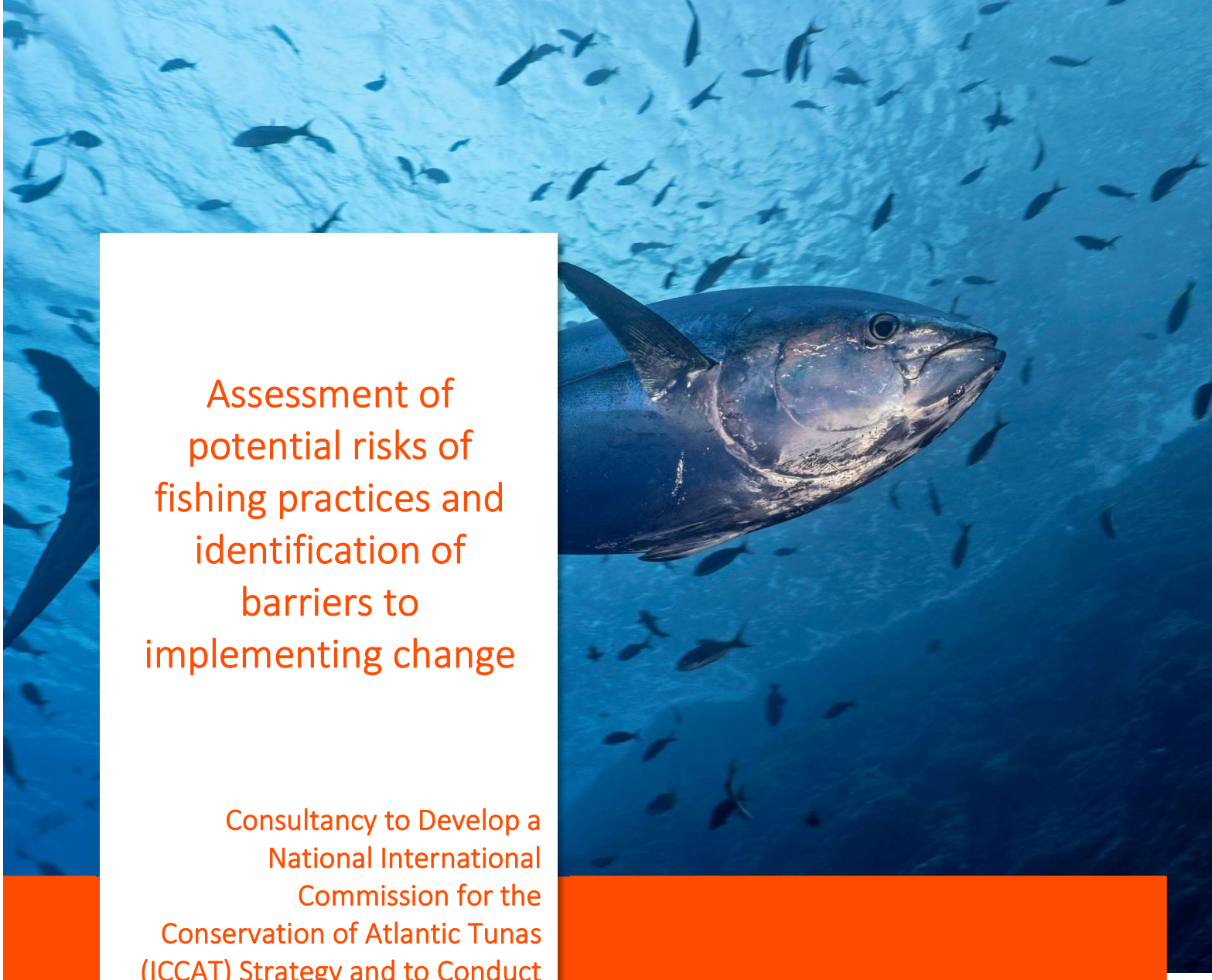

Assessment of potential risks of fishing practices and identification of barriers to implementing change

Consultancy to Develop a National International Commission for the Conservation of Atlantic Tunas (ICCAT) Strategy and to Conduct Key Activities from the Fishery Improvement Plan for Grenada

CH | Business Consulting.

COMPETE CARIBBEAN

IDB Inter-American Development Bank

CONTENTS

ACRONYMS AND ABBREVIATIONS

ALB	Albacore
BET	Bigeye Tuna
BUM	Blue Marlin
CPC	Contracting Party and Cooperating Non-Contracting Party, Entity or Fishing Entity in ICCAT
FAD	Fish Aggregating Device
FAO	Food and Agriculture Organization of the UN
ICCAT	International Commission for Conservation of Atlantic Tunas
MSY	Maximum Sustainable Yield
RFMO	Regional Fisheries Management Organisation
SAI	Sailfish
SIDS	Small Island Developing States
SKJ	Skipjack Tuna
TAC	Total Allowable Catch
WHM	White Marlin
YFT	Yellowfin Tuna

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This document was prepared by Joseph Powers.

1 ASSESSMENT OF POTENTIAL RISKS OF FISHING PRACTICES AND IDENTIFICATION OF BARRIERS TO IMPLEMENTING CHANGE

1.1 INTRODUCTION

The Grenada longline/troll fishery developed in the 1980's primarily targeting yellowfin tuna. The Grenadian government recognized the importance of participating in the management of highly migratory species in the Atlantic by formally becoming a member state of the International Commission for the Conservation of Atlantic Tunas (ICCAT) in 2018. Additionally, the longline/troll sector expressed an interest in attaining certification by the Marine Stewardship Council (MSC) as a sustainable fishery. To that end, a preliminary analysis was conducted in 2019 (MSC Pre-Assessment (Sieben and Gascoigne, 2021)) to identify strengths and deficiencies in achieving certification criteria. In response to that pre-assessment, a workplan was developed to address weaknesses in the fishery (Comprehensive Fisheries Improvement Project (C-FIP 2020)).

One goal of the C-FIP was to complete a "risk assessment of current tuna fishing practices to ensure target and other species within the marine ecosystem are protected and develop harvest control rules that reflect the risks." How those risks are evaluated and management implemented in the ICCAT arena are an important factor in this evaluation. Therefore, the scientific functions of ICCAT and the use of science in the development of management advice are discussed. Additionally, this report draws upon the analyses of the MSC Pre-Assessment year (Sieben and Gascoigne, 2021) and the C-FIP to evaluate progress based upon additional data, *if any*. Potential impacts of the practices of the Grenada fishery on the status of target and non-target/bycatch species and on habitat and ecosystem sustainability are examined. Also, control measures to mitigate impacts are suggested.

1.2 ICCAT AND GRENADA

Tuna and tuna-like species occur throughout the Atlantic Ocean and Mediterranean and Caribbean Seas in both temperate and tropical waters. They are exploited by fisheries flagged by coastal states of the Atlantic and its Seas and also by distant water fleets from outside the Atlantic. A Regional Fisheries Management Organization (RFMO) was developed in the 1970's to address the management of these resources, i.e. the International Commission for the Conservation of Atlantic Tunas (ICCAT). ICCAT is comprised of member countries who formally agree to promote the goals and objectives of the ICCAT treaty. Grenada has chosen to be a member state of ICCAT. The term CPC refers to Contracting Party and Cooperating Non-Contracting Party, Entity or Fishing Entity in ICCAT. Thus, Grenada is a Contracting Party.

ICCAT makes binding recommendations for management measures through member state agreements. With membership comes the responsibility to report catch and compliance data, as well as other information as stipulated in individual management measures. ICCAT also monitors compliance with extant regulations by both member and non-member states. The members of ICCAT can (and have) imposed sanctions on imports to member states of tuna exported from countries that are not in compliance.

The ICCAT Secretariat serves as the collator of ICCAT databases on catches, fishing effort and size frequency and other data. Through ICCAT's Standing Committee on Research and Statistics (SCRS), scientists from both member states and cooperating parties use these data to develop research to support stock assessments of the ICCAT species. Assessments provide the Commission with scientific advice on the status of the resources, overall recommendations on exploitation and the effectiveness of regulations.

Primary tuna and tuna-like species that are caught by Grenada fisheries are yellowfin tuna (YFT), bigeye tuna (BET), skipjack tuna (SKJ), albacore (ALB), blue marlin (BUM), white marlin (WHM), swordfish (SWO) and sailfish (SAI). Their status (SCRS 2024) and implications for Grenada fisheries are provided in Appendices

Appendix 1. Grenada Tuna Catches and Stock Status.

1.3 GRENADA TUNA PELAGIC LONGLINE, TROLL AND DROPLINE FISHERIES

Longline, troll and dropline fisheries are directed at large pelagic fishes in the Grenadian Exclusive Economic Zone (EEZ). The pelagic species comprise the dominant proportion of Grenadian total landings of ca 2000 tonnes (FAO FishStatj). Higher-grade fresh yellowfin and bigeye tunas are exported to the United States, while lower grade yellowfin tuna and other marketable species are sold into the domestic market. The main domestic market species of this fishery are yellowfin tuna, common dolphinfish (*Coryphaena hippurus*) and sailfish, while white marlin, blue marlin, swordfish and wahoo are rare/seasonal components of the retained marketable catch (Burns, 2019). Small catches of albacore, blackfin tuna and skipjack appear as Grenada landings in ICCAT databases (SCRS 2024). It is unclear the source and markets of these species. Additionally, Burns (2019) noted non-retained catches of several pelagic and coastal sharks and other teleosts from this fishery.

Currently (2024), the Grenada Fisheries Division reported approximately 385 registered longline vessels (10 vessels with length < 12 ft, 120 vessels 12-26 ft, 75 vessels 26-31 ft, 150 vessels 32-54 ft and 20 vessels 55-80 ft) employing 1700 full time fishers and 150 part time (Rennie pers comm 2024). Additionally, there were 265 vessels trolling/FAD vessels (500 fulltime and 95 part time fishers, Rennie pers comm 2024). Vessels using pelagic longline and troll gear target free-swimming schools of yellowfin tuna, and other tuna and tuna-like species and billfishes. This longline/troll fishery occurs on fishing grounds along the west coast of Grenada. Small-sized longline vessels make day trips using a ca 50 hooks per set. Vessels of about 9 m length make trips of between two and five days with approximately 200-300 hooks per set and larger vessels make trips of up to two weeks deploying between 400-1000 hooks per set (Sieben and Gascoigne, 2021). The fishery occurs year-round but the main yellowfin tuna season is from October to July. The longline vessels make shallow sets, with hooks fishing at depths between 10 and 55 m. Longline vessels primarily use J hooks but some larger vessels use circle hooks. Leaders (the fishing line adjacent to hooks) are made of nylon monofilament (Sieben and Gascoigne, 2021). Longline vessels use drift gillnets to catch flyingfish (*Hirundichthys affinis*) to be used as longline bait, purchase imported frozen bait (e.g. thread herring, *Opisthonema oglinum*) which they use as chum to catch flying fish to use as bait, or purchase pelagic forage fish, mainly bigeye scad (*Selar crumenophthalmus*) caught by a Grenada inshore beach seine fishery and kept alive in pens, for use as bait (Gentner et al., 2018). In recent years the use of scad as bait has predominated relative to flyingfish, as the availability of flyingfish has declined (Gentner 2024 *pers comm*).

The Grenada FAD fishery is conducted by vessels using troll and dropline gears aggregated around anchored fish aggregating devices (FADs). There are four FADs, anchored at approximately 10 nm, 12 nm, 20 nm and 25 nm along the east coast of Grenada, and a fifth off Carriacou (Sieben and Gascoigne 2021). The Grenville FAD Fishers Organisation (GFFO) maintains and manages the ownership of the anchored FADs (Sieben and Gascoigne 2019). The droplines are deployed from the smaller artisanal vessels around FADs at ca. 35 to 100 m depth using lures or live bait. Participants based mainly from Grenville, with a few participants based from Carriacou and Petit Martinique (Gentner et al., 2018; Sieben and Gascoigne, 2021). The FAD high season is between January and June, but operates throughout the year (Sieben and Gascoigne, 2021).

1.4 RISKS TO TARGET AND NON-TARGET SPECIES IN GRENADA LONGLINE, TROLL AND DROPLINE FISHERIES

The target species of these fisheries are defined as yellowfin tuna and bigeye tuna. This specification is based largely on the fact that these are the two species in the tuna export market. Catches of other tuna and tuna-like species occur and are sold in domestic markets and sometimes landings exceed those of bigeye. However, those species will be covered under the category of *Non-Target Species*. This analysis draws heavily on the C-FIP and the study conducted by Sieben and Gascoigne (2021), noting where the information base has changed and, most importantly, where it has not. So, for purposes of this analysis, yellowfin and bigeye are the target species. Skipjack, albacore, the marlins, sailfish and swordfish are non-target species termed "bycatch" locally because they are not targeted.

The primary information on tuna and tuna-like species catches used in this evaluation is the Task 1 ICCAT database. Task 1 data are the landings and discards reported by each CPC to ICCAT. Grenada's reports are for landings only, as discards are not estimated. The most recent update of Task 1 data were provided in the report of SCRS in October of 2024. Grenada's reported landings for recent years (Table 1) show the dominance of yellowfin tuna in the landings followed by sailfish, a non-target species. In many of these years, non-target landings of tuna species exceed that of bigeye, a target species. The decline overall of landings in the last three years coincides with the impact of COVID; however, we suspect that some of the reports are incomplete, as well.

Year	2016	2017	2018	2019	2020	2021	2022	2023	%
Atlantic Yellowfin	1607	1257	1391	818	784	369	1036	730	77.5%
Atlantic Bigeye	23	33	27	19	11	0	1	4	1.1%
Western Atlantic Skipjack	17	17	18	30	10	13	12	11	1.2%
North Atlantic Albacore	50	62	37	23	22	6	3	0	2.0%
Atlantic Blue Marlin	53	54	62	69	49	31	30	37	3.7%
Atlantic White Marlin	15	9	11	19	14	1	5	7	0.8%
West Atlantic Sailfish	137	165	150	111	97	61	58	71	8.2%
North Atlantic Swordfish	29	36	36	22	15	4	7	6	1.5%
Blackfin tuna	0	0	0	94	73	0	36	40	2.4%
Atlantic bonito	2	2	1	0	1	1	0	0	0.1%
King mackerel	4	5	4	18	11	2	1	0	0.4%
Little tunny	1	0	0	0	0	0	0	0	0.0%
Atlantic Spanish mackerel	1	1	1	1	1	0	0	0	0.0%
Wahoo	0	0	0	32	18	15	16	16	0.9%
Total	1939	1641	1738	1256	1106	503	1205	922	100.0%

Table 1 - Grenada Landings of tuna and tuna-like species 2016-2023 in tonnes (SCRS 2024)

Sieben and Gascoigne (2021) in their Table 9 include the additional species of dolphinfish, great barracuda, rainbow runner and generic sharks. However, no updates on their landings post-2016 have been provided. Additionally, there are recorded Grenada landings of flyingfish and bigeye scad from the FAO database (FishStatj) which are discussed separately under bait species.

The current status of each of the target and non-target tuna and tuna-like species in the Grenada fishery have been updated from that given in Sieben and Gascoigne (2021). Assessments have been conducted for all of the tuna stocks subsequent to 2021 (SCRS 2024). Status updates are given in Appendix 1, as well as a discussion of management measures, progress in the development of harvest control rules (HCRs) at ICCAT and Grenada's participation in the fishery. ICCAT status determinations are defined as "overfished or not" and "overfishing or not" . A species-stock is overfished if its current biomass is less than that which would support maximum

sustainable yield (MSY), i.e B/Bmsy < 1. A stock is undergoing overfishing if the current fishing mortality rate is greater than that which would eventually produce MSY, i.e. F/Fmsy > 1.

Additionally, a description of HCRs with examples from ICCAT and paths for Grenada's input into their development are provided in Appendix 2.

1.4.1 Bycatch Assessment of Relative Risks

The C-FIP Workplan requests in Activity 3 that there be "*a comprehensive ecological risk assessment of the open ocean longline/troll and troll/dropline FAD fisheries. (a) Assess relative risks to affected species, populations and stocks by comparing threat status categorizations, both within and between taxonomic groups in combination with assessing raised fishery-wide annual catch levels. (b) Determine the relative risks from the fishery on the viability of affected species, populations and stocks especially vulnerable to overexploitation, within and across taxonomic groups, by comparing indices for productivity and for susceptibility. (c) Identify contemporary fishing methods and gear, and opportunities for improved bycatch mitigation, accounting for potential cross-taxa conflicts or tradeoffs that might result from some bycatch mitigation approaches.*"

1.4.1.1 Non-Target Data Deficient Species

The bycatch species for which no stock assessments have been done (termed main secondary species using MSC parlance) were defined by Sieben and Gascoigne (2021) as dolphinfish, great barracuda, blackfin tuna, wahoo and Atlantic thread herring. As such they are data deficient. Therefore, they performed a productivity-susceptibility analysis (PSA) for these species. No new information on these species has become available since then so their results are given here (Table 2). The PSA scoring assigns a low risk to sustainability for each of the species, except a medium risk for the baitfish threadfin herring. Based on this information, it can be concluded that these species are ***highly likely to be above biologically-based limits.***

	Dolphinfish	Wahoo	Barracuda	Blackfin tuna	Threadfin Herring	Bigeye Scad
Average Age at Maturity	1	1	1	1	1	1
Ave Max Age	1	1	2	1	1	1
Fecundity	1	1	1	1	1	1
Ave Max Size	2	2	2	2	1	1
Ave Size at Maturity	2	2	2	2	1	1
Reproductive Strategy	1	1	1	1	1	1
Trophic Level	3	3	3	3	2	3
Ave Total Productivity	1.57	1.6	1.7	1.57	1.14	1.29
Availability	2	1	1	2	3	1
Encounterability	2	3	3	2	3	2
Selectivity	3	2	2	2	3	3
Post Capture Mortality	3	3	3	3	3	3
Total (multiplicative)	1.88	1.4	1.4	1.58	3.00	1.48
PSA Score	2.45	2.1	2.2	2.22	3.21	1.91
Risk Category	Low	Low	Low	Low	Med	Low

Table 2 - Risk based framework: productivity-susceptibility analysis for secondary species taken from Sieben and Gascoigne (2021) their Appendix 1. Entries are PSA scores described in their report

1.4.1.2 NON-TARGET SPECIES WITH STOCK ASSESSMENTS

Skipjack, albacore, the marlins, sailfish and swordfish all have had stock assessments conducted since 2021 (Appendix 1). Skipjack, albacore and swordfish are not overfished and are managed through Total Allowable Catch (TACs) and harvest control rules. Grenada catches are minimal relative to the TACs. Therefore, the Grenada fisheries impose ***a low risk of deleterious impacts on these stocks***.

The marlins and sailfish are overfished and stock-wide limitations on annual landings have been imposed by ICCAT without country-specific allocations. Grenada's reported landings are a significant proportion of the landings limits. Grenada's blue marlin landings are 3% of the landings limit of 1670 t which, itself, is less than the total landed catch. Grenada's white marlin landings are 3% of the 335 t landings limit. And the sailfish landings are 10% of the 1030 t limit (Appendix 1 and SCRS 2024). Given this, the Grenada fishery imposes ***a risk of impeding the recovery of these three stocks***

1.4.1.3 ENDANGERED, THREATENED AND PROTECTED SPECIES (ETPS)

While anecdotal evidence indicates that the Grenada longline/troll fishery rarely interacts with ETP species of sea turtles, seabirds and cetaceans, at present there is insufficient information to evaluate risk. The level of ETP interactions need to be verified including possible interactions with the use of gillnets for baitfish fishing.

1.4.1.4 BAITFISH SPECIES

The three baitfish species identified in the Grenada longline/troll fishery are flyingfish, bigeye scad and threadfin herring. No stock assessments have been conducted for bigeye scad and, thus, a PSA analysis was conducted, concluding that there was a low risk to sustainability (see Table 2). Similarly, for threadfin herring there is a medium risk with the higher risk attributable to lack of information on the source of the threadfin herring. Recent information indicates that much of the threadfin herring bait purchased by fishers as imports from outside the Caribbean region.That source needs to be identified to verify that thredfin herring are being sustainably managed.

Flyingfish were traditionally the source of bait for the longline fishery with gillnets being used by the longline fishers to capture flyingfish. Additionally, there was an important targeted fishery for flyingfish that began to decline in the 2000's primarily centered in Barbados and Tobago. Hypothesized reasons for the decline include oceanographic shifts and interaction with increased sargassum. However, the development of the Grenada longline fishery undoubtedly contributed to an increase in flyingfish catches used as bait (but unreported). A flyingfish assessment was conducted in 2008 (Medley et al. 2008) which assessed the regional resource including landed catches and estimates of Grenada's baitfish usage at that time. Since that time regional reports of landings declined and bait usage was monitored. However, anecdotal information has indicated that bait usage has shifted from flyingfish to predominantly bigeye scad at the present time. The regional usage of baits in yellowfin fisheries was revisited (see Grenada Longline Bait Usage Assessment). Additionally, that report reexamined the flyingfish stock assessment in light of bait usage. That report used simple kg YFT per hook information to estimate bait usage as a first approximation. However, no information was available to divide it into the three bait species. Nevertheless, even if all the usage was flyingfish (which clearly it is not) then the assessment indicates ***the regional flyingfish resource is not overfished and not undergoing overfishing.*** An initial harvest control rule for flying fish was proposed by Medley et al. (2008) and was incorporated into a Caribbean regional flyingfish management plan (CRFM 2014). We support efforts to implement both the Plan and the HCR. Nevertheless, there is a need to monitor baitfish catches to improve accuracy and precision relative to the Grenada Longline Bait Usage Assessment and to divide the aggregate usage estimates into individual species.

1.4.1.5 HABITAT AND ECOSYSTEM

The longline/troll fishery occurs in pelagic waters. The FAD fishery includes a small number of FADs at fixed anchored locations. Thus, the risk of the fishery to the habitat is low. Ecosytem risks are largely unknown due to the lack of information on the baitfish fisheries in terms of the suite of species caught in baitfish gillnets and bigeye scad beach seines.

1.5 CONCLUSIONS AND RECOMMENDATIONS ON OPPORTUNITIES FOR IMPROVED BYCATCH MITIGATION

The analyses in this report addressed activities in the fisheries improvement plan for Grenada's longline troll fishery by updating the ICCAT stock assessments and the progress in the development of Harvest Control Rules for the ICCAT tuna species. Additionally, the likely risks to baitfish stocks were evaluated and are likely to be low (based on Bait Usage Report and PSA analysis).

The most important risks of the fishery lie with the marlin and sailfish stocks where the stocks are overfished and Grenada landings are a significant proportion of the landings limitation. Thus, far the main recommended mitigation is non-offset circle hooks. The extent of their use within the Grenada fishery needs to be quantified. Additionally, the release of marlins and sailfish alive should be considered, with the right handling techniques and the appropriate circumstances.

On the broader issues of management, a limiting factor remains the quantification of catches. A system for estimating discarded catches is imperative for fisheries improvement. While observers are problematic for small boats with day trips, larger vessels may be able to take observers periodically. A standard data collection protocol should be developed to take advantage of those opportunities should they arise.

Logbooks should be considered (ideally electronic) as a means of obtaining discard information. Additionally, personal logbooks from cooperating fishers can be extremely helpful in interpreting the fisheries data and designing monitoring programs. These would have to be accompanied with appropriate confidentiality agreements.

On the larger scale, the implications of harvest control rules and implementation of ICCAT recommendations on catch limits is that there will be controls on the fisher's catches, effort or both. Grenada needs to establish the mechanisms to do that. This involves such things as: legislation providing the authority to do so; professionalizing the fishery through licensing and license limitations; and developing mechanisms to monitor the fishery within-year.

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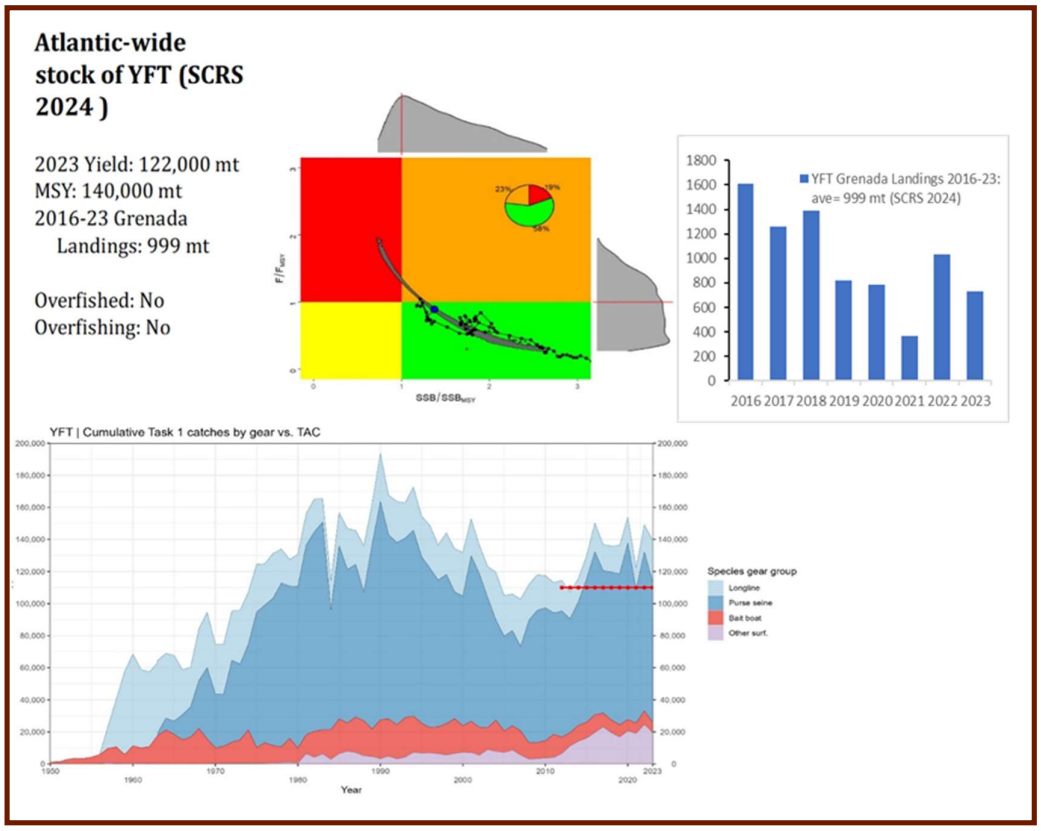
1.7 APPENDICES

1.7.1 APPENDIX 1. GRENADA TUNA CATCHES AND STOCK STATUS

Primary tuna and tuna-like species that are caught by Grenada fisheries are yellowfin tuna (YFT), bigeye tuna (BET), skipjack tuna (SKJ), albacore (ALB), blue marlin (BUM), white marlin (WHM), swordfish (SWO) and sailfish (SAI). Other "small tunas" such as wahoo, blackfin tuna, king mackerel and Spanish mackerel are caught periodically. Catch data reported by member and non-member countries are collated into an ICCAT database. However, reporting of the small tuna species by both member and non-member countries is irregular. The following discusses each of primary species separately giving their status and implications to Grenada fisheries.

1.7.1.1 YELLOWFIN TUNA (YFT)

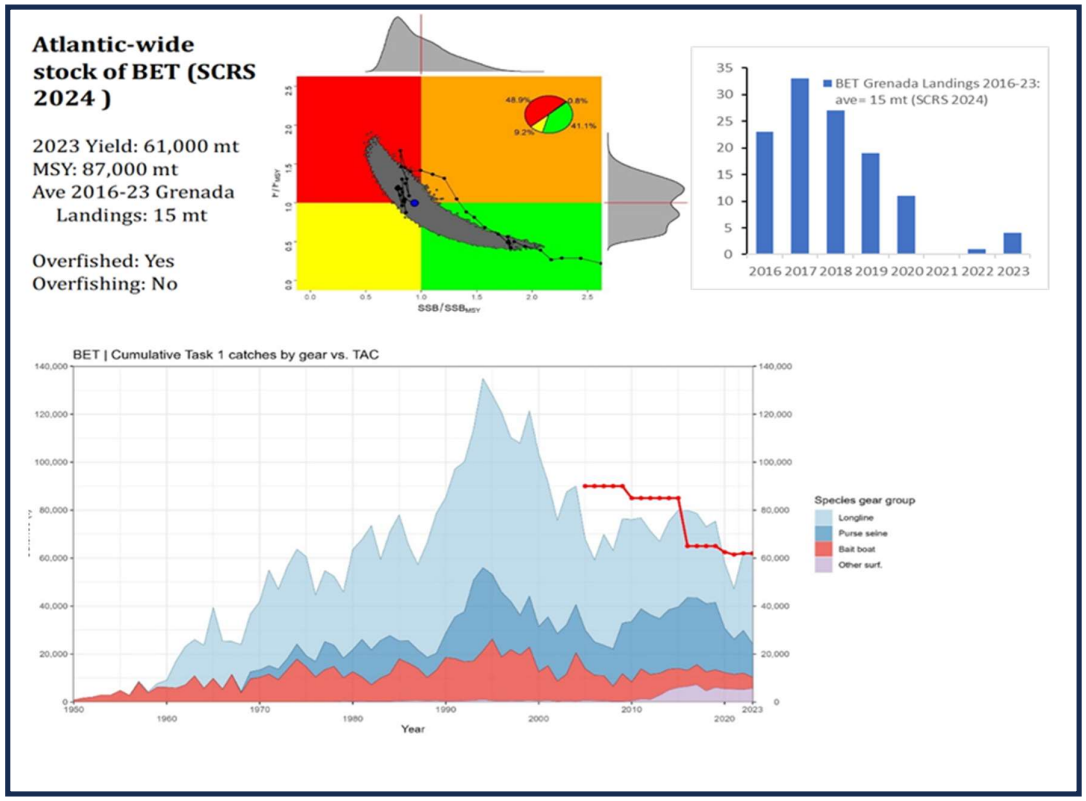


The preponderance of yellowfin catch occurs in the Eastern Atlantic, much of it in the Gulf of Guinea, predominately by purse seines, larger longliners (greater than 20 m length) and larger bait boats. In response to the status of the stock in the early 2000's, ICCAT established a TAC of 110,000 tons in 2012 but did not specify country-specific allocations. Thus, the TAC has been exceeded continuously by substantial amounts, indicating that existing conservation and management measures appear to be insufficient to limit harvest. The concern over the catches of small yellowfin and bigeye tunas at that time led to the establishment of temporal-spatial closures to surface fishing gear FAD sets in the Gulf of Guinea and subsequently in the entire Atlantic. Concerns have been reiterated that current catch levels, averaging nearly 140,000 mt over the last 5 years, are expected to result in overfishing and lead to an overfished status if they continue. Nevertheless, the current stock assessment (completed and approved by the SCRS in Oct 2024) indicates the Atlantic-wide stock of yellowfin is not as yet overfished (current spawning stock biomass is greater than the spawning stock biomass at maximum sustainable yield, i.e SSB/SSBmsy > 1) and is not undergoing overfishing (i.e. the current fishing mortality rate is less than the fishing mortality rate that would produce maximum sustainable yield, i.e. F/Fmsy < 1).

Yellowfin are the most important of Grenada's tuna catches, yet those catches are less than 1% of the Atlantic-wide catch. Additionally, Grenada fisheries are comprised primarily of small longliners (many less than 10 m in length) and trollers. The size of typical fish in the landed catch is in the 40-50 kg range, indicating there is not a concern in Grenada about "small fish" like that that drove the original ICCAT FAD regulations. Additionally, the Grenada FAD fishery uses a small number of anchored FADs, whereas the ICCAT FAD regulations were focused on the large-scale use of drifting FADs with radio beacons by purse seines. Thus, it appears that Grenada fisheries are not experiencing those management concerns. Grenada's catches will have little impact on yellowfin's overall status. However, collectively all the member states do impact the resource and Grenada should be prepared for future management actions designed to address those impacts and to meet the obligations that those regulations impose.

Presently there is no ICCAT HCR for Atlantic yellowfin tuna and the stated TAC (110,000 mt) is routinely exceeded. Thus far, the stock has remained in adequate conditions (no overfishing, not overfished), but the data and analyses from assessments indicate that there is little room for an increase in sustainable production of YFT. Hence, there is an expectation that a new TAC will need to be specified and country-specific allocations negotiated. Likely, those discussions among ICCAT members will focus on Eastern Atlantic issues of purse seines, FADs and large longliners. It is important that small island developing states (SIDS), such as Grenada, participate in those discussions such that the specific issues of small longline fisheries be recognized. In past ICCAT actions, agreements on small fishery allocations have been addressed by saying something like: *member states catching less than 1000 tonnes shall maintain (or reduce by "x" percent) catches of recent levels* (see for example (22-1. Recommendation by ICCAT replacing Recommendation 21-01 on a Multi-annual Conservation and Management Programme for tropical tunas. 2022-01-e.pdf). Grenada should be prepared for this circumstance by having a full knowledge of the variability of annual yellowfin catches and effort that have occurred in their fisheries.

1.7.1.2 BIGEYE TUNA (BET)

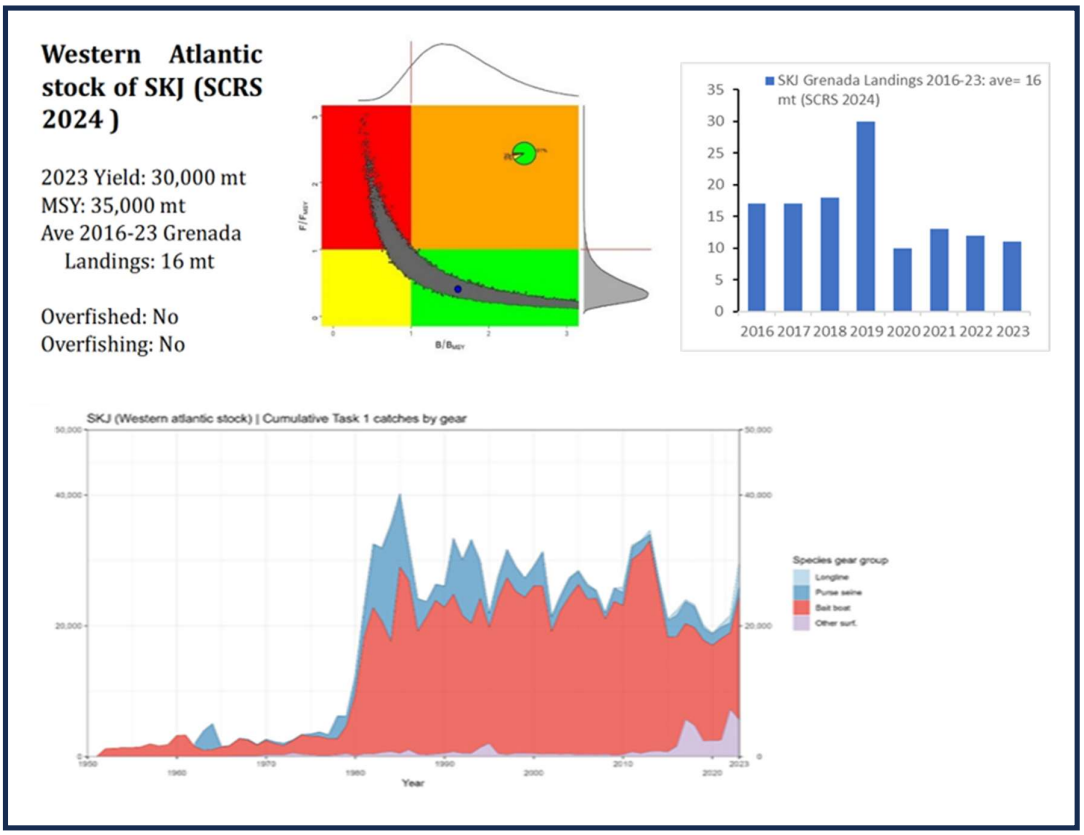


Based on the stock assessment of 2021, Atlantic bigeye tuna is overfished but not undergoing overfishing (probability of being overfished 58%, probability of overfishing 50%). Thus, in 2022 a TAC of 61,500 mt was imposed (2022-01-e.pdf). At that time, the SCRS (2024) advised that the Commission should consider adopting a TAC that would shift the stock status of BET towards a state of no overfishing and not overfished with a high probability. They also advised that "increased harvests on small fishes could have had negative consequences for the productivity of bigeye tuna fisheries (e.g., reduced yield at MSY and increased SSB required to produce MSY) (SCRS 2024). ICCAT Recommendation Rec. 22-01 (2022-01-e.pdf) also contains measures adopted by the Commission aimed at increasing long-term sustainable yield by reducing the catch of juveniles of tropical tunas. It is too early to know the extent by which these measures have reduced mortality of juvenile BET or if the stock has begun recovery.

The recent reports of Grenadian catches of BET (SCRS 2024) are very small relative to the Atlantic-wide catches and thus they fall into the category in Recommendation Rec. 22-01 (2022-01-e.pdf) that "(t)hose CPCs with recent average catch of less than 1,000 t are encouraged to maintain catch and effort at recent levels". However, there are requirements in the Recommendation for timely reporting of catches, FAD usage and other items by contracting parties.

No HCR has yet been developed for Atlantic BET but it is on the ICCAT/SCRS long term schedule. As that activity progresses it will undoubtedly have a focus on the multi-species nature of the Eastern Atlantic fishery of YFT/BET/SKJ and drifting FADS. Grenada should be prepared to engage in HCR development activities to assure that western Atlantic issues are appropriately considered.

1.7.1.3 SKIPJACK TUNA (SKJ)



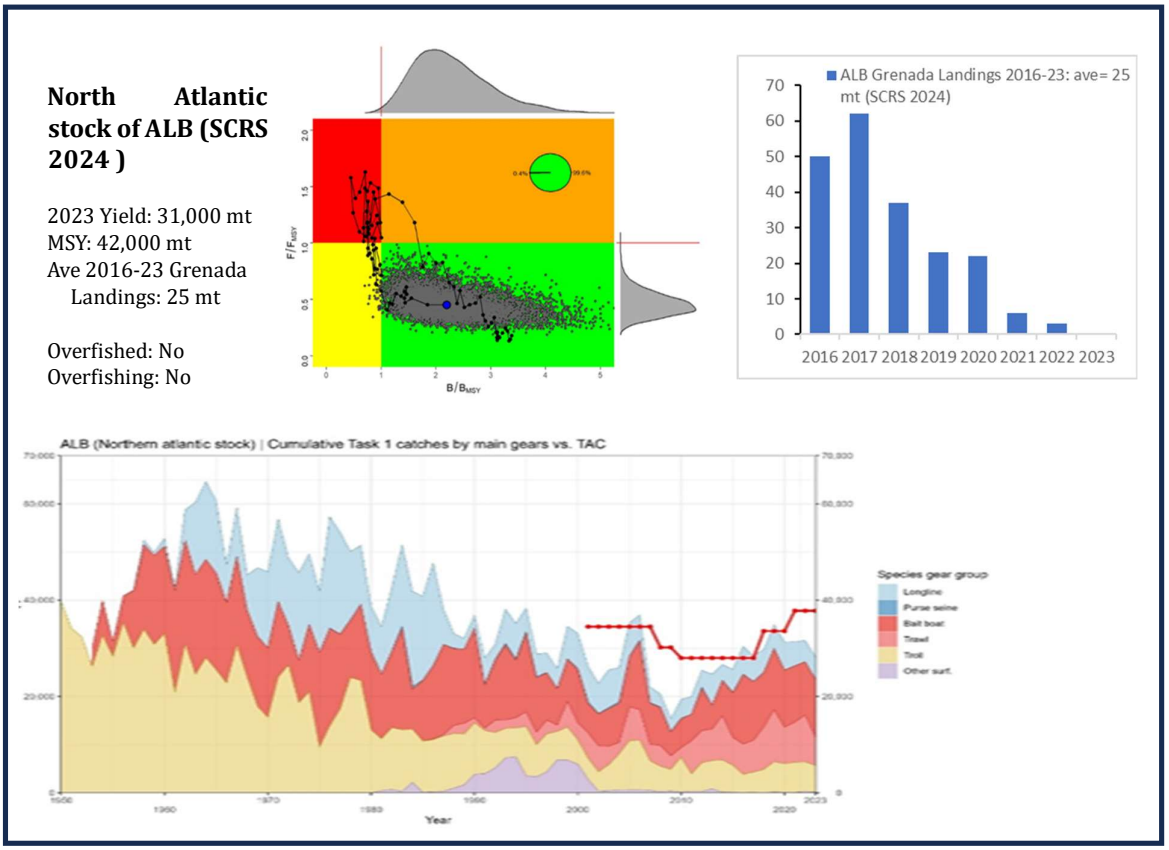
The 2022 stock assessment of western Atlantic skipjack concluded that was a high probability (91%) that the stock is not overfished nor undergoing overfishing and that a future constant catch using the median MSY of 35,277 t (the median estimate of MSY) will have about 70% probability of maintaining the stock in a not-overfished/not-overfishing condition.

An HCR has been in development by ICCAT and is nearing completion. Commission/SCRS development activity has been ongoing since 2022 through multiple science/management dialogs and ensuing analyses. There are currently 10 candidate management procedures(CMPs) as described in Response to the Commission, item 19.33 of SCRS report REP_EN_22-23-II-2.pdf), six empirical and four model-based. Briefly, these include: 1) Three index ratio CMPs with different limits on TAC change. TACs are set based on the combined index but when the change of index is within the specified envelope, TAC is not changed; 2) Three constant exploitation rate CMPs with three different limits on TAC change; and 3) Four model-based CMPs that use either a surplus production model or state-space surplus production model with a 100-40 hockey stick harvest control rule and an FTARGET of either 100%FMSY or 80%FMSY.

SCRS (2024) recommended that the Commission adopt one of the MSE-tested Management Procedures (MPs) (see Response to the Commission, item 19.33 of SCRS report REP_EN_22-23-II-2.pdf) and that a TAC be set based on that MP for 2025 and beyond.

Grenadian catches of SKJ are small averaging 16 t annually in recent years.

1.7.1.4 ALBACORE (ALB)

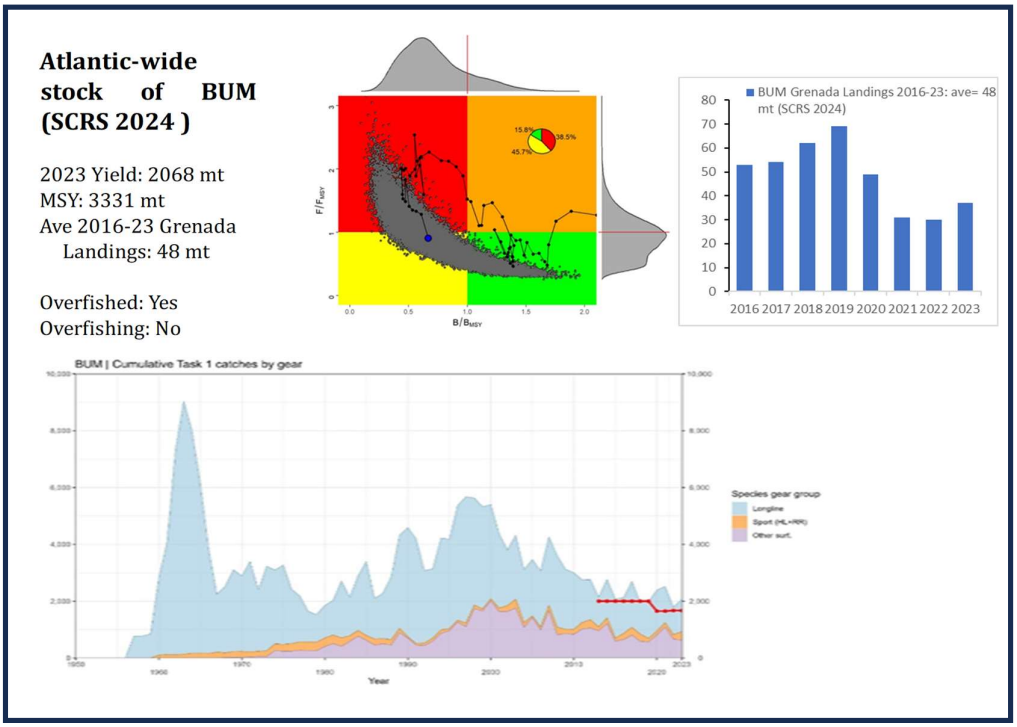


The 2023 stock assessment of North Atlantic albacore concluded that there was a high probability (>99%) that the stock is not overfished nor undergoing overfishing, noting that the abundance of North Atlantic albacore has continued to increase over the last two decades. A HCR was developed for NA ALB and fully implemented through Recommendation 21-04 (2021-04-e.pdf) that sets the management procedure to achieve Commission objectives. The SCRS applied that procedure yielding a recommended TAC of 47,251 t for 2024-2026.

Shares of the ALB TAC was allocated to CPCs through Recommendation 2023-05-e.pdf. That agreement notes that "CPCs other than those mentioned in paragraph 6 shall limit their annual catches to 302 t", where

paragraph 6 refers to the CPC specific allocations. Thus, Grenada falls into this category with recent catches averaging 25 t, the most recent years < 5 t.

1.7.1.5 BLUE MARLIN (BUM)



Blue Marlin were assessed in 2024 and the SCRS again concluded that the stock remains overfished but is not undergoing overfishing (61% probability that it is overfished and a 39% probability that it is undergoing overfishing). The SCRS (2024) emphasized that unaccounted uncertainties, mostly associated with the levels of landings and dead discards, continue to hamper the ability to provide sound management advice. Therefore, it was recommended that the Commission maintain or lower the current 1,670 t landings limit until the increasing biomass trend observed in the 2024 stock assessment is confirmed at the next BUM assessment. The SCRS once again recommended that instead of adopting landings limits, the Commission should adopt limits corresponding to true catch (i.e., landings + dead discards). The SCRS reiterated that it is of the utmost importance that CPCs report their total catch of BUM (i.e., landings and dead discards).

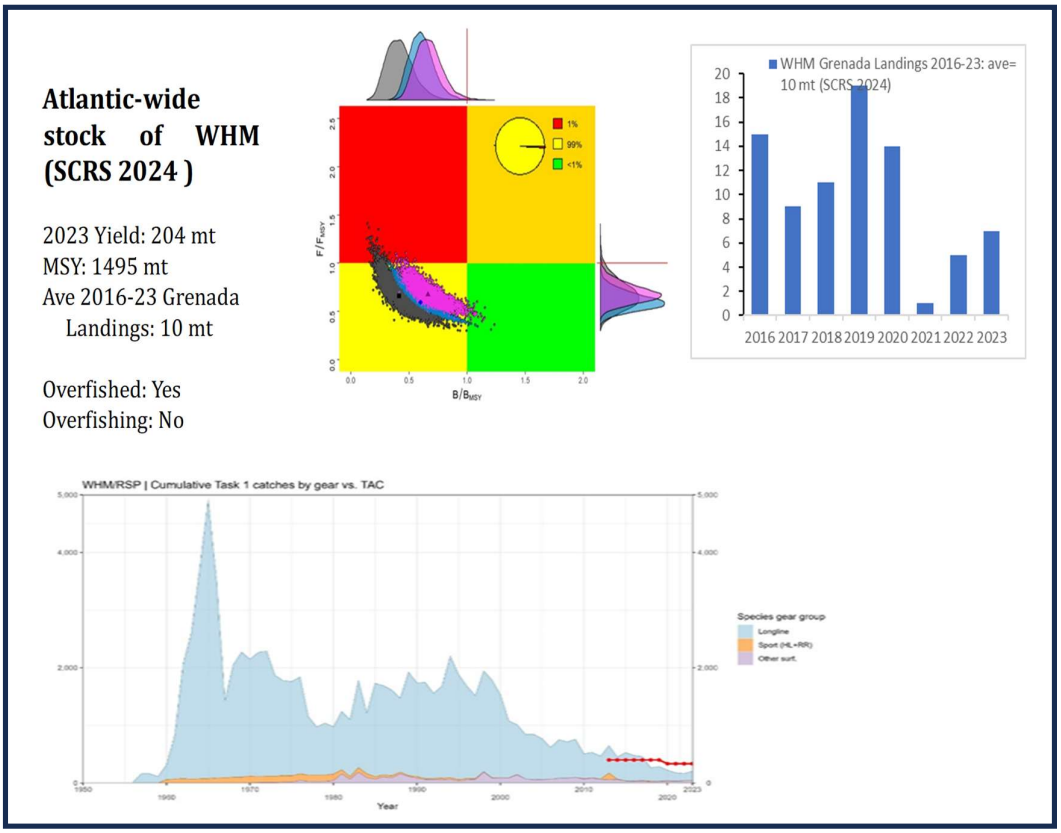
There has been a significant increase in the contribution from non-industrial fisheries to the total blue marlin harvest, and the landings from these fisheries are not fully accounted for in the current ICCAT database (SCRS 2024) which places serious limitations on the precision and accuracy of the current and future assessments. SCRS (2024) noted: “Recent research has demonstrated that in some longline fisheries, the use of non-offset circle hooks resulted in a reduction of billfish mortality, while the catch rates of several of the target species remained the same or were greater than the catch rates observed with the use of conventional J hooks or offset circle hooks. More countries have started reporting data on live releases since 2006. Additional information has come about, for some fleets, regarding the potential for modifying gears to reduce the bycatch and increase the survival of marlins. Such studies have also provided information on the rates of live releases for those fleets. However, there is not enough information on the proportion of fish being released alive for all fleets, to evaluate the effectiveness of the ICCAT recommendation relating to the live release of marlins.” Grenada does not estimate and report discarded catch for BUM or other species. While catches of BUM are generally avoided in the longline fishery (Gentner 2018), it is likely that discarding does occur to some extent.

There is a domestic market for BUM in Grenada with recent average annual landings of 48 t (SCRS 2024), but the species is considered a non-target species in the longline troll fisheries, as BUM are not part of the export market. Grenada landings averaging 48 t annually is about 3% of the Atlantic-wide landed catch limit of 1670 t.

The use of circle hooks has been shown to reduce billfish mortality in the Caribbean. Additionally, the use of circle hooks are believed to contribute to a better quality of catch of target species, as caught fish are more likely to stay alive for longer on the line. In Grenada, a trial project was run on commercial longline vessels that primarily target tunas for export (Burns, 2019). Sieben and Gascoigne (2021) reported that fishers who participated in the trial continued using circle hooks full-time, while the other fishers were gradually gravitating towards them. That transition apparently has continued, but it has not been verified.

There is no HCR in place for BUM and it is unlikely ICCAT will initiate development of one in the next few years until better discard information becomes available.

1.7.1.6 WHITE MARLIN (WHM)



White Marlin were last assessed in 2019 and the SCRS again concluded that the stock remains overfished but not undergoing overfishing (99% probability that it is overfished and a 99% probability that it is undergoing overfishing). In response, a landings limit of 335 t was established. Although there is some evidence of slow rebuilding in recent years, the SCRS noted that catches have exceeded the landings limit in every year since its initial implementation and warns that if catches continue to exceed the landings limit, the rebuilding of the stock will proceed more slowly, or be put at risk of further declines.

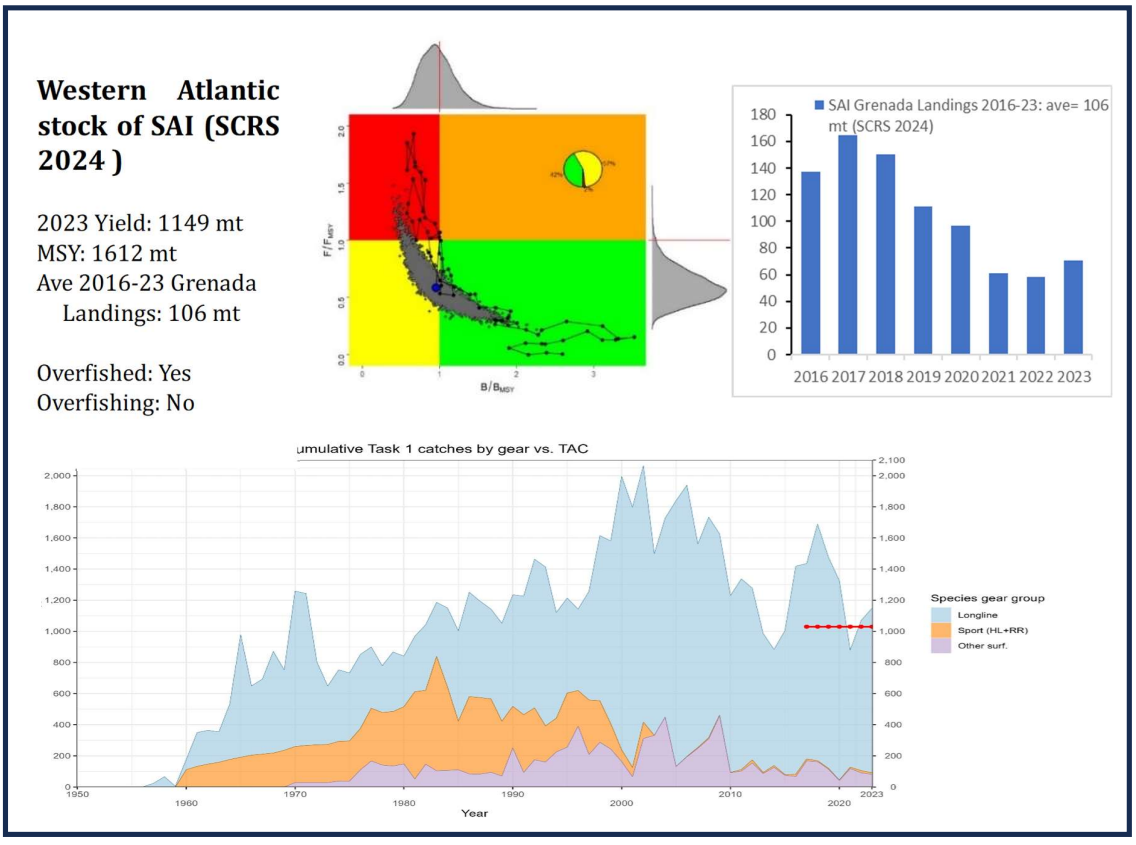
There has been a significant increase in the contribution from fishing by artisanal and small-scale fleets to the total white marlin harvest and these fisheries are not fully accounted for in the current ICCAT statistics (SCRS 2024). In addition, there is likely misidentification of spearfishes in the white marlin catches. This situation adds uncertainty to the stock assessment results.

Thus, the SCRS notes the great uncertainty in the assessment: *This is due to the inadequate reporting of discards, as well as the lack of reports from some artisanal and recreational fisheries that take marlin species. Measures should be taken to ensure that monitoring and reporting of all landings and discards, including live releases, are appropriate, accurate, and complete. This will likely require improvements to (or establishment of) observer programs of many CPCs, as well as the implementation of discard estimation methods using those data. Given the overfished status of the stock and the uncertainties in the data, including for both total removals and indices of abundance, it should be ensured that catches do not exceed current TAC until the stock has fully recovered. Given that experimental research has demonstrated that in longline fisheries the use of circle hooks resulted in a reduction of marlin catch rates and haulback mortality, and noting that they have different impacts on both target and bycatch species; then to reduce the chance of exceeding any established landings limit or TAC, the Commission should consider the use of non-offset circle hooks, the release of all marlins that are alive at haul back in ways that maximize their survival.*

Like BUM, landed WHM are sold in the domestic market and are non-target species in the longline fishery, generally avoided. However, the landed catch (SCRS 2024) represents about 3% of the Atlantic-wide landings limit.

There is no HCR in place for WHM and it is unlikely ICCAT will initiate development of one in the next few years until better discard information becomes available.

1.7.1.7 SAILFISH (SAI)



The most recent assessment of Western Atlantic Sailfish was conducted in 2023 at which time it was determined that the stock was overfished (59% probability of being overfished) and a 98% probability that it was not undergoing overfishing. The SCRS (2024) noted that in 2016 ICCAT adopted a decision rule: *if the total catch harvested in any year exceeds 1,030 t (based on 67% of MSY), the Commission shall review the Recommendation*

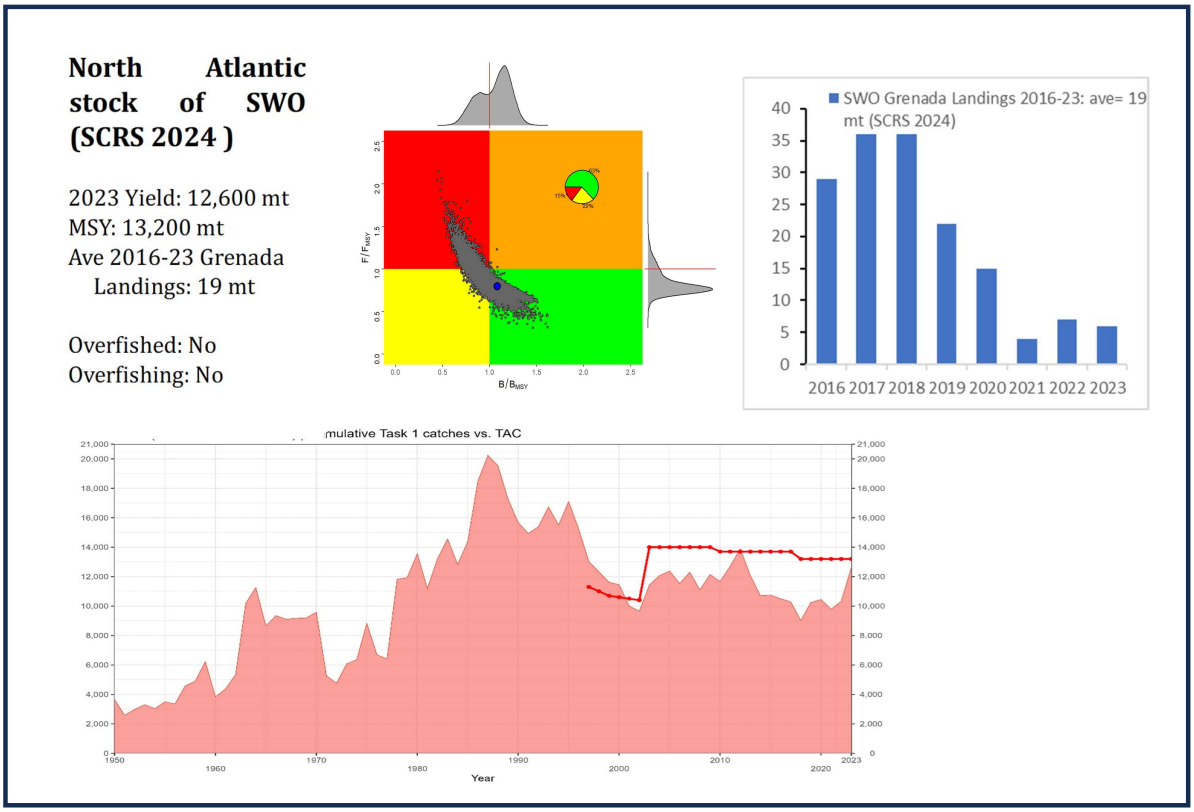
and effectiveness of this. However, the reported catch levels in 2018, 2019, 2020, 2022 and 2023 exceeded this level (catches in 2021 (880 t) did not). In line with other ICCAT conservation measures, some countries have established domestic regulations to limit the catch of sailfish. Among these regulations are: the requirement of releasing all billfish from longline vessels, minimum size restrictions, use of circle hooks and catch and release strategies in sport fisheries. Currently, four ICCAT Contracting Parties (Brazil, Canada, Mexico, and the United States) mandate or encourage the use of circle hooks on their pelagic longline fleets. Recent research has demonstrated that in some longline fisheries, the use of non-offset circle hooks resulted in a reduction of billfish mortality, while the catch rates of several of the target species remained the same or were greater than the catch rates observed with the use of conventional J hooks or offset circle hooks.

Important sources of uncertainty still remain in the stock assessment of Western Atlantic Sailfish. Available abundance indices demonstrate conflicting trends and reported catches, including dead discards, are significantly incomplete and unreported. While the reported catches in the past few years have been below the estimated MSY (1,612 t), the stock remains overfished. If ICCAT were to use the same decision rule as in 2016, the new catch limit at 67% of the current MSY would be 1,080 t. ICCAT has not adopted this as of yet.

An HCR for Western Atlantic Sailfish is not yet under development at ICCAT.

Grenada landings of sailfish averaged 106 t 2016-23 (SCRS 2024). It is considered a non-target species in the longline fishery. However, the landings of sailfish are only exceeded by yellowfin.

1.7.1.8 SWORDFISH (SWO)



North Atlantic Swordfish were last assessed in 2022 and the SCRS again concluded that the stock is not overfished nor undergoing overfishing (median B/Bmsy=1.08, median F/Fmsy=0.80). Additionally, catches have remained below both the TACs and the estimated MSY for the last two decades. Options for HCRs and management procedures were developed over the last two years and have now been completed. The SCRS (2024) recommends that the Commission adopt one of the tested management procedures (MPs) at the 2024 Commission meeting and that the TAC be set based on that MP for 2025 and beyond.

1.7.1.9 SMALL TUNAS

	Blackfin tuna (Thunnus atlanticus)	Atlantic bonito (Sarda sarda)	King mackerel (Scomberomorus cavalla)	Little tunny (Euthynnus alletteratus)	Atlantic Spanish mackerel (Scomberomorus maculatus)	Wahoo (Acanthocybium solandri)
2016	0	2	4	1	1	0
2017	0	2	5	0	1	0
2018	0	1	4	0	1	0
2019	94	0	18	0	1	32
2020	73	1	11	0	1	18
2021	0	1	2	0	0	15
2022	36	0	1	0	0	16
2023	40	0	0	0	0	16

Table 3 - Grenada small tuna landings in tonnes (SCRS 2024). Grenadian landings of all other small tunas (bullet tuna, Serra Spanish mackerel, cero, narrow and frigate tuna) were zero during this period.

No assessments of small tunas in the Caribbean region have been conducted, nor are there any harvest control rules. However, some assessments and management strategy evaluations have been done on selected species/stocks of small tunas outside the Caribbean region.

1.7.2 APPENDIX 2. ROLE OF HARVEST CONTROL RULES IN ICCAT AND GRENADA

An HCR is a pre-described rule that specifies management actions to be taken given the current status of the stock. For example, an HCR might specify: *if biomass falls below Bmsy, the fishing mortality rate should be reduced to 75% of Fmsy*. Then the TAC is set at the catch that will be expected when the reduced fishing mortality rate is imposed on the current biomass. Alternatives might be that the fishing mortality rate is reduced further in steps as the biomass surpasses lower and lower thresholds; or that the fishing mortality rate will be a proportion of Fmsy, where that proportion is defined by the ratio of current biomass to Bmsy. These example methods require that stock assessments have provided estimates of fishing mortality rates and biomass. These have been done for the major ICCAT species. If assessments have not been done, more empirical methods might be employed. An example might be one in which there is a time series of a survey data or catch rates available (call it an index of abundance). An objective of management is then defined as a period when the fishery was deemed to be performing "optimally". Then the index level during that period becomes the criteria to base an HCR. The HCR might be: *if the index for the last three consecutive years is less than "x" percent of the index during the "optimal" period, then reduce catches by "y" percent*. With either procedure, there should be analyses (Management Strategy Evaluations, MSEs) to consider the impacts of various uncertainties in data collection, biological understanding and to establish precautionary criteria to account for those uncertainties. ICCAT defines MSEs as "an inclusive, interactive and iterative process for evaluating, inter alia, the performance of proposed harvest control rules and reference points in relation to management objectives, including the risk associated with not achieving those objectives". A major ICCAT goal expressed in the 2015-2020 SCRS Science Strategic Plan was to use MSE to evaluate precautionary management reference points and determine robust harvest control rules.

The development of HCRs usually includes the definition and evaluation of multiple options. In the case of ICCAT, the selection of options is the responsibility of the ICCAT Commission. The SCRS role is to evaluate the quality of data sources, to develop decision rules and to define risks, i.e. the probability of outcomes and trade-offs between those outcomes. For example, a common trade-off considered in HCRs is the desire for larger annual TACs versus the desire for stability of annual catches (less year-to-year changes in TACs). In many cases those two goals are opposed (higher TACs lead to higher variability). It is the Commissioners' role to choose the

acceptable risk (probability) of outcomes and the tradeoffs between various goals. Thus, the development of HCRs requires a concerted dialog between managers, stakeholders and scientists.

HCRs are usually defined to establish stock-wide management responses such as TACs or limits on effort or days fished. As ICCAT HCRs are developed within Commission/SCRS dialog processes, it is expected that ICCAT HCRs will provide the overall management actions and allocation to member states will be negotiated. Once agreed, it is the responsibility of the member state to implement actions to maintain their fisheries within those allocations, to monitor the fisheries and to obtain the authority to do so. Implementation might be done through such actions such as area closures, seasons, TACs, live-release and others. However, development of HCRs for Atlantic tuna and tuna like species will be through the ICCAT/SCRS processes and schedules that have been established.

Currently, ICCAT/SCRS has developed HCRs and management procedures through extensive management strategy evaluations for several tuna stocks for which Grenada has Task 1 catches in the ICCAT database(SCRS 2024), These include North Atlantic albacore, North Atlantic swordfish and western Atlantic skipjack. The HCR and management procedure for NA ALB has been implemented (Recommendation 21-04 (2021-04-e.pdf) provides an excellent summary of how the HCR and management procedure was constructed). Options for HCRs and management procedures for NA SWO and WA SKJ have been fully developed and tested by the SCRS and awaits the Commission's final selection at the next ICCAT Commission meeting. The development of YFT/BET HCRs will be more complicated due to the multi-species and FAD nature of the eastern Atlantic fisheries. These await further work by the SCRS and Commission. Grenada's participation in those processes will be important by providing the perspective of small island developing states.