1.0 INTRODUCTION

This document is the Predraft for the Draft Environmental Impact Statement (DEIS) for Amendment 4 to the 2006 Consolidated Atlantic Highly Migratory Species (HMS) Fishery Management Plan (FMP). Amendment 4 to the Consolidated HMS FMP would address HMS fishery management measures in the U.S. territories of Puerto Rico and the U.S. Virgin Islands (USVI). The Predraft document is a non-compulsory, but valuable step in the fishery management plan amendment process. It allows the National Marine Fisheries Service (NOAA Fisheries) to obtain additional information and input from interested stakeholders, fishery participants, state and federal government agencies, the general public, and consulting parties on potential alternatives thereby allowing NOAA Fisheries to refine preliminary management alternatives, as appropriate, prior to development of the formal DEIS. The formal Draft Amendment 4 to the Consolidated HMS FMP will be an integrated document that includes a DEIS, draft regulatory impact review, initial regulatory flexibility analysis, and draft social impact analysis.

Under §304(g)(1)(A) of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) and the regulatory process for managing HMS, NOAA Fisheries is required to consult with Consulting Parties for HMS fisheries when amending an Atlantic HMS FMP. Consulting Parties are defined under the Magnuson-Stevens Act as affected Fishery Management Councils, International Commission for the Conservation of Atlantic Tunas (ICCAT) commissioners and advisory groups, and the HMS Advisory Panel (HMS AP). As such, NOAA Fisheries is requesting comments on this Predraft document for Amendment 4 to the 2006 Consolidated HMS FMP. An electronic version of the Predraft is also available on the website of the HMS Management Division at: http://www.nmfs.noaa.gov/sfa/hms. In addition, in accordance with the National Environmental Policy Act (NEPA) as implemented by the Council on Environmental Quality (CEQ), NOAA Fisheries is engaging in an early and open public process for determining the scope of issues related to the amendment that the public believes are significant.

There are substantial differences between some segments of the U.S. Caribbean HMS fisheries and the HMS fisheries that occur off the mainland of the United States, including, but not limited to: limited fishing and dealer permit possession; smaller vessels; limited availability of processing and cold storage facilities; shorter trips; limited profit margins; and, high local consumption of catches. These differences can create an awkward fit between current federal HMS fishery regulations and the traditional operation of Caribbean fisheries.

Currently, there are no HMS limited access permits (LAPs) held in the U.S. Caribbean and only a limited number of HMS open access fishing permits and dealer permits. This is likely the result of numerous factors including the cost associated with HMS LAPs and owning/operating a commercial vessel, the limited number of HMS LAPs initially issued to residents of the U.S. Caribbean, language barriers, and a lack of awareness of regulations and the HMS permitting process, among others. The small number of HMS dealer permits may be a result of limited processing and cold storage facilities and the customary sales and distribution system for seafood in the U.S. Caribbean, among others. The low number of HMS fishing and dealer permits has resulted in limited catch and landings data from the U.S. Caribbean fisheries, thereby complicating fishery management efforts. In some cases, traditionally utilized fishing gears and economically necessary practices, such as targeting both pelagic and reef fish species with multiple gear types during a single trip, may diverge from fishing norms in U.S. mainland fisheries.

NOAA Fisheries has benefited from receiving various recommendations to improve management of the HMS permitting program and U.S. Caribbean HMS fisheries from the HMS Advisory panel (AP), Caribbean Fishery Management Council (CFMC), territorial governments, local fishermen, and non-governmental organizations (NGOs). Some suggestions regarding management of U.S. Caribbean HMS fisheries received to date include, but are not limited to: creating a new commercial Caribbean HMS permit; combining Caribbean vessel and dealer permits (allowing vessels to retail/wholesale catch); modifying authorized gears; and, providing additional training and outreach.

Based on discussions with the HMS AP, CFMC, and the territorial governments, NOAA Fisheries believes that the depletion of continental shelf fishery resources may be increasing local interest in exploiting HMS resources. As local fishermen become more dependent on offshore fishery resources and increase fishing effort on HMS, there is an increased need for NOAA Fisheries to consider ways of including small commercial Caribbean vessels into the HMS permitting and reporting regime in order to collect better catch and effort data.

Thus, an amendment to the 2006 Consolidated HMS FMP is needed to implement management measures specific to the U.S. Caribbean region. The purpose of this amendment is to enact management measures that better correspond with the traditional operation of the fishing fleet in the Caribbean region and to provide NOAA Fisheries with an improved capability to monitor and sustainably manage those fisheries.

On May 27, 2008 (73 FR 30381), NOAA Fisheries published a notice of intent (NOI) to initiate an amendment to the 2006 Consolidated HMS FMP, including preparation of an environmental impact statement. The comment period for the NOI ended on October 31, 2008. On July 14, 2008 (73 FR 40301), NOAA Fisheries announced the availability of an issues and options document describing potential measures for inclusion in Amendment 4 to the 2006 Consolidated HMS FMP. In this same announcement, NOAA Fisheries provided details for scoping meetings and requested comments on the issues and options document. The comment period was open until October 31, 2008.

NOAA Fisheries anticipates that a proposed rule and DEIS will be available in the summer of 2010 and the Final Amendment 4 to the 2006 Consolidated HMS FMP and its related documents will be available in the spring of 2011. NOAA Fisheries requests receipt of any comments on this document by October 1, 2009.

Any written comments on the Predraft should be submitted to Greg Fairclough, HMS Management Division, F/SF1, Office of Sustainable Fisheries, 263 13th Avenue South, Saint Petersburg, FL 33701 or faxed to (727) 824-5398 by October 1, 2009. For further information, contact Greg Fairclough or Randy Blankinship at (727) 824-5399, or Jackie Wilson at (240) 338-3936.

This Predraft includes a summary of the anticipated purpose and need (Chapter 1) and tables summarizing the ecological, social, and economic impacts of management alternatives that NOAA Fisheries is considering at this time (Chapter 2). The alternatives outlined in Chapter 2 may be modified, removed, or supplemented based on any comments received, additional analyses, and other factors, as appropriate.

NOAA Fisheries specifically solicits opinions and advice on the range of alternatives and whether there are additional alternatives that should be addressed. Additionally, NOAA Fisheries solicits opinions and advice on the impacts described for each alternative.

1.1 HMS Management History and Description of the Fishery

Prior to 1990, the five Atlantic Regional Fishery Management Councils (New England, Mid-Atlantic, South Atlantic, Gulf of Mexico, and Caribbean) had authority to manage Atlantic HMS in their regions. In 1985, those councils implemented the original Swordfish FMP and, in 1988, the original Billfish FMP.

On November 28, 1990, the President of the United States signed into law the Fishery Conservation Amendments of 1990. This law amended the Magnuson Act and gave the Secretary of Commerce the authority to manage Atlantic tunas, swordfish (SWO), billfish (BLF), and sharks in the exclusive economic zone (EEZ) of the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea (16 U.S.C. 1811 and 16 U.S.C. 1854(f)(3)). The Secretary subsequently delegated this authority to manage HMS to NOAA Fisheries. The HMS Management Division within NOAA Fisheries develops regulations for HMS fisheries, although some actions (*e.g.*, Large Whale Take Reduction Plan) are taken by other NOAA Fisheries offices if the primary legislation (*e.g.*, Marine Mammal Protection Act) driving the action is not the Magnuson-Stevens Act or the Atlantic Tunas Convention Act (ATCA). NOAA Fisheries manages HMS at the international and national levels given the highly migratory nature of these species.

In 1996, Congress amended the Magnuson Act with the Sustainable Fisheries Act, re-naming it the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act), to require that NOAA Fisheries establish advisory panels (APs) to assist in the development of FMPs and FMP amendments for Atlantic HMS. As a result, NOAA Fisheries established the HMS and Billfish APs and, in 1999, finalized and implemented the 1999 FMP for Atlantic Tunas, Swordfish, and Sharks (1999 FMP) and Amendment 1 to the Atlantic Billfish FMP. In 2003, NOAA Fisheries amended the 1999 FMP. In 2006, NOAA Fisheries published the 2006 Consolidated HMS FMP, which combined the 1999 FMP, the Atlantic Billfish FMP, and their amendments, and also combined the two separate APs into a single HMS AP. The 2006 Consolidated HMS FMP has since been amended by Amendment 1 to the 2006 Consolidated HMS FMP, which focuses on essential fish habitat, and Amendment 2 to the 2006 Consolidated HMS FMP in 2008, which focuses on shark management measures. NOAA Fisheries is currently developing Amendment 3 to the 2006 Consolidated HMS FMP, which focuses on management measures for small coastal sharks, pelagic sharks, and smooth dogfish. The regulations for Atlantic HMS can be found at 50 CFR part 635. Detailed descriptions of domestic management measures can be found in the 2006 Consolidated HMS FMP and the HMS commercial and recreational compliance guides. These documents are available on the NOAA Fisheries HMS website (http://www.nmfs.noaa.gov/sfa/hms).

Since 1966, ICCAT has been responsible for international conservation and management of tuna and tuna-like species. ICCAT currently includes 48 contracting parties, including the United States, and its stated objective is to “cooperate in maintaining the populations of these fishes at levels which will permit the maximum sustainable catch for food and other purposes.” Atlantic tunas, SWO, and BLF are subject to ICCAT management authority. ICCAT also assesses the stock status of some pelagic shark species. Recommendations adopted by ICCAT are promulgated as regulations in the United States under the ATCA, which was signed in 1975 (16 U.S.C. 971). The ATCA authorizes the Secretary of Commerce to administer and enforce all provisions of ICCAT.

1.1.1 Atlantic Tunas

1.1.1.1 Management History

Atlantic bluefin (BFT), bigeye (BET), albacore (ALB), yellowfin (YFT), and skipjack (SKJ) tunas are managed under the 2006 Consolidated HMS FMP, consistent with relevant ICCAT recommendations.

Bluefin Tuna

In 1998, ICCAT adopted a recommendation for a rebuilding program for western Atlantic BFT with the goal of reaching stock levels to support maximum sustainable yield (MSY) in 20 years. The rebuilding plan has been modified a number of times since its adoption, primarily to adjust quotas consistent with updated scientific advice and to improve monitoring of the fishery. The annual western Atlantic BFT total allowable catch (TAC), as established in 2008, is 1,900 metric tons (mt) whole weight (ww) in 2009 and 1,800 mt ww in 2010. The TAC is shared between the United States, Japan, Canada, the United Kingdom territory of Bermuda, the French territories of St. Pierre and Miquelon, and Mexico. The United States is allocated 57.48 percent of the western Atlantic BFT TAC. The 2006 Consolidated HMS FMP apportions the U.S. allocation to various commercial and recreational sectors and includes additional management measures including: minimum sizes; retention limits; permitting and reporting requirements; area closures; and, gear restrictions, among others. Detailed descriptions of domestic management measures can be found in the 2006 Consolidated HMS FMP and the HMS commercial and recreational compliance guides.

Bigeye Tuna

The number of ICCAT recommendations directly affecting U.S. participation in the Atlantic BET fishery is limited. In 1998, ICCAT adopted Recommendation 98-03 limiting the number of fishing vessels over 24 m that could participate in the Atlantic BET fishery, with an exception for ICCAT contracting parties (CPCs) identified as minor harvesters. The United States was exempted from the restriction as a minor harvester. In 2004, ICCAT adopted Recommendation 04-01, which established a TAC of 90,000 mt ww and allocated specific catch limits to six CPCs considered to be major harvesters. The United States was not provided a specific allocation. In 2004, ICCAT repealed a minimum size limit for BET, which had been in effect since 1980. Domestically, the United States has permitting, gear restrictions, minimum size restrictions, and reporting requirements in place for BET.

Northern Albacore Tuna

In 1998, ICCAT adopted Recommendation 98-08 limiting fishing capacity for North Atlantic ALB to the average number of vessels fishing for that species during the period 1993-1995, exclusive of recreational vessels. In 2003, ICCAT adopted a TAC of 34,500 mt ww, with the United States being allocated 607 mt ww. The TAC was reduced to 30,200 in 2007 with the U.S. share being reduced to 538 mt ww. Domestically, the United States has permitting requirements, reporting requirements, and gear restrictions in place among other regulations, but does not have bag or trip limits in place.

Yellowfin Tuna

There is a single, active ICCAT Recommendation directly pertaining to Atlantic YFT (93-04). Recommendation 93-04 limits the level of effective effort exerted on YFT to 1992 levels. As with BET, ICCAT repealed a minimum size limit for YFT in 2005 that had been in effect since 1973. There are no country-specific TACs in effect, and no quota limit for the United States. The United States implemented a domestic minimum size limit for YFT in 1999 to comply with the now repealed ICCAT minimum size. Domestically, the United States has permitting, gear restrictions, minimum size restrictions, and reporting requirements in place for YFT.

Atlantic Skipjack Tunas

There are no ICCAT recommendations in effect for SKJ. Domestically, fishermen fishing for or retaining SKJ are subject to permitting and reporting requirements and gear restrictions.

1.1.1.2 Description of the Atlantic Tunas Fisheries

In the United States, seven types of Atlantic tuna permits are currently issued: Atlantic Tunas General, HMS Angling, HMS Charter/Headboat (CHB), Atlantic Tunas Harpoon, Atlantic Tunas Purse Seine, Atlantic Tunas Longline, and Trap. These permit types, except for HMS CHB, correspond to a BFT sub-quota category. BFT harvested by HMS CHB permitted vessels are counted against the Angling or General Category sub-quotas depending on the size category of the first fish landed that day. The Purse Seine category has been managed under a transferable quota system since 1982. In 2003, the Angling and CHB permits were changed from tuna-specific to all HMS. The HMS Angling permit is required to fish for HMS recreationally and the sale of fish is prohibited under this permit. The HMS CHB permit is required for for-hire vessels that target HMS. Atlantic tunas may be sold with an HMS CHB permit. The Atlantic tunas Longline permit is valid only if the vessel owner also holds both an Atlantic SWO and an Atlantic shark LAP. The Atlantic Tunas General, Harpoon, and Trap permits are open access and only allow for the harvest of tunas. Federal dealers for HMS are also required to have federal dealer permits.

As of May 2009, there were approximately 17,225 vessel permits issued in the Atlantic tuna fisheries, including: 12,480 HMS Angling permits; 1,986 Atlantic Tunas General permits; 2,519 HMS CHB permits; 230 Atlantic Tunas Longline permits; 5 Atlantic Tunas Harpoon permits; 2 Trap permits; and 3 Atlantic Tunas Purse Seine permits. The distribution of HMS permits in Puerto Rico and the USVI is shown in Table 1.1.

Table 1.1 Distribution of HMS permits among Puerto Rico and the USVI.

Permit Type	Puerto Rico	St. Thomas	St. Croix	St. John
Atlantic Tunas General	76	4	9	1
HMS CHB	22	6	3	4
HMS Angling	529	15	16	0

* There are no other HMS fishing permits held in the U.S. Caribbean.

As of May 2009, there were approximately 332 BET, ALB, YFT, and SKJ (BAYS) and 305 BFT dealer permits issued. Of those permits, 7 BAYS and 2 BFT dealer permits were issued to businesses in Puerto Rico; 1 BAYS and 1 BFT dealer permit were issued to businesses in St. Thomas; 2 BAYS dealer permits were issued to businesses in St. Croix; and, no tuna dealer permits were issued to businesses in St. John.

In the Caribbean, commercial tuna fishermen primarily use pelagic longline (PLL), rod and reel, and handline gears. In 2007, vessels fishing in the Caribbean landed approximately 277.1 mt of YFT, 13.9 mt of SKJ, 3.4 mt of BET, and 1.4 mt of ALB. Of the 295.8 mt of tunas landed in the U.S. Caribbean in 2007, 260.2 mt was reported as captured with PLL gear (NMFS, 2008). Since no Atlantic Tunas Longline permits are held by residents of Puerto Rico or the USVI, it can be assumed that these tuna landings were reported by vessels fishing in the Caribbean but based out of other U.S. ports. Approximately 35.6 mt of tunas were reported as harvested with handline and rod and reel gears (NMFS, 2008). The handline and rod and reel landings were likely reported by Caribbean fishermen fishing under Atlantic Tunas General or HMS CHB permits.

1.1.2 Atlantic Swordfish

1.1.2.1 Management History

The U.S. Atlantic SWO fishery is managed under the 2006 Consolidated HMS FMP under the authority of the Magnuson-Stevens Act and ATCA. There are two distinct management units for SWO in the Atlantic Ocean, north and south, divided at 5° N latitude. Because the southern stock is located south of 5° N latitude, South Atlantic SWO are not within the management authority of the Magnuson-Stevens Act. However, the stock and its fishery are included in the 2006 Consolidated HMS FMP because South Atlantic SWO are managed by ICCAT and because there are U.S. fishermen who have traditionally fished in the South Atlantic.

The first Atlantic SWO FMP was completed and implemented in 1985 by the South Atlantic Fishery Management Council in cooperation with other Atlantic Regional Fishery Management Councils. This FMP laid the groundwork for defining approved fishing methods, determining optimum yield and status of the stocks, implementing variable season closures, and regulating foreign fishing in U.S. waters. Swordfish management was transferred from the Fishery Management Councils to NOAA Fisheries in the early 1990s. From that time to implementation of a rebuilding plan in 2000, numerous management initiatives were implemented including a minimum size limit, commercial quota changes, and a prohibition on driftnets for SWO.

In 1999, ICCAT established a 10-year rebuilding plan, reducing the TAC to 10,400 mt ww over a three-year period while maintaining the U.S. quota share at 29 percent of the overall TAC. The United States completed development of a domestic rebuilding plan for North Atlantic SWO in 2000. In 2002, after limited stock increases, ICCAT increased the overall TAC to 14,000 mt and increased the U.S. allocation to 30.49 percent. In 2006, the United States began providing 1,345 mt of its North Atlantic SWO underharvest on a temporary basis to CPCs attempting to develop North Atlantic SWO fisheries. A new stock assessment and allocation scheme are anticipated in 2009.

In recent years, management measures other than quota changes have been implemented that affect commercial SWO fishermen. These measures include: time/area closures; mandatory use of circle hooks in the PLL fishery; bait restrictions; gear requirements; mandatory workshop training; mandatory vessel monitoring systems (VMS); and, changes to authorized gears and vessel upgrading restrictions.

The implementation of the aforementioned measures has resulted in the North Atlantic SWO stock being almost fully rebuilt (Biomass (B) = 0.99 biomass at maximum sustainable yield (B_{MSY})) as of 2007. However, the numbers of active U.S. participants and permit holders in the PLL fishery have declined significantly over the past decade.

1.1.2.2 Description of the Swordfish Fishery

The U.S. directed fishery for North Atlantic SWO is limited by regulation to two gear types: longline and handgear. Pelagic longlining accounts for the majority of U.S. SWO landings; however, there is increasing effort in the commercial handgear and recreational fisheries. Driftnets were allocated two percent of the U.S. North Atlantic directed fishery quota in the past; however, this gear was prohibited by NOAA Fisheries in 1999. The 1999 FMP established a LAP program for the commercial Atlantic SWO and shark fisheries to rationalize harvesting capacity with the available quota and reduce latent effort while preventing further overcapitalization. Incidental catches by fishing gears other than PLL and handgear are restricted by incidental commercial retention limits of 15 to 30 SWO per trip depending on gear type and are counted against the incidental catch quota. As of May 2009, there were a total of 184, 72, and 87 LAPs issued for directed, incidental, and handgear SWO fishing, respectively. Currently, no LAPs allowing commercial SWO fishing are held by residents of Puerto Rico or the USVI. One SWO dealer permit is issued to a business in Puerto Rico. In 2007, 27.7 mt of SWO were reported as harvested from the Caribbean (NMFS, 2008). All of those landings were reported as harvested with PLL gear and likely by vessels not based in Caribbean ports.

One objective of the 1999 FMP was to rebuild the SWO stock such that recreational fishermen may enjoy an enhanced recreational experience through higher interactions with SWO. The 1999 FMP required that all recreational SWO landings be subtracted from the U.S. incidental quota, and mortality be reported to ICCAT. Recently, as the North Atlantic SWO stock has rebuilt, the recreational SWO fishery has become very popular. In 2008, recreational fishermen and tournament operators reported 483 SWO harvested in the recreational SWO fishery. In 2008, no recreationally landed SWO were reported from Puerto Rico or the USVI.

Swordfish may be retained on recreational vessels issued an HMS Angling or HMS CHB permit. The distribution of those HMS permits in Puerto Rico and the USVI are shown in Table 1.1. Detailed information on SWO landings can be found in the 2006 Consolidated HMS FMP and the 2008 SAFE Report.

1.1.3 Atlantic Sharks

1.1.3.1 Management History

Sharks have been managed by the Secretary of Commerce since 1993 under the authority of the Magnuson-Stevens Act. At that time, NOAA Fisheries implemented the FMP for Sharks of the Atlantic Ocean, which established three management complexes: large coastal sharks (LCS), small coastal sharks (SCS), and pelagic sharks. This 1993 FMP implemented commercial quotas for LCS and pelagic sharks and established recreational retention limits for all sharks, consistent with the LCS rebuilding program. As a result of the 1996 amendments to the Magnuson-Stevens Act, the 1999 FMP revised much of the management of Atlantic sharks, including establishing new commercial quotas, a commercial size limit, a recreational bag limit, a new rebuilding plan for LCS, and a LAP program for the commercial fishery. Between 1999 and 2008, NOAA Fisheries changed many of the shark management measures including revising quotas, eliminating the commercial minimum size, adjusting the recreational bag and size limits, establishing a time/area closure off the coast of North Carolina, establishing a mechanism for changing the species on the prohibited species list, requiring shark dealers to attend shark identification workshops, and requiring gillnet, bottom longline (BLL), and PLL fishermen to attend workshops on the safe handling and release of protected resources.

In the 2008 Amendment 2 to the 2006 Consolidated HMS FMP, NOAA Fisheries focused on additional shark management measures based on the 2005/2006 LCS stock assessment, 2006 dusky shark stock assessment, and 2005 porbeagle shark stock assessment. These included, but were not limited to: removing sandbar sharks from the LCS complex and establishing a non-sandbar LCS complex; setting new sandbar, non-sandbar LCS, and porbeagle shark commercial quotas; establishing a sandbar shark research fishery with prohibition on the retention of sandbar sharks outside the shark research fishery; creating one region for SCS, sandbar, and pelagic sharks and two regions (Gulf of Mexico and Atlantic regions) for non-sandbar LCS; prohibiting shark BLL gear in eight marine protected areas as requested by the South Atlantic Fishery Management Council; establishing new non-sandbar LCS retention limits for directed and incidental shark permit holders; establishing a fishing year for sharks that begins on January 1 of each year; limiting the carryover of underharvest to 50 percent of the base quota for shark stocks whose status are healthy and prohibiting the carryover of underharvest for shark stocks whose status are overfished, experiencing overfishing, or are determined to be unknown; deducting overharvests from the following fishing year, or multiple years (up to five year maximum), based on the level of overharvest; requiring HMS dealer reports to be received by NOAA Fisheries within 10 days of the end of a reporting period; requiring sharks to be offloaded with all fins naturally attached; and, proportioning unclassified sharks out among each shark species/complex based on observer and dealer reports.

NOAA Fisheries is currently developing Amendment 3 to the 2006 Consolidated HMS FMP to rebuild blacknose sharks and address overfishing of Atlantic blacknose sharks and shortfin mako sharks, among other issues.

1.1.3.2 Description of the Atlantic Shark Fisheries

The Atlantic commercial shark fisheries primarily use BLL, PLL, and gillnet gears. Prior to the implementation of Amendment 2 to the 2006 Consolidated HMS FMP in 2008, the primary target species in the fisheries were sandbar and blacktip sharks, although many other shark species were caught as well. In May 2009, 222 vessels were permitted to directly fish for sharks and another 280 vessels had incidental shark LAPs. As of May 2009, no shark LAPs or shark dealer permits were held by residents of Puerto Rico, St. Thomas, St. Croix, or St. John.

Recreational fishing for Atlantic sharks takes place from New England to the Caribbean Sea and is popular due to the accessible nature of the resources. Sharks can be caught virtually anywhere in salt water, from the surf to offshore areas. Charter vessel fishing for sharks is also popular. Currently, federal regulations state that recreational anglers can retain blacktip, spinner, bull, lemon, nurse, great hammerhead, smooth hammerhead, scalloped hammerhead, tiger, bonnethead, Atlantic sharpnose, finetooth, blacknose, porbeagle, common thresher, shortfin mako, oceanic whitetip, and blue sharks. Recreational anglers can not retain any prohibited species, sandbar, or silky sharks. Recreational anglers can land one shark from the above list with a minimum fork length (FL) of 54 inches per vessel per trip, in addition to one Atlantic sharpnose (no minimum size) and one bonnethead shark (no minimum size) per person per trip.

Sharks may be retained on recreational vessels issued an HMS Angling or HMS CHB permit. The distribution of those HMS permits in Puerto Rico and the USVI are shown in Table 1.1.

Puerto Rico reported approximately 10.1 mt of commercial shark landings for 2006 (PR DNER, 2007). It is not clear what portion of these landings or what species were harvested from federal waters. Currently, little information is available regarding shark catches in the USVI. Additional information on recreational and commercial Atlantic shark landings is provided in Amendment 2 to the 2006 Consolidated HMS FMP and the 2008 SAFE Report.

1.1.4 Atlantic Billfish

1.1.4.1 Management History

The Atlantic billfish (BLF) complex includes Atlantic blue marlin (BUM), Atlantic white marlin (WHM), west Atlantic sailfish (SAI), and longbill spearfish (SPX). Billfish present unique challenges for fisheries management in the United States due to their distributional and behavioral patterns. International management is required because BLF are widely distributed throughout the Atlantic as well as the U.S. EEZ. Atlantic BLF have historically been landed incidentally on foreign and domestic commercial PLL vessels or in directed recreational and subsistence handline fisheries. On the national level, revisions to the Magnuson-Stevens Act in 1996 prompted NOAA Fisheries to initiate rebuilding programs for overfished stocks of BUM, WHM, and SAI. Atlantic BLF are currently managed under the 2006 Consolidated HMS FMP under the authority of the Magnuson-Stevens Act and ATCA.

In 1997, ICCAT made its first binding recommendation for BUM and WHM, requiring reductions in landings and noting the need for improvements in data and monitoring. The United States sponsored a resolution at the 1998 ICCAT meeting resulting in a recommendation that the Standing Committee on Research and Statistics (SCRS) develop stock recovery scenarios following stock assessments for BUM and WHM in 2000 and 2002, respectively. In November 2000, ICCAT adopted a two-phase marlin rebuilding program. Phase I of the plan required, among other things, that countries reduce landings of WHM from PLL and purse seine fisheries by 67 percent and BUM landings by 50 percent from 1999 levels; the United States had previously prohibited commercial retention of BLF in the 1988 Atlantic Billfish FMP. For its recreational fishery, the United States agreed to limit annual landings to 250 BUM and WHM, combined, annually through 2010.

The 1999 Billfish FMP amendment included the following measures: address overfished populations of BUM and WHM; reduce bycatch and discard mortality of BLF; comply with 1997 ICCAT recommendations to reduce landings; improve monitoring and data collection; and, determine the status of SAI and SPX populations. The current size limits (BUM, 99 inches (251 cm) lower jaw fork length (LJFL); WHM, 66 inches (168 cm) LJFL; SAI, 63 inches (160 cm) LJFL) are intended to provide an increase in reproductive potential, and thus, lead to a long-term benefit for the Atlantic-wide stock. To facilitate compliance with the ICCAT rebuilding plan, NOAA Fisheries implemented regulations effective March 2003, requiring (1) an Atlantic HMS recreational angling permit, (2) mandatory self-reporting of all non-tournament landings of BLF, and (3) reporting of tournament landings via the Recreational Billfish Survey (RBS). Effective January 2008, in an effort to reduce post-release mortality of BLF, NOAA Fisheries required anglers fishing from HMS permitted vessels and participating in BLF tournaments to use only non-offset circle hooks when deploying natural bait or natural bait/artificial lure combinations.

Additionally, it is illegal to sell Atlantic BLF. This prohibition on sale precludes the possession of Atlantic BLF by commercial fishermen, seafood dealers, and restaurants with the intent to sell. While BLF are still caught incidentally in commercial fishing operations, the sale prohibition has ended directed fishing effort on these species, which supports rebuilding.

On September 4, 2001, NOAA Fisheries received a petition to list WHM as endangered or threatened throughout its range, and to designate critical habitat under the Endangered Species Act (ESA). NOAA Fisheries conducted a status review of WHM in 2002 and determined that a listing was not warranted (67 FR 57204; September 9, 2002). As a result of subsequent litigation and a settlement agreement with the Center for Biological Diversity, NOAA Fisheries agreed to initiate a status review following the 2006 stock assessment by ICCAT. In 2007, NOAA Fisheries conducted a status review of WHM again and determined that a listing was not warranted (73 FR 843; January 4, 2008). While WHM was determined not to be endangered or threatened throughout its range, NOAA Fisheries retains WHM on the Species of Concern list.

1.1.4.2 Description of Billfish Fisheries

NOAA Fisheries authorizes only recreational anglers to target and harvest BLF. Billfish caught in the Atlantic PLL and shark fisheries cannot be retained and are considered bycatch. Post-release survival rates are identified as a critical data need for BLF management. Atlantic BUM and WHM fishing seasons generally begin in May, although tournaments in warmer-water areas start in March. Marlins move up the coast of the United States as waters warm during the summer, with relatively more WHM traveling farther north and caught off mid-Atlantic and southern New England during July to September. The Atlantic marlin season generally ends by October for the continental United States, but fish are still caught past October in the warm Caribbean waters off Puerto Rico and the USVI. Currently, minimum size limits (LJFL) of 99 inches, 66 inches, and 63 inches are in place for BUM, WHM, and SAI, respectively, with a ban on harvest of SPX. All tournament and non-tournament landings must be reported and, under an ICCAT recommendation, up to 250 BUM and WHM (combined) may be harvested annually in the United States.

Billfish may be retained on recreational vessels issued an HMS Angling or HMS CHB permit. The distribution of those HMS permits in Puerto Rico and the USVI can be seen in Table 1.1. In 2008, 58 BUM and 59 WHM were reported to NOAA Fisheries by recreational fishermen or tournament operators. Of those landings, 13 BUM were reported from Puerto Rico.

1.2 Status of the Stocks

The thresholds used to determine the status of Atlantic HMS are fully described in Chapter 3 of the 1999 FMP and Amendment 1 to the Billfish FMP, and are presented in Figure 1.1. These thresholds were incorporated into the 2006 Consolidated HMS FMP. These thresholds are based on the thresholds described in a paper providing technical guidance for implementing National Standard 1 of the Magnuson-Stevens Act (Restrepo et *al*., 1998).

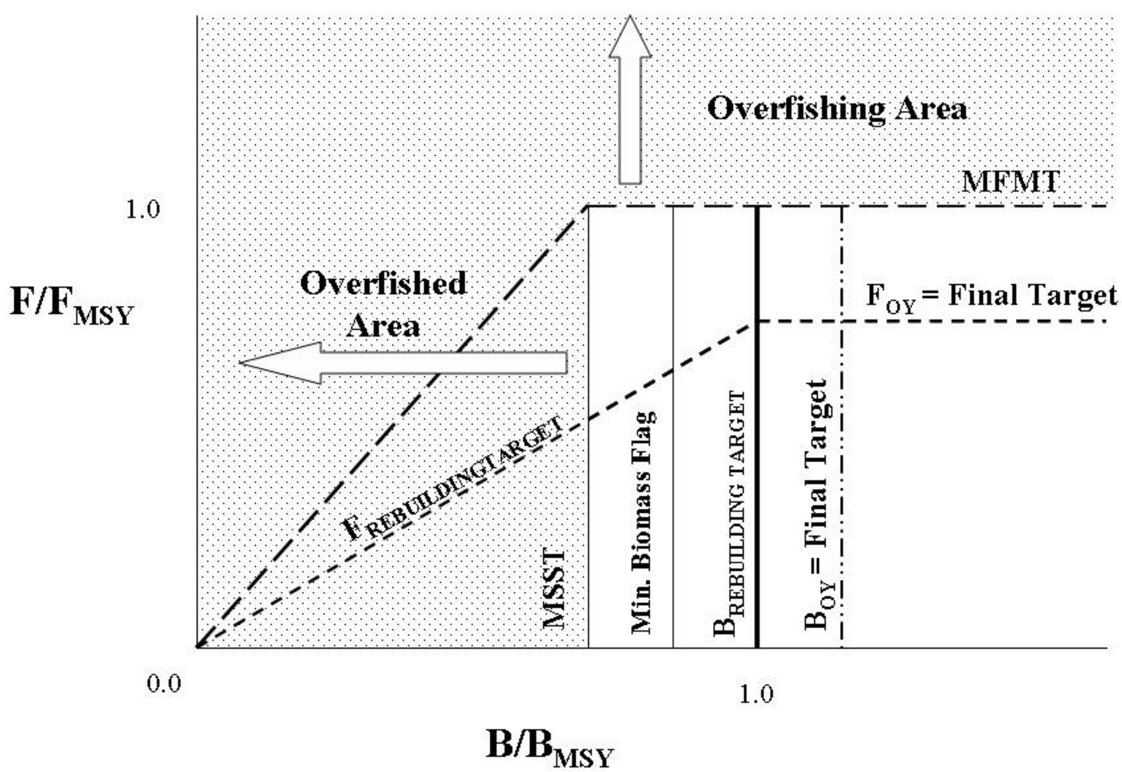

Figure 1.1 Illustration of the status determination criteria and rebuilding terms.

In summary, a species is considered overfished when the current 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 B_{MSY}. 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 (MFMT) is F_{MSY}. Thus, if F exceeds F_{MSY}, the stock is experiencing overfishing.

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

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

Atlantic shark stock assessments for LCS and SCS are completed by the NOAA Fisheries Southeast Data, Assessment, and Review (SEDAR) process. For porbeagle sharks, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) conducted a species report and assessment in 2004 (COSEWIC, 2004). The Canadian Department of Fisheries and Oceans conducted the latest assessment on porbeagle sharks in 2005, and NOAA Fisheries has deemed this assessment the best available science and appropriate to use for U.S. domestic management measures (November 7, 2006, 71 FR 65086). A joint ICCAT-ICES intersessional meeting is proposed in 2009 to further assess porbeagle sharks. Table 1.2 and Table 1.3 summarizes stock assessment information and the current status of Atlantic HMS as of October 2008.

Table 1.2 **Stock assessment summary table for Atlantic tunas, swordfish, and billfish.**
Source: SCRS, 2008.

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_{07}/SSB_{MSY} = 0.57 (0.46-0.70) (low recruitment) SSB_{07}/SSB_{MSY} = 0.14 (0.08-0.21) (high recruitment) SSB_{07}/SSB_{75} = 0.25	$0.86SSB_{MSY}$	$F_{04\text{-}06}/F_{MSY}$ = 1.27 (1.04-1.53) (low recruitment) $F_{04\text{-}06}/F_{MSY}$ =2.18 (1.74-2.64) (high recruitment)	*Not estimated*	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
Atlantic Bigeye Tuna	B_{06}/B_{MSY} = 0.92 (0.85-1.07)	$0.6B_{MSY}$ (age 2+)	F_{05}/F_{MSY} = 0.87 (0.70-1.24)	0.20 (0.07-0.33)	Rebuilding; 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)*	*Not estimated*	Not overfished; overfishing not occurring.
North Atlantic Albacore Tuna	B_{05}/B_{MSY} = 0.81 (0.68-0.97)	$0.7B_{MSY}$	F_{05}/F_{MSY} = 1.5 (1.3-1.7)	*Not estimated*	Overfished; overfishing is occurring.
West Atlantic Skipjack Tuna	B_{06}/B_{MSY}: most likely>1	*Unknown*	F_{06}/F_{MSY}: most likely<1	*Not estimated*	Unknown
North Atlantic Swordfish	B_{06}/B_{MSY} = 0.99 (0.87-1.27)	*Unknown*	F_{05}/F_{MSY} = 0.86 (0.87-1.27)	*Not estimated*	Rebuilding; overfishing not occurring
South Atlantic Swordfish	Likely >1	*Unknown*	Likely <1	*Not estimated*	Unknown
Blue Marlin	$B_{04}<B_{MSY}$: yes	$0.9B_{MSY}$	$F_{04}>F_{MSY}$: yes	*Not estimated*	Overfished: overfishing is occurring
White Marlin	$B_{04}<B_{MSY}$: yes	$0.85B_{MSY}$	$F_{04}>F_{MSY}$: possibly	*Not estimated*	Overfished: overfishing is occurring
West Atlantic Sailfish	*Unknown*	$0.75B_{MSY}$	*Unknown*	*Not estimated*	Overfished; overfishing is occurring
Spearfish	*Unknown*	*Unknown*	*Unknown*	*Not estimated*	*Unknown*

*Fcurrent refers to F2006 in the case of ASPIC, and the geometric mean of F across 2003 - 2006 in the case of VPA.

Table 1.3 **Stock assessment summary table for Atlantic sharks.**
Sources: SCRS, 2007; 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
LCS Complex	*Unknown*	*Unknown*	*Unknown*	*Unknown*	*Unknown*

Species	Current Relative Biomass Level	Minimum Stock Size Threshold	Current Relative Fishing Mortality Rate	Maximum Fishing Mortality Threshold	Outlook
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	*Unknown*	*Unknown*	*Unknown*	*Unknown*	*Unknown*
Dusky Sharks	B_{03}/B_{MSY} = 0.15-0.47	*Unknown*	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	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	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	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	0.07	Overfished; overfishing is occurring
Finetooth Sharks	N_{05}/N_{MSY} = 1.80	2.4E+06	F_{05}/F_{MSY} = 0.17	0.03	Not overfished; overfishing not occurring
Pelagic Sharks	*Unknown*	*Unknown*	*Unknown*	*Unknown*	*Unknown*
Shortfin Mako Sharks	B_{07}/B_{MSY} = 0.95-1.65	*Unknown*	F_{07}/F_{MSY} = 0.48-3.77	0.007-0.05	Not overfished; but approaching an overfished status; overfishing occurring
Blue Sharks	B_{07}/B_{MSY} = 1.87-2.74	*Unknown*	F_{07}/F_{MSY} = 0.13-0.17	0.15	Not overfished; overfishing not occurring
Porbeagle Sharks	SSN_{04}/SSF_{MSY} = 0.15-0.32	*Unknown*	F_{04}/F_{MSY} = 0.83	0.033-0.065	Overfished; overfishing is not occurring

1.2.1 Atlantic Tunas

All text, figures and tables for this section are from the SCRS 2008 Report and the 2008 U.S. National Report to ICCAT. All weights are reported as whole weights unless otherwise indicated.

1.2.1.1 Atlantic Bluefin Tuna

Life History and Species Biology

The Atlantic BFT is one of the only large pelagic fish living permanently in temperate Atlantic waters. They are distributed from the Gulf of Mexico to Newfoundland in the western Atlantic, from roughly the Canary Islands to south of Iceland in the east Atlantic, and throughout the Mediterranean Sea. Historically, catches of BFT were made from a broad geographic range in the Atlantic and Mediterranean.

Bluefin tuna appear to display homing behavior and spawning site fidelity in both the Mediterranean Sea and Gulf of Mexico, which constitute the two main spawning areas being clearly identified today. Less is known about feeding migrations within the Mediterranean and the North Atlantic, but results from electronic tagging indicate that BFT movement patterns vary considerably between individuals, years, and areas. Although the BFT population is managed as two stocks, separated at 45° W latitude, its population structure remains poorly understood and needs to be further investigated. Recent genetic and microchemistry studies as well as work based on historical fisheries tend to indicate that the BFT population structure is complex.

Bluefin tuna are assumed to mature at 4 years of age (approximately 25 kg or 55 lb) in the Mediterranean and at approximately 8 to 10 years of age (approximately 140 kg - 150 kg or 300 lb to 330 lb) in the Gulf of Mexico, although recent analyses of longline data in the Gulf of Mexico estimate the age of 50 percent maturity to be 12 years (Diaz and Turner, 2007). Juvenile and adult BFT are opportunistic feeders (as are most predators) and their diet can include jellyfish and salps, as well as demersal and sessile species such as octopus, crabs and sponges. However, in general, juveniles feed on crustaceans, fish and cephalopods, while adults primarily feed on fish such as herring, anchovy, sand lance, sardine, sprat, bluefish, and mackerel. Juvenile growth is rapid for a teleost fish (about 76 cm or 30 inches/year), but slower than other tuna and BLF species. Growth in length tends to be lower for adults than juveniles, but growth in weight is higher for adults than juveniles. At 10 years old, a BFT is about 200 cm (79 inches) and 150 kg (331 lb) and reaches about 300 cm (118 inches) and 400 kg (882 lb) at 20 years. However, there remain large uncertainties about BFT growth curves, and BFT in the western Atlantic generally reach a larger maximum size compared to BFT caught in the eastern Atlantic. The BFT is a long lived species, with a lifespan of 20 years or more, as indicated by recent studies from radiocarbon deposition.

Stock Status and Outlook

The last full stock assessment for western Atlantic BFT was conducted in 2008 by SCRS with the next scheduled for 2010. The 2008 western BFT assessment, which included information up to 2007, showed results consistent with previous evaluations, in that spawning stock biomass (SSB) declined steadily between the early 1970s and 1992. Since then, SSB has fluctuated between 18 percent and 27 percent of the 1975 level. The stock has experienced different levels of F over time, depending on the size of fish targeted by various fleets. Fishing mortality for spawners (age 8+) declined markedly between 2002 and 2007.

Estimates of recruitment were very high in the early 1970's, and additional analyses involving longer catch and index series suggest that recruitment was also high during the 1960s. Since 1977, recruitment has varied from year to year without any noticeable trend. SCRS noted that a key factor in estimating MSY-related benchmarks is the highest level of recruitment that can be achieved in the long term. Assuming that average recruitment cannot reach the high levels from the early 1970s, recent F (2004 - 2006) is about 30 percent higher than the MSY level and SSB is about half of the MSY level. Estimates of stock status are more pessimistic if a high recruitment scenario is considered ($F/F_{MSY} = 2.1$, $B/B_{MSY} = 0.14$).

One important factor in the recent decline of fishing mortality on large BFT is that the TAC has not been taken during this time period, due primarily to a shortfall by U.S. fisheries that target large BFT. Two plausible explanations for the shortfall were put forward previously by SCRS: (1) that availability of fish to the U.S. fishery has been abnormally low, and/or (2) the overall size of the population in the western Atlantic declined substantially from the level of recent years. SCRS noted that while there is no overwhelming evidence to favor either explanation over the other, the base case assessment [which excluded the Canadian Gulf of St. Lawrence catch per unit effort (CPUE) index since inclusion might produce overly optimistic results] implicitly favors the first hypothesis (regional changes in availability) because a large recent reduction in SSB is not estimated. Nevertheless, SCRS noted that substantial uncertainty remains on this issue and more research needs to be done. SCRS also cautioned that the conclusions of the 2008 assessment do not capture the full degree of uncertainty in the assessments and projections, due to: (1) mixing between fish of eastern and western origin; (2) recruitment, both in terms of recent levels (which are estimated with low precision in the assessment), and potential future levels (the "low" vs. "high" recruitment hypotheses which affect management benchmarks); and, (3) the assumed growth curve, which may be revised based on new information that is being collected. If the growth curve changes substantially, it may impact the assessment results as well as management benchmarks.

To determine the outlook, SCRS conducted a medium-term (12-year) evaluation of changes in spawning stock size and yield over the remaining rebuilding period under various management options. In order to provide advice relative to rebuilding the western Atlantic BFT resource, SCRS conducted projections for two scenarios about future recruitment. The "low recruitment" scenario assumed that future average recruitment will approximate the average of recruitment (at age one) levels observed from 1976 through 2004 (70,000 recruits). The "high recruitment" scenario assumed average recruitment levels would increase as the stock rebuilds (an MSY level of 160,000 recruits). SCRS had no strong evidence to favor one scenario over the other and noted that both are reasonable (but not extreme) lower and upper bounds on rebuilding potential. The outlook for BFT in the western Atlantic with the low recruitment scenario (Figure 1.2) is similar to that from the 2006 assessment. Under the low recruitment scenario, a total catch of either 1,800 mt or 1,900 mt (per ICCAT Recommendation 08-04) is predicted to have at least a 75 percent probability of achieving the convention objectives of preventing overfishing and rebuilding the stock to MSY levels ahead of the 2019 rebuilding target date. The outlook under the high recruitment scenario is more pessimistic since the rebuilding target would be higher.

Under the high recruitment scenario, total catches of either 1,800 mt or 1,900 mt would not be predicted to rebuild the western BFT population to convention objectives by the target date of 2019 with either a 50 percent or 75 percent probability. Similarly, under the high recruitment scenario, total catches of 1,900 mt would not be anticipated to halt overfishing by 2019; however, total catches of 1,800 would be expected to halt overfishing by 2019. Figure 1.2 shows projections of spawning stock biomass for Atlantic BFT under various levels of constant catch.

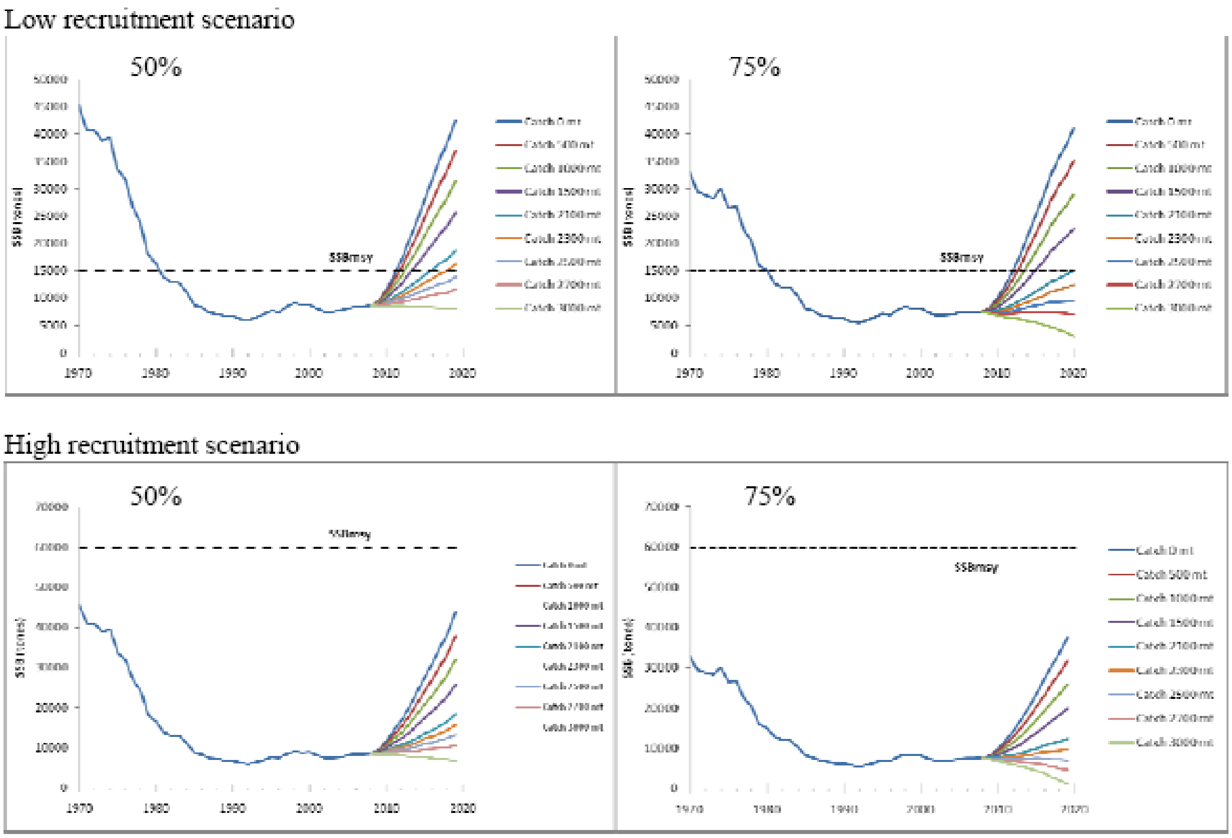

Figure 1.2 Projections of BFT spawning stock biomass (SSB) for the Base Case assessment under low recruitment (top panels) and high recruitment (bottom panels) and various levels of constant catch. The labels "50%" and "75%" refer to the probability that the SSB will be greater than or equal to the values indicated by each curve. Note that curves are arranged sequentially in the same order as the legends. The dashed horizontal lines represent the median (50%) level of SSB at MSY. Source: SCRS, 2008.

1.2.1.2 Atlantic Bigeye Tuna

Life History and Species Biology

Bigeye tuna are distributed throughout the Atlantic Ocean between 50º N and 45º S, but not in the Mediterranean Sea. This species swims at deeper depths than other tropical tuna species and exhibits extensive vertical movements. Similar to the results obtained in other oceans, pop-up tagging and sonic tracking studies conducted on adult fish in the Atlantic show that they are found much deeper during the daytime than at night indicating a clear diurnal pattern. Spawning takes place in tropical waters when the environment is favorable. From nursery areas in tropical waters, juvenile fish tend to diffuse into temperate waters as they grow larger. Catch information from surface gears indicate that the Gulf of Guinea is a major nursery ground for this species.

Bigeye tuna feed on a variety of prey organisms including fish, mollusks, and crustaceans. Bigeye tuna exhibit relatively fast growth (about 105 cm FL at age 3, 140 cm at age 5, and 163 cm at age 7). Bigeye tuna over 200 cm are relatively rare, but do occur with some frequency. Bigeye tuna mature at about 3 - 5 years of age. Young fish form schools mostly mixed with other tunas such as YFT and SKJ. These schools are often associated with drifting objects, whale sharks, and sea mounts. This association appears to weaken as BET grow larger. Various pieces of evidence, such as a lack of identified genetic heterogeneity and the time-area distribution of fish and movements of tagged fish, suggest an Atlantic-wide single stock for this species, which is currently accepted by SCRS. However, the possibility of other scenarios, such as the existence of north and south stocks, should not be disregarded.

Stock Status and Outlook

The most recent stock assessment for BET was conducted in 2007. The current MSY estimated using two types of production models was around 90,000 mt and 93,000 mt, although uncertainty in the estimates broadens the range. In addition, the estimates reflect the current relative mixture of fisheries that capture small or large BET. MSY can change considerably with changes in the relative fishing effort exerted on the stock by surface and longline fisheries.

The 2007 assessment results indicated that the BET stock declined rapidly during the 1990s due to the large catches taken in that period, and it has recently stabilized at around or below the level that produces MSY in response to a large reduction in reported catches. Estimated fishing mortality exceeded F_{MSY} for several years in the period of the mid-1990s and has rapidly been reduced since 1999. A summary of the 2007 stock assessment is provided in Table 1.4.

The biomass at the beginning of 2006 was estimated to be nearly 92 percent of the biomass at MSY, and the 2005 fishing mortality rate was estimated to be about 13 percent below the fishing mortality rate at MSY. The replacement yield for 2006 was estimated to be slightly below MSY. Projections indicate that catches reaching 85,000 mt or less will permit the stock to rebuild in the future. SCRS indicated that this overall characterization best represents the current status of BET in the Atlantic; however, it was also noted that there are other models showing both more optimistic and more pessimistic stock status evaluations.

Table 1.4 Summary table for the status of Atlantic bigeye tuna.
Source: SCRS, 2008**.**

Age/size at Maturity	Age 3/~100 cm curved fork length (CFL)
Spawning Sites	Tropical waters
Current Relative Biomass Level *Minimum Stock Size Threshold*	B_{06}/B_{MSY} = 0.92 (0.85 - 1.07) *$0.6B_{MSY}$ (age 2+)*

Current Relative Fishing Mortality Rate *Maximum Fishing Mortality Threshold*	F_{05}/F_{MSY} = 0.87 (0.70 - 1.24) F_{MSY} = 0.20 (0.07 - 0.33)
Maximum Sustainable Yield	90,000 - 93,000 mt
Current (2007) Yield	67,172 mt
Current (2006) Replacement Yield	Slightly below MSY
(Outlook – Status of Stocks, NMFS, 2008)	***(Rebuilding; Overfishing not occurring)***

1.2.1.3 Atlantic Yellowfin Tuna

Life History and Species Biology

The YFT is a cosmopolitan species distributed mainly in the tropical and subtropical oceanic waters. The size of YFT exploited by fisheries ranges from 30 cm to 170 cm FL, and maturity occurs at about 100 cm FL. Smaller fish (juveniles) form mixed schools with SKJ and juvenile BET, and are mainly limited to surface waters, while larger fish form schools in surface and sub-surface waters. The younger age classes of YFT exhibit a strong association with fish aggregating devices (FADs), which can be natural or artificial (see section 2.3.1).

Reproductive output among females has been shown to be highly variable. The main spawning ground is the equatorial zone of the Gulf of Guinea, with spawning primarily occurring from January to April. Juveniles are generally found in coastal waters off Africa. In addition, spawning occurs in the Gulf of Mexico, in the southeastern Caribbean Sea, and off Cape Verde, although the relative importance of these spawning grounds is unknown.

Although separate spawning areas might imply separate stocks or substantial heterogeneity in the distribution of YFT, a single stock for the entire Atlantic is assumed as a working hypothesis, taking into account the trans-Atlantic migration (from west to east) indicated by tagging, a 40-year time series of longline catch data that indicates YFT are distributed continuously throughout the entire tropical Atlantic Ocean, and other information (*e.g.*, time-area size frequency distributions and locations of fishing grounds). Males are predominant in the catches of larger sized fish. Natural mortality is assumed to be higher for juveniles than for adults; this is supported by tagging studies for Pacific YFT.

Growth rates have been described as relatively slow initially, increasing at the time the fish leave the nursery grounds. Nevertheless, questions remain concerning the most appropriate growth model for Atlantic YFT. Shuford *et al*., (2007) developed a new growth curve using daily growth increment counts from otoliths. The results of this study, as well as other recent hard part analyses, do not support the concept of the two-stanza growth model (initial slow growth) which is currently used for ICCAT (as well as other management bodies) YFT stock assessments and was developed from length frequency and tagging data. This discrepancy in growth models could have implications for stock assessments and is being investigated.

Stock Status and Outlook

A full stock assessment was conducted for YFT in 2008, applying both an age-structured model and a non-equilibrium production model to the available catch data through 2006. Information from the assessment is summarized in Table 1.5.

Since the relatively high catch levels of 2001 (164,650 mt), catches have declined each year to a level of 108,160 mt, a reduction of 34 percent. Catches in 2005 and 2006 represented the lowest level of catches since 1974. The catch estimate in 2007 (96,580 mt) is preliminary, but may be even lower. A potential explanation for this decline is the reduction in eastern Atlantic purse seine effort, but that alone does not explain the reduction of baitboat and purse seine catches in the western Atlantic, nor the more recent declines of longline catches in both the western and eastern Atlantic.

The estimate of MSY derived from age-structured virtual population analyses (VPA) was 130,600 mt. This estimate may be below what was achieved in past decades because overall selectivity has shifted to smaller fish; the impact of this change in selectivity on estimates of MSY is clearly seen in the results from VPA. The estimate of relative fishing mortality (F_{06}/F_{MSY}) was 0.84, and for relative biomass (B_{06}/B_{MSY}) was 1.09.

The stock was also assessed with a stock production model incorporating covariates (ASPIC). The estimate of MSY derived using ASPIC was 146,600 mt. Although the estimate of MSY was somewhat higher than that from the age structured model, the stock status results are slightly more pessimistic. The estimate of relative fishing mortality (F_{06}/F_{MSY}) was 0.89, and for relative biomass (B_{06}/B_{MSY}) was 0.83.

The trend estimated from VPA indicates that overfishing ($F>F_{MSY}$) has occurred in recent years, but that the current status is neither overfished ($B<B_{MSY}$) nor is there overfishing. The more pessimistic ASPIC estimates indicate that there has been both overfishing and an overfished status in recent years, but that overfishing was not occurring in 2006. Examination of the distribution of these estimates from both models shows that about 40 percent indicate a sustainable situation, in which the stock is not overfished and overfishing is not occurring.

In summary, 2006 YFT catches are estimated to be well below MSY levels, stock biomass is estimated to be near the ICCAT Convention objective and recent fishing mortality rates somewhat below F_{MSY}. The recent trends indicate declining effective effort and some recovery of stock levels. However, when the uncertainty around the point estimates from both models is taken into account, there is still about a 60 percent chance that stock status is not consistent with Convention objective.

Table 1.5 **Summary table for the status of Atlantic yellowfin tuna.**
Source: SCRS, 2008.

Age/size at Maturity	Assumed to be knife-edge at the beginning of Age 3 ~100 cm CFL
Spawning Sites	Tropical waters
Relative Biomass Level *Minimum Stock Size Threshold*	B_{06}/B_{MSY} = 0.96 (0.72 - 1.22) $0.5B_{MSY}$ (age 2+)
Relative Fishing Mortality Rate *Maximum Fishing Mortality Threshold*	$F_{current}/F_{MSY}$ = 0.86 (0.71 - 1.05)* F_{MSY} = not estimated
Maximum Sustainable Yield	~ 130,600 mt (120,100 - 136,500 mt) (VPA) ~ 146,600 mt (128,200 - 152,500 mt) (ASPIC)
Current (2006) Yield	108,160 mt
Replacement Yield (2006)	~ 130,000 mt
(Outlook – Status of Stocks, NMFS, 2008)	***(Not Overfished; overfishing not occurring)***

*Fcurrent refers to F_{2006} in the case of ASPIC, and the geometric mean of F across 2003 - 2006 in the case of VPA.

1.2.1.4 Atlantic Albacore Tuna

Life History and Species Biology

Albacore is a temperate tuna widely distributed throughout the Atlantic Ocean and Mediterranean Sea. On the basis of the biological information available for assessment purposes, the existence of three stocks is assumed: northern and southern Atlantic stocks (separated at 5º N) and a Mediterranean stock.

Albacore spawning areas in the Atlantic are found in subtropical western areas of both hemispheres and throughout the Mediterranean Sea. Spawning takes place during austral and boreal spring-summer. Sexual maturity is considered to occur at about 90 cm FL (age five) in the Atlantic, and at smaller size (62 cm, age two) in the Mediterranean. Until this age, they are mainly found in surface waters, where they are targeted by surface gears. Some adult ALB are also caught using surface gears but, as a result of their deeper distribution, they are mainly caught using longlines. Young ALB are also caught by longlines in temperate waters.

Stock Status and Outlook

The most recent stock assessment for northern and southern ALB was conducted in 2007. Based on the 2007 assessment, which considered catch, size and effort since the 1930s, SCRS stated that the northern ALB spawning stock biomass has declined. In 2005, the spawning stock biomass was about one quarter of the peak levels estimated for the late 1940s. Estimates of recruitment to the fishery, although variable, have shown generally higher levels in the 1960s and earlier periods, with a declining trend thereafter. However, the most recent recruitment is estimated to be large, but uncertain.

Table 1.6 provides a summary of the stock assessment results for northern ALB. The 2007 northern ALB stock assessment indicates that the stock has recently rebuilt to levels near B_{MSY} (current SSB is approximately 20 percent below the MSY level, compared to 2000 when it was 50 percent below) (Table 1.6). Recent fishing mortality rates have generally been above F_{MSY} (current F is approximately 50 percent higher than F_{MSY}).

While estimates of MSY varied over time as the relative combination of fisheries taking juvenile and mature ALB varies, which results in different overall selectivity patterns across time, the biomass that supports that MSY has little variation. For the three most recent years, the estimate of MSY is about 30,000 mt, but over time the estimates have ranged from about 26,000 mt to 34,000 mt, depending on the relative importance of the surface and longline fisheries catch levels.

The assessment indicated that the ALB spawning stock will decline from the levels estimated in 2005 over the next few years, particularly given the fact that the 2006 catch was higher than the 2005 level. The spawning stock response to different catch levels after the next few years depends upon the real strength of the 2003 year class, which could be relatively strong (although SCRS did not have confidence in the overall level).

Table 1.6 Summary table for the status of northern Atlantic albacore tuna.
Source: SCRS, 2008.

Age/size at Maturity	Age 5/~90 cm CFL
Spawning Sites	Subtropical western waters of the northern Hemisphere
Current Relative Biomass Level *Minimum Stock Size Threshold*	B_{05}/B_{MSY} = 0.81 (0.68 - 0.97) *0.7B_{MSY}*
Current Relative Fishing Mortality Rate *Maximum Fishing Mortality Threshold*	F_{05}/F_{MSY} = 1.5 (1.3 - 1.7) *F_{MSY}* = not estimated
Maximum Sustainable Yield	30,200 mt [26,800 - 34,100 mt]
Current (2007) Yield	21,549 mt
Current (2006) Replacement Yield	~32,000 mt
(Outlook – Status of Stocks, NMFS, 2008)	***(Overfished; overfishing is occurring)***

1.2.1.5 Atlantic Skipjack Tuna

Life History and Species Biology

The SKJ is a gregarious species that is found in schools in the tropical and subtropical waters of the three oceans. It is the predominant species found under FADs where it is caught in association with juvenile YFT, BET and with other species of epipelagic fauna. Skipjack tuna show an early maturity (around first or second year of life), high fecundity, and spawn opportunistically throughout the year in warm waters above 25º C. Skipjack tuna are also thought to be a faster-maturing and shorter lived species than YFT. One of the characteristics of SKJ is that from its first year of life it spawns opportunistically throughout the year and in vast sectors of the ocean. A recent analysis of tagging data from the eastern Atlantic confirmed that the growth of SKJ varies according to the latitude. However, this variation is not as great as had been previously thought. The increasing use of FADs since the early 1990s, has changed the species composition of free swimming schools. It is noted that, in effect, the free schools of mixed species were considerably more common prior to the introduction of FADs. Furthermore, the association with FADs may also have an impact on the biology (food intake, growth rate, plumpness of the fish) and on the ecology (displacement rate, movement orientation) of SKJ and YFT (ecological trap concept).

Stock Status and Outlook

The last full stock assessment for SKJ was conducted in 2008. Summarized information for west Atlantic SKJ are shown in Table 1.7. Traditional stock assessment models have been difficult to apply to SKJ because of their particular biological (continuous spawning, areal variation in growth) and fishery characteristics (non-directed effort, weak cohorts identified). In order to overcome these difficulties, several different assessment methods which accommodate expert opinion and prior knowledge of the fishery and biological characteristics of skipjack tuna have been carried out on the two stocks of Atlantic SKJ.

The standardized CPUEs of Brazilian baitboats remain stable while those of Venezuelan purse seiners and U.S. rod and reel decreased in recent years. This decrease, also observed in the YFT CPUE time series of Venezuela, could be linked to specific environmental conditions (high surface temperatures, lesser accessibility of prey). The average weight of SKJ caught in the western Atlantic is higher than in the east (3 - 4.5 kg vs. 2 - 2.5 kg), at least for the Brazilian baitboat fishery. The catch-only model estimated MSY at around 30,000 mt and the Bayesian surplus model (Schaefer formulation) at 34,000 mt. SCRS attempted several analyses, specifically sensitivity runs using different values of natural mortality. For this stock, only the three fisheries mentioned above were considered. The final estimate of MSY converges also at about 31,000-36,000 mt. It must be stressed that all of these analyses correspond to the current geographic coverage of this fishery (*i.e.*, relatively coastal fishing grounds due to the deepening of the thermocline and of the oxycline to the east). For the western Atlantic stock, it is unlikely that the current catch is larger than the current replacement yield as shown by the trajectories of B/B_{MSY} and F/F_{MSY}.

Table 1.7 **Summary table for the status of western Atlantic skipjack tuna.**
Source: SCRS, 2008.

Maturity schedule	Assumed to be knife-edge at the beginning of Age 2
Spawning Sites	Spawn opportunistically in tropical and subtropical waters
Current Relative Biomass Level *Minimum Stock Size Threshold*	B_{06}/B_{MSY}: most likely >1 *Unknown*
Current Relative Fishing Mortality Rate *Maximum Fishing Mortality Threshold*	F_{06}/F_{MSY}: most likely <1 F_{MSY} = not estimated
Maximum Sustainable Yield	Around 30,000 - 36,000 mt
Current (2007) Yield	25,400 mt
Current Replacement Yield	Somewhat higher than 25,400 mt
(Outlook – Status of Stocks, NMFS, 2008)	***(Unknown)***

1.2.2 Atlantic Swordfish

1.2.2.1 North Atlantic Swordfish

Life History and Species Biology

Swordfish are one of the fastest and largest predators of the Atlantic Ocean, reaching maximum size at 530 kg. Swordfish are characterized by having dimorphic growth, where females show faster growth rates and attain larger sizes than males. Young SWO grow very rapidly, reaching about 130 cm LJFL by age two. Swordfish are difficult to age, but greater than 50 percent of females are considered mature by age five, at a length of about 180 cm. Known spawning areas are located in warm tropical and subtropical waters, where SWO spawn throughout the year in different localized areas displaying a regular seasonal pattern.

Swordfish are widely distributed in the Atlantic Ocean and Mediterranean Sea. They range from Canada to Argentina in the western Atlantic, and from Norway to South Africa in the eastern Atlantic. The management units for assessment purposes are a separate Mediterranean group, and North and South Atlantic groups separated at 5° N.

In 2006, a SCRS workshop examined both the SWO stock structure and the boundaries of the North and South Atlantic and Mediterranean stocks. This workshop, held in Crete, was conducted to satisfy ICCAT's Resolution 99-03, Resolution by ICCAT on the Clarification of the Stock Structure and Boundaries between the Swordfish Stocks in the Atlantic. In this resolution, ICCAT noted that there were considerable uncertainties about the structure, mixing and boundaries of the SWO stocks, and called for national and international research programs on SWO stock structure. The stock structure data presented at the 2006 workshop were consistent with current theories about Atlantic and Mediterranean SWO stock structure. Researchers at the workshop found that without intensified collaborative and multi-disciplinary research, different SWO stock boundaries could not be improved upon. However, the workshop confirmed that some mixing of stocks between the Atlantic and Mediterranean occur, and fish from the Mediterranean stock are genetically different from SWO in other oceans. The next SWO stock assessment scheduled by ICCAT is to take place in 2009.

Stock Status and Outlook

The biomass of North Atlantic SWO has improved, reaching 99 percent of the level necessary to support MSY in 2006 (Table 1.8). Several strong year classes in the late 1990s, and a reduction in the overall catch since 1987, have allowed the rebound of SWO in the North Atlantic. In 2005, the fishing mortality for North Atlantic SWO was 14 percent below the level needed to maintain MSY. The F_{2005} was less than F_{MSY}, but the SCRS has shown some uncertainty in the estimates of F_{2005}. The replacement yield for 2006 (14,438 mt) was slightly above MSY, and the TAC set by ICCAT in 2005 was 14,000 mt assuming that North Atlantic SWO biomass would continue to reach B_{MSY} with those catch levels (SCRS, 2006).

Table 1.8 **Summary table for the status of North Atlantic swordfish.**
Source: SCRS, 2006.

Age/size at Maturity	Females: 180 cm LJFL Male: 129 cm LJFL
Spawning Sites	Warm tropical and subtropical waters throughout the year
Current Relative Biomass Level	B_{06}/B_{MSY} = 0.99 (0.87 - 1.27)
Current Relative Fishing Mortality Rate *Maximum Fishing Mortality Threshold*	F_{05}/F_{MSY} = 0.86 (0.65 - 1.04) F_{MSY} = not estimated
Maximum Sustainable Yield	14,133 mt (12,800 - 14,790)
Current (2007) Yield	11,938 mt
Current (2006) Replacement Yield	14,438 mt
(Outlook – Status of Stocks, NMFS, 2008)	***(Stock nearly rebuilt; overfishing is not occurring)***

1.2.3 Atlantic Sharks

Life History and Species Biology

Sharks belong to the class Chondrichthyes (cartilaginous fishes) that also includes rays, skates, and deepwater chimaeras (ratfishes). From an evolutionary perspective, sharks are an old group of fishes characterized by skeletons lacking true bones. The life span of all shark species in the wild is not known, but it is believed that many species may live 30 to 40 years or longer.

Relative to other marine fish, sharks have a very low reproductive potential. Several commercial species, including large coastal carcharhinids such as sandbar (Casey and Hoey, 1985; Sminkey and Musick, 1995; Heist *et al.*, 1995), lemon (Brown and Gruber, 1988), and bull sharks (Branstetter and Stiles, 1987), do not reach maturity until 12 to 18 years of age. Various factors determine this low reproductive rate: slow growth; late sexual maturity; one to two-year reproductive cycles; a small number of young per brood; and, specific requirements for nursery areas. These biological factors leave many species of sharks vulnerable to overfishing.

There is extreme diversity among the approximately 350 species of sharks, ranging from tiny pygmy sharks of only 20 cm (7.8 in) in length to the giant whale sharks, over 12 meters (39 feet) in length. There are fast-moving, streamlined species such as mako and thresher sharks, and sharks with flattened, ray-like bodies, such as angel sharks. The most commonly known sharks are large apex predators including the white, mako, tiger, bull, and great hammerhead sharks. Some shark species reproduce by laying eggs, while others nourish their embryos through a placenta. Despite their diversity in size, feeding habits, behavior and reproduction, many of these adaptations have contributed greatly to the evolutionary success of sharks.

Adults usually congregate in specific areas to mate and females travel to specific nursery areas to pup. These nurseries are discrete geographic areas, usually in waters shallower than those inhabited by the adults. Frequently, the nursery areas are in highly productive coastal or estuarine waters where abundant small fishes and crustaceans provide food for the growing pups. These areas also may have fewer large predators, thus enhancing the chances of survival of the young sharks. In temperate zones, the young leave the nursery with the onset of winter; in tropical areas, young sharks may stay in the nursery area for a few years.

Most shark species can be grouped into four broad categories: coastal; coastal-pelagic; pelagic; and, deep-dwelling. Coastal species (*e.g.*, blacktip, finetooth, bull, lemon, and Atlantic sharpnose sharks) inhabit estuaries and waters of the continental shelf. Coastal-pelagic species are intermediate in that they occur both inshore and beyond the continental shelves, but have not demonstrated mid-ocean or transoceanic movements. Sandbar sharks are examples of a coastal-pelagic species. Pelagic species, on the other hand, range widely in the upper zones of the oceans, often traveling over entire ocean basins. Examples include shortfin mako, blue, and oceanic whitetip sharks. Deep-dwelling species, *e.g*., most cat sharks and gulper sharks, inhabit the dark, cold waters of the continental slopes and deeper waters of the ocean basins.

Seventy-three species of sharks are known to inhabit the waters along the U.S. Atlantic coast, including the Gulf of Mexico and the waters around Puerto Rico and the USVI. Thirty-nine species are managed by NOAA Fisheries; spiny dogfish also occur along the U.S. coast, however management for this species is under the authority of the Atlantic States Marine Fisheries Commission as well as the New England and Mid-Atlantic Fishery Management Councils. Deep-water sharks and smooth dogfish were placed in the management unit in 1999 and subsequently removed in 2003. Based on the ecology and fishery dynamics, the sharks have previously been divided into four species groups for management: (1) LCS, (2) SCS, (3) pelagic sharks, and (4) prohibited species (Table 1.9).

Table 1.9 **Common names of shark species included within the four species management units under the purview of NOAA Fisheries.**

Management Unit	Shark Species Included
Large Coastal Sharks (11)	Sandbar*, silky**, tiger, blacktip, bull, spinner, lemon, nurse, smooth hammerhead, scalloped hammerhead, and great hammerhead sharks
Small Coastal Sharks (4)	Atlantic sharpnose, blacknose, finetooth, and bonnethead sharks
Pelagic Sharks (5)	Shortfin mako, thresher, oceanic whitetip, porbeagle, and blue sharks
Prohibited Species (19)	Whale, basking, sand tiger, bigeye sand tiger, white, dusky, night, bignose, Galapagos, Caribbean reef, narrowtooth, longfin mako, bigeye thresher, sevengill, sixgill, bigeye sixgill, Caribbean sharpnose, smalltail, and Atlantic angel sharks

*sandbar sharks can only be retained commercially within a shark research fishery, and cannot be retained by recreational anglers
**silky sharks cannot be retained by recreational anglers

Stock Status and Outlook

NOAA Fisheries is responsible for conducting stock assessments for the LCS and SCS complexes (Cortés, 2002; Cortés *et al*., 2002). The COSEWIC has recently conducted assessments of three pelagic shark species. ICCAT's SCRS conducted stocks assessments for blue sharks and shortfin mako in 2008 and will assess porbeagle in 2009. Ecological risk assessments were also conducted by the SCRS for nine additional priority species of pelagic elasmobranchs (longfin mako; bigeye thresher; common thresher; oceanic whitetip; silky; porbeagle; scalloped hammerhead; smooth hammerhead; and, the pelagic stingray). Stock assessments were conducted for the LCS complex, sandbar sharks, and blacktip sharks in 2006 (NMFS, 2006), and the SCS stock assessment was finalized during the summer of 2007 (NMFS, 2007), which also assessed finetooth, Atlantic sharpnose, blacknose, and bonnethead sharks separately. NOAA Fisheries also released a stock assessment for dusky sharks (May 25, 2006, 71 FR 30123) (Cortés *et al*., 2006). Summaries of recent stock assessments and reports on several species of pelagic sharks (blue sharks, shortfin mako sharks, and porbeagle sharks) by COSEWIC and ICCAT are also included in this section.

A number of new shark stock assessments were conducted in 2005 - 2007 (Gibson and Campana, 2005; Cortés *et al*., 2006; NMFS, 2006; NMFS, 2007). Based on those assessments, NOAA Fisheries has determined that sandbar, dusky, and porbeagle sharks are overfished; sandbar and dusky sharks have overfishing occurring; the status of the Atlantic blacktip shark population and the LCS complex is unknown; and the Gulf of Mexico blacktip shark population is healthy (November 7, 2006, 71 FR 65086). Based on the 2005 and 2006 stock assessments and these stock status determinations, NOAA Fisheries has developed new management measures to rebuild sandbar, dusky, and porbeagle sharks while providing an opportunity for the sustainable harvest of blacktip and other sharks in the Gulf of Mexico. In addition, based on the 2007 SCS assessment, NOAA Fisheries has determined that blacknose sharks are overfished with overfishing occurring (May 7, 2008, 73 FR 25665). NOAA Fisheries is currently working on a new amendment to rebuild blacknose sharks and end overfishing.

1.2.3.1 Large Coastal Sharks

The 2005/2006 stock assessment for LCS followed the Southeast Data, Assessment, and Review (SEDAR) process and became available on July 24, 2006 (71 FR 41774). Unlike past assessments, the 2005/2006 LCS stock assessment determined that it is inappropriate to assess the LCS complex as a whole due to the variation in life history parameters, different intrinsic rates of increase, and different catch and abundance data for all species included in the LCS complex. Based on these results, NOAA Fisheries changed the status of the LCS complex from overfished to unknown and is continuing to examine viable options to assess shark populations (November 7, 2006; 71 FR 65086).

Sandbar Sharks

According to 2005/2006 sandbar shark stock assessment, sandbar sharks are overfished ($SSF_{2004}/SSF_{MSY} = 0.72$; SSF is spawning stock fecundity and was used a proxy for biomass), and overfishing is occurring ($F_{2004} / F_{MSY} = 3.72$). The assessment recommends that rebuilding could be achieved with 70 percent probability by 2070 with a total allowable catch across all fisheries of 220 metric tons (mt) whole weight (ww) each year and F between 0.0009 and 0.011.

Blacktip Sharks

The 2005/2006 stock assessment assessed blacktip sharks for the first time as two separate populations: a Gulf of Mexico and an Atlantic population. The results indicate that the Gulf of Mexico stock is not overfished and overfishing is not taking place (November 7, 2006, 71 FR 65086), but the assessment panel did not accept the absolute estimates of the stock status. The three abundance indices believed to be most representative of the stock were consistent with each other, suggesting that stock abundance has been increasing over a period of declining catch during the past 10 years. Based on life history characteristics, blacktip sharks are a relatively productive shark species, and a combination of these characteristics and recent increases in the most representative abundance indices, suggested that the blacktip stock is relatively healthy. There was no scientific basis, however, to consider increasing the catch or quota.

This assessment also indicated that the current status of the blacktip shark population in the South Atlantic region is unknown. The assessment scientists were unable to provide estimates of stock status or reliable population projections, but indicated that current catch levels should not change. Based on this, NOAA Fisheries has declared the status of the South Atlantic blacktip shark population to be unknown (November 7, 2006, 71 FR 65086).

Dusky Sharks

The first dusky-specific shark assessment was released on May 25, 2006 (71 FR 30123) (Cortés *et al*., 2006). The 2006 dusky shark stock assessment included data through 2003 and indicated that dusky sharks are overfished (B_{2003}/B_{MSY} = 0.15 – 0.47) with overfishing occurring (F_{2004}/F_{MSY} = 1.68 – 1,810). The assessment concluded that rebuilding for dusky sharks could require 100 to 400 years. Based on these results, NOAA Fisheries declared the status of dusky sharks as overfished with overfishing occurring (November 7, 2006, 71 FR 65086).

1.2.3.2 Small Coastal Sharks

On November 13, 2007, NOAA Fisheries completed a SCS stock assessment following the SEDAR process (72 FR 63888). The assessment reviewed data and models for the SCS complex and for each individual species within the SCS complex, per recommendations in previous assessments. This allowed individual analyses, discussions, and stock status determinations for five separate assessments: 1) SCS complex, 2) Atlantic sharpnose shark, 3) bonnethead shark, 4) blacknose shark, and 5) finetooth sharks. These assessments are included in one report as many of the indices, data, and issues overlap among assessments. The Review Panel found that the data and methods used were appropriate and the best available; however, the panel recommended using the individual assessments for each species rather than the assessment on the SCS complex as a whole. Based on these assessments, NOAA Fisheries determined that blacknose sharks are overfished with overfishing occurring; however, Atlantic sharpnose, bonnethead, and finetooth sharks are not overfished and overfishing is not occurring (May 7, 2008, 73 FR 25665).

SCS complex

According to the 2007 the SCS stock assessment, the SCS complex is not overfished and overfishing is not taking place (May 7, 2008, 73 FR 25665). The peer reviewed assessment provides an update from the 2002 stock assessment on the status of SCS stocks and projects future abundance under a variety of catch levels in the U.S. Atlantic Ocean, Gulf of Mexico, and Caribbean Sea. Because the species were individually assessed, the peer reviewers recommended using species-specific results rather than on the aggregated SCS complex results. As a result of this recommendation, and because the stock assessment covered all SCS species, NOAA Fisheries will no longer provide status updates or determinations on the SCS complex as a whole.

Atlantic sharpnose sharks

The 2002 SCS stock assessment found that Atlantic sharpnose sharks were not overfished and overfishing was not occurring. The 2007 assessment for Atlantic sharpnose sharks also indicated that the stock is not overfished (SSF_{2005}/SSF_{MSY} = 1.47) and that no overfishing is occurring (F_{2005} / F_{MSY} = 0.74). Based on these results, NOAA Fisheries has determined that the Atlantic sharpnose sharks are not overfished with no overfishing occurring (May 7, 2008, 73 FR 25665). However, because estimates of fishing mortality from the assessment indicate that fishing mortality is close to, but presently below, F_{MSY} (*i.e.*, overfishing is not occurring), the peer reviewers suggest setting a threshold for fishing mortality to keep it below the F_{MSY} threshold to prevent overfishing in the future.

Bonnethead sharks

Based on the bonnethead stock assessment, the peer reviewers determined that bonnethead sharks are not overfished (SSF_{2005}/SSF_{MSY} = 1.13). In addition, the estimate of fishing mortality rate in 2005 was less than FMSY, (F_{2005} / F_{MSY} = 0.61), thus overfishing was not occurring. As a result, NOAA Fisheries has determined that bonnethead sharks are not overfished and no overfishing is occurring (May 7, 2008, 73 FR 25665). In addition, the assessment showed that there had been years of overfishing, and the main contributor of population mortality is the recreational fleet and the commercial gillnet fleet.

Blacknose Sharks

The 2002 assessment found blacknose sharks were not overfished and overfishing was not occurring. However, the 2007 assessment for blacknose sharks indicates that spawning stock fecundity (SSF; *i.e.*, the number of reproductive-age individuals in a population) in 2005 and during 2001-2005 was smaller than SSF_{MSY} (SSF_{2005}/SSF_{MSY} = 0.48). Therefore, NOAA Fisheries has determined that blacknose sharks are overfished. In addition, the estimate of fishing mortality in 2005 and the average from 2001-2005 was greater than F_{MSY}, and the ratio was substantially greater than 1 in both cases (F_{2005} / F_{MSY} = 3.77). Based on these results, NOAA Fisheries has determined that blacknose sharks are experiencing overfishing (May 7, 2008, 73 FR 25665). The assessment recommended a rebuilding plan with 70 percent probability of recovering to SSF_{MSY} by 2019 with F = 0. The assessment found that the majority of the mortality for blacknose sharks was occurring as bycatch in the Gulf of Mexico shrimp trawl fishery. In addition, the majority of mortality was occurring on juvenile and neonate blacknose sharks. Blacknose sharks mature around 91 cm total length and around 4.5 years of age. NOAA Fisheries has proposed management measures to rebuild blacknose sharks and end overfishing in draft Amendment 3 to the 2006 Consolidated HMS FMP and the associated proposed rule (74 FR 36892).

Finetooth Sharks

According to the 2007 finetooth shark stock assessment, finetooth sharks are not overfished (N_{2005}/N_{MSY} = 1.80) and overfishing is not occurring (F_{2005} / F_{MSY} = 0.17) (May 7, 2008, 73 FR 25665). This is a change from the 2002 assessment in which finetooth sharks were determined to be experiencing overfishing. However, NOAA Fisheries also notes that while the peer reviewers agreed that it is reasonable to conclude that the stock is not currently overfished, they also indicated that given the limited data available on the population dynamics for finetooth, management should be cautious. Unlike the other SCS, where the bulk of the mortality occurs in shrimp trawl gear, the majority of the mortality for finetooth sharks occur in gillnets.

1.2.3.3 Pelagic Sharks

Pelagic sharks are subject to exploitation by many different nations and exhibit trans-oceanic migration patterns. As a result, ICCAT's SCRS Subcommittee on Bycatch has recommended that ICCAT take the lead in conducting stock assessments for pelagic sharks.

The SCRS decided to conduct an assessment of Atlantic pelagic sharks beginning in 2004. Emphasis was placed on blue sharks and shortfin mako sharks. Several models such as non-equilibrium production and statistical age/length-structured models were considered to analyze the population dynamics of pelagic shark species. All SCRS stock assessments can be found at http://www.iccat.es/assess.htm.

2008 ICCAT Shark Stock Assessment

Ecological risk assessments (ERA) were conducted for nine additional priority species of pelagic elasmobranchs, for which available data are very limited. The ERAs conducted by the SCRS, for eleven priority species of sharks (including blue shark and shortfin mako) caught in ICCAT fisheries, demonstrated that most Atlantic pelagic sharks have exceptionally limited biological productivity and, as such, can be overfished even at very low levels of fishing mortality. Specifically, the analyses indicated that bigeye thresher, longfin mako, and shortfin mako sharks have the highest vulnerability (and lowest biological productivity) of the shark species examined (with bigeye thresher being substantially less productive than the other species). All species considered in the ERA, particularly smooth hammerhead, longfin mako, bigeye thresher, and crocodile sharks, are in need of improved biological data to evaluate their biological productivity more accurately and thus specific research projects should be supported to that end. The SCRS recommended that ERAs be updated with improved information on the productivity and susceptibility of these species.

In 2008, an updated stock assessment for blue and shortfin mako sharks was conducted by ICCAT's SCRS. The SCRS determined that while the quantity and quality of the data available for use in the stock assessment had improved since the 2004 assessment, they were still uninformative and did not provide a consistent signal to inform the models used in the 2008 assessment. The SCRS noted that if these data issues could not be resolved in the future, their ability to determine stock status for these and other species will continue to be uncertain. The SCRS assessed blue and shortfin mako sharks as three different stocks, North Atlantic, South Atlantic, and Mediterranean. However, the Mediterranean data was considered insufficient to conduct the quantitative assessments for these species.

Blue Sharks

With regard to North and South Atlantic blue sharks, the stock assessment determined that the biomass is estimated to be above the biomass that would support MSY. Similar to the results of the 2004 assessment, in many of the model runs, stock status appeared to be close to the unfished biomass levels (B_{2007}/B_{msy} = 1.87 - 2.74) and fishing mortality rates were well below those corresponding to the level at which MSY is reached (F_{msy} = 0.15). Most of the models used in the assessment consistently predicted that blue shark stocks in the Atlantic are not overfished and overfishing is not occurring (SCRS, 2008). Given these results, NOAA Fisheries is considering blue sharks as not overfished with no overfishing occurring.

Shortfin Mako Sharks

The estimates of stock status for the North Atlantic shortfin mako shark were much more variable than for blue sharks. For the North Atlantic, multiple model outcomes indicated stock depletion to be about 50 percent of virgin biomass (1950s levels) and levels of F above those resulting in MSY, whereas other models estimated considerably lower levels of depletion and no overfishing. The SCRS determined that there is a "non-negligible probability" that the North Atlantic shortfin mako stock could be below the biomass that could support MSY (B_{2007}/B_{msy} = 0.95 - 1.65) and above the fishing mortality rate associated with MSY (F_{2007}/F_{msy} = 0.48 - 3.77). Similar outcomes were determined by the SCRS from the 2004 assessment; however, recent biological data show decreased productivity for this species. Therefore, given the results of this assessment, NOAA Fisheries has determined that North Atlantic shortfin mako is not overfished, but is approaching an overfished status and is experiencing overfishing (FR 74 29185). NOAA Fisheries has proposed management measures to end overfishing of shortfin mako sharks in draft Amendment 3 to the 2006 Consolidated HMS FMP and the associated proposed rule (74 FR 36892).

COSEWIC Stock Assessment on Porbeagle

COSEWIC conducted a species report and assessment for porbeagle in 2004 (COSEWIC, 2004). They suggest that significant declines in porbeagle abundance have occurred as a result of overexploitation in fisheries.

The Canadian Department of Fisheries and Oceans has conducted stock assessments on porbeagle sharks in 1999, 2001, 2003, and 2005. Reduced Canadian porbeagle quotas in 2002 brought the 2004 exploitation rate to a sustainable level. According to the 2005 recovery assessment report conducted by Canada (Canadian Science Advisory Secretariat, 2005), the North Atlantic porbeagle stock has a 70 percent probability of recovery in approximately 100 years if F is less than or equal to 0.04. To date, the United States has not conducted a stock assessment on porbeagle sharks. NOAA Fisheries has reviewed the Canadian stock assessment and deemed it to be the best available science and appropriate to use for U.S. domestic management purposes. The Canadian assessment indicates that porbeagle sharks are overfished (SSN_{2004}/SSN_{MSY} = 0.15 – 0.32; SSN is spawning stock number and used as a proxy for biomass) (Gibson and Campana, 2005). However, the Canadian assessment indicates that overfishing is not occurring (F_{2004}/F_{MSY} = 0.83) (Gibson and Campana, 2005). Based on these results, NOAA Fisheries declared the status of porbeagle sharks as overfished, but overfishing is not occurring (71 FR 65086). A joint ICCAT-ICES intersessional meeting is proposed in 2009 to further assess porbeagle sharks.

1.2.4 Atlantic Billfish

1.2.4.1 Atlantic Blue Marlin

Life History and Species Biology

Blue marlin range from Canada to Argentina in the western Atlantic, and from the Azores to South Africa in the eastern Atlantic. Blue marlin are large apex predators with an average weight of 100 – 175 kg (220 – 385 lb). Female BUM grow faster and reach a larger maximum size than males. Young BUM are one of the fastest growing teleosts, reaching 30 – 45 kg (66 – 99 lb) after the first year. The maximum growth rate of these fish is 1.66 cm/day (0.65 inches/day), which occurs at 39 cm LJFL (15.3 inches) (NMFS, 1999). Life expectancy for BUM is between 20 – 30 years based on age and growth analyses of dorsal spines.

Blue marlin have an extensive geographical range, migratory patterns that include trans-Atlantic as well as trans-equatorial movements, and are generally considered to be a rare and solitary species relative to the schooling Scombrids (tunas). Graves *et al*. (2002) captured eight BUM with recreational fishing gear and then implanted fish with pop-up satellite tags. These fish moved 74 – 248 km (40 – 134 nautical miles (nm)) over five days, with a mean displacement of 166 km (90 nm). Fish spent the vast majority of their time in waters with temperatures between 22 and 26° C (71 – 78° F) and at depths less than 10 m. Prince *et al*. (2005) tagged one BUM with a pop-up satellite archival tag (PSAT) off the coast of Punta Cana, Dominican Republic and found that the fish moved 406.2 km (219.3 nm) during a 40-day deployment (10.15 km/day (5.48 nm/day)). The maximum time at liberty recorded of a tagged individual was 4,024 days (about 11 years) for a BUM that was estimated to weigh 29.5 kg (65 lb) at the time of release. Junior *et al*. (2004) found the depth of capture for BUM with PLL gear ranged from 50 – 190 m (164 – 623 feet), with most individuals captured at 90 m (295 feet).

These fish generally reproduce between the ages of two and four, at 220 – 230 cm (86 – 90 inches) in length, and weigh approximately 120 kg (264 lb). Female BUM begin to mature at approximately 47 – 60 kg (104 – 134 lb), while males mature at smaller weights, generally from 35 – 44 kg (77 – 97 lb). A female specimen weighing over 1,000 lb was found to be in spawning condition, indicating that even the largest females are capable of spawning (Luckhurst *et al.*, 2006). The central and northern Caribbean Sea and northern Bahamas have historically been known as the primary spawning area for BUM in the western North Atlantic. Recent reports show that BUM spawning can also occur north of the Bahamas in an offshore area near Bermuda at about 32º-34º N. lat. Peak spawning activity in the North Atlantic Ocean occurs between July and October, with females capable of spawning up to four times per reproductive season (De Sylva and Breder, 1997). New information on the reproduction of BUM from West Africa reported no evidence of spawning events from female BUM caught by artisanal vessels on the Ivory Coast. Pre-spawning and post-spawning females are present in larger numbers than males (4:1 female/male ratio) in this area (SCRS, 2008).

Stock Status and Outlook

Since 1995, BUM have been managed internationally under a single stock hypothesis because of tagging data and mitochondrial DNA evidence that are consistent with one Atlantic-wide stock. The most recent stock assessment for BUM was conducted in 2006. However, large catches of BLF continue to be reported to ICCAT as unclassified and reporting gaps remain for some important fleets, which introduced significant uncertainty into the 2006 SCRS stock assessment. As a result, specific quantitative reference points normally associated with stock assessments could not be produced with reasonable confidence levels, and the 2006 assessment focused instead on recent trends in abundance. It should be noted that these trends are based only on a few years of observations. Confirmation of these recent apparent changes in abundance trends will require at least an additional four or five years of data (SCRS, 2006).

The October 2008 SCRS Report indicated that no new information on BUM stock status has become available since the 2006 assessment, which found that BUM remain overfished (Table 1.10), and that the biomass level most likely remains well below the B_{MSY} estimated in 2000. However, over the period 2001 - 2005, several indicators suggest that a decline in abundance has been at least partially arrested, although some other indicators suggest that abundance has continued to decline. While the 2006 assessment includes significant uncertainty, it appears that recent abundance trends (2001 - 2004) have possibly stabilized for BUM. Current and provisional mortality estimates suggest that F has recently declined during 2000 - 2004 and is possibly smaller than $F_{replacement}$, but larger than the F_{MSY} estimated in the 2000 assessment. The

SCRS reported that BUM have the potential to rebuild under the current ICCAT management plan but this potential needs verification with an additional 4 - 5 years of data collection, especially since the reliability of recent information has diminished and may continue to do so (SCRS, 2006). Recent analyses suggest that the recovery of BUM stock might proceed faster than would have been estimated at the 2000 assessment, provided catches remain at the level estimated for 2004. Some signs of stabilization in the abundance trend are apparent in the most recent catch per unit of effort data of BUM (2000 - 2004). Despite more positive results in the 2006 SCRS BUM stock assessment than existed in the 2002 assessment, the overfished status of BUM remains unchanged. Table 1.10 contains a summary of the Atlantic BUM and WHM stock assessment data.

Table 1.10 **Summary of Atlantic blue and white marlin stock assessment data**.
Source SCRS, 2008

Atlantic blue marlin and Atlantic white marlin summary		
	WHM	BUM
$B_{2004} < {}^{1}B_{MSY}$	Yes	Yes
Recent Abundance Trend (2001-2004)	Slightly upward	Possibly stabilizing
$F_{2004} > F_{replacement}$	No	Possibly
$F_{2004} > {}^{1}F_{MSY}$	Possibly	Yes
[2]$Catch_{recent}/Catch_{1996}$ Longline and Purse seine	0.47	0.52
[3]$Catch_{2004}$	610 t	2,916 t
Rebuilding to B_{MSY}	Potential to rebuild under current management plan but needs verification.	Potential to rebuild under current management plan but needs verification.
[1]MSY	[4] 600-1,320 t	~ 2,000 t (1,000 ~ 2,400 t)

[1] As estimated during the 2000 (Anon. 2001) and 2002 (Anon. 2003a) assessments.
[2] Catch recent is the average longline catch for 2000-2004.
[3] Estimate of total removals obtained by the Committee. The Task I catch reported for 2006 is 2,182 t for blue marlin and 387 t for white marlin. The preliminary Task I catch reported for 2007 is 2,303 t for blue marlin and 302 t for white marlin. Final estimates for 2005-2007 are likely to be greater.
[4] Range of estimates were obtained in the previous assessments, but recent analyses suggest that the lower bound for white marlin should be at least 600.

1.2.4.2 Atlantic White Marlin

Life History and Species Biology

White marlin are found exclusively in tropical and temperate waters of the Atlantic Ocean and adjacent seas, unlike SAI and BUM, which are also found in the Pacific Ocean. White marlin movements extend to the higher temperate latitudes of their range only during the warmer months of the year. They may occur in small, same-age schools, however they are generally solitary compared to the Scombrids (tunas). Catches in some areas may include a rare species, the so-called “hatchet marlin” (*Tetrapturus georgei*), which is superficially similar to the WHM. The “hatchet marlin” has been caught occasionally in the Gulf of Mexico and South Atlantic (NMFS, 1999).

White marlin are primarily general piscivores, but also feed on squid and other prey items. In the Gulf of Mexico and along the U.S. Atlantic coast important prey items for adult WHM include herring, dolphin, hardtail jacks, and squid (Nakamura, 1985). Likely predators of adult WHM include sharks and killer whales (Mather *et al*., 1975).

White marlin exhibit sexually dimorphic growth patterns with females growing larger than males. Size at harvest generally ranges from 20 to 30 kg (44 - 66 lb). They grow quickly and can reach an age of at least 18 years, based on tag recapture data (SCRS, 2004). Adult WHM can grow to over 280 cm (110 inches) total length (TL) and 82 kg (184 lb).

Female WHM are about 20 kg (44 lb) in mass and 130 cm (51.2 inches) in length at sexual maturity. Spawning activity occurs during the spring (March through June) in northwestern Atlantic tropical and sub-tropical waters marked by relatively high surface temperatures (20 - 29° C) and salinities (> 35 ppt). White marlin move to higher latitudes during summer, as waters warm. White marlin sampled during the summer at these higher latitudes (Mid-Atlantic states) were in a post-spawning state (De Sylva and Davis, 1963). Arocha *et al*. (2006) reported females exhibiting high gonad index values (associated with mature gonads) present in the western North Atlantic from April to July between 18° N. latitude and 22° N. latitude. Spawning seems to take place further offshore than SAI, although larvae are not found as far offshore as BUM. Females may spawn up to four times per spawning season (De Sylva and Breder, 1997). It is believed there are at least five spawning areas in the western north Atlantic: northeast of Little Bahama Bank off the Abaco Islands; northwest of Grand Bahama Island; southwest of Bermuda; the Mona Passage, east of the Dominican Republic; and the Gulf of Mexico. Prince *et al*. (2005) collected eight WHM larvae in neuston tows in April/May off the coast of Punta Cana, Dominican Republic indicating that there had been recent spawning activity in this general area. More recently, WHM larvae were collected during March and April in Bahamian waters, and from May-June in the Florida Straits (D.E. Richardson and S.A. Luthy, unpubl. data). White marlin larvae (n = 15) have also been genetically identified from the Gulf of Mexico, confirming spawning activity in that region (J. Rooker, unpubl. data).

Stock Status and Outlook

White marlin have been managed under a single stock hypothesis by ICCAT since 2000. The most recent stock assessment for WHM was conducted in 2006. No new information has been provided on stock status since then. Large catches of BLF continue to be reported to ICCAT as unclassified and reporting gaps remain for some important fleets, which introduced significant uncertainty into the 2006 SCRS stock assessment. For a variety of reasons, the 2006 assessment concentrated on evaluating recent population trends, and looking for possible impacts of the new ICCAT catch restrictions.

The 2006 stock assessment for WHM indicated that the biomass of WHM for 2000 - 2004 most likely remained well below the B_{MSY} estimated in the 2002 assessment (Table 1.10). The 2006 assessment estimated that F_{2004} was probably smaller than $F_{replacement}$ and probably also larger than F_{MSY} estimated in the 2002 assessment. Over the period 2001 – 2004, combined longline indices and some individual fleet indices suggest that the decline in abundance has been at least partially reversed, but some other individual fleet indices suggest that abundance has continued to decline. Overall, the SCRS noted that some signs of a recovery trend are apparent, and that

WHM have the potential to rebuild to the B_{MSY} level under the current ICCAT management plan, but reports of recent increases in artisanal fisheries could negate this potential (SCRS, 2006). Despite more positive results in the 2006 SCRS WHM stock assessment compared to the 2002 assessment, the overfished status of WHM remains unchanged. It should be noted that the abundance trends are based only on a few years of observations. Confirmation of these recent apparent changes in trends will require at least an additional four or five years of data (SCRS, 2006). A summary of both Atlantic BUM and WHM stock assessment data may be found in Table 1.10.

1.2.4.3 Atlantic Sailfish

Life History and Species Biology

Sailfish have a pan-tropical distribution and prefer water temperatures between 25°C and 28°C (77°F - 82°F). They are the most coastal of all BLF species and conventional tagging data suggest that they move shorter distances than other BLF. Although SAI are the least oceanic of the Atlantic BLF and have higher concentrations in coastal waters (more than any other Istiophorid), they are occasionally also found in offshore waters. Sailfish range from 40° N to 40° S in the western Atlantic and 50° N to 32° S in the eastern Atlantic. Few trans-Atlantic movements have been recorded, suggesting a lack of mixing between east and west.

Sailfish are generally piscivorous, but also consume squid. Larvae eat copepods early in life. The diet of adult SAI caught around Florida consists mainly of pelagic fishes, however they are opportunistic feeders and there is evidence that they may feed on demersal species such as sea robin, cephalopods, and gastropods found in deep water (NMFS, 1999).

Junior *et al*. (2004) captured SAI in the southwestern Atlantic Ocean with PLL gear at depths between 50 – 210 m (164 - 688 feet), with most individuals captured at 50 m. A study in the southern Gulf of Mexico indicated that habitat preferences for SAI were primarily within the upper 20 m of the water column (SCRS, 2008). Sailfish are the most common representative of the Atlantic Istiophorids in U.S. waters (SCRS, 2005). Female SAI grow faster, and attain a larger maximum size, than males. Sailfish have a maximum age of at least 17 years (SCRS, 2008).

In the winter, SAI are found in schools around the Florida Keys and eastern Florida, in the Caribbean, and in offshore waters throughout the Gulf of Mexico. In the summer, they appear to migrate northward along the U.S. coast as far north as the coast of Maine, although there is a population off the east coast of Florida year-round. During the summer, some of these fish move north along the inside edge of the Gulf Stream. In the winter, they regroup off the east coast of Florida.

Sailfish spawn year-round over a wide area. The timing of spawning can differ, and occurs from late spring to early summer in the higher latitudes (Florida, southern Brazil) and in the winter months in the lower latitudes (Caribbean Sea, western Africa) (SCRS, 2008). Female SAI spawn at age three and are generally 13 – 18 kg and 157 cm (28.6 – 39.6 lb and 61.8 inches), whereas males generally mature earlier at 10 kg and 140 cm (22 lb and 55.1 inches). Spawning in U.S. waters takes place between April and October (De Sylva and Breder, 1997). Sailfish can spawn multiple times in one year, with spawning activity-moving northward in the western Atlantic as the summer progresses. Larvae are found in Gulf Stream waters in the western Atlantic, and in offshore waters throughout the Gulf of Mexico from March to October (NMFS, 1999).

Stock Status and Outlook

Sailfish and SPX landings have historically been reported together in annual ICCAT landing statistics. At present it is not possible to separate the catches of these two species. The most recent stock assessment was conducted in 2001 based on SAI/SPX composite catches and SAI "only" catches. For the western Atlantic stock, annual SAI catches have averaged about 700 mt (1,543,235 lb) over the past two decades and the abundance indices have remained relatively stable. The reported catches of SAI/SPX combined (Task I) for 2007 were 920 mt (2,028,252 lb) and 1,060 mt (2,336,899 lb) for the west and east Atlantic, respectively. Recent analyses did not provide any information on the MSY or other stock benchmarks for the 'SAI only' stock.

Although the 2001 attempts at quantitatively assessing the status of the two stocks (eastern and western SAI) proved to be unsatisfactory, there were indications of early decreases in biomass for these two stocks. These decreases probably lowered the biomass of the stocks to levels that may be producing sustainable catches, but it is unknown whether biomass levels are below those that could produce MSY. There is no new information available to change the outlook presented in the 2001 assessment. It is still unknown if the western or eastern SAI stocks are undergoing overfishing or if the stocks are currently overfished. Because no assessment has been conducted since 2001, no relative abundance indices are available after 2000. The SCRS stated that trends in abundance, catch, and CPUE are not very informative, and the outlook for both the eastern and western stock is uncertain. During a 2008 intercessional data preparatory meeting, the SCRS found that the available data had improved. The next SAI assessment is scheduled for 2009.

A summary of Atlantic SAI stock assessment data is given in Table 1.11.

Table 1.11 Summary of Atlantic sailfish stock assessment data.
Weights are in metric tons, whole weight. Source: SCRS, 2008**.**

ATLANTIC SAILFISH SUMMARY[1]		
	West Atlantic	East Atlantic
Maximum Sustainable Yield (MSY)	Not estimated	Not estimated
Recent Yield (2000)	506 t	969 t
2000 Replacement Yield	~ 600 t	Not estimated
Management Measures in Effect	None	None

[1]As estimated in 2001.

1.2.4.4 Atlantic Longbill Spearfish

Life History and Species Biology

Longbill spearfish are the rarest of the Atlantic istiophorids, and were identified as a distinct species in 1963. There is relatively little information available on spearfish life history. A related istiophorid, the Mediterranean spearfish, is the most common representative of this family in the Mediterranean Sea. Longbill spearfish are known to occur in epipelagic waters above the thermocline, off the east coast of Florida, the Bahamas, the Gulf of Mexico, and from Georges Bank to Puerto Rico. Junior *et al*. (2004) captured SPX off the coast of Brazil at depths ranging from 50 – 190 m (164 – 623 feet). The geographic range for this species is from 40° N to 35° S. There are seasonal variations and in general, SPX are distributed mostly in the offshore area while SAI are more coastal, and hence, the SAI proportion is much higher in the coastal waters (SCRS, 2007).

Longbill spearfish spawn from November to May and females are generally 17 – 19 kg (37.4 – 41.8 lb) and 160 – 170 cm (63 – 66 inches) at first maturity. These fish are unique among istiophorids in that they are winter spawners. Larval SPX have been identified from the vicinity of the Mid-Atlantic ridge from December to February, indicating that this species spawns in offshore waters (De Sylva and Breder, 1997).

Common prey items include fish and squid. Specifically, Junior *et al*. (2004) observed 37 stomachs and found that oceanic pomfret and squid comprised 63 percent of the items identified in stomachs. Most prey items were between 1 – 10 cm (0.39 – 3.9 inches) in length, with a mean length of 6.7 cm (2.63 inches). The maximum number of prey items found in any individual stomach was 33.

Similar to SAI, SPX are caught incidentally or as bycatch in offshore longline fisheries by many nations. There are also artisanal fisheries that take place in the Caribbean Sea and in the Gulf of Guinea. Directed recreational fisheries for SPX are limited due to the fact that the fish are generally located further offshore than other istiophorids. The 2001 – 2003 reported catch of unclassified BLF was 12 percent of the reported catch for all BLF and, for some fisheries, this proportion is much greater. This is a problem for species like SPX for which there is already a paucity of data (SCRS, 2004).

Stock Status and Outlook

Initial stock assessments conducted on SPX aggregated these landings with SAI. As mentioned in the SAI section above, the 2001 assessment included a 'SAI only' assessment in addition to an aggregate SAI/SPX assessment. There is no new information available to change the outlook presented in the 2001 assessment. Recent analyses did not provide any information on the MSY or other stock benchmarks for the 'SPX only' stock. It is still unknown if the western or eastern SPX stocks are undergoing overfishing or if the stocks are currently overfished. Because no assessment has been conducted since 2001, no relative abundance indices are available after 2000. Spearfish catch levels through 2000 are shown in Figure 1.3.

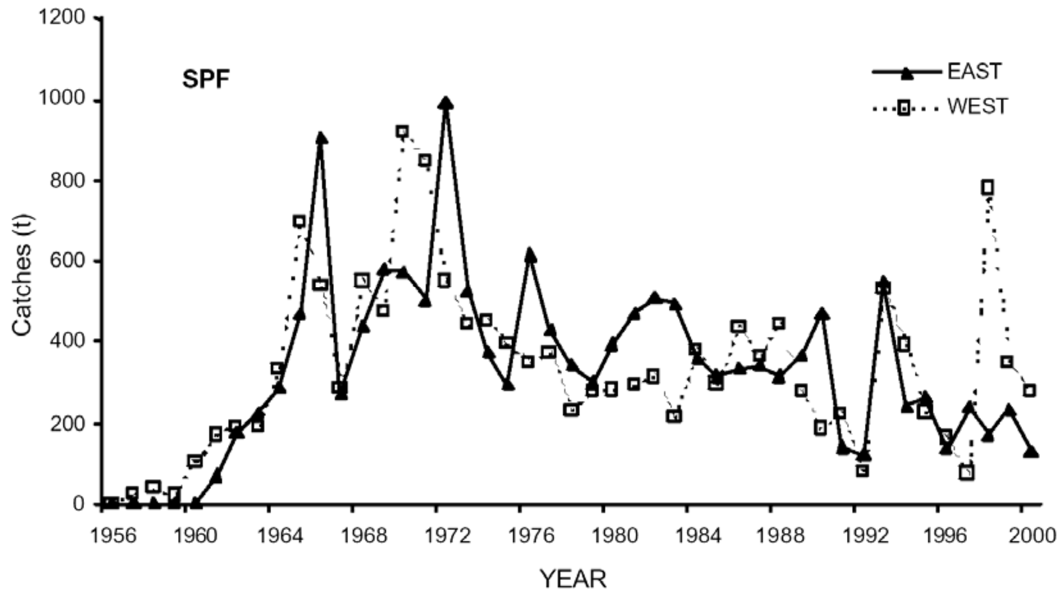

Figure 1.3 **Estimated spearfish "only" catches in the Atlantic based on the new procedure for splitting combined sailfish and spearfish catches from 1956-2000. Weights are in metric tons, whole weight.** Source: SCRS, 2005.

1.3 Purpose and Need

There are substantial differences between some segments of the U.S. Caribbean HMS fisheries and the HMS fisheries that occur off the mainland of the United States, including, but not limited to: limited fishing and dealer permit possession; smaller vessels; limited availability of processing and cold storage facilities; shorter trips; limited profit margins; and, high local consumption of catches. These differences can create an awkward fit between current federal HMS fishery regulations and the traditional operation of Caribbean fisheries.

Currently, there are no HMS LAPs held in the U.S. Caribbean and only a limited number of HMS open access fishing permits and dealer permits. This is likely the result of numerous factors including the cost associated with HMS LAPs and owning/operating a commercial vessel, the limited number of HMS LAPs initially issued to residents of the U.S. Caribbean, language barriers, and a lack of awareness of regulations, among others. The small number of HMS dealer permits may be a result of limited processing and cold storage facilities and the customary sales and distribution system for seafood in the U.S. Caribbean, among others. The low number of HMS fishing and dealer permits has resulted in limited catch and landings data from the U.S. Caribbean fisheries, thereby complicating fishery management efforts. In some cases, traditionally utilized fishing gears and economically necessary practices, such as targeting both pelagic and reef fish species with multiple gear types during a single trip, may diverge from fishing norms in U.S. mainland fisheries.

NOAA Fisheries has benefited from receiving various recommendations to improve management of the HMS permitting program and U.S. Caribbean HMS fisheries from the HMS AP, CFMC, territorial governments, local fishermen, and NGOs. Some suggestions regarding management of U.S. Caribbean HMS fisheries received to date include, but are not limited to: creating a new commercial Caribbean HMS permit; combining Caribbean vessel and dealer permits (allowing vessels to retail/wholesale catch); modifying authorized gears; and, providing additional training and outreach.

Based on discussions with the HMS AP, CFMC, and the territorial governments, NOAA Fisheries believes that the depletion of continental shelf fishery resources may be increasing local interest in exploiting HMS resources. As local fishermen become more dependent on offshore fishery resources and increase fishing effort on HMS, there is an increased need for NOAA Fisheries to consider ways of including small commercial Caribbean vessels into the HMS permitting and reporting regime in order to collect better catch and effort data and provide for sustainably managed fisheries.

Thus, an amendment to the 2006 Consolidated HMS FMP is needed to implement management measures specific to the U.S. Caribbean region. The purpose of this amendment is to enact management measures that better correspond with the traditional operation of the fishing fleet in the Caribbean region and to provide NOAA Fisheries with an improved capability to monitor and sustainably manage those fisheries. Changes to the Caribbean HMS fishery management structure are anticipated to be implemented in the spring or summer of 2011.