Report of the Advisory Committee to the U.S. Section to the International Commission For the Conservation of Atlantic Tunas (ICCAT)

October 10, 2013 (Closed Session)

Summary: The Advisory Committee (IAC) to the U.S. Section to the International Commission for the Conservation of Atlantic Tunas (ICCAT) met in closed session on October 10, 2013, in Silver Spring, Maryland. The IAC considered recent information related to bilateral consultations as well as new scientific information and management updates for ICCAT species including bluefin, bigeye, yellowfin, albacore, and skipjack tunas, swordfish, sharks, marlins, and sailfish. The IAC also reviewed information related to the work of the Working Group on Convention Amendment, the Permanent Working Group, and the upcoming elections. The IAC provided advice on possible U.S. positions and strategies for the 2013 ICCAT Annual Meeting. Dr. John Graves (Chair of the IAC) presided over the closed session. Due to the partial government shutdown, the U.S. government was represented by the Department of State; NOAA was not in attendance. The agenda for the closed session is included as Attachment 1.

I. Questions from the Committee regarding SCRS scientific advice

It was decided that any questions regarding advice from the SCRS would be discussed during the species-specific deliberations of the Committee.

II. Committee business

Dr. Graves informed the Committee that he submitted a grant to NOAA for three years of funding for the IAC, which was approved. It is estimated that after expenses for the fall meeting and committee member travel to the ICCAT meeting in Cape Town that the current award will have a balance of about $20,000. Dr. Graves has requested a no cost extension for the current award to apply any remaining funds toward the purchase of a new sound system.

Dr. Graves tentatively planned the 2014 Spring Meeting for the week of March 3-7, pending consultation with the Commissioners.

Dr. Graves announced that the U.S. Delegation to ICCAT will include Rich Ruais, Jack Devnew, Mike McGowan, Rick Weber, Sonja Fordham, and Gerry Leape.

Dave Kerstetter announced that the Planning and Review Subcommittee made a unanimous decision to nominate Dr. John Graves to continue as IAC Chairman, and brought the nomination to the Committee as a motion. The motion was seconded by several Committee members and adopted by acclimation.

III. Update on other consultations/issues

Overview of consultations

Deirdre Warner-Kramer from the Department of State briefed the Committee on the outcome of bilateral consultations on ICCAT-related matters, including conversations with Canada, Mexico, and Russia. The primary goal of this outreach was to provide a general sense of U.S. objectives and priorities and seek similar information from other Contracting Parties. Outreach efforts will continue in the weeks leading up to the 2013 ICCAT Annual Meeting. Ms. Warner-Kramer noted that planned bilateral consultations with the EU, Norway, and Ghana were up in the air due to the U.S. government furlough, as was U.S. participation in the annual quadrilateral meeting with Japan, the EU, and Canada scheduled for the end of October. In addition to species-specific concerns and efforts to build support for a fins-attached requirement for sharks, broad-based outreach has taken place on a number of other issues. She reported specifically that the United States has been working with Canada and the EU on the high seas boarding and inspection issue.

One Committee member inquired if the IAC will make specific recommendation for panels and species. Dr. Graves replied that a U.S. position setting meeting has not been scheduled, and he would encourage Federal Commissioner Russell Smith to hold a conference call prior to that meeting so that views and advice could be provided directly to him by Committee members. Another member was concerned with the outcome of the U.S. transfer of 150 t of swordfish quota to Morocco to facilitate a gear transition, noting Morocco's subsequent withdrawal from the project. The member inquired whether Morocco or other countries expressed interest in a similar transfer. Ms. Warner-Kramer replied that we have not been approached by Morocco or other countries for a transfer of quota to support that kind of work.

2013 ATCA Identification Review

Ms. Warner-Kramer provided the IAC with an update on the identification review required by the Atlantic Tunas Convention Act (ATCA). ATCA Section 971d(c)(6) requires NMFS, in consultation with DOS, to "*identify those nations whose fishing vessels are fishing, or have fished during the preceding calendar year, within the Convention area in a manner or under circumstances that diminish the effectiveness of a conservation recommendation.*" Ms. Warner-Kramer stated that no countries were identified under this year's ATCA identification review.

One Committee member asked if there were updates on the Magnuson-Stevens Act (MSA) identification process. Ms. Warner-Kramer replied that the MSA requires the Secretary of Commerce to submit a report to Congress on IUU fishing, sharks, and bycatch issues. The most recent report came out in January 2013 in which 10 countries where identified for IUU fishing and one country for bycatch issues. Currently NMFS is in the two year consultation process and will produce a progress report in January 2014.

IV. Discussion of Options

Panel 1

The Committee is supportive of SCRS plans for a skipjack assessment next year. Several Committee members stated that we need to push forward the process in Recommendation 11-01 for the SCRS to look at the efficacy of FAD closed areas. Committee members also inquired if

data has been compiled on the transfer of effort from the Indian Ocean to the Atlantic. One member was concerned with whether there is information about bycatch of small bigeye and yellowfin tunas in the increased purse seine catches of skipjack. The Committee noted the importance of the Compliance Committee reviewing implementation of the port sampling plan developed by SCRS last year to help determine this information.

Panel 2

Northern Albacore
The Committee agreed that the United States should seek to maintain the multiyear flexibility for the U.S. fleet without changing the total allowable catch (TAC) for northern albacore. One committee member inquired about the harvest control rule for albacore and swordfish and whether it is related to Marine Stewardship Council (MSC) certification. It was clarified that the Commission asked the SCRS to develop limit reference points on a pilot basis for two stocks (northern albacore and North Atlantic swordfish), as a number of RFMOs are taking up this approach as part of the Kobe process. It was also noted that the MSC certification process does also take into account whether RFMOs have established harvest control rules with limit reference points for relevant fisheries.

Bluefin
Regarding western bluefin, several members of the Committee urged that the United States seek an increase in the TAC for western Atlantic bluefin, arguing that an increase would greatly benefit the U.S. industry without significantly affecting the probability of rebuilding. The requests for a higher TAC ranged from a 50 t increase (to 1,800 t) to an additional 200 t (to 1,950 t). One Committee member expressed concern about the HMS Amendment 7 process and how that will affect bluefin and swordfish management. The member relayed that many in the Committee support a 200 t increase in the western bluefin quota to alleviate uncertainty under Amendment 7. The member pointed out that management advice from the SCRS suggests that biomass would continue to increase with catches up to 2,000 t, leaving room for an increase above the current TAC of 1,750 t. The member called for the SCRS to analyze a range of TAC levels between 1,750 t and 2,000 t. Another member responded that the SCRS recommended that stock growth would be needed to determine recruitment. One member pointed out that the SCRS was answering a request by the Commission to test the stock-recruitment relationship and that the decision to set the TAC is a management decision, not a decision of the SCRS.

One Committee member stated that when the stock recruitment changed from high to low, it was abrupt, not a gradual change. The member said that in order to get back to high recruitment levels, we would have to know where the threshold is, but we are not currently dealing with all of the variables. This member noted the clear effects of climate change being seen and recent unusual movements of stocks for which we do not fully understand the cause. The member stated that he had previously supported the current TAC level, but had now lost faith that we would ever return to a high recruitment paradigm. The member went on to say that because of this uncertainty, the decision to follow the high recruitment versus low recruitment scenario is no longer about science, but about economics. Another member agreed and added that the United States should be in a position to do research and construct an index using our fleets and data from landings and observers. A few members echoed what was said and stated that they are

seeing more fish but have not caught them and need to find a way to assess the numbers of fish. One member stated that it would take very little additional quota to fix the problems under Amendment 7, even 50-100 t, and that the carry-forward of underharvest must at least be maintained at 10% or even increased.

One Committee member stated that we should support the 1,750 t TAC and look toward the results of the upcoming stock assessment. Another member suggested the SCRS change the bluefin assessment, which is to be run with new mixed stock models, from 2015 to 2017 to have more information.

One member proposed that we set a TAC that would cover more than one year, for example a total TAC of 3500 t for 2014 and 2015. Dr. Graves posed the question to the Committee if they would support a two-year combined TAC to allow flexibility with Amendment 7. There was some agreement among members. One member suggested increasing the 10% rollover of underharvest instead of going to a two-year measure. Dr. Graves pointed out that there is not agreement on the rollover issue, but the Committee seems more prepared to accept a two-year TAC.

Regarding eastern bluefin, one Committee member pointed out that the eastern recovery program has been touted as a success in European news articles and emphasized that any action in the east must consider the overall bluefin tuna fishery and the effects of the eastern TAC on western fisheries. The member said that the TAC in the Mediterranean and the east must allow enough emigration to the west. A few members gave the opinion that since the eastern bluefin is a two-year measure it will not be reopened this year. One member disagreed based on the level of debate on eastern bluefin at the SCRS meeting and whether the measure would need to be opened to make changes to the 2014 assessment recommendation.

One member presented a position on eastern Atlantic and Mediterranean bluefin, asking to maintain the TAC at current levels until a new assessment is available. The member also presented recommendations to address overcapacity, for the SCRS to focus all resources on a more reliable stock assessment by 2015, and regarding fish farming, which will be circulated in a paper.

Panel 3

One Committee member supported maintaining the TAC for southern albacore and stated that the information for the new assessment is much more accurate.

Panel 4

Swordfish

Regarding northern swordfish, one Committee member stated that, in total, North Atlantic harvesters exceeded the TAC by about 300 t, which was not a surprise because we have been right at the limit. The member urged that any decrease in quotas to fit within the TAC must be equal across all quota-holders and not harm the United States disproportionately. The member noted that the United States could support an increase in the TAC to better accommodate the

current allocations. Another member cautioned that we shouldn't seek an overall increase in TAC when the United States is not catching its full quota and supported status quo. The member pointed out that Amendment 7 affects swordfish as well as bluefin.

One Committee member recalled the requirement that new quota recipients submit fishery development plans and that the United States should start pushing for timelines for those countries to actually develop their fishery or lose their quota. Another member recounted that the U.S. fleet is not fishing because swordfish from Canada is entering the U.S. market and depressing U.S. fishers' prices. One member cautioned that the United States be careful with allocating quota given what occurred with Morocco.

Regarding southern swordfish, a few Committee members urged the United States to retain its quota in order to remain in the discussion.

Billfish
Dr. Graves pointed out that a significant measure, including country-specific quotas, was put in place last year for blue and white marlin. One Committee member inquired whether there are opportunities for sailfish this year, and Dr. Graves replied that sailfish measures in previous years have met considerable opposition due to the unknown impact of artisanal fisheries.

Sharks
The Committee agreed the United States should continue to press the fins attached proposal. One Committee member urged that the "no data, no fish" measure be enforced. The member also supports banning the retention of porbeagle and setting strict catch limits for blue and mako sharks until we have a stock assessment. Another member replied that the United States does more than anyone else to conserve sharks and that we should not be pushing new measures, such as for porbeagle, shortfin mako, and blue shark, until other countries come up to our level.

Compliance Committee and elections

Dr. Graves pointed out that this is Chris Rogers' last year as Compliance Chair. Ms. Warner-Kramer stated that all positions are up for election this year including Chair of the Commission, the Panels, Compliance Committee, PWG, and STACFAD. The United States has heard interest from Stefaan Depypere from the EU for the Commission Chair and someone else from the EU for Compliance Chair. The United States was considering putting itself forward for Panel 2. The Chairs of Panels 1, 3, and 4 are expected to remain, but it was unknown whether the current chairs of STACFAD and PWG intended to continue. Ms. Warner-Kramer asked the Committee where we should put our priorities.

Several Committee members agreed that the EU candidates are a good start and that the United States should Chair a major group such as Panel 2. One member suggested that Dr. Rogers may have recommendations for a good successor.

Dr. Graves stated that there were no compliance tables to review. One member asked about "no data, no fish" and how the Compliance Committee will respond if countries say they could not submit data because they don't have the resources. Ms. Warner-Kramer replied that "no data, no

fish" is designed to be applied automatically, but she also noted that there are funds available within ICCAT to assist parties to build capacity for data collection.

One Committee member presented a report, which had already been shared with Dr. Rogers as Compliance Committee Chair, outlining potential irregularities in catch and farming reports in certain Mediterranean bluefin fisheries.

Permanent Working Group (PWG)

Ms. Warner Kramer noted that several issues were anticipated, including VMS, high seas boarding and inspection regime, and advancing the use of IMO numbers as a unique vessel identifier. One Committee member hoped that progress would be made on these issues.

Plenary, including Working Group on Convention Amendment

Ms. Warner-Kramer introduced Patrick Pearsall from the Department of State, a legal adviser to the U.S. delegation to the Working Group. Ms. Warner-Kramer recalled that the IAC was informed of the progress of the Future of ICCAT Working Group each time it met and that in 2012 and 2013, the IAC species working groups were requested to develop recommendations on Convention issues. She emphasized that these discussions had already informed the early development of U.S. positions and priorities.

The Committee discussed different options to expand and clarify the scope of the Convention. A few Committee members expressed concerns that the current workload of SCRS was very heavy, and questioned whether adding sea turtles, mammals, and seabirds would take up time and resources that should go to tuna and tuna-like species. One member stated that the United States needs to look at where we want the Convention to go over the next 2-3 decades. He pointed out that the decision will affect priorities and that other RFMOs manage sharks but are still able to deal well with tuna. Another member replied that given the restricted resources, prioritizing would mean that something is left off. One Committee member urged that it should be more difficult under the current Convention to add new species.

Ms. Warner-Kramer explained that in the preliminary discussions at the Working Group, most seemed to agree that the Convention could already be read to allow ICCAT to take measures regarding the bycatch of sharks and other species in fisheries for tuna or tuna-like species. The debate in the Working Group focused on what changes might be appropriate to expand ICCAT's mandate to cover management of directed fisheries for sharks or other species. Mr. Pearsall emphasized that a key U.S. goal is to make sure the Convention catches up to what we are already doing within ICCAT as well as to make sure it covers what we may want or need to do in the future.

Several Committee members expressed concern at the prospect of including the ecosystem and precautionary approaches in the Convention. Mr. Pearsall explained that the U.S. proposal submitted with Brazil and Norway created a new article establishing several general principles to guide the Commission's work, including a call to apply the precautionary approach in accordance with relevant internationally agreed upon standards, as we are already doing. Mr.

Pearsall also read the text from the paper on the ecosystem approach and reiterated that he would take questions back to the Working Group head of delegation, Bill Gibbons-Fly. One Committee member stated great skepticism of the ecosystem approach, as even managing a single species is challenging.

V. Strategies and Priorities

The Committee considered that these matters had been adequately covered during the discussion of the various issues. Dr. Graves invited Committee members to distribute position papers supporting their views to the rest of the IAC. He added that the meeting report will go to the Commissioners and form the basis for the Committee's input to the position setting process. Dr. Graves thanked Staci Rijal, Luis Leandro, and Carrie Soltanoff for their support of the Committee meeting. The meeting was adjourned by the Chair.

Attachment 1

AGENDA

Advisory Committee to the U.S. Section to the International Commission for the Conservation of Atlantic Tunas

Fall Meeting
Sheraton Hotel
8777 Georgia Ave.
Silver Spring, MD

CLOSED SESSION

SESSION 1: Thursday, October 10, 2013
John Graves, Advisory Committee Chairman, presiding

(NOTE: Advisory Committee Members, Ex Officio State Representatives and Federal Government Officials only)

1:15 pm I. Questions from the Committee regarding SCRS scientific advice

1:30pm II. Committee Business *(Graves)*
- A. Funding/Budget
- B. Dates for 2014 Spring Meeting
- C. U.S. Delegation to ICCAT in 2013
- D. Election of IAC Chairman

1:45 pm III. Update on other consultations/issues

- A. Overview of Consultations *(Warner-Kramer)*
- B. 2013 ATCA Identification Review *(Warner-Kramer)*
- C. Other matters

2:00pm IV. Discussion of Options (break as needed)
- Panel 1
- Panel 2
- Panel 3
- Panel 4
- Compliance Committee
- Permanent Working Group (PWG)
- Plenary, including Working Group on Convention Amendment, elections

*6:00pm V. Strategies and Priorities

*Ideally, we will finish our discussions by 6:00 pm on Thursday. If not, we will reconvene at 8:30 a.m. on Friday.

November 25, 2013

The International Commission for the Conservation of Atlantic Tunas (ICCAT) concluded its annual meeting today after adopting several new measures that will support the sustainable management of key species. There were contentious negotiations for major stocks managed by ICCAT -- western and eastern Atlantic bluefin tuna; North and South Atlantic swordfish; and North and South Atlantic albacore. At the same time, the United States was disappointed that the Commission was unable to agree on several shark measures, including a U.S. proposal to require that sharks be landed with their fins naturally attached. Actions taken by ICCAT include:

- Extending for one year the current Total Allowable Catch (TAC) level for western Atlantic bluefin to support continued stock growth. Research plans will be developed t to improve the science behind the management of this important resource. The current TAC in the eastern Atlantic was also extended, and an update for both eastern and western stocks will take place in 2014.

- Extending management measures for North and South Atlantic swordfish for three years, to ensure the continued sustainability of these stocks while protecting the U.S. share of these fisheries.

- Maintaining current TACs were also for North and South Atlantic albacore.

- Again proposing, along with Belize and Brazil, a requirement that all sharks caught in ICCAT fisheries be landed with their fins naturally attached. While not adopted, support for this approach is growing. The European Union, Guatemala, Mexico, Panama, Senegal and the United Kingdom – Overseas Territories joined as co-sponsors of this proposal, and Gabon also expressed support from the floor.

- Adopting a requirement for many vessels greater than 20 meters to obtain unique vessel identifiers (UVIs). This new tool will support ongoing efforts to fight IUU fishing and help to level the playing field for U.S. fishermen.

- Conducting a thorough review of the records of the 47 members of ICCAT, and 5 non-members, to determine compliance with dozens of conservation measures and reporting requirements. On the basis of this review, some fishing rights will be suspended and ICCAT will send letters of concern or identification that indicate areas where progress must be demonstrated. A U.S. representative was again elected to chair ICCAT's Compliance Committee for the next two years.

U.S. National Report to ICCAT, 2013

U.S. Department of Commerce, NOAA Fisheries

September 2013

1. NATIONAL FISHERIES INFORMATION

Total (preliminary) reported U.S. catch of tunas (YFT, SKJ, BET, ALB, BFT) and swordfish, including dead discards, in 2012 was 10,082 MT, an increase of about 27% from 7,952 MT in 2011. Swordfish catches (including estimated dead discards) increased from 2,773 MT in 2011 to 3,651 MT in 2012, and provisional landings from the U.S. fishery for yellowfin tuna increased in 2012 to 4,109 MT from 3,010 MT in 2011. U.S. vessels fishing in the northwest Atlantic caught in 2012 an estimated 916 MT of bluefin tuna, an increase of about 11 MT compared to 2011. Provisional skipjack tuna landings increased by about 25 MT to 112 MT from 2011 to 2012, bigeye tuna landings increased by 150 MT compared to 2011 to an estimated 869 MT in 2012, and albacore landings increased from 2011 to 2012 by 3 MT to 425 MT.

2. STATISTICS AND RESEARCH

2.1 Fisheries Statistics

2.1.1 Tropical Tuna Fishery Statistics

Yellowfin Tuna. Yellowfin is the principal species of tropical tuna landed by U.S. fisheries in the western North Atlantic. Total estimated landings increased to 4,109 MT in 2012, from the 2011 landings estimate of 3,010 MT (Table 2.1-YFT). The 2012 estimate is considered provisional and may change owing to incorporation of late reports of commercial catches as they become available and to possible revisions in estimates of rod & reel catches made by recreational anglers. A high proportion of the 2012 estimated landings were due to rod & reel catches of recreational anglers in the NW Atlantic (1,727 MT). Estimates of U.S. recreational harvests for tuna and tuna-like species are periodically reviewed and this may result in the need to report additional revisions to the available estimates in the future. In the case of commercial landings, the highest proportion of landings in 2012 corresponded to the U.S. longline fleet operating in the Gulf of Mexico (1,254 MT). Total commercial and total recreational landings in 2012 were 2,382 MT and 1,727 MT, respectively. Nominal catch rate information from logbook reports (longline catch per 1,000 hooks) for yellowfin by general fishing areas is shown in Figure 2.1.

Table 2.1-YFT. Annual Landings (MT) of Yellowfin Tuna from 2008 to 2012						
Area	Gear	2008	2009	2010	2011	2012
NW Atlantic	Longline	**460.5**	**416.4**	**673.4**	**684.1**	**882.1**
	Gillnet	**0.6**	**0.0**	**0.5**	**0.06**	**1.6**
	Handline	**30.1**	**58.7**	**43.5**	**34**	**66.0**
	Trawl	**0.0**	**0.0**	**1.4**	**1.3**	**0.2**
	Troll	**2.4**	**5.4**	**1.2**	**0.5**	**0.3**
	Trap	**0.05**	**0.1**	**0.5**	**0.0**	**0.0**
	Rod and Reel*	**657.1**	**742.6**	**1,209**	**1,133.8**	**1,433**
	Unclassified	**1.4**	**2.2**	**9.5**	**4.2**	**4.4**
Gulf of Mexico	Longline	**756.5**	**1,147**	**303.2**	**642.1**	**1,254**
	Handline	**11.2**	**21.6**	**2.9**	**8.7**	**16.9**
	Rod and Reel*	**366.3**	**264.7**	**18**	**362.8**	**294.1**
	Unclassified	**0.0**	**0.0**	**0.0**	**0.1**	**8.7**
Caribbean	Longline	**107.1**	**136.7**	**212.2**	**132.1**	**141.9**
	Gillnet	**0.04**	**0.04**	**0.0**	**0.0**	**0.0**
	Handline	**3.7**	**3.3**	**1.9**	**1.5**	**2.8**
	Rod and Reel*	**9.7**	**3.5**	**4.5**	**0.9**	**0.0**
NC Atlantic	Longline	**0.4**	**0.0**	**0.0**	**0.0**	**3**
	TOTAL	**2,407.2**	**2,802.3**	**2,481.7**	**3,010.4**	**4,109**

* Rod and Reel catches and landings represent estimates of landings based on statistical surveys of the U.S. recreational harvesting sector.

Skipjack Tuna. Skipjack tuna also are caught by U.S. vessels in the western North Atlantic, but it is a minor component of the U.S. total tuna landings. Total reported skipjack landings (preliminary) increased from 87 MT in 2011 to 112 MT in 2012 (Table 2.2-SKJ). Estimates of recreational harvests of skipjack continue to be reviewed and could be revised again in the future. Figure 2.2 presents nominal catch rate information (longline catch per 1,000 hooks) based on logbook reports.

Table 2.2-SKJ. Landings (MT) of Skipjack Tuna from 2008 to 2012

Area	Gear	2008	2009	2010	2011	2012
NW Atlantic	Longline	**0.1**	**0.4**	**1.4**	**0.4**	**0.3**
	Gillnet	**0.04**	**3.3**	**0.2**	**0.04**	**1.6**
	Handline	**0.4**	**2.8**	**1.2**	**1.5**	**2.0**
	Trawl	**0.003**	**0.0**	**0.0**	**0.0**	**0.006**
	Rod and Reel*	**21.0**	**75.7**	**29.1**	**50.3**	**98.0**
	Unclassified	**0.5**	**1.2**	**0.1**	**0.8**	**0.6**
Gulf of Mexico	Longline	**0.05**	**0.05**	**0.0**	**0.2**	**0.0**
	Handline	**0.06**	**0.2**	**0.02**	**0.2**	**0.06**
	Rod and Reel*	**16.3**	**22.0**	**15.5**	**23.7**	**2.5**
Caribbean	Longline	**1.3**	**0.05**	**0.0**	**0.0**	**0.1**
	Gillnet	**0.01**	**0.6**	**0.0**	**0.0**	**0.0**
	Handline	**16.0**	**8.8**	**6.2**	**6.6**	**3.3**
	Rod and Reel*	**11.3**	**4.3**	**0.4**	**3.0**	**3.0**
	TOTAL	**67.1**	**119.4**	**54.2**	**86.7**	**111.5**

* Rod and Reel catches and landings represent estimates of landings and dead discards based on statistical surveys of the U.S. recreational harvesting sector.

Bigeye Tuna. The other large tropical tuna reported in catches by U.S. vessels in the western North Atlantic is bigeye tuna. Total reported landings (preliminary) for 2012 increased by approximately 150 MT from 719 MT in 2011 to 869 MT (Table 2.3-BET). Note that, like yellowfin, the estimates of rod & reel catch are considered provisional and may be revised based on results of a future review of recreational harvest estimates. Figure 2.3 presents nominal catch rates (longline catch per 1,000 hooks) estimated from logbook reports.

Table 2.3-BET. Annual Landings (MT) of Bigeye Tuna from 2008 to 2012

Area	Gear	2008	2009	2010	2011	2012
NW and North Central Atlantic	Longline	**384.8**	**388.4**	**431.1**	**397.2**	**567**
	Gillnet	**0.04**	**0.0**	**0.0**	**0.0**	**0.2**
	Handline	**6.6**	**4.6**	**1.8**	**3.4**	**7.8**
	Trawl	**0.0**	**0.0**	**0.7**	**1.2**	**0.2**
	Trap	**0.0**	**0.3**	**1.2**	**0.0**	**0.0**
	Troll	**0.8**	**0.6**	**0.0**	**0.09**	**0.2**
	Rod and Reel*	**70.9**	**77.6**	**116.8**	**72.4**	**269.6**
	Unclassified	**2.0**	**1.9**	**6.7**	**4.7**	**7.1**
Gulf of Mexico	Longline	**14.0**	**19.5**	**6.9**	**2.2**	**13.1**
	Handline	**0.0**	**0.07**	**0.09**	**0.0**	**0.0**
	Rod and Reel	**0.0**	**0.0**	**0.8**	**34.9**	**0.1**
	Unclassified	**0.0**	**0.0**	**0.0**	**0.0**	**0.4**
Caribbean	Longline	**8.9**	**22.2**	**5.0**	**0.0**	**0.002**
	Handline	**0.0**	**0.0**	**0.0**	**0.05**	**0.0**
	Rod and Reel*	**0.0**	**0.0**	**0.0**	**2.3**	**0.0**
SW Atlantic	Longline	**0**	**0**	**0.2**	**200.8**	**3.1**
	TOTAL	**488.5**	**515.2**	**571.3**	**718.7**	**868.8**

* Rod and Reel catches and landings represent estimates of landings and dead discards based on statistical surveys of the U.S. recreational harvesting sector.

2.1.2 Temperate Tuna Fishery Statistics

Albacore Tuna. Albacore are landed by U.S. vessels; however, historically, albacore has not been a main target of the U.S. commercial tuna fisheries operating in the North Atlantic. Reported commercial catches were relatively low prior to 1986; however, these catches increased substantially and have remained at higher levels with nearly all of the production coming from the northeastern U.S. coast. The U.S. landings from the Caribbean increased in 1995 to make up over 14% of the total U.S. harvest of albacore, but have since remained below 4% of the total. Nominal catch rates from U.S. pelagic longline logbook reports are shown in Figure 2.4. Estimated total catches of albacore were about 425 MT in 2012, an increase of 3 MT from 2011 (Table 2.4-ALB).

Table 2.4-ALB. Annual Landings (MT) of Albacore Tuna from 2008 to 2012

Area	Gear	2008	2009	2010	2011	2012
NW and North Central Atlantic	Longline	**115.9**	**141.3**	**87.8**	**138.2**	**158.3**
	Gillnet	**2.1**	**5.6**	**0.5**	**0.2**	**5.7**
	Handline	**0.2**	**0.5**	**1.9**	**1.7**	**0.6**
	Trawl	**0.01**	**0.08**	**0.2**	**2.0**	**0.3**
	Trap	**0.005**	**0.01**	**0.01**	**0.0**	**0.0**
	Troll	**0.2**	**0.07**	**0.04**	**0.0**	**0.0**
	Rod and Reel*	**125.2**	**22.8**	**46.2**	**170.6**	**144.3**
	Unclassified	**1.9**	**1.3**	**2.2**	**7.8**	**11.1**
Gulf of Mexico and Caribbean	Longline	**10.6**	**17.0**	**72.1**	**101.8**	**103.1**
	Rod and Reel*	**0.0**	**0.0**	**103.4**	**0.0**	**0.7**
	Handline	**0.6**	**0.01**	**0.05**	**0.1**	**0.4**
	TOTAL	**256.7**	**188.8**	**314.5**	**422.4**	**424.5**

* Rod and Reel catches and landings represent estimates of landings and dead discards based on statistical surveys of the U.S. recreational harvesting sector.

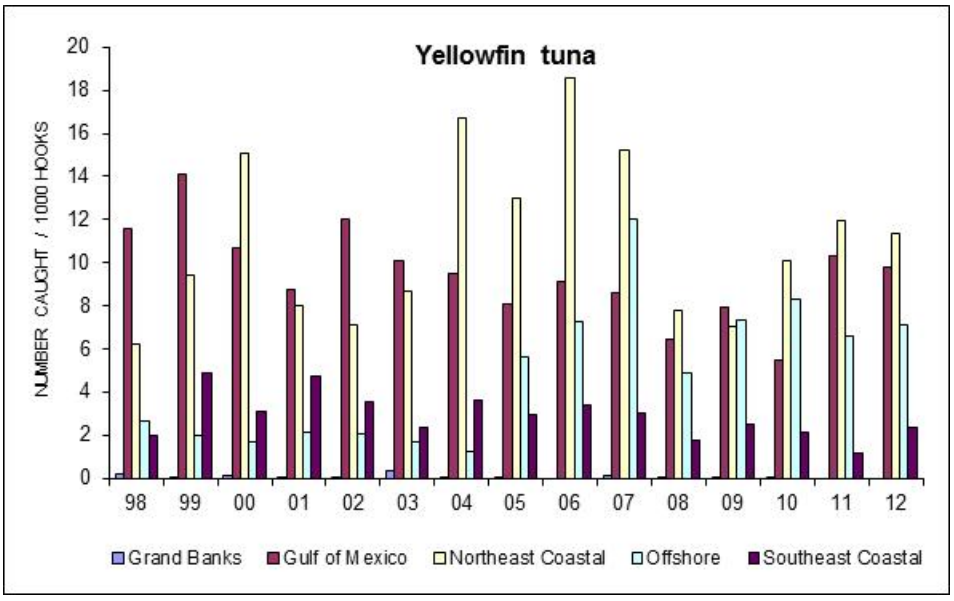


Figure 2.1 – YFT. *Nominal catch rates for YFT in U.S. pelagic longline logbook reports*

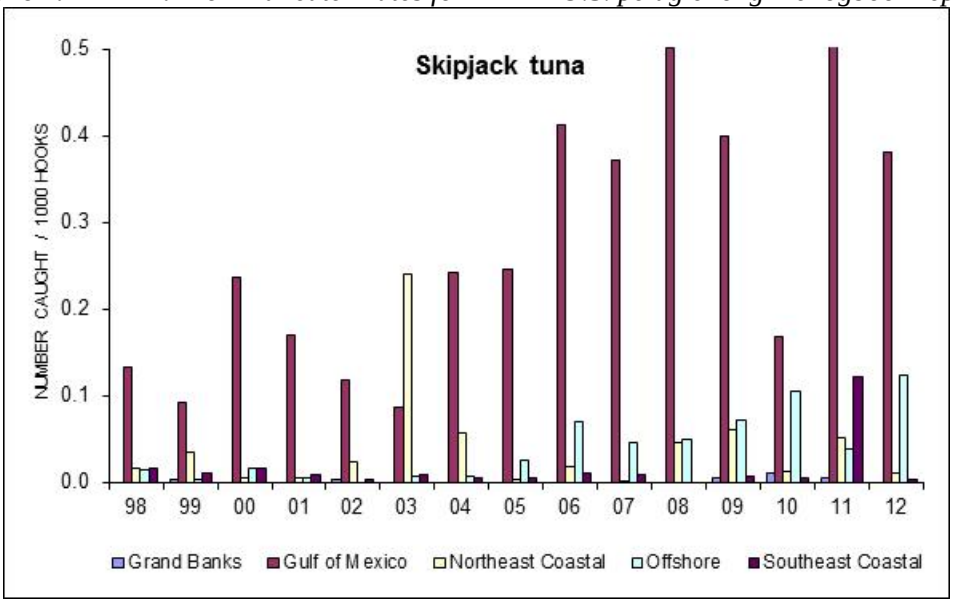


Figure 2.2 – SKJ. *Nominal catch rates for SKJ in U.S. pelagic longline logbook reports.*

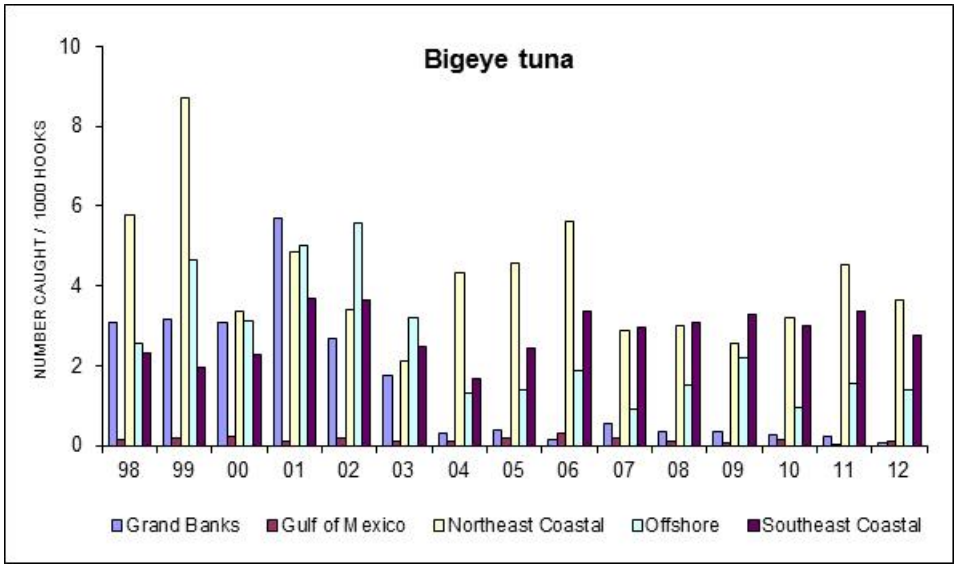


Figure 2.3 – BET. *Nominal catch rates for BET in U.S. pelagic longline logbook reports.*

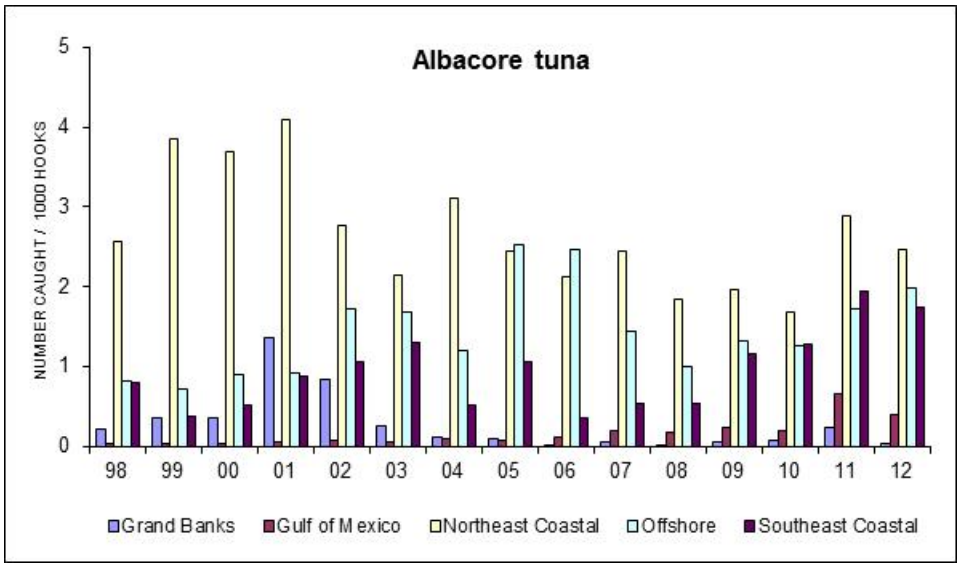


Figure 2.4 – ALB. *Nominal catch rates for ALB in U.S. pelagic longline logbook reports.*

Bluefin Tuna. The U.S. bluefin fishery continues to be regulated by quotas, seasons, gear restrictions, limits on catches per trip, and size limits. These regulations are designed to manage total U.S. landings in conformance with ICCAT recommendations. U.S. provisional estimated landings and dead discards for 2012 from the northwest Atlantic (including the Gulf of Mexico) were approximately 713 MT and 202 MT, respectively. Those estimated landings and dead discards represent an increase of approximately 11 MT from the 2011 estimates. The 2012 catches by gear were: 52 MT by harpoon, 420 MT by commercial rod and reel and 149 MT by recreational rod and reel, 292 MT by longline (including discards) of which 105 MT were from the Gulf of Mexico, 1 MT by handline and 2 MT by purse seine (Table 2.5-BFT).

In response to 1992 regulations limiting the allowable catch of small fish by U.S. fishermen, in conformity with ICCAT agreements, enhanced monitoring of the recreational rod and reel fishery was implemented in 1993 for the purpose of providing near real-time advice on catch levels by this fishery. This monitoring activity has continued and has included estimation of catches by finer scale size categories than reported above. The preliminary estimates for the 2012 recreational rod and reel fishery off the northeastern U.S. for landings in several size categories were 63 MT of fish 66-114 cm, 43 MT of fish 115-144 cm, 36 MT of fish 145-178 cm, and 6 MT of fish >178 cm SFL.

Table 2.5-BFT. Annual Catches (MT) of Bluefin Tuna from 2008 to 2012

Area	Gear	2008	2009	2010	2011	2012
NW Atlantic	Longline**	**107.4**	**166.7**	**164.7**	**216.3**	**182.2**
	Handline	**0.6**	**0.1**	**2.7**	**0.9**	**1.3**
	Harpoon	**30.2**	**65.6**	**29.0**	**70.1**	**52.3**
	Purse seine	**0.0**	**11.4**	**0.0**	**0.0**	**1.7**
	Rod and reel (>145 cm FL)*	**305.7**	**717.1**	**570.8**	**-**	**-**
	Rod and reel (<145 cm FL)*	**352.2**	**143.3**	**111.4**	**-**	**-**
	Unclassified	**0.3**	**0.0**	**0.0**	**0.0**	**0.0**
	Commercial Rod and Reel	**-**	**-**	**-**	**418.6**	**419.5**
	Recreational Rod and Reel*	**-**	**-**	**-**	**173.4**	**148.7**
	Trawl	**0.0**	**0.0**	**0.0**	**0.4**	**0.0**
Gulf of Mexico	Longline**	**111.7**	**111.6**	**56.2**	**13.2**	**105**
NC Atlantic	Longline**	**13.5**	**56.7**	**17.8**	**11.3**	**3.8**
Caribbean	Longline**	**0.0**	**0.0**	**0.0**	**0.6**	**0.9**
	TOTAL	**919.9**	**1272.5**	**952.6**	**904.7**	**915.5**

* Recreational Rod and Reel catches and landings represent estimates of landings and dead discards when

available based on statistical surveys of the U.S. recreational harvesting sector.

** includes *landings* and *estimated discards* from scientific observer and logbook sampling programs

2.1.3 Swordfish Fishery Statistics

For 2012, the provisional estimate of U.S. vessel landings and dead discards of swordfish was 3,651 MT (Table 2.6-SWO). This estimate represents an increase from the 2,774 MT estimated for 2011. The provisional landings, including discard estimates, by ICCAT area for 2012 (compared to 2011) were: 690 MT (372 MT) from the Gulf of Mexico (Area BIL91); 2,259 MT (1,936 MT) from the northwest Atlantic (Area BIL92); 4 MT (15 MT) from the Caribbean Sea (Area BIL93); and 698 MT (451 MT) from the North Central Atlantic (Area BIL94A).

U.S. swordfish landings are monitored in-season from reports submitted by dealers, vessel owners and captains, NMFS port agents, and mandatory daily logbook reports submitted by U.S. commercial vessels permitted to fish for swordfish. The U.S. swordfish longline fishery is also being monitored via a scientific observer sampling program, instituted in 1992. Approximately 8% of the longline fleet-wide fishing effort is randomly selected for observation during the fishing year. The observer sampling data, in combination with logbook reported effort levels, support estimates of approximately 13,525 fish discarded dead in 2012. For the North Atlantic (including Gulf of Mexico and Caribbean Sea), the estimated tonnage discarded dead in 2012 was 258 MT, of which 249 was estimated due to longline gear. Overall, the estimates of dead discarded catch increased by about 35 MT compared to the 2011 levels, and corresponded to approximately 7% of the commercially landed catch.

Total weight of swordfish sampled for sizing U.S. commercial landings by longline, trawl, and handline was 3,064 MT, 14 MT, and 151 MT in 2012. The weight of sampled swordfish landings in 2012 were 96%, 51%, and 96% of the U.S. total reported annual landings of swordfish for longline, trawl, and handline, respectively. Again, incorporation of late reports into the estimated 2012 landings figure will likely result in changes in the sampled fraction of the catch. The 2012 estimate of rod and reel recreational landings of swordfish, based on surveys of recreational anglers, was 54 MT.

Table 2.6-SWO. Annual Catches (MT) of Swordfish from 2008 to 2012

Area	Gear	2008	2009	2010	2011	2012
NW Atlantic	Longline**	**1,622.5**	**1,696**	**1,6477**	**1,741.8**	**2009.2**
	Gillnet	**0.0**	**0.05**	**0.0**	**0.0**	**0.08**
	Handline	**83.2**	**123**	**126.9**	**120.4**	**154.2**
	Harpoon	**0.0**	**0.05**	**0.6**	**0.6**	**0.3**
	Trawl	**7.6**	**23.7**	**21.2**	**17.9**	**26.8**
	Rod and Reel*	**56.7**	**19.0**	**47.6**	**48.7**	**64.3**

	Unclassified	**0.2**	**0.0**	**2.1**	**0.0**	**0.5**
	Unclassified discards	**4.1**	**3.5**	**3.6**	**5.8**	**3.6**
Gulf of Mexico	Longline**	**361.6**	**476.2**	**212.3**	**363.6**	**673.3**
	Handline	**1.2**	**1.9**	**2.6**	**0.5**	**3.3**
	Rod and Reel*	**19.0**	**12.6**	**1.7**	**4.9**	**6.3**
	Unclassified discards	**4.6**	**3.1**	**1.3**	**2.5**	**6.8**
Caribbean	Longline**	**57.9**	**22.7**	**41.4**	**14.2**	**3.7**
	Handline	**0.0**	**0.003**	**0.0**	**0.0**	**0.0**
	Rod and Reel*	**0.0**	**0.0**	**0.0**	**0.0**	**0.2**
	Unclassified discards	**0.0**	**0.2**	**0.04**	**0.9**	**0.0**
NC Area 94A	Longline**	**311.6**	**496.4**	**304.8**	**451.3**	**698.3**
	Unclassified discards	**0.0**	**0.0**	**0.01**	**0.0**	**0.0**
SW Atlantic	Longline**	**0.0**	**0.0**	**0.3**	**0.0**	**0.0**
	TOTAL	**2,530.3**	**2,878**	**2,412.1**	**2,773.7**	**3,651**

* Rod and Reel catches and landings represent estimates of landings and dead discards when available based on statistical surveys of the U.S. recreational harvesting sector.
** includes *landings* and *estimated discards* from scientific observer and logbook sampling programs

2.1.4 Marlins and Sailfish Fishery Statistics

Blue marlin, white marlin, and sailfish are landed by U.S recreational rod and reel fishermen and are a bycatch of the U.S. commercial tuna and swordfish longline fisheries. The United States allows billfish that are caught by recreational gear (rod and reel) to be landed only if the fish is larger than the minimum size specified for each species. Annual landings of blue marlin and white marlin/roundscale spearfish are limited to 250 fish combined. Recreational landings of each billfish species are monitored through: (a) the Southeast Fisheries Science Center (SEFSC) Recreational Billfish Survey (RBS) which provides the number of billfish caught during tournaments held along the southeastern U.S. coast (south of 35^0 N latitude), in the Gulf of Mexico, and U.S. Caribbean regions (i.e., U.S. Virgin Islands and Puerto Rico); (b) the Large Pelagics Recreational Survey (LPS) conducted by the National Marine Fisheries Service (NMFS) which provides estimates of recreational harvest of highly migratory species (including billfish), from waters along the northeastern United States (north of 35^o N latitude); (c) Marine Recreational Information Program (MRIP); (d) a Headboat survey (large multi-party charter boats); and/or (e) a coastal sport fishing survey of the Texas recreational fishery (TPW). In addition, recreational catch statistics by self-reported catch cards also document billfish landings in some states.

The estimates of 2012 U.S. recreational rod and reel landings for these billfish species, combining the geographical areas of the Gulf of Mexico (Area BIL91), the northwestern Atlantic Ocean west of the 60^o W longitude (Area BIL92), and the Caribbean Sea (Area BIL93) are: 14.2 MT for blue marlin, 1.2 MT for white marlin, and 4.2 MT for sailfish. The estimates for 2011 were: 6.2 MT for blue marlin, 2.3 MT for white marlin, and 4 MT for sailfish.

In addition to restrictions on U.S. recreational harvest, retention and sale of Atlantic billfish is prohibited in U.S. commercial fisheries. For this reason, there are no U.S. commercial landings reported. Estimates of dead discards in the U.S. longline fleet are obtained using data collected through the mandatory Pelagic Logbook Program and the Pelagic Observer Program. The procedure for estimating the historical bycatch of blue marlin, white marlin, and sailfish was detailed in SCRS/96/97-Revised. Revisions to historical landings of billfish previously reported to ICCAT were based on review of the estimates conducted at the 1996 ICCAT Billfish Workshop held in Miami, Florida (U.S.A). Estimates of the billfish bycatch discarded dead in the U.S. commercial longline and other commercial fisheries in 2012 were 38.8 MT for blue marlin, 21 MT for white marlin, and 18.3 MT for sailfish.

2.1.5 Shark Fishery Statistics

Landings and dead discards of sharks by U.S. pelagic longline fishermen are monitored and reported to ICCAT. In 2012, the species of shark with largest amount of landings (in weight) was shortfin mako with a total of 411 MT (of which 229 MT were landed by the U.S. recreational fishery), followed by thresher sharks (*Alopias spp. – with the exception of bigeye thresher shark, a prohibited species*), and blue shark, with 100 and 56 MT, respectively.

In 2012, estimates of dead discards for blue shark by the U.S. pelagic longline fleet amounted to almost 106 MT, the largest amount of any shark species discarded by this fleet.
Dead discards of ICCAT prohibited species were 98 MT of scalloped hammerhead sharks, 36 MT of silky sharks, 38 MT of bigeye thresher, and 2.3 MT of oceanic whitetip sharks. No dead discards of smooth hammerhead were recorded by the U.S. Pelagic Observer Program (POP). The POP only recorded 17 great hammerhead discarded dead by the pelagic longline fleet. The low number observed precluded the estimation of a fleet wide discard value for this species. All available data on live releases of these species collected through the U.S. POP will be included in Part II of the U.S. Annual Report. At this time, formats and standards for reporting these data to SCRS have not been developed.

2.2. Research Activities

In a study with implications for multiple species, the United States and Chinese-Taipei collaborated in 2012 and 2013 on a cooperative research project to investigate circle hook effectiveness for catch of target species and incidental catch of sea turtles on a longline fishing vessel in the tropical Atlantic Ocean. Chinese-Taipei provided the observer and arranged for one of their flagged vessels to participate in the experiment. The United States provided the circle hooks, conducted the observer training and provided a stipend to the fishing vessel. The experiment lasted from September 2012 to May 2013. The experiment tested the effectiveness of relatively large circle hooks (18/0 circle hooks with a 10° offset) with whole finfish bait as compared to traditionally used Japanese tuna hooks (4.2 sun). At the conclusion of the experiment, scientists from the United States and Chinese-Taipei jointly analyzed the data and prepared a paper entitled “Circle hook effectiveness for catch of target and bycatch species on a deep-set longline fishing vessel in the Atlantic Ocean.” This paper was submitted to the July 2013

Ecosystems Subcommittee meeting of the SCRS. Additionally, manuscripts are currently being prepared for submission to Marine Ecology Progress Series and Second Symposium on Fishery-Dependent Information in Rome, Italy 3-6 March, 2014. This cooperation provided important insights into the effectiveness of circle hooks in deep-set fisheries that neither country previously had and established important scientific collaborations between the United States and Chinese-Taipei.

2.2.1 Bluefin Tuna Research

As part of its commitment to the Atlantic-wide Research Program for Bluefin Tuna (GBYP), research supported by the United States has concentrated on ichthyoplankton sampling, tagging, biological sampling from fisheries and modeling.

Ichthyoplankton surveys in the northern Gulf of Mexico were continued on a standard grid in spring 2012, and spring 2013. During 2012, additional larval bluefin tuna samples were collected for stable isotope analyses, in collaboration with scientists from the Spanish Institute of Oceanography (IEO). These samples are currently being analyzed. During 2013, an additional exploratory cruise was completed between Key West and waters north of the Bahamas. Most tuna larvae collected were from tropical species, but a few bluefin larvae were found to the east and north of the Bahamas. Collaborative work with scientists from the IEO in Spain has continued, with the publication of a study comparing environmental characteristics of bluefin tuna spawning grounds in the northern Gulf of Mexico and western Mediterranean Sea. Collaborators from Oregon State University and the BaIearic Islands Coastal Observing and Forecasting System were also involved. Other ongoing collaborative activities include studies of age, growth and feeding characteristics in larvae, with scientists from the University of Miami, the IEO and Woods Hole Oceanographic Institution. This work will improve understanding of processes influencing survival and recruitment, and tie in to ongoing research examining climate change impacts on tuna larvae.

The NOAA Fisheries Southeast Fisheries Science Center (SEFSC) has deployed a total of 35 PSATs on bluefin tuna from contracted longline vessels fishing in the Gulf of Mexico to monitor survivorship and post release behavior of bluefin tuna in the western Atlantic (from February-June, 2010, 2011, and 2012). Monitoring times ranged from 4-93 days. Three tags are still at large. Continued field activities are planned until 15 additional PSATs are deployed.

The Large Pelagic Research Center at the University of Massachusetts (LPRC), in partnership with the Guy Harvey Ocean Foundation, conducted PSAT tagging of nine adult ABFT off Nova Scotia, Canada in 2012, continuing a program initiated in 2005. This tagging effort made use of new tag technology (Desert Star Systems, Sea-Tag MOD) which includes accelerometer and magnetic geolocation capabilities.

Scientists from Stanford University and the Tag-A-Giant research team continued to deploy electronic tags on giant bluefin tuna in Canada to monitor bluefin in the Gulf of Mexico. They continued archival tagging off North Carolina to keep the time series of archival tagged bluefin moving forward

The LPRC continued its collaboration with the SEFSC and ICCAT GBYP program on a scientific mark recapture study focused on juvenile BFT. Tagging continued in 2012 and 2013. Conventional, high reward and PSAT tags are being deployed simultaneously to facilitate the estimation of key population parameters. The Tag a Tiny network documented several

conventional tag recoveries including US and Spain. Analyses of 2011 juvenile ABFT tagging results showed extensive of the Gulf Stream in winter and spring months and occasional movements east of the 45^{o} management line. None of the individuals tagged reached the Mediterranean or E. Atlantic areas where trap fisheries operate.

A NMFS-Seagrant population dynamics fellowship, through the University of Massachusetts, is supporting research towards characterizing the ontogenetic and interannual heterogeneity of Atlantic bluefin tuna movement. This research utilizes fisheries independent information from a large electronic tagging database (LPRC, UMass and AZTI Technalia) will inform movement rates for spatially explicit operational and stock assessment models. Deriving fishery independent movement estimates outside of the assessment or operational framework avoids overparameterization and delivers biologically realistic results.

The SEFSC initiated the first ever comprehensive sampling program for bluefin tuna in 2010, collecting otoliths, dorsal spines, caudal vertebrae and other tissues in a manner representative of the catch. The 2010 pilot program produced only a few dozen otoliths; however an additional 334 otoliths and 213 dorsal spines were collected opportunistically by SEFSC collaborators from the University of Maine/Gulf of Maine Research Institute and the LPRC. These 2010 samples were collected from a few participating commercial fish houses focusing on catches located in Ipswich Bay and on George's Bank. Subsequently, SEFSC scientists and contractors met with several university scientists to expand and better coordinate a collaborative approach to sampling both the recreational and commercial fisheries in the New England region. As a result, otoliths and other samples were taken from over 1,300 bluefin tuna (commercial and recreational CFL range 69-305cm) between 2010 and 2012 in this region. The LPRC and Univ. of Maine received a NMFS grant to continue collections of otoliths, dorsal spines, and gonads in 2012; they have conducted analyses of gonads and endocrinology. Sampling is currently underway during the 2013 season and to date, we have an additional 475 otoliths and other tissues. Of note is the sampling of the purse seine fleet (n>140), a gear type, which until this current year, has been relatively inactive in the fishery. Approximately 230 bluefin were sampled from the recreational fishery through the Large Pelagic Survey and over 600 bluefin were sampled from commercial fisheries (520 through the LPRC and 81 through the pelagic observer program and Northeast Regional Office of NMFS). The University of Maine/Gulf of Maine Research Institute and the LPRC have been conducting natal origin, age and growth studies on these samples in collaboration with the Panama City Lab, the University of Maryland, and the Department of Fisheries and Oceans, Canada. This work focuses on the production of population specific growth curves and length at age matrices as well as age comparisons between structures e.g. spines and otoliths for western and eastern Atlantic studies. To date, UMaine/GMRI and LPRC staff have aged over 800 otoliths and 400 dorsal spines from the 2010 and 2011 seasons. In total, samples supplied by this program support research on bluefin reproduction (histology/endocrinology), genetics, natal origin, contaminants, age and growth. The SEFSC Panama City laboratory continued to archive biological samples from Atlantic bluefin tuna collected from the NOAA Pelagic Observer Program and the contractor QuanTech, Inc. During 2012, 235 otoliths were sectioned and micro-milled for stable isotope analysis and ageing . A sub-set of otoliths collected from North Carolina which had two otoliths per fish was used to compare sectioning and milling methods between the Panama City Laboratory and the Chesapeake Biological Laboratory. Result of stable isotope analysis indicated both laboratories' methods were consistent.

Scientists from Texas A & M University and the University of Maryland assigned natal origin (Mediterranean Sea or Gulf of Mexico) to Atlantic bluefin tuna collected off North Carolina in

2011 and 2012, targeting an abundant 2003 year-class. Maximum likelihood estimates of the sample's mixture were based on stable isotope composition, δ^{18}O and δ^{13}C, of base-line natal age-1 juveniles. Estimated contribution rate of Gulf of Mexico members to the 2003 year-class was 98.3% ± 3.6% SD. When all ages were included (3-17 years; CFL 117-285 cm; N=218), the contribution of the Gulf of Mexico population was estimated at 76.8% ± 4.9% SD. These revised results support the view that the 2003 year-class, evident in US fisheries during the past 6 years, was mostly of Western stock origin.

Researchers at the Virginia Institute of Marine Science have identified a total of 82,000 putative single nucleotide polymorphism (SNP) loci for Atlantic bluefin tuna and identified and designed primers for 18,000 microsatellite loci based on the results of a reduced representation library sequenced on an Illumina Genome Analyzer. During the past year they have designed primers for 228 SNP loci, which are being tested on a Fluidigm BioMark automated genotyper, and optimized and tested 44 novel microsatellite . Additional loci are currently being tested for both marker classes.

The LPRC, with collaboration with the NOAA's NEFSC and the Center of Coastal and Ocean Mapping at the University of New Hampshire, continue to develop analytical techniques for integrating aerial photographs and acoustic data in support of fisheries independent survey of juvenile BFT. In 2012, five days of field trials were conducted with the sonar unit (split-beam sonar Simrad EK-60, 120 kHz) including four days of aerial surveillance collecting 17 hours of sonar images (1.8 GB of data) and 7996 aerial photos (58.4 GB of data) of tuna schools. LPRC researchers met with AZTI direct assessment scientists for a workshop to share results and exchange technical information and recommendations.

Scientists from the Gulf of Maine Research Institute, University of Massachusetts and University of Maryland have developed a simulation model for bluefin tuna to explore consequences of leading hypotheses of bluefin tuna stock structure and mixing on stock productivity and the stock composition of catch. The model includes two spawning populations based on western and eastern stocks, each with unique vital rates and independent recruitment. It is a stochastic, age-structured, overlap model that is seasonally and spatially-explicit, with seven geographic zones. Movement rates of eastern and western stock fish were estimated from the Multistock Age-Structured Tag-integrated stock assessment model and were informed by tagging data, as well as otolith chemistry and CPUE data. Model simulations indicated the stock composition of mature biomass and yield in the western, central, and eastern Atlantic was mixed and the proportional contribution of stocks depended on the method used to parameterize movement. Work is on-going to refine and test the model further and to augment current and historical stock composition information on bluefin tuna using otolith chemistry to better inform stock composition in the model.

From early April through mid-June 2012, the SEFSC conducted extensive observations of the pelagic longline fishery in the Gulf of Mexico. Approximately 53% of known fishing trips and a higher percentage of total effort was observed. Various biological samples were taken from the bluefin including otoliths, gonads and muscle. Contracts were awarded to conduct research on bluefin stock structure, growth, gender determination and reproduction.

At the same time as the extended coverage observer program, the SEFSC has been assessing the efficacy of a new 16/0 "weak" circle hook designed to reduce the bycatch mortality of bluefin tuna in the directed yellowfin tuna fishery in the Gulf of Mexico. The 2008-12 study was a

continuation of research conducted in April 2007 to examine"weak link" concepts which would allow bluefin tuna to escape capture on pelagic longlines, while retaining yellowfin tuna. Results of the study indicate that the new circle hook design reduces the bluefin tuna catch rate by an estimated 46% with no significant reduction in the target catch of yellowfin tuna. Consequently, the National Marine Fisheries Service published a final rule requiring the new hook design in the Gulf of Mexico pelagic longline fishery effective 5 May 2011. During 2012, the study also used hook time-depth recorders to record the time fish were on the line and movements until straightening the hook or being brought alongside the boat. Combined with electronic tagging also conducted during the study, this research promises to provide insight on the survival rates of fish escaping the gear or being released alive.

The SEFSC continues to be a leader in developing methodology to improve catch per unit effort standardization methods. To build upon this research, SEFSC has initiated a project to investigate the effects of incorporating gear effects and remotely sensed satellite and hydrodynamic model data as variables in fishery-dependent bluefin tuna indices. The goal of this project will be to better account for the environmental factors that may affect bluefin catch rates, resulting in more accurate CPUE indices.

Table 1: Atlantic bluefin tuna samples collected by type per year (UMaine/GMRI and LPRC).

	Otoliths	**Spines**	**Gonads**	**Tissue**
2010	339	213	0	212
2011	460	165	100	282
2012	552	199	230	364
Total	1351	577	330	858

2.2.2 Swordfish Research

U.S. research on Atlantic swordfish in 2012 focused on stock management, assessing movement and habitat use, and fisheries statistics. Scientists from Canada, Venezuela, U.S. (Southeast Fisheries Science Center), Spain, South Africa, Brazil, and Greece jointly published a review of the factors contributing to the rebuilding success of North and South Atlantic swordfish stocks (Neilson et al. 2013). The authors concluded that coupled effects of swordfish biology (including relatively fast growth, and spatially- and temporally-dispersed spawning), positive management actions, and a period of relatively good recruitment were essential factors resulting in stock rebuilding. The researchers describe the challenges that must be faced and measures that must be taken to maintain the stocks, including risk adverse assessment and management measures.

Researchers from National Taiwan University, University of Maine, and the U.S. Pacific Islands Fisheries Research Center published a habitat suitability model to identify optimal swordfish habitat in the equatorial Atlantic Ocean (Chang et al. 2013). The authors reported that Swordfish aggregated in the northwest equatorial region during March–May and spread southeast thereafter in response to seasonal shifts in oceanographic conditions. They documented annual variation in the distribution of habitat patches, with reduced habitat quality in the northwest region of the equatorial Atlantic Ocean during 2005. They suggest that the apparent spatial shifts in optimal habitats might be linked to reduced mixed layer depth and elevation in sea surface height, which might be related to climate variability (e.g. Nin˜o-Southern Oscillation and/or Northern Atlantic Oscillation). The authors propose that the habitat models may be used to evaluate possible

changes in habitat suitability resulting from climate change and provide scientific advice for the development of management regulations.

U.S. scientists from the University of Miami, Nova Southeastern University, and the Southeast Fisheries Science Center published on movement and habitat use information of eight satellite archival tagged fish in the Western Atlantic Ocean (Lerner et al. 2013). They documented diel cycles in vertical habitat use patterns, and suggested that swordfish resided primarily below the thermocline during the day and migrated closer to the surface at night, with vertical movements between the surface and depth occurring during crepuscular hours. Results also supported the hypothesis that swordfish activity varies in relation to moon phase.

U.S. anglers participating in the cooperative tagging program marked 49 swordfish captured in recreational fisheries off the U.S. East Coast and reported recapture information on 8 fish. The recaptured swordfish demonstrated regional site fidelity, with six fish released and recaptured off the east coast of Florida, over a range of times at liberty between 235 and 3,106 days. One swordfish was recaptured in the Northeast distant waters, initially released in the Grand Banks region over 1,200 kilometers away from the recapture location, with a time at liberty of nearly 15 years. One swordfish was recaptured off the coast of Delaware that was originally tagged off the coast of North Carolina, approximately 500 kilometers away, with a time at liberty of 961 days. The recapture of tagged fish with long-time at liberty provide valuable data for validation of longevity, stock spatial structure, and growth estimates.

U.S. and Canadian scientists collaborated on a joint analysis to assess longline gear configuration effects on swordfish catches, to validate prior estimates of gear effects on catch indices. Specifically, a combined analysis of data from the two fleets provided contrast in catch data under different gear configurations, and produced preliminary estimates of the combined effect of hook and bait type on swordfish catch indices used in the assessment.

2.2.3 Tropical Tunas Research

U.S. scientists participated in the 21012 ICCAT SCRS Tropical Tuna Species Group Inter-Sessional Meeting held in Madrid, Spain, April 23 to 27, 2012. A U.S. SEFSC scientist developed abundance indices for skipjack tuna (Katsuwonus pelamis) larvae in the Gulf of Mexico (1982-2011). Work also continued on the collaborative research with Mexican scientists, developing yellowfin tuna abundance indices using data from U.S. and Mexican pelagic longline observer programs.

In response to the Deepwater Horizon oil spill event, SEFSC scientists initiated a study in 2010 to evaluate the movements, migration patterns and site fidelity of yellowfin tuna in the Gulf of Mexico in order to assess the potential exposure of the stock to contaminants, as well as optimal fishery closure strategies for potential future events. Fish tagged have ranged in size from about 100 cm to 155 cm FL, and longline vessels were used as deployment platforms (in addition to recreational vessels) to achieve a broad geographic representation of deployment locations, corresponding more closely to the range of the fishery. Tagging effort increased in 2012 and is ongoing in 2013 (with expectations to continue at least through 2014). Through 2012, the movements of 37 yellowfin had been tracked for durations of 10 to as many as 172 days (8 of the fish were tracked for more than 3 months. In addition, collaborative work with Mexican scientists was initiated in 2012 (and is ongoing), with the goal of deploying at least 12 PSATs on

yellowfin tuna in Mexican water within the southwestern Gulf of Mexico. These data will be analyzed in conjunction with the ongoing study. In addition to the main study objectives, the resulting data should be of great benefit to improving understanding of stock structure, movement rates, mortality, defining essential fish habit and improving CPUE standardization approaches, etc., all of which are important to improving the stock assessments.

NOAA's SEFSC has also increased biological sampling of tropical tunas from the commercial and recreational fisheries, including hard parts.

2.2.4 Albacore Research

Research conducted by U.S. scientist on Atlantic albacore (Thunnus alalunga) has been limited. However, a collaborative study between European and U.S. scientists regarding the population structure was published in 2013 entitled "Single nucleotide polymorphism discovery in albacore and Atlantic bluefin tuna provides insights into worldwide population structure". This study reports the development of single nucleotide polymorphisms (SNPs) in albacore and BFT and the application of these SNPs to survey genetic variability across the geographic ranges of these tunas. A total of 616 SNPs were discovered in 35 albacore tuna by comparing sequences of 54 nuclear DNA fragments. A panel of 53 SNPs yielded FST values ranging from 0.0 to 0.050 between samples after genotyping 460 albacore collected throughout the distribution of this species. No significant heterogeneity was detected for albacore tuna within oceans, but between-ocean comparisons (Atlantic, Pacific and Indian oceans along with Mediterranean Sea) were significant.

U.S. scientists participated in the 2013 ICCAT South Atlantic and North Atlantic albacore assessment meeting held in Sukarrieta, Spain 17-24 June 2013. Their participation included providing a U.S. albacore abundance index as well as several stock assessment models.

2.2.5 Mackerels and Small Tunas Research

King mackerel. The last domestic stock assessment of U.S. Gulf of Mexico and South Atlantic king mackerel populations was carried out in 2008 (the next assessments are scheduled to take place 2013-2014). During 2012, SEFSC scientists continued to make routine collections of otolith samples from the directed commercial and recreational fisheries for use in developing age length keys. These updated age length keys will be incorporated into future updated population models. The estimates of age composition from the updated age length keys will enable analysts to evaluate changes in year class strength since the 2008 stock assessment; additional samples can be acquired through cooperative efforts with state entities.

Spanish mackerel. The last U.S. domestic stock assessment for Gulf of Mexico and South Atlantic Spanish mackerel populations was carried out during 2012. The Data Workshop was held February 6-10, 2012 in Charleston, SC, the Assessment workshop was held May 7-11, 2012 in Miami, FL and the Review workshop concerning South Atlantic stocks was held October 29-November 2, 2012 in Atlanta, GA. SEDAR (Southeast Data, Assessment, and Review) Working papers document the methods, datasets, and preliminary analyses that were under consideration at the various workshops.

During 2012, SEFSC scientists continued efforts to acquire otolith samples from the directed commercial and recreational fisheries for use in developing age length keys. These updated age length keys were utilized in the 2012 updated population models. The age composition samples were used to evaluate changes in year class size since the last stock evaluation.

2.2.6 Shark Research

Following a Data Preparatory Meeting held in 2011, the SCRS conducted a stock assessment of the shortfin mako in Olhão, Portugal, 11-18 June 2012. Although the conclusion for both the North Atlantic and South Atlantic stocks of shortfin mako was that the stock was not overfished and overfishing was not occurring, the Committee stressed that there was a high degree of uncertainty in the results of the stock assessment. During 2012 the Shark Working Group also completed an updated and extended Ecological Risk Assessment of 15 Atlantic pelagic shark and one ray species (20 stocks in total) which found that the five stocks with lowest productivity were the bigeye thresher, sandbar, longfin mako, night, and South Atlantic silky shark, whereas the highest susceptibility (to pelagic longline fisheries) corresponded to shortfin mako, North and South Atlantic blue sharks, porbeagle, and bigeye thresher. Based on one of the indices used, the bigeye thresher, longfin and shortfin makos, porbeagle, and night sharks were classified as the most vulnerable (a combination of low productivity and high susceptibility) stocks.

In 2013, The Shark Working Group held a meeting in which a special shark data collection and research program for sharks was developed. Although there has been effort in recent years aimed at improving shark data collection and research, current knowledge on many fisheries and basic biology is still limited. These gaps in knowledge are responsible for much of the uncertainty in stock assessments, and have caused constraints to the provision of scientific advice. Therefore, the proposal for a Shark Research and Data Collection Program (SRDCP) represents a further step to fill knowledge gaps on fisheries and biology issues by improving data collection, cooperation and capacity building. In order to achieve these goals, the SRDCP aims to provide guidance to SCRS researchers, by prioritizing those issues related to data collection and research lines on species biology/ecology, fisheries and mitigation measures. Finally, by promoting coordination between SCRS researchers, the SRDCP aims to improve the quality and reduce the uncertainty of the scientific advice on sharks provided to the Commission, and to better assess the impact of management measures on these species.

As part of a cooperative shark research project between Brazil (Universidade Federal Rural de Pernambuco) and the United States (NMFS SEFSC Panama City Laboratory and the University of Florida's Florida Museum of Natural History) initiated in 2007 and aimed at understanding better the factors that affect catchability and habitat use of pelagic sharks, a document on "Survivorship of pelagic species in the Southwest Atlantic Ocean's Tuna Longline Fishery" was submitted for publication to a peer-reviewed journal. Catches in longlines employing circle hooks (15/0 and 17/0) and 10/0 "J"- hooks were compared with the use of "hook timers" (HTs) to measure differences in fishing mortality associated with time fish are hooked and on the line and hook type in the southwest Atlantic Ocean off the coast of Brazil. A total of 431 HTs were activated, showing a clear increase in the mortality rate of fish caught with increasing time between capture and boarding; however, some species endured long capture periods surviving until the time of boarding. Swordfish had high mortality rates, unlike blue sharks, which had low mortality rates regardless of hook type and the location in which the hook was set. The species of

tuna and billfish examined in this study showed a strong association between hook location and the animal's release condition, with reduced mortality in individuals hooked externally. A trend of increased survival with increased individual fish length was observed for most species. However, in sharks, increased survival with increased individual fish length was only observed for the blue shark, while other shark species showed an opposite pattern, although the difference was only statistically significant for crocodile sharks. Results suggest that knowledge of factors affecting the survival of pelagic fish caught in longline fisheries may enable the development and adoption of fishing methods to reduce mortality of longline bycatch

A collaborative project between the SEFSC and Uruguay's fisheries agency (DINARA) entitled "Sustainable fisheries and bycatch reduction of pelagic sharks in the Atlantic Ocean", initiated in 2009, continues. The ultimate goal of this project is to advance knowledge on the productivity and susceptibility of pelagic sharks to longline fisheries in the western South Atlantic Ocean, aspects which are largely unknown for pelagic sharks in the southern hemisphere. To that end, ten archival satellite tags (five PSATs, three SPOTs, two SPLASH) obtained through grants awarded to conduct this project, have been deployed to date on blue sharks to characterize in detail the spatio-temporal habitat use of this species. The two individuals fitted with SPOT tags (a 127 cm FL female and a 245 cm FL male) were captured in the western South Atlantic Ocean in EEZ waters and headed N-NE for the first five weeks after capture and release at a mean speed of 2 km/h. These individuals were tracked for 60 and 257 days, respectively. Of the five individuals tagged with PSAT tags, two never sent a signal, two (a 127 cm FL female and a 122 cm FL male) were deployed for 46 and 146 days, respectively, and the information for the 5th has not yet been analyzed. The immature female (which had been double-tagged with an MK10-PAT tag and a SPOT tag) spent 97% of the time at depths <100m. Five tags are providing real time data, which along with data for Ecological Risk Assessments are used as outreach to promote the collaboration between NOAA and DINARA (http://cicmar.org/en/projects-developed-by-cicmar/tiburuy-project-research-and-conservation-of-sharks-in-uruguay/blue-shark-satellite-tracking). . Scientists from Uruguay and the USA also worked on the ERA mentioned above and one of the Uruguayan scientists received training in preparation techniques and laboratory analysis of shark vertebral samples for age and growth studies.

Staff from DINARA and the SEFSC also worked cooperatively on the development of an identification guide for carcharhinid sharks of the Atlantic Ocean for ICCAT. Another guide for pelagic sharks had been completed in late 2010 and the guide for carcharhinid sharks (Guide for the identification of Atlantic Ocean sharks. Domingo et al. ICCAT) was completed in 2011.

Data collection and sampling of biological tissues for determining life history characteristics of several pelagic species (i.e. silky, bigeye thresher and common thresher) continues, with the number of archived samples close to 500. Reproductive tissues are processed and sectioned using histological techniques. Morphological data on organ measurements have been plotted and will be compared to the histological results. Vertebrae are also processed using histology and image analysis and are currently being read.

Controlled experiments are being conducted comparing catchability, at vessel mortality, and post release survivorship in longline sets using J style hooks and those using circle hooks. Contracted fishing vessels are deploying 500 hooks per set and with the exception of hook type, all other factors remain constant. Soak time is limited to the average rate observed for the fishery. All gangions are two m long and constructed of a snap, 363 kg test monofilament line and a swivel, to which the leader and hook are attached. The two experimental treatments are Lindgren-Pitman

Inc. 0° offset 18/0 circle hooks and Mustad 12/0 J hooks. Post-release survivorship, will be assessed tagging sandbar sharks (*Carcharhinus plumbeus*) with a satellite pop-up archival transmitting (PAT) tag. Survival of post-captured PAT tagged animals will be inferred from data provided by the PAT tag. Ten PAT tags have been deployed and four made the full deployment of 34 days. Of the remaining six tags, four pulled early with two showing indications of mortality and one tag is still due to report. The current 90% report rate is higher than other PAT tag studies to date.

Dusky sharks (*Carcharinus obscurus*) are a large coastal-pelagic shark species that inhabit the waters of the western Atlantic and Gulf of Mexico. A recent stock assessment indicates population depletions of ~80% of unfished levels. Management regulations include listing dusky sharks as a prohibited species and creating a time-area closure to protect juveniles. Despite strict regulations, dusky sharks are still caught as bycatch on pelagic longlines where at-vessel mortality rates are up to 85%. To help improve the status of the dusky shark, hook timers and temperature depth recorders were used to collect data to assess factors affecting mortality during longline capture. Eighty-five specimens from 16 longline sets were caught off North Carolina and Florida Keys. Time-on-hook, length, sex, average water temperature, and soak time were recorded. Preliminary logistic regression models predict that as time-on-hook and soak time increase, mortality rates also increase. Median mortality occurs at 6.6 hours of time-on-hook and 13.5 hours of soak time. Water temperature was not a significant factor in analysis. The difference in the mortality rates of time-on-hook versus soak time suggest that current soak time is longer than dusky shark tolerance to longline fishing. While preliminary, these results reflect the potential of bycatch mortality rates to influence already depleted populations and could be used to propose regulations on longline soak time, aiding in population recovery of this species.

NMFS and Stony Brook University completed a visual key (Abercrombie et al. 2013) for field identification of fins from shark species caught in fisheries in the Atlantic Ocean that are important to the global fin trade. Specifically, fisheries agents and customs inspectors will be able, with minimal training, to identify fins. The format of the guide is designed for rapid and, for many species, unambiguous identification using key characteristics of the fin, such as shape, color and texture. A photograph of a dorsal fin for 19 species and paired pectoral fins for 20 species has been included in this guide, along with a general distribution, a brief fin description and a list of similar species (if applicable) that may be confused for fins of the species in question.

2.2.7. Billfish Research

U.S. scientists again played substantial roles in the ICCAT Enhanced Research Program for Billfish in 2012, with a U.S. scientist serving as western Atlantic coordinator. Major accomplishments in the western Atlantic in 2012 were documented in SCRS/12/178. Highlights include at-sea biological sampling by observers aboard Venezuelan longline vessels targeting tuna and/or swordfish. Sampling of swordfish, istiophorids, and yellowfin tuna for reproductive, age determination, and genetic studies was continued at about the same rate as the previous year. Program participants in Venezuela, Grenada, and Barbados continued to assist in obtaining information on tag-recaptured billfish, as well as numerous sharks. In the western Atlantic Ocean, during 2012, a total of seven tagged billfish were recaptured, most were blue marlin.

An international collaboration on billfish genetic research, initiated in 2008 and ongoing in 2012,

included U.S. scientists from NOVA Southeastern University and SEFSC. Other collaborators include Venezuela (Instituto Oceanografico, Universidad de Oriente), Uruguay (Recursos Pelagicos, Direccion Nacional de Recursos Acuaticos), and Brazil (Universidade Federal Rural de Pernambuco). One of the primary goals is to develop accurate estimates of white marlin/round scale spearfish ratios in the Atlantic Ocean, including retrospective analyses. A draft paper entitled " A Comparative Population Genetic View of Two Look-Alike and Commonly Misidentified Billfishes: the Recently Validated Roundscale Spearfish (Tetrapturus georgii) and the Overfished White Marlin (Kajikia albida)" is currently under review. U.S. scientists (SEFSC and Univ. of Miami's RSMAS) collaborated in 2011 with oceanographers from the Leibniz Institute of Marine Science (Kiel, Germany) on an interdisciplinary study entitled "Expansion of oxygen minimum zones may reduce available habitat of tropical pelagic fishes" published in Nature Climate Change in January 2012. Results of this work were also presented to the "Planet Under Pressure" Conference in London, UK during 2012.

U.S. scientists participated in the ICCAT Atlantic white marlin stock assessment meeting held in Madrid, Spain in May 2012, for which a U.S. scientist prepared and implemented a statistically integrated model (Stock Synthesis) during. This represents the first implementation of such models for Atlantic white marlin, and was used for the development of management advice.

2.2.8 Seabird research

During 2011 and 2012, U.S. scientists worked to improve techniques for estimating seabird bycatch of the U.S. Atlantic pelagic longline fleet using data collected through the Pelagic Observer Program (POP) and data from the pelagic longline logbooks. Because the observed seabird catches are rare events even on the scale of the POP sampling, and further, observed catches are not well distributed in space or time, new estimation methods and model structures are applied each year in an effort to improve the accuracy and reliability of the estimates. The entire data series since the start of the POP program is used to estimate anew each year the annual catch for each year from 1992 through the latest year of the record.

Research by U.S. scientists relevant to seabird interactions with ICCAT fisheries in general also takes place in the Pacific Ocean, considering potential mitigation approaches in longline fisheries.

2.2.9 Tagging

Participants in the Southeast Fisheries Science Center's Cooperative Tagging Center (CTC) and The Billfish Foundation (TBF) Tagging Program tagged and released 2,528 billfishes (including swordfish) and 878 tunas in 2012. This represents an increase of 35.2% for billfish and an increase of 82.2% for tunas from 2011 levels. Several electronic tagging studies involving yellowfin tuna, bluefin tuna and billfish in the Atlantic Ocean and adjacent waters continued during 2012. These are discussed in the corresponding research sections above. There were 93 billfish recaptures from the CTC and TBF projects in 2012. This represents an increase of 200% from 2011. These recaptures included 55 sailfish, 14 swordfish, 13 white marlin, and 11 blue marlin. A total of 15 tunas were recorded as recaptures in 2012, 8 bluefin tuna and 7 yellowfin tuna. This recapture level was an increase of 275% from the 2011 values.

2.2.10 Fishery Observer Deployments

Domestic Pelagic Longline Observer Coverage

In accordance with ICCAT recommendations, randomized observer sampling of the U.S. pelagic longline fleet was continued into 2012 (see Figure 2.5) through the U.S. Pelagic Observer Program. Representative scientific observer sampling of this fleet has been underway since 1992. The data collected through this program have been used to quantify the composition, disposition, and quantity of the total catch (both retained and discarded at sea) by this fleet which fishes in waters of the northwest Atlantic Ocean, Gulf of Mexico, and the Caribbean Sea. Selection of the vessels is based on a random sampling of the number of sets reported by the longline fleet. The percent of fleet coverage has varied over time, for example in 1992 it reached 2.5% coverage of sets; while in 2012 it reached a 9.8 % of sets. The targeted sampling fraction of the U.S. pelagic longline fleet was increased from 5% to 8% of sets in 2002.

A total of 16,173 longline sets (11,749,858 hooks) were recorded by NOAA Fisheries observer personnel from May of 1992 to December of 2012. During this period, observers recorded over 547,969 fish (primarily swordfish, tunas, and sharks), in addition to marine mammals, sea turtles, and seabirds. Documents SCRS/04/168 and SCRS/08/034 provided a more detailed summary of the data resulting from observer sampling, observer coverage, and sampling strategy. Similar to 2007-2011, from approximately April 2 through June 15, 2012, the pelagic observer program increased the coverage of the longline fleet operating in the Gulf of Mexico. The goal of this increase was to collect data to better characterize the interaction between the longline fleet and bluefin tuna during the spawning season. A total of 373 longline sets were observed (227,938 hooks) from 29 vessels which accounted for approximately 53.8 % of the longline trips during that period.

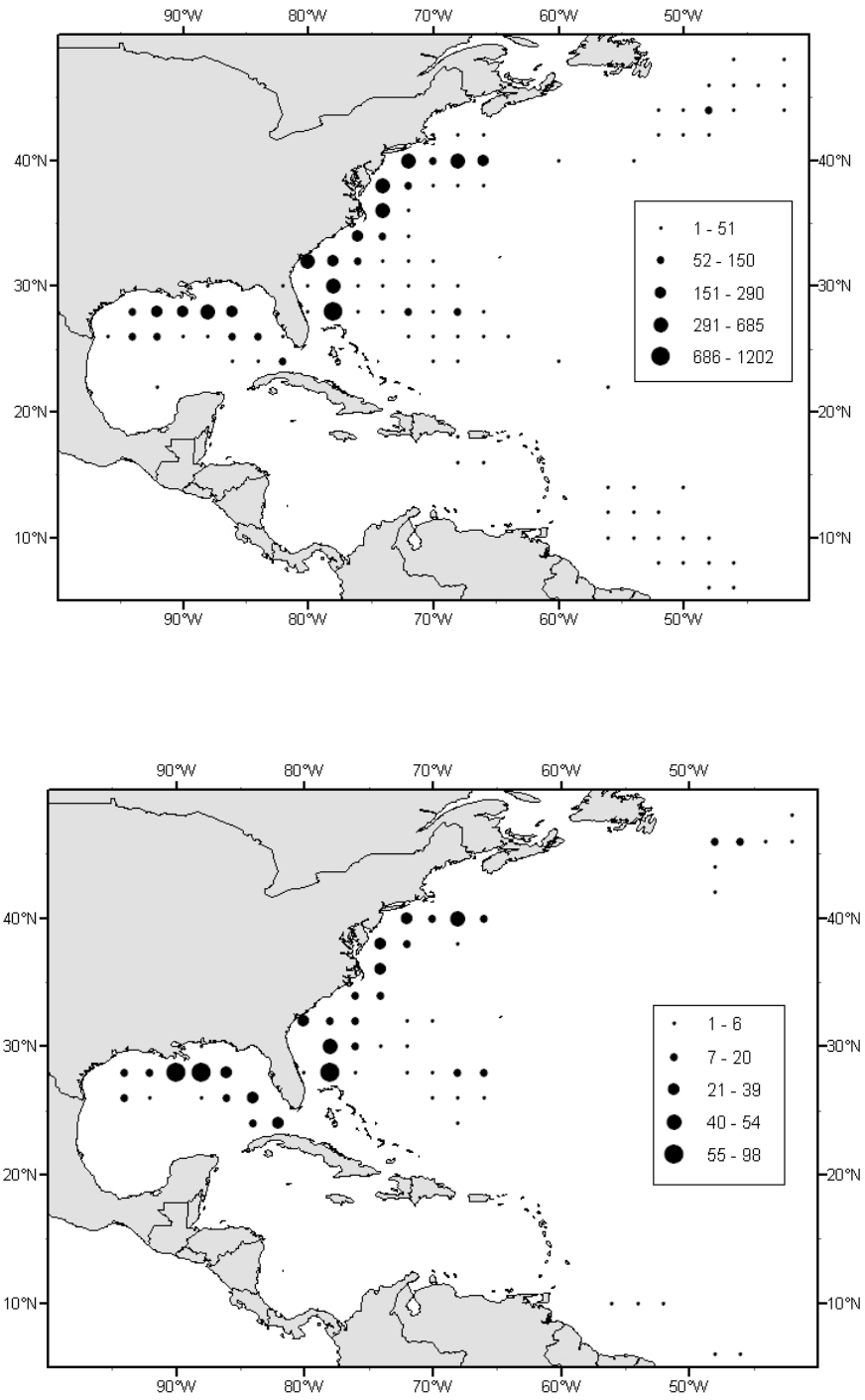


Figure 2.5 – *Position of longline sets as reported in pelagic logbooks (upper panel) and observed by the U.S. pelagic observer program (lower panel) in 2011 summarized by $2^{o}x2^{o}$ square.*

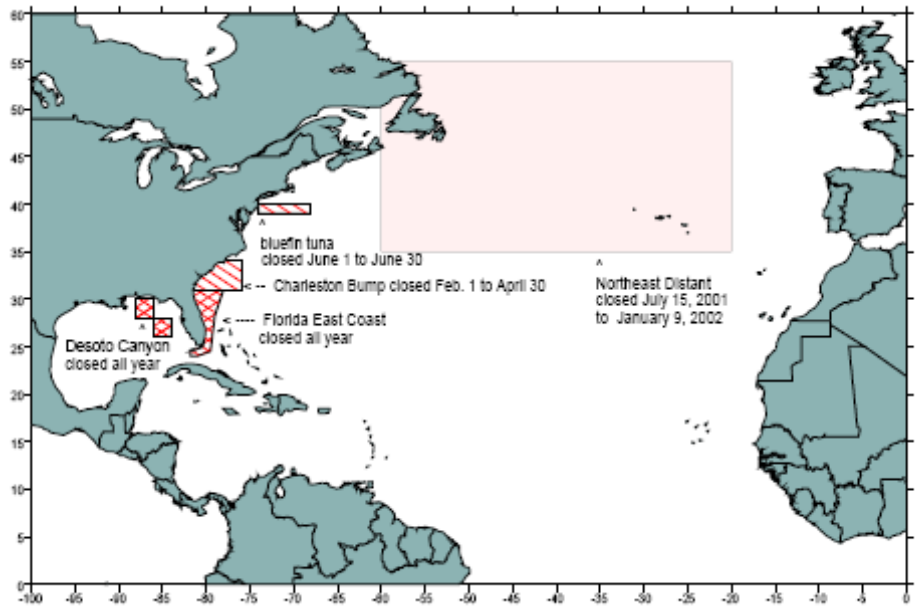
Shark Bottom Longline Observer Coverage

The U.S. Atlantic shark bottom longline fishery operates in the Atlantic Ocean from about the Mid-Atlantic Bight to south Florida and throughout the Gulf of Mexico. The bottom longline gear targets large coastal sharks, but small coastal sharks, pelagic sharks, and dogfish species are also caught. Currently, about 214 U.S. fishermen are permitted to target sharks (excluding dogfish) in the Atlantic Ocean and Gulf of Mexico, and an additional 285 fishermen are permitted to land sharks incidentally caught. Amendments to the Consolidated Atlantic Highly Migratory Species Fishery Management Plan based on updated stock assessments have eliminated the major directed shark fishery in the U.S. Atlantic. However, the amendments implemented a shark research fishery, which allows the U.S. National Marine Fisheries Service (NMFS) to select a limited number of commercial shark vessels on an annual basis to carry observers 100% of trips to collect life history data, and other necessary data to conduct shark stock assessments. Furthermore, the revised measures affected quotas, sharply reduced retention limits, and modified the authorized species in commercial shark fisheries. Specifically, commercial shark fishermen not participating in the research fishery are no longer allowed to land sandbar sharks, which have been the main target species for most fishermen. Additionally, commercial fishermen are required to land shark with their fins naturally attached. Observations of the shark-directed bottom longline fishery in the Atlantic Ocean and Gulf of Mexico have been conducted since 1994. From January to December 2012, a total of 81 hauls on 53 trips were observed on vessels in the shark research fishery. Sharks comprised 97.9% of the catch, followed by teleosts (1.6%) and batoids (0.2%). Sandbar shark comprised 48.6% of the shark catch followed by other large coastal shark species (e.g. tiger, hammerhead, bull shark), small coastal shark (11.8%), and deep water sharks comprised 0.1%. Prohibited shark species were also caught including the dusky shark (8.7% of shark catch),sand tiger shark, (1.0%), and the white shark, (0.1%). Outside the research fishery, 89 hauls on 36 trips were observed. Sharks comprised 97.6% of the catch, followed by teleosts (1.9%), and batoids (0.5%).

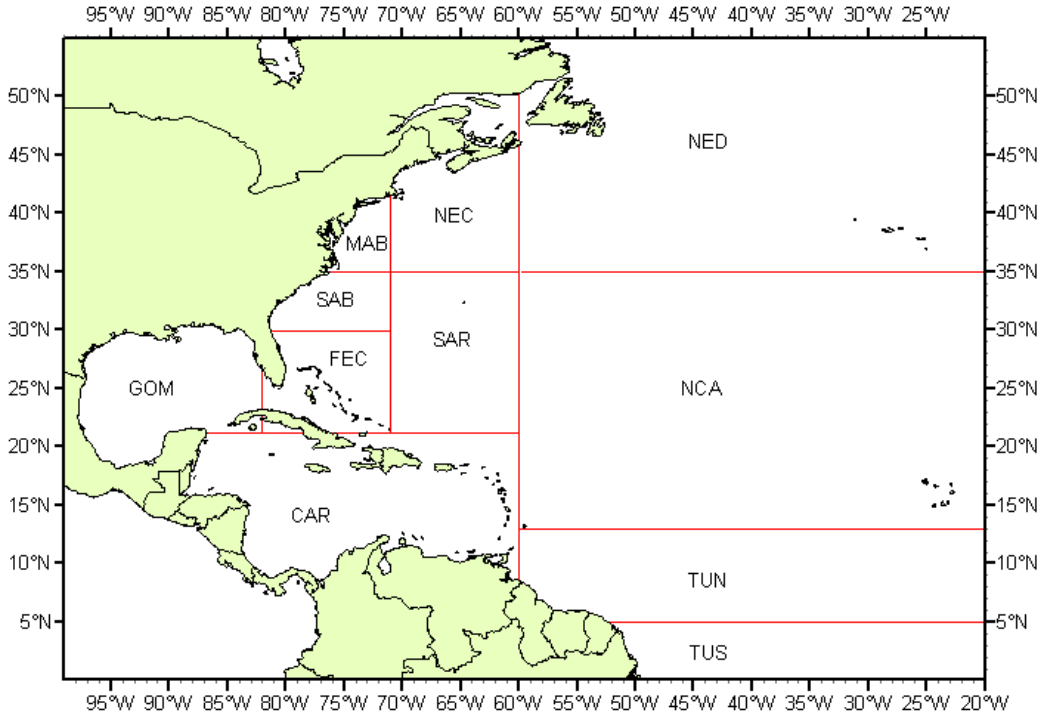
Appendix 1. Effects of time/area closures on the U.S. swordfish fishery.

Beginning in 2001, U.S pelagic longline fishing was prohibited or restricted in the five areas shown in *Appendix Figure 1.1*. The three southern areas, (Charleston Bump, Florida East Coast, and Desoto Canyon), were selected, at least in part, to reduce the catch of swordfish < 125 cm and other bycatch species. The bluefin tuna area was closed primarily to reduce the catch of bluefin smaller than legal size for sale by U.S. fishers. Longline vessels were allowed to fish in the closed Northeast Distant area only if they participated in a circle hook fishing experiment aimed to investigate the performance of circle hooks with respect to sea turtle bycatch and if they carried a scientific observer. In 2002 and 2003, the Northeast Distant area remained closed year round to all longline vessels (except those participating in the turtle study), and it was reopened to the entire fleet in 2004.

The number of longline vessels in the U.S. fishery targeting swordfish declined steadily from the mid-1990s, reached the lowest numbers in 2006 and showed a variable increasing trend since then. The number of active vessels in 2012 was slightly higher than in the previous 3 years. Reported effort (hooks) declined initially, remained fairly stable through 2001 and further declined to the lowest reported number in 2006 (Appendix Table 1.1). The number of hooks fished increased from 2007 through 2009. Year 2010 showed a decreased in part caused by the oil spill event in the Gulf of Mexico. The number of hooks fished in 2012 is the highest since 2001. The percentage effort in number of hooks and swordfish discarded dead in numbers (reported) and in metric tons (estimated) in 2010, 2011, and 2012 are compared to the average effort and numbers/estimates from 1997 through 1999 (Appendix Table 1.2). There was some overall reduction in effort, reported in hooks fished. Some of the effort previously reported from the Florida East Coast fishing area appears to have redistributed into the Gulf of Mexico and up to the south Atlantic and Mid Atlantic Bights (See Appendix Figure 1.2 for domestic areas). The years 2010, 2011, and 2012 and the average (1997-1999) swordfish discarded dead in numbers (reported) and in metric tons (estimated) and effort in hooks are reported by area and time/area status in Appendix Table 1.3**.**



Appendix Figure 1.1- Time/area closures for the U.S. pelagic longline fishery in 2012. Note that the Northeast Distant area is currently open for pelagic longline fishing only.



pendix Figure 1.2- U.S. domestic fishing areas: Caribbean (CAR), Florida East coast (FEC), Gulf of Mexico (GOM), Mid Atlantic Bight (MAB), Northeast Central (NEC), Northeast Distant (NED), South Atlantic Bight (SAB), Sargasso Sea (SAR), North Central Atlantic (NCA), Tuna North (TUN), and Tuna South (TU.S.).

Appendix Table 1.1. *Number of Active U.S. Pelagic Longline Vessels.* "Vessels" indicates the number of vessels that submitted at least one positive fishing report during that year, "Vessels that caught SWO" corresponds to the number of vessels that reported catching at least one swordfish during that year and "Vessels that caught SWO in 5 month period" indicates the number of vessels that reported catching at least one swordfish per month in at least five months of that year. "Hooks Reported" includes all submitted logbooks single pelagic longline sets and summary records.

Year	Vessels	Vessels that caught SWO	Vessels that caught SWO in 5 month period	Hooks reported
1989	456	415	251	7,927,401
1990	419	363	209	7,500,095
1991	342	308	176	7,754,127
1992	340	304	184	9,076,717
1993	435	306	177	9,735,806
1994	501	306	176	10,351,805
1995	489	314	198	11,270,539
1996	367	275	194	10,944,660
1997	352	265	167	10,213,780
1998	288	233	139	8,120,273
1999	226	200	143	7,996,685
2000	206	185	135	8,158,390
2001	185	168	114	7,897,037
2002	149	140	107	7,107,958
2003	123	119	94	6,862,091
2004	117	114	96	7,345,048
2005	112	108	79	5,973,150
2006	103	102	77	5,522,236
2007	119	117	90	6,312,406
2008	122	122	89	6,273,257
2009	116	114	88	6,772,732
2010	116	115	63	5,565,170
2011	117	116	81	5,900,451
2012	122	122	100	7,718,091

Appendix Table 1.2. Numbers (reported) and metric tons (estimated) of swordfish discarded dead, and reported number of hooks in years 2010-2012 by pelagic longline vessels expressed as percentage of the mean values from years 1997-1999 by area Caribbean (CAR), Florida East coast (FEC), Gulf of Mexico (GOM), Mid Atlantic Bight (MAB), Northeast Central (NEC), Northeast Distant (NED), and South Atlantic Bight (SAB).

	Number of SWO				Number of Hooks				Metric tons			
	Mean	2010	2011	2012	Mean	2010	2011	2012	Mean	2010	2011	2012
CAR	433	14%	3%	1%	233,291	32%	3%	3%	6	12%	3%	0%
FEC	2,488	14%	17%	12%	579,777	155%	148%	183%	37	13%	16%	15%
GOM	1,806	30%	47%	86%	1,465,689	39%	49%	112%	17	32%	58%	105%
MAB	1,195	37%	75%	34%	730,291	105%	133%	157%	18	31%	74%	35%
NEC	767	29%	23%	24%	622,812	86%	78%	90%	11	24%	23%	25%
NED	972	92%	11%	7%	494,842	56%	46%	63%	13	84%	11%	9%
SAB	2,391	31%	61%	45%	556,779	141%	132%	123%	39	28%	57%	41%

BLUEFIN TUNA - WEST

BFTW-2. Fishery indicators

The total catch for the West Atlantic peaked at 18,671 t in 1964, mostly due to the Japanese longline fishery for large fish off Brazil (that started in 1962) and the U.S. purse seine fishery for juvenile fish **(BFT-Table 1, BFTW-Figure 1)**. Catches dropped sharply thereafter with the collapse of the bluefin tuna by-catch longline fishery off Brazil in 1967 and decline in purse seine catches, but increased again to average over 5,000 t in the 1970s due to the expansion of the Japanese longline fleet into the northwest Atlantic and Gulf of Mexico and an increase in purse seine effort targeting larger fish for the sashimi market. The total catch for the West Atlantic including discards has been relatively stable since 1982 due to the imposition of quotas. However, since a total catch level of 3,319 t in 2002 (the highest since 1981, with all three major fishing nations indicating higher catches), total catch in the West Atlantic declined steadily to a low of 1,638 t in 2007 and then increased in 2008 and 2009 to 2,000 t and 1,980 t, respectively. The catch in 2012 was 1,750 t **(BFTW-Figure 1).** The decline through 2007 was primarily due to considerable reductions in catch levels for U.S. fisheries. Since 2002, the Canadian annual catches have been relatively stable at about 500-600 t (735 t in 2006); the 2006 catch was the highest recorded since 1977 (972 t). The 2012 Canadian catch (including dead discards) was 493 t. Japanese catches have generally fluctuated between 300-500 t, with the exception of 2003 (57 t), which was low for regulatory reasons, and 2009 (162 t). Japanese landings for 2011 were considerably higher than previous at 578 t, while catch in 2012 was 289 t.

The average weight of bluefin tuna taken by the combined fisheries in the West Atlantic were historically low during the 1960s and 1970s **(BFTW-Figure 2)**, for instance showing an average weight of only 33 kg during the 1965-1975 period. However, since 1980 they have been showing a quite stable trend and at a quite high average weight of 93 kg.

The overall number of Japanese vessels engaged in bluefin fishing has declined from more than 100 vessels to currently less than 10 vessels in the West Atlantic. After reaching a catch level of 2,014 t in 2002 (the highest level since 1979), the catches (landings and discards) of U.S. vessels fishing in the northwest Atlantic (including the Gulf of Mexico) declined precipitously during 2003-2007. The United States did not catch its quota in 2004-2008 with catches of 1,066, 848, 615, 858 and 922 t, respectively. However, in 2009 the United States fully realized its base quota with total catches (landings including dead discards) of 1,272 t and since that time catches have remained around 900 t with a catch in 2012 of 915 t.

The indices of abundance used in the 2012 assessment were updated through 2012 **(BFTW-Figure 3)**. The catch rates of juvenile bluefin tuna in the U.S. rod and reel fishery fluctuate with little apparent long-term trend, but exhibit a pattern that is consistent with the strong year-class estimated for 2003 and showed small increases in 2010 and 2011, but declined in 2012. The catch rates of adults in the U.S. rod and reel fishery remain low, but increased in 2010 to the highest level since 2002, showed a small decrease in 2011 and 2012. The catch rates of the Japanese longline fishery north of 30^{o}N fluctuated significantly since 2007, showing considerably high values for 2007, 2009, 2011, and 2012 fishing years. These high indices might be related to an increase in abundance of relatively small (135-150cm, 50-60 kg) and medium (180-200 cm, 115-165 kg) sized bluefin. The catch rates from the U.S. Gulf of Mexico longline fishery showed a gradual increasing trend from 1996 to 2008, a slight decrease afterwards, and a sharp increase in 2012. The nominal catch rates in the Gulf of St. Lawrence have increased steadily since 2004 and the catch rates in 2011 were the highest in the time series considered in the 2012 assessment, and further increased in 2012. The nominal catch rates in southwest Nova Scotia have continued to follow a general increasing trend since 2000. The Gulf of Mexico larval survey (the only fishery independent indicator) continues to fluctuate around the low levels observed since the 1980s. In view of these trends, there is no indication of a change in stock status sufficient to warrant advancing the scheduling of the next stock assessment.

BFTW-3. State of the stock

The most recent assessment was conducted in 2012 and included information through 2011 (Anon. 2013). The SCRS cautions that the conclusions of that assessment do not capture the full degree of uncertainty in the assessments and projections. An important factor contributing to uncertainty is mixing between fish of eastern and western origin. Based on earlier work, the estimates of stock status can be expected to vary considerably depending on the type of data used to estimate mixing (conventional tagging or isotope signature samples) and modeling assumptions made. Mixing models will be further investigated prior to the next assessment. Another important source of uncertainty is 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). Improved knowledge of maturity at age will also affect the perception of changes in stock size. Finally, the lack of representative samples of otoliths requires determining the catch at age from length samples, which is imprecise for larger bluefin tuna. Many of these deficiencies are being addressed by current research programs.

The 2012 assessment estimated trends that are consistent with previous analyses in that spawning stock biomass (SSB) declined steadily from 1970 to 1992 and has since fluctuated between 25% and 36% of the 1970 level (**BFTW-Figure 4**). In recent years, however, there appears to have been a gradual increase in SSB from 27% in 2003 to an estimated 36% in 2011. Since 1998, when the rebuilding plan was adopted, the SSB has increased by 19%. The stock has experienced different levels of fishing mortality (F) over time, depending on the size of fish targeted by various fleets (**BFTW-Figure 4**). Fishing mortality on spawners (ages 9 and older) declined markedly after 2003.

Estimates of recruitment were very high in the early 1970s (**BFTW-Figure 4**), and previous 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 trend with the exception of a strong year-class in 2003. The previous assessment estimated that the 2003 year-class was the largest since 1974, but the current assessment estimates two somewhat smaller year classes (2002 and 2003) instead. The Committee continues to believe the 2003 year class was large based on the progression of size classes through various fisheries; and the estimate of two adjacent but smaller year classes is likely an artifact of the lack of direct observations of the age of fish in the catch and recent regulations in the United States that limited the take of fish in that size range. In 2012, the 2003 year class has started to contribute to the spawning biomass.

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 (2008-2010) is 61% of F_{MSY} and SSB_{2011} is about 140% of SSB_{MSY} (**BFTW-Figure 5, BFTW-Figure 6**). Estimates of stock status are more pessimistic if a high recruitment scenario is considered (F =160% of F_{MSY}, SSB =19% of SSB_{MSY}).

The Committee recognizes that the large uncertainty in stock status is exacerbated by the lack of appropriate information/data and scientific surveys, and suggests using a scientific research quota (as recommended previously by the SCRS) to help support the improvement of stock abundance indices for western Atlantic bluefin tuna and overcome this standstill situation. However, the Committee also points out that the collection of the information mentioned above is a long-term endeavor.

BFTW-4. Outlook

A medium-term outlook evaluation of changes in spawning stock size and yield over the remaining rebuilding period under various management options was conducted in 2012. Future recruitment was assumed to fluctuate under two scenarios: (i) average levels observed for 1976-2008 (87,000 fish, the low recruitment potential scenario) and (ii) levels that increase as the stock rebuilds (MSY level of 280,000 fish, the high recruitment potential scenario). The Committee has no strong evidence to favor either scenario over the other and notes that both are plausible (but not extreme) lower and upper bounds on rebuilding potential.

The outlook for bluefin tuna in the West Atlantic is summarized in **BFTW-Figure 7 and BFTW-Tables 1-3**. The low recruitment scenario suggests the stock is above the MSY level with greater than 60% probability and catches of 2,500 t or lower will maintain it above the MSY level. Constant catches of 2,000 t would result in 2019 SSB nearly equal to that in 2012. If the high recruitment scenario is correct, then the western stock will not rebuild by 2019 even with no catch, although catches of 1,200 t or less are predicted to have a 60% chance to immediately end overfishing and initiate rebuilding.

The Committee notes that considerable uncertainties remain for the outlook of the western stock, including the effects of mixing and management measures on the eastern stock.

BFTW-5. Effect of current regulations

The Committee previously noted that Recommendation 08-04, which was implemented in 2009, was expected to result in a rebuilding of the stock towards the convention objective, but also noted that there has not yet been enough time to detect with confidence the population response to the measure. This statement is also true for

Recommendation 10-03, which was implemented in 2011, and Recommendation 12-02, which was implemented in 2013. Nevertheless, the available fishery indicators **(BFTW-Figure 3)** as well as the 2012 assessment suggest the spawning biomass of western bluefin tuna continues to increase.

BFTW-6. Management recommendations

In 1998, the Commission initiated a 20-year rebuilding plan designed to achieve SSB_{MSY} with at least 50% probability. In response to recent assessments, the Commission recommended a total allowable catch (TAC) of 1,900 t in 2009, 1,800 t in 2010 [Rec. 08-04] and 1,750 t in 2011, 2012 and 2013 [Rec. 10-03, Rec. 12-02].

The most recent (2012) assessment indicates similar historical trends in abundance as in previous assessments. The strong 2003 year class has contributed to stock productivity such that total biomass has been increasing in recent years.

Future stock productivity, as with prior assessments, is based upon two hypotheses about future recruitment: a 'high recruitment scenario" in which future recruitment has the potential to achieve levels that occurred in the early 1970s and a "low recruitment scenario" in which future recruitment is expected to remain near present levels (even if stock size increases). The results of this assessment have shown that long term implications of future biomass are different between the two hypotheses and the issue of distinguishing between them remains unresolved.

Probabilities of achieving SSB_{MSY} within the Commission rebuilding period were projected for alternative catch levels **(BFTW-Table 1)**. The "low recruitment scenario" suggests that biomass is currently sufficient to produce MSY, whereas the "high recruitment scenario" suggests that SSB_{MSY} has a very low probability of being achieved within the rebuilding period. Despite this large uncertainty about the long term future productivity of the stock, under either recruitment scenario current catches (1,750 t) should allow the biomass to continue to increase. Larger catches in excess of 2,000 t will prevent the possibility of the 2003 year class elevating the productivity potential of the stock in the future. Maintaining catch at current levels (1,750 t) is expected to allow the spawning biomass to increase, which may help resolve the issue of low and high recruitment potential. Analyses conducted in SCRS/2013/191 predict that maintaining catches of 1,750 t could allow the more correct recruitment scenario to be identified with reasonable confidence (statistical power of 70-80%) by the year 2024 and maintaining a catch of 1,000 t or less could allow the spawning biomass to rebuild enough to do so by the end of the rebuilding period (2018).

The Commission should decide the TAC, which should include the scientific research quota (such as proposed by Japan, see SCRS/2013/200, SCRS/2013/203) if it is implemented. The Committee notes that TAC should be decided considering the alternative catch levels shown above and the priority placed on protecting 2003 year class, continued stock growth, and the future ability to discriminate the recruitment hypothesis.

As noted previously by the Committee, both the productivity of western Atlantic bluefin tuna and western Atlantic bluefin tuna fisheries are linked to the eastern Atlantic and Mediterranean stock. Therefore, management actions taken in the eastern Atlantic and Mediterranean are likely to influence the recovery in the western Atlantic, because even small rates of mixing from East to West can have considerable effects on the West due to the fact that eastern plus Mediterranean resource is much larger than that of the West.

WEST ATLANTIC BLUEFIN TUNA SUMMARY (Catches and Biomass in t)		
Current (2012) Catch (including discards)	1,750 t	
Assumed recruitment	Low potential	High potential
Maximum Sustainable Yield (MSY)	2,634 (2,452-2,834)[1]	6,472 (5,736-7,500)[1]
SSB_{MSY}	12,943 (12,717-13,268)[1]	93,621 (77,288-116,679)
SSB_{2011}/SSB_{MSY}	1.4 (1.14-1.72)[1]	0.19 (0.13-0.29)[1]
F_{MSY}	0.17 (0.14-0.19)[1]	0.064 (0.056-0.074)[1]
$F_{0.1}$	0.11 (0.10-.12)[1]	0.11 (0.10-.12)[1]
$F_{2008-2010}/F_{MSY}$[2]	0.61 (0.49-0.74)[1]	1.57(1.24-1.95)[1]
$F_{2008-2010}/F_{0.1}$	0.92 (0.77-1.12)[1]	0.92 (0.77-1.12)[1]
Stock status	Overfished: NO	Overfished: YES
	Overfishing: NO	Overfishing: YES
Management Measures:	[Rec. 08-04] TAC of 1,900 t in 2009 and 1,800 t in 2010, including dead discards.	
	[Rec. 10-03, Rec. 12-02] TAC of 1,750 t in 2011-2013, including dead discards.	

[1] Median and approximate 80% confidence interval from bootstrapping from the assessment.
[2] $F_{2008-2010}$ refers to the geometric mean of the estimates for 2008-2010 (a proxy for recent F levels).

8.9 SWO-ATL-ATLANTIC SWORDFISH

The status of the North and South Atlantic swordfish stocks was assessed in September 2013, by means of applying statistical modelling to the available data up to 2011. Complete information on the assessment can be found in the Report of the 2013 ICCAT Swordfish stock assessment meeting (Anon. 2013). Other information relevant to Atlantic swordfish is presented in the Report of the Sub-Committee on Statistics, included as **Appendix 7** to this SCRS Report, and recommendations pertinent to Atlantic swordfish are presented in Item 17.

SWO-ATL-1. Biology

Swordfish (*Xiphias gladius*) are members of the family *Xiphiidae* and are in the suborder *Scombroidei*. They can reach a maximum weight in excess of 500 kg. They are distributed widely in the Atlantic Ocean and Mediterranean Sea. In the ICCAT Convention area, the management units of swordfish for assessment purposes are a separate Mediterranean group, and North and South Atlantic groups separated at 5°N. This stock separation is supported by recent genetic analyses. However, the precise boundaries between stocks are uncertain. Swordfish feed on a wide variety of prey including groundfish, pelagic fish, deep-water fish, and invertebrates. They are believed to feed throughout the water column, and from recent electronic tagging studies, undertake extensive diel vertical migrations.

Swordfish mostly spawn in the western warm tropical and subtropical waters throughout the year, although seasonality has been reported in some of these areas. They are found in the colder temperate waters during summer and fall months. Young swordfish grow very rapidly, reaching about 140 cm LJFL (lower-jaw fork length) by age three, but grow slowly thereafter. Females grow faster than males and reach a larger maximum size. Tagging studies have shown that some swordfish can live up to 15 years. Swordfish are difficult to age, but about 50% of females were considered to be mature by age five, at a length of about 180cm. However, the most recent information indicates a smaller length and age at maturity.

New length-weight relationships were proposed for both the North and South Atlantic, but these will be considered interim solutions until further analysis is conducted with new and more recent data.

The Group reviewed document SCRS/2013/151 which presented the horizontal tracking of 21 swordfish tagged with pop-up satellite tags in the central and eastern North Atlantic. The analysis of the horizontal movements evidenced seasonal patterns with fish generally moving south by winter and returning to the temperate foraging grounds in spring. Broader areas of mixing between some eastern and western areas were also suggested. These new results obtained by pop-up satellite tags fully confirm the previous knowledge that was available from fishery data: deep longline catch swordfish during the day time as a by-catch, while shallow longliners target swordfish at night in very shallow waters.

SWO-ATL-2. Fishery indicators

Due to the broad geographical distribution of Atlantic swordfish (**SWO ATL-Figure 1**) in coastal and off-shore areas (mostly ranging from 50ºN to 45ºS), this species is available to a large number of fishing countries. **SWO ATL-Figure 2** shows total estimated catches for North and South Atlantic swordfish. Directed longline fisheries from Canada, EU-Spain, and the United States have operated since the late 1950s or early 1960s, and harpoon fisheries have existed at least since the late 1800s. Other directed swordfish fisheries include fleets from Brazil, Morocco, Namibia, EU-Portugal, South Africa, Uruguay, and Venezuela. The primary by-catch or opportunistic fisheries that take swordfish are tuna fleets from Chinese Taipei, Japan, Korea and EU-France. The tuna longline fishery started in 1956 and has operated throughout the Atlantic since then, with substantial catches of swordfish that are produced as a by-catch of tuna fisheries. The largest proportion of the Atlantic catches is made using surface-drifting longline. However, many additional gears are used, including traditional gillnets off the coast of western Africa.

The Group reviewed document SCRS-2013-161 that demonstrated a significant relation between temperate fishery CPUE residuals and the size of the Atlantic Warm Pool (AWP), which was shown to be highly correlated with the Atlantic Multidecadal Oscillation (AMO). This supported the information provided on document SCRS/12/022, that described the occurrence of swordfish (1.5 to 2.65 m) off the Norwegian coast (58 to 70ºN latitude) from 1967 to 2011. The effect of AWP was thought to be responsible for conflicting signals in the CPUEs from the northern temperate and tropical regions. Further analysis and hypothesis testing was recommended to determine if this relationship was due to a swordfish temperature preference, a change in prey distribution, or perhaps both.

For both the North and South Atlantic many of the indices of abundance were affected by changes in gear technology and management that could not be accounted for in the CPUE standardization, and therefore had to be split. Splitting the indices reduces the abundance signal and, to the degree possible continuity of the indices can be maintained, it will increase the reliability of the assessment results.

Total Atlantic

The total Atlantic estimated catch (landings plus dead discards) of swordfish (North and South, including reported dead discards) in 2012 (24,152 t) is close to the reported catch in 2011 (23,914 t). As a small number of countries have not yet reported their 2012 catches and because of unknown unreported catches, this value should be considered provisional and subject to further revision.

The trends in mean fish weight taken in the North and South Atlantic fisheries is shown in **SWO-ATL-Figure 3**.

North Atlantic

For the past decade, the North Atlantic estimated catch (landings plus dead discards) has averaged about 11,500 t per year (**SWO-ATL-Table 1** and **SWO-ATL-Figure 4**). The catch in 2012 (13,972 t) represents a 31 % decrease since the 1987 peak in North Atlantic landings (20,236 t). These reduced landings have been attributed to ICCAT regulatory recommendations and shifts in fleet distributions, including the movement of some vessels in certain years to the South Atlantic or out of the Atlantic. In addition, some fleets, including at least the United States, EU-Spain, EU-Portugal and Canada, have changed operating procedures to opportunistically target tuna and/or sharks, taking advantage of market conditions and higher relative catch rates of these species previously considered as by-catch in some fleets. Recently, socio-economic factors may have also contributed to the decline in catch.

Available catch per unit effort (CPUE) series were evaluated by the Group and certain indices were identified as suitable for use in assessment models (Japan, Portugal, Morocco, Canada, Spain and USA). Trends in standardized CPUE series by fleets contributing to the production model are shown in **SWO-ATL-Figure 5**. Most of the series have an increasing trend since the late 1990s, but the U.S. catch rates remained relatively flat. There have been some recent changes in United States regulations that may have impacted catch rates, but these effects remain unknown. The combined index is shown in **SWO-ATL-Figure 6**, rescaled to the final fishery specific indices.

The most frequently occurring ages in the catch include ages 2 and 3 (**SWO-ATL-Figure 6**).

South Atlantic

The historical trend of catch (landings plus dead discards) can be divided in two periods: before and after 1980. The first one is characterized by relatively low catches, generally less than 5,000 t (with an average value of 2,300 t). After 1980, landings increased continuously up to a peak of 21,930 t in 1995, levels that are comparable to the peak of North Atlantic harvest (20,236 t in 1987). This increase of landings was, in part, due to progressive shifts of fishing effort to the South Atlantic, primarily from the North Atlantic, as well as other waters. Expansion of fishing activities by southern coastal countries, such as Brazil and Uruguay, also contributed to this increase in catches. The reduction in catch following the peak in 1995 resulted from regulations and partly due to a shift to other oceans and target species. In 2012, the 10,180 t reported catches were about 54 % lower than the 1995 reported level (**SWO-ATL-Figure 4**). The SCRS received reports from Brazil and Uruguay that those CPCs have reduced their fishing effort directed towards swordfish in recent years. Uruguay recently received increased albacore quotas that may allow increased effort for swordfish in the near future.

Six data sets of relative abundance indices (Brazil, Japan, Spain, Uruguay, South Africa and Chinese Taipei) were made available to the Group. These CPUE indices were standardized using various analytical approaches. The standardized CPUE series presented show different trends and high variability which indicates that at least some are not depicting trends in the abundances of the stock. The available indices are illustrated in Figure **SWO-ATL-Figure 6**. Two combined indices were produced (**SWO-ATL-Figure 7**), one excluding Brazil and the other excluding both Brazil and Chinese Taipei data series.

Discards

Since 1991, several fleets have reported dead discards (see **SWO-ATL-Table 1**). The volume of Atlantic-wide reported discards since then has ranged from 215 t to 1,139 t per year. Reported annual dead discards (in tonnes) have been declining in recent years.

SWO-ATL-3. State of the stocks

North Atlantic

Two stock assessment platforms were used to provide estimates of stock status for the North Atlantic swordfish stock, non-equilibrium surplus production model (ASPIC) and Bayesian Surplus Production Model (BSP2).

Results from the North Atlantic base case ASPIC model are shown in **SWO-ATL-Figure 8**. The estimated relative biomass trend shows a consistent increase since 1997. The bias corrected deterministic outcome indicates that the stock is at or above B_{MSY} (**SWO-ATL-Figure 9**). The relative trend in fishing mortality shows that the level of fishing peaks in 1995, followed by a decrease until 2001, followed by small increase in the 2002-2005 period and downward trend since then (**SWO-ATL-Figure 8)**. Fishing mortality has been below F_{MSY} since 2000. The estimate of stock status in 2011 is relatively similar to the estimated status in the 2009 assessment, and suggests that there is greater than 90% probability that the stock is at or above B_{MSY}. However, it is important to note that for the first time since 2002 the reported catches in 2012 (13,972 t) exceeded the TAC of 13,700 t. The most recent estimate of stock productivity is very consistent with previous estimates. The absolute biomass trajectory showed a consistent upturn from the estimated 1997 value, and the biomass values for the most recent years are near the level estimated in the mid-1980s (**SWO-ATL-Figure 10**). The high value in 1963 is not well fit as in prior evaluations. Trends in both fishing mortality and biomass are consistent with those produced by the BSP2 model, with the latter model estimating larger stock biomass and lower fishing mortality across the entire time series (**SWO-ATL-Figure 10**). Estimates of stock status from the BSP2 model are consistent with ASPIC results (**SWO-ATL-Figure 11**).

The stock is considered rebuilt, consistent with the 2009 evaluation. Compared with the 2009 ASPIC base case model, the trajectory of biomass and F ratios are similar until the late 1990s, thereafter the current model predicted slightly lower fishing mortality rates and higher relative biomass, but certainly within the estimated 80% confidence bounds (**SWO-ATL-Figure 12**).

South Atlantic

In 2009, evaluation of the status of the South Atlantic swordfish stock was assessed using a 'Catch only' model. During the 2013 stock assessment two platforms were used to provide stock status advice for the South Atlantic swordfish stock (i.e. ASPIC and BSP2).

The results of both models indicated that there was a conflicting signal for several of the indices used and substantial conflict between the landings history and the indices. Consequently the Group had low confidence in the estimation of the absolute productivity level of the stock or on MSY-related benchmarks. Both models had similar difficulties estimating these quantities but both offered useful status advice. Consequently each platform provided a reference model on which the stock status was based.

Both models had similar trajectories of fishing mortality and biomass (**SWO-ATL-Figure 13 and 14**) but differed in their absolute levels and their status relative to benchmarks (**SWO-ATL-Figure 15**). Hence the two models differ in their view of current stock status, with ASPIC estimating the stock to be overfished (B_{2011}/B_{MSY} =0.98) but not undergoing overfishing (F_{2011}/F_{MSY} =0.84), and BSP, neither overfished (B_{2011}/B_{MSY} =1.38), nor overfishing (F_{2011}/F_{MSY} =0.47). Though, it should be noted that there is considerable uncertainty around any of these point estimates.

The groups choose to base stock status determination on a combination of model output and ancillary information, of which two pieces of information are informative. First, total removals (1950-2011) for the South Atlantic stock have been only 73% of the total removals for the North Atlantic stock for the same time period. Second the mean weight for the South (**SWO-ATL-Figure 16**) is larger than for the North. Assuming similar production dynamics, both indicators would suggest a lower exploitation rate for the South stock than for the North. Hence, while the Group does not believe it can estimate the absolute productivity of the stock without improved scientific information, the Group believes that the stock is not overfished.

SWO-ATL-4. Outlook

North Atlantic

Based on the currently available information to the Group, the ASPIC base model was projected to the year 2021 under constant TAC scenarios of 8 to 20 thousand tones. Projections used reported catch as of September 5, 2013 for 2012. For those CPCs whose reported catch was not yet available, their catch was assumed to be the average of the last three years (2009-2011), giving a total catch of 14,038 t. Median trajectories for biomass and fishing mortality rate for all of the future TAC scenarios are plotted in **SWO-ATL-Figure 17**. Results from the 2013 assessment indicated that there is greater than 90% probability that the northern swordfish stock has rebuilt to or above B_{MSY} (**SWO-ATL-Figure 9**), therefore the Commission's rebuilding plan goal has been achieved.

Future TACs above 15,000 t are projected to result in 50% or lower probabilities of the stock biomass remaining above B_{MSY} over the next decade (**SWO-ATL-Table 2**) as the resulting probability of F exceeding F_{MSY} for these scenarios would trend above 50% within four years. A TAC of 13,700 t would have an 83% probability of maintaining the stock and fishing mortality at a level consistent with the Convention objective over the next decade. Projections with BSP also used similar specifications for 2012 and 2013 yields and projected over the same time frame. Both models provide very consistent advice that TAC levels of 13,700 t would maintain the stock at a level consistent with the Convention Objectives over the next decade.

South Atlantic

The Group considered that the ASPIC and BSP estimated benchmarks were unreliable due to the conflicting signal between the catch data and the CPUE time series available to the Group. Hence, it is unknown whether it is possible to obtain substantially higher yields from the stock as BSP suggests or whether the stock is fully exploited as suggested by ASPIC. Until improved scientific information is available in the form of more consistent indices, tagging studies to estimate fishing mortality or abundance or other improved information, this uncertainty may remain.

SWO-ATL-5. Effect of current regulations

In 2006, the Committee provided information on the effectiveness of existing minimum size regulations. New catch regulations were implemented on the basis of Rec. 06-02, which entered into effect in 2007 (Rec. 08-02 extended the provisions of Rec. 06-02 to include 2009). Rec. 09-02 came into effect in 2010 and extended most of the provisions of Rec. 06-02 for one year only. Rec. 10-02 came into effect in 2011, and again extended those provisions for one year only, but with a slight reduction in total allowable catch (TAC).

For the South Atlantic, the most recent recommendation can be found in Rec. 09-03, which establishes a three year management plan for that stock.

Catch limits

The total allowable catch in the North Atlantic during the 2007 to 2009 period was 14,000 t per year. The reported catch during that period averaged 11,969 t and did not exceed the TAC in any year. In 2010, the TAC was reduced to 13,700 t, compared with 2012 catches of 13,972 t. Reports for 2012 are considered provisional and subject to change.

The total allowable catch in the South Atlantic for the years 2007 through 2009 was 17,000 t. The reported catch during that period averaged 13,482 t, and did not exceed the TAC in any year. In 2010, the TAC was reduced to 15,000 t, compared with 2012 catch of 10,180 t. Reports for 2012 are considered provisional and subject to change.

Minimum size limits

There are two minimum size options that are applied to the entire Atlantic: 125 cm LJFL with a 15% tolerance, or 119 cm LJFL with zero tolerance and evaluation of the discards.

For the 2006-2008 period, the estimate of the percentage of swordfish reported landed (throughout the Atlantic) less than 125 cm LJFL was about 24% (in number) overall for all nations fishing in the Atlantic (28% in the northern stock and 20% in southern stock). If this calculation is made using reported landings plus estimated

dead discards, then the percentage less than 125 cm LJFL would be of the same order given the relatively small amount of discards reported. These estimates are based on the overall catch at size, which have high levels of substitutions for a significant portion of the total catch.

Other implications

The Committee is concerned that in some cases national regulations have resulted in the unreported discarding of swordfish caught in the North stock and, to a certain extent, could have influenced similar behavior of the fleet that fishes the South Atlantic swordfish stock. The Committee considers that these regulations may have had a detrimental effect on the availability and consistency of scientific data on catches, sizes and CPUE indices of some of the Atlantic fleets. The Committee expressed its serious concern over this limitation on data for future assessments.

SWO-ATL-6. Management recommendations

North Atlantic

For continuity of advice relative to previous assessments, ASPIC results are provided in **SWO-ATL-Table 2**, which shows the ranges of total catch limits and associated probabilities associated with stock status by year. The current TAC of 13,700 t has an 83% probability of maintaining the North Atlantic swordfish stock in a rebuilt condition by 2021 while maintaining nearly level biomass. This TAC would be in accordance with [Rec. 11-13], adopted by the Commission that indicates that 'For stocks that are not overfished and not subject to overfishing (i.e., stocks in the green quadrant of the Kobe plot), management measures shall be designed to result in a high probability of maintaining the stock within this quadrant'. However, the Committee acknowledges that without better direction from the Commission with regard to what constitutes a 'high probability', it cannot provide more specific advice. TACs up to 14,300 t would still have a higher than 50% probability of maintaining the stock in a rebuilt condition by 2021 but would be expected to lead to greater biomass declines.

South Atlantic

Considering the unquantified uncertainties and the lack of signal in the data for the southern Atlantic swordfish stock, and until sufficiently more research has been conducted to reduce the high uncertainty in stock status, the Committee did not have sufficient confidence in the assessment results to change the previous recommendation to limit catches to no more than 15,000 t.

ATLANTIC SWORDFISH SUMMARY

	North Atlantic	***South Atlantic***
Maximum Sustainable Yield[1]	13,660 t (13,250-14,080)[3]	Unknown
Current (2012) TAC	13,700 t	15,000 t
Current (2012) Yield[2]	13,972 t	10,180 t
Yield in last year used in assessment (2011)	12,834 t[4]	11,055 t[4]
B_{MSY}	65,060 (54,450-76,700)	Unknown
F_{MSY}	0.21 (0.17-0.26)	Unknown
Relative Biomass (B_{2011}/B_{MSY})	1.14 (1.05-1.24)	Unknown, but likely above 1[5]
Relative Fishing Mortality (F_{2011}/F_{MSY}[1])	0.82 (0.73-0.91)	Unknown, but likely below 1[5]
Stock Status	Overfished: NO Overfishing: NO	Overfished: NO[5] Overfishing: NO
Management Measures in Effect:	Country-specific TACs [Rec. 11-02]; 125/119cm LJFL minimum size	Country-specific TACs [Rec. 12-01]; 125/119cm LJFL minimum size

[1] Base Case production model (Logistic) results based on catch data 1950-2011.
[2] Provisional and subject to revision.
[3] Point estimate, 80% bias corrected confidence intervals are shown.
[4] As of 5 September 2013.
[5] This determination is based on the models and the ancillary information (e.g. catch trends, mean weight trends).

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Reported U.S. catches of tunas and swordfish in 2012, including dead discards, exceeded 10,000 tons, an increase of about 25% from 2011. Swordfish catches increased from 2,800 MT in 2011 to nearly 3,700 tons in 2012, and landings of yellowfin tuna increased from 3,000 tons to 4,000 tons. U.S. vessels caught 916 tons of bluefin tuna, an increase of about 11 tons. Skipjack tuna landings increased by about 25 tons to 112 tons, bigeye tuna landings increased by 150 tons to 869 tons, and albacore landings increased 3 tons to 425 tons. U.S. catches remained within quotas for western Atlantic bluefin, North and South Atlantic swordfish, and northern albacore. U.S. recreational landings of blue marlin, white marlin and spearfish were within the combined annual limit of 250 fish. Commercial landings of Atlantic billfish are prohibited. The U.S. pelagic longline fishery is subject to several time/area closures to reduce bycatch (e.g., undersized swordfish, billfish, turtles, etc.), hook and bait restrictions, and use of approved sea turtle release gear in accordance with release and handling protocols. Pelagic longline vessels must use "weak hooks" when fishing in the Gulf of Mexico to reduce bluefin tuna bycatch. The United States continues to fulfill the requirements of ICCAT's shark recommendations through prohibitions, data collection programs and domestic management measures including a pelagic shark quota and a requirement to land sharks with fins naturally attached. Research on tuna and tuna like species continued in areas such as genetics, age and growth, tagging, habitat utilization, bycatch mitigation through gear modifications, and assessment modeling. The United States supports bluefin tuna research through dedicated research funding and domestic programs to fund research proposals and in-kind support of GBYP. U.S. Atlantic tagging programs tagged more than 2,500 billfishes (including swordfish) and nearly 900 tunas during 2012, an increase of more than 35% for billfish and more than 80% for tunas from 2011. Scientific observers covered 9.8% of pelagic longline sets in 2012; expanded coverage in the Gulf of Mexico during the bluefin tuna spawning season continued in 2012 (54% of longline sets during this period).

A Report on the History of United States Swordfish Fishing and a Development/Management Plan for the United States Swordfish Fishery Prepared Pursuant to ICCAT Recommendation 11-02

September 15, 2013

U.S. Department of Commerce, NOAA Fisheries

I. Executive Summary

ICCAT Recommendation 11-02, which replaced Recommendation 10-02, renewed the requirement for each CPC to submit its development or fishing/management plan to the Commission by September 15 of each year. This document describes the history, future development, management, and socio-economic aspects of the U.S. North Atlantic swordfish (*Xiphias gladius*) fishery.

The conservation and management of U.S. Atlantic swordfish fisheries since 1985 – five years before active management by ICCAT – has been defined by a comprehensive suite of ecosystem-based measures that go beyond the requirements of ICCAT recommendations. These measures have been developed following the results and advice from scientific studies with the goal of developing and maintaining a sustainable swordfish fishery. The U.S. commercial swordfish fishery is quota managed and operated under a permit program. There are no trip limits for directed commercial swordfish permit holders, and there is a trip limit of 30 swordfish per trip for incidental swordfish permit holders. The United States commercial swordfish fishermen may only sell to permitted swordfish dealers, and reporting in a logbook is mandatory for limited access permit holders. All importers, exporters, and re-exporters of swordfish are required to obtain an International Trade Permit and submit bi-weekly reports. All pelagic longline vessels fishing in the Gulf of Mexico must use weak hooks to reduce bycatch of bluefin tuna. In addition, all pelagic longline vessels are required to have a functioning vessel monitoring system (VMS) unit onboard and are subject to mandatory observer coverage. The U.S. observer coverage target for this fishery is eight percent of all fishing sets in each area/quarter strata; actual coverage in 2012 was 9.8 percent overall.

The United States has implemented several time/area closures for pelagic longline gear to minimize bycatch mortality of juvenile swordfish and other highly migratory and protected species. The United States has implemented sea turtle protection measures including the use of dipnets and line cutters to release turtles, gangion lengths must be 110 percent of the length of the floatline in sets of 100 meters or less in depth, sea turtle guidelines for safe handling and release must be posted inside the wheelhouse, and fishermen must use corrodible circle hooks on all pelagic longline vessels. In addition, all U.S. longline vessel owners and operators must attend mandatory workshops to learn to carefully release and handle sea turtles and other protected species.

Recreational swordfish fishermen must have an Angling or Charter/Headboat permit and the sale of recreational landings of swordfish is prohibited. Recreational trip limits for swordfish include one per person up to four per trip. In addition, charter boats and headboats may retain one swordfish per paying passenger for a total of up to six and 15 swordfish, respectively. Recreational fishermen are required to report all non-tournament swordfish landings and tournament operators, if selected, must report tournament swordfish landings. If a tournament is not selected, vessel owners are responsible for reporting their swordfish landings.

The United States has also implemented extensive scientific programs to support the collection of reliable fishery data, participation in stock assessments, and innovative research on swordfish biology, life history, and fishing techniques to reduce bycatch. These actions support

our efforts to prevent and eliminate overfishing and excess fishing capacity, while ensuring that levels of fishing effort are commensurate with the ICCAT objective of achieving and maintaining a swordfish biomass that can support MSY. Together, they help ensure the sustainability of the swordfish stock and support an ecosystem-based approach to management.

Several U.S. domestic management measures (e.g., gear requirements, time/area closures, bycatch mitigation) have temporarily affected the ability of the U.S. fleet to fully harvest its ICCAT allocation. For example, as a responsible steward of the Florida Straits swordfish nursery grounds, U.S. actions to reduce fishing effort by our fleet in this area reduced mortality on both immature and mature swordfish. Such actions resulted in substantial declines in U.S. catches during the first part of the last decade (2001-2006), which were further exacerbated by natural disasters such as Hurricane Katrina. However, these same measures also resulted in a significant U.S. contribution to the health and rebuilding of the North Atlantic swordfish stock and the associated marine ecosystem, to the ultimate benefit of all ICCAT members that fish for this stock.

Ecosystem based management plays a key role in the sustainability of fisheries. It is a challenging but essential task to achieve broad ecosystem conservation and management objectives while preserving a viable fishery. As this document will demonstrate, the United States is taking its ocean stewardship responsibilities seriously. While ICCAT has taken some steps aimed at addressing certain ecosystem matters, in particular with regard to bycatch, the United States has gone beyond those requirements, and we are implementing measures designed to ensure the health of both the swordfish stock and the fishery. It is important for ICCAT and other RFMOs to encourage these kinds of efforts by their members in order to ensure sustainable fisheries and healthy ecosystems.

Since the North Atlantic stock of swordfish was declared rebuilt, the United States has been fully committed to the revitalization of our swordfish fishery, and has made significant efforts over the past few years to restructure its fisheries and adjust regulatory constraints on its swordfish fishery in light of the new circumstances. These measures are designed to increase swordfish landings while ensuring that the fishery complies with U.S. laws and regulations, including those aimed at preserving the long-term sustainability of the stock, and ICCAT requirements. Notably, in 2013, the Marine Stewardship Council certified the North Atlantic Swordfish fishery operated by Day Boat Seafood Inc. in the southeastern United States, including pelagic longline and buoy gear, as sustainable and well managed. Other sectors of the U.S. swordfish fishery are currently under consideration for MSC certification.

As a result of swordfish revitalization efforts, the U.S. swordfish fishery has shown increasing trends in catch. The United States swordfish catches in 2012 were 3,651.03 mt and were at the highest level since 2000, even with fewer active pelagic longline vessels. In 2012, six years after revitalization began U.S. swordfish catch was more than 70 percent higher relative to 2006 and is just below our base quota level from ICCAT. We continue to make steady progress toward fully harvesting our swordfish allocation while using best fishing practices to protect juvenile swordfish and conserve other marine species. In further support of these efforts, the United States published a final rule on August 21, 2013, to implement a new open access commercial vessel permit to retain and sell a limited number of swordfish caught on rod and reel,

handline, harpoon, greenstick, and bandit gear. This new swordfish permit will provide additional opportunities for U.S. fishermen to commercially harvest swordfish, using selective gears that have very low levels of bycatch, given the rebuilt status of the swordfish and their increased availability.

In summary, the United States has chosen to pursue a prudent and deliberate strategy of incrementally increasing swordfish fishing effort to ensure an environmentally and economically sustainable fishery while preserving its record of compliance with all ICCAT recommendations. U.S. swordfish landings have been increasing since 2006 due to efforts to revitalize this fishery in a responsible manner and we are now experiencing almost complete use of our base quota from ICCAT. Our approach to the management of this fishery supported ICCAT's rebuilding efforts and is now helping to ensure the long-term sustainability of the stock in accordance with the objectives of the Convention. The United States looks forward to continuing its active participation in this socially and economically important fishery. To that end, this document describes the interests, fishing patterns, and fishing practices of the U.S. Atlantic swordfish fleet – past, present, and future.

II. History of the U.S. Swordfish Fishery

Early History (1800s - 1960s)

The United States has a long history of fishing for swordfish. The commercial North Atlantic swordfish fishery began in the early 1800s as a harpoon fishery off the New England coast in the northeastern United States. Sailing vessels used harpoons to capture swordfish on extended trips to the Hudson Canyon and Georges Bank during summer months. The catch was dominated by large fish that basked at the surface. Eventually, the fishery expanded to follow annual migration patterns along the eastern North American seaboard. For more than 150 years, up until the 1960s, most U.S. commercial swordfish were caught using harpoons or handlines. A small U.S. recreational swordfish fishery developed in the 1920s using rod and reel and handline, primarily from Massachusetts to New York. As diesel engines came to replace sail, pelagic longlines eventually replaced harpoons as the primary commercial swordfish gear during the 1960s.

1985 U.S. Swordfish Fishery Management Plan (1970s – 1980s)

The U.S. pelagic longline fishery grew steadily during the 1960s and 1970s. At the same time, a recreational rod and reel fishery developed in Florida during the 1970s, and many towns along the Mid-Atlantic coast developed a tradition of holding annual swordfish tournaments, which contributed to tourism and local economies. As overall Atlantic swordfish fishing effort increased in the 1980s, the commercial U.S. pelagic longline fishery also expanded into the Grand Banks, Florida Keys, and Gulf of Mexico. In 1985, the first U.S. Atlantic Swordfish Fishery Management Plan (FMP) was implemented, which included reductions in the harvest of small swordfish, permitting and monitoring requirements, and scientific research. Paralleling the overall increase in reported landings of North Atlantic swordfish, the U.S. commercial swordfish catch grew steadily through the 1980s, before peaking in 1989 at 6,411 mt. At the same time, the average North Atlantic swordfish caught in the late 1990s weighed only 41 KG as compared to an average of 113 KG for harpoon-caught swordfish in the 1960s.

ICCAT Swordfish Management Begins (1990s)

In 1990, with support and encouragement from the United States, ICCAT recommended reductions in the harvest of undersized swordfish (Rec. 90-02). To comply with the ICCAT recommendation, in 1991 the United States established a minimum size limit of 25 kg with a 15 percent tolerance based on the number of swordfish landed. A corresponding minimum size of 119cm LJFL/15 kg, with zero tolerance, was later adopted by ICCAT (in 1995) at the initiative of the United States in order to provide a more enforceable mechanism for protecting juvenile swordfish.

In 1994, ICCAT recommended further reductions in North Atlantic swordfish landings by implementing quotas for the first time and encouraging countries to maintain their minimum size regulations and to take other measures to protect small swordfish, including the establishment of time and area closures. In 1995, the number of U.S. open access swordfish permit holders peaked at 1,531 (with about 400 active pelagic longline vessels). In 1996, with strong support from the United States, ICCAT adopted a 3-year phase down of TACs to the level of replacement yield for years 1997, 1998, and 1999 with the goal of ending overfishing.

In 1999, the United States prohibited the use of all small-scale driftnets in the North Atlantic swordfish fishery due to concerns about marine mammal bycatch. Driftnets >2.5km had already been banned in the United States following the UN moratorium on large-scale pelagic driftnet fishing on the high seas. The United States also implemented regulations to track swordfish trade, including dealer permitting and reporting for all swordfish importers, documents indicating the country of origin and flag of the vessel (the U.S. certificate of eligibility program), and a prohibition on the import of undersized swordfish based on U.S. implementation of ICCAT's alternative minimum size recommendation first adopted in 1995.

U.S. FMP for Atlantic Tunas, Swordfish, & Sharks (1999)

The United States finalized a new FMP for Atlantic Tunas, Swordfish and Sharks in 1999, which replaced the 1985 Atlantic Swordfish FMP. The 1999 FMP contained several important management measures to rebuild the swordfish stock including: 1) an annual swordfish quota; 2) limited access swordfish vessel permits and vessel upgrading restrictions; 3) swordfish dealer permits; 4) minimum size requirements; 5) a 1-month pelagic longline closed area to reduce bluefin tuna dead discards; 6) both observer coverage and logbook reporting; 7) vessel monitoring systems (VMS) for pelagic longline vessels; and, 8) tournament registration and tournament reporting requirements for tunas, swordfish, and sharks. Many of these requirements are still in effect and are described in detail in Section IV. The 1999 FMP also called for the United States to seek the adoption of an international swordfish rebuilding program.

ICCAT 10-Year Swordfish Rebuilding Plan Established (1999)

In 1999, the SCRS indicated that North Atlantic swordfish biomass had dropped to approximately 65 percent of B_{msy} and that current levels of catch would lead to continued stock decline. In response, and with significant participation from the United States, ICCAT established a 10-year rebuilding program for North Atlantic swordfish (Rec. 99-02). The ICCAT rebuilding program began in 2000 with a goal for the stock to be rebuilt by 2010. One component of the program was to protect small fish. The ICCAT measure reduced total allowable catches (TACs) for the three year period 2000-03, starting at 10,600 mt. TACs were inclusive of dead discards. The measure also continued the prohibition on the taking of swordfish less than 119 cm LJFL, or 15 kg as an alternative (with no tolerance for fish less than 119 cm LJFL or 15 kg). For 2001 and 2002, the overall TAC was set at 10,500 and 10,400 mt, respectively. The annual U.S. swordfish quota for 2000 – 2002 was set at 2,951 mt. Based on scientific advice, ICCAT revised the TAC and other provisions of the rebuilding program periodically throughout the rebuilding period.

Implementation of U.S. Pelagic Longline Closed Areas (2000 – 2001)

To reduce the bycatch of undersized swordfish, billfish, sharks, and protected species, the United States implemented several large time/area closures for pelagic longline vessels in 2000 and 2001, which closed a total of 132,670 square nautical miles (343,610 square kilometers) to pelagic longline gear. These closures included the DeSoto Canyon year-round closure (Gulf of Mexico), the Florida East Coast year-round closure, and the Charleston Bump seasonal closure (mid-Atlantic coast). These time/area closures resulted in reduced U.S. North Atlantic swordfish landings. Those reduced landings that translated into a lower fishing mortality rate for the stock

contributed to the North Atlantic swordfish stock being declared almost fully rebuilt (B/B_{msy} = 0.99) in 2006, four years ahead of schedule.

Implementation of Sea Turtle Protection Measures (2001 – 2004)

In 2000-2001, to reduce sea turtle bycatch the United States closed 2,631,000 square nautical miles (9,035,617 square kilometers) of the Northeast Distant Statistical Area (NED) to fishing by the U.S. pelagic longline fleet. The closed area included portions of the high seas where the vessels of many nations operated. Of course, only the operations of U.S. flag vessels were affected by the NED closure.

The United States also implemented regulations during this period to require: (1) dipnets and line clippers to be used to safely release sea turtles; (2) gangion lengths to be 110 percent of the length of the floatline in sets of 100 meters or less in depth; (3) sea turtle guidelines for safe handling and release to be posted inside the wheelhouse; and (4) the use of corrodible hooks on all pelagic longline vessels.

From 2001 - 2003, the United States conducted a research experiment with the pelagic longline fishing industry in the NED to determine if gear modifications and other techniques could reduce sea turtle bycatch and bycatch mortality. The results of the experiment showed that large circle hooks with finfish bait reduced sea turtle bycatch rates. Based upon the results of this experiment and consistent with domestic requirements to protect certain sea turtle species, the United States reopened the NED to pelagic longline fishing in 2004, but required the use of large circle hooks 18/0 gauge or larger only with finfish baits, the use of release tools, and adherence to careful sea turtle handling and release techniques. The United States also distributed revised sea turtle handling and release placards, protocols, and videos to all pelagic longline vessels. The placards, protocols, and videos were made available in English, Spanish, and Vietnamese.

The United States has continued to pursue sea turtle conservation through international, regional, and bilateral organizations, including ICCAT, the InterAmerican Convention for the Protection and Conservation of Sea Turtles, and the FAO Committee on Fisheries. Sea turtle bycatch mitigation technology has been shared with many other nations fishing in the Atlantic including Spain, Canada, Morocco, Mexico, Italy, and Uruguay. Cooperative research has been conducted with the Dominican Republic, Turkey, Spain, Canary Islands, Brazil, Uruguay, Italy, and South Korea, and the United States is currently engaged in a joint research project with Chinese Taipei to test the use of circle hooks in their deep set pelagic longline fishery.

Implementation of U.S. Recreational Swordfish Management Measures (2003)

In order to further improve and expand the collection of fishery data, the United States required that all recreational vessels fishing for swordfish, tunas, billfish, and sharks must obtain a recreational angling permit. In January 2003, the United States established a mandatory reporting system for all non-tournament recreational landings of swordfish. These regulations became effective in March 2003.

Highly Migratory Species (HMS) International Trade Permit (2005)

In 2005, the United States began requiring all importers and exporters of swordfish to obtain an annual International Trade Permit and submit bi-weekly activity reports. One goal of this program is to enforce the requirements of ICCAT's statistical document programs, including for swordfish. The permit program is also designed to support and reinforce the U.S. ban on imports of swordfish below the ICCAT minimum size and ensure that this ban is respected by all trade partners.

2006 ICCAT Recommendation

ICCAT Recommendation 06-02 set a TAC of 14,000 mt for 2007 and 2008 with 3,907 mt allocated to the United States for each year. The 2006 recommendation established carryover caps specifying that the maximum quota underage that could be carried over could not exceed 50 percent of the quota allocation. The United States agreed to allocate 2,690 mt of its underharvest from 2003 - 2006 to the TAC for 2007 and 2008 to accommodate the swordfish fisheries of developing States (evenly split at 1,345 mt per year for 2007 and 2008).

Protected Species Workshops for Longline Vessels/Authorization of Buoy Gear (2006)

In October 2006, the United States finalized its Consolidated HMS FMP which implemented many new management measures for swordfish, tunas, billfish, and sharks. With regard to swordfish, the new regulations established mandatory workshops for all pelagic longline fishermen to train them in the careful release and handling of sea turtles and other protected species. As a result, all U.S. pelagic longline vessel owners and operators must become certified at protected species workshops and renew this certification every three years. The first workshops were conducted in 2006 and have continued each year since.

The 2006 Consolidated HMS FMP also authorized the use of buoy gear for commercial swordfish fishing. Since 2006, the U.S. buoy gear fishery has grown to about 25 active vessels based primarily in southeastern Florida. The gear is relatively simple and inexpensive, and it consists of a single section of heavy monofilament or braided nylon to which one or two hooks and one or more floatation devices (i.e., buoys) are attached. Approximately 10-15 units of this free-floating gear are deployed 35-50 meters apart at night, when swordfish are feeding close to the surface. When a swordfish strikes the bait, the attached buoys are dragged away alerting the fisherman that a swordfish has been hooked. The fisherman can quickly land the fish ensuring a high quality product (and price) and allowing for immediate re-deployment of the gear. Results of a recent two-year study showed that the use of buoy gear resulted in increased swordfish catch rates and low bycatch as compared to longline gear.

Revitalization of U.S. Swordfish Fishery (2007 – 2013)

Decreased swordfish stock abundance, natural and man-made disasters, market conditions, management regulations, and increased operating costs contributed to a generally declining trend in U.S. swordfish landings starting in 1990 with the lowest catches reported in 2006 (2,057 mt). The United States took several important steps to address this issue as the North Atlantic swordfish stock continued to rebuild. In 2007, the United States modified pelagic longline vessel upgrading requirements, increased incidental swordfish landing limits, and increased recreational landing limits to provide additional opportunities for U.S. vessels to harvest the allocated swordfish quota. These actions allowed for increased U.S. swordfish catches while continuing to minimize the bycatch of undersized swordfish and protected species.

In January 2008, the United States started research on pelagic longline bycatch rates within some of the pelagic longline closed areas. The final report on the first round of this research has been released, and the U.S. National Marine Fisheries Service (NMFS) is evaluating potential next steps. This research is providing information for future swordfish management activities, which could include alterations to the length and/or size of current time and area closures. In July 2008, the United States relaxed restrictions on the renewal of certain longline permits. This action helped to ensure that an adequate number of pelagic longline permits would be available to fish for swordfish as the stock rebuilt. In 2011, the United States modified incidental retention limits for *Illex* squid trawl vessels to reduce regulatory dead discards of swordfish. Further, in 2012, the United States implemented ICCAT Recommendation 11-02 which, among other requirements, included an alternative swordfish minimum size measurement of 63.5 cm cleithrum to caudal keel (CK). U.S. revitalization efforts are discussed in greater detail in Section III. In 2009, the SCRS indicated that overfishing was not occurring (F_{2009}/F_{MSY} = 0.76) and the stock was not overfished (B_{2009}/B_{MSY} = 1.05). Thus, ICCAT's rebuilding objective for North Atlantic swordfish had been achieved ahead of the schedule established in the 1999 rebuilding program.

On August 21, 2013, the United States published a final rule to implement a new open access commercial vessel permit to retain and sell a limited number of swordfish caught on rod and reel, handline, harpoon, greenstick, and bandit gear. The intent of the new open access swordfish permit is to provide additional opportunities for U.S. fishermen to commercially harvest swordfish using selective gears that are low in bycatch given the rebuilt status of the swordfish and their increased availability.

III. Revitalization and the Future of the U.S. Swordfish Fishery

U.S. commercial fisheries have faced several challenges over the past decade, including severe hurricanes and the 2010 Deepwater Horizon/BP oil spill in the Gulf of Mexico. The impacts of both Hurricane Katrina and Hurricane Rita in 2005 had a devastating effect on many Gulf of Mexico communities. Economic losses to the commercial fishing industry in Louisiana and Mississippi from Hurricane Katrina are estimated to be $13 billion and $484 million dollars, respectively (Impact Assessment Inc, 2007). The U.S. pelagic longline fishery was significantly impacted by these hurricanes primarily because many Gulf of Mexico fishermen were displaced from their homes. Some estimates indicate that in the wake of these hurricanes, approximately half of the Gulf of Mexico pelagic longline fleet was not operational (National Fishermen, 2006). This certainly contributed to the decline in U.S. swordfish landings in 2006. Hurricanes Gustav and Ike also caused damage to Gulf of Mexico coastal communities in 2008, with damage to the fishing industry in Louisiana estimated to be $300 million dollars (Times-Picayune, 2008).

In response to the 2010 Deepwater Horizon MC252 oil spill, the United States issued a series of emergency rules that closed portions of the Gulf of Mexico EEZ to all fishing activities. The closures ranged in size from 6,817 sq. mi. (<4 percent of the U.S. Gulf of Mexico) on May 2, 2010, to 88,522 sq. mi. (approx. 37 percent of the U.S. Gulf of Mexico) on June 2, 2010. As a result of these closures, a significant part of the U.S. Gulf of Mexico pelagic longline fleet was inactive for at least six months during 2010. As expected, there was a temporary decrease in

swordfish catches in this region. 2010 U.S. swordfish catches totaled 2,412 mt, with 217.9 mt caught in the Gulf of Mexico. Swordfish catch rebounded in 2011 with landings of 2773.7 mt, of which 372 mt came from the Gulf of Mexico. This represents more than a 40 percent increase since 2006. In 2012, swordfish catches continued to rebound and landings were, 3651 mt, more than 70 percent higher relative to landings in 2006. In 2012, Gulf of Mexico landings accounted for 690 mt of total U.S. swordfish landings.

In light of these and other challenges, the United States has implemented proactive measures to revitalize the U.S. swordfish fleet, as summarized below:

- The United States re-opened NED closed area to pelagic longline vessels in 2004, requiring circle hooks and specific baits to reduce sea turtle bycatch.

- The United States authorized 'buoy gear' to fish for swordfish in 2006, which maximizes target catch and minimizes bycatch.

- Pelagic longline vessel upgrading restrictions were relaxed in 2007, removing barriers to larger and more powerful vessels participating in the swordfish fishery.

- The United States increased commercial and recreational swordfish retention limits in 2007.

- In 2008, the United States relaxed some permit conditions, allowing certain pelagic longline permits that had previously been expired to be renewed. This has allowed dozens of previously expired commercial swordfish permits to be utilized again.

- In 2011, the United States modified incidental retention limits for *Illex* squid trawl vessels to reduce regulatory dead discards of swordfish.

- In 2012, the United States implemented an alternative swordfish minimum size measurement pursuant to ICCAT recommendation 11-02, which will allow U.S. vessels to land legal-sized fish that would previously have had to be discarded. This change is estimated to increase future U.S. swordfish landings by at least 68 mt ww.

- In 2013, the United States implemented a new open access commercial vessel permit to retain and sell a limited number of swordfish caught on rod and reel, handline, harpoon, greenstick, and bandit gear. The intent of the new open access swordfish permit is to provide additional opportunities for U.S. fishermen to commercially harvest swordfish using selective gears that are low in bycatch given the rebuilt status of the swordfish and their increased availability.

As a result of these revitalization efforts - and despite natural disasters and domestic actions to implement bycatch protection measures and other ecosystem approaches that have reduced effort - the U.S. swordfish fishery has shown an increasing trend in catch. U.S. swordfish catches in 2012 were at the highest level since 2000, even with fewer active pelagic

longline vessels. In 2012 (six years after revitalization efforts began), U.S. swordfish catch was more than 70 percent higher than in 2006. Table 1 shows the increases in U.S. catch since 2006.

Table 1. Change in U.S. Swordfish Catch Since 2006

Year	U.S. Catch (mt)	+/- Tonnage relative to 2006	% Change Relative to 2006
2006	2,058	--	--
2007	2,683	+625	30.34%
2008	2,592	+534	25.95%
2009	2,878	+820	39.85%
2010	2,412	+354	17.20%
2011	2,773	+715	34.74%
2012 (preliminary)	3,651	+1,593	77.40%

In conjunction with the recent increases in U.S. swordfish landings, there has also been a recent emergence (or re-emergence) of alternative fishing gears used to fish commercially for swordfish, including buoy gear, harpoon gear, and rod and reel. These gears are considered "handgear" and have the benefit of low bycatch and bycatch mortality rates compared to pelagic longline gear. As the swordfish stock has rebuilt, the abundance of swordfish in the larger size classes has also increased and so these gears have become more economically viable. The United States believes this is a positive development that will help to facilitate a sustainable fishery and continue to produce a high quality product for consumption.

To support domestic demand, the United States is providing consumers with factual information to inform their purchasing decisions. Information regarding swordfish stock status, management, and nutritional data is provided on federal internet websites and distributed using other media. In December 2011, the Marine Stewardship Council (MSC) certified that the Southeast U.S. North Atlantic swordfish fishery is a sustainable and well-managed fishery and, in 2013, the MSC certified the U.S. North Atlantic swordfish fishery operated by Day Boat Seafood Inc, including pelagic longline and buoy gear. This industry-driven initiative provides independent verification to consumers that the swordfish fishery in that region is sustainable. Other sectors of the U.S. North Atlantic swordfish fishery are currently undergoing MSC assessments, and if they are also successful in obtaining MSC certification, these efforts are expected to further increase consumer demand.

Revitalization of the U.S. swordfish fishery is an ongoing process. Retention limits have been increased and permit availability has expanded consistent with domestic legal obligations. Important research continues to be conducted to inform future management decisions. The United States has chosen to pursue a prudent and deliberate strategy of incrementally increasing swordfish fishing effort to ensure an environmentally and economically sustainable fishery. This long-term strategy is expected to continue to result in steadily increasing swordfish catches with minimal adverse ecological impacts on juvenile swordfish as well as protected and other species.

IV. U.S. Swordfish Management Measures

Swordfish management actions in the United States are developed, coordinated, and implemented through a single fishery management plan entitled *The 2006 Consolidated Atlantic Highly Migratory Species Fishery Management Plan*, which is issued under the jurisdiction of the National Marine Fisheries Service. Recommendations adopted by ICCAT, including annual quota allocations to the United States, are implemented in the United States by regulation under the authority of the Atlantic Tunas Convention Act (ATCA). The annual U.S. swordfish quota allocation is divided into equal semi-annual directed fishery quotas (all commercial landings), an annual incidental catch quota for fishermen targeting other species or taking swordfish recreationally (300 mt dressed weight), and a reserve category. Domestic legislation including the Magnuson-Stevens Act, the Endangered Species Act, and the Marine Mammal Protection Act also result in requirements for conservation and management measures for both recreational and commercial sectors.

Permitting and Effort Controls

The U.S. swordfish fishery is quota-managed and is operated under a limited access permit program. NMFS no longer issues new limited access permits for Atlantic swordfish. Permits can be transferred between vessels, but are subject to vessel upgrading restrictions to control effort, although these have recently been somewhat relaxed to encourage renewed participation in the fishery. Four types of limited access permits are available to U.S. commercial fishermen; directed swordfish; swordfish handgear; incidental swordfish; and incidental HMS squid trawl. Directed permits allow fishermen to target swordfish using any authorized gear. Directed permit holders must also hold an Atlantic Tunas Longline permit and an Atlantic Shark limited access permit to fish with pelagic longline gear for swordfish. A swordfish handgear permit allows fishermen to target swordfish using only handgear (rod & reel, handline, harpoon, and buoy gear). Directed swordfish permit holders and swordfish handgear permit holders are not subject to trip limits. Incidental swordfish permits allow fishermen to land up to 30 swordfish while engaged in other fishing activities, but these fishermen must also have valid Atlantic Tunas Longline and Atlantic Shark permits. Finally, in 2011, the United States implemented the Incidental HMS Squid Trawl permit which allows *Illex* squid trawl vessels to retain up to 15 swordfish per trip. Trawl gear is otherwise not authorized for HMS. The general commercial swordfish permit is an open access permit that will allow sale of a limited number of swordfish using handgear, starting in 2014.

Swordfish vessel permit holders may only sell to permitted swordfish dealers. Atlantic swordfish dealers must obtain an Atlantic swordfish dealer permit to receive, purchase, trade for, or barter for Atlantic swordfish from a vessel. Dealers importing and/or exporting swordfish must obtain an International Trade Permit. Recreational fishermen must be issued an Angling or Charter/Headboat permit to fish for swordfish. HMS tournaments must be registered at least four weeks prior to the tournament. Recreationally landed swordfish may not be sold.

Minimum Size and Landing Requirements

The minimum size of swordfish that can be landed under any HMS permit is 119 cm (47 in.) lower jaw fork length (LJFL). If the head of a swordfish is no longer naturally attached when landed, swordfish must be at least 63cm (25 in.) from the cleithrum to caudal keel (CK). A swordfish damaged by shark bites may only be kept if the remainder of the carcass meets these

specifications. Swordfish must be kept whole or in dressed form (a headed/gutted fish with some or all fins removed). A swordfish may not be filleted or cut into pieces at sea. Dressed swordfish are measured using CK and whole swordfish are measured using LJFL.

Gear Specifications

The U.S. pelagic longline fleet must comply with several types of gear specifications including gear type (handgear or longline only), mandatory use of corrodible circle hooks of a specified size and whole finfish or squid baits, gangion length, and the use of weak hooks in the Gulf of Mexico to reduce the bycatch of bluefin tuna. The swordfish handgear permit may only be used for handline, buoy gear, rod and reel, harpoon, and bandit gear; longline gear may not be on board. Buoy gear specifications include gear configuration, number and type of floatation devices, deployment processes, and gear marking. Holders of a swordfish Incidental permit are subject to the gear deployment restrictions of target fisheries. Holders of the Incidental HMS Squid Trawl permit may only use trawl gear, and 75 percent of the overall catch must be squid. Recreational fishermen may only use rod and reel or handline gear.

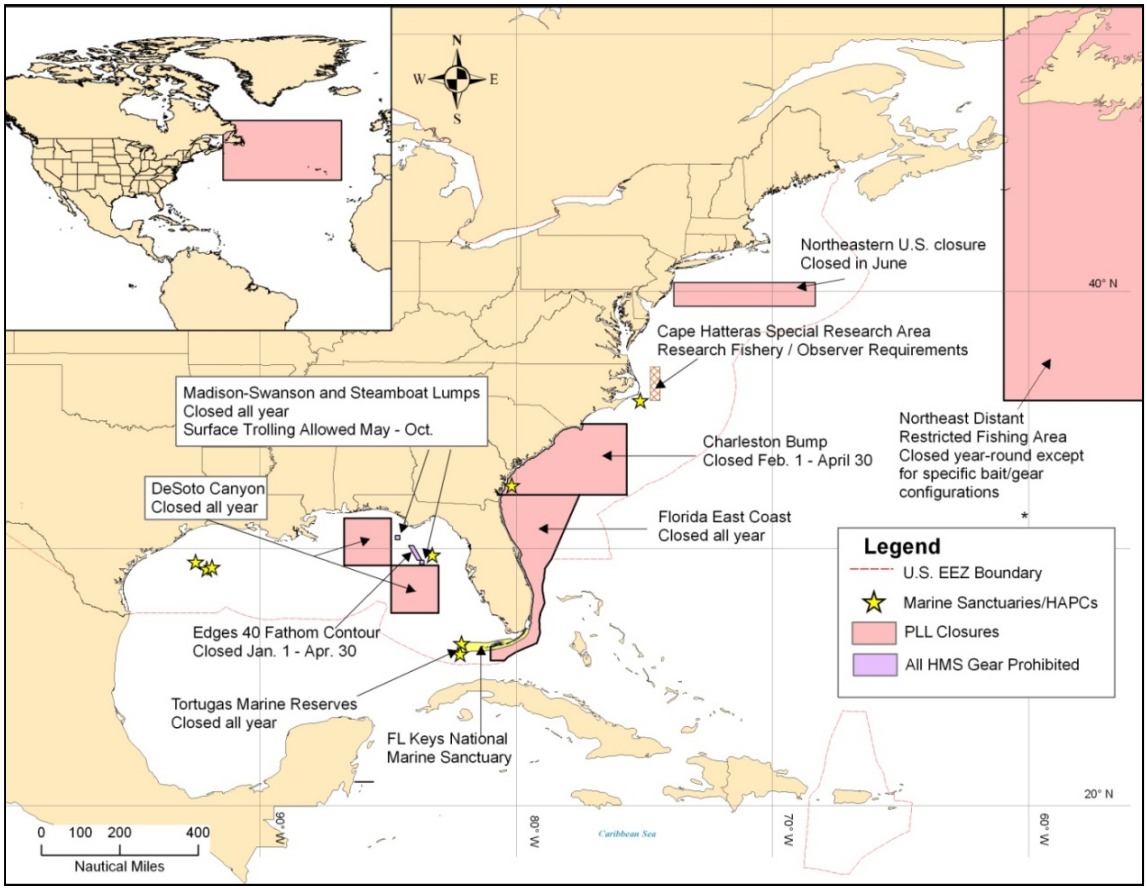
Retention Limits

There is no trip limit for Directed permit holders when the swordfish directed fishery is open. When the directed fishery is closed, retention is restricted to 15, two, and zero swordfish for pelagic longline, handgear, and harpoon fisheries, respectively. The incidental limits are 30/trip. *Illex* squid trawl vessels with an HMS permit may retain 15/trip. General commercial handgear permit holders may retain up to three per trip, depending on the region. Retention limits for the recreational fishery are one per person up to four per trip; charter boats and headboats may retain one per paying passenger up to six and 15 swordfish per trip, respectively.

Time & Area Closures/Gear Restricted Areas

Three areas in the Gulf of Mexico are closed to all HMS gear to protect spawning aggregations of gag grouper (*Mycteroperca microlepis*) (Madison-Swanson and Steamboat Lumps closed areas, and the Edges 40 Fathom Contour closed area). Several time/area closures pertain specifically to pelagic longline gear to protect undersized swordfish and to minimize the bycatch of other HMS and protected species. These include the Florida East Coast closed area, the Charleston Bump closed area, and the DeSoto Canyon closed area. Only 18/0 gauge circle hooks and specified baits may be deployed by pelagic longline vessels in the NED Gear Restricted Area. Please see Figure 1 below for a chart of the major HMS closed areas.

Figure 1. HMS Time/Area Closures and the NED Gear Restricted Area



Reporting Requirements

Reporting in a logbook is mandatory for all limited access swordfish permit holders. Logbooks must be completed within 48 hours of completion of a day's activities or before offloading for one day trips, whichever is sooner. A selected number of fishermen must also complete a cost-earnings section of the HMS logbooks to provide socio-economic information. To minimize reporting burden, fishermen incidentally targeting swordfish may report in other logbook programs. Some states have logbook programs to collect similar information as required in the federal HMS logbook, although participants reporting through state programs must still provide these data to the Federal government.

All swordfish dealer permit holders must submit bi-weekly dealer reports on all HMS they purchase. To facilitate quota monitoring, "negative reports" for swordfish are also required from dealers when no purchases are made. The United States has recently implemented a program to require all Federally-permitted Atlantic HMS dealers to report purchases of HMS through an electronic reporting system. This program includes additional "first receiver" rules, which would require that the first individuals to receive product from fishermen have a dealer permit and report in the electronic dealer system.

A combination of both generalized surveys covering all species and more specialized data collection programs focused specifically on HMS are required of recreational permit holders. In addition, a planned national registry of saltwater anglers will improve recreational survey

efficiency and data quality. All non-tournament recreational landings of swordfish and billfish must be reported by telephone or online within 24 hours of landing by the permitted owner of the vessel landing the fish. Tournament operators are required to report the results of their tournament to the Southeast Fisheries Science Center in Miami, FL, if the tournament is selected for reporting. If a tournament is not selected, vessel owners are responsible for reporting their swordfish landings.

Monitoring & Reporting Compliance

The United States has implemented a fleet-wide VMS requirement in the Atlantic pelagic longline fishery which requires all vessels away from port with pelagic longline gear onboard to operate their VMS units.

The U.S. observer coverage goal is eight percent of all sets in each area/quarter stratum. The achieved observer coverage of the U.S. longline fleet from 2004 through 2011 ranged from 6.9 to 18.1 percent of the fishing sets deployed, and in 2012, it was 9.8 percent. If the U.S. Observer Program coordinator sends a letter to fishermen notifying them that they have been selected to carry an observer aboard their vessel, the fishermen must inform NMFS when they will be taking a trip. If that trip is selected, a NMFS observer must be onboard in order for that vessel to go fishing. For additional information, please refer to the report on domestic observer programs submitted by the United States pursuant to ICCAT Recommendation 10-10.

Bycatch Reduction

The United States has taken numerous actions since 1999 designed to reduce interactions with non-target species, undersized fish, and protected species such as sea turtles and marine mammals. Some of these actions include time/area closures, gear restrictions (including hooks, baits, gangion length, and a maximum length for longlines in certain areas), and requiring that all swordfish directed or incidental permit holders using longline gear attend a Protected Species Safe Handling, Release and Identification Workshop. At least one operator onboard these vessels, if different from the permit holder, must also attend the workshop.

Enforcement of Swordfish Regulations

U.S. Atlantic enforcement for ICCAT-managed species is undertaken by the NOAA Office of Law Enforcement (OLE), the U.S. Coast Guard, and, pursuant to cooperative enforcement agreements, by States and territories with maritime boundaries in the Atlantic Ocean, Gulf of Mexico, and/or Caribbean Sea. At-sea boarding and inspection activities monitor for compliance with gear requirements, bycatch, and size restrictions. Enforcement activities also include monitoring and inspecting offloads at landing facilities and marinas in conjunction with dealer record checks and significant recordkeeping and reporting requirements. Enforcement of pelagic longline time/area closures is accomplished by monitoring VMS signals as well as at-sea enforcement patrols.

NOAA provides oversight for several import monitoring programs to ensure that fisheries products entering the U.S. marketplace are harvested in a manner consistent with international agreements and domestic standards for sustainable fishing and protected species conservation. Several NMFS offices are involved in these import monitoring programs including the Silver Spring, MD, Offices of International Affairs, Sustainable Fisheries, Law Enforcement and

Protected Resources. Much of the work involving data collection, permitting of importers and admissibility determinations is conducted out of NMFS Regional Offices in Gloucester, MA, Long Beach, CA, and the National Seafood Inspection Laboratory (NSIL) in Pascagoula, MS. These efforts also include implementation of ICCAT requirements, including the ICCAT Statistical Document and other permitting and reporting requirement for U.S. importers. As needed in cases of targeted enforcement, OLE special agents work in partnership with Customs and Border Protection officials to address importation violations concerning swordfish.

OLE has implemented enhanced procedures for handling referrals of International Trade Permit violations by the NMFS trade monitoring program for swordfish. NMFS swordfish trade monitoring staff operating out of NSIL performs routine monitoring for dealer compliance regarding permitting and required reporting. Where apparent technical violations are detected concerning permitting or reporting, NSIL staff initiates first contact with the dealer or their authorized agent, and attempt to gain compliance. Where non-compliance continues, apparent violations are documented and forwarded to OLE for review and, where appropriate, further enforcement action. Enforcement emphasis is directed towards those who are illegally importing swordfish without an ITP permit, failing to submit required statistical documents, attempting to subvert an embargo, or introducing IUU product into the United States. These enforcement priorities are designed to ensure appropriate monitoring for compliance with ICCAT conservation measures and international obligations. The NOAA OLE works closely with NSIL and the NOAA Office of General Counsel to take appropriate enforcement action as needed to ensure compliance.

V. Social and Economic Considerations

The U.S. commercial swordfish fishery supports a high-value processing and trade (domestic and international) sector worth millions of dollars. Valuable tuna species are also caught in conjunction with swordfish, thereby increasing the value of these important multispecies fisheries. The U.S. swordfish fishery also provides significant social and economic benefits to coastal communities by supporting both commercial and recreational fishermen, dealers, and shore-based businesses (e.g., mechanics, marinas, boat builders, gear manufacturers, electricians, bait and tackle shops, fuel suppliers, hotels, and restaurants). In 2011, more than 11 million U.S. saltwater anglers took over 70 million fishing trips around the country, generating $70 billion in sales impacts, $20 billion in income impacts, and supporting more than 455,000 U.S. jobs.

In 2011, the U.S. seafood industry (including harvesters, processors, dealers, wholesalers and distributors, importers, and retailers) supported approximately 1.2 million full- and part-time jobs and generated $129 billion in sales impacts, $36 billion in income impacts, and $55 billion in value-added impacts. Commercial fishermen in the U.S. harvested 9.9 billion pounds of finfish and shellfish in 2011, earning $5.3 billion for their catch. The total value of commercial tunas, swordfish, and shark landings in 2011 was $52.4 million.

U.S. imports of edible fishery products in 2012 were valued at $16.7 billion, about the same as 2011. The quantity of edible imports was 2,441,516 metric tons, an increase of 14,648 tons from the quantity imported in 2011. U.S. exports of edible fishery products of domestic origin in 2012

were 1,425,591 tons valued at $5.12 billion, U.S. imports of swordfish from all sources far exceed the level of domestic production from the Atlantic and Pacific. The U.S. market for swordfish is completely open to international competition with a zero import tariff for all product forms of swordfish, in contrast with other ICCAT members whose tariffs range as high as 18%. As with other major import markets, the United States has a keen interest in seeking to ensure that its imports are from sustainable fisheries that are carefully managed and monitored.

Social and Economic Considerations for Local U.S. Communities

The United States utilizes research studies, industry statistics, and constituent feedback to identify participants and communities that are heavily dependent upon the swordfish fishery. This process provides information on the social importance of the swordfish fishery to coastal communities and participants. The United States also tracks operating costs for the U.S. swordfish fishery via logbook reporting and voluntary submissions of the trip expense and payment section of the logbook form from non-selected vessels. The primary expenses associated with operating a swordfish commercial vessel include labor, fuel, bait, ice, groceries, other gear, and light sticks. Operating costs, in general, have increased in recent years.

Average ex-vessel prices, landings and total revenue from swordfish are shown in Table 2 (NMFS, 2012). As described above, U.S. landings of swordfish have gradually increased since 2006, due to efforts to sustainably revitalize the fishery. Despite this increase in landings, annual swordfish revenues have fluctuated due to changes in ex-vessel price. In recent years, U.S. market prices have been depressed by imports from nations that do not have comparable bycatch requirements or costs associated with regulatory compliance. It is hoped that U.S. efforts to promote comparable conservation standards around the world will strengthen U.S. market prices for swordfish and thereby encourage greater U.S. harvests. In 2011, the average ex-vessel price for swordfish was US$4.51/lb dw.

Table 2. U.S. Average Swordfish Ex-Vessel Price, Landings, and Fishery Revenue

Species		2006	2007	2008	2009	2010	2011
Swordfish	Ex-vessel $/lb dw	$3.54	$4.02	$3.63	$3.46	$4.41	$4.51
	Weight lb dw	3,002,597	3,643,926	3,414,513	3,762,280	3,676,324	4,473,140
	Fishery Revenue	10,629,193	14,648,583	12,565,408	13,017,489	16,212,589	20,173,861

Swordfish are sold fresh and frozen in dressed form and as processed products (e.g., steaks and fillets). As an important commodity on world markets, swordfish can generate significant export earnings for U.S. companies. Employment varies widely among processing firms, but over 35,700 people are employed in processing or wholesale businesses that are involved with the production of HMS, including swordfish. Often employment is seasonal unless the firms also process imported seafood or a wide range of domestic seafood.

The commercial U.S. swordfish fleet is comprised of both distant water ships that follow the swordfish through its migration, and ships that target swordfish as they become seasonally available in specific regions. There are currently 257 pelagic longline vessels that are licensed to fish for Atlantic swordfish. For various reasons, not all licensed vessels are authorized to fish in the fishery each year. The U.S. Atlantic distant water fleet, which is based out of ports between Puerto Rico and Maine, covers the western North Atlantic. Some large vessels fishing in distant waters operate out of Mid-Atlantic and New England ports during the summer and fall months targeting swordfish and tunas, and then move to Caribbean ports during the winter and spring months. Many of the current distant water vessels were among the early participants in the U.S. directed Atlantic commercial swordfish fishery. These large vessels, with greater ranges and capacities than coastal fishing vessels, enabled the United States to become a significant participant in the North Atlantic swordfish fishery.

Landings of swordfish tend to vary regionally but have increased in southern communities over the past decade. According to a recent analysis (MRAG Americas, Inc. 2008), the communities with the greatest annual landings in 2006 include: Dulac, Louisiana (165.7 mt ww); Wanchese, North Carolina (140.2 mt ww); Beaufort, North Carolina (107 mt ww); Barnegat Light, New Jersey (88.8 mt ww) and, New Bedford, Massachusetts (60.7 mt ww). Based on the average ex-vessel price for 2006, this equated to estimated direct sales impacts of $1,293,294 in Dulac, Louisiana; $1,093,917 in Wanchese, North Carolina; $835,192 in Beaufort, North Carolina; $693,156 in Barnegat Light, New Jersey; and $474,107 in New Bedford, Massachusetts.

The communities with the greatest average number of swordfish landed per year, between 1999 and 2010, include Dulac, Louisiana (3,857 SWO/yr); Fairhaven, Massachusetts (3,215 SWO/yr) which is adjacent to New Bedford, Massachusetts (1,907 SWO/yr); Ft. Pierce, Florida (3,215 SWO/yr); Wanchese, North Carolina (3,121 SWO/yr); Wadmalaw Island, South Carolina (2,632 SWO/yr); Barnegat Light, New Jersey (2,586 SWO/yr); San Juan, Puerto Rico (2,297 SWO/yr); and Beaufort, North Carolina (2,209 SWO/yr). Significant commercial and recreational swordfish fisheries also occur along the east coast of Florida including Pompano Beach, Florida and Islamorada, Florida.

Fishing in the New England and mid-Atlantic regions has evolved during recent years to focus almost year-round on directed tuna trips, with substantial numbers of swordfish trips as well. Some vessels participate in directed bigeye/yellowfin tuna fishing during the summer and fall months and then switch to bottom longline fishing during the winter when the large coastal shark season is open. During the season, vessels in this region primarily offload in the ports of New Bedford, Massachusetts; Barnegat Light, New Jersey; Ocean City, Maryland; and Wanchese, North Carolina.

In New England, the communities of Gloucester and New Bedford, Massachusetts, are heavily invested in the swordfish fishery and serve as a home port for many distant water vessels. Both have significant infrastructure investments in processing and distribution facilities. New Bedford has become increasingly dependent on high-value species such as swordfish, sea scallops (*Placopecten magellanicus*), and groundfish as the city's manufacturing base has declined. Several fishing communities in the mid-Atlantic (*e.g.*, Barnegat Light, New Jersey;

Wanchese, North Carolina; and, Hatteras, North Carolina) are also heavily dependent on the fishing industry to support the local economy. Half of Barnegat Light's 300 person civilian workforce and 1/3 of Hatteras' civilian workforce are employed in the fishing industry. Recent investments by the state of North Carolina into an industrial seafood park in the town of Wanchese demonstrate a commitment to the fishing industry in that region.

The New England and mid-Atlantic swordfish fisheries must comply with time-area closures and measures to protect bycatch. In 1999, NMFS closed the Northeastern U.S. area in June to pelagic longline gear to reduce bluefin tuna discards. Additionally, in 2009, NMFS published the final Pelagic Longline Take Reduction Plan to protect pilot whales and Risso's dolphins which included, among other measures, a requirement that pelagic longline vessel operators fishing in the Cape Hatteras Special Research Area contact NMFS at least 48 hours prior to a trip, and carry observers, if requested.

Off the southeastern coast of the United States, pelagic longline vessels target swordfish year-round although yellowfin tuna (*Thunnus* albacores) and dolphin fish (*Coryphaena hippurus*) are other important marketable components of the catch. Some mid-sized and larger vessels based out of ports in the southeastern United States migrate seasonally on longer trips from the Yucatan Peninsula throughout the West Indies and Caribbean Sea, and some trips range as far north as the Mid-Atlantic coast of the United States to target bigeye tuna (*Thunnus obesus*) and swordfish during the late summer and fall. Home ports (including seasonal ports) for this fishery include, but are not limited to, Georgetown, South Carolina; Charleston, South Carolina; Fort Pierce, Florida; Pompano Beach, Florida; and Key West, Florida. Smaller vessels fish short trips from the Florida coast and typically sell fresh swordfish to local markets.

Florida has the greatest number of commercial swordfish permit holders (161). Florida also has the greatest number of swordfish dealers with 74 permitted in 2012. Following the implementation of the East Florida Coast pelagic longline closure in 2001, some commercial swordfish effort in this area has shifted to the commercial handgear sector. The recreational swordfish fishery in Florida has also grown significantly since 2003. Many coastal communities in Florida are invested in recreational fishing through the charter/headboat industry and supporting businesses.

Tournaments provide a significant economic benefit and marketing device to many coastal communities, especially in southeastern Florida, and have increased in popularity as the stock has recovered. In 2012, 75 tournaments targeting swordfish in the United States were registered. Events include the Miami Swordfish Tournament and the Key West Summer Swordfish tournament. These tournaments can generate a substantial amount of money for surrounding communities and local businesses. Less direct, but equally important, fishing tournaments may serve to generally promote the local tourist industry in coastal communities. Islamorada, FL, for example, is heavily dependent upon tourism, and has over 45 hotels/motels and 24 marinas to support recreational fishing activities.

Gulf of Mexico pelagic longline vessels primarily target yellowfin tuna year-round but may also catch and sell swordfish. A handful of these vessels directly target swordfish, either seasonally or year-round. Many of these vessels participate in other Gulf of Mexico fisheries

(targeting shrimp, shark, and snapper/grouper) during allowed seasons. Home ports for this fishery include, but are not limited to, Madeira Beach, Florida; Panama City, Florida; Dulac, Louisiana; and Venice, Louisiana. Dulac is one of the most important fishing ports in the state of Louisiana, and consistently ranks high in landings of swordfish, tunas, and sharks.

The U.S. Caribbean fleet is similar to the southeastern U.S. pelagic longline fleet in that it consists primarily of smaller vessels making short, relatively near-shore trips, producing high quality fresh product. The U.S. Caribbean fleet has historically landed swordfish and tunas that support the tourist trade in the Caribbean.

VI. Swordfish Research

The United States also makes a significant contribution to the conservation and management of stocks through the collection and provision of scientific data to the SCRS, active participation in stock assessments, joint research activities, and capacity building initiatives. U.S. research on Atlantic swordfish in 2011 focused primarily on assessing movement and habitat use of the North and South Atlantic populations. U.S. anglers participating in the long-term cooperative tagging program marked 106 swordfish captured in recreational fisheries off the U.S. east coast and reported recapture information on two fish. The recaptured swordfish demonstrated regional site fidelity, with one fish released and recaptured after 114 days at large in the Gulf of Mexico near the Florida panhandle, and the other released and recaptured after 81 days at large in the Atlantic Ocean near Ft. Lauderdale, FL

U.S. research on Atlantic swordfish in 2012 focused on stock management, assessing movement and habitat use, and fisheries statistics. Scientists from Canada, Venezuela, U.S. (Southeast Fisheries Science Center), Spain, South Africa, Brazil, and Greece jointly published a review of the factors contributing to the rebuilding success of North and South Atlantic swordfish stocks (Neilson et al. 2013). The authors concluded that coupled effects of swordfish biology (including relatively fast growth, and spatially- and temporally-dispersed spawning), positive management actions, and a period of relatively good recruitment were essential factors resulting in stock rebuilding. The researchers describe the challenges that must be faced and measures that must be taken to maintain the stocks, including risk adverse assessment and management measures.

Researchers from National Taiwan University, University of Maine, and the U.S. Pacific Islands Fisheries Research Center published a habitat suitability model to identify optimal swordfish habitat in the equatorial Atlantic Ocean (Chang et al. 2013). The authors reported that Swordfish aggregated in the northwest equatorial region during March–May and spread southeast thereafter in response to seasonal shifts in oceanographic conditions. They documented annual variation in the distribution of habitat patches, with reduced habitat quality in the northwest region of the equatorial Atlantic Ocean during 2005. They suggest that the apparent spatial shifts in optimal habitats might be linked to reduced mixed layer depth and elevation in sea surface height, which might be related to climate variability (e.g. Nin˜o-Southern Oscillation and/or Northern Atlantic Oscillation). The authors propose that the habitat models

may be used to evaluate possible changes in habitat suitability resulting from climate change and provide scientific advice for the development of management regulations.

U.S. scientists from the University of Miami, Nova Southeastern University, and the Southeast Fisheries Science Center published on movement and habitat use information of eight satellite archival tagged fish in the Western Atlantic Ocean (Lerner et al. 2013). They documented diel cycles in vertical habitat use patterns, and suggested that swordfish resided primarily below the thermocline during the day and migrated closer to the surface at night, with vertical movements between the surface and depth occurring during crepuscular hours. Results also supported the hypothesis that swordfish activity varies in relation to moon phase.

U.S. anglers participating in the cooperative tagging program marked 49 swordfish captured in recreational fisheries off the U.S. East Coast and reported recapture information on 8 fish. The recaptured swordfish demonstrated regional site fidelity, with six fish released and recaptured off the east coast of Florida, over a range of times at liberty between 235 and 3,106 days. One swordfish was recaptured in the Northeast distant waters, initially released in the Grand Banks region over 1,200 kilometers away from the recapture location, with a time at liberty of nearly 15 years. One swordfish was recaptured off the coast of Delaware that was originally tagged off the coast of North Carolina, approximately 500 kilometers away, with a time at liberty of 961 days. The recapture of tagged fish with long-time at liberty provide valuable data for validation of longevity, stock spatial structure, and growth estimates.

U.S. and Canadian scientists collaborated on a joint analysis to assess longline gear configuration effects on swordfish catches, to validate prior estimates of gear effects on catch indices. Specifically, a combined analysis of data from the two fleets provided contrast in catch data under different gear configurations, and produced preliminary estimates of the combined effect of hook and bait type on swordfish catch indices used in the assessment.

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