

2.0 STATUS OF THE STOCKS

The thresholds used to determine the status of Atlantic HMS are presented in Figure 2.1. They are fully described in Chapter 3 of the 1999 Tunas, Swordfish, and Shark FMP and in Amendment 1 to the Billfish FMP. These thresholds were carried over in full in the 2006 Consolidated HMS FMP and are based upon the thresholds described in a paper providing the technical guidance for implementing National Standard 1 of the Magnuson-Stevens Act (Restrepo *et al.*, 1998).

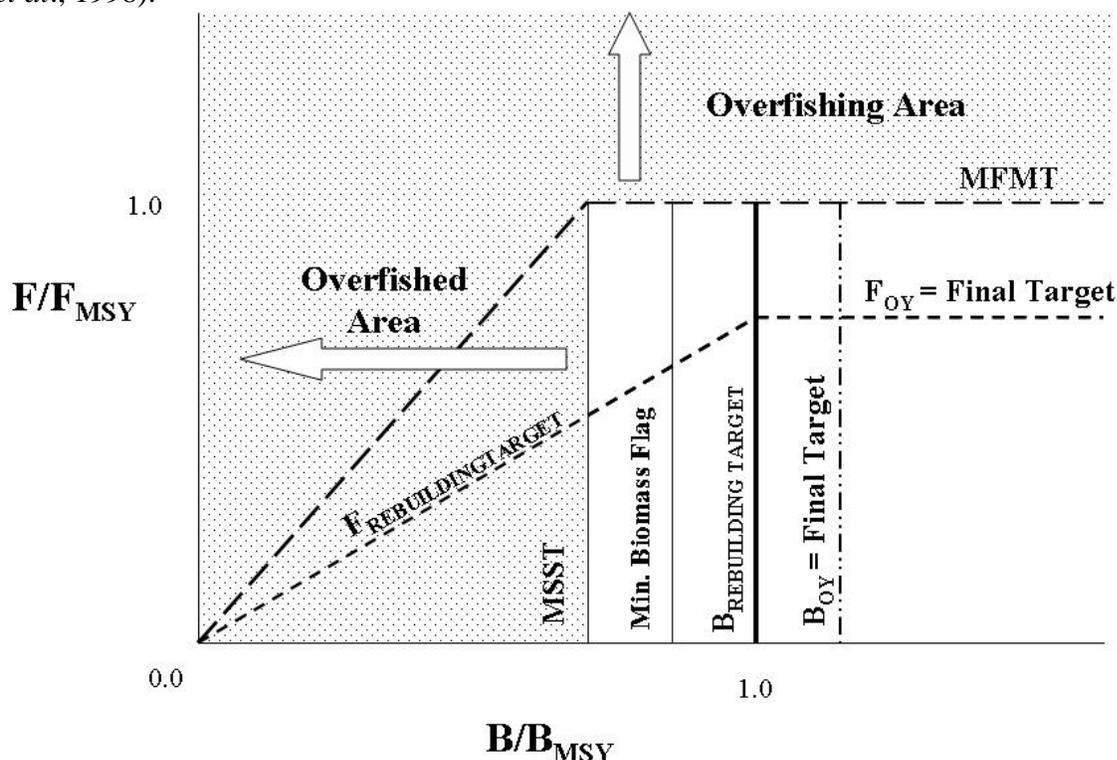


Figure 2.1 Illustration of the status determination criteria and rebuilding terms.

In summary, a species is considered overfished when the current biomass (B) is less than the minimum stock size threshold ($B < B_{MSST}$). The minimum stock size threshold ($MSST$) is determined based on the natural mortality of the stock and the biomass at maximum sustainable yield (B_{MSY}). Maximum sustainable yield (MSY) is the maximum long-term average yield that can be produced by a stock on a continuing basis. The biomass can be lower than B_{MSY} , and the stock not be declared overfished as long as the biomass is above B_{MSST} .

Overfishing may be occurring on a species if the current fishing mortality (F) is greater than the fishing mortality at MSY (F_{MSY}) ($F > F_{MSY}$). In the case of F , the maximum fishing mortality threshold is F_{MSY} . Thus, if F exceeds F_{MSY} , the stock is experiencing overfishing.

If a species is declared overfished or overfishing is occurring, action to rebuild the stock and/or prevent further overfishing is required by law. A species is considered rebuilt when B is

greater than B_{MSY} and F is less than F_{MSY} . A species is considered healthy when B is greater than or equal to the biomass at optimum yield (B_{OY}) and F is less than or equal to the fishing mortality at optimum yield (F_{OY}).

In summary, the thresholds used to calculate the status of Atlantic HMS, as described in the 1999 FMP and Amendment 1 to the Billfish FMP, are:

- Maximum Fishing Mortality Threshold (MFMT) = $F_{limit} = F_{MSY}$;
- Overfishing is occurring when $F_{year} > F_{MSY}$;
- Minimum Stock Size Threshold (MSST) = $B_{limit} = (1-M)B_{MSY}$ when $M < 0.5 = 0.5B_{MSY}$ when $M \geq 0.5$ (for billfish, the specific MSST values are: blue marlin = $0.9B_{MSY}$; white marlin = $0.85B_{MSY}$; west Atlantic sailfish = $0.75B_{MSY}$);
- Overfished when $B_{year}/B_{MSY} < MSST$;
- Biomass target during rebuilding = B_{MSY} ;
- Fishing mortality during rebuilding $< F_{MSY}$;
- Fishing mortality for healthy stocks = $0.75F_{MSY}$;
- Biomass for healthy stocks = $B_{OY} = \sim 1.25$ to $1.30B_{MSY}$;
- Minimum biomass flag = $(1-M)B_{OY}$; and
- Level of certainty of *at least* 50 percent but depends on species and circumstances.
- For bluefin tuna, spawning stock biomass (SSB) is used as a proxy for biomass
- For sharks, in some cases, spawning stock fecundity (SSF) or spawning stock number (SSN) can be used as a proxy for biomass since biomass does not influence pup production in sharks.

With the exception of Atlantic sharks, stock assessments for Atlantic HMS are conducted by ICCAT's SCRS. In 2010, the SCRS completed stock assessments for western Atlantic bluefin tuna and Atlantic bigeye tuna. All SCRS final stock assessment reports can be found at www.iccat.int/assess.htm.

Atlantic shark stock assessments for LCS and small coastal sharks (SCS) are completed by the NMFS Southeast Data, Assessment, and Review (SEDAR) process. Currently, sandbar, blacknose, and dusky sharks are undergoing a formal assessment through the SEDAR process. Results from these assessments will not be available until early to mid- 2011.

Table 2.1 summarizes stock assessment information and the current status of Atlantic HMS as of November 2009.

Table 2.1 Stock Assessment Summary Table for Atlantic tunas, swordfish, and marlin.
 Source: SCRS, 2007; SCRS, 2008; SCRS, 2009a; SCRS, 2009b; SCRS 2010;
 Gibson and Campana, 2005; Cortés *et al.*, 2006; NMFS, 2006; NMFS, 2007.

Species	Current Relative Biomass Level	Minimum Stock Size Threshold	Current Relative Fishing Mortality Rate	Maximum Fishing Mortality Threshold	Outlook – From Status of Stocks for U.S. managed species*
West Atlantic Bluefin Tuna	SSB ₀₉ /SSB _{MSY} = 1.1 (0.89-1.35) (low recruitment) SSB ₀₉ /SSB _{MSY} = 0.15 (0.10-0.22) (high recruitment) SSB ₀₉ /SSB ₇₅ = 0.34	0.86SSB _{MSY}	F ₀₆₋₀₈ /F _{MSY} = 0.73 (0.59-0.91) (low recruitment) F ₀₆₋₀₈ /F _{MSY} = 1.88 (1.49-2.35) (high recruitment)	F _{year} /F _{MSY} = 1.00	Low recruitment scenario: Not overfished; overfishing is not occurring. High recruitment scenario: Overfished; overfishing is occurring
	The SCRS, as stated in the stock assessment, has no strong evidence to favor either scenario over the other and notes that both are reasonable (but not extreme) lower and upper bounds on rebuilding potential.				
Atlantic Bigeye Tuna	B ₀₉ /B _{MSY} = 0.72-1.34 (median 1.01)	0.6B _{MSY} (age 2+)	F ₀₉ /F _{MSY} = 0.65-1.55 (median 0.95)	F _{year} /F _{MSY} = 1.00	Not overfished; overfishing not occurring.
Atlantic Yellowfin Tuna	B ₀₆ /B _{MSY} = 0.96 (0.72-1.22)	0.5B _{MSY} (age 2+)	F _{current} /F _{MSY} =0.86 (0.71-1.05)*	F _{year} /F _{MSY} = 1.00	Not overfished; overfishing not occurring.
North Atlantic Albacore Tuna	B ₀₇ /B _{MSY} = 0.62 (0.45-0.79)	0.7B _{MSY}	F ₀₇ /F _{MSY} = 1.045 (0.85-1.23)	F _{year} /F _{MSY} = 1.00	Overfished; overfishing is occurring.
West Atlantic Skipjack Tuna	B ₀₆ /B _{MSY} : most likely >1	<i>Unknown</i>	F ₀₆ /F _{MSY} : most likely <1	F _{year} /F _{MSY} = 1.00	Unknown
North Atlantic Swordfish	B ₀₉ /B _{MSY} = 1.05 (0.94-1.24)	<i>Unknown</i>	F ₀₈ /F _{MSY} = 0.76 (0.67-0.96)	F _{year} /F _{MSY} = 1.00	Not overfished; overfishing not occurring
South Atlantic Swordfish	Likely >1	<i>Unknown</i>	Likely <1	F _{year} /F _{MSY} = 1.00	Unknown
Blue Marlin	B ₀₄ <B _{MSY} : yes	0.9B _{MSY}	F ₀₄ >F _{MSY} : Yes	F _{year} /F _{MSY} = 1.00	Overfished: overfishing is occurring
White Marlin	B ₀₄ <B _{MSY} : yes	0.85B _{MSY}	F ₀₄ >F _{MSY} : Possibly	F _{year} /F _{MSY} = 1.00	Overfished: overfishing is occurring
West Atlantic Sailfish	B ₀₆ <B _{MSY} : Possibly	0.75B _{MSY}	F ₀₇ >F _{MSY} : Possibly	<i>Not estimated</i>	Overfished; overfishing is occurring

Species	Current Relative Biomass Level	Minimum Stock Size Threshold	Current Relative Fishing Mortality Rate	Maximum Fishing Mortality Threshold	Outlook – From Status of Stocks for U.S. managed species*
Spearfish	<i>Unknown</i>	<i>Unknown</i>	<i>Unknown</i>	<i>Not estimated</i>	<i>Unknown</i>
LCS Complex	<i>Unknown</i>	<i>Unknown</i>	<i>Unknown</i>	<i>Unknown</i>	<i>Unknown</i>
Sandbar	$SSF_{04}/SSF_{MSY} = 0.72$	4.75-5.35E+05	$F_{04}/F_{MSY} = 3.72$	0.015	Overfished; overfishing is occurring
Gulf of Mexico Blacktip	$SSF_{04}/SSF_{MSY} = 2.54-2.56$	0.99-1.07E+07	$F_{04}/F_{MSY} = 0.03-0.04$	0.20	Not overfished; overfishing not occurring
Atlantic Blacktip	<i>Unknown</i>	<i>Unknown</i>	<i>Unknown</i>	<i>Unknown</i>	<i>Unknown</i>
Dusky Sharks	$B_{03}/B_{MSY} = 0.15-0.47$	<i>Unknown</i>	$F_{03}/F_{MSY} = 1.68-1,810$	0.00005-0.0115	Overfished; overfishing is occurring
SCS Complex	$N_{05}/N_{MSY} = 1.69$	2.1E+07	$F_{05}/F_{MSY} = 0.25$	$F_{MSY} = 0.091$	Not overfished; overfishing not occurring
Bonnethead Sharks	$SSF_{05}/SSF_{MSY} = 1.13$	1.4 E+06	$F_{05}/F_{MSY} = 0.6$	$F_{MSY} = 0.31$	Not overfished; overfishing not occurring
Atlantic Sharpnose Sharks	$SSF_{05}/SSF_{MSY} = 1.47$	4.09 E+06	$F_{05}/F_{MSY} = 0.74$	$F_{MSY} = 0.19$	Not overfished; overfishing not occurring
Blacknose Sharks	$SSF_{05}/SSF_{MSY} = 0.48$	4.3 E+05	$F_{05}/F_{MSY} = 3.77$	$F_{MSY} = 0.07$	Overfished; overfishing is occurring
Finetooth Sharks	$N_{05}/N_{MSY} = 1.80$	2.4E+06	$F_{05}/F_{MSY} = 0.17$	$F_{MSY} = 0.03$	Not overfished; overfishing not occurring
Northwest Atlantic Porbeagle Sharks	$B_{09}/B_{MSY} = 0.43-0.65$	<i>Unknown</i>	$F_{08}/F_{MSY} = 0.83$	$F_{MSY} = 0.03-0.36$	Overfished; overfishing is not occurring
North Atlantic Blue Sharks	$B_{07}/B_{MSY} = 1.87-2.74$	<i>Unknown</i>	$F_{07}/F_{MSY} = 0.13-0.17$	$F_{MSY} = 0.15$	Not overfished; overfishing not occurring
North Atlantic Shortfin Mako Sharks	$B_{07}/B_{MSY} = 0.95-1.65$	<i>Unknown</i>	$F_{07}/F_{MSY} = 0.48-3.77$	$F_{MSY} = 0.007-0.05$	Approaching an overfished status; overfishing is occurring

* Status of the Stocks website: <http://www.nmfs.noaa.gov/sfa/statusoffisheries/SOSmain.htm>

2.1 Stock Assessment Details

Detailed stock assessments for each of the species listed in Tables 2.1 and 2.2 can be found in the websites listed below.

2.1.1 Western Atlantic Bluefin tuna

Assessed by ICCAT's SCRS in 2010. The stock assessment can be found online: http://www.iccat.int/Documents/Meetings/Docs/2010_SCRS_ENG.pdf

2.1.2 Atlantic Bigeye Tuna

Assessed by ICCAT's SCRS in 2010. The stock assessment can be found online: http://www.iccat.int/Documents/Meetings/Docs/2010_SCRS_ENG.pdf

2.1.3 Atlantic Yellowfin Tuna

Assessed by ICCAT's SCRS in 2008. The stock assessment can be found online: http://www.iccat.int/Documents/Meetings/Docs/2008_TROP_REP_EN.pdf

2.1.4 North Atlantic Albacore Tuna

Assessed by ICCAT's SCRS in 2009. The stock assessment can be found online: http://www.iccat.int/Documents/Meetings/Docs/2009_ALB_ASSESS_ENG.pdf

2.1.5 West Atlantic Skipjack Tuna

Assessed by ICCAT's SCRS in 2008. The stock assessment can be found online: http://www.iccat.int/Documents/Meetings/Docs/2008_TROP_REP_EN.pdf

2.1.6 North Atlantic Swordfish

Assessed by ICCAT's SCRS in 2009. The stock assessment can be found online: http://www.iccat.int/Documents/Meetings/Docs/2009_SWO_ASSESS_ENG.pdf

2.1.7 South Atlantic Swordfish

Assessed by ICCAT's SCRS in 2009. The stock assessment can be found online: http://www.iccat.int/Documents/Meetings/Docs/2009_SWO_ASSESS_ENG.pdf

2.1.8 Blue Marlin

Assessed by ICCAT's SCRS in 2006. The stock assessment can be found online: <http://www.iccat.int/Documents/SCRS/DetRep/DET BUM-WHM.pdf>

2.1.9 White Marlin

Assessed by ICCAT's SCRS in 2006. The stock assessment can be found online: <http://www.iccat.int/Documents/SCRS/DetRep/DET BUM-WHM.pdf>

2.1.10 West Atlantic Sailfish

Assessed by ICCAT's SCRS in 2009. The stock assessment can be found online: http://www.iccat.int/Documents/Meetings/Docs/2009_SAI_ASSESS_ENG.pdf

2.1.11 Spearfish

Spearfish have not been individually assessed by ICCAT's SCRS due to the paucity of data. Some information can be found in the 2001 sailfish stock assessment located online: http://www.iccat.int/Documents/SCRS/DetRep/DET_sai.pdf

2.1.12 LCS Complex

Assessed in 2006 through the SEDAR process. The stock assessment can be found online: http://www.sefsc.noaa.gov/sedar/Sedar_Workshops.jsp?WorkshopNum=11

2.1.13 Sandbar

Currently under assessment through the SEDAR process. Assessed in 2006 through the SEDAR process. The 2006 stock assessment can be found online: http://www.sefsc.noaa.gov/sedar/Sedar_Workshops.jsp?WorkshopNum=11

2.1.14 Gulf of Mexico Blacktip

Assessed in 2006 through the SEDAR process. The stock assessment can be found online: http://www.sefsc.noaa.gov/sedar/Sedar_Workshops.jsp?WorkshopNum=11

2.1.15 Atlantic Blacktip

Assessed in 2006 through the SEDAR process. The stock assessment can be found online: http://www.sefsc.noaa.gov/sedar/Sedar_Workshops.jsp?WorkshopNum=11

2.1.16 Dusky Sharks

Currently under assessment through the SEDAR process. Assessed in 2006 by NMFS. The 2006 stock assessment can be found online: http://www.nmfs.noaa.gov/sfa/hms/sharks/2006_Dusky_Shark_Assessment_for_distribution.pdf

2.1.17 SCS Complex

Assessed in 2007 through the SEDAR process. The stock assessment can be found online: http://www.sefsc.noaa.gov/sedar/Sedar_Workshops.jsp?WorkshopNum=13

2.1.18 Bonnethead Sharks

Assessed in 2007 through the SEDAR process. The stock assessment can be found online: http://www.sefsc.noaa.gov/sedar/Sedar_Workshops.jsp?WorkshopNum=13

2.1.19 Atlantic Sharpnose Sharks

Assessed in 2007 through the SEDAR process. The stock assessment can be found online: http://www.sefsc.noaa.gov/sedar/Sedar_Workshops.jsp?WorkshopNum=13

2.1.20 Blacknose Sharks

Currently under assessment through the SEDAR process. Assessed in 2007 through the SEDAR process. The 2007 stock assessment can be found online: http://www.sefsc.noaa.gov/sedar/Sedar_Workshops.jsp?WorkshopNum=13

2.1.21 Finetooth Sharks

Assessed in 2007 through the SEDAR process. The stock assessment can be found online:
http://www.sefsc.noaa.gov/sedar/Sedar_Workshops.jsp?WorkshopNum=13

2.1.22 Northwest Atlantic Porbeagle Sharks

Assessed by ICCAT's SCRS in 2009. The stock assessment can be found online:
http://www.iccat.int/Documents/Meetings/Docs/2009_POR_ASSESS_ENG.pdf

2.1.23 North Atlantic Blue Sharks

Assessed by ICCAT's SCRS in 2008. The stock assessment can be found online:
http://www.iccat.int/Documents/Meetings/Docs/2008_SHK_Report.pdf

2.1.24 North Atlantic Shortfin Mako Sharks

Assessed by ICCAT's SCRS in 2008. The stock assessment can be found online:
http://www.iccat.int/Documents/Meetings/Docs/2008_SHK_Report.pdf

Chapter 2 References

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