2}$ Bmsy = 0.28 tow). The most recent 3-year moving average (2002-2004) of the autumn survey mean weight per tow is 0.75 kg/tow.

Rosette Skate - Overfishing occurs when the 3-year moving average of the autumn survey mean weight per tow declines 60% or more, or when the autumn survey mean weight per tow declines for 3 consecutive years.

The stock is in an overfished condition when the 3-year moving average of the autumn survey mean weight per tow is less than one-half of the 75th percentile of the mean weight per tow observed in the autumn trawl survey from the selected reference time series.

(Rosette skate $\frac{1}{2}$ Bmsy = 0.01 kg/tow). The most recent 3-year moving average (2002-2004) of the autumn survey mean weight per tow is 0.04 kg/tow.

Atlantic Herring - The following overfishing definition has been fully approved under SFA guidelines and was used to make the assessments contained in this report. The definition contains both an F and a B component.

If the stock biomass is equal to or greater than B_{MSY} , overfishing occurs when F exceeds F_{MSY} . If the stock biomass is less than B_{MSY} , overfishing occurs when F exceeds the level that has a 50-percent probability of rebuilding the stock biomass to B_{MSY} in 5 years ($F_{THRESHOLD}$). The best available estimate of F_{MSY} is 0.30.

The stock is overfished when stock biomass is less than $\frac{1}{2} B_{MSY}$. The best estimate of B_{MSY} is 1.07 million mt.

Deep-Sea Red Crab - The following overfishing definition has been fully approved under SFA guidelines and was used to make the assessments contained in this report. The definition contains both an F and a B component.

Overfishing is defined as any rate of exploitation such that the ratio of current exploitation to an idealized exploitation under MSY conditions exceeds a value of 1.0 (the actual measure of exploitation used is determined by the availability of suitable data).

The stock is overfished when one of the following three conditions is met:

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Condition 1 – The current biomass in the management unit is below $\frac{1}{2} B_{MSY}$.

Condition 2 – The annual fleet average CPUE, measured as marketable crabs landed per trap haul, continues to decline below a baseline level for 3 or more years. The baseline level = $\frac{1}{2}$ CPUE under virgin stock conditions (not currently specified).

Condition 3 – The annual fleet average CPUE, measured as marketable crabs landed per trap haul, declines below a minimum threshold level in any single year. The minimum threshold level = $\frac{1}{4}$ CPUE under virgin stock conditions (not currently specified).

Monkfish - The following overfishing definitions have been fully approved under SFA guidelines and were used to make the assessments contained in this report. The definitions contain both an F and a B component.

Northern Stock: Overfishing occurs when F exceeds $F_{THRESHOLD}$, which is set equal to F_{MAX} , which is currently estimated at $F=0.2$.

The stock is overfished when the survey index is less than $B_{THRESHOLD}$, which is set equivalent to $\frac{1}{2} B_{TARGET}$. Thus, $B_{THRESHOLD}=1.25$ kg/tow for the northern stock.

Southern Stock: Overfishing occurs when F exceeds $F_{THRESHOLD}$, which is set equal to F_{MAX} , which is currently estimated to be $F=0.2$.

The stock is overfished when the survey index is less than $B_{THRESHOLD}$, which is set equivalent to $\frac{1}{2} B_{TARGET}$. Thus, $B_{THRESHOLD}=0.93$ kg/tow for the southern stock.

Spiny Dogfish -The following overfishing definition was partially approved under SFA guidelines and was used to make assessments in this report. The approved portion of the definition contains an F component. The biomass (B) target proposed in the FMP was disapproved because it was specified at 90 percent of SSB_{MAX} , rather than SSB_{MAX} .

Overfishing occurs when F exceeds $F_{THRESHOLD}$, the mortality rate that stabilizes the population at SSB_{MAX} when size at entry to the fishery is at 27.5 inches (70cm). The current estimate of $F_{THRESHOLD}$ is 0.11 and F_{TARGET} is 0.08.

The stock is overfished when the biomass is less than $\frac{1}{2}SSB_{MAX}$. The current estimate of $B_{THRESHOLD}$ is 100,000-mt female biomass. However, there is no approved biomass target in the FMP.

Summer Flounder, Scup, and Black Sea Bass

Summer Flounder - The following overfishing definition has been fully approved under SFA

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guidelines and was used to make the assessments contained in this report. The definition contains both an F and a B component.

Overfishing occurs when F exceeds the threshold of F_{MAX} (F_{MAX} is used as a proxy for F_{MSY}). The best available estimate of F_{MAX} is 0.276.

The stock is overfished when the total biomass falls below the minimum biomass threshold of $\frac{1}{2}B_{MSY}$. The best available estimate of B_{MSY} is 92,645 mt.

Scup - The following overfishing definition has been fully approved under SFA guidelines and was used to make the assessments contained in this report. The definition contains both an F and a B component.

Overfishing occurs when F exceeds the threshold F_{MAX} (F_{MAX} is used as a proxy for F_{MSY}). The best available estimate of F_{MAX} is 0.26.

The stock is overfished when the minimum biomass index for rebuilding is less than $B_{THRESHOLD}$, which is the maximum value of a 3-year moving average of the Northeast Fisheries Science Center's spring survey catch per tow of spawning stock biomass (SSB). The best available estimate of $B_{THRESHOLD}$ is 2.77 kg/tow, the average of 1977-1979.

Black Sea Bass - The following overfishing definition has been fully approved under SFA guidelines and was used to make the assessments contained in this report. The definition contains both an F and a B component.

Overfishing occurs when F exceeds the threshold F_{MAX} (F_{MAX} is used as a proxy for F_{MSY}). The best available estimate of F_{MAX} is 0.33.

The stock is overfished when the minimum biomass index for rebuilding is less than $B_{THRESHOLD}$, which is the maximum value of a 3-year moving average of the Northeast Fisheries Science Center's spring survey exploitable biomass index (fish >22 cm). The best available estimate of $B_{THRESHOLD}$ is 0.9 kg/tow.

Bluefish (except Gulf of Mexico) - The following overfishing definition has been fully approved under SFA guidelines and was used to make the assessments contained in this report. The definition contains both an F and a B component.

Overfishing occurs when F exceeds the threshold F_{MSY} . The best available estimate of F_{MSY} is 0.19.

The stock is overfished when the minimum biomass is less than $\frac{1}{2}B_{MSY}$. The best available estimate of B_{MSY} is 66,702 mt.

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Surfclams and Ocean Quahogs

Surfclam - The following overfishing definition was approved under SFA guidelines and was used to make the assessments contained in this report. This definition contains an F component and a B component.

Overfishing occurs when F exceeds $F_{MSY} = M$ (the natural mortality rate). The best current available estimate of F_{MSY} is 0.15.

The stock is overfished when the current biomass estimate is less than $\frac{1}{2}$ of the B_{MSY} proxy ($\frac{1}{2}$ of the B_{1999}). The best available current estimate of the B_{MSY} proxy is 730,250 mt (meat weight).

Ocean Quahog – The following overfishing definition has been fully approved under SFA guidelines and was used to make the assessments contained in this report. The definition contains both an F and a B component.

Overfishing occurs when the overfishing target is exceeded, which is $F_{TARGET} = F_{0.1}$ for the exploited region. The best available estimate of $F_{0.1}$ is 0.028.

The stock is overfished when the minimum biomass is less than the biomass threshold of $\frac{1}{2}B_{MSY}$ or $\frac{1}{4}$ of the virgin biomass. The best available estimate of B_{MSY} is 1.2 million mt (meat weight).

Atlantic Mackerel, Squid, and Butterfish

Illex Squid - The following overfishing definition has been fully approved under SFA guidelines and was used to make the assessments contained in this report. The definition contains both an F and a B component.

Overfishing occurs when F exceeds the fishing mortality threshold of F_{MSY} . The best available estimate of F_{MSY} is 1.22.

The stock is overfished when the minimum biomass is less than $\frac{1}{2}B_{MSY}$. The best available estimate of B_{MSY} is 39,300 mt.

Loligo Squid - The following overfishing definition has been fully approved under SFA guidelines and was used to make the assessments contained in this report. The definition contains both an F and a B component.

Overfishing occurs when F exceeds the fishing mortality threshold of F_{MAX} (F_{MAX} is a proxy for F_{MSY}). Current estimates for $F_{MAX} = 0.7$ and 1.2 for winter and summer cohorts, respectively.

The stock is overfished when the minimum biomass is less than the biomass threshold of $\frac{1}{2}B_{MSY}$.

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The best available estimate of B_{MSY} is 80,000 mt. (According to SAW34, CRD 02-07, it is unknown.)

Atlantic Mackerel – The following overfishing definition has been fully approved under SFA guidelines and was used to make the assessments contained in this report. The definition contains both an F and a B component.

Overfishing occurs when F exceeds the fishing mortality threshold of F_{MSY} (0.45). To avoid low levels of recruitment, the threshold F decreases linearly from 0.45 at 890,000 mt SSB to zero at 225,000 mt SSB ($\frac{1}{4}B_{MSY}$).

The stock is overfished when the SSB is less than 445,000 mt. The estimates of the component parts of this overfishing definition were not re-estimated from past levels and therefore remain the best available estimates.

Butterfish (Atlantic) – The following overfishing definition has been fully approved under SFA guidelines and was used to make the assessments contained in this report. The definition contains both an F and a B component.

Overfishing occurs when the catch associated with a threshold F of F_{MSY} is exceeded. The current F_{MSY} proxy is $F_{0.1} = 1.01$ (SAW 38,2004).

The stock is overfished when the minimum biomass is less than the biomass threshold of $\frac{1}{2}B_{MSY}$. B_{MSY} is estimated imprecisely as 22,800 mt.

Golden Tilefish - The following overfishing definition has been fully approved under SFA guidelines and was used to make the assessments contained in this report. The definition contains both an F and a B component.

Overfishing occurs when the catch associated with a threshold F of F_{MSY} is exceeded. The current estimate of F_{MSY} is 0.21.

The stock is overfished when the total stock biomass falls below the minimum biomass threshold ($B_{THRESHOLD}$) of $\frac{1}{2}B_{MSY}$. The current estimate of $B_{THRESHOLD}$ is 4,692 mt.

Golden Crab of the South Atlantic - The following overfishing definition was partially approved under SFA guidelines and was used to make the assessments contained in this report. This definition contains both an F and a B component; however, the estimate of MSY was rejected.

Overfishing occurs when the F associated with the fishing mortality rate that produces maximum sustainable yield (F_{MSY}) is exceeded.

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A stock is overfished when the current biomass (B_{CURRENT}) is less than the minimum stock size threshold (MSST). The MSST is defined as a ratio of current biomass (B_{CURRENT}) to biomass at MSY or $(1-M) * B_{\text{MSY}}$, where $1-M$ should never be less than 0.5.

Shrimp Fishery of the South Atlantic - The following overfishing and overfished definition was approved under post-SFA guidelines and was used to make the assessments contained in this report. This definition contains both an F and a B component.

White Shrimp – Overfishing (MFMT) is a fishing mortality rate that diminishes the stock below the designated MSY stock abundance (B_{MSY}) for two consecutive years and MSST is established with two thresholds: (1) if the stock diminishes to $\frac{1}{2}$ MSY abundance ($\frac{1}{2} B_{\text{MSY}}$) in one year, or (b) if the stock is diminished below MSY abundance (B_{MSY}) for two consecutive years. In addition, the South Atlantic white shrimp resource is considered to be overfished when the overwintering white shrimp population within a state's water declines by 80% or more following severe winter resulting in prolonged cold water temperatures. A proxy for B_{MSY} would be established for each species using CPUE information from SEAMAP-SA data as the lowest values in the 1990-2003 time period that produced catches meeting MSY the following year. White shrimp CPUE = 5.868 individuals per hectare.

Rock Shrimp – MSY/OY for rock shrimp is the mean total landings for the South Atlantic during 1986 through 2000 (4,912,927 pounds heads on), where overfishing (MFMT) for rock shrimp is a fishing mortality rate that leads to annual landings larger than two standard deviations (9,774,848 pounds heads on) above MSY ($4,912,927 + 9,774,848 = 14,687,775$ //pounds heads on) for two consecutive years, and MSST would be parent stock size less than $\frac{1}{2}$ (B_{MSY}) for two consecutive years.

Brown Shrimp and Pink Shrimp – Overfishing (MFMT) is a fishing mortality rate that diminishes the stock below the designated MSY stock abundance (B_{MSY}) for two consecutive years and MSST is established with two thresholds: (1) if the stock diminishes to $\frac{1}{2}$ MSY abundance ($\frac{1}{2} B_{\text{MSY}}$) in one year, or (b) if the stock is diminished below MSY abundance (B_{MSY}) for two consecutive years. A proxy for B_{MSY} would be established for each species using CPUE information from SEAMAP-SA data as the lowest values in the 1990-2003 time period that produced catches meeting MSY the following year. Brown shrimp CPUE = 2.000 individuals per hectare, and pink shrimp CPUE = 0.461 individuals per hectare.

South Atlantic Snapper-Grouper - For the following overfishing definitions, the F component has been approved under SFA guidelines, and was used to make the assessments contained in this report. Amendment 11 to the Snapper Grouper Fishery Management Plan established a post SFA definition for snapper grouper species where $\text{MSST} = 1-M * B_{\text{MSY}}$. Amendment 11 only provided estimates of MSST for **Black Sea Bass** and **Red Porgy**. Values of MSST for other species were not specified. Since Amendment 11 the B component and MSST has also been

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approved under SFA guidelines for **Greater Amberjack, Tilefish, and Snowy Grouper.**

Tilefish - Overfishing is defined as an F that exceeds $MFMT = F_{MSY}$. The best estimate of $MFMT = 0.043$

Overfished is defined as a stock size less than $MSST$. The Pre-SFA definition of overfished is defined as SPR less than 30%. $MSST = 1,783,650$ lbs. when $M = 0.08$ and $MSST = (1-M)B_{MSY}$.

Snowy Grouper - Overfishing is defined as an F that exceeds $MFMT = F_{MSY}$. The best estimate of $MFMT = 0.05$

Overfished is defined as a stock size less than $MSST$. The Pre-SFA definition of overfished is defined as SPR less than 30%. $MSST = 4,105,182$ lbs. when $M = 0.12$ and $MSST = (1-M)B_{MSY}$.

Black Sea Bass - Overfishing is defined as an F that exceeds $MFMT = F_{MSY}$. The best estimate of $MFMT = 0.43$.

Overfished is defined as a stock size less than the minimum stock size threshold (10.5 million pounds).

Red Porgy - Overfishing is defined as an F that exceeds $MFMT = F_{MSY}$. The best estimate of $MFMT = 0.19$.

Overfished is defined as a stock size less than the minimum stock size threshold (5.21 million pounds).

Gag, Red Snapper, Speckled Hind, Warsaw Grouper, Red Grouper, Black Grouper, Mutton Snapper, Greater Amberjack, Wreckfish, Yellowedge Grouper, Scamp, White Grunt, Gray (Mangrove) Snapper, Lane Snapper, Gray Triggerfish, Queen Triggerfish, Ocean Triggerfish, Yellow Jack, Blue Runner, Crevalle Jack, Bar Jack, Lesser Amberjack, Almaco Jack, Banded Rudderfish, Atlantic Spadefish, Black Margate, Porkfish, Margate, Tomtate, Smallmouth Grunt, French Grunt, Spanish Grunt, Cottonwick, Sailors Choice, Bluestriped Grunt, Hogfish, Puddingwife, Black Snapper, Queen Snapper, Schoolmaster, Blackfin Snapper, Cubera Snapper, Mahogany Snapper, Dog Snapper, Silk Snapper, Blueline Tilefish, Sand Tilefish, Bank Sea Bass, Rock Sea Bass, Rock Hind, Graysby, Coney, Red Hind, Misty Grouper, Yellowmouth Grouper, Tiger Grouper, Yellowfin Grouper, Sheepshead, Grass Porgy, Jolthead Porgy, Saucereye Porgy, Whitebone Porgy, Knobbed Porgy, Longspine Porgy, Scup – Overfishing is defined as an F that exceeds $MFMT = F_{MSY}$ where $F_{MSY} = F_{30\%SPR}$.

Except for black sea bass and red porgy, overfished is defined as SPR less than 30% based on pre-SFA criteria.

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The following definition was approved in Amendment 11 and is in compliance with SFA requirements. Except for black sea bass, red porgy, snowy grouper, tilefish, vermilion snapper, and yellowtail snapper no assessments have been conducted yet using this new definition: Overfished is defined as a stock size less than MSST, where $MSST = 1 - M * B_{MSY}$.

Amendment 15 is being developed that may change the definition of MSST for tilefish and snowy grouper. The preferred alternative would set $MSST = 0.75 * B_{MSY}$

Goliath Grouper, Nassau Grouper - Overfishing is defined as an F in excess of the fishing mortality rate corresponding to a 40% Static SPR.

Overfished is defined as a stock size less than MSST. The Pre-SFA definition of overfished is defined as SPR less than 40%. The most recent assessment on goliath grouper could not make a determination using post SFA criteria.

Vermilion Snapper - Overfishing is defined as an F that exceeds $MFMT = F_{MSY}$. The best estimate of $F_{MSY} = 0.38$; current $F = 0.60$ (from the base run of the forward projection model).

Overfished is defined as a stock size less than $MSST = (1 - c)B_{MSY}$, where c is the lesser of M or 0.5. $M = 0.25$; the best estimate of MSST is $0.75B_{MSY}$.

Atlantic Coast Red Drum - For the following overfishing definition, the F component has been approved under SFA guidelines, and was used to make the assessment contained in this report. Spawning Potential Ratio (SPR) was used to determine the overfished status, and was approved under pre-SFA guidelines.

Overfishing is defined as an F in excess of the fishing mortality rate corresponding to a 30% Static SPR.

Overfished is defined as SPR less than 30%.

Coral, Coral Reefs, and Live / Hard Bottom Habitats of the South Atlantic Region - The following overfishing definition was approved under pre-SFA guidelines and was used to make the assessments contained in this report. This definition contains only an F component.

Fire Corals, Hydrocorals, Octocorals, Stony Corals, Black Corals - Overfishing is defined as an annual level of harvest that exceeds optimum yield (OY). OY for coral reefs, stony corals, hydrocorals, black corals, seafans, and live rock is zero, except as may be authorized for scientific and educational purposes. Harvest of allowable octocorals in the EEZ is specified by the South Atlantic Council each year.

Overfished is not defined.

Pelagic Sargassum Habitat of the South Atlantic Region - Both the overfishing and overfished definitions were approved under SFA guidelines and were used to make the assessment contained in this report. However, the overfishing threshold (MFMT) was not approved.

Overfishing is defined as the rate of harvest which compromises the stocks's ability to produce MSY.

A stock is overfished when the stock is reduced below MSST. The MSST is 25,000 mt, which would be $B_{MSY}/2$, where B_{MSY} is defined as one-half the carrying capacity (MSY) of the harvest area.

Dolphin Wahoo – Both the overfishing and overfished definitions were approved under SFA guidelines and were used to make the assessments contained in this report.

Dolphin and Wahoo - In the Atlantic, U.S. Caribbean and Gulf of Mexico overfishing for dolphin and wahoo is defined as a fishing mortality rate (F) in the excess of F_{MSY} ($F_{30\%}$ Static SPR).

In the Atlantic, U.S. Caribbean, and Gulf of Mexico the minimum stock size threshold for dolphin and wahoo is defined as a ratio of current biomass (B_{curr}) to biomass at MSY or $(1-M)*B_{MSY}$, where $1-M$ should never be less than 0.5. Using the best estimates of natural mortality ($M = 0.68-0.80$) in the formula results in a MSST of 50% B_{MSY} . A stock would be overfished if current biomass (B_{curr}) was less than MSST and would be recovered when current biomass was equal or greater than the biomass at MSY.

NOTE: Dolphin is contained in both the SAFMCs Dolphin Wahoo FMP and the Coastal Migratory Pelagics FMP maintained jointly by the South Atlantic and Gulf of Mexico Councils but is not considered as 2 separate stocks.

South Atlantic Snapper Grouper and Reef Fish of the Gulf of Mexico

NOTE: This stock is contained in both the South Atlantic Snapper Grouper and Gulf of Mexico Reef Fish FMPs but is not considered as 2 separate stocks. Thus, it is listed as being managed jointly under these FMPs and under the jurisdiction of the SAFMC and GMFMC.

Yellowtail Snapper - Overfishing is defined as an F that exceeds $MFMT = F_{MSY}$. The best estimate of $F_{MSY} = 0.33$; current $F = 0.24$ (from the Fleet Specific model run of the stock assessment).

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Overfished is defined as a stock size less than $MSST = (1-c)B_{MSY}$, where c is the lesser of M or 0.5 . $M = 0.2$; the best estimate of $MSST$ for yellowtail snapper is $0.8B_{MSY}$.

Coastal Migratory Pelagics of the South Atlantic and Gulf of Mexico - The overfishing definitions for the following South Atlantic stocks have been fully approved under SFA guidelines, and were used to make the assessments contained in this report. The definitions contain both an F and a B component.

Atlantic group King Mackerel, Atlantic group Spanish Mackerel, Gulf group King Mackerel, Gulf group Spanish Mackerel, and Cobia - Overfishing is defined as an F that exceeds $MFMT = F_{MSY}$ where $F_{MSY} = F_{30\%}SPR$. The best estimate of $MFMT$ for Atlantic group Spanish Mackerel is 0.38-0.48 and for Atlantic group King Mackerel is 0.26-0.35. The best estimate of $MFMT$ for Gulf group Spanish Mackerel is 0.629 and for Gulf group King Mackerel is 0.269.

Gulf group King Mackerel and Atlantic group King Mackerel - A stock is overfished when the stock size is less than the minimum stock size threshold. For Gulf group King Mackerel, $MSST = (1-M)*B_{MSY}$ or 80% of B_{MSY} . For Atlantic group King Mackerel, $MSST = (1-M)*B_{MSY}$ or 85% of B_{MSY} . The best estimate of Gulf group is $MSST = 5.108$ trillion eggs. The best estimate of Atlantic group is $MSST^* = 4.0-6.1$.

Gulf group Spanish Mackerel and Atlantic group Spanish Mackerel - A stock is overfished when the stock size is less than $MSST = (1-M)*B_{MSY}$ or 70% of B_{MSY} . The best estimate of Spanish group is $MSST = 11.5402$ mp ($B_{MSY} = 16.486$ mp). The best estimate of Atlantic group is $MSST^* = 8.5-11.1$.

*Biomass values are a unitless relative fecundity estimate in millions.

Cobia - A stock is overfished when the stock size is less than the minimum stock size threshold. $MSST = (1-M)*B_{MSY}$ or 70% of B_{MSY} .

For the following stocks, the F component of the overfishing definition has been approved under SFA guidelines, and was used to make the assessments contained in this report. Transitional Spawning Potential Ratio (SPR) was used to determine the overfished status, and was approved under pre-SFA guidelines.

Dolphin - In the Atlantic, U.S. Caribbean and Gulf of Mexico overfishing for dolphin is defined as a fishing mortality rate (F) in the excess of F_{MSY} ($F_{30\%}$ Static SPR).

In the Atlantic, U.S. Caribbean, and Gulf of Mexico the minimum stock size threshold for dolphin is defined as a ratio of current biomass (B_{curr}) to biomass at MSY or $(1-M)*B_{MSY}$, where $1-M$ should never be less than 0.5 . Using the best estimates of natural mortality ($M = 0.68-0.80$) in the formula results in a $MSST$ of 50% B_{MSY} . A stock would be overfished if current biomass

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(B_{curr}) was less than MSST and would be recovered when current biomass was equal or greater than the biomass at MSY.

NOTE: Dolphin is contained in both the SAFMCs Dolphin Wahoo FMP and the Coastal Migratory Pelagics FMP maintained jointly by the South Atlantic and Gulf of Mexico Councils but is not considered as 2 separate stocks.

Cero, Little Tunny, Bluefish (Gulf of Mexico only) - Overfishing occurs when the F is in excess of the F corresponding to a 30% Static SPR.

A stock is overfished when the transitional SPR is less than 30%. The recent stock assessment provides an estimate of biomass that is greater than MSST.

Spiny Lobster Fishery of the South Atlantic and Gulf of Mexico - For the following overfishing definition, the F component has been approved under SFA guidelines, and was used to make the assessment contained in this report. Transitional Spawning Potential Ratio (SPR) was used to determine the overfished status, and was approved under pre-SFA guidelines.

Spiny Lobster - Overfishing is defined as an F in excess of the fishing mortality rate corresponding to a 20% SPR.

The stock is overfished when the SPR is less than 20%.

Slipper Lobster - No overfishing definition exists in the FMP.

Stone Crab Fishery of the Gulf of Mexico - For the following overfishing definition, the F component has been approved under SFA guidelines, and was used to make the assessment contained in this report. The pre-SFA definition was used to make the assessment of overfished status.

Overfishing occurs and a stock is overfished when the realized egg production per recruit is reduced below 70% of potential production. This will be avoided when there is a minimum claw length (length of prodopus) that assures survival of the crabs to achieve 70% egg production per recruit potential.

Shrimp Fishery of the Gulf of Mexico - For the following overfishing definitions, the B component has been approved for **Brown Shrimp**, **Pink Shrimp**, and **White Shrimp** under SFA guidelines, and was used to make the assessments contained in this report. For **Royal Red Shrimp**, there is no B component of the overfishing definition to make an assessment. For the F component, the pre-SFA definitions were used to make the assessments for all of the shrimp.

Brown Shrimp - Overfishing is occurring and the stock is overfished when the parent stock

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levels are reduced below 125 million shrimp (MSST). This value is slightly lower than the 1983 level of parent stock, which is the lowest observed value since 1960. Parent stock is defined for brown shrimp as the number of age 7+ (months) shrimp during the November through February period.

Pink Shrimp - Overfishing is occurring and the stock is overfished when parent stock levels are reduced below 100 million shrimp (MSST). Parent stock is defined for pink shrimp as the number of 5+ (months) shrimp during the July through June period. Pink shrimp in the western U.S. Gulf were not included in this definition because mixed catches of brown and pink shrimp are not separated and are landed, sold, and statistically treated as brown shrimp.

White Shrimp - Overfishing is occurring and the stock is overfished when parent stock levels are reduced below 330 million shrimp (MSST). Parent stock is defined for white shrimp as the number of age 7+ (months) shrimp during the May through August period.

Royal Red Shrimp - Overfishing is occurring and the stock is overfished when landings exceed optimum yield (OY). OY is set at MSY (maximum sustainable yield), which was estimated to be 392,000 pounds of tails over 1,290 days fished. Royal red shrimp differ from penaeid shrimp in that they are not estuarine dependent but exist in a relatively constant environment in the deeper waters of the Gulf of Mexico (100 to 300 fathoms). Thus, they conform more closely to a classical Schaefer-type fishery.

Overfished is undefined.

Rock Shrimp and Seabob Shrimp - No overfishing or overfished definitions exist in the FMP.

Coral and Coral Reefs of the Gulf of Mexico - The following overfishing definition was approved under pre-SFA guidelines and was used to make the assessments contained in this report. This definition contains only an F component.

Fire Corals, Hydrocorals, Octocorals, Stony Corals, Black Corals - Overfishing is defined as an annual level of harvest that exceeds optimum yield (OY). OY for coral reefs, stony corals, hydrocorals, black corals, seafans, and live rock is zero, except as may be authorized for scientific and educational purposes. Harvest of allowable octocorals in the EEZ is not to exceed 50,000 colonies per year (Gulf and South Atlantic EEZ combined).

Overfished is undefined.

Reef Fish of the Gulf of Mexico - For all of the following stocks, the F component of the overfishing definition has been approved under SFA guidelines, and was used to make the assessments contained in this report. For all stocks except **Red Grouper, Greater Amberjack, Vermilion Snapper, and Red Snapper**, Spawning Potential Ratio (SPR) was used to determine

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the overfished status, and was approved under pre-SFA guidelines.

Red Snapper - The post SFA definition of overfishing is $MFMT = F_{MSY}$. F_{MSY} is estimated to be 0.092 with low recruitment and a steepness of 0.90.

The post SFA definition of overfished is $MSST = (1-M) \cdot B_{MSY}$. The best estimate of $MSST = 2,453$ million pounds with low recruitment and a steepness of 0.90.

Red Grouper - Overfishing is defined as a fishing mortality rate that exceeds $MFMT = F_{MSY}$. The best estimate of $F_{MSY} = 0.306$; current $F = 0.315$ (assuming a stock-recruitment curve steepness of 0.7. If it were 0.8, $F_{MSY} = 0.364$ and $F_{CURR} = 0.316$).

Overfished is defined as a stock size less than $MSST = (1-c)B_{MSY}$, where c is the lesser of M or 0.5. $M = 0.2$, $MSST = (1-c)SS_{MSY}$. The best estimate of $MSST = 538$ metric tons.

Greater Amberjack – The maximum fishing mortality threshold is the rate corresponding to a 30% static SPR. Overfishing occurs when the fishing mortality rate exceeds that associated with a 30% static SPR. $F_{30\% SPR}$ is currently estimated as 0.25.

Overfished is defined as a stock size less than $MSST = (1-c)B_{MSY}$, where c is the lesser of M or 0.5. $M=0.25$; the best estimate of $MSST = 0.75B_{MSY}$. The best estimate of $MSST = 21.3$ million pounds.

Vermilion Snapper – The post SFA definition of overfishing is $MFMT = F_{MSY}$. The most recent stock assessment estimates F_{MSY} as 0.32.

Overfished is defined as a stock size less than $MSST = (1-M)B_{MSY}$. $M=0.25$; the best estimate of $MSST = 7.95$ million pounds.

Nassau Grouper, Goliath Grouper - The maximum fishing mortality threshold is the rate corresponding to a 40% static SPR. Overfishing occurs when the fishing mortality rates exceeds that associated with a 40% static SPR.

A stock is overfished when the transitional SPR is less than 20%. A quantitative assessment indicates the stock is overfished and is rebuilding. However, biomass estimates from the assessment are highly uncertain.

Gag, Gray Triggerfish, Lesser Amberjack, Almaco Jack, Banded Rudderfish, Queen Snapper, Mutton Snapper, Schoolmaster, Blackfin Snapper, Cubera Snapper, Gray (Mangrove) Snapper, Dog Snapper, Mahogany Snapper, Lane Snapper, Silk Snapper, Wenchman, Goldface Tilefish, Blackline Tilefish, Anchor Tilefish, Blueline Tilefish, Tilefish, Rock Hind, Speckled Hind, Yellowedge Grouper, Red Hind, Misty Grouper, Warsaw Grouper, Snowy Grouper, Black Grouper, Yellowmouth Grouper, Scamp, Yellowfin Grouper, Hogfish, Dwarf Sand Perch, Sand Perch - The maximum fishing

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mortality threshold is the rate corresponding to a 30% static SPR. Overfishing occurs when the fishing mortality rate exceeds that associated with a 30% static SPR.

A stock is overfished when the transitional SPR is less than 20%.

Red Drum (Gulf of Mexico) - For the following overfishing definition, the F component has been approved under SFA guidelines, and was used to make the assessment contained in this report. Transitional Spawning Potential Ratio (SPR) was used to determine the overfished status, and was approved under pre-SFA guidelines.

The maximum fishing mortality threshold is the rate corresponding to a 30% static SPR. Overfishing occurs when the fishing mortality rates exceeds that associated with a 30% static SPR.

A stock is overfished when the transitional SPR is less than 20%.

Spiny Lobster (Caribbean) - Overfishing and overfished definitions have been approved under post-SFA guidelines (70FR62073).

Overfishing is defined as a fishing mortality rate that exceeds $MFMT = F_{MSY}$. When the data needed to determine F_{MSY} are not available, use natural mortality (M) as a proxy for F_{MSY} .

Overfished is defined as a stock size less than $MSST$ is set = $B_{MSY}(1-c)$; where c = the natural mortality rate (M) or 0.50, whichever is smaller.

Queen Conch Resources of Puerto Rico and the U.S. Virgin Islands - The following species are included for data collection purposes only: **Atlantic Triton's Trumpet, Cameo Helmet, Green Star Shell, Hawkwing Conch, Milk Conch, Roostertail Conch, West Indian Fighting Conch, and True Tulip.**

Queen Conch -

Overfishing and overfished definitions have been approved under post-SFA guidelines (70FR62073). Overfishing is defined as a fishing mortality rate that exceeds $MFMT = F_{MSY}$.

Overfished is defined as a stock size less than $MSST$ is set = $B_{MSY}(1-c)$; where c = the natural mortality rate (M) or 0.50, whichever is smaller.

Reef Fish Fishery of Puerto Rico and the U.S. Virgin Islands – Species in the Caribbean are included in the following units.

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Snappers -- (Unit 1) Silk snapper, Blackfin Snapper, Black Snapper, Vermilion Snapper; (Unit 2) Queen Snapper, Wenchman; (Unit 3) Gray Snapper, Lane Snapper, Mutton Snapper, Dog Snapper, Schoolmaster, Mahogany Snapper; (Unit 4) Yellowtail Snapper.

Sea Basses and Groupers -- (Unit 1) Nassau Grouper; (Unit 2) Goliath Grouper; (Unit 3) Red Hind, Coney, Rock Hind, Graysby, Creole-fish; (Unit 4) Red Grouper, Yellowedge Grouper, Misty Grouper, Tiger Grouper, Yellowfin Grouper.

Grunts -- White grunt, Margate, Tomtate, Bluestriped Grunt, French Grunt, Porkfish.

Goatfishes -- Spotted Goatfish, Yellow Goatfish.

Porgies -- Jolthead Porgy, Sea Bream, Sheepshead Porgy, Pluma.

Squirrelfishes -- Blackbar Soldierfish, Bigeye, Longspine Squirrelfish, Squirrelfish.

Tilefishes -- Blackline Tilefish, Sand Tilefish.

Jacks -- Blue Runner, Horse-eye Jack, Black Jack, Almaco Jack, Bar Jack, Greater Amberjack, Yellow Jack.

Parrotfishes -- Blue Parrotfish, Midnight Parrotfish, Princess Parrotfish, Queen Parrotfish, Rainbow Parrotfish, Redfin Parrotfish, Redtail Parrotfish, Stoplight Parrotfish, Redband Parrotfish, Striped Parrotfish.

Surgeonfishes -- Blue Tang, Ocean Surgeonfish, Doctorfish.

Triggerfishes -- Ocean Triggerfish, Queen Triggerfish, Sargassum Triggerfish.

Filefishes -- Scrawled Filefish, Whitespotted Filefish, Black Durgon.

Boxfishes -- Honeycomb Cowfish, Scrawled Cowfish, Trunkfish, Spotted Trunkfish, Smooth Trunkfish.

Wrasses -- Hogfish, Puddingwife, Spanish Hogfish.

Angelfishes - Queen Angelfish, Gray Angelfish, French Angelfish.

Overfishing and overfished definitions have been approved under post-SFA guidelines (70FR62073). Overfishing is defined as a fishing mortality rate that exceeds $MFMT = F_{MSY}$.

For Caribbean reef fish excluding those species retained for data collection purposes, overfished is defined as a stock size less than $MSST$ is set = $B_{MSY}(1-c)$; where c = the natural mortality rate (M) or 0.50, whichever is smaller.

Aquarium Trade --The following aquarium trade species are included for data collection purposes only: Frogfish, Flamefish, Conchfish, Redlip Blenny, Peacock Flounder, Longsnout Butterflyfish, Foureye Butterflyfish, Spotfin Butterflyfish, Banded Butterflyfish, Redspotted Hawkfish, Flying Gurnard, Atlantic Spadefish, Neon Goby, Rusty Goby, Royal Gramma, Creole Wrasse, Yellowcheek Wrasse, Yellowhead Wrasse, Clown Wrasse, Pearly Razorfish, Green Razorfish, Bluehead Wrasse, Chain Moray, Green Moray, Goldentail Moray, Batfish, Goldspotted Eel, Yellowhead Jawfish, Dusky Jawfish, Cherubfish, Rock Beauty, Sergeant Major, Blue Chromis, Sunshinefish, Yellowtail Damsel, Dusky Damsel, Beaugregory, Bicolor Damsel, Threespot Damsel, Glasseye Snapper, High-hat, Jackknife-fish, Spotted Drum, Scorpionfishes, Butter Hamlet, Swissguard Basslet, Greater Soapfish, Orangeback Bass, Lantern Bass, Tobaccodfish,

Harlequin Bass, Chalk Bass, Caribbean Tonguefish, Seahorses, Pipefishes, Sand Diver, Sharpnose Puffer, Porcupinefish, Trumpetfish, and Cardinal Soldierfish.

Corals and Reef Associated Invertebrates of Puerto Rico and the U.S. Virgin Islands – For species managed in the Coral Reef FMP, MSY = 0. MFMT and ABC = 0. NMFS determined that the available data are inadequate or insufficient for providing a defensible and meaningful estimate of MSST for managed species in the Coral Reef FMP. The following taxa are included for data collection purposes only:

I. Coelenterates--Phylum Coelenterata

A. Hydrocorals--Class Hydrozoa; 1. Hydroids--Order Athecatae; Family Milleporidae; *Millepora spp.*, Fire Corals; Family Styasteridae, *Styaster roseus*, Rose Lace Corals

B. Anthozoans--Class Anthozoa;

1. Soft Corals--Order Alcyonacea

Family Anthothelidae; *Erythropodium caribaeorum*, Encrusting Gorgonian *Iciligorgia schrammi*, Deepwater Sea Fan; Family Briaridae *Briareum asbestinum*, Corky Sea Finger; Family Clavulariidae *Carijoa riisei*, *Telesto spp.*;

2. Gorgonian Corals--Order Gorgonacea; Family Ellisellidae, *Ellisella spp.*, Sea Whips; Family Gorgoniidae; *Gorgonia flabellum*, Venus Sea Fan, *G. mariae*, Wide-mesh Sea Fan, *G. ventalina*, Common Sea Fan, *Pseudopterogorgia acerosa*, Sea Plume, *P. albatrossae*, *P. americana*, Slimy Sea Plume, *P. bipinnata*, Bipinnate Plume, *P. rigida*, *Pterogorgia anceps*, Angular Sea Whip, *P. citrina*, Yellow Sea Whip; Family Plexauridae; *Eunicea calyculata*, Warty Sea Rod, *E. clavigera*, *E. fusca*, Doughnut Sea Rod, *E. knighti*, *E. laciniata*, *E. laxispica*, *E. mammosa*, Swollen-knob, *E. succinea*, Shelf-knob Sea Rod, *E. touneforti*, *Muricea atlantica*, *M. elongata*, Orange Spiny Rod, *M. laxa*, Delicate Spiny Rod, *M. muricata*, Spiny Sea Fan, *M. pinnata*, Long Spine Sea Fan, *Muriceopsis spp.*, *M. flavida*, Rough Sea Plume, *M. sulphurea*, *Plexaura flexuosa*, Bent Sea Rod, *P. homomalla*, Black Sea Rod, *Plexaurella dichotoma*, Slit-pore Sea Rod, *P. fusifera*, *P. grandiflora*, *P. grisea*, *P. nutans*, Giant slit-pore, *Pseudoplexaura cruces*, *P. flagellosa*, *P. porosa*, Porous Sea Rod, *P. wagnaari*;

3. Hard Corals--Order Scleractinia; Family Acroporidae; *Acropora cervicornis*, Staghorn Coral, *A. palmata*, Elkhorn Coral, *A. prolifera*, Fused Staghorn; Family Agaricidae; *Agaricia agaricities*, Lettuce Leaf Coral, *A. fragilis*, Fragile Saucer, *A. lamarcki*, Lamarck's Sheet, *A. tenuifolia*, Thin Leaf Lettuce, *Leptoseris cucullata*, Sunray Lettuce; Family Astrocoeniidae; *Stephanocoenia michelinii*, Blushing Star; Family Caryophyllidae; *Eusmilia fastigiata*, Flower Coral, *Tubastrea aurea*, Cup Coral; Family Faviidae; *Cladocora arbuscula*, Tube Coral, *Colpophyllia natans*, Boulder Coral, *Diploria clivosa*, Knobby Brain Coral, *D. labyrinthiformis*, Grooved Brain, *D. strigosa*, Symmetrical Brain, *Favia fragum*, Golfball Coral, *Manicina*

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areolata, Rose Coral, *M. mayori*, Tortugas Rose Coral, *Montastrea annularis*, Boulder Star Coral, *M. cavernosa*, Great Star Coral, *Solenastrea bournoni*, Smooth Star Coral; Family Meandrinidae; *Dendrogyra cylindrus*, Pillar Coral, *Dichocoenia stelleris*, Pancake Star, *D. stokesi*, Elliptical Star, *Meandrina meandrites*, Maze Coral; Family Mussidae; *Isophyllastrea rigida*, Rough Star Coral, *Isophyllia sinuosa*, *Sinuosa cactus*, *Mussa angulosa*, Large Flower Coral, *Mycetophyllia aliciae*, Thin Fungus Coral, *M. danae*, Fat Fungus Coral, *M. ferox*, Grooved Fungus, *M. lamarckiana*, Fungus Coral, *Scolymia cubensis*, Artichoke Coral, *S. lacera*, Solitary Disk; Family Oculinidae; *Oculina diffusa*, Ivory Bush Coral; Family Pocilloporidae; *Madracis decactis*, Ten-ray Star Coral, *M. mirabilis*, Yellow Pencil; Family Poritidae; *Porites astreoides*, Mustard Hill Coral, *P. branneri*, Blue Crust Coral, *P. divaricata*, Small Finger Coral, *P. porites*, Finger Coral; Family Rhizangiidae; *Astrangia solitaria*, Dwarf Cup Coral, *Phyllangia americana*, Hidden Cup Coral; Family Siderastreidae; *Siderastrea radians*, Lesser Starlet, *S. siderea*, Massive Starlet;

4. Black Corals--Order Antipatharia; *Antipathes spp.*, Bushy Black Coral, *Stichopathes spp.*, Wire Coral;

II. Sea Grasses--Phylum Angiospermae; *Halodule wrightii*, Shoal Grass, *Halophila spp.*, Sea Vines, *Ruppia maritima*, Widgeon Grass, *Syringodium filiforme*, Manatee Grass, *Thalassia testudium*, Turtle Grass.

Aquarium Trade Species in the Coral FMP--The following taxa are included for data collection purposes only:

I. Sponges--Phylum Porifera

A. Demosponges--Class Demospongiae; *Aphimedes compressa*, Erect Rope Sponge, *Chondrilla nucula*, Chicken Liver Sponge, *Cynachirella alloclada*, *Geodia neptuni*, Potato Sponge, *Haliclona spp.*, Finger Sponge, *Myriastras spp.*, *Niphates digitalis*, Pink Vase Sponge, *N. erecta*, Lavender Rope Sponge, *Spinoseella policifera*, *S. vaginalis*, *Tethya crypta*;

II. Coelenterates--Phylum Coelenterata

A. Anthozoans--Class Anthozoa

1. Anemones--Order Actiniaria; *Aiptasia tagetes*, Pale Anemone, *Bartholomea annulata*, Corkscrew Anemone, *Condylactis gigantea*, Giant Pink-tipped Anemone, *Hereractis lucida*, Knobby Anemone, *Lebrunia spp.*, Staghorn Anemone, *Stichodactyla helianthus*, Sun Anemone;
2. Colonial Anemones--Order Zoanthidea; *Zoanthus spp.*, Sea Mat;
3. False Corals--Order Corallimorpharia; *Discosoma spp.* (formerly *Rhodactis*), False Coral; *Ricordia florida*, Florida False Coral;

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III. Annelid Worms--Phylum Annelida; Polychaetes--Class Polychaeta; Family Sabellidae, Feather Duster Worms, *Sabellastarte* spp., Tube Worms, *S. magnifica*, Magnificent Duster; Family Serpulidae; *Spirobranchus giganteus*, Christmas Tree Worm;

IV. Mollusks--Phylum Mollusca;

A. Gastropods--Class Gastropoda; Family Elysiidae; *Tridachia crispata*, Lettuce Sea Slug; Family Olividae; *Oliva reticularis*, Netted Olive; Family Ovulidae; *Cyphoma gibbosum*, Flamingo Tongue;

B. Bivalves--Class Bivalvia; Family Limidae; *Lima* spp., Fileclams, *L. scabra*, Rough Fileclam; Family Spondylidae; *Spondylus americanus*, Atlantic Thorny Oyster;

C. Cephalopods--Class Cephalopoda; Octopuses--Order Octopoda; Family Octopodidae; *Octopus* spp. (except the Common octopus, *O. vulgaris*);

V. Arthropods--Phylum Arthropoda; A. Crustaceans--Subphylum Crustacea; Decapods--Order Decapoda; Family Alpheidae; *Alpheus armatus*, Snapping Shrimp; Family Diogenidae; *Paguristes* spp., Hermit Crabs, *P. cadenati*, Red Reef Hermit; Family Grapsidae; *Percnon gibbesi*, Nimble Spray Crab; Family Hippolytidae; *Lysmata* spp., Peppermint Shrimp, *Thor amboinensis*, Anemone Shrimp; Family Majidae, Coral crabs, *Mithrax* spp., Clinging crabs, *M. cinctimanus*, Banded Clinging, *M. sculptus*, Green clinging, *Stenorhynchus seticornis*, Yellowline Arrow; Family Palaemonida; *Periclimenes* spp., Cleaner Shrimp; Family Squillidae, Mantis Crabs, *Gonodactylus* spp., *Lysiosquilla* spp.; Family Stenopodidae, Coral Shrimp, *Stenopus hispidus*, Banded Shrimp, *S. scutellatus*, Golden Shrimp;

VI. Echinoderms--Phylum Echinodermata;

A. Feather Stars--Class Crinoidea

***Analcidometra armata*, Swimming Crinoid, *Davidaster* spp., Crinoids, *Nemaster* spp., Crinoids;**

B. Sea Stars--Class Asteroidea; *Astropecten* spp., Sand Stars, *Linckia guildingii*, Common Comet Star, *Ophidiaster guildingii*, Comet Star, *Oreaster reticulatus*, Cushion Sea Star;

C. Brittle and Basket Stars--Class Ophiuroidea; *Astrophyton muricatum*, Giant Basket Star, *Ophiocoma* spp., Brittlestars, *Ophioderma* spp., Brittlestars, *O. rubicundum*, Ruby Brittlestar;

D. Sea Urchins--Class Echinoidea; *Diadema antillarum*, Long-spined Urchin, *Echinometra* spp., Purple Urchin, *Eucidaris tribuloides*, Pencil Urchin, *Lytechinus* spp., Pin Cushion Urchin, *Tripneustes ventricosus*, Sea Egg,

E. Sea Cucumbers--Class Holothuroidea; *Holothuria* spp., Sea Cucumbers;

VII. Chordates--Phylum Chordata

A. Tunicates--Subphylum Urochordata

Coastal Pelagics Species - The following overfishing definitions have been fully approved under SFA guidelines and were used to make the assessments contained in this report. For Pacific (Chub) Mackerel, Pacific Sardine, and Market Squid, the definition contains both an F and a B component. For Jack Mackerel and Northern Anchovy (Central subpopulation), the overfishing definition contains only an F component. There are no overfishing and overfished definitions for Northern Anchovy (Northern subpopulation).

Pacific (Chub) Mackerel, Pacific Sardine - In operational terms, overfishing occurs whenever catch exceeds ABC, which is the annual value of the MSY control rule adopted for Pacific mackerel and Pacific sardine, which are actively managed species under the Coastal Pelagic Species FMP.

A stock is overfished when the biomass level is low enough to jeopardize the capacity of the stock to produce MSY on a continuing basis. For Pacific (Chub) Mackerel, the stock is overfished if the stock biomass is 18,200 mt or less. For Pacific Sardine, the stock is overfished if the 1+ stock biomass on July 1 is 50,000 mt or less.

Market Squid - In operational terms, overfishing occurs when market squid are harvested at a rate or level that results in egg escapement falling below 30 percent of the potential maximum level. The fishery is monitored real time and the catch is examined to estimate the reproductive output of the harvested population and compare it to the output of the population in the absence of fishing.

A stock is overfished when the ratio of egg escapement compared to the potential maximum level results in a ratio below 30 percent. If a stock is declared overfished, fishing ceases until the next year.

Jack Mackerel, Northern Anchovy (Central subpopulation) - In operational terms, overfishing occurs whenever catch exceeds ABC, which, based on the default MSY control rule used for monitored species, is set at 25% of estimated MSY.

There is no threshold level of stock biomass defining overfished.

Northern Anchovy (Northern subpopulation) - No overfishing or overfished definitions exist in the FMP.

West Coast Highly Migratory Species - The following overfishing definitions have been fully approved under SFA guidelines. The definitions contain both an F and a B component.

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Yellowfin Tuna (Eastern Pacific), Skipjack Tuna (Eastern Pacific), Striped Marlin (Eastern Pacific) - Overfishing occurs when F is greater than $F_{MSY} B / c B_{MSY}$ if the stock biomass (B) is less than or equal to $c B_{MSY}$, or when F is greater than F_{MSY} if the stock biomass (B) is greater than $c B_{MSY}$, where c is equal to the greater of 1 minus the natural mortality rate (M) and 0.5. The most current estimates of M are taken from the FMP and published reports. The values of M are as follows: Yellowfin Tuna (Eastern Pacific) ($M=0.8$), Skipjack Tuna (Eastern Pacific) ($M=1.5$). The latest estimates of F/F_{MSY} are as follows: Yellowfin Tuna (Eastern Pacific) ($F_{2003}/F_{MSY} = 0.89$), Skipjack Tuna (Eastern Pacific) ($F_{2003}/F_{MSY} < 1$), Striped Marlin (Eastern Pacific) ($F_{2001}/F_{MSY} < 1$).

A stock is overfished when stock biomass (B) is less than $c B_{MSY}$, where c is equal to the greater of 1 minus the natural mortality rate (M) and 0.5. The most current estimates of M are taken from the FMP and published reports. The values of M are as follows: Yellowfin Tuna (Eastern Pacific) ($M=0.8$), Skipjack Tuna (Eastern Pacific) ($M=1.5$). The latest estimates of B/B_{MSY} are as follows: Yellowfin Tuna (Eastern Pacific) ($B_{2003}/B_{MSY}=0.79$), Skipjack Tuna (Eastern Pacific) ($B_{2003}/B_{MSY} > 1$), and Striped Marlin (Eastern Pacific) ($B_{2001}/B_{MSY} > 1$).

Pelagic Fisheries of the Western Pacific and West Coast Highly Migratory Species - The following overfishing definitions have been fully approved under SFA guidelines. The definitions contain both an F and a B component.

Albacore (North Pacific), Bigeye Tuna (Pacific), Swordfish (North Pacific), Dolphinfin (Dorado or Mahimahi) (Pacific), Bluefin Tuna (Pacific), Common Thresher Shark (North Pacific), Blue Shark (North Pacific), Bigeye Thresher Shark (North Pacific), Pelagic Thresher Shark (North Pacific), Shortfin Mako Shark (North Pacific) - Overfishing occurs when F is greater than $F_{MSY} B / c B_{MSY}$ if the stock biomass (B) is less than or equal to $c B_{MSY}$, or when F is greater than F_{MSY} if the stock biomass (B) is greater than $c B_{MSY}$, where c is equal to the greater of 1 minus the natural mortality rate (M) and 0.5. In the case of the Pelagic Fisheries of the Western Pacific, the best estimates of M are published annually in the SAFE report. The latest published estimates of M are as follows: Bigeye Tuna (Pacific) ($M = 0.4$), Swordfish (North Pacific) ($M = 0.2$). In the case of the West Coast Highly Migratory Species, the most current estimates of M are taken from the FMP and published reports: Bigeye Tuna (Pacific) ($M=0.4$). The latest estimates of F/F_{MSY} are as follows: Bigeye Tuna (Central Western Pacific): $F_{2004}/F_{MSY} = 1.23$; Eastern Pacific: $F_{2004}/F_{MSY} = 1.75$; Swordfish (North Pacific) $F_{2002}/F_{MSY} = 0.33$, Blue Shark (North Pacific) $F_{1998}/F_{MSY} = 0.01$.

A stock is overfished when stock biomass (B) is less than $c B_{MSY}$, where c is equal to the greater of 1 minus the natural mortality rate (M) and 0.5. In the case of the Pelagic Fisheries of the Western Pacific, the best estimates of M are published annually in the SAFE report. The latest published estimates of M are as follows: Bigeye Tuna (Pacific) ($M = 0.4$), Swordfish (North Pacific) ($M = 0.2$). In the case of the West Coast Highly Migratory Species, the most current estimates of M are taken from the FMP and published reports. The latest estimates of B/B_{MSY} are as follows: The latest estimates of B/B_{MSY} are as follows: Bigeye Tuna (Central Western Pacific):

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$B_{2004}/B_{MSY} = 1.25$; Eastern Pacific: $B_{2004}/B_{MSY} = 0.76$; Pacific: $B_{2001}/B_{MSY} = 1.26$, Swordfish (North Pacific) $B_{2002}/B_{MSY} = 1.75$, Blue Shark (North Pacific) $B_{1999}/B_{MSY} = 1.9$.

Pelagic Fisheries of the Western Pacific - The following overfishing definitions have been fully approved under SFA guidelines. The definitions contain both an F and a B component.

Yellowfin Tuna (Central Western Pacific), Skipjack Tuna (Central Western Pacific), Striped Marlin (Central Western Pacific), Albacore (South Pacific), Indo-Pacific Blue Marlin (Pacific), Shortbill Spearfish (Pacific), Wahoo (Pacific), Kawakawa (Tropical Pacific), Moonfish (Opah) (Pacific), other tuna relatives (*Auxis* spp., *Scomber* spp., and *Allothunnus* spp.) (Tropical Pacific), Black Marlin (Pacific), Pomfrets (Pacific), Sailfish (Pacific), Oilfish family (Western Pacific), Longfin Mako Shark (North Pacific), Silky Shark (Tropical Pacific), Oceanic Whitetip Shark (Tropical Pacific), Salmon Shark (North Pacific) - Overfishing occurs when F is greater than $F_{MSY} B / c B_{MSY}$ if the stock biomass (B) is less than or equal to $c B_{MSY}$, or when F is greater than F_{MSY} if the stock biomass (B) is greater than $c B_{MSY}$, where c is equal to the greater of 1 minus the natural mortality rate (M) and 0.5. The best estimates of M are published annually in the SAFE report. The latest published estimates of M are as follows: Yellowfin Tuna (Central Western Pacific) (M = 0.8-1.6), Skipjack Tuna (Central Western Pacific) (M > 0.5), Albacore (South Pacific) (M = 0.3), Indo-Pacific Blue Marlin (Pacific) (M = 0.2). The latest estimates of F/ F_{MSY} are as follows: Yellowfin Tuna (Central Western Pacific) $F_{2004}/F_{MSY} = 1.22$, Skipjack Tuna (Central Western Pacific) $F_{2004}/F_{MSY} = 0.17$, Albacore (South Pacific) $F_{2004}/F_{MSY} = 0.05$, Indo-Pacific Blue Marlin (Pacific) $F_{1997}/F_{MSY} = 0.5$.

A stock is overfished when stock biomass (B) is less than $c B_{MSY}$, where c is equal to the greater of 1 minus the natural mortality rate (M) and 0.5. The best estimates of M are published annually in the SAFE report. The latest published estimates of M are as follows: Yellowfin Tuna (Central Western Pacific) (M = 0.8-1.6), Skipjack Tuna (Central Western Pacific) (M > 0.5), Albacore (South Pacific) (M = 0.3), Indo-Pacific Blue Marlin (Pacific) (M = 0.2). The latest estimates of B/ B_{MSY} are as follows: Yellowfin Tuna (Central Western Pacific) $B_{2004}/B_{MSY} = 1.32$, Skipjack Tuna (Central Western Pacific) $B_{2004}/B_{MSY} = 3.0$, Indo-Pacific Blue Marlin (Pacific) $B_{1997}/B_{MSY} = 1.4$, Albacore (South Pacific) $B_{2002}/B_{MSY} = 1.69$.

Crustaceans of the Western Pacific - The following overfishing definitions have been fully approved under SFA guidelines. The definitions contain both an F and a B component.

Lobster complexes (Red and Green spiny lobster and Common, Chinese, and Giant slipper lobster) of the Northwestern Hawaiian Islands - The lobster stock complex is assessed as multi-species stock complexes or as individual species, depending on the data and stock assessment tools available.

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Overfishing occurs when F is greater than $F_{MSY} B / B_{MSY}$ if the stock biomass (B) is less than or equal to B_{MSY} , or when F is greater than F_{MSY} if the stock biomass (B) is greater than B_{MSY} . The fishery in the EEZ for the stock complex in the Northwestern Hawaiian Islands is closed.

A stock is overfished when stock biomass (B) is less than $c B_{MSY}$, where c is equal to the greater of 1 minus the natural mortality rate (M) and 0.5. The best estimates of M are published annually in the SAFE report; no estimates have yet been published.

Lobster complexes (Red and Green spiny lobster and Common, Chinese, and Giant slipper lobster) of areas other than the Northwestern Hawaiian Islands – No overfishing or overfished definitions exist in the FMP.

Kona Crab of the Hawaiian Archipelago - No overfishing or overfished definitions exist in the FMP.

Western Pacific Precious Corals - The following overfishing definitions have been fully approved under SFA guidelines and were used to make the assessments contained in this report. The definitions contain both an F and a B component. Assessments are made for individual coral beds for which adequate data are available.

Pink Corals (*Corallium secundum*, *Corallium regale*, *Corallium laauense*), **Gold Corals** (*Gerardia* spp., *Callogorgia gilberti*, *Narella* spp., *Calyptrophora* spp.), **Bamboo Corals** (*Lepidisis olapa*, *Acanella* spp.), **Black Corals** (*Antipathes grandis*, *Antipathes dichotoma*, *Antipathes ulex*) – The precious corals stocks are assessed as part of multi-species complexes: the precious corals multi-species complex in the Makapu‘u Bed, the precious corals multi-species complexes in the Conditional Beds, and the black coral complex in the Au‘au Bed. Overfishing occurs when F is greater than 0.066. There has been no fishing for precious corals at the Makapu‘u Bed since 2001.

A stock is overfished when the ratio of the total spawning stock biomass for all species combined to the estimated unfished total spawning stock biomass for all species combined (SPR) is less than 0.3, based on cohort analysis of the pink coral, *Corallium secundum*.

Bottomfish and Seamount Groundfish of the Western Pacific - The following overfishing definitions have been fully approved under SFA guidelines. The definitions contain both an F and a B component.

Bottomfish: **Seabass** (*hapu upuu*), **Squirrelfish Snapper** (*ehu*), **Red Longtail Snapper** (*onaga*), **Silver Jaw Jobfish** (*lehi*), **Gray Jobfish** (*uku*), **Blueline Snapper** (*taape*), **Yellowtail Snapper** (*yellow tail kalekale*), **Crimson Jobfish** (*opakapaka*), **Yelloweye Snapper** (*yelloweye opakapaka*), **Von Siebolds snapper** (*kalekale*), **Oblique-banded snapper** (*gindai*), **Giant Trevally** (*white ulua*), **Black Trevally** (*black ulua*), **Thick Lipped Trevally** (*pig ulua*),

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Amberjack (*kahala*), Blacktip Grouper, Lunartail Grouper, Ambon Emperor (*mafuti*), Redgill Emperor (*mafuti*) - The bottomfish stocks are assessed as multi-species stock complexes, one complex for each of American Samoa, Guam, the Hawaiian Archipelago, and the Northern Mariana Islands.

Overfishing occurs when F is greater than $F_{MSY} B / c B_{MSY}$ if the stock biomass (B) is less than or equal to $c B_{MSY}$, or when F is greater than F_{MSY} if the stock biomass (B) is greater than $c B_{MSY}$, where c is equal to the greater of 1 minus the natural mortality rate (M) and 0.5. Effort (E) is used as a proxy for F . The best estimates of M are published annually in the SAFE report. The latest estimates of M are as follows: American Samoa complex ($M = 0.3$), Guam complex ($M = 0.3$), Hawaiian Archipelago complex ($M = 0.3$). The latest estimates of E/E_{MSY} are as follows: American Samoa complex ($E/E_{MSY} = 0.14$), Hawaiian Archipelago complex ($E/E_{MSY} = 1.14-1.35$).

A stock is overfished when stock biomass (B) is less than $c B_{MSY}$, where c is equal to the greater of 1 minus the natural mortality rate (M) and 0.5. CPUE is used as a proxy for B . The best estimates of M are published annually in the SAFE report. The latest estimates of M are as follows: American Samoa complex ($M = 0.3$), Guam complex ($M = 0.3$), Hawaiian Archipelago complex ($M = 0.3$). The latest estimates of $CPUE/CPUE_{MSY}$ are as follows: American Samoa complex ($CPUE/CPUE_{MSY} = 2.42$), Hawaiian Archipelago complex ($CPUE/CPUE_{MSY} = 0.72-0.86$), and Northern Mariana Islands ($CPUE/CPUE_{MSY} = 1.36$).

Seamount Groundfish: **Pelagic Armorhead, Alfonsin, Raftfish** - The seamount groundfish stocks of the Hancock Seamounts are assessed as a multi-species complex, using pelagic armorhead as an indicator species.

Overfishing occurs when F is greater than $F_{MSY} B / c B_{MSY}$ if the stock biomass (B) is less than or equal to $c B_{MSY}$, or when F is greater than F_{MSY} if the stock biomass (B) is greater than $c B_{MSY}$, where c is equal to the greater of 1 minus the natural mortality rate (M) and 0.5. The best estimates of M are published annually in the SAFE report; no estimates have yet been published.

A stock is overfished when stock biomass (B) is less than $c B_{MSY}$, where c is equal to the greater of 1 minus the natural mortality rate (M) and 0.5. The best estimates of M are published annually in the SAFE report; no estimates have yet been published. It should be noted that although this definition has been fully approved under SFA guidelines, no assessment has yet been made relative to these criteria. The most recent assessment is based on pre-SFA criteria, which are as follows: A stock is overfished when its SPR is equal to or less than 0.20.

Coral Reef Ecosystems of the Western Pacific - The following overfishing definitions have been fully approved under SFA guidelines. The definitions contain both an F and a B component.

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The coral reef ecosystem stocks are assessed as multi-species stock complexes, one complex for each of American Samoa, Northern Marianas, Guam, the Hawaiian Archipelago, and the Pacific Remote Island Areas, but stocks are assessed individually in cases where adequate data are available. Adequate data may be available for the Bigeye Scad and Mackerel Scad stocks of the Hawaiian Archipelago but assessments are pending.

Overfishing occurs when the fishing mortality rate (F) is greater than $F_{MSY} B / c B_{MSY}$ if the stock biomass (B) is less than or equal to $c B_{MSY}$, or when F is greater than F_{MSY} if B is greater than $c B_{MSY}$, where c is equal to the greater of 1 minus the natural mortality rate (M) and 0.5. Effort (E) is used as a proxy for F . A value of 0.3 is used for M , but this value is subject to change by stock and by year.

A stock is overfished when stock biomass (B) is less than $c B_{MSY}$, where c is equal to the greater of 1 minus the natural mortality rate (M) and 0.5. Catch-per-unit-effort (CPUE) is used as a proxy for B . A value of 0.3 is used for M , but this value is subject to change by stock and by year.

West Coast Salmon - The following overfishing definition was approved under post-SFA guidelines and was used to make the assessments contained in this report. This definition was used to make determinations for both the fishing mortality rate and stock level.

CALIFORNIA CENTRAL VALLEY CHINOOK (includes Sacramento River Fall, Sacramento River Spring, and Sacramento River Winter), NORTHERN CALIFORNIA COAST CHINOOK (includes Eel, Mattole, Mad, and Smith Rivers, Klamath River Fall, and Klamath River Spring), OREGON COAST CHINOOK (includes Southern Oregon, and Central and Northern Oregon), COLUMBIA RIVER BASIN CHINOOK (includes North Lewis River Fall, Lower River Hatchery Fall, Lower River Hatchery Spring, Upper Willamette Spring, Mid-River Bright Hatchery (Fall), Spring Creek Hatchery (Fall), Klickitat, Warm Springs, John Day, and Yakima Rivers (Spring), Snake River Fall, Snake River Spring / Summer, Upper River Bright (Fall), Upper River Summer, and Upper River Spring), WASHINGTON COAST CHINOOK (includes Willapa Bay Fall (natural), Willapa Bay Fall (hatchery), Grays Harbor Fall, Grays Harbor Spring, Quinault Fall, Queets Fall, Queets Spring / Summer, Hoh Fall, Hoh Spring / Summer, Quillayute Fall, Quillayute Spring / Summer, and Hoko Summer / Fall), PUGET SOUND CHINOOK (includes Eastern Strait of Juan de Fuca Summer / Fall, Skokomish Summer / Fall (Hood Canal), Nooksack Spring (early), Skagit Summer / Fall, Skagit Spring, Stillaguamish Summer / Fall, Snohomish Summer / Fall, Cedar River Summer / Fall (Lake Washington), White River Spring, Green River Summer / Fall, and Nisqually River Summer / Fall (South Puget Sound)), SOUTHERN BRITISH COLUMBIA CHINOOK (includes Coastal Stocks, and Fraser River), OREGON PRODUCTION INDEX AREA COHO (includes Central California Coast, Northern California, Oregon Coastal Natural, Columbia River Late (Hatchery), Columbia River Early (Hatchery), and Columbia River (Natural)), WASHINGTON COASTAL COHO (includes Willapa Bay (Hatchery), Grays Harbor,

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Quinault (Hatchery), Queets, Hoh, Quillayute Fall, Quillayute Summer (Hatchery), and Western Strait of Juan deFuca), PUGET SOUND COHO (includes Eastern Strait of Juan de Fuca, Hood Canal, Skagit, Stillaguamish, Snohomish, South Puget Sound (Hatchery)), SOUTHERN BRITISH COLUMBIA COAST COHO (includes Coastal Stocks, and Fraser River) and PINK (ODD-NUMBERED YEARS) (includes PUGET SOUND, and Fraser River) - With NMFS approval of Amendment 14 to the Pacific Coast Salmon Plan (Salmon FMP) on September 27, 2000, the Pacific Fishery Management Council's (PFMC) criteria for an overfishing concern are met if, in three consecutive years, the post-season estimates indicate a natural stock has fallen short of its conservation objective (MSY, maximum sustainable production (MSP₂), or spawner floor as noted for some harvest rate objectives) as listed in Table 3-1 of the Salmon FMP. It is possible that a failure to meet conservation objectives for three consecutive years could result from normal variation, as has been seen in the past for several previously referenced salmon stocks which were reviewed under the PFMC's former overfishing definition. However, the occurrence of three consecutive years of reduced stock size or spawner escapements, depending on the magnitude of the short-fall, may signal the beginning of a critical downward trend which may result in fishing that jeopardizes the capacity of the stock to produce MSY over the long term if appropriate actions are not taken.

Chinook salmon (*Oncorhynchus tshawytscha*) and coho salmon (*O. kisutch*) are the main species caught in PFMC-managed ocean salmon fisheries. In odd-numbered years, catches of pink salmon (*O. gorbuscha*) can also be significant, primarily off Washington and Oregon. Therefore, while all species of salmon fall under the jurisdiction of this plan, it currently contains conservation objectives only for chinook, coho, pink (odd-numbered years only), and any salmon species listed under the Endangered Species Act (ESA) that is measurably impacted by PFMC fisheries. To the extent practicable, the Council has partitioned this coastwide aggregate of chinook, coho and pink salmon into various stock components with specific conservation objectives. A detailed listing of the individual stocks or stock complexes managed under the Salmon FMP, along with pertinent stock information and conservation objectives, is provided in Chapter 3 of the Salmon FMP.

The Salmon FMP contains no fishery management objectives for **even-numbered year pink salmon, chum (*O. keta*), sockeye (*O. nerka*), steelhead (*O. mykiss*), or sea-run cutthroat (*O. clarki*)**. The PFMC does not manage fisheries for these species and incidental catches are inconsequential (low hundreds of fish each year) to very rare. Stocks without specified goals in the FMP are also provided significant protection against overfishing because the PFMC bases its management on the stock which is first reduced to its annual specified goal level by the fisheries. Such a stock could be the weakest stock or an abundant stock that is heavily impacted by ocean salmon fisheries.

To achieve optimum yield, prevent overfishing, and assure rebuilding of salmon stocks whose abundance has been depressed to an overfished level, the Salmon FMP establishes, to the extent practicable, conservation objectives to perpetuate the coastwide aggregate of salmon stocks covered by the Salmon FMP. The PFMC's stock conservation objectives (to be achieved annually) and other pertinent stock management information are contained in Table 3-1 of the

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Salmon FMP. Specific objectives are listed for natural and hatchery stocks that are part of the PFMC's preseason fishery option development process, including all stocks listed under the federal ESA. The objectives may be applicable to a single stock or a complex of interrelated stocks (those sharing similarities in life-history traits, geographic distribution, habitat preferences and genetic characteristics). Stocks that are not included in the preseason analyses may lack specific conservation objectives because the stock is not significantly impacted by ocean fisheries or insufficient management information is available from which to assess ocean fishery impacts directly. In the latter case, the conservation objective for a managed stock may serve to provide for the conservation of a closely related stock unless, or until, more specific management information can be developed.

The PFMC's conservation objectives for natural stocks may (1) be based on estimates for achieving MSY, an MSY proxy, or MSP₂, or (2) represent special data gathering or rebuilding strategies to approach MSY, which could be used to eventually develop MSY or MSP₂ objectives. The objectives have generally been developed through extensive analysis by the fishery management entities with direct management authority for the stock, or through joint efforts coordinated through the PFMC, or with other state, tribal or federal entities. Details of the conservation objectives are available in PFMC (1984), in individual amendment documents, and as referenced in Table 3-1. Most of the objectives for stocks north of Cape Falcon, Oregon, have been included in U.S. District Court orders. Under those orders for Washington coastal and Puget Sound stocks (U.S. v. Washington, 626 F. Supp. 1405 [1985] and Hoh v. Baldrige No. 81-742 [R] C), the treaty tribes and Washington Department of Fish and Wildlife may agree to annual spawner targets that differ from Salmon FMP objectives.

The Salmon FMP contains three exceptions to the application of overfishing criteria and subsequent PFMC actions for stocks or stock complexes with conservation objectives in Table 3-1: (1) hatchery stocks, (2) stocks for which PFMC management actions have inconsequential impacts, and (3) stocks listed under the ESA.

Salmon stocks important to ocean fisheries and comprised exclusively of hatchery production generally have conservation objectives expressed as an egg-take or the number of spawners returning to the hatchery rack to meet program objectives. The Salmon FMP recognizes these objectives and strives to meet them. However, these artificially produced stocks generally do not need the protection of overfishing criteria and special PFMC rebuilding programs to maintain long-term production. Because hatchery stocks can generally sustain significantly higher harvest exploitation rates than natural stocks, ocean fisheries rarely present a threat to their long-term survival. Therefore, hatchery stocks that meet these criteria are the first exception to the application of overfishing criteria.

Several natural stock components identified within the Salmon FMP are subject to minimal harvest impacts in PFMC fisheries because of migration timing and/or distribution and therefore are exceptions to the application of overfishing criteria. As a result, the PFMC's ability to affect the overall trend in the abundance of these components through harvest restrictions is limited. Components in this second exception are identified by a cumulative adult equivalent exploitation

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rate of less than 5% in ocean fisheries under PFMC jurisdiction during base periods utilized by the fishery regulation assessment models (1979-1982 for chinook and 1979-1981 for coho).

The PFMC regards stocks listed as endangered or threatened under the ESA as a third exception to the application of overfishing criteria of the Magnuson-Stevens Act. The ESA requires federal agencies whose actions may jeopardize listed salmon to consult with NMFS. Because NMFS implements ocean harvest regulations, it is both the action and consulting agency for actions taken under the Salmon FMP. To ensure there is no jeopardy, NMFS conducts internal consultations with respect to the effects of ocean harvest on listed salmon. The PFMC implements NMFS' guidance as necessary to avoid jeopardy, as well as in recovery plans approved by NMFS. As a result of NMFS' consultation, an incidental take statement may be issued which authorizes take of listed stocks under the FMP that would otherwise be prohibited under the ESA. The PFMC believes that the requirements of the ESA are sufficient to meet the intent of the Magnuson-Stevens Act overfishing provisions. Those provisions are structured to maintain or rebuild stocks to levels at or above MSY and require the PFMC to identify and develop rebuilding plans for overfished stocks.

Washington, Oregon, and California Groundfish - The following overfishing definition has been fully approved under SFA guidelines and was used to make the assessments contained in this report. The definition contains both a fishing mortality rate and a biomass component.

Lingcod, Pacific Ocean Perch, Bocaccio, Canary Rockfish, Cowcod, Darkblotched Rockfish, Widow Rockfish, Yelloweye Rockfish, Bank Rockfish, Shortspine Thornyhead, Longspine Thornyhead, Yellowtail Rockfish, Pacific Whiting, Sablefish, Dover Sole, English Sole, Petrale Sole, Chilipepper Rockfish, Shortbelly Rockfish, Arrowtooth Flounder, Black Rockfish (North), Silvergrey Rockfish, Pacific Cod, Butter Sole, Curlfin Sole, Flathead Sole, Pacific Sanddab, Rex Sole, Rock Sole, Sand Sole, Starry Flounder, Aurora Rockfish, Black-and-Yellow Rockfish, Blackgill Rockfish, Blue Rockfish, Bronzespotted Rockfish, Brown Rockfish, Calico Rockfish, China Rockfish, Copper Rockfish, Dusky Rockfish, Flag Rockfish, Gopher Rockfish, Grass Rockfish, Greenblotched Rockfish, Greenspotted Rockfish, Greenstriped Rockfish, Harlequin Rockfish, Honeycomb Rockfish, Kelp Rockfish, Mexican Rockfish, Olive Rockfish, Pink Rockfish, Quillback Rockfish, Redbanded Rockfish, Redstripe Rockfish, Rosethorn Rockfish, Rosy Rockfish, Roughey Rockfish, Sharpchin Rockfish, Shortraker Rockfish, Speckled Rockfish, Splitnose Rockfish, Squarespot Rockfish, Starry Rockfish, Stripetail Rockfish, Tiger Rockfish, Vermilion Rockfish, Yellowmouth Rockfish, Leopard Shark, Soupfin Shark, Spiny Dogfish, Big Skate, California Skate, Longnose Skate, Ratfish, Finescale Codling, Pacific Rattail, Cabezon, Kelp Greenling, California Scorpionfish, Treefish – Overfishing occurs when the catch exceeds the fishing mortality rate needed to produce the maximum sustainable yield (F_{MSY}) on a continual basis. The default F_{MSY} proxy used for setting acceptable biological catches (ABCs) are as follows: For flatfish and whiting $F_{40\%}$, for rockfish (including thornyheads) $F_{50\%}$, and for other groundfish such as sablefish and lingcod $F_{45\%}$.

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A stock is overfished if its current biomass is less than 25% of the unfished biomass level or if the current biomass is less than 50% of the biomass that would produce the maximum sustainable yield (MSY).

Overfishing and overfished parameters cannot be estimated for all species because of the wide range of knowledge available for the species managed under the FMP. Three categories of species are identified. The first includes the few species for which a quantitative stock assessment can be conducted on the basis of catch-at-age or other data. The second category includes a large number of species for which some biological indicators are available, but a quantitative analysis cannot be completed. The third category includes minor species that are caught, but for which there is, at best, only partial information on landed biomass.

Alaska High Seas Salmon - For the following overfishing definitions, both the F and the B components were approved under SFA guidelines, and were used to make the assessments contained in this report.

Salmon Fisheries in the EEZ off the Coast of Alaska - These overfishing definitions separate the salmon stocks caught in the southeast Alaska (SEAK) EEZ into three tiers. Tier 1 stocks are chinook stocks covered by the Pacific Salmon Treaty (PST)². The overfishing definition is based on a harvest based on a relationship between a pre-season relative abundance index generated by the Pacific Salmon Commission's Chinook Technical Committee and a harvest control rule specified in the PST. Tier 2 are coho salmon stocks. Tier 3 stocks are coho, pink, chum, and sockeye salmon stocks managed as mixed-species complexes, with coho salmon stocks as indicator stocks.

Tier 1: Chinook stocks

- 1) Under the PST, the MSY control rule consists of a segmented linear relationship between catch and relative abundance.
- 2) The fishing mortality rate for these stocks is expressed as cumulative catch per generation time.
- 3) The maximum fishing mortality threshold is 1.075 times the fishing mortality rate associated with the MSY control rule.
- 4) Should the fishing mortality rate exceed the MFMT in any year, it will be determined that the stocks are being subjected to overfishing.

²Chapter 3 of Annex IV of the Pacific Salmon Treaty (PST) as amended June 30, 1999 (also referred to as the US/Canada bilateral agreement for the Southeast Alaska all-gear chinook catch)

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- 5) The productive capacity of a stock group is measured as the sum of the indicator stocks' escapements from the most recent generation.
- 6) The minimum stock size threshold for a stock group is equal to one-half the sum of the indicator stocks' MSY escapement goals from the most recent generation, where each MSY escapement goal is set at the midpoint of the respective escapement goal range established by the Chinook Technical Committee.
- 7) Should a stock group's productive capacity fall below the MSST in any year, it will be determined that the stock group is overfished.

Tier 2: Coho stocks managed as individual units

- 1) The MSY control rule is of the "constant escapement" form. Specifically, the catch corresponding to the control rule in any given year is equal to the amount that would result in a post-harvest run size equal to the MSY escapement goal, unless the pre-harvest run size fails to exceed the MSY escapement goal, in which case the catch corresponding to the control rule is zero.
- 2) The fishing mortality rate for these stocks is expressed as an exploitation rate, and is computed as a weighted average of run-specific exploitation rates observed in the stock from the most recent generation.
- 3) The maximum fishing mortality threshold for these stocks is computed as a weighted average of run-specific exploitation rates corresponding to the MSY control rule from the most recent generation.
- 4) Should the fishing mortality rate exceed the MFMT in any year, it will be determined that the stock is being subjected to overfishing.
- 5) The productive capacity of a stock is measured as the sum of the stock's escapements from the most recent generation.
- 6) The minimum stock size threshold for a stock is equal to one-half the sum of the stock's MSY escapement goals from the most recent generation.
- 7) Should a stock's productive capacity fall below the MSST in any year, it will be determined that the stock is overfished.

Tier 3: Coho, sockeye, pink, and chum salmon stocks managed as complexes

The MSY control rule is of the "constant escapement" form. The difference with respect to Tier 2 is not the *form* of the control rule, but rather the level of aggregation at which it is applied.

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Using the same definitions and criteria described under Tier 2, a determination that one or more indicator coho stocks is being subjected to overfishing or is overfished will constitute a determination that the respective stock complex is being subjected to overfishing or is overfished, except that overfishing of one or more stocks in a stock complex may be permitted, and will not result in a determination that the entire stock complex is being subjected to overfishing, under the conditions set forth in 50 CFR §600.310(d)(6).

Pink Salmon, Sockeye Salmon, Chum Salmon, Coho Salmon - A stock is overfished if it falls below MSST in any year, which is equal to one-half the sum of the indicator coho stocks' MSY escapement goals from the most recent T coho years.

Chinook Salmon - A stock is overfished if it falls below MSST in any year, which is equal to one-half the sum of the indicator stocks' MSY escapement goals from the most recent T chin years, where each MSY escapement goal is set at the midpoint of the respective escapement goal range established by the Chinook Technical Committee under the Pacific Salmon Treaty.

Gulf of Alaska Groundfish - The following overfishing definition has been fully approved under SFA guidelines and was used to make the assessments contained in this report. All stocks are covered, either directly or indirectly, by a definition containing an F component. For a stock managed individually, coverage is direct (i.e., the definition applies to the stock itself. For stocks managed jointly, as members of a complex, coverage is indirect (i.e., the definition applies to the complex as a whole, not to the member stocks separately).

Western/Central Walleye Pollock, Eastern Walleye Pollock, Pacific Cod, Sablefish (assessed jointly across the Gulf of Alaska, Bering Sea, and Aleutian Islands), **Arrowtooth Flounder, Pacific Ocean Perch, Western/Central Northern Rockfish, Flathead Sole, Pelagic Shelf Rockfish Complex** (consists of Dark Rockfish, Dusky Rockfish, Widow Rockfish, and Yellowtail Rockfish), **Deep Water Flatfish Complex** (consists of Deepsea Sole, Dover Sole, and Greenland Turbot), **Rex Sole, Atka Mackerel, Thornyhead Rockfish Complex** (consists of Longspine Thornyhead and Shortspine Thornyhead), **Rougheye Rockfish, Shortraker Rockfish Complex, Demersal Shelf Rockfish Complex** (consists of Canary Rockfish, China Rockfish, Copper Rockfish, Quillback Rockfish, Rosethorn Rockfish, Tiger Rockfish, and Yelloweye Rockfish), **Other Slope Rockfish Complex** (consists of Blackgill Rockfish, Bocaccio, Chilipepper, Darkblotched Rockfish, Greenstriped Rockfish, Harlequin Rockfish, Northern Rockfish (Eastern GOA only), Pygmy Rockfish, Redbanded Rockfish, Redstripe Rockfish, Sharpchin Rockfish, Silvergray Rockfish, Splitnose Rockfish, Stripetail Rockfish, Vermilion Rockfish, and Yellowmouth Rockfish), **Shallow Water Flatfish Complex** (consists of Alaska Plaice, Butter Sole, C-O Sole, Curlfin Sole, English Sole, Northern Rock Sole, Pacific Sanddab, Petrale Sole, Sand Sole, Slender Sole, Southern Rock Sole, Speckled Sanddab, Starry Flounder, and Yellowfin Sole), **Big Skate, Longnose Skate, and Other Skates Complex** (consists of Alaska Skate, Aleutian Skate, Bering Skate, Deepsea Skate, Roughshoulder Skate, Roughtail Skate, and Whiteblotched Skate) - Overfishing is defined as any rate of fishing in excess of the maximum fishing mortality threshold (MFMT). The catch corresponding to fishing at a rate

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equal to the MFMT is referred to as the “overfishing level” (OFL). This MFMT is prescribed through a set of six tiers [which are listed in Appendix 4] in descending order of preference, corresponding to descending order of information availability. The SSC will have final authority for determining whether a given item of information is “reliable” for the purpose of this definition, and may use either objective or subjective criteria in making such determinations. For tier 1, a “pdf” refers to a probability density function. For tiers 1-2, if a reliable pdf of B_{MSY} is available, the preferred point estimate of B_{MSY} is the geometric mean of its pdf. For tiers 1-5, if a reliable pdf of B is available, the preferred point estimate is the geometric mean of its pdf. For tiers 1-3, the coefficient α is set at a default value of 0.05, with the understanding that the SSC may establish a different value for a specific stock or stock complex as merited by the best available scientific information. For tiers (2-4), a designation of the form “ $F_{X\%}$ ” refers to the F associated with an equilibrium level of spawning per recruit (SPR) equal to $X\%$ of the equilibrium level of spawning per recruit in the absence of any fishing. If reliable information sufficient to characterize the entire maturity schedule of a species is not available, the SSC may choose to view SPR calculations based on a knife-edge maturity assumption as reliable. For tier 3, the term $B_{40\%}$ refers to the long-term average biomass that would be expected under average recruitment and $F=F_{40\%}$.

Other Species Complex (consists of Pacific Sleeper Shark, Salmon Shark, Spiny Dogfish, Antlered Sculpin, Armorhead Sculpin, Bigmouth Sculpin, Blackfin Sculpin, Blob Sculpin, Brightbelly Sculpin, Brown Irish Lord, Buffalo Sculpin, Crested Sculpin, Darkfin Sculpin, Dusky Sculpin, Eyeshade Sculpin, Fourhorn Sculpin, Frog Sculpin, Frogmouth Sculpin, Great Sculpin, Grunt Sculpin, Longfin Sculpin, Northern Sculpin, Pacific Staghorn Sculpin, Plain Sculpin, Red Irish Lord, Ribbed Sculpin, Roughspine Sculpin, Roughskin Sculpin, Sailfin Sculpin, Scissortail Sculpin, Silverspotted Sculpin, Slim Sculpin, Smoothcheek Sculpin, Smoothhead Sculpin, Spatulate Sculpin, Spectacled Sculpin, Spinyhead Sculpin, Sponge Sculpin, Spotfin Sculpin, Tadpole Sculpin, Thorny Sculpin, Threaded Sculpin, Threadfin Sculpin, Warty Sculpin, Yellow Irish Lord, Sculpin *Arctodiellus sp.*, Sculpin *Icelus euryops*, Flapjack Devilfish, Giant Pacific Octopus, Pelagic Octopus, Red Octopus, Smoothskin Octopus, Vampire Squid, North Pacific Bigeye Octopus, Squid *Berryteuthis anonychus*, Squid *Berryteuthis magister*, Squid *Chiroteuthis calyx*, Squid *Cranchia scabra*, Squid *Eogonatus tinro*, Squid *Galiteuthis phyllura*, Squid *Gonatopsis makko*, Squid *Gonatus berryi*, Squid *Gonatus kamtschaticus*, Squid *Gonatus madokai*, Squid *Gonatus onyx*, Squid *Gonatus pyros*, Squid *Histioteuthis hoylei*, Squid *Loligo opalescens*, Squid *Moroteuthis robusta*, Squid *Octopoteuthis deletron*, and Squid *Onychoteuthis borealijaponicus*) – There is no MFMT defined for this complex.

Western/Central Walleye Pollock, Pacific Cod, Sablefish, Arrowtooth Flounder, Pacific Ocean Perch, Western/Central Northern Rockfish, Flathead Sole, Pelagic Shelf Rockfish Complex (indicator species = dusky rockfish), **Deep Water Flatfish Complex** (indicator species = Dover sole), **Rex Sole**, and **Rougheye Rockfish** - The following definition, while not contained in the FMP, is contained in the Stock Assessment and Fishery Evaluation (SAFE) Report, and is the definition used to make the determinations contained in this report: A stock is overfished when it falls below its MSST, defined as whichever of the following is greater: $\frac{1}{2}$ the

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MSY stock size, or the minimum stock size at which rebuilding to the MSY level would be expected to occur within 10 years if the stock were exploited at the MFMT. The MSY level is interpreted as B_{MSY} in Tiers 1-2 and $B_{35\%}$ in Tier 3.

Eastern Walleye Pollock, Atka Mackerel, Thornyhead Rockfish Complex, Shortraker Rockfish, Demersal Shelf Rockfish Complex, Other Slope Rockfish Complex, Shallow Water Flatfish Complex, Big Skate, Longnose Skate, Other Skates Complex, and Other Species Complex - No MSY level, and therefore no MSST, can be specified for Tiers 4-6.

Bering Sea/Aleutian Islands Groundfish - The following overfishing definition has been fully approved under SFA guidelines and was used to make the assessments contained in this report. All stocks are covered, either directly or indirectly, by a definition containing an F component. For a stock managed individually, coverage is direct (i.e., the definition applies to the stock itself). For stocks managed jointly, as members of a complex, coverage is indirect (i.e., the definition applies to the complex as a whole, not to the member stocks separately).

Eastern Bering Sea Walleye Pollock, Aleutian Islands Walleye Pollock, Bogoslof Walleye Pollock, Pacific Cod, Yellowfin Sole, Greenland Turbot, Arrowtooth Flounder (consists of Arrowtooth Flounder and Kamchatka Flounder), **Rock Sole** (consists of Northern Rock Sole and Southern Rock Sole), **Flathead Sole** (consists of Flathead Sole and Bering Flounder), **Sablefish** (assessed jointly across the Gulf of Alaska, Bering Sea, and Aleutian Islands), **Pacific Ocean Perch, Atka Mackerel, Alaska Plaice, Northern Rockfish, Shortraker Rockfish, Rougheye Rockfish, Other Rockfish Complex** (consists of Dark Rockfish, Dusky Rockfish, Harlequin Rockfish, Redbanded Rockfish, Redstripe Rockfish, Sharpchin Rockfish, Shortspine Thornyhead, and Yelloweye Rockfish), **Other Flatfish Complex** (consists of Arctic Flounder, Butter Sole, Curlfin Sole, Deepsea Sole, Dover Sole, English Sole, Longhead Dab, Pacific Sanddab, Petrale Sole, Rex Sole, Roughscale Sole, Sakhalin Sole, Sand Sole, Slender Sole, and Starry Flounder), **Other Species Complex** (consists of Antlered Sculpin, Arctic Staghorn Sculpin, Armorhead Sculpin, Banded Irish Lord, Bigmouth Sculpin, Blackfin Sculpin, Blacknose Sculpin, Blob Sculpin, Bride Sculpin, Broadfin Sculpin, Butterfly Sculpin, Crescent-tail Sculpin, Crested Sculpin, Darkfin Sculpin, Eyeshade Sculpin, Flabby Sculpin, Fourhorn Sculpin, Great Sculpin, Grunt Sculpin, Leister Sculpin, Longfin Irish Lord, Longfin Sculpin, Northern Sculpin, Pacific Hookear Sculpin, Pacific Staghorn Sculpin, Plain Sculpin, Purplegray Sculpin, Red Irish Lord, Ribbed Sculpin, Roughskin Sculpin, Roughspine Sculpin, Sailfin Sculpin, Scaled Sculpin, Scalybreasted Sculpin, Scissortail Sculpin, Slim Sculpin, Smoothcheek Sculpin, Spatulate Sculpin, Spectacled Sculpin, Spinyhead Sculpin, Sponge Sculpin, Tadpole Sculpin, Thorny Sculpin, Threaded Sculpin, Uncinate Sculpin, Warty Sculpin, Wide-eye Sculpin, Yellow Irish Lord, Flapjack Devilfish, Giant Pacific Octopus, Pelagic Octopus, Smoothskin Octopus, Octopus *Benthoctopus oregonensis*, Octopus *Graneledone boreopacifica*, Octopus *Bathypolypus arcticus*, Pacific Sleeper Shark, Salmon Shark, Spiny Dogfish, Alaska Skate, Aleutian Skate, Bering Skate, Big Skate, Butterfly Skate, Commander Skate, Deepsea Skate, Mud Skate, Okhotsk Skate, Roughshoulder Skate, Roughtail Skate, Whiteblotched Skate, and Whitebrow Skate), and **Squid Complex** (consists of Squid *Belonella borealis*, Squid *Berryteuthis anonychus*, Squid

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Beryteuthis magister, Squid *Chiroteuthis calyx*, Squid *Cranchia scabra*, Squid *Eogonatus tinro*, Squid *Galiteuthis phyllura*, Squid *Gonatopsis borealis*, Squid *Gonatopsis makko*, Squid *Gonatus berryi*, Squid *Gonatus kamtschaticus*, Squid *Gonatus madokai*, Squid *Gonatus onyx*, Squid *Gonatus pyros*, Squid *Histioteuthis hoylei*, Squid *Moroteuthis robusta*, and Squid *Rossia pacifica*) - Overfishing is defined as any rate of fishing in excess of the maximum fishing mortality threshold (MFMT). The catch corresponding to fishing at a rate equal to the MFMT is referred to as the “overfishing level” (OFL). This MFMT is prescribed through a set of six tiers [which are listed in Appendix 4] in descending order of preference, corresponding to descending order of information availability. The SSC will have final authority for determining whether a given item of information is “reliable” for the purpose of this definition, and may use either objective or subjective criteria in making such determinations. For tier 1, a “pdf” refers to a probability density function. For Tiers 1-2, if a reliable pdf of B_{MSY} is available, the preferred point estimate of B_{MSY} is the geometric mean of its pdf. For Tiers 1-5, if a reliable pdf of B is available, the preferred point estimate is the geometric mean of its pdf. For Tiers 1-3, the coefficient α is set at a default value of 0.05, with the understanding that the SSC may establish a different value for a specific stock or stock complex as merited by the best available scientific information. For Tiers 2-4, a designation of the form “ $F_{X\%}$ ” refers to the F associated with an equilibrium level of spawning per recruit (SPR) equal to $X\%$ of the equilibrium level of spawning per recruit in the absence of any fishing. If reliable information sufficient to characterize the entire maturity schedule of a species is not available, the SSC may choose to view SPR calculations based on a knife-edge maturity assumption as reliable. For Tier 3, the term $B_{40\%}$ refers to the long-term average biomass that would be expected under average recruitment and $F=F_{40\%}$.

Eastern Bering Sea Walleye Pollock, Pacific Cod, Yellowfin Sole, Greenland Turbot, Arrowtooth Flounder (indicator species = Arrowtooth Flounder), **Rock Sole** (indicator species = Northern Rock Sole), **Flathead Sole** (indicator species = flathead sole), **Sablefish, Pacific Ocean Perch, Atka Mackerel, Alaska Plaice, Northern Rockfish** - The following definition, while not contained in the FMP, is contained in the Stock Assessment and Fishery Evaluation (SAFE) Report, and is the definition used to make the determinations contained in this report: A stock is overfished when it falls below its MSST, defined as whichever of the following is greater: $\frac{1}{2}$ the MSY stock size, or the minimum stock size at which rebuilding to the MSY level would be expected to occur within 10 years if the stock were exploited at the MFMT. The MSY level is interpreted as B_{MSY} in Tiers 1-2 and $B_{35\%}$ in Tier 3.

Aleutian Islands Walleye Pollock, Bogoslof Walleye Pollock, Shortraker Rockfish, Rougheye Rockfish, Other Rockfish Complex, Other Flatfish Complex, Other Species Complex, and Squid Complex - No MSY level, and therefore no MSST, can be specified for Tiers 4-6.

Bering Sea/Aleutian Islands King and Tanner Crabs - The following overfishing definition has been fully approved under SFA guidelines and was used to make the assessments contained in this report. The definition contains both an F and a B component.

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Blue King Crab (Pribilof Islands, Saint Matthew Island, Saint Lawrence Island), Golden King Crab (Aleutian Islands, Pribilof Islands, Northern District), Red King Crab (Bristol Bay, Norton Sound, Pribilof Islands, Aleutian Islands-Adak, Aleutian Islands-Dutch Harbor), Scarlet King Crab (Aleutian Islands, Eastern Bering Sea), Bering Sea Snow Crab, Tanner Crab [Eastern Bering Sea, Eastern Bering Sea Triangle, Eastern Bering Sea Grooved, Eastern Aleutian Islands, Eastern Aleutian Islands Triangle, Eastern Aleutian Islands Grooved, Adak (Western Aleutians), Western Aleutian Islands Grooved] - Overfishing is defined as any rate of fishing mortality in excess of M , where $M = 0.2$ for all species of king crab and $M = 0.3$ for all *Chionoecetes* species.

Blue King Crab (Pribilof Islands, Saint Matthew Island), Red King Crab (Bristol Bay, Pribilof Islands), Bering Sea Snow Crab, Tanner Crab (Eastern Bering Sea) - A stock is overfished when it falls below MSST, which is equal to $\frac{1}{2}$ the MSY stock size. MSY stock size equals the average mature biomass observed from 1983-1997.

Alaska Weathervane Scallops - The following overfishing definition has been fully approved under SFA guidelines and was used to make the assessments contained in this report. The definition contains both an F and a B component.

Overfishing is a level of fishing mortality that jeopardizes the long-term capacity of a stock or stock complex to produce MSY on a continuing basis. MSY is defined as the largest long-term average catch that can be taken from a stock under prevailing ecological and environmental conditions. Amendment 6 to the scallop FMP established MSY for weathervane scallops at 1.24 million lbs of shucked meats based on the average catch from 1990-1997 excluding 1995. Optimum Yield (OY) was defined as 0-1.24 million lbs, and the overfishing control rule was defined as a fishing rate in excess of the natural mortality rate, which has been estimated as $F_{\text{OVERFISHING}} = M = 0.13$ (12% per year) statewide.

A stock is overfished when it falls below MSST, which is equal to $\frac{1}{2}$ MSY stock size = 4.76 million pounds. The most recent assessment (2003) estimated abundance for only two of the nine registration areas and a determination of MSST could not be made. The fishery is managed conservatively with harvest levels well below MSY (39 to 66% of MSY since establishment of MSY in 1996).

Atlantic Billfishes - The following overfishing definition has been fully approved under SFA guidelines and was used to make the assessments contained in this report. The definition contains both an F and a B component.

Blue Marlin (North Atlantic), White Marlin (North Atlantic), Sailfish (West Atlantic), Spearfish (West Atlantic) – Overfishing occurs when the MFMT exceeds F_{MSY} . The relative fishing mortality rates are as follows: Blue Marlin (North Atlantic) ($F_{99}/F_{\text{MSY}} = 4.0$), White

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Marlin (North Atlantic) ($F_{00}/F_{MSY} = 8.28$), Sailfish ($F/F_{MSY} =$ not estimated), and Spearfish ($F/F_{MSY} =$ not estimated).

A stock is overfished when the stock biomass level falls below MSST, which is set at $(1-M)B_{MSY}$, where M is the instantaneous natural mortality rate. The relative biomass levels are as follows: Blue Marlin (North Atlantic) ($B_{2000}/B_{MSY} = 0.4$), White Marlin (North Atlantic) ($B_{01}/B_{MSY} = 0.12$), and Sailfish / Spearfish (West Atlantic) ($B/B_{MSY} =$ not estimated).

Atlantic Tunas, Swordfish, and Sharks - The following overfishing definition has been fully approved under SFA guidelines and was used to make the assessments contained in this report. The definition contains both an F and a B component.

Bigeye Tuna (Atlantic), Albacore (North Atlantic), Yellowfin Tuna (West Atlantic), Skipjack Tuna (West Atlantic), Bluefin Tuna (West Atlantic), Swordfish (North Atlantic), Sandbar Shark, Blacktip Shark, Dusky Shark, Spinner Shark, Silky Shark, Bull Shark, Bignose Shark, Narrowtooth Shark, Galapagos Shark, Night Shark, Caribbean Reef Shark, Tiger Shark, Lemon Shark, Sand Tiger Shark, Bigeye Sand Tiger Shark, Nurse Shark, Scalloped Hammerhead Shark, Great Hammerhead Shark, Smooth Hammerhead Shark, Whale Shark, Basking Shark, White Shark, Atlantic Sharpnose Shark, Caribbean Sharpnose Shark, Finetooth Shark, Blacknose Shark, Smalltail Shark, Bonnethead Shark, Atlantic Angel Shark, Shortfin Mako Shark, Longfin Mako Shark, Porbeagle Shark, Thresher Shark, Bigeye Thresher Shark, Blue Shark, Oceanic Whitetip Shark, Sevengill Shark, Sixgill Shark, Bigeye Sixgill Shark - Overfishing occurs when the MFMT is exceeded, which is set at $F_{limit} = F_{MSY}$. The relative fishing mortality rates (F_{year}/F_{MSY}) are as follows: North Atlantic Swordfish ($F_{01}/F_{MSY} = 0.75$), West Atlantic Bluefin Tuna ($F_{01}/F_{MSY} = 2.35-4.64$, low vs high recruitment), Bigeye Tuna ($F_{02}/F_{MSY} = 0.73-1.01$), North Atlantic Albacore Tuna ($F_{00}/F_{MSY} = 1.10$ (0.99-1.30)), Yellowfin Tuna ($F_{01}/F_{MSY} = 0.87-1.46$), Skipjack Tuna ($F_{02}/F_{MSY} =$ not estimated), Blacktip Shark ($F_{01}/F_{MSY} = 0.42-0.82$ (SPM)), Sandbar Shark ($F_{01}/F_{MSY} = 1.08-1.68$ (SPM)), Large Coastal Sharks ($F_{01}/F_{MSY} = 0.89-4.48$ (SPM)), Pelagic Sharks ($F/F_{MSY} =$ not estimated), Small Coastal Sharks ($F_{00}/F_{MSY} = 0.24-0.78$), Atlantic Sharpnose Sharks ($F_{00}/F_{MSY} = 0.14-0.42$), Bonnethead ($F_{00}/F_{MSY} = 0.35-0.56$), Finetooth Shark ($F_{00}/F_{MSY} = 3.42-4.13$), and Blacknose Shark ($F_{00}/F_{MSY} = 0.61-0.65$).

A stock is overfished when the stock level biomass falls below MSST, which is set at $MSST = B_{LIMIT} = (1-M)B_{MSY}$ when $M < 0.5$; $MSST = B_{LIMIT} = 0.5B_{MSY}$ when $M > 0.5$. For Yellowfin Tuna, $MSST = 0.5B_{MSY}$. The relative biomass levels are as follows: (B_{YEAR}/B_{MSY}) for North Atlantic Swordfish ($B_{02}/B_{MSY} = 0.94$), West Atlantic Bluefin Tuna ($SSB_{01}/SSB_{MSY} = 0.31-0.06$, low vs high recruitment), Bigeye Tuna ($B_{03}/B_{MSY} = 0.85-1.07$), North Atlantic Albacore Tuna ($B_{00}/B_{MSY} = 0.68$ (0.52-0.86)), Yellowfin Tuna ($B_{01}/B_{MSY} = 0.73-1.10$), Skipjack Tuna ($B_{02}/B_{MSY} =$ not estimated), Blacktip Shark* ($N_{01}/N_{MSY} = 1.20-1.45$ (SPM)), Sandbar Shark* ($N_{01}/N_{MSY} = 0.77-2.22$ (SPM)), Large Coastal Sharks* ($N_{01}/N_{MSY} = 0.46-1.18$ (SPM)), Pelagic Sharks ($B/B_{MSY} =$ not estimated), Small Coastal Sharks ($B_{01}/B_{MSY} = 1.38-2.39$), Atlantic Sharpnose Shark ($B_{01}/B_{MSY} = 1.69-3.16$), Bonnethead ($B_{01}/B_{MSY} = 1.46-2.78$), Finetooth Shark ($B_{01}/B_{MSY} =$

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1.39-2.37), and Blacknose Shark ($B_{01}/B_{MSY} = 1.92-3.15$).

*N is the number of fish, rather than biomass or yield in weight.

Iceland Cat Shark, Smallfin Cat Shark, Deepwater Cat Shark, Broadgill Cat Shark, Marbled Cat Shark, Blotched Cat Shark, Chain Dogfish, Dwarf Catshark, Japanese Gulper Shark, Gulper Shark, Little Gulper Shark, Kitefin Shark, Flatnose Gulper Shark, Portuguese Shark, Greenland Shark, Lined Lanternshark, Broadband Dogfish, Caribbean Lanternshark, Great Lanternshark, Smooth Lanternshark, Fringefin Lanternshark, Green Lanternshark, Cookiecutter Shark, Bigtooth Cookiecutter, Smallmouth Velvet Dogfish, Pygmy Shark, Roughskin Spiny Dogfish, Blainville's Dogfish, Cuban Dogfish, Bramble Shark, American Sawshark, Florida Smoothhound, Smooth Dogfish- Although these stocks are no longer contained in the management unit, they are retained in the FMP for data collection only purposes. There are no directed fisheries for these species and they are protected from being finned under the Shark Finning Prohibition Act. In the event that a directed fishery commences, NMFS will evaluate data available to see if an FMP amendment or other regulatory measures are warranted.

APPENDIX 3. **OVERFISHING DEFINITIONS FOR SPECIES NOT CONTAINED
IN FEDERAL FISHERY MANAGEMENT PLANS**

American Lobster - The following overfishing definition was approved under pre-SFA guidelines and the assessments contained in this report are based on this definition. This definition contains only an F component.

The American lobster resource is considered recruitment overfished when, throughout its range, the F, given the regulations in place at that time under the suite of regional management measures, results in a reduction in estimated egg production per recruit to 10% or less of a non-fished population ($F_{10\%}$).

A benchmark stock assessment was conducted and peer reviewed in 2005. The assessment recommended a new suite of biological reference points. The Atlantic States Marine Fisheries Commission is currently considering approving the new reference points. If adopted, the new reference points will modify the status of the lobster stocks.

Atlantic Menhaden - The overfishing definition contained in the FMP has F-based and SSB-based benchmarks. The F-based benchmarks are $F_{\text{THRESHOLD}} = 1.18$ and $F_{\text{TARGET}} = 0.75$, and the fecundity based benchmarks are $\text{fecundity}_{\text{target}} = 26.6$ trillion maturing or ripe eggs, and the $\text{fecundity}_{\text{threshold}} = 13.3$ trillion maturing or ripe eggs.

Northern Shrimp - Amendment 1 to the Interstate FMP for Northern Shrimp contains approved definitions for both F and B.

Overfishing occurs when the fishing mortality target of $F_{\text{target}} = F_{50\%} = 0.22$ is exceeded. The fishing mortality limit is $F_{\text{limit}} = F_{20\%} = 0.6$.

The northern shrimp population is considered overfished when the stock biomass is less than the threshold of $B_{\text{THRESHOLD}} = 9,000$ metric tons. The stock biomass limit is $B_{\text{LIMIT}} = 6,000$ metric tons.

Striped Bass - Amendment 6 to the Interstate FMP for Atlantic Striped Bass contains an approved definition for both F and B.

Overfishing occurs when F exceeds the fishing mortality threshold F_{MSY} , which is currently estimated to be 0.41. The fishing mortality target is set equal to $F=0.30$, and $F=0.27$ for the Chesapeake Bay and the Albemarle Sound/Roanoke River stocks, respectively.

A striped bass population is considered overfished when the female spawning stock biomass falls below the threshold spawning stock biomass level of 30.9 million pounds (14,000 mt). The female spawning stock biomass target is set at 38.6 million pounds (17,500 metric tons).

Amendment 6 establishes a biomass target and threshold based on the sexually mature females in

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the striped bass population. Using a threshold only slightly greater than the restoration level, Amendment 6 sets the female spawning stock biomass threshold at 30.9 million pounds (14,000 mt). The female spawning stock biomass target is set at 125% of the spawning stock biomass threshold. This equates to a target of 38.6 million pounds (17,500 metric tons).

Tautog - The overfishing definition is contained in the ASMFC Tautog FMP and was used to make the assessment contained in this year's report. This definition contains only an F component.

Overfishing occurs when F exceeds the threshold, or the interim, fishing rate of 0.29. The FMP established a target fishing rate equal to that of natural mortality ($F=M=0.15$).

Weakfish - Amendment 4 to the Interstate FMP for Weakfish contains an approved definition for both F and B.

Overfishing occurs if the fishing mortality threshold is greater than $F_{\text{THRESHOLD}} = F_{20\%} - 0.5$. The fishing mortality target of $F_{\text{target}} = 0.31$. The ASMFC assessment for Weakfish through 2000, found that the fishing mortality rate for weakfish was between F 0.31 and F 0.45.

A stock is overfished when the biomass is less than $SSB_{20\%}$. The best available estimate of $SSB_{20\%}$ is 31.8 million pounds.

Atlantic Croaker – Amendment 1 to the Interstate FMP for Atlantic croaker contains an approved definition for both F and B for the mid-Atlantic region only.

Overfishing occurs when F exceeds F_{msy} , currently estimated to be 0.39. There is a fishing mortality target of 0.75 F_{msy} (0.29). The fishing mortality threshold and target are for the mid-Atlantic region only. The latest F estimates (2002) for Atlantic croaker in the mid-Atlantic region are 0.11. The status of the stock for the south-Atlantic remains unknown due to a lack of data.

The stock is overfished when biomass is less than is 70% of SSB_{msy} (20,252 mt). The biomass target is the spawning stock biomass that allows for maximum sustainable yield (SSB_{msy}), currently estimated at 28,932 MT. The SSB target and threshold are for the mid-Atlantic region only. The latest SSB estimates (2002) for Atlantic croaker are approximately 80,000 MT.

Pacific Halibut – Overfishing is defined as a rate of fishing that exceeds the constant exploitation yield. The constant exploitation yield is computed using a harvest rate of 0.20 of the exploitable biomass (8-year+ Pacific halibut).

APPENDIX 4. SIX TIERS COMPRISING THE OVERFISHING DEFINITION FOR GULF OF ALASKA AND BERING SEA /ALEUTIAN ISLANDS GROUND FISH

See Appendix 5 for definitions of acronyms used in this appendix.

1) Information available: Reliable point estimates of B and B_{MSY} and reliable pdf of F_{MSY} .

- 1a) Stock status: $B/B_{MSY} > 1$
 $F_{OFL} = \mu_A$, the arithmetic mean of the pdf
 $F_{ABC} \leq \mu_H$, the harmonic mean of the pdf
- 1b) Stock status: $\alpha < B/B_{MSY} \leq 1$
 $F_{OFL} = \mu_A \times (B/B_{MSY} - \alpha) / (1 - \alpha)$
 $F_{ABC} \leq \mu_H \times (B/B_{MSY} - \alpha) / (1 - \alpha)$
- 1c) Stock status: $B/B_{MSY} \leq \alpha$
 $F_{OFL} = 0$
 $F_{ABC} = 0$

2) Information available: Reliable point estimates of B, B_{MSY} , F_{MSY} , $F_{35\%}$, and $F_{40\%}$.

- 2a) Stock status: $B/B_{MSY} > 1$
 $F_{OFL} = F_{MSY}$
 $F_{ABC} \leq F_{MSY} \times (F_{40\%}/F_{35\%})$
- 2b) Stock status: $\alpha < B/B_{MSY} \leq 1$
 $F_{OFL} = F_{MSY} \times (B/B_{MSY} - \alpha) / (1 - \alpha)$
 $F_{ABC} \leq F_{MSY} \times (F_{40\%}/F_{35\%}) \times (B/B_{MSY} - \alpha) / (1 - \alpha)$
- 2c) Stock status: $B/B_{MSY} \leq \alpha$
 $F_{OFL} = 0$
 $F_{ABC} = 0$

3) Information available: Reliable point estimates of B, $B_{40\%}$, $F_{35\%}$, and $F_{40\%}$.

- 3a) Stock status: $B/B_{40\%} > 1$
 $F_{OFL} = F_{35\%}$
 $F_{ABC} \leq F_{40\%}$
- 3b) Stock status: $\alpha < B/B_{40\%} \leq 1$
 $F_{OFL} = F_{35\%} \times (B/B_{40\%} - \alpha) / (1 - \alpha)$
 $F_{ABC} \leq F_{40\%} \times (B/B_{40\%} - \alpha) / (1 - \alpha)$
- 3c) Stock status: $B/B_{40\%} \leq \alpha$
 $F_{OFL} = 0$
 $F_{ABC} = 0$

4) Information available: Reliable point estimates of B, $F_{35\%}$, and $F_{40\%}$.

$$F_{OFL} = F_{35\%}$$

$$F_{ABC} \leq F_{40\%}$$

5) Information available: Reliable point estimates of B and natural mortality rate M.

$$F_{OFL} = M$$

$$F_{ABC} \leq 0.75 \times M$$

6) Information available: Reliable catch history from 1978 through 1995.

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OFL = the average catch from 1978 through 1995, unless an alternative value is established by the SSC on the basis of the best available scientific information.

$$ABC \leq 0.75 \times \text{OFL}$$

APPENDIX 5.

ACRONYMS USED IN THE TEXT AND APPENDICES

α - The relative stock size at which the overfishing level falls to zero, set at a default value of 0.05 with the understanding that the SSC may establish a different value for a specific stock or stock complex as merited by the best available scientific information.

ABC - Allowable Biological Catch - A term that refers to the range of allowable catch for a species or species group. It is set each year by a scientific group. The ABC estimates are used to set the annual total allowable catch (TAC). This term is also referred to as Acceptable Biological Catch.

ASMFC - Atlantic States Marine Fisheries Commission - Serves as a deliberative body of the Atlantic coastal states, coordinating the conservation and management of nearshore fishery resources, including marine, shell, and anadromous species.

B - The weight (biomass) of a group of fish.

B_{MSY} - The weight (biomass) of a group of fish necessary to produce MSY on a continuing basis.

CFMC - Caribbean Fishery Management Council.

CPUE - Catch Per Unit of Effort - The number of fish caught by an amount of effort. Typically, effort is a combination of gear type, gear size, and length of time gear is used. Catch per unit of effort is often used as a measurement of relative abundance.

EEZ - Exclusive Economic Zone - All waters from the seaward boundary of coastal states out to 200 nautical miles.

EPR - Eggs-Per-Recruit - The average number of eggs produced by an individual fish that has been recruited, i.e., that moved into a certain class, such as the spawning class or fishing-size class. Used as an index of abundance.

ESA - Endangered Species Act.

F - Fishing Mortality Rate - A measurement of the rate of removal of fish from a population by fishing. Fishing mortality rate can be reported as either discrete or instantaneous. Discrete mortality is the percentage of fish dying in one year. Instantaneous mortality is the rate at which fish are dying at a point in time

F_{ABC} - The level of fishing mortality that results in the allowable biological catch.

F_{MAX} - The level of fishing mortality that results in the greatest yield from the fishery.

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F_{MSY} - The level of fishing mortality that results in the maximum sustainable yield.

F_{OF} - The level of fishing mortality defined as overfishing.

F_{OFL} - The level of fishing mortality associated with overfishing.

$F_{20\%}$ - The level of fishing mortality that results in a spawning potential ratio of 20% of the maximum.

$F_{25\%}$ - The level of fishing mortality that results in a spawning potential ratio of 25% of the maximum.

$F_{30\%}$ - The level of fishing mortality that results in a spawning potential ratio of 30% of the maximum.

$F_{35\%}$ - The level of fishing mortality that results in a spawning potential ratio of 35% of the maximum.

$F_{40\%}$ - The level of fishing mortality that results in a spawning potential ratio of 40% of the maximum.

$F_{0.1}$ - The point on the spawning per recruit curve at which the level of spawning per recruit is 35% of 40% of the maximum.

$FAKR$ - NMFS, Alaska Region.

FMP - Fishery Management Plan - A plan to achieve specified management goals for a fishery.

$GARM$ - Groundfish Assessment Review Meeting. A review of stock status for groundfish stocks under the Northeast Multispecies Fishery Management Plan.

$GMFMC$ - Gulf of Mexico Fishery Management Council.

$GSMFC$ - Gulf States Marine Fisheries Commission - Serves as a deliberative body of the Gulf of Mexico coastal states, coordinating the conservation and management of nearshore fishery resources, including marine, shell, and anadromous species.

HMS - Highly migratory species including tunas, marlins, oceanic sharks, sailfishes, and swordfish; the HMS Management Division develops fishery policies designed to manage any Atlantic highly migratory species.

$LTPY$ - Long-Term Potential Yield - The maximum long-term average catch that can be achieved from a resource.

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MAFMC - Mid-Atlantic Fishery Management Council.

MFMT – Maximum Fishing Mortality Threshold – The level or rate of fishing mortality, that if exceeded, constitutes overfishing because it jeopardizes the capacity of a stock or stock complex to produce MSY on a continuing basis.

MSP₁ - Maximum Spawning Potential - See SPR.

MSP₂ - Maximum Sustainable Production - The adult spawning population that will, on average, maximize the biomass of juvenile outmigrants with average environmental conditions. Conservation objectives for specific salmon stocks managed under the Pacific Coast Salmon Plan are currently based on either MSP principles for stocks managed primarily for natural production or upon hatchery escapement needs for stocks managed for artificial production.

MSST – Minimum Stock Size Threshold – The minimum size of the stock or stock complex that is required to produce MSY, the size below which the stock or stock complex is determined to be overfished. The threshold should equal whichever of the following is greater: ½ the MSY stock size, or the minimum stock size at which rebuilding to the MSY level would be expected to occur within 10 years if the stock or stock were exploited at the maximum fishing mortality threshold.

MSY - Maximum Sustainable Yield - The largest long-term average catch or yield that can be taken from a stock or stock complex under prevailing ecological and environmental conditions.

NEFMC - New England Fishery Management Council.

NEFSC - NMFS, Northeast Fisheries Science Center.

NPFMC - North Pacific Fishery Management Council.

OLO - *Our Living Oceans* - A report on the status of U.S. living marine resources.

OY - Optimum Yield - The amount of fish that: (1) 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; (2) is prescribed on the basis of the MSY from the fishery, as reduced by any relevant economic, social, or ecological factors; (3) in the case of an overfished fishery, provides for rebuilding to a level consistent with producing the MSY in such fishery.

pdf - Probability Density Function - A description of the probability that a variable takes a specified value.

PFMC - Pacific Fishery Management Council.

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SAFE - Stock Assessment and Fishery Evaluation - A document or set of documents that provides Councils with a summary of the most recent biological condition of species in the fishery management unit, and the social and economic condition of the recreational and commercial fishing interests 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 and fisheries being managed under Federal regulation.

SAFMC - South Atlantic Fishery Management Council.

Salmon FMP - Pacific Coast Salmon Plan.

SARC - Stock Assessment Review Committee.

SEDAR - Southeast Data, Assessment and Review.

SEFSC - Southeast Fishery Science Center.

SFA - Sustainable Fisheries Act - Amended the Magnuson-Stevens Fishery Conservation and Management Act, on October 11, 1996.

SPR - Spawning Potential Ratio - The number of eggs that could be produced by an average recruit in a fished stock, divided by the number of eggs that could be produced by an average recruit in an unfished stock. SPR can also be expressed as the spawning stock biomass per recruit (SSBR) of a fished stock divided by the SSBR of the stock before it was fished.

SSB - Spawning Stock Biomass - The total weight of the fish in a stock that are old enough to spawn.

SSBR - Spawning Stock Biomass Per Recruit - The spawning stock biomass divided by the number of recruits to the stock, or how much spawning biomass an average recruit would be expected to produce.

SSC - Scientific and Statistical Advisory Committee - A group of scientific and technical people giving advice to a council.

TAC - Total Allowable Catch.

T coho - The average coho life span that would be expected over the long term in the absence of exploitation. The default of T coho is four years, but the SSC may set T coho at another value without an FMP amendment on the basis of the best scientific information.

TRAC - Transboundary Resources Assessment Committee - A committee established in 1998 to peer review assessments of transboundary resources in the Georges Bank area and thus to ensure that the management efforts of both Canada and USA, pursued either independently or

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cooperatively, are founded on a common understanding of resource status.

WPFMC - Western Pacific Fishery Management Council.