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P1 Assessment Upgrade to MSC FCR V2.01 for the Swordfish element of the

US North Atlantic Swordfish, Yellowfin, and Albacore Tuna Fishery

Public Comment Draft Report

August 4th, 2020

Conformity Assessment Body (CAB)	MRAG Americas, Inc.
Assessment team	Dr. Mónica Valle-Esquivel (Team Leader) Dr. Graeme Parkes (Team Member)
Fishery client	Dayboat Seafood
Assessment Type	Principle 1 Assessment Upgrade from v1.3 to v2.01
Date	30 July 2020

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Contents[1]

[1] Some sections are blank or contain instructions (highlighted in gray). These sections will be populated at the appropriate, later stage of the certification process.

Glossary

AP	Advisory Panel (NMFS)
ASPIC	A Stock Production Model Incorporating Covariates
ATCA	Atlantic Tunas Convention Act
B	Biomass
B_{MSY}	Biomass at Maximum Sustainable Yield
BA	Biological Assessment (NOAA)
BFT	Bluefin Tuna
BiOp	Biological Opinion (NOAA)
CCAMLR	Convention on the Conservation of Antarctic Marine Living Resources
CITES	Convention on International Trade in Endangered Species
CMS	Convention on Migratory Species
CoC	Chain of Custody certification
COFI	FAO Committee on Fisheries
CPC	ICCAT Contracting Party, Cooperating non-Contracting Party, Entity or Fishing Entity
CPUE	Catch Per Unit of Effort
CTC	Cooperative Tagging Center (SEFSC)
CZMA	Coastal Zone Management Act (US)
DLS	Dealer Logbook System
DOS	Department of State (US)
EBM	Ecosystem Based Management
EC	European Community
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat
EPAP	Ecosystem Principles Advisory Panel (of NMFS)
ESA	Endangered Species Act
ETP	Endangered, Threatened or Protected (species)
EU	European Union
F	Fishing mortality rate
F_{MSY}	Fishing mortality rate at Maximum Sustainable Yield
FAO	Food and Agriculture Organisation of the United Nations
FAM	Fisheries Assessment Methodology (MSC)
FCM	Fisheries Certification Methodology (MSC)
FEC	Florida East-Coast
FEP	Fisheries Ecosystem Plan
FiB	Fishing in Balance index
FLS	Fisheries Logbook Systems
FMP	Fisheries Management Plan
GOM	Gulf of Mexico
HCR	Harvest Control Rule
HMS	Highly Migratory Species
IAC	Inter-American Convention for the Protection and Conservation of Sea Turtles
IATTC	Inter-American Tropical Tuna Commission
ICCAT	International Commission for the Conservation of Atlantic Tunas
IERPBF	ICCAT Enhanced Research Programme for Billfish
IMO	International Maritime Organization
IOSEA	Indian Ocean and South-east Asia

Executive summary

To be drafted at Announcement Comment Draft Report stage

To be completed at Public Certification Report stage

The executive summary shall include:

- Date and location of site visit.
- The main strengths and weaknesses of the client's operation.
- The draft determination / determination reached with supporting justification.

Reference(s): FCP v2.1 Section(s) 7.12, 7.18, 7.21

This Public Comment Draft Report sets out the results of the P1 assessment upgrade for the North Atlantic U.S. Swordfish Pelagic Longline and Headgear Buoy Line Fishery. This report was carried out by MRAG Americas, Inc. against the Marine Stewardship Council (MSC) Principles and Criteria for Sustainable Fishing. The assessment team for this fishery was composed of Dr. Mónica Valle-Esquivel who acted as the team leader and Dr. Graeme Parkes who was responsible for assessing Principle 1. The Peer Review College shortlisted two candidates to conduct the review of the Client and Peer Review Draft Report: Dr. Geoff Tingley and Dr. Joseph Powers. One of them was selected to conduct the (anonymous) review, included in Section 5.3., with comments addressed by the Team.

This fishery was first certified on 28 March 2013 and obtained re-certification on 6 March 2018. Both the initial assessment and reassessment were carried out under version 1.3 of the MSC Certification Requirements and using version 1.3 of the MSC Full Assessment Reporting Template. The fishery has recently completed the first surveillance audit after recertification (please click here to download the 1st surveillance report submitted on October 19, 2019).

In accordance with the combined tuna fishery variation request accepted by the MSC in February 2019, MRAG Americas has undertaken a Principle 1 v2.0 assessment upgrade. The process followed for this assessment upgrade follows the requirements set out in Appendix B (Principle 1 v2.0 assessment upgrade process) of the MSC's VR response (MSC 2019). A remote site visit was performed during the month of August 2019 as part of the 1st surveillance audit. Follow-up communications with the Client and the management authorities occurred between February and March 2020 to verify and update information (see Section 5.2.1). A description of the harmonisation activities implemented as part of this P1 assessment upgrade is provided in Section 5.8.

In accordance with Appendix B, as part of the P1 assessment upgrade the CAB shall produce the following reports:

a. Client and Peer Review Draft Report
b. Public Comment Draft Report
c. Final Draft Report
d. Public Certification Report

The content of these reports shall be limited to:

- Sections 1 to 5 of the MSC Reporting Template, limited to P1
- Section 7.1 (limited to P1) and Section 7.2 of the MSC Reporting Template
- Section 8 of the MSC Reporting Template

As the original assessment the UoA of this P1 upgrade is the US harvest of North Atlantic Broadbill Swordfish (*Xiphias gladius*) in the geographical area of the US East Coast, captured by pelagic longline and handgear buoy line. The geographical area of the US East Coast here includes the National Marine Fisheries Service (NMFS) statistical areas of the Florida East Coast (FEC), South Atlantic Bight (SAB), Mid-Atlantic Bight (MAB), Sargasso Sea (SAR), Northeast Coastal (NEC), North East Distant (NED), and North Central Atlantic (NCA). This UoA specifically excludes the Caribbean (CAR) and the Gulf of Mexico (GOM).

The client group is Day Boat Seafood and associated vessels and fish receivers. The current certificate covers all longline and buoy gear fishing in the statistical areas listed above, implying that all US HMS licensed fishermen using longline and buoy gear in the statistical areas covered by the assessment would be eligible to share in the certification, subject to the terms agreed with the Client.

A rigorous re-assessment of MSC Principle 1 was undertaken by the assessment team, which involved updating information, upgrading the analysis to version 2.0 criteria, and harmonizing with other certified fisheries, namely the Canadian harpoon and longline swordfish fisheries. Detailed and fully referenced scoring rationale is provided in Section 3.2.8 of this report. The peer review of the P1 assessment upgrade is presented in Section 5.3.

The main findings from this P1 upgrade assessment are summarized below:

- The PRI is set to be at the default MSC LRP of 0.5 B_{MSY}. The 2017 ICCAT assessment estimated the stock in 2015 was above the default PRI. Median values and 95% quantiles from SS and BSP2 models combined were B_{2015}/B_{MSY}= 1.04 (0.82-1.39).
- The fishing mortality in 2015 was estimated to be below F_{MSY}. Median values and 95% quantiles from SS and BSP2 models combined were F_{2015}/F_{MSY}= 0.78 (0.62-1.01)
- The stock is above the MSY with 61% probability.
- The stock is not overfished and overfishing is not occurring. The probability of this stock to be in the red quadrant of the Kobe plot is 5%. While the estimate of stock status in 2017 is slightly more pessimistic than the estimated status in the previous 2009 and 2013 assessments, the degree of uncertainty in the estimates is significantly reduced.
- New ICCAT Recommendations 2017-02 and 2019-03 have superseded Rec 2016-03 to define the harvest strategy for swordfish. The strategy is intended to achieve the target BMSY, but it is not fully specified or designed as a clear set of rules. ICCAT plans to develop an HCR using Management Strategy Evaluation (MSE), effectively to 'design' a strategy to achieve explicit objectives reflected in specified reference points, which are being developed following the process outlined in Resolution 2019-14.
- In 2017, the SCRS determined the 2015 stock status using Stock Synthesis and Bayesian surplus production (BSP2) models. ASPIC was used mainly for comparison with previous assessments. This shows that several stock assessment model formulations with varying degrees of complexity with different hypotheses and a range of uncertainties were used to support the results obtained from the current assessment.
- The upgraded P1 assessment was harmonized among overlapping certified swordfish fisheries in the North Atlantic. Harmonization discussions between MRAG Americas (US North Atlantic longline and handgear buoy line fishery) and Lloyd's Register (Canada North Atlantic longline and harpoon fisheries) agreed on all P1 performance indicator scores.

1 Report details

1.1 Authorship and peer review details

1.1.1 Assessment Team

The assessment team for this P1 Upgrade consisted of Mónica Valle-Esquivel, and Graeme Parkes of MRAG Americas. A discussion between team members regarding conflict of interest and biases was held and none were identified. Team members' profiles and roles in the assessment follow:

Dr. Mónica Valle-Esquivel was the Team Leader and responsible of updating and consolidating all parts of the report. Dr. Valle joined MRAG Americas in 2010 as Senior Fisheries Biologist. She has over 20 years of experience in sustainable management of marine fisheries. She specialized in fish and shellfish population dynamics, stock assessment, design and evaluation of management strategies, statistical analysis, risk analysis, and fishery simulation modeling. Dr. Valle worked with the University of Miami and NOAA Fisheries as a post-doctoral stock assessment scientist, and has provided scientific advice to FAO, CITES, CARICOM, ACP Fish II, and other international organizations for the management of tropical marine species in the US, Latin America, and the Caribbean. In Mexico she coordinated a United Nations (UNIDO) coastal management project within the Gulf of Mexico Large Marine Ecosystem program.

At MRAG, Dr. Valle has worked with institutions, scientists, fishers, managers, NGOs, and other stakeholders to promote and achieve sustainability of fishery resources around the world. She is a certified Marine Stewardship Council lead assessor, and for seven years has served as a team leader and member for several fisheries, ranging from invertebrate fisheries to highly migratory fish.
Among other professional achievements, Dr. Valle has acquired wide experience in the development and implementation of fishery improvement projects and fishery management plans, in the design and analysis of various monitoring programs, and in essential fish habitat and ecosystem assessments. Dr. Valle received a B.S. degree in Biology from the National Autonomous University of Mexico (UNAM), and a Ph.D. in Marine Biology and Fisheries from the Rosenstiel School of Marine and Atmospheric Science, University of Miami.

Dr. Graeme Parkes was the assessor responsible for Principle 1. is a fisheries scientist with over 30 years' experience. He has a PhD in Fisheries Science from Imperial College, London (assessment of Antarctic fish stocks) and joined MRAG in 1994 as a consultant and projects manager based at the London headquarters. In 1997 he relocated to the US to establish MRAG Americas and remained there as Vice President until late 2003. He then returned to London to London to take up the position of Technical Director and in 2008 he became MRAG's Deputy Managing Director, responsible for the development and management of core and new business and project leadership. In July 2010, Dr. Parkes returned to MRAG Americas to take up the position of Vice President, responsible for core business areas and functions of the company, including primary responsibility for project deliverables and staff management.

Dr. Parkes has worked on a wide variety of projects. His specific recent experience includes at-sea catch estimation methods, fisheries certification and benchmarking marine fish ecolabelling schemes, performance evaluation of fisheries governance, fisheries improvement in developing countries and analysis of Rights Based Management (RBM) instruments. Dr Parkes is a Lead Assessor for the Marine Stewardship Council fisheries certification standard, a former member of the EU Scientific, Technical and Economic Committee for Fisheries (STECF), and former Head of the UK Delegation to the Scientific Committee of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR).

1.1.2 Peer Reviewers

The Peer Review College shortlisted two qualified candidates and selected one of them to carry out the review of the Client and Peer Reviewer Draft Report. To maintain the anonymity of the review, the name and short biography of both candidates is presented below. Peer reviewers can also be viewed on the assessment downloads page on the MSC website[2]

Dr Geoff Tingley has over 30 years' experience in academia, government and the private sector, mostly working in marine & freshwater fisheries research and applied fisheries management. His long-term focus has been on improving the sustainability of fisheries world-wide, using tools such as the MSC certification scheme and fishery improvement projects (FIPs) with Sustainable Fisheries Partnership (SFP).

Dr Tingley has been a Principal Scientist at both CEFAS in the UK, and then at New Zealand's Ministry of Primary Industries, where he provided advice on the science & management of deepwater and inshore fisheries both within the EEZ and for the NZ high seas fisheries in the Pacific. This included abundance estimation and stock assessments of hoki, orange roughy, ling, hake, sharks, squid & rock lobster, as well as understanding and mitigating the environmental impacts of fishing. He chaired a Deepwater Fisheries Assessment Working Group and provided advice on fisheries science & management both within the Ministry and to industry.

Dr Tingley has also advised on MSC certification, including stock status (P1), ecosystem elements of by-catch, benthic, ecosystem and ETP impacts (P2) and fisheries management (P3) (including hake, ling, orange roughy, oreo, squid). He was also Head of the NZ Delegation to the Scientific Committee of the South Pacific Regional Fisheries Management Organisation (SPRFMO) and a NZ Delegate to the SPRFMO Commission. He also initiated and then chaired the MPI South Pacific Fisheries Assessment Working Group to support the science process underpinning the work for SPFRMO.

Dr Joseph Powers has been involved in fisheries issues for more than 40 years, conducting stock assessments, coordinating international stock assessment research, communicating scientific advice to fishery management councils and commissions and also serving as the senior marine fisheries manager in the southeast US. His background includes: Professor of Marine Resource Assessment at Louisiana State University; Senior Stock Assessment Scientist of the US's National Marine Fisheries Service (NMFS) southeast region, Laboratory Director of a NMFS facility; lead US scientist for Atlantic tuna, swordfish and billfish species for the International Commission for the conservation of Atlantic Tunas (ICCAT); Chair of the Scientific Committee of ICCAT; Chair of the Stock Assessment Committee for Southern Bluefin Tuna; Chair of the Scientific Committee of the Gulf of Mexico Fisheries Management Council. He has also worked on numerous Marine Stewardship Council assessments of tunas, swordfish, hake and other fisheries resources in the Atlantic, Pacific and Indian Oceans.

[2] https://fisheries.msc.org/en/fisheries/us-north-atlantic-swordfish-yellowfin-and-albacore-tuna-fishery/@@assessments

1.2 Version details

Table 1 -Fisheries program documents versions.

Document	Version number
MSC Fisheries Certification Process	**Version 2.1**
MSC Fisheries Standard	**Version 2.01**
MSC General Certification Requirements	**Version 2.4.1**
MSC Reporting Template	**Version 1.1**

2 Unit(s) of Assessment and Certification and results overview

2.1 Unit(s) of Assessment and Unit(s) of Certification

2.1.1 Unit(s) of Assessment

MRAG Americas has confirmed that this fishery is within scope for MSC fisheries certification through the following determinations:

- The fishery does not use poisons or explosives.
- The fishery is not conducted under a controversial unilateral exemption to an international agreement.
- No member of the client group has been successfully prosecuted for a forced or child labour violation in the last 2 years.

The following taxa are not target species under Principle 1:

a. Amphibians
b. Reptiles
c. Birds
d. Mammals

Table 2 – Unit(s) of Assessment (UoA)

UoA 1	**Description**
Species	Broadbill swordfish (*Xiphias gladius*)
Stock	North Atlantic stock
Geographical area	North Atlantic Ocean, Food and Agriculture Organisation of the United Nations (FAO) statistical area 31. FAO statistical area 21, U.S. east coast (NMFS statistical areas FEC, SAB, MAB, SAR, NEC, NCA, NED), excluding

	the Caribbean and the Gulf of Mexico.
Harvest method / gear	Pelagic longline and handgear buoy line. Both gear types are assessed jointly for this fishery because the handline buoy gear has limited impacts, which are addressed in the longline gear assessment. In addition, there is a lack of handline gear data, so as a precautionary measure, it is assumed to take of the characteristics of the longline gear, where applicable. Differences between gears are noted where information and data allowed a separate analysis.
Client group	Day Boat Seafood LLC and associated companies and vessels that may be included through a certificate sharing agreement.
Other eligible fishers	United States HMS licensed fishermen using longline and buoy gear in the waters of the North Atlantic off the US east coast (in statistical areas FEC, SAB, MAB, SAR, NEC, NCA, NED), excluding the Caribbean and the Gulf of Mexico.

The UoA was chosen originally (during the first assessment) to represent the largest area of the U.S. North Atlantic fishery likely to meet the conditions for certification. Areas of the North Atlantic excluded from the UoA were identified to have impediments to certification.

The UoA includes Day Boat Seafood owned or formally managed vessels. The proposed UoC would be Day Boat Seafood owned or managed vessels (the UoA) and may include other fishers that are United States HMS licensed fishermen using longline and buoy gear in the statistical areas covered by the assessment, who will be eligible to share in the certification, subject to the terms agreed with the Client. A list of potential fishers who would qualify to share the certificate would be available from the National Marine Fisheries Service HMS Division. Such list may contain confidential information that cannot be made public.

There is a certificate sharing mechanism in place for the fishery. Day Boat Seafood has agreed to make all longline and hand gear buoy line harvesters, registered with the US government, eligible to be covered by the fisheries certificate, subject to complying with any conditions imposed on the fishery and complying with the Day Boat catch sharing agreement, and subject to catch delivery at designated facilities/companies. Day Boat Seafood will accept new participants as designated facilities/companies based on an agreement to equitably share the costs associated with obtaining and maintaining the fishery certificate. Up until the time of reassessment of the fishery, the certificate had not been shared with any other companies or vessels. It is unlikely that this will occur because other eligible fishers have not appeared interested in sharing the costs of certification.

2.1.2 Unit(s) of Certification

To be drafted at Client and Peer Review Draft Report stage

To be completed at Public Certification Report stage

Table 3 – Unit(s) of Certification (UoC)

UoC 1	**Description**
Species	Broadbill swordfish (*Xiphias gladius*)
Stock	North Atlantic stock

Geographical area	North Atlantic Ocean, Food and Agriculture Organisation of the United Nations (FAO) statistical area 31. FAO statistical area 21, U.S. east coast (NMFS statistical areas FEC, SAB, MAB, SAR, NEC, NCA, NED), excluding the Caribbean and the Gulf of Mexico.
Harvest method / gear	Pelagic longline and handgear buoy line. Both gear types are assessed jointly for this fishery because the handline buoy gear has limited impacts, which are addressed in the longline gear assessment. In addition, there is a lack of handline gear data, so as a precautionary measure, it is assumed to take of the characteristics of the longline gear, where applicable. Differences between gears are noted where information and data allowed a separate analysis.
Client group	Day Boat Seafood LLC and associated companies and vessels that may be included through a certificate sharing agreement.
Other eligible fishers	United States HMS licensed fishermen using longline and buoy gear in the waters of the North Atlantic off the US east coast (in statistical areas FEC, SAB, MAB, SAR, NEC, NCA, NED), excluding the Caribbean and the Gulf of Mexico.

2.2 Assessment results overview

2.2.1 Determination, formal conclusion and agreement

To be drafted at Final Draft Report

To be completed at Public Certification Report

The report shall include a formal statement as to the certification determination recommendation reached by the assessment team on whether the fishery should be certified.

The report shall include a formal statement as to the certification action taken by the CAB's official decision-makers in response to the Determination recommendation.

Reference(s): FCP v2.1 Section 7.21

2.2.2 Principle level scores

Table 4 - Principle level scores	
Principle	UoA 1
Principle 1 – Target species	89.2
Principle 2 – Ecosystem impacts	85.3
Principle 3 – Management system	93.0

2.2.3 Summary of conditions

No new conditions were raised during this upgraded assessment of Principle 1. The conditions remaining for Principle 2 at reassessment were closed at the first surveillance audit (October 2019). The US North Atlantic Swordfish fishery does not require any conditions at this time.

2.2.4 Recommendations

N/A, no further recommendations.

3 Scoring

3.1 Summary of Performance Indicator level scores

Principle	Component	Weight		Performance Indicator (PI)	Weight	Score
One	Outcome	0.333	1.1.1	Stock status	1.000	90
	Management	0.667	1.2.1	Harvest strategy	0.250	85
			1.2.2	Harvest control rules & tools	0.250	85
			1.2.3	Information & monitoring	0.250	90
			1.2.4	Assessment of stock status	0.250	95
				Overall weighted Principle-level scores		**Score**
				Principle 1 - Target species		**89.2**

3.2 Principle 1 background

3.2.1 Stock biology and structure

Swordfish are cosmopolitan, and can be found in the tropical and temperate waters of all the oceans between 45ºN and 44ºS. They are distributed widely in the Atlantic Ocean and Mediterranean Sea. Variation in size and sex distribution is evident over its range, both geographically and vertically: larger individuals are found in deeper colder waters and males are more prevalent than females in warmer waters.

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. Swordfish have been observed spawning in the Atlantic Ocean, in water less than 75 m. Solitary males and females appear to pair up during the spawning season. The most recognized spawning site is in the Mediterranean, off the coast of Italy where in July and August males are observed chasing females. Traditional Atlantic spawning areas are the Gulf of Mexico, south of Sargasso Sea and east of the Antilles in the Straits of Florida, along the southeast coast of the United States, with new spawning areas recently identified between 10 and 15^0N and longitudes 30-40^0W. Spawning may occur year round however peak activity is between December and July, in water temperatures ranging from 23-26^0C (ICCAT 2007).

Swordfish can reach a maximum weight in excess of 500 kg. Females grow faster than males and reach a larger maximum size. Swordfish are difficult to age, but tagging studies have shown that some swordfish can live up to 15 years. The size at sexual maturity of swordfish varies with location. About 50% of females are considered to be mature by age five, at a length of about 180 cm. The ICCAT Standing Committee for Research and Statistics (SCRS) has adopted the size at first maturity (L50%) of 179 cm (5 years) for swordfish in the North Atlantic stock. However, the most recent information indicates a smaller length and age at maturity. Males reach maturity one year earlier than females. Reproductive activity of females appears to be related to temperatures in the epipelagic layers and is largely restricted to the warm tropical regions of the western Atlantic (ICCAT 2008).

There is considerable individual variation in fecundity with females carrying from 1 million to 29 million eggs in their gonads. The pelagic eggs are buoyant, measuring 1.6-1.8mm in diameter. Embryonic development occurs during the 2.5 days following fertilization. Young swordfish reach about 140 cm LJFL (lower-jaw fork length) by age three.

Despite ageing difficulties, growth curves have been developed for both males and females showing sexual-dimorphism in which females at older ages are larger than males. However, the application of these growth relationships to traditional age-structured assessments has been limited because size-frequency information is limited to landed fish which are gilled and gutted, thus, the sex is undetermined. Unisex growth curves have been developed; however, their application for assessment purposes is limited.

Larval swordfish feed on copepods, but at an early juvenile age their diet consists almost entirely of fish. Adults feed on a wide variety of prey including groundfish, invertebrates, pelagic and deep-water fish. Adults are believed to feed throughout the water column, and based on recent electronic tagging studies undertake diurnal migrations, rising to the surface mixed layer at night and descending to deeper waters during day to feed on fishes and squids. Smaller prey is generally eaten whole, while larger prey is often observed with slash marks from the swordfish rostrum. It still remains unclear when and how often the bill is used during feeding. Swordfish are apex predators, located at the top of the food chain. Predation on swordfish (other than human) is expected to be limited to that on young and infirm swordfish (ICCAT 2007a).

Swordfish are known to migrate in significant numbers between the relatively hot subtropical waters and the temperate waters of the North and South Atlantic. This has been shown through tagging recoveries where tagged fish were released from Northwest, Northeast and Southwest Atlantic fisheries. Importantly, these tagging programs have not shown extensive movements across the Equator. The results of these programs have not shown the existence of extensive trans-Atlantic migration of this species, but these observations are limited by problems associated with use of conventional tags (ICCAT 2007a).

Significant differences in size of initial sexual maturity and growth parameters between the Atlantic and Mediterranean provides evidence of distinct stocks. Recent genetic work indicates there is significant difference in the genetic structure of swordfish between the populations of the four regions: North Atlantic, South Atlantic, Mediterranean and Indian Ocean, with a Mediterranean population significantly distinguished from the others. However, boundaries between these stocks are not well defined biologically. Areas of mixing of the North and South Atlantic Stock probably occur around latitude 5^0N and, perhaps, further north, between 10 and 20^0N. In addition, there is evidence to support exchanges between the Mediterranean and Northeast Atlantic. Some consider the area of mixing of these two stocks to be around 10^0W (ICCAT 2007a).

Based on this information, current understanding is that there is a separate Mediterranean group, and separate North and South Atlantic groups. Thus, ICCAT assesses and manages swordfish on three distinct units of management: North Atlantic, South Atlantic and Mediterranean with the North and South stocks separated at 5° North.

3.2.2 Information and Stock Assessment

Stock assessments are based upon a suite of data reported to ICCAT, including catches, catches by size, effort and CPUE and biological and distributional/migration data. Responsibility for reporting data lies with member countries, but in the developed fisheries, monitoring mechanisms include logbooks, monitoring of dealers, at-sea observers and dockside sampling for size distribution. All of these are done in the case of the United States.

For the past decade, the North Atlantic estimated swordfish catch (landings plus dead discards) has averaged about 11,245 t per year. The catch in 2018 (8,858 t) represents a 56.2% decrease since the 1987 peak in North Atlantic landings (20,238 t).The catch for the North Atlantic swordfish fishery through 2018 is illustrated below (Figure 1, ICCAT 2019)[3].

[3] https://www.iccat.int/Documents/SCRS/ExecSum/SWO_ATL_ENG.pdf

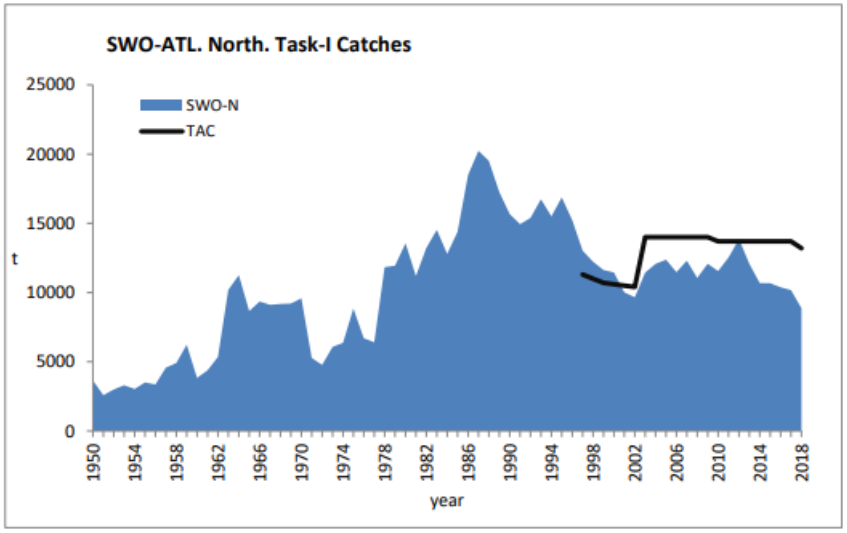

Figure 1 North Atlantic swordfish catches and TAC (t) for the period 1950-2018 (ICCAT 2019).

Total annual catch of North Atlantic swordfish in 2018 was 8,858 mt of which about 1,137 mt (approx. 13%) was caught by US vessels. Other main countries that harvest swordfish in the North Atlantic are Canada, Japan, Ecuador, Morocco, and Chinese Taipei (ICCAT SCRS 2019).

In the case of US fisheries, catches are monitored by dealer reporting of catches and catches at size of fish, logbooks and observer reports. Observer sampling has varied considerably over the last decades over 2-6% of sea days (although in 2016 it reached 18% of the PLL sets) (2017 SAFE Report, NOAA 2018)[4]. Note that size sampling is as landed, which are gilled and gutted. Conversions are calculated to round weight; however, the sex of fish landed as gilled and gutted cannot be determined. In the past observers would bag gonad samples and return to the dock with them with associated lengths, such that a sample of sex at size was determined. However, the sampling was limited and the program could not be maintained.

Indices of abundance are calculated in biomass and in numbers. These are estimated using general linear models adjusting for the spatial and temporal distribution of the fisheries, as well as environmental data. Indices are age-specific for ages less than 5 years old. At those ages the sexually-dimorphic growth rates have not diverged, thus the estimates of abundance trends (including recruitment of age 1-2 year old fish) are deemed useful for monitoring changes. However, the size data used in these analyses only go back to the 1980s. Age-specific indices are calculated for US, Canadian and European Community (EC) fisheries. Long term pooled biomass CPUEs combined for US, Canadian, Japanese and EC fisheries are also calculated going back to the 1950s.

To take into account uncertainty about stock dynamics and data quality the ICCAT SCRS routinely considers a range of scenarios comprising alternative model structures and datasets for a single stock. In the past, the SCRS had used two production approaches to provide advice to the ICCAT Commission relative to BMSY. In 2017 the SCRS used three stock assessment platforms to provide estimates of stock status as of 2015: the two production models used in previous years: A Stock Production Model Incorporating Covariates (ASPIC) and a Bayesian surplus production model with process error (BSP2); and a third age-structured model that was a new application for this stock: Stock Synthesis (SS). SS is an integrated statistical age-structured population modeling framework

[4] https://www.fisheries.noaa.gov/resource/document/2017-stock-assessment-and-fishery-evaluation-safe-report-atlantic-highly

that has been applied in a wide variety of fish assessments globally (Methot and Wetzel 2013). It is designed to accommodate both age and size structure in the population with multiple stock sub-areas and has the ability to utilize a wide diversity of age, size, and aggregate data from fisheries and surveys. Compared to production models it takes into account significantly more features relevant to the biology of the species and the nature of the fishery. Its application to the North Atlantic swordfish assessment in 2017 was possible based on data presented at the 2017 ICCAT Swordfish Data Preparatory Meeting (ICCAT 2017a).

3.2.3 Stock Status and Reference Points

The most recent stock assessment for North Atlantic swordfish was conducted by ICCAT in 2017, providing estimates of stock status as of 2015. The most recent advice on status, outlook, and management is given in ICCAT (2019) which takes account of catches since 1950 and provides status estimates for 2015 and beyond based on projections from the 2017 assessment. Three assessment approaches were used: a Surplus Production Model (ASPIC - A Stock Production Model Incorporating Covariates), a Bayesian Surplus Production Model with process error (BSP2 - Bayesian Surplus Production 2) and an Integrated Age Structured Model (SS - Stock Synthesis). Stock status was determined from the SS and the BSP2 models, while ASPIC was used for comparison with previous assessments. Multiple sensitivity tests were conducted for all assessment approaches.

The final base case SS model estimated that B2015 was above BMSY (median = 1.13, 95% CIs = 0.81-1.45) and F2015 was lower than FMSY (median = 0.75, 95% CIs = 0.57-0.92) (Table 5). The final base case BSP2 model estimated that current biomass (B2015) was near BMSY (median = 0.99, 95% CIs = 0.77-1.24) and current F2015 was lower than FMSY (median = 0.81, 95% CIs = 0.61-1.10). Median values and 95% quantiles from SS and BSP2 models combined were B2015/BMSY= 1.04 (0.82-1.39) and F2015/FMSY= 0.78 (0.62-1.01). Both models agreed that in 2015 overfishing was not occurring and that biomass was either higher or very close to BMSY (Figure 2).

The following stock status results are taken from the Atlantic Swordfish Summary of the 2019 ICCAT SCRS report (ICCAT 2019).

Table 5 North Atlantic Swordfish summary stock status (ICCAT 2019).

Maximum Sustainable Yield:	13,059t (11,840-14,970) Average from base case BSP2 and SS models; range corresponding to the lowest and highest 95% CIs from the two models.
B_{MSY}	B_{MSY} (2015) = 82,640t (51,580-132,010): From base case BSP2 model, with 95% CIs. *(Previously Bmsy (2011) = 65,060t (+/- 80% range of 54,450-76,600t))*
Relative Biomass (B_{2015}/B_{MSY}):	In 2015: 1.04 (0.82 - 1.39): Median and 95% quantiles from base case SS and BSP2 models.
Relative Fishing Mortality Rate F_{2015}/F_{MSY}:	0.78 (0.62-1.01): Median and 95% quantiles from base case SS and BSP2 models
Overfished	No
Overfishing	No
Management measures in effect	TAC (2018-2021): 13,200 t [Rec. 17-02] 125/119 cm LJFL minimum size

Results from the 2013 assessment indicated that there was a greater than 90% probability that the stock had rebuilt to or above BMSY. The estimate of stock status in 2017 is slightly more pessimistic than the estimated status in the previous 2009 and 2013 assessments, and suggests that in 2015 there was a 61% probability that the stock is at or above MSY reference levels. However, stock projections carried out under both, the BSP2 and the SS models showed that future catches around 13,000 t (the TAC since 2018 is 13,200 t) would allow the population to remain at or above BMSY throughout the projected time frame (2018 through 2028) (Figure 3).

Even though the most recent estimates of stock productivity are lower than the previous estimates, the degree of uncertainty in the estimations is also lower. The SCRS noted that the 2017 assessment represents a significant improvement in the understanding of current stock status for North Atlantic swordfish (ICCAT SCRS 2019).

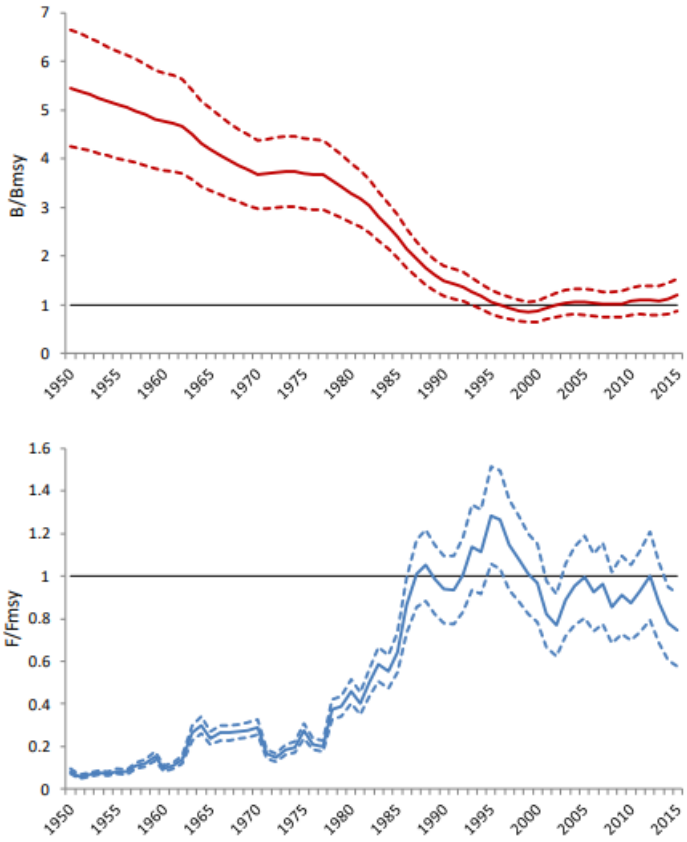

Figure 2 Results from the North Atlantic swordfish base case Age Structured Model: trends in relative biomass (top) and fishing mortality (bottom). Dashed lines represent lower and upper 95% Cis (ICCAT 2019).

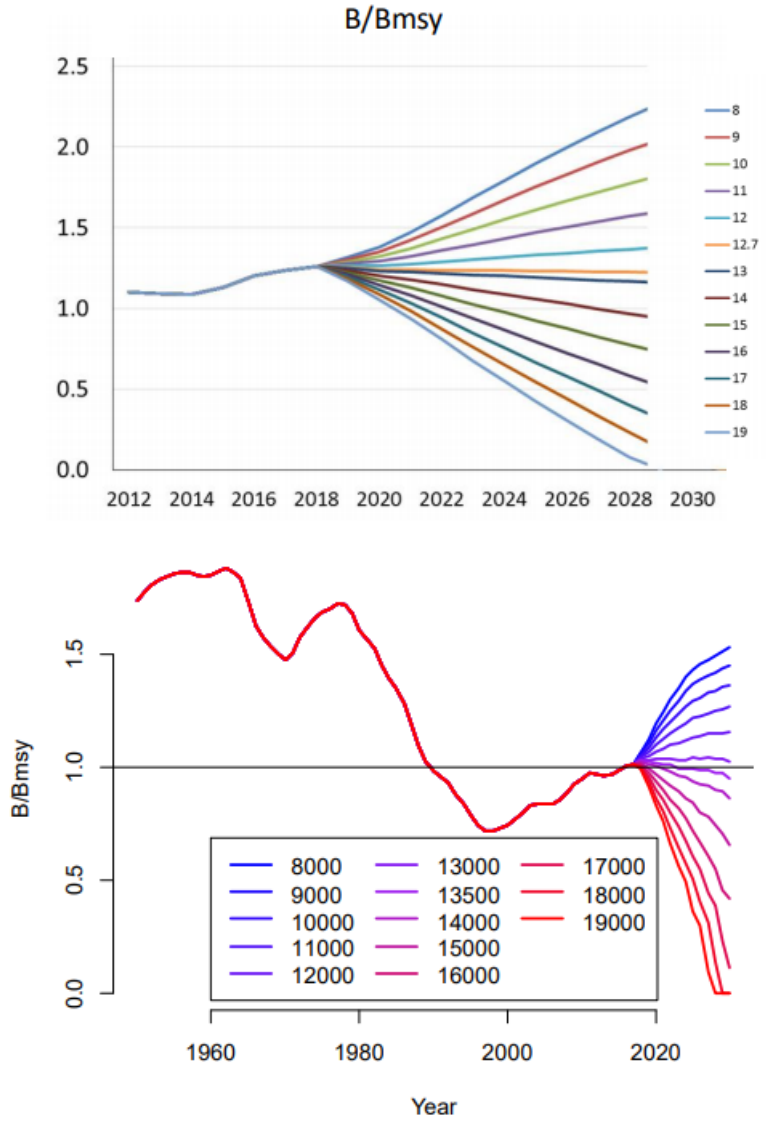

Figure 3 Median trends of relative biomass (B/BMSY) for the projected North Atlantic swordfish stock based on the final SS (top) and BSP2 (bottom) base case models under different constant catch scenarios (thousand tons) (ICCAT 2019).

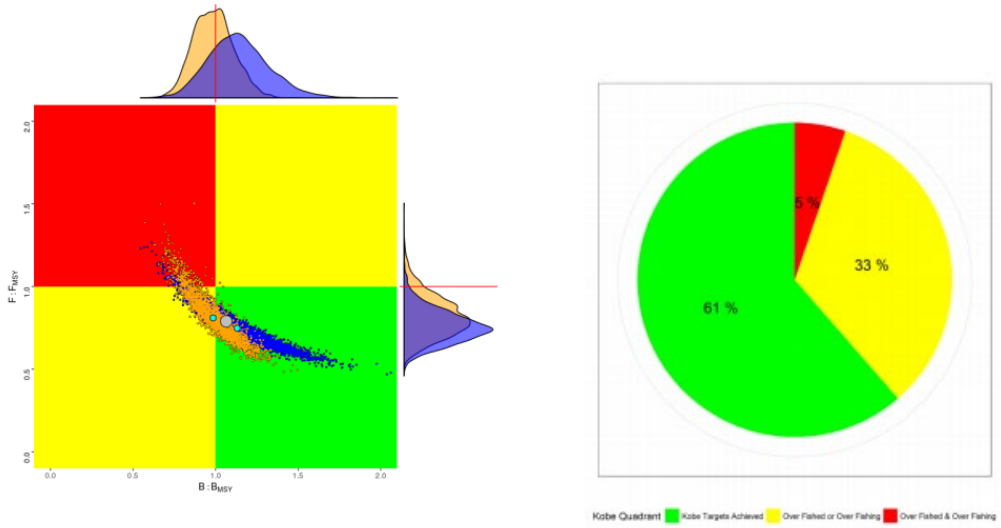

Figure 4 Kobe plot illustrating North Atlantic swordfish stock status in 2015 from the final base SS and BSP models. The light blue circles are the estimated median point with the respective uncertainties from each model (BSP in orange and SS model in dark blue). The large grey circle is the overall median from both models combined. The pie chart represents the probabilities of the stock being in the different color quadrants combined from both models (red 5%, yellow 33%, green 61%) (ICCAT 2019).

For the 2017 management advice, the SCRS (ICCAT 2019) calculated the probabilities of maintaining the stock in the green quadrant of the Kobe plot, maintaining F<FMSY and maintaining B>BMSY (Figure 4, Table 6, Table 7 and Table 8), over a range of TAC options for North Atlantic swordfish over a period of 10 years. The current TAC of 13,700 t has a 36% probability of maintaining the North Atlantic swordfish stock in the green quadrant of the Kobe plot by 2028, whereas a TAC of 13,200 t would have a 50% probability, and would also result in the biomass being above BMSY with a probability greater than 50%, consistent with Rec. 16-03.

The SCRS also recognized that this advice does not account for removals associated with the actual mortality of unreported dead and live discards, quota carryovers (15% in the North Atlantic), quota transfers across the North and South stock management boundaries nor the total cumulative quota, which includes that allocated to "other CPCs" and would fall above the TAC if achieved. The Committee emphasized the importance of this uncertainty particularly given that the current (2015) estimated biomass is close to BMSY.

Note that the reference points used in status determinations are biomass and fishing mortality rates at MSY. This relates to the ICCAT Convention stated goal of maintaining catches at maximum sustainable yield.

Table 6 Estimated probabilities (%) that fishing mortality is below FMSY for North Atlantic swordfish from the Bayesian Surplus Production and Age Structured final base models.

Catch	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
12000	83	83	83	83	83	83	83	83	83	83	83
12200	81	81	80	80	80	80	80	80	80	79	79
12400	78	77	78	77	77	76	77	76	75	75	75
12500	77	75	76	75	75	75	74	74	73	73	73
12600	76	74	74	74	74	73	72	72	71	71	70
12700	74	72	72	72	72	70	71	69	69	69	67
12800	72	71	71	70	70	69	68	67	67	65	64
12900	71	70	68	68	68	66	65	65	63	63	61
13000	70	68	67	66	65	64	62	62	61	60	58
13100	68	66	65	64	63	61	60	58	58	56	56
13200	67	65	63	62	60	59	58	56	55	54	52
13300	65	64	61	61	58	56	55	53	52	50	50
13400	64	63	60	58	56	53	52	51	49	48	46
13500	62	61	58	57	54	51	49	47	46	44	43
13600	61	59	56	54	52	49	47	45	43	42	41
13700	60	57	55	52	50	47	45	43	41	38	37
13800	58	55	52	50	47	45	42	40	38	36	35
14000	54	51	48	46	43	41	38	35	33	32	30

Table 7 Estimated probabilities (%) that biomass is above BMSY for North Atlantic swordfish from the Bayesian Surplus Production and Age Structured final base models.

Catch	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
12000	74	74	75	75	76	77	77	78	77	78	78
12200	74	74	74	74	75	75	75	76	76	75	75
12400	74	73	73	73	73	73	73	73	73	73	72
12500	74	73	73	73	73	72	72	72	71	71	70
12600	74	73	72	72	72	71	71	71	70	70	69
12700	74	73	71	71	71	70	70	69	69	68	67
12800	74	73	71	71	70	69	69	68	67	66	65
12900	74	73	71	70	69	68	68	66	65	64	63
13000	73	72	70	70	68	67	66	65	64	63	61
13100	73	72	70	69	67	66	65	64	62	61	59
13200	73	71	69	68	66	65	64	62	60	59	57
13300	73	71	69	67	65	64	62	61	59	58	55
13400	73	71	69	67	65	63	61	59	57	55	53
13500	73	71	68	66	64	62	60	57	55	53	51
13600	73	71	68	66	63	60	58	56	53	51	49
13700	73	71	68	65	62	59	57	55	51	48	47
13800	73	70	67	64	61	58	55	53	49	47	44
14000	73	69	66	63	60	56	53	49	46	43	40

Table 8 Estimated probabilities (%) that both the fishing mortality is below FMSY and biomass is above BMSY for North Atlantic swordfish from the Bayesian Surplus Production and Age Structured final base models.

Catch	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
12000	73	73	75	74	76	76	77	77	77	78	77
12200	72	72	72	73	74	74	74	74	74	74	74
12400	71	71	71	71	71	72	72	71	71	71	70
12500	71	70	70	70	70	70	70	70	69	69	68
12600	70	69	69	69	69	68	68	68	67	67	66
12700	69	68	68	68	67	66	66	66	65	64	64
12800	68	67	67	67	66	65	64	64	63	62	61
12900	67	66	65	65	64	63	62	62	60	59	59
13000	66	65	64	63	62	61	60	59	58	57	56
13100	66	64	62	62	60	59	57	57	56	55	53
13200	64	63	61	60	58	57	55	54	53	52	50
13300	64	62	60	58	56	54	53	51	50	49	48
13400	62	61	58	57	55	52	50	49	47	46	45
13500	61	59	57	55	53	50	48	46	45	43	42
13600	60	57	55	53	51	48	46	44	43	41	39
13700	59	56	54	51	49	46	44	42	40	38	36
13800	57	54	52	49	47	44	42	40	37	36	34
14000	54	51	48	46	43	40	37	35	33	31	29

3.2.4 Harvest Strategy and Harvest Control Rule

The north Atlantic swordfish fishery underwent a period of rapid expansion and extensive exploitation in the exploitation in the 1980s and 1990s (Figure 5). In the early 1990s the SCRS advice was to reduce fishing mortality rates in order to recover the biomass to the MSY level. Fishing mortality rates were reduced by several ad hoc measures including transfer of effort to the South Atlantic by some countries, implementation of a minimum size and later in the 1990s the implementation of TACs which were renegotiated after every stock assessment. In 1999 a more formal recovery plan was adopted specifying a recovery time and the TAC to be taken. Since then, the plan and TACs were amended in response to stock assessment information. Additionally, fishing mortality rates on small fish were further reduced by implementation of closed areas in Northwest Atlantic (US) waters in the early 2000s.

The objective of the harvest strategy over the last decade has been to recover biomass to BMSY. This is in accordance with ICCAT Convention goals. There is annual monitoring (of catch and CPUE) and assessment (either full or update by the SCRS) of biomass and fishing mortality and setting of TACs, catch limits, and other measures by the Commission to achieve the objective. ICCAT is yet to establish by Recommendation or Resolution an explicit LRP for North Atlantic swordfish, however, an implicit LRP can be inferred from rebuilding measures started in 1999 (ICCAT Recommendation 99-02). The Commission introduced rebuilding measures in response to stock and fishing mortality status estimates, effectively treating either or both of those estimates as triggers, or thresholds for action. The trigger was to rebuild to meet Convention objectives but implicitly also to avoid further stock decline. These 1999 status estimates might generally be interpreted as management threshold reference points but it is not unreasonable here to treat them as LRPs which the Commission sought to avoid with a high probability by rebuilding to BMSY within a specified timeframe and taking appropriate, sustained action to meet that goal.

Recommendation 99-02[5] established a rebuilding program for NA swordfish when the stock was estimated to be at 0.65 BMSY and with fishing mortality estimated as 1.34FMSY. The Commission adopted rigorous measures (catch reductions and various technical measures) and has followed through since that time to ensure rebuilding, with the stock currently above BMSY with a high probability, going beyond the rebuilding objective of achieving BMSY with a greater than 50% probability.

In 2011, ICCAT adopted Recommendation 11-13 setting out principles of decision making for ICCAT conservation and management measures (ICCAT 2011). This describes a generally understood decision-making framework based on a harmonized format for tuna RFMO science bodies to convey advice (Strategy Matrix). This recommendation guides the Commission in developing management measures responsive to stock status as represented on the Kobe Plot (a standardized "four quadrant, red-yellow-green" format, which is widely embraced as a practical, user-friendly method to present stock status information). The Recommendation sets out clearly how management measures should be designed depending on where status is estimated in the Kobe quadrants, generally codifying the type of action taken in Recommendation 99-02. In all cases, the requirement is that management measures should be designed to maintain the stock at, or rebuild to, Bmsy, with a high probability. Where appropriate (overfishing and overfished) the adoption of a rebuilding plan is required.

While the strategy is intended to achieve the target BMSY, it is not fully specified or designed as a clear set of rules. For this purpose, Recommendation 13-02[6] specifies that the SCRS and the Commission shall begin a dialogue to allow for the development of harvest control rules (HCRs). Further, Recommendation 15-07[7] specifies the development of a new HCR using MSE and requires setting LRPs for all stocks, including a 5-year schedule for the establishment of species-specific HCRs.

Following the last ICCAT stock assessment (ICCAT 2017)[8], management advice was based on the TAC of 13,700 t having a 36% probability of maintaining the North Atlantic swordfish stock in the green quadrant of the Kobe plot by 2028, whereas a TAC of 13,200 t would have a 50% probability, and would also result in the biomass being above BMSY with a probability greater than 50%. This is consistent with Recommendation 16-03[9] that specifies actions to be taken if the stock falls to a specified trigger point. It has now been superseded by Recommendations 2017-02[10] and 2019-03[11], which are more explicit. Rec. 19-03 specifies a "rebuilding plan", determines when a "rebuilding plan" shall be triggered, and clearly states a requirement for harvest levels as recommended by the SCRS that will meet the Commission's objectives of maintaining or rebuilding stocks to Bmsy within the defined (10 year) period. It also specifies that the Commission "shall adopt" those harvest levels. Specified actions are required if the biomass is estimated/projected to fall towards 0.65 Bmsy.

While the strategy is intended to achieve the target Bmsy, it is not fully specified or designed as a clear set of rules. This is reflected by the agreement of ICCAT to develop Harvest Control Rules (HCR) using Management Strategy Evaluation (MSE), effectively to 'design' a strategy to achieve explicit objectives reflected in specified reference points, some of which are still being developed following a clear process outlined in Resolution 19-14[12].

[5] https://www.iccat.int/Documents/Recs/compendiopdf-e/1999-02-e.pdf
[6] https://www.iccat.int/Documents/Recs/compendiopdf-e/2013-02-e.pdf
[7] https://www.iccat.int/Documents/Recs/compendiopdf-e/2015-07-e.pdf
[8] https://www.iccat.int/Documents/Meetings/Docs/2017_ATL_SWO_ASS_REP_ENG.pdf
[9] https://www.iccat.int/Documents/Recs/compendiopdf-e/2016-03-e.pdf
[10] https://www.iccat.int/Documents/Recs/compendiopdf-e/2017-02-e.pdf
[11] https://www.iccat.int/Documents/Recs/compendiopdf-e/2019-03-e.pdf
[12] https://www.iccat.int/Documents/Recs/compendiopdf-e/2019-14-e.pdf

Given the small proportion of swordfish harvested by the handgear buoy line sector (Section 3.2.5) and the high survival of discarded swordfish relative to the longline fishery, monitoring of the longline sector characterizes the discards of the swordfish at an accuracy sufficient to support the harvest control rules.

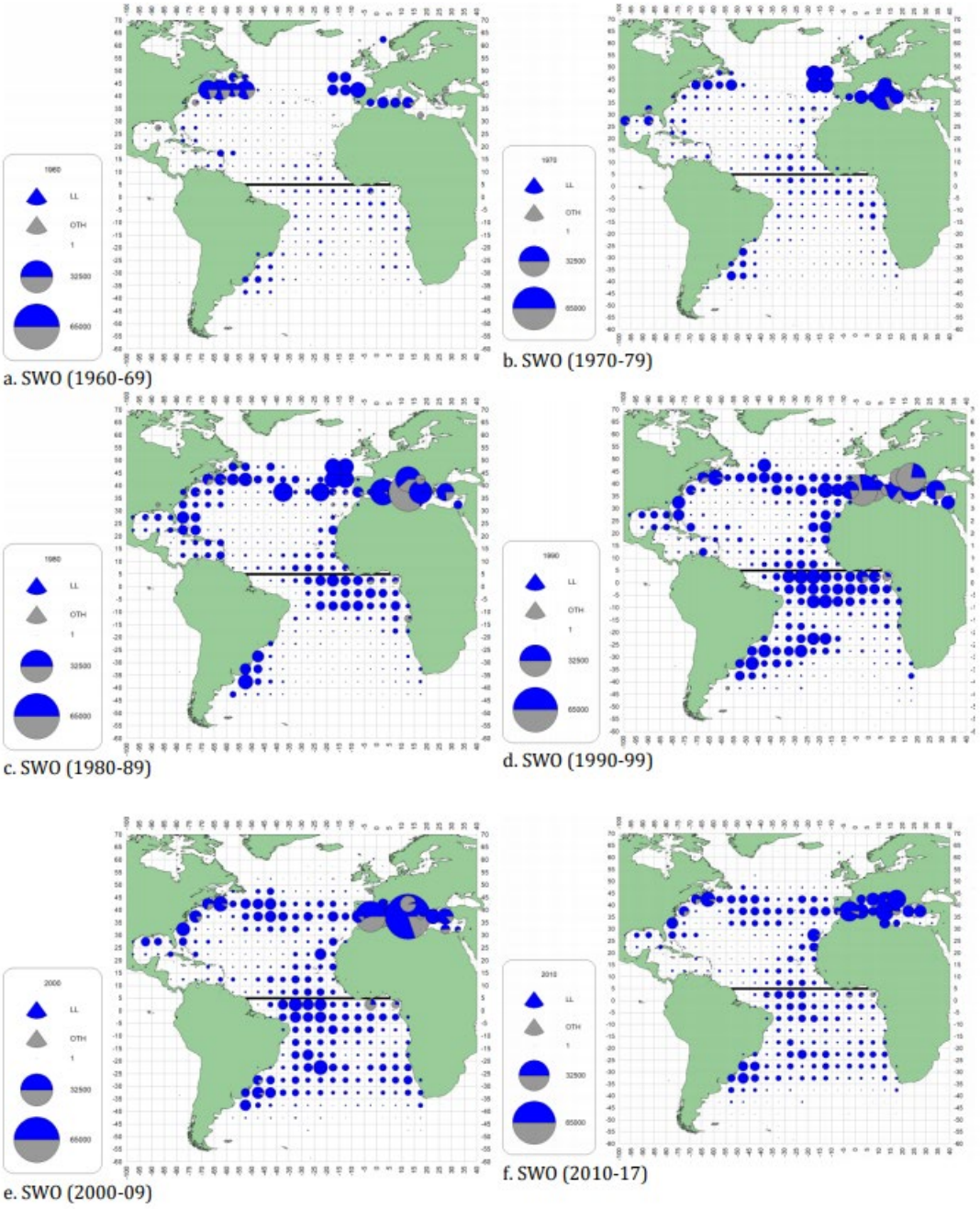

Figure 5 Geographic distribution of swordfish cumulative catch (t) by gear, in the Convention area, shown on a decadal scale. The maps are scaled to the maximum catch observed during 1960-2017 (the last decade only covers 8 years) (2019 SCRS Report)[13].

[13] https://www.iccat.int/Documents/SCRS/ExecSum/SWO_ATL_ENG.pdf

3.2.5 Description of the Fishery

North Atlantic swordfish are widely distributed across the north Atlantic (Figure 5). Harpoon fisheries for this species have existed at least since the late 1800s. Directed longline fisheries from Canada, EU-Spain, and the United States have operated since the late 1950s or early 1960s. Other directed swordfish fisheries include fleets from Brazil, Morocco, Namibia, EU-Portugal, South Africa, Uruguay, and Venezuela.

Two distinct fisheries for Atlantic HMS species occur on the U.S. East Coast: the pelagic longline fishery and the handgear buoy line fishery, the latter occurring principally in the southern part of the area (the Florida East Coast - FEC). The U.S. pelagic longline fishery for Atlantic HMS primarily targets swordfish, yellowfin tuna (*Thunnus albacares*), or bigeye tuna (*Thunnus obesus*) in various areas and seasons. Secondary target species include dolphinfish (*Coryphaena hippurus*); albacore tuna (*Thunnus alalunga*); pelagic sharks including mako, thresher, and porbeagle sharks; as well as several species of large coastal sharks. Although this gear can be modified (e.g., depth of set, hook type) to target swordfish, tunas, or sharks, it is generally a multi-species fishery. Vessel operators are opportunistic, switching gear style and making subtle changes to target the best available economic opportunity of each individual trip. Longline gear sometimes attracts and hooks non-target finfish with no commercial value, as well as species that cannot be retained by commercial fishermen due to regulations, such as billfish. Pelagic longlines may also interact with protected species such as marine mammals, sea turtles, and seabirds. Thus, this gear has been classified as a Category I fishery with respect to the Marine Mammal Protection Act (MMPA). Any species (or undersized catch of permitted species) that cannot be landed due to fishery regulations is required to be released, whether dead or alive.

Pelagic longline gear is composed of several parts (Figure 6). The primary fishing line, or mainline of the longline system, can vary from 5 to 40 miles in length, with approximately 20-30 hooks per mile. The depth of the mainline is determined by ocean currents and the length of the floatline, which connects the mainline to several buoys, and periodic markers which can have radar reflectors or radio beacons attached. Each individual hook is connected by a leader to the mainline. Light sticks, which contain chemicals that emit a glowing light, are often used for targeting swordfish. When attached to the hook and suspended at a certain depth, light sticks attract bait fish which may, in turn, attract pelagic predators.

When targeting swordfish, the lines generally are deployed at sunset and hauled at sunrise to take advantage of swordfish nocturnal near-surface feeding habits. Except for vessels of the distant water fleet which undertake extended trips, fishing vessels preferentially target swordfish during periods when the moon is full to take advantage of increased densities of pelagic species near the surface. The number of hooks per set varies with line configuration and target catch.

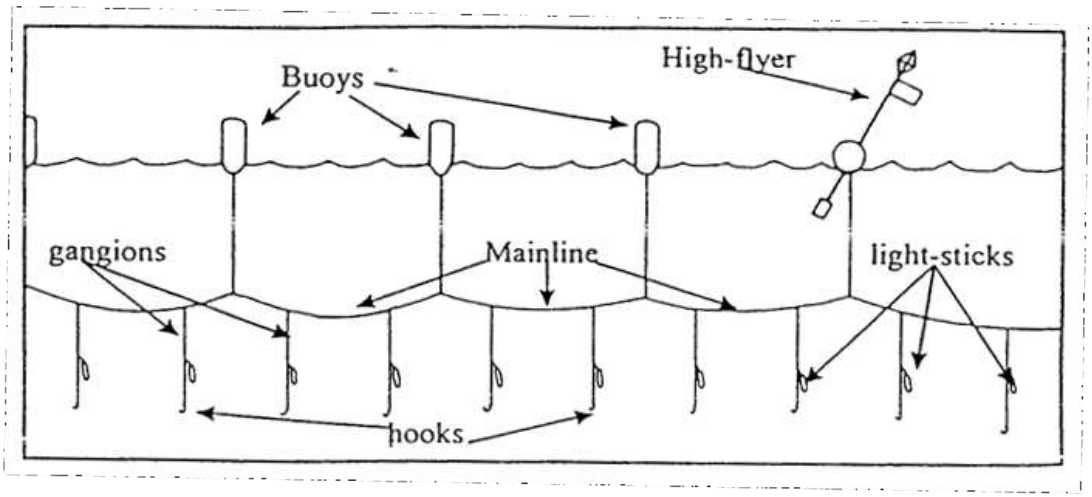

Figure 6 Typical U.S. Pelagic Longline Gear (source: Arocha, 1997).

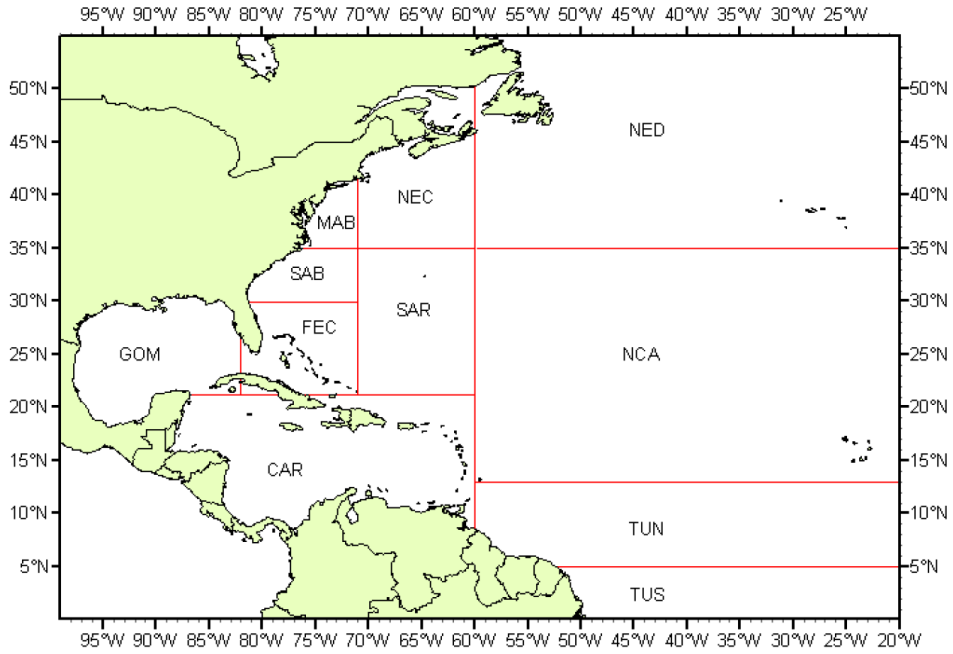

Figure 7 US domestic fishing areas: Caribbean (CAR), Florida East coast (FEC), Gulf of Mexico (GOM), Mid Atlantic Bight (MAB), Northeast Central (NEC), Northeast Distant (NED), South Atlantic Bight (SAB), Sargasso Sea (SAR), North Central Atlantic (NCA), Tuna North (TUN), and Tuna South (TUS) (2016 Annual Report of the United States to ICCAT, NOAA Fisheries 2016)[14]

The US pelagic longline fishery sector is comprised of five relatively distinct segments with different fishing practices and strategies (NOAA Fisheries 2016): (i) Gulf of Mexico yellowfin tuna fishery (GOM), (ii) south Atlantic-Florida east coast to Cape Hatteras swordfish fishery (FEC and SAB), (iii) mid-Atlantic and New England swordfish and bigeye tuna fishery (MAB and NEC), (iv) U.S. distant water swordfish fishery (NED, NCA and TUN), and (v) Caribbean Islands tuna and swordfish fishery (CAR). This assessment covers the US East Coast fishery with the exclusion of the Gulf of Mexico, the Caribbean, and the Tuna North area (Figure 7).

[14] https://www.fisheries.noaa.gov/atlantic-highly-migratory-species/atlantic-hms-national-reports-international-commission#national-reports-to-iccat (2016-iccat-national-report)

Some vessels fish in more than one fishery segment during the course of the year. Each vessel type has different range capabilities due to fuel capacity, hold capacity, size, and construction. In addition to geographical area, segments differ by percentage of various target and non-target species, gear characteristics, bait, and deployment techniques.

A commercial swordfish handgear fishery has developed off the east coast of Florida (Figure 8; NMFS, 2006). Commercial buoy gear was authorized in 2006 for Swordfish Directed and Handgear permit holders. Swordfish Directed permit holders may retain swordfish only if they have also been issued a Shark Directed or Incidental limited access permit and an Atlantic Tunas Longline permit. Swordfish Handgear permit holders are not required to be issued other permits to retain swordfish. HMS Charter/Headboat, Angling, and Swordfish Incidental permit holders may not fish with buoy gear. Buoy gear means a fishing gear consisting of one or more floatation devices supporting a single mainline to which no more than two hooks or gangions are attached. The buoy gear fishery is usually undertaken at night.

Authorized permit holders may not possess, or deploy, more than 35 floatation devices and may not deploy more than 35 individual buoy gears per vessel. Information on the level of recent fishing effort and catches are given in the tables below. Prior to 2007, buoy gear catch data were included in handline catch data. About 40 handgear vessels currently target swordfish off the east coast of Florida, each deploying on average 11 buoys. This gear is used to primarily target swordfish, although dolphinfish (*Coryphaena hippurus*), oilfish (*Ruvettus pretiosus*), and shortfin mako (*Isurus oxyrinchus*) are also landed in small quantities.

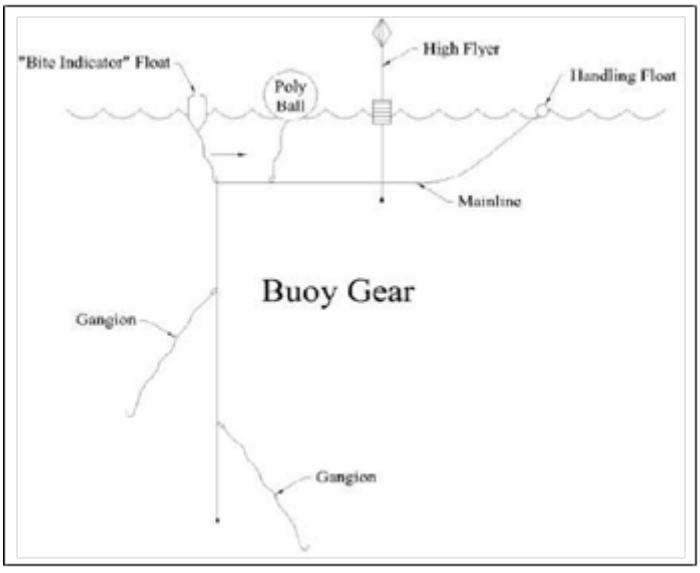

Figure 8 A diagram of a buoy gear with four flotation devices attached (source: NMFS, 2006).

3.2.5.1 Historical Development of the Fishery

U.S. commercial swordfish fishing in the Atlantic Ocean is reported to have begun in the early 1800s as a harpoon fishery off the coast of New England. This fishery traditionally consisted of harpoon vessels operating out of Rhode Island and Massachusetts where they took extended trips for swordfish north and east of Hudson Canyon and particularly off Georges Bank and could land as many as 20-25 large swordfish over a ten-day period. These fish primarily consisted of large fish that finned on the surface and were available to the harpoon gear some weighing as much as 600 lbs. but

averaging about 225-300 lbs. at the turn of the century. Because of the limited effort directed towards large fish, the stock was sufficient to support a sustainable seasonal swordfish fishery for more than 150 years

Most swordfish caught in the United States in the early 1900s were harvested with harpoon. Harpoon landings declined from the 1940s through the 1960s. This fishery continued at a low level until the global expansion of longline fisheries in the 1950s and 1960s (Myers and Worm, 2003). In more recent years, a new commercial swordfish fishery utilizing handgear has developed off the east coast of Florida. This fishery has been operating under the current regulations, which require that handlines be restricted to no more than two hooks and be released and retrieved by hand.

Pelagic longline fisheries exerted the greatest fishing effort on the North Atlantic swordfish stock and contributed to a decline in stock status. ICCAT requested a reduction in fishing effort by all party members to enable the stock to rebuild. Today, the U.S. fleets do not take the full TAC allocated by ICCAT, which has enabled a modest transfer of quota to Canada over the past few years (Section 3.2.7- Table 12). The reduced level of catches below the U.S. allocation has helped to enable the swordfish population to recover and was considered rebuilt in 2009 (ICCAT 2009).

3.2.5.2 Permits

The U.S. federal system incorporates gear and license (permit) limitations to rationalize fishing effort and restrictions on vessel upgrading within the swordfish fishery[15]. North Atlantic swordfish can only be taken with bandit, handline, harpoon, rod and reel, buoy gear, green-stick, and long line, except that a limited number of swordfish may be taken incidentally on a vessel with squid trawl. To fish for or take Atlantic swordfish, commercial fishermen are required to hold a permit for the vessel they are operating (see text box for current permit types). These permits are issued under a limited access system such that to enter the fishery it is necessary to obtain a permit from a fisherman who is leaving the fishery. In general, an owner may upgrade a vessel with a directed or handgear limited access permit or transfer the permit to another vessel, only if the upgrade or transfer does not result in an increase in horsepower of more than 20% or an increase of more than 10% in length overall, gross registered tonnage, or net tonnage from the original qualifying vessel's specifications.

To fish recreationally in federal waters for any Atlantic HMS, and within the waters of most Atlantic coastal states for Atlantic tunas, vessel owners must have a valid federal fishing permit for their vessel. The type of permit depends on the fish species, fishing gear, and fishing trip. The four types (or categories) of permits that can be used to recreationally fish for Atlantic HMS are HMS Angling, HMS Charter/Headboat, Atlantic Tunas General category, and Swordfish General Commercial permit. The following limits apply to the recreational fishery (HMS Recreational Compliance Guide (as of April 2019)[16]:

- Charter Vessels - 1 swordfish per paying passenger, up to 6 swordfish per vessel, per trip.
- Headboat Vessels - 1 swordfish per paying passenger, up to 15 swordfish per vessel, per trip.
- HMS Angling OR Atlantic Tunas General Category Vessels (in a registered HMS tournament) - 1 swordfish per person, up to 4 swordfish per vessel, per trip.

[15] The regulations applicable to the North Atlantic Swordfish fishery are provided in the HMS Commercial Compliance Guide (as of April, 2019), at https://www.fisheries.noaa.gov/atlantic-highly-migratory-species/atlantic-highly-migratory-species-fishery-compliance-guides

[16] 2019 Recreational Compliance Guide. https://www.fisheries.noaa.gov/atlantic-highly-migratory-species/atlantic-highly-migratory-species-fishery-compliance-guides

Permit Types in the Atlantic Swordfish Fishery

Vessel owners must obtain a valid swordfish limited access permit (**Directed, Incidental, or Handgear**), an open access **HMS Commercial Caribbean Small Boat permit** (valid only in the U.S. Caribbean Region), an open access **Swordfish General Commercial permit**, or an **HMS Charter/Headboat permit** (with a commercial endorsement and on non-for-hire trips only) for the vessel they are using to commercially harvest Atlantic swordfish.

An **Incidental HMS Squid Trawl permit** may be obtained by valid *Illex* squid moratorium permit holders and authorizes the retention of swordfish caught incidentally using trawl gear, subject to target catch requirements.

3.2.6 Catch profiles

Table 9 and Figure 9 show the catches of swordfish estimated by ICCAT for the entire North Atlantic and for the US North Atlantic region from 1994 through 2018 (ICCAT 2019). Over this period, US catches represented on average, 21% of the total North Atlantic catch. In 2018, they represented approximately 13% of the total.

Details of the US swordfish catches are provided in Table 10. Longline and handline catches from the Northwest and North Central Atlantic best represent the UoA.

Table 9. Estimated swordfish catches in the North Atlantic (total and USA) (mt) (ICCAT 2019).

Year	USA ATN	Total ATN	Year	USA ATN	Total ATN
1994	3366	15501	2007	2463	12302
1995	4026	16872	2008	2387	11050
1996	3559	15222	2009	2730	12081
1997	2987	13025	2010	2274	11553
1998	3058	12223	2011	2551	12523
1999	2908	11622	2012	3393	13868
2000	2863	11453	2013	2824	12069
2001	2217	10011	2014	1809	10678
2002	2384	9654	2015	1581	10673
2003	2513	11442	2016	1408	10376
2004	2380	12068	2017	1294	10169
2005	2160	12373	2018	1137	8858
2006	1873	11470			

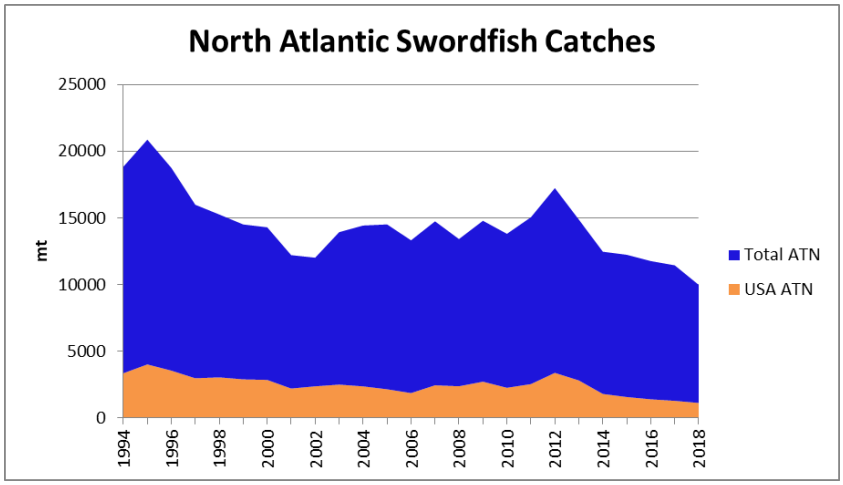

Figure 9 Estimated swordfish catches in the North Atlantic (total and USA) (mt) (ICCAT 2019).

Table 10. U.S. catches and landings (mt ww) of Atlantic swordfish by area and gear in 2013–2017 (2018 SAFE Report, NOAA 2019).

Area	Gear	2013	2014	2015	2016	2017
Northwest Atlantic	Longline*	1,720.5	1,200.4	1,088.6	835.4	788.1
	Gillnet	0.0	0.0	0.0	0.0	0.0
	Handline	104.8	86.9	70.7	71.2	58.2
	Trawl	2.9	5.3	2.8	6.0	5.8
	Harpoon	0.5	0.0	0.0	0.0	0.3
	Rod and reel**	21.7	35.1	45.1	22.5	22.6
	Unclassified	1.6	0.4	0.0	0.0	0.0
	Unclassified discards	0.0	0.0	0.0	0.0	0.0
Gulf of Mexico	Longline*	531.6	307.4	127.4	175.8	249.6
	Handline	0.5	0.3	5.5	3.5	2.7
	Rod and reel**	0.3	1.5	1.0	4.8	10.5
	Unclassified discards	0.0	0.0	0.0	0.0	0.0
Caribbean	Longline*	20.8	16.5	8.8	72.4	88.3
	Rod and reel**	0.0	0.07	0.0	0.0	0.7
	Handline	0.0	0.3	0.2	0.9	0.0
	Unclassified discards	0.0	0.0	0.0	0.0	0.0
North Central Atlantic	Longline*	539.1	308.0	367.9	304.9	150.4
	Handline	.0.0	0.0	0.2	0.0	0.0
Southwest Atlantic	Longline*	0.06	0.0	0.0	0.0	0.0
All areas	All gears	2,944.0	1,962.2	1,718.4	1,497.5	1,377.2

* = Includes landings and estimated dead discards from scientific observer and logbook sampling programs. ** = Rod and reel catches and landings represent estimates of landings and dead discards based on statistical surveys of the U.S. recreational harvesting sector. Source: NMFS 2018.

3.2.7 Total Allowable Catch (TAC) and catch data

Table 11 provides preliminary landings estimates and remaining quotas for the Atlantic swordfish fisheries for the 2019 fishing year. NOAA-HMS estimates landings using commercial dealer reports and reports by anglers in the HMS Non-Tournament Recreational Swordfish and Billfish Landings Database and the Recreational Billfish Survey.[17]

[17] https://www.fisheries.noaa.gov/atlantic-highly-migratory-species/2019-atlantic-swordfish-landings-updates

Table 11. Preliminary landings estimates and remaining quotas as of December 31, 2019, for the Atlantic swordfish Note that these estimates are subject to late reporting and do not include discards. Totals are reported in metric tons (mt) dressed weight (dw). Updated SWO quotas are provided in the Federal Register (2019)[18]

		2019 Landings (mt dw)	Percent of 2019 Baseline Quota Taken (2019 Baseline Quota)	Percent of 2019 Adjusted Quota Taken (2019 Adjusted Quota)	2018 Landings During the Same Time Period (mt dw)
Directed fishery[1]	Jan 1–June 30	474.7	36.0% (1,318.8 mt dw)	31.4% (1,514.1 mt dw)	341.8
	July 1–Dec 31	511.3	38.8% (1,318.8 mt dw)	33.8% (1,514.1 mt dw)	453.4
Incidental fishery[2]	Commercial landings	12.3	18.2% (300 mt dw)	18.2% (300 mt dw)	10.0
	Recreational landings	42.4			26.3
Total		1,040.7	35.4% (2,937.6 mt dw)	31.3% (3,328.2 mt dw)	831.5

[1]Annual directed quota split equally into two 6 month seasons (baseline: 1,318.8 mt dw per season); contains landings reported by vessels with a directed swordfish limited access permit, handgear swordfish limited access permit, swordfish general commercial permit, HMS commercial Caribbean small boat permit, or HMS charter/headboat permit (when on a non for-hire trip).

[2]Recreational landings (HMS angling permit or HMS charter/headboat permit when on a for-hire trip) and commercial landings by incidental swordfish limited access and incidental HMS squid trawl permit holders count toward the annual incidental quota.

The above information is summarized in Table 12. TACs and landings for the directed and incidental fishery (commercial and recreational catches) over the entire year (2019) are combined.

Table 12 Total Allowable Catch (TAC) and catch data (in metric tons, mt and dressed weight, dw)[19] .

TAC – ICCAT (North Atlantic)	Year	2019	North Atlantic	13,200 mt dw
US share of TAC	Year	2019	US North Atlantic	Baseline Quota: 2,937.6 mt
				Adjusted Quota[1]: 3,378.2 mt
UoA share of TAC	Year	2019	UoA: US North Atlantic, Statistical Areas SAB, MAB, NEC, NED, FEC, SAR, NCA	Quota not specified by area or for all areas included in the UoA
Total dressed weight catch- US North	Year (most recent)	2019	US North Atlantic	1,040.7 mt

[18] https://www.federalregister.gov/documents/2019/09/10/2019-19476/atlantic-highly-migratory-species-adjustments-to-2019-northern-albacore-tuna-quota-2019-north-and

[19] TAC and catch data published by NOAA Fisheries are in metric tons (mt), dressed weight (dw). This information is not readily available in green weight, either on NOAA documents or the Federal Register.

Atlantic[2]	Year (second most recent)	2018	US North Atlantic	831.5 mt

[1]Adjusted Quota includes directed (3,028.2 mt), incidental (300 mt), and reserve (50mt) categories.

[2]UoA catches are not available; these catches are for the entire US North Atlantic, including the statistical areas listed above plus others that are not part of the UoA (GOM, CAR, TUN, and TUS) (see Figure 7).

3.2.8 Principle 1 Performance Indicator scores and rationales

PI 1.1.1 – Stock status

PI 1.1.1		The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing		
Scoring Issue		SG 60	SG 80	SG 100
a	**Stock status relative to recruitment impairment**			
	Guide post	It is **likely** that the stock is above the point where recruitment would be impaired (PRI).	It is **highly likely** that the stock is above the PRI.	There is a **high degree of certainty** that the stock is above the PRI.
	Met?	**Yes**	**Yes**	**Yes**

Rationale:

The most recent stock assessment for North Atlantic swordfish was conducted by ICCAT in 2017, providing estimates of stock status as of 2015. The most recent advice on status, outlook, and management is given in ICCAT (2019)[20] which takes account of catches since 1950 and provides status estimates for 2015 and beyond based on projections from the 2017 assessment. Three assessment approaches were used (see PI 1.2.4): a Surplus Production Model (ASPIC - A Stock Production Model Incorporating Covariates), a Bayesian Surplus Production Model with process error (BSP2 - Bayesian Surplus Production 2) and an Integrated Age Structured Model (SS - Stock Synthesis). Stock status was determined from the SS and the BSP2 models, while ASPIC was used for comparison with previous assessments. Multiple sensitivity tests were conducted for all assessment approaches.

The final base case SS model estimated that B_{2015} was above B_{MSY} (median = 1.13, 95% CIs = 0.81-1.45) and F_{2015} was lower than F_{MSY} (median = 0.75, 95% CIs = 0.57-0.92). The final base case BSP2 model estimated that current biomass (B_{2015}) was near B_{MSY} (median = 0.99, 95% CIs = 0.77-1.24) and current F_{2015} was lower than F_{MSY} (median = 0.81, 95% CIs = 0.61-1.10). Median values and 95% quantiles from SS and BSP2 models combined were B_{2015}/B_{MSY}= 1.04 (0.82-1.39) and F_{2015}/F_{MSY}= 0.78 (0.62-1.01). Both models agreed that in 2015 overfishing was not occurring and that biomass was either higher or very close to B_{MSY}.

Results from the 2013 assessment indicated that there was a greater than 90% probability that the stock had rebuilt to or above B_{MSY}. The estimate of stock status in 2017 is slightly more pessimistic than the estimated status in the previous 2009 and 2013 assessments, and suggests that in 2015 there was a 61% probability that the stock is at or above MSY reference levels. However, stock projections carried out under both, the BSP2 and the SS models, showed that future catches around 13,000 t (the TAC since 2018 is 13,200 t) would allow the population to remain at or above B_{MSY} throughout the projected time frame (2018 through 2028).

Even though the most recent estimates of stock productivity are lower than the previous estimates, the degree of uncertainty in the estimations is also lower. The SCRS noted that the 2017 assessment represents a significant improvement in the understanding of current stock status for North Atlantic swordfish.

Considering the default MSC LRP of $0.5B_{MSY}$ (MSC FS v2.01 SA2.2.3.), the 2017 stock assessment suggested that in 2015 the stock was above B_{MSY} with 61% probability. The median biomass ratios (B_{2015}/B_{MSY}) and the lower 95% confidence intervals were greater than $0.5B_{MSY}$ under both models. This implies that there is a high degree of certainty that the stock in 2015 was above the point of recruitment impairment (PRI). Therefore, SG100 requirements are met, and, by definition, SG60 (likely above PRI) and SG80 (highly likely above PRI) are also met.

[20] https://www.iccat.int/Documents/SCRS/ExecSum/SWO_ATL_ENG.pdf

b	**Stock status in relation to achievement of Maximum Sustainable Yield (MSY)**			
	Guide post		The stock is at or fluctuating around a level consistent with MSY.	There is **a high degree of certainty** that the stock has been fluctuating around a level consistent with MSY or has been above this level over recent years.
	Met?		**Yes**	**No**

Rationale:

The most recent stock assessment for North Atlantic swordfish was conducted by ICCAT in 2017, providing estimates of stock status as of 2015. The most recent advice on status, outlook, and management is given in ICCAT (2019) which takes account of catches since 1950 and provides status estimates for 2015 and beyond based on projections from the 2017 assessment. Three assessment approaches were used (see PI 1.1.1a PI 1.2.4): a Surplus Production Model (ASPIC), a Bayesian Surplus Production Model (BSP2) and an Integrated Age Structured Model (SS - Stock Synthesis). Stock status was determined from the SS and the BSP2 models, while ASPIC was used for comparison with previous assessments. Multiple sensitivity tests were conducted for all assessment approaches.

SA2.2.2.1 states that at SG80, there shall be evidence that the stock (biomass) is fluctuating around a level, B_{MSY}, at which MSY may be achieved, or around a higher level. The 2013 assessment showed that the lower 80% confidence bound of stock biomass was at B_{MSY} in 2009-10 and increased above this level in 2011. The 2017 assessment estimated the median and 95% quantiles from base case SS and BSP2 models at B_{2015}/B_{MSY}= 1.04 (0.82-1.39), indicating that in 2015 the median biomass value was very close to the MSY level. The estimate of stock status in 2017 is slightly more pessimistic than the estimated status in the previous 2009 and 2013 assessments, and suggests that in 2015 there was a 61% probability that the stock was at or above MSY reference levels. The results obtained in the 2017 assessment are not strictly comparable with those obtained in previous assessments due to the incorporation of more data sources, the use of joint probabilities from two base case models, and updated catch and CPUE information.

The most recent advice on status and outlook (ICCAT 2019) indicates that stock productivity estimates are lower than the previous 2009 and 2013 Surplus Production model estimates. Biomass trajectories were similar until the late 1990s; thereafter the current model predicted considerable lower relative biomass. Notably, the CPUE series have been decreasing since 2012, causing biomass trends to adjust to a lower minimum compared to the previous assessments. The estimate of Bmsy is now 82,640 tonnes, up from the previous estimate of 65,060 tonnes. Median Bcurrent/Bmsy in 2015 of 1.04 had been at or above 1 in several years preceding. The lower 95% confidence bound in 2015 was 0.82. The new assessment confirms that SG80 requirements are met.

SG100 requires a high degree of certainty that the stock has been fluctuating around its target reference point, or has been above its target reference point, over recent years. SA2.2.1 defines a high degree of certainty as 95%. CB2.2.2.2 clarifies “over recent years” as meaning for a period longer than the past few years (the standard for SG80). The 2013 stock assessment and the 2015 update advice indicate that the stock had rebuilt from below the TRP to the TRP in 2007, and has continued to increase since then. The results from the 2017 assessment are more pessimistic regarding the current stock status compared to the 2013 assessment, but the degree of confidence in the results is higher. If the if the 95% CIs are viewed as showing the variability each year, the 2017 assessment results indicate that there is a good chance that the stock has been above Bmsy at least as much as it has been below over recent years, i.e. it has been fluctuating around a level consistent with MSY. Based on these results, the Assessment Team agreed that an argument could be made either way regarding whether the stock status meets SG100. On balance, the Assessment Team agreed to score PI 1.1.1b at the SG80 level. If the stock status results of the 2017 assessment are at least maintained in the next full assessment, then this scoring issue should be raised to the SG100 level.

References

ICCAT (2019) SCRS Report https://www.iccat.int/Documents/SCRS/ExecSum/SWO_ATL_ENG.pdf

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Stock status relative to reference points			
	Type of reference point	Value of reference point	Current stock status relative to reference point
Reference point used in scoring stock relative to PRI (SIa)	*Limit reference point* 0.5Bmsy MSC default	Bmsy from age structured model (SS3) – value for SS3 model not explicit in ICCAT reports as shown only for BSP2 model	B2015/Bmsy = 1.13 Bmsy (0.81-1.45) Note: ICCAT provides results also for combined models (SS3 and BSP2) of 1.04 (0.82 - 1.39)
Reference point used in scoring stock relative to MSY (SIb)	*Target reference point* Bcurrent/Bmsy Where Bmsy is model defined as 0.5K	Bmsy from age structured model (SS3) – value for SS3 model not explicit in ICCAT reports as shown only for BSP2 model	B2015 / Bmsy = 1.13 Bmsy (0.81 - 1.45) Note: ICCAT provides results also for combined models (SS3 and BSP2) of 1.04 (0.82 - 1.39)

Draft scoring range and information gap indicator added at Announcement Comment Draft Report

Draft scoring range	**≥80**
Information gap indicator	**Information sufficient to score PI**

Overall Performance Indicator scores added from Client and Peer Review Draft Report

Overall Performance Indicator score	**90**
Condition number (if relevant)	**NA**

PI 1.1.2 – Stock rebuilding

PI 1.1.2		Where the stock is reduced, there is evidence of stock rebuilding within a specified timeframe		
Scoring Issue		SG 60	SG 80	SG 100
a	Rebuilding timeframes			
	Guide post	A rebuilding timeframe is specified for the stock that is the **shorter of 20 years or 2 times its generation time**. For cases where 2 generations is less than 5 years, the rebuilding timeframe is up to 5 years.		The shortest practicable rebuilding timeframe is specified which does not exceed **one generation time** for the stock.
	Met?	**NA**		**NA**
Rationale: Not applicable: The stock is not depleted and so this PI is not scored.				
b	**Rebuilding evaluation**			
	Guide post	Monitoring is in place to determine whether the rebuilding strategies are effective in rebuilding the stock within the specified timeframe.	There is **evidence** that the rebuilding strategies are rebuilding stocks, **or it is likely** based on simulation modelling, exploitation rates or previous performance that they will be able to rebuild the stock within the **specified timeframe**.	There is **strong evidence** that the rebuilding strategies are rebuilding stocks, **or it is highly likely** based on simulation modelling, exploitation rates or previous performance that they will be able to rebuild the stock within the **specified timeframe**.
	Met?	**NA**	**NA**	**NA**
Rationale: Not applicable: The stock is not depleted and so this PI is not scored.				
References: NA				

Draft scoring range and information gap indicator added at Announcement Comment Draft Report

Draft scoring range	**NA**
Information gap indicator	**Information sufficient to score PI**

Overall Performance Indicator scores added from Client and Peer Review Draft Report

Overall Performance Indicator score	**NA**
Condition number (if relevant)	**NA**

PI 1.2.1 – Harvest strategy

PI 1.2.1		There is a robust and precautionary harvest strategy in place		
Scoring Issue		SG 60	SG 80	SG 100
a	Harvest strategy design			
	Guide post	The harvest strategy is **expected** to achieve stock management objectives reflected in PI 1.1.1 SG80.	The harvest strategy is responsive to the state of the stock and the elements of the harvest strategy **work together** towards achieving stock management objectives reflected in PI 1.1.1 SG80.	The harvest strategy is responsive to the state of the stock and is **designed** to achieve stock management objectives reflected in PI 1.1.1 SG80.
	Met?	**Yes**	**Yes**	**No**

Rationale:

The harvest strategy consists of an objective (B_{MSY}), annual monitoring (of catch and CPUE) and assessment (either full or update by the SCRS) of biomass and fishing mortality and setting of TACs, catch limits, and other measures by the Commission to achieve the objective. An implicit LRP (the previous low biomass) can be inferred from rebuilding measures started in 1999. The strategy of setting quotas to achieve the target biomass over the long term has maintained the stock above the MSC default PRI (0.5Bmsy) and has rebuilt the stock to well above B_{MSY}. Continued use of the strategy would be expected to ensure this continues. SG60 requirements are met.

The Commission has set annual TACs consistent with the advice of the SCRS. The most dramatic example of this is the implementation of the 10-year rebuilding plan in 1999 (ICCAT, 1999) in response to SCRS-assessed declines in stock biomass. This resulted in reductions in TACs until signs of stock recovery in 2003, at which time the TACs were permitted to increase. Therefore, as the stock conditions changed, the TACs of the rebuilding plan were amended to respond to these changes. SG80 requirements are met.

The harvest strategy is responsive to the state of the resource. Recommendation 2016-03 (ICCAT, 2016a), adopted in late 2016, specified actions to be taken if the stock fell to a specified trigger point (if the biomass is estimated/projected to fall towards 0.65 Bmsy). That Recommendation has now been superseded by Recommendations 2017-02 (ICCAT, 2017a) and 2019-03 (ICCAT, 2019a). While the strategy is intended to achieve the target B_{MSY}, it is not fully specified or designed as a clear set of rules. This is reflected by the agreement of ICCAT to develop HCR using Management Strategy Evaluation (MSE), effectively to 'design' a strategy to achieve explicit objectives reflected in specified reference points, some of which are still being developed following a clear process outlined in Resolution 2019-14 (ICCAT, 2019b). SG100 requirements are not met.

b	**Harvest strategy evaluation**			
	Guide post	The harvest strategy is **likely** to work based on prior experience or plausible argument.	The harvest strategy may not have been fully **tested** but evidence exists that it is achieving its objectives.	The performance of the harvest strategy has been **fully evaluated** and evidence exists to show that it is achieving its objectives including being clearly able to maintain stocks at target levels.
	Met?	**Yes**	**Yes**	**No**

Rationale:

The SCRS carries out stock assessments based on fisheries-dependent data, and provides advice to the Commission relative to BMSY. The SCRS evaluates management measures in place and recommends changes as required to meet management objectives. In the case of swordfish, this advice has been used to set TACs and other measures. Since 1999 the stock has rebuilt and been maintained above BMSY (see PI 1.1.1). SG60 and SG80 requirements are met.

The harvest strategy has not yet been evaluated. ICCAT has agreed to develop an HCR using Management Strategy Evaluation (MSE), effectively to evaluate and design a harvest strategy. The MSE process for North Atlantic Swordfish started in 2018, with the initial development of the framework to use in the conditioning of the operating model (OM). At its 2018 intersessional meeting, the Swordfish Species Group defined a list of factors that were identified as the ones with more uncertainty associated during the last stock assessment (2017) and that should be addressed within the MSE framework. The 2018 N-SWO MSE work was mostly devoted to some initial OM development trials using a grid approach for some of the main factors.

The current objectives of the N-SWO MSE are for the continuation of the OM development and validation. Further OM configurations should incorporate uncertainties in parameter values. This work is expected to continue through 2019-2020. SG100 requirements are not met.

c	**Harvest strategy monitoring**			
	Guide post	Monitoring is in place that is expected to determine whether the harvest strategy is working.		
	Met?	**Yes**		

Rationale:

Every three to four years, the SCRS undertakes a full assessment of the stock. Previous assessments were conducted in 2013 and 2017 and the next is scheduled for 2021.The full assessment includes a review of the catch, fishery dependent indices of abundance, models of historical population size as well as biological reference points. TAC and other management measures are reviewed annually and changed as required. This process provides the monitoring to determine whether or not the strategy is working. The SG60 requirements are met.

d	**Harvest strategy review**			
	Guide post			The harvest strategy is periodically reviewed and improved as necessary.
	Met?			**Yes**

Rationale:

The ICCAT SCRS reviews the elements of harvest strategy annually and provides advice to the Commission on whether the strategy has been successful and whether it needs to be changed. The

SCRS has regularly reviewed and conducted stock assessments, re-estimated (re-calculated) and re-evaluated the appropriateness of the reference points, and whether the objectives of the Convention are being met. The Commission takes the advice of the SCRS under consideration and agrees binding Recommendations. Recommendations for the management of the North Atlantic swordfish stock have generally been in line with the advice from the SCRS.

Neilson et. al. (2013) provides a detailed history of the status of the North Atlantic swordfish stock as assessed by the SCRS and management actions taken by ICCAT to recover the status of the stock, demonstrating how the harvest strategy has been modified over time following the successive reviews of its effectiveness by the SCRS. During the early 1990s when the stock status was both overfished and undergoing overfishing, ICCAT introduced a minimum size limit (Rec 90- 02), recommended national quotas (Rec 94-14) and in 1995 resolved that the SCRS would develop a TAC series that allowed a 50% probability of rebuilding to the level of biomass that corresponds to MSY within 5, 10, and 15 years (Res 95-09).

During the second half of the decade the stock continued to be in an overfished state, culminating in 1999 with ICCAT setting annual TACs at 10,600 mt in 2000, 10,500 mt in 2001 and 10,400 mt in 2002. By 2002, the stock status was improving, being somewhat overfished (B = 95% of B_{MSY}) but no longer undergoing overfishing (F = 75% of F_{MSY}) and ICCAT set a TAC of 14,000 mt for the years 2003–2005. The SCRS noted additional years of strong recruitment contributing to stock recovery. By 2006 the stock status had improved further to nearly recovered; B near B_{MSY}; F < F_{MSY} since 2001. ICCAT extended the 14,000 mt TAC through 2008 and elected to add 2,690 mt to the TACs during the new management period, which was the unused portion of the United States quota during the 2003–2006 period.

This addition brought the recommended TAC to levels that exceeded the scientific recommendations. In 2009, the status was updated to “Recovery plan achieved with >50% probability”, with estimated B > B_{MSY}, F < F_{MSY}; MSY = 13,730 mt. ICCAT recommended a TAC intended to maintain the stock at or above B_{MSY}.

The TAC in 2010 and 2011 was 13,700 mt (Rec. 09-02 and Rec.10-02 respectively), just below the estimated MSY. In 2011 (Rec. 11-02), ICCAT the Commission noted the concern expressed by the SCRS that the allowable country-specific catch levels agreed to in Rec. 10-02 exceeded the 2011 TAC. In 2011 (Rec. 11-02) ICCAT set the annual TACs for 2012 and 2013 at 13,700 mt with added provisions to ensure that any overages would be deducted in subsequent years. In Rec. 11-02 ICCAT also called for the establishment at its 2013 meeting of conservation and management measures for a next three-year period (2014/15/16) on the basis of the SCRS advice resulting from the stock assessment in 2013 as well as the ICCAT Criteria for the Allocation of Fishing Possibilities (Rec. 01-25). In 2013 (Rec 13-02) ICCAT set the annual TACs for 2014, 2015 and 2016 at 13,700 mt. In 2016 (Rec 16-03), ICCAT set the annual TAC at 13,700 mt but following the stock assessment in 2017, and advice from the SCRS, annual TACs for 2018, 2019, 2020, and 2021 have been set at 13,200 mt with conditions for adjusting party catch limits (which cumulatively exceed the TAC) should any annual catch exceed 13,200 t. The conditions give inter-annual flexibility to parties while providing mechanisms to constrain overall catch to the TACs (Rec 17-02).

Although there is no evidence that the current harvest strategy as a whole has been evaluated in detail, the annual review and record of changes over time demonstrates that the strategy has achieved its rebuilding objectives. ICCAT has also recognised limitations in the harvest strategy and has agreed to develop an HCR to evaluate and design an explicit and more robust harvest strategy (see PI1.2.2). Therefore, SCRS is in regular discussion with the Commission to develop and further improve assessment methods and evaluate reference points. The harvest strategy is periodically reviewed and improved as necessary. SG 100 requirements are met.

	Shark finning			
e	Guide post	It is **likely** that shark finning is not taking place.	It is **highly likely** that shark finning is not taking place.	There is a **high degree of certainty** that shark finning is not taking place.
	Met?	**NA**	**NA**	**NA**

Rationale:
Swordfish (the target species) is not a shark; this SI is not applicable.

f	**Review of alternative measures**			
	Guide post	There has been a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock.	There is a **regular** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock and they are implemented as appropriate.	There is a **biennial** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock, and they are implemented, as appropriate.
	Met?	**Yes**	**Yes**	**No**

Rationale:

The Assessment Team understands that when referring to UoA-related mortality of unwanted catch of the target stock, PI 1.2.1(f) is referring to the fishery, not the whole stock. Even though P1 assesses the whole stock, the term UoA is used in the same sense as it is used in P2, i.e. for the fishery (SA2.4.8.1). In the context of this assessment, unwanted catch of the target stock is regarded as swordfish which are harvested in the fishery, but which are not sold or kept for personal use. In essence, these are undersized swordfish. ICCAT (2017) and its predecessors establish a minimum size for the take of swordfish. Paragraph 9 prohibits the taking of swordfish weighing less than 25 kg live weight or 125 cm lower jaw fork length but allows CPCs the option of setting tolerances for incidental catch (15 kg and 119 cm fork length but not exceeding 15% of the catch). Paragraph 10 sets out further conditions. CPCs are required to include data on discards (both live and dead) annually.

National Standard 9 of the Magnuson-Stevens Act requires that fishery conservation and management measures shall, to the extent practicable, minimize bycatch and minimize the mortality of bycatch that cannot be avoided[21]. NMFS utilizes both self-reported logbook data and observer data to monitor bycatch in the pelagic longline fishery.

The goal of bycatch reduction, therefore, is to minimize the amount of bycatch to the extent practicable and safely minimize the mortality of species caught as bycatch. The following table lists the methods employed to reduce bycatch in the Atlantic HMS fisheries. Final Amendment 5b to the 2006 Consolidated HMS FMP (all measures effective by January 1, 2018) expanded the use of several of these methods in HMS fisheries.

Bycatch Reduction Methods in the Atlantic HMS Fisheries	
Commercial Fisheries	**Recreational Fisheries**
Gear Modifications (including hook and bait types) Circle Hooks Weak Hooks Time/Area Closures Performance Standards Education/Outreach Effort Reductions (i.e., Limited Access) De-hooking Devices (mortality reduction only) Prohibiting retention of fish	Circle Hooks (mortality reduction only) Formal Voluntary or Mandatory Catch-and-Releas Program for all Fish or Certain Species Prohibiting retention of fish Education/Outreach De-hooking Devices (mortality reduction only)

An HMS Bycatch Reduction Implementation Plan was developed in late 2003 and updated through 2010, which identified priority issues to be addressed in the following areas: 1) monitoring; 2) research; 3) management; and 4) education/outreach. Since 2000, NMFS has implemented a number of time/area closures and gear restrictions in the Atlantic Ocean to reduce discards and bycatch of a number of species, including juvenile swordfish. Measures taken in the pelagic longline fishery to reduce bycatch and bycatch mortality, with potential relevance to swordfish include: quotas (SWO - 1985); minimum size (1995); gear

[21] 16 U.S.C. §1851(a)(9)

marking (1999); MAB closure (1999); limited access (1999); GOM closure (2000); FL, Charleston Bump, NED closures (2001); gangion length, corrodible hooks, de-hooking devices, handling & release guidelines (2001); NED experiment (2001-03); VMS (2003); circle hooks and bait requirements (2004); mandatory safe handling and release workshops (2006); closed area research (2008-10); observer and research requirements in Cape Hatteras Spec. Research Area (CHSRA), increased observer coverage in Atl PLL fishery (2009).

The combined effects of the individual area closures and gear restrictions have been examined by comparing the reported catch and discards from 2005-2016 to the averages for 1997-1999 throughout the U.S. Atlantic fishery. Previous analyses attempted to examine the effectiveness of the time/area closures only by comparing the 2001-2003 reported catch and discards to the base period (1997-1999). Declines were noted for both the numbers of kept and discards of almost all species examined including swordfish (see below).

Year	Number of Hooks Set (x1000)	Swordfish Kept	Swordfish Discards
1997-99	**8,533.10**	**69,131**	**21,519**
(A) 2001-03	**7,364.10**	**50,838**	**13,240**
2012	7,678.50	51,544	7,996
2013	7,305.90	44,556	4,765
2014	7,125.20	32,908	4,655
2015	5,855.90	27,730	5,382
2016	5,217.60	24,456	4,427
(B) 2005-16	**6,374.50**	**39,171**	**7,729**

This information provides evidence that there has been a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock (undersized swordfish). SG60 requirements are met. This review has been conducted regularly over recent years and measures have been implemented as appropriate, as shown by the monitoring of their effectiveness. SG80 requirements are met. The Assessment Team did not have evidence that the review has been biennial. SG100 requirements are not met.

References

ICCAT (2007) The International Convention for the Conservation of Atlantic Tunas (as amended) http://www.iccat.int/Documents/Commission/BasicTexts.pdf
ICCAT (1999) Recommendation on Rebuilding Program for North Atlantic swordfish, Rec 99-2 https://www.iccat.int/Documents/Recs/compendiopdf-e/1999-02-e.pdf
ICCAT (2013) Recommendation 13-02 for the Conservation of North Atlantic Swordfish https://www.iccat.int/Documents/Recs/compendiopdf-e/2013-02-e.pdf
ICCAT (2015) Recommendation by ICCAT on the Development of Harvest Control Rules and of Management Strategy Evaluation, Rec 15-07 https://www.iccat.int/Documents/Recs/compendiopdf-e/2015-07-e.pdf
ICCAT (2016) Recommendation by ICCAT for the Conservation on North Atlantic swordfish. Rec 16-03 https://www.iccat.int/Documents/Recs/compendiopdf-e/2016-03-e.pdf
ICCAT (2017a) Recommendation by ICCAT Amending the Recommendation for the Conservation on North Atlantic swordfish. Rec. 16-03 https://www.iccat.int/Documents/Recs/compendiopdf-e/2017-02-e.pdf
ICCAT (2017b) Report of the 2017 ICCAT Atlantic Swordfish Stock ASSESSMENT session https://www.iccat.int/Documents/Meetings/Docs/2017_ATL_SWO_ASS_REP_ENG.pdf.
ICCAT (2019a) Recommendation by ICCAT Amending the Recommendation for the Conservation on North Atlantic swordfish. Rec. 17-02 https://www.iccat.int/Documents/Recs/compendiopdf-e/2019-03-e.pdf
ICCAT (2019b) Resolution by ICCAT on Development of Initial Management Objectives for North Atlantic swordfish. https://www.iccat.int/Documents/Recs/compendiopdf-e/2019-14-e.pdf
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Neilson, J., Arocha, F., Calay, S., Mejuto, J., Ortiz, M., Scott, G., Smith, C., Travassos, P., Tserpes, G. & Andrushchenk, I. (2013). The Recovery of Atlantic Swordfish: The Comparative Roles of the Regional Fisheries Management Organization and Species Biology, Reviews in Fisheries Science, 21:2, 59-97

Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	**≥80**
Information gap indicator	**Information sufficient to score PI**
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	**85**
Condition number (if relevant)	**NA**

PI 1.2.2 – Harvest control rules and tools

PI 1.2.2		There are well defined and effective harvest control rules (HCRs) in place		
Scoring Issue		SG 60	SG 80	SG 100
a	HCRs design and application			
	Guide post	**Generally understood** HCRs are in place **or available** that are **expected** to reduce the exploitation rate as the point of recruitment impairment (PRI) is approached.	**Well defined** HCRs are **in place** that **ensure** that the exploitation rate is reduced as the PRI is approached, are expected to keep the stock **fluctuating around** a target level consistent with (or above) MSY, or for key LTL species a level consistent with ecosystem needs.	The HCRs are expected to keep the stock **fluctuating at or above** a target level consistent with MSY, or another more appropriate level taking into account the ecological role of the stock, **most** of the time.
	Met?	**Yes**	**Yes**	**No**

Rationale:

The MSC Interpretation on Harvest Control Rules (HCRs) distributed to CABs on 16 December 2015, explains that "…'*generally understood' HCRs do not need to be well defined or explicitly agreed, but there should be at least some implicit agreement supported by past management actions from which to understand that 'generally understood' rules exist, and there should be no reason to expect that management will not continue to follow such generally understood rules in future and act to be responsive to changes in indicators of stock status with respect to explicit or implicit reference points."*

ICCAT has a history of taking management action to reduce the exploitation rate in the NA swordfish fishery in response to stock and fishing mortality status estimates. Fishing mortality rates were reduced by several ad hoc measures including transfer of effort to the South Atlantic by some countries, implementation of a minimum size and, later in the 1990s, the implementation of TACs which were renegotiated after every stock assessment.

In 1999, ICCAT implemented a more formal, ten-year rebuilding plan under Recommendation (Rec) 99-02 (see PI1.1.2) and has set TACs, catch limits, and other technical regulations regularly since that time, following advice from the SCRS, to rebuild and maintain the North Atlantic swordfish stock above Bmsy.

In 2011, ICCAT adopted Recommendation 11-13 setting out principles of decision making for ICCAT conservation and management measures (ICCAT 2011). This describes a generally understood decision-making framework based on a harmonized format for tuna RFMO science bodies to convey advice (Strategy Matrix) agreed at the Second Joint Meeting of Tuna RFMOs in June 2009 in San Sebastian, Spain. Recommendation 11-13 guides the Commission in developing management measures responsive to stock status as represented on the Kobe Plot (a standardized "four quadrant, red-yellow-green" format, which is widely embraced as a practical, user-friendly method to present stock status information). The Recommendation sets out clearly how management measures should be designed depending on where status is estimated in the Kobe quadrants, generally codifying the type of action taken in Recommendation 99-2. In all cases, the requirement set out is that management measures should be designed to maintain the stock at, or rebuild to, Bmsy, with a high probability. Where appropriate (overfishing and overfished) the adoption of a rebuilding plan is required.

The framework does not specify actions with respect to approaching limits but is designed around achieving targets with high probability, considering both stock status and exploitation rate with requirements to reduce exploitation rate when it is above Fmsy. By definition, as the framework is designed to achieve the TRP with high probability and maintain fishing mortality below Fmsy, it will also act to maintain the stock above the implicit LRPs (see PI1.1.2 si(b)). This represents, generally understood HCR that is consistent with the harvest strategy.

Further, ICCAT recommendation 13-02 (ICCAT, 2013) on the conservation of North Atlantic swordfish, specifies at paragraph 5 that: *The SCRS and the Commission shall begin a dialogue to allow for the development of harvest control rules (HCRs) for consideration in any subsequent recommendations.*

Further, while the HCRs are being developed, should the biomass approach the level which triggered the establishment of the previous rebuilding plan [Rec 99-02] then management measures should be considered to avoid further decline and begin to rebuild the stock.

The SG60 requirements are therefore met.

A new recommendation in 2016 (recommendation 16-03; ICCAT, 2016a) is more explicit. It specifies a "rebuilding plan", determines when a "rebuilding plan" shall be triggered, and clearly states a requirement for harvest levels as recommended by the SCRS that will meet the Commission's objectives of maintaining or rebuilding stocks to Bmsy within the defined (10 year) period. It also specifies that the Commission "shall adopt" those harvest levels. Specified actions are required if the biomass is estimated/projected to fall towards 0.65 Bmsy.

The MRAG and Lloyd's Register teams note that:

1. The SCRS undertakes regular reviews and provides regular advice;
2. The SCRS reviews don't just look at current status; they project future status with measures of uncertainty.
3. The trigger is, in effect, above 0.65 Bmsy; Recommendation 16-03 states that "should the biomass approach the level which triggered the establishment of the previous
4. rebuilding plan [Rec. 99-02], then the Commission shall adopt a 10-year rebuilding plan.".
5. The minimum expectation is rebuilding within 10 years.
6. The words, "maintaining or rebuilding" imply a more precautionary approach and the possibility of triggering the plan well above 0.65 Bmsy.

We further note that the Rec 99-02 rebuilding plan pre-dated any certifications and has been invoked to suggest a general approach, supporting SG60 scoring. It was put in place when the Commission recognised the advice of the SCRS that the stock was over exploited, but not in response to a pre-planned rule guiding the Commission's decision making. Rec 99-02 outlined (at Para 1) that a 10-year rebuilding program will be implemented to achieve Bmsy, and set up new catch limits for contracting parties. It also specified (at Para 9) that the SCRS should regularly conduct an assessment and provide advice. But it did not say how the Commission must react to that advice. The rebuilding of the swordfish stocks to above Bmsy demonstrates that the control implemented worked as desired and the requirement in advance to follow this action, should the biomass approach the level at which it was previously put in place, is now codified in Rec 17-02 (previously 16-03). The SG80 requirements are therefore met.

While the HCRs are expected to keep the stock fluctuating at or above a target level consistent with MSY, no explicit consideration has bene made of the ecological role of the stock. ICCAT Resolution 2019-14 (ICCAT, 2019b) specifies a process for developing initial management objectives for North Atlantic swordfish but does not include any consideration of other issues. The SG100 requirements are not met.

b	**HCRs robustness to uncertainty**			
	Guide post		The HCRs are likely to be robust to the main uncertainties.	The HCRs take account of a **wide** range of uncertainties including the ecological role of the stock, and there is **evidence** that the HCRs are robust to the main uncertainties.
	Met?		**Yes**	**No**

Rationale:

The SCRS assessments provide the Commission with estimates of projected biomass for a range of TAC options along with the associated probability of being at or above B_{MSY}. It has also advised the Commission on TACs that would achieve a specified probability of being at or above Bmsy (e.g. 75% in ICCAT, 2012). These probabilities are based upon the main uncertainties in the stock assessment, with consideration of alternative assessment approaches and multiple sensitivity tests (see PI 1.2.4). The HCR can therefore be considered to take account of the main uncertainties (due to data, assumptions and assessment model) in setting harvest levels. SG80 requirements are met.

The HCR framework is an instruction to the Commission on how to proceed given status estimates and outlook advice from the SCRS. It naturally incorporates uncertainties due to the scientific processes but does not account for other uncertainties related, for example, to implementation error or issues not considered in the stock assessment processes, such as environmental or ecological processes. SG100 requirements are not met.

	HCRs evaluation			
c	Guide post	There is **some evidence** that tools used **or available** to implement HCRs are appropriate and effective in controlling exploitation.	**Available evidence indicates** that the tools in use are appropriate and effective in achieving the exploitation levels required under the HCRs.	**Evidence clearly shows** that the tools in use are effective in achieving the exploitation levels required under the HCRs.
	Met?	**Yes**	**Yes**	**Yes**

Rationale:

ICCAT relies on its CPCs to constrain domestic harvesting within each country's or entity's catch limit. In addition, minimum size regulations have been established for the Convention area. Countries can implement domestic controls above and beyond these limits to further the conservation of North Atlantic swordfish. For example, US-specific tools include fleet quotas, individual quotas, time/area closures, observer coverage requirements, VMS requirements, dockside monitoring requirements, hail in/out requirements, logbook requirements, season, transfer processes and bycatch reduction measures.

The available evidence indicates that these tools used to implement the generally understood harvest control rule are appropriate and clearly shows that they are effective in achieving the required exploitation levels (ICCAT, 2009b; 2012a). While there is evidence that the catch was reduced further than required by the TAC reductions implemented as part of the rebuilding plan, the successful rebuilding of the stock to B_{MSY} between 1999 and 2009 nevertheless shows that these tools are appropriate and effective in controlling exploitation. The consistent decline in fishing mortality from 1999 to recent years (since when it has been stable) is shown in the stock assessment outputs (for example, Figure 9 of ICCAT, 2016). The Commission is committed to implementing the TACs (ICCAT, 2011) and has put in place carry-over mechanisms to ensure this in all recommendations on the Conservation of North Atlantic swordfish (e.g. ICCAT, 2016a; 2017). SG60, SG80 and SG100 requirements are met.

References:

ICCAT (2009) Supplemental Recommendation by ICCAT to amend the Rebuilding Program for North Atlantic swordfish, Rec 09-02 http://www.iccat.int/Documents/Recs/compendiopdf-e/2009-02-e.pdf

ICCAT (2011). Recommendation by ICCAT for Conservation of North Atlantic Swordfish, Rec. 11-02. https://www.ofdc.org.tw:8181/web/components/Editor/ICCAT/files/2011-02-e.pdf

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ICCAT (2012) Report of the Standing Committee on Research and Statistics (SCRS), Madrid, Spain, October 2012. 303 pp. http://www.iccat.int/Documents/Meetings/SCRS2012/2012_SCRS_R

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ICCAT (2016a) Recommendation 16-03 by ICCAT for the Conservation of North Atlantic Swordfish. https://www.iccat.int/Documents/Recs/compendiopdf-e/2016-03-e.pdf

ICCAT (2017) Recommendation by ICCAT Amending the Recommendation for the Conservation on North Atlantic swordfish. Rec. 16-03 https://www.iccat.int/Documents/Recs/compendiopdf-e/2017-02-e.pdf

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ICCAT (2019c) SCRS Report Section 9.9 SWO-ATL https://www.iccat.int/Documents/SCRS/ExecSum/SWO_ATL_ENG.pdf

Draft scoring range and information gap indicator added at Announcement Comment Draft Report

Draft scoring range	**≥80**
Information gap indicator	**Information sufficient to score PI**

Overall Performance Indicator scores added from Client and Peer Review Draft Report

Overall Performance Indicator score	**85**
Condition number (if relevant)	**NA**

PI 1.2.3 – Information and monitoring

PI 1.2.3		**Relevant information is collected to support the harvest strategy**		
Scoring Issue		SG 60	SG 80	SG 100
a	Range of information			
	Guide post	**Some** relevant information related to stock structure, stock productivity and fleet composition is available to support the harvest strategy.	**Sufficient** relevant information related to stock structure, stock productivity, fleet composition and other data are available to support the harvest strategy.	A **comprehensive range** of information (on stock structure, stock productivity, fleet composition, stock abundance, UoA removals and other information such as environmental information), including some that may not be directly related to the current harvest strategy, is available.
	Met?	**Yes**	**Yes**	**No**

Rationale:

There is a good understanding of stock structure (ICCAT, 2007a). On-going tagging, genetic and morphological studies have generally confirmed stock structure, indicating that it is sufficient to support the harvest strategy.

Several studies (ICCAT, 2006) have described Swordfish growth and have been used to characterize historical trends in the catch at length in the fishery, indicating that this information is also sufficient to support the harvest strategy.

Information on growth is time invariant which does not allow for examination of production- associated temporal trends. The same appears to be the case with maturity changes. It is not therefore possible to say that information on stock productivity is comprehensive.

Landings are generally dockside monitored and information on removals from all fleets exploiting the stock is considered adequate to inform the current harvest strategy (and future HCR development).

SG60 and SG80 requirements are met.

Overall, information on the fishery, while sufficient for the harvest strategy (and future HCR development), is not considered comprehensive (e.g. for growth and maturity trends). The new ICCAT stock assessment in 2017 has resulted in improvements in the estimates of stock status (ICCAT 2017b), but the picture with respect to relevant information is little changed.

SG100 requirements are not met.

B	**Monitoring**			
	Guide post	Stock abundance and UoA removals are monitored and **at least one indicator** is available and monitored with sufficient frequency to support the harvest control rule.	Stock abundance and UoA removals are **regularly monitored at a level of accuracy and coverage consistent with the harvest control rule**, and **one or more indicators** are available and monitored with sufficient frequency to support the harvest control rule.	**All information** required by the harvest control rule is monitored with high frequency and a high degree of certainty, and there is a good understanding of inherent **uncertainties** in the information [data] and the robustness of assessment and management to this uncertainty.
	Met?	**Yes**	**Yes**	**Yes**

Rationale:

The composition and operations of fleets involved in the North Atlantic swordfish fishery are well understood. This species is available to a large number of fishing countries due to its broad geographical distribution in the Atlantic. Directed swordfish fisheries (longline and harpoon) across the whole Atlantic include fleets from Canada, EU-Spain, United States, 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.

ICCAT requires members to report information regarding fishing activities, including catches, catches by size, effort and CPUE and biological and distributional/migration data. Recommendation 13-02 states that all CPCs catching swordfish in the North Atlantic shall endeavor to provide annually the best available data to the SCRS, including catch, catch at size, location and month of capture on the smallest scale possible, as determined by the SCRS. The data submitted shall be for broadest range of age classes possible, consistent with minimum size restrictions, and by sex when possible. The data shall also include discards (both dead and alive) and effort statistics, even when no analytical stock assessment is scheduled. The SCRS shall review these data annually.

Responsibility for reporting lies with the CPCs. Landings are recorded either through logbooks, dealer records or dockside monitoring. As most if not all swordfish are landed as individual fish, there is comprehensive information on the age/size composition of the landings. Reporting of catch data is reasonably up to date although there are some time lags. ICCAT (2013) reported catches up to 2012, noting that at the time of the assessment no 2012 catches were reported for eight CPCs. For these CPCs, the ICCAT swordfish stock assessment group used the average value of catches reported for 2009-2011 as an estimate for 2012 to use in the projections. This amounted to approximately a 6% increase in the reported catch of 13,134. The SCRS Report (ICCAT, 2019c) reiterates this comment for the total Atlantic, though it is unclear for the North Atlantic alone: *The total Atlantic estimated catch (landings plus dead discards) of swordfish (North and South, including reported dead discards) in 2018 (19,262 t) was 7.1% lower than the reported catch of 2017 (20,726 t). As a small number of countries have not yet reported their 2018 catches and because of unknown unreported catches, this value should be considered provisional and subject to further revision.*

Discards are estimated through observer coverage for those countries with this type of monitoring (e.g. US,

Canada and Spain). Evaluations have been conducted which provide estimates of the uncertainty in these data and give guidance on the appropriate level of observer coverage. Observer coverage of the US pelagic longline fishery is consistent with NMFS guidelines (8%) and is sufficient to characterize discards. Observer coverage of the Spanish pelagic longline fishery is consistent with the recommendations of IEO scientists and the General secretariat for Fisheries (1%). Observer coverage of the Canadian longline fishery is consistent with the DFO recommended minimum coverage (5%). The SCRS reports in 2015 (ICCAT, 2015a) and 2016 (ICCAT, 2016) that several fleets have reported dead discards since 1991. The volume of Atlantic- wide reported discards has ranged from a minimum of 157 t in 2009 to a maximum of 1,139t in 2000, with 198t reported for 2014 and 149t in 2015. In 2015, the SCRS expressed concern due to the low percentage of fleets that have reported annual dead discards (in t) in recent years. Nevertheless, overall unreported landings and discards, do not appear to be significant. The uncertainties in these data are quantified through statistical models as part of the assessment process.

Stock abundance is monitored through the SCRS assessment process (see PI 1.2.4). A number of indices of fishable biomass (from 1963) and abundance at age (from 1978) are available and are used in the stock assessment (e.g. ICCAT 2013) from a number of harvesting nations (Japan, Portugal, Morocco, Canada 1 and 2, Spain age-specific and age-aggregated, and USA 1 and 2). These represent about 3 – 5 swordfish generations of monitoring. There are no fishery independent indices available so stock abundance indices are restricted to fishery dependent sources.

The CPUE data and stock assessment support the setting of annual TACs and catch limits by ICCAT (see PI1.2.2 si(c)). Stock abundance and fishery removals are therefore regularly monitored at a level of accuracy and coverage consistent with the generally understood harvest control rule (see PI1.2.2 si(a)), and CPUE indices are available and monitored with sufficient frequency to support the harvest control rule. The SG60 and SG80 requirements are met.

The most recent stock assessment was conducted in 2017 using data up to 2015. The previous stock assessment was in 2013 and the next is planned for 2021. Monitoring of abundance between assessments is based on CPUE indices. The ICCAT stock assessment in 2017, particularly the use of the Stock Synthesis model alongside the Bayesian Surplus Production model, resulted in a good understanding of inherent uncertainties in the information and enhanced the robustness of the assessment and management to this uncertainty. The SG100 requirements are met.

c	**Comprehensiveness of information**			
	Guide post		There is good information on all other fishery removals from the stock.	
	Met?		**Yes**	

Rationale:

All other fishery removals from the stock comprise only IUU fishing, if any.

ICCAT has taken significant measures to eliminate IUU fishing as indicated by Rec 2003-16 and Rec 2011-18.

Rec 2011-18 states that, “IUU fishing is one of ICCAT’s most pressing problems, threatening the sustainability of the stocks and undermining ICCAT’s credibility. It affects mostly Atlantic bluefin tuna (BFT) but also other ICCAT species, including bigeye, yellowfin, and skipjack tuna, and many shark species.” The Recommendation does not mention North Atlantic swordfish in the list of species affected by IUU.

Where IUU is considered a potential problem for stock assessment, the ICCAT SCRS incorporates stock assessment runs which include estimates of unreported catch. This has not been done for North Atlantic swordfish. As part of certification assessments, the Canadian DFO (pers. comm.) and US National Marine Fisheries Service (pers. comm.) have confirmed that the SCRS has no reason to believe there are any substantial unreported catches of North Atlantic swordfish, based on current information.

Overall, all information on North Atlantic swordfish removals is considered good and able to support a robust stock assessment. The ICCAT stock assessment in 2017 did not incorporate stock assessment runs

with estimates of unreported catch for the same reason indicated above. The SG80 requirements are met.

References:

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ICCAT (2011) Recommendation by ICCAT Further Amending Recommendation 09- 10 Establishing a List of Vessels Presumed to Have Carried Out Illegal, Unreported and Unregulated Fishing Activities in the ICCAT Convention Area

https://www.iccat.int/Documents/Recs/compendiopdf-e/2011-18-e.pdf

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https://www.iccat.int/Documents/Meetings/SCRS2015/SCRS_PROV_ENG.pdf

ICCAT (2017a) https://www.iccat.int/Documents/SCRS/ExecSum/SWO_ATL_ENG.pdf.

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ICCAT (2019c) SCRS Report Section 9.9 SWO-ATL
https://www.iccat.int/Documents/SCRS/ExecSum/SWO_ATL_ENG.pdf

Draft scoring range and information gap indicator added at Announcement Comment Draft Report

Draft scoring range	**≥80**
Information gap indicator	**Information sufficient to score PI**

Overall Performance Indicator scores added from Client and Peer Review Draft Report

Overall Performance Indicator score	**90**
Condition number (if relevant)	**NA**

PI 1.2.4 – Assessment of stock status

PI 1.2.4		There is an adequate assessment of the stock status		
Scoring Issue		SG 60	SG 80	SG 100
a	Appropriateness of assessment to stock under consideration			
	Guide post		The assessment is appropriate for the stock and for the harvest control rule.	The assessment takes into account the major features relevant to the biology of the species and the nature of the UoA.
	Met?		**Yes**	**Yes**

Rationale:

Stock production (that is, age-aggregated) and/or age-based models are commonly used in assessments to assess stock biomass and fishing mortality in relation to reference points associated with harvest control rules. Age-structured approaches, but not stock production ones, allow a description and consideration of year-class specific processes. For North Atlantic swordfish, it is not possible to reliably age 5+ fish and, for the age groups in the fishery (less than age 5), spatial and temporal dynamics, which may vary considerably by region in the North Atlantic, further complicate an age-structure approach. These make a stock production approach an appropriate option until these issues are resolved.

Prior to 2017, the SCRS used two production model approaches to provide the ICCAT Commission advice relative to MSY. In 2017, the SCRS used three stock assessment platforms (one only for continuity) to provide estimates of stock status as of 2015: the two production models used in previous years: A Stock Production Model Incorporating Covariates (ASPIC) and a Bayesian surplus production model with process error (BSP2); and a third age-structured model that was a new application for this stock: Stock Synthesis (SS). SS is an integrated statistical age-structured population modeling framework that has been applied in a wide variety of fish assessments globally (Methot and Wetzel, 2013). It is designed to accommodate both age and size structure in the population with multiple stock sub-areas and has the ability to utilize a wide diversity of age, size, and aggregate data from fisheries and surveys. Compared to production models it takes into account significantly more features relevant to the biology of the species the nature of the fishery, and the UoA. Its application to the North Atlantic swordfish assessment in 2017 was possible based on data presented at the 2017 ICCAT Swordfish Data Preparatory Meeting (ICCAT, 2017c).

In 2017, the SCRS determined the 2015 stock status using just the SS and BSP2 models. ASPIC was used mainly to provide continuity with the previous assessments. The results obtained in this evaluation were not strictly comparable with those obtained in the 2009 and 2013 assessments due to the incorporation of more data sources, updated catch and CPUE information and using joint probabilities from these two base case models. The SCRS regarded the 2017 assessment as providing a significant improvement in the understanding of current stock status for North Atlantic swordfish (ICCAT, 2017a,b). Projections were made based on both SS and BSP2.

Both SS and BSP2 models are appropriate for the stock and the use of the two models allows a wide exploration of the data to underpin the provision of robust advice relevant to implementation of the harvest control rules. While BSP2 is appropriate given the restricted age data for North Atlantic swordfish, the use of SS has allowed fuller exploration of stock recruit dynamics and recruitment fitting. The assessment now takes into account the major features of the species and fishery with consideration of fleet and spatial components as well as recruitment dynamics. SG80 and SG100 requirements are met.

b	**Assessment approach**			
	Guide post	The assessment estimates stock status relative to generic reference points appropriate to the species category.	The assessment estimates stock status relative to reference points that are appropriate to the stock and can be estimated.	
	Met?	**Yes**	**Yes**	

Rationale:

Each assessment conducted by the SCRS for the last decade has provided estimates of current and historical biomass relative to Bmsy and current and historical fishing mortality rate relative to Fmsy. These are appropriate to the stock and can be estimated using both BSP2 (where Bmsy is fixed) and SS (where it is estimated). While there is no explicit limit reference point yet agreed, there is an implicit one (the lowest estimated biomass which led to a rebuilding plan) which is estimated by stock assessments. SG60 and SG80 requirements are met.

c	**Uncertainty in the assessment**			
	Guide post	The assessment **identifies major sources** of uncertainty.	The assessment **takes uncertainty into account**.	The assessment takes into account uncertainty and is evaluating stock status relative to reference points in a **probabilistic** way.
	Met?	**Yes**	**Yes**	**Yes**

Rationale:

Alternate models of surplus production dynamics are considered (ASPIC and BSP2). Within theses, major sources of uncertainty are identified in the assessments and include observation uncertainty in the combined biomass index and process uncertainty in the stock's intrinsic rate of growth, r, and carrying capacity, K. Process error is taken into account through consideration of alternate surplus production functions (e.g. Schaefer vs Fox) as well as uncertainty in the intrinsic rate of stock growth, r, and carrying capacity, K.

Observation uncertainty is taken into account through use of a number of CPUE indices and their synthesis into a combined index through General Linear Modelling. Error in the catch and its associated proportions at age is assumed to be negligible.

Model uncertainty is examined through comparing the results of age structured (SS) and age aggregated (SPM and BSM) models. In addition, retrospective analyses explore how the models perform when updated with new data. The SG60 and 80 requirements are met.

The assessment, either using age-aggregated (surplus production) or age-structured (SS) approaches, takes uncertainty into account through examination of the implications of observation, process and model error. Retrospective analyses are undertaken to determine how the models perform when updated with new information. Sensitivity tests are used extensively. Key model parameters are described in probabilistic terms including the ratio of current biomass and fishing mortality to B_{MSY} and F_{MSY}, respectively. SG100 requirements are met.

d	**Evaluation of assessment**			
	Guide post			The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored.
	Met?			**Yes**

Rationale:

ICCAT (2013) explored the implications of alternative model formulations and a range of hypotheses under each model. For the two stock production models there was a rigorous evaluation of each model while there was less time available to do the same for exploratory age structured model. At the time, noting the base case model used is a stock production model, ICCAT (2013) explored the implications of alternative model formulations and a range of hypotheses in a rigorous manner. Importantly, management advice based on the base case assessment model has been rigorously explored and estimates of trends in biomass and fishing mortality were similar across model formulations and a reasonable range of assumptions.

ICCAT (2017a,b) continued use of the two stock production models with the one (BSP2) forming part of the base case assessment set while the other (ASPIC) was used for continuity testing (as part of testing for consistency of estimation and advice). An age structured model fit using SS was also explored extensively using a range of sensitivity (e.g., selectivity form, stock-recruit steepness assumptions and estimation, index jackknifing) and retrospective analyses. The model appeared to be stable and, alongside BSP@ was used as a basis for advice on TACs. The SG 100 requirements are met.

e	**Peer review of assessment**			
	Guide post		The assessment of stock status is subject to peer review.	The assessment has been **internally and externally** peer reviewed.
	Met?		**Yes**	**No**

Rationale

The assessment of the stock status is subject to peer review. Internal peer reviews of stock assessments are conducted by the ICCAT SCRS which usually meets in October of every year. Additionally, working group meetings are held within a year on an ad-hoc as needed basis. Usually these are used to prepare data and analyses prior to an assessment meeting. Once an assessment has been reviewed by the full SCRS, an executive summary is presented to the Commission. The SG80 requirements are met.

The SCRS is the scientific committee within ICCAT responsible for preparing and reviewing assessments. It is composed of scientists from the countries of ICCAT. While a broad range of international expertise participates in the SCRS this is considered an internal review. External review would require ICCAT to request individuals or a group outside of the SCRS to undertake a review of assessments. While ICCAT has a process for this which has been used for other stocks, it has not been applied to Swordfish. The SG100 requirements are not met.

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Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	**≥80**
Information gap indicator	**Information sufficient to score PI**
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	**95**
Condition number (if relevant)	**NA**

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5 Appendices

5.1 Assessment information

5.1.1 Previous assessments

The first MSC assessment of the US North Atlantic swordfish fishery was conducted in 2012-2013, and resulted in the certification of the fishery on 28 March 2013. The fishery was reassessed in 2017-2018 and was recertified on March 6, 2018. The first surveillance audit after recertification occurred in August 2019, producing a report on 19 October 2019.

Based on the combined tuna variation request approved by the MSC in February 2019: "all tuna and tuna-like fisheries certified against Certification Requirements v1.3 will be upgraded to v2.0 to foster harmonization efforts", an extended surveillance audit was announced in January 2020 to conduct a remote site visit and carry out the upgrade. This report represents the Principle 1 v2.0 upgrade assessment of the swordfish fishery only. The yellowfin and albacore fisheries included in the current certificate will be upgraded during the second surveillance using the "partial upgrade" process given in the variation approval. Details of all previous assessments and surveillance audits for this fishery are available in the MSC Track a Fishery page[22], listed under Assessments.

There are no conditions remaining for P1 and no conditions were closed at or between the previous surveillance audits and this upgrade P1 assessment. However, the fishery has had two conditions on P1 since the time of first certification, both of which have been closed. Previous assessment conditions for swordfish- P1 are summarized below.

Table 13. Summary of previous assessment conditions.

Condition	PI(s)	Year closed	Justification
Insert condition number and summary	Insert PI	State year of closure, if applicable.	
1.1 A limit reference point must be set above the level at which there is an appreciable risk of impairing reproductive capacity. Recognizing that ICCAT is the body responsible for the development and implementation of reference points for this stock, to address the condition the assessment team requires the client to work with NMFS and with other appropriate groups to strongly encourage ICCAT to develop and implement an explicit Limit Reference Point for	PI 1.1.2b. Reference Points	Closed at 3rd surveillance (Nov. 2016)	The language in the original Condition requiring ICCAT to develop and implement an explicit LRP for the N Atlantic swordfish stock went further than required by MSC CR v1.3. CB2.3.2.1 allows for the use of an implicit LRP (and TRP) for managing the stock in meeting SG80 for PI 1.1.2 scoring issue b. The reinterpretation of ICCAT Recommendations during the MSC ICCAT Harmonization Pilot and the acknowledgement of the MSC requirements articulated in paragraph CB2.3.2.1 of CR v1.3 allowed rescoring of the PI to SG80, meaning that Condition 1.1 is now met without any need for further action. Thus, the limit reference point is set above the level at which there is an appreciable risk of impairing reproductive capacity. This scoring issue was met in 2016 and PI 1.1.2 was

[22] https://fisheries.msc.org/en/fisheries/us-north-atlantic-swordfish/@@assessments

North Atlantic Swordfish stock.			rescored from 75 to 80.
1.2 Well-defined harvest control rules must be put in place that are consistent with the harvest strategy and ensure that the exploitation rate is reduced as limit reference points are approached. Recognizing that ICCAT is the body responsible for the development and implementation of control rules, to address the condition the assessment team requires the client to work with NMFS and with other appropriate groups to strongly encourage ICCAT to develop and implement control rules for North Atlantic Swordfish stock	PI 1.2.2a. HCRs	Closed at 4th surveillance (July 2017) following harmonization with the North West Atlantic Canada Harpoon Swordfish Fishery	ICCAT Recommendation 16-03, in combination with previous ICCAT Recommendations and actions, met SG 80 for PI 1.2.2.a in 2017, and allowed closure of this condition. Provisions in these recommendations include the necessary elements to support a well-defined harvest control rule that is consistent with the harvest strategy and ensures that the exploitation rate is reduced as limit reference points are approached. The assessors concluded that the SG80 requirements were met. PI 1.2.2 was rescored from 75 to 80, allowing the condition to close.

5.2 Evaluation processes and techniques

5.2.1 Site visits

An extended surveillance audit (from the one carried out in August 2019) was announced in January 2020 to conduct a remote site visit and carry out the P1 assessment upgrade. The remote audit consisted of email exchanges between MRAG Americas, the Client, and P1 stakeholders (scientists from the SEFSC/ NOAA Fisheries) between February and March 2010. No new information was provided by stakeholders for this upgrade P1 assessment.

5.2.2 Stakeholder participation

No new interviews were conducted during the remote audit, nor were any meetings with the assessment team requested. Stakeholders consulted via electronic mail did not provide additional information beyond what was provided in the Re-assessment and surveillance audit of 2018/19.

5.2.3 Evaluation techniques

MSC posted the announcement of the P1 upgrade assessment on its North Atlantic swordfish track-a-fishery page, as well as sent it by email in their Fishery Announcements newsletter to all registered recipients. At this time, MRAG Americas also announced the remote assessment site visit dates, as well as the assessment team. This was done according to the process requirements as laid out in MSC's Fisheries Certification Process v2.1 and as modified by the joint tuna variation response.

In the Fishery Standard v2.1 default assessment tree used for this assessment, the MSC has 28 'performance indicators', six in Principle 1, 15 in Principle 2, and seven in Principle 3. The performance indicators are grouped in each principle by 'component.' Principle 1 has two components, Principle 2 has five, and Principle 3 has two. Each performance indicator consists of

one or more 'scoring issues;' a scoring issue is a specific topic for evaluation. 'Scoring Guideposts' define the requirements for meeting each scoring issue at the 60 (conditional pass), 80 (full pass), and 100 (state of the art) levels.

Note that some scoring issue may not have a scoring guidepost at each of the 60, 80, and 100 levels. The scoring issues and scoring guideposts are cumulative; this means that a performance indicator is scored first at the SG60 levels. If not all of the SG scoring issues meet the 60 requirements, the fishery fails and no further scoring occurs. If all of the SG60 scoring issues are met, the fishery meets the 60 level, and the scoring moves to SG80 scoring issues. If no scoring issues meet the requirements at the SG80 level, the fishery receives a score of 60. As the fishery meets increasing numbers of SG80 scoring issues, the score increases above 60 in proportion to the number of scoring issues met; performance indicator scoring occurs at 5-point intervals. If the fishery meets half the scoring issues at the 80 level, the performance indicator would score 70; if it meets a quarter, then it would score 65; and it would score 75 by meeting three-quarters of the scoring issues. If the fishery meets all of the SG80 scoring issues, the scoring moves to the SG100 level. Scoring at the SG100 level follows the same pattern as for SG80.

Principle scores result from averaging the scores within each component, and then from averaging the component scores within each Principle. If a Principle averages less than 80, the fishery fails.

This upgrade assessment only includes scoring for Principle 1.

Scoring for this fishery followed a consensus process in which the assessment team discussed the information available for evaluating performance indicators to develop a broad opinion of performance of the fishery against each performance indicator. Review of scoring sections by all team members assured that the assessment team was aware of the issues for each performance indicator. Subsequently, the assessment team member responsible for Principle 1 filled in the scoring table and provided a provisional score. The assessment team members reviewed the rationales and scores, and recommended modifications as necessary, including possible changes in scores. Once the team had reached consensus on the scores for each Principle 1 indicator, discussions with other CAB were held to harmonize scores with overlapping swordfish assessments (see section 5.8).

5.3 Peer Review reports

To be drafted at Public Comment Draft Report

The peer reviewer´s report with the Assessment Team´s response is shown in Table 14 and Table 15 below (also in the attached Excel File (PR-US North Atlantic Swordfish (P1Upgrade) – 2020 - PR A_mrag.xlsx).

Table 14 – Peer review report of the US North Atlantic swordfish (P1 Upgrade)- General Comments (see attached Excel file).

Fishery	Assess-ment Start Year	Peer Reviewer (A/B/C)	Question	Yes/No	Peer Reviewer Justification (as given at initial Peer Review stage). Peer Reviewers should provide brief explanations for their 'Yes' or 'No' answers in this table, summarising the detailed comments made in the PI and RBF tables.	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)
US North Atlantic swordfish (P1 Upgrade)	2020	PR A	Is the scoring of the fishery consistent with the MSC standard, and clearly based on the evidence presented in the assessment report?	Yes	The scoring is straight-forward in that it only addresses P1, the scores are consistent with previous evaluations, all old conditions have been closed, no new conditions were suggested and the scoring was informally harmonized with the previously certified Canadian NAT swordfish fishery.	Thank you for your comment. One further clarification is that MRAG Americas conducted a formal meeting (in person) and had subsequent communications with Lloyd´s Register to harmonise scores with the North West Atlantic Canada Harpoon and Longline Swordfish fisheries. The outcomes of these (formal) meetings are included in Section 5.6 of the report (Harmonised fishery assessments).
US North Atlantic swordfish (P1 Upgrade)	2020	PR A	Are the condition(s) raised appropriately written to achieve the SG80 outcome within the specified timeframe? [Reference: FCP v2.1, 7.18.1 and sub-clauses]	Yes	Not applicable. The fishery has had two conditions on P1 since the time of first certification. However, both were closed and there are no conditions remaining for P1 and no new conditions were suggested in this upgrade P1 assessment.	Thank you for your comment, your assessment of the closure of past conditions is correct.
US North Atlantic swordfish (P1 Upgrade)	2020	PR A	Is the client action plan clear and sufficient to close the conditions raised? [Reference FCR v2.0, 7.11.2-7.11.3 and sub-clauses]	Yes	Not applicable. The fishery has had two conditions on P1 since the time of first certification. However, both were closed and there are no conditions remaining for P1 and no new conditions were suggested in this upgrade P1 assessment. Therefore, a client action to address conditions is moot.	Thank you for your comment, your assessment of the closure of past conditions is correct. Indeed, the client action plan to address conditions was met and conditions were closed at different times during the previous certification and at recertification (see Table 13). Note: We understand that the PR meant “met”, not “moot” (possible typo).

US North Atlantic swordfish (P1 Upgrade)	2020	PR A	Enhanced fisheries only: Does the report clearly evaluate any additional impacts that might arise from enhancement activities?	No	Not an enhanced fishery. Not applicable	N/A
US North Atlantic swordfish (P1 Upgrade)	2020	PR A	Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary)	N/A	The Report is well-written and addresses P1 upgrade issues concisely. Editorial: On page 63 there are two paragraphs that start with "The North West Atlantic Canada swordfish longline fishery was..." I believe that the second of those paragraphs should be referring to the harpoon fishery, rather than longline.	Thank you for your comment. We have addressed the editorial issue on Section 5.6 of the report (Harmonised fishery assessments). There was an error indeed. We meant to describe the MSC re-certification and surveillance schedule for both Canadian swordfish fisheries that this fishery is harmonised with: the North West Atlantic Canada swordfish harpoon fishery and the North West Atlantic Canada swordfish longline fishery. Both fisheries were re-certified and have undergone 3 surveillance audits. We have edited this information on the report.

Table 15 - Peer review report of the US North Atlantic swordfish (P1 Upgrade)- PI comments (Standard v2.0) (see attached Excel file).

Fishery	Year	UoA stock	UoA gear	PR (A/B/C)	PI	PI Information	PI Scoring	PI Condition	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)	CAB Res-ponse Code
US North Atlantic swordfish (P1 Upgrade)	2020	N Atl Swordfish	Longline, handgear buoy line	PR A	1.1.1	Yes	No (score increase expected)	NA	1.1.1b. The Report says: "Median Bcurrent/Bmsy in 2015 of 1.04 had been at or above 1 in several years preceding. The lower 95% confidence bound in 2015 was 0.82". Referring to Fig 2 and 3, B>Bmsy for about the last decade. Whether or not there is a high degree of certainty that the stock is fluctuating around Bmsy depends on the interpretation of what the CI's mean. The 95% CI means that there is an 2.5% chance [(1-95%)/2] that the was below 0.82 Bmsy in the final year reported. If you interpret that the CI indicates whether the B trajectory over the last decade is below 0.82, then SG100 is not met. But if the CIs are viewed as variability each year, then there is a pretty good chance that it has been fluctuating around Bmsy. As an example, if you had 10 years at which the median estimate of B/Bmsy was 0.999, it is highly likely	The Assessment Team agreed that an argument could be made either way regarding whether the stock status meets SG100. On balance, the Assessment Team preferred to maintain the SG80 level score for this scoring issue, although if the stock status results of the 2017 assessment are at least maintained in the next full assessment, then this scoring issue should be raised to the SG100 level. The last paragraph of the justification for SI1.1.1b has been updated to address this comment and our response in the report.	Not accepted (no score change)

									(>95%) that the stock has been above 1 in 3 or more years. I realize this is an obscure technical comment. But the SG wording relates to certainty about the "fluctuation", meaning that some are above and some below.		
US North Atlantic swordfish (P1 Upgrade)	2020	N Atl Swordfish	Longline, handgear buoy line	PR A	1.1.2	Yes	Yes	NA	Scoring Agreed; Stock not overfished. Not Applicable	NA	Accepted (no score change)
US North Atlantic swordfish (P1 Upgrade)	2020	N Atl Swordfish	Longline, handgear buoy line	PR A	1.2.1	Yes	Yes	NA	Scoring Agreed	NA	Accepted (no score change)
US North Atlantic swordfish (P1 Upgrade)	2020	N Atl Swordfish	Longline, handgear buoy line	PR A	1.2.2	Yes	Yes	NA	Scoring Agreed	NA	Accepted (no score change)
US North Atlantic swordfish (P1 Upgrade)	2020	N Atl Swordfish	Longline, handgear buoy line	PR A	1.2.3	Yes	Yes	NA	Scoring Agreed	NA	Accepted (no score change)
US North Atlantic swordfish (P1 Upgrade)	2020	N Atl Swordfish	Longline, handgear buoy line	PR A	1.2.4	Yes	Yes	NA	Scoring Agreed	NA	Accepted (no score change)

5.4 Stakeholder input

To be drafted at Client and Peer Review Draft Report
To be completed at Public Certification Report

No stakeholder input was received.

5.5 Surveillance

This fishery was first certified on 28 March 2013 and obtained re-certification on 6 March 2018. A scope extension process to add yellowfin and albacore tuna as P1 target species to the certificate was completed on October 23, 2018. After recertification and the scope extension, the fishery completed the first surveillance audit in October, 2019. This Principle 1 v2.0 assessment upgrade is an extended surveillance audit for swordfish that follows the combined tuna fishery variation request of February 2019 and the MSC's VR response and requirements set out in Appendix (MSC 2019). These requirements call the CAB to produce the following reports:

a. Client and Peer Review Draft Report
b. Public Comment Draft Report
c. Final Draft Report
d. Public Certification Report

This is the first draft report of the P1 upgrade process for the swordfish fishery, which is scheduled to be completed in July 2020. To remain on schedule with the surveillance audits that were planned at recertification and to coordinate with the schedule for the yellowfin and albacore tuna fisheries that are covered by the certificate, the second surveillance audit will be carried out in May, 2020. At that time, the upgrade P1 assessments for yellowfin and albacore tuna will also be carried out. Thus, the 2nd surveillance will occur while the swordfish P1 upgrade is ongoing.

Tables showing the frequency, level, and timing of surveillance audits for the swordfish fishery are included in the re-certification report (click here for US_N_Atlantic_SWO_PCR report). Variations will be requested to coordinate surveillance audits for the three fisheries (North Atlantic swordfish, yellowfin tuna, and albacore tuna) each year.

5.6 Harmonised fishery assessments

To be drafted at Announcement Comment Draft Report stage
To be completed at Public Certification Report stage

Harmonisation is required in cases where assessments overlap, or new assessments overlap with pre-existing fisheries. This is the case of the US North Atlantic swordfish fishery and the Northwest Atlantic Canada swordfish fisheries. A summary of the recent processes, activities and outcomes of efforts to harmonize assessments for these fisheries follow.

No new harmonization activities had taken place since recertification of the U.S. North Atlantic Swordfish fishery on 06 March 2018. However, for this upgrade P1 assessment, a harmonisation meeting was carried out in St. Petersburg, Florida on February 27, 2020. Dr. Kevin Stokes, the P1 expert with Lloyd's Register and Dr. Graeme Parkes and Dr. Mónica Valle from MRAG Americas participated in the meeting. They agreed to update and upgrade justifications for some P1 indicators and to update some scores according to the v2.01 requirements and language. Electronic communications between Dr. Stokes and Dr. Paul Knapman from Lloyd's Register and MRAG Americas continued through March, 2020. Both CABs produced draft upgraded P1 scoring tables and reviewed each other's. Agreement on all scores and the suitable arguments to justify scores was achieved on March 16, 2020. Upgraded and updated scoring tables for P1 are included in this report. Lloyd's Register will incorporate these new updates in their third surveillance reports for the NW Atlantic harpoon and longline fisheries (likely to be issued in April, 2020).

Relevant developments in MSC certified fisheries are:

Both, the North West Atlantic Canada swordfish harpoon fishery and the North West Atlantic Canada swordfish longline fishery were recertified on 12 December 2017. Both fisheries have also followed the same schedule for surveillance audits. The first surveillance reports after recertification were published on 05 April 2018, the second surveillance reports on 05 April 2019, and the third surveillance reports recently, on 17 April 2020.

The (certified) fisheries and Performance Indicators that have been subject to harmonization are presented below. Fisheries that have withdrawn from the MSC program are not listed, even if harmonization occurred in the past.

Table 16. Overlapping fisheries.

Fishery name	Certification status and date	Performance Indicators to harmonise
North West Atlantic Canada harpoon swordfish	Certified 18 June 2010 Recertified 12 December 2017 Lloyds Register (Acoura)	P1- All PIs
North West Atlantic Canada longline swordfish	Certified 19 April 2012 Recertified 12 December 2017 CAB: Lloyds Register (Acoura)	P1- All PIs

Table 17. Overlapping fisheries- Supporting information

Supporting information	
The key background or supporting information relevant to the harmonization activities, processes and outcomes included: - MRAG Americas re-certification report (published 06 March 2018). - Lloyd's Register re-certification reports (published 12 December 2017) - Latest surveillance reports from both CABS - MSC FCP Version 2.1 - The current MSC assessment report template - 2017 ICCAT/SCRS swordfish stock assessment - New ICCAT recommendations and resolutions (issued since 2017)	
Was either FCP v2.1 Annex PB1.3.3.4 or PB1.3.4.5 applied when harmonising?	**No**
Date of harmonisation meeting	**02/27/2020**
If applicable, describe the meeting outcome	
Agreement was reached between MRAG Americas' and Lloyd Register's teams for all the P1 PIs.	

5.7 Objection Procedure – delete if not applicable

To be added at Public Certification Report stage

The report shall include all written decisions arising from a 'Notice of Objection', if received and accepted by the Independent Adjudicator.

Reference(s): FCP v2.1 Annex PD