ANABAC INDIAN OCEAN PURSE SEINE SKIPJACK TUNA FISHERY

Announcement Comment Draft Report

September 2022

Picture from: fao.org

BUREAU VERITAS

Conformity Assessment Body (CAB)	Bureau Veritas Certification Holding SAS
Assessment team	Giuseppe Scarcella, Luis Ambrosio, Diego Solé, José Ríos
Fishery client	ANABAC
Assessment Type	Initial Assessment
Date	September 2022

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2 Glossary

Concepts and terms:

ACDR	MSC Announcement Comment Draft Report
B0	Virgin biomass
Bcurr	Most recent biomass estimated from the stock assessment
BAI	Buoy-derived Abundance Index
BET	Bigeye tuna
BRP	Biological Reference Points
Bsafety	Safety level. Proxy for the limit reference point
Cmax	Maximum catch limit
CAB	Conformity Assessment Body (in the case of this assessment the CAB is Bureau Veritas)
CMM	IOTC Conservation and Management Measures
CoC	Chain of Custody
COC	Code of Conduct
CPCs	Contracting Parties and Cooperating Non-Contracting Parties of the IOTC Convention
CPRDR	MSC Client and Peer Review Draft Report
CPUE	Catch per Unit of Effort
Dmax	Maximum change in catch limit
E	Exploitation rate -proxy for Fishing mortality
Etarg	Exploitation rate associated with an equilibrium biomass of the target reference point
ENSO	Southern Pacific Oscillation (El Niño)
ETP	Endangered, Threatened and Protected
f/v	Fishing vessel
F_{MSY}	Fishing mortality at MSY
F_{target}	Management objective based on a fishing mortality rate that should be achieved and maintained
FAD	Fish Aggregating Device
FCP	MSC Fisheries Certificacion Process
FSC	Free swimming (tuna) school
HCRs	Harvest Control Rules. pre-agreed rules and management actions that will be taken in response to changes in indicators of stock status with respect to explicit or implicit reference points (GSA 2.5)
IO	Indian ocean
LOSC	Law of the Sea Convention
LRP	Limit Reference Point
LTL	Low Trophic Level (species)
P1, P2, P3	MSC Principles (1,2 & 3)
PI	MSC Performance Indicator
PR	Peer Reviewer
PRI	Point where recruitment would be impaired
PCDR	MSC Public Comment Draft Report
PCR	MSC Public Comment Report
PSLS	EU and Seychelles FAD-associated purse seine
MCS	Monitoring, Control and Surveillance
MPA	Marine Protected Area
MSE	Management Strategy Evaluation
MSY	Maximum Sustainable Yield
NM	Nautical miles
Res	IOTC Resolution
SB	Spawning biomass
SFPA	Sustainable Fishery Partnership Agreements (concluded between the EU and other countries)
SG	MSC Scoring Guidepost
SKJ	Skipjack tuna
SS3	Stock Synthesis 3 (stock assessment model)
TAC	Total Allowable Catch
TRP	Target Reference Point
UoA	Unit of Assessment
UoC	Unit of Certification
VME	Vulnerable Marine Ecosystem

VMS	Vessel Monitoring System
YFT	Yellowfin tuna

Institutions, organization, bodies, agreements and programmes:

AGAC	Spanish Association of Large Tuna Freezers
ANABAC	National Spanish Association of Ship owners of Freezer Tuna Vessels
BV	Bureau Veritas
CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
CCBST	Commission for the Conservation of Southern Bluefin Tuna
CFTO	Compagnie Française du Thon Océanique
DCS	(IOTC) Developing Coastal States
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
ISSF	International Seafood Sustainability Foundation
MAPA	Spanish Ministry of Agricultures, Fisheries and Food (Ministerio e Agricultura, Pesca y Alimentación)
MSC	Marine Stewardship Council
OPAGAC	Organization of Spanish producers of frozen tuna
PNA	Parties to the Nauru Agreement
PSMA	FAO Port State Measures Agreement
RFMO	Regional Fisheries Management Organization (e.g. IOTC)
SC	Scientific Committee of the Indian Ocean Tuna Commission
SFA	Seychelles Fishing Authority
SGCI	Spanish Sub-directorate for Fisheries Control and Inspection (Subdirección General de Control e Inspección)
SGP	Spanish General Secretariat for Fisheries (Secretaría General de Pesca)
SIDS	(IOTC) Small Island Developing States
SIOFA	Southern Indian Ocean Fishery Agreement
SWIOFC	Southwest Indian Ocean Fisheries Commission
UNCLOS	United Nations Convention on the Law of the Sea
UNFSA	United Nations Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks
TAAF	Terres Australes et Antartiques Françaises
TCAC	IOTC Technical Committee on allocation criteria
TWG	Joint (RFMOs) Management Strategy Evaluation (MSE) Technical Working Group
WPB	Working Party on billfish
WPEB	IOTC Working Party on Ecosystems and bycatch
WPTT	IOTC Working Party on Tropical Tunas
WWF	World Wildlife Fund

3 Executive summary

Draft determination to be completed at Public Comment Draft Report stage

The National Association of Freezer Tuna Vessel Owners (ANABAC) ANABAC was established in 1974 with the objective of representing the interests of Spanish companies dedicated to the tropical tuna fishery. Currently ANABAC integrates 3 groups of Spanish ship owners located in Bermeo: ATUNSA, PEVASA and Echebastar. However, the Echebastar group is not involved in this assessment since its fleet is already certified (click here to access MSC website on that certified fishery).

The client group for this assessment is formed by ANABAC and the tuna fishing fleet owned and operated by the Atunsa Group (including Atunsa and Atunsa INC) and the Pevasa group (including Pevasa and Beach Fishing LTD). Currently, a total of 8 vessels from these 2 of ANABAC's members are included in the UoA (**see Table 5.1.1.2)**.

This Announcement Comment Draft Report (ACDR) provides details to the client on the preliminary results of the assessment of the Anabac Indian Ocean Purse Seine Skipjack Fishery against the MSC-Fisheries Standard v2.01. The reassessment process will follow the MSC Fisheries Certification Process v2.2 and using the default assessment tree (Annex SA) of the MSC Fisheries Standard, v2.01.

Bureau Veritas shall give the client an opportunity to question the team and have an issue re-examined if the client has a concern that insufficient information is available to support the team's decisions or that a decision has been made in error, in accordance with FCP7.11.3. After reviewing the ACDR, the client shall inform Bureau Veritas of its decision to either proceed to announce the assessment or defer announcement of assessment. If the client proceeds to announce the assessment of the fishery, this ACDR will be published together with the announcement that the fishery is entering its first assessment, in accordance with FCP7.12.1. After the announcement and the publication of this ACDR, 60-day consultation period for stakeholder input will be allowed before the site visit takes place, in accordance with FCP 7.15.1.1.

This report was prepared by Bureau Veritas Certification Holding SAS. The assessment team for this fishery is comprised of Giuseppe Scarcella who is mainly responsible for assessing P1, Diego Solé who is mainly responsible for assessing P2, Luis Ambrosio who is mainly responsible for assessing P3, and José Ríos acting as Team Leader and ensuring compliance with the MSC fisheries certification process and standard.

The assessment team has completed this ACDR using the information provided in the Client Document Checklist, and public information from scientific literature, science-based reports and administration.

This new assessment overlaps with several overlapping MSC-certified fisheries (see **section 8.8** for more details). Thus, harmonisation following Annex PB (FCP) is required. Processes, activities, and specific outcomes of efforts to harmonise fishery assessments are described in **section 8.8**.

Main strengths and weaknesses of the client's operation identified during the preliminary assessment performed for this ACDR are described below:

Strengths:

- The status of the stock is estimated at high biomass and low fishing mortality in relation to MSY based reference points.
- There is a good data collection system.
- The scientific advice is based on an accurate approach (SS3).
- The fleet has a significant observation coverage on board that allows the collection of a significant amount of scientific and operational data.
- There is detailed and comprehensive data on catch composition of the UoA.
- There is a relative low impact of the fishery on some ETP species.
- There is a strong legal framework at regional (IOTC) and national level (Spain_EU; Seychelles).
- There is no IUU problem in the area that prevents meeting the objectives of P1 and P2.
- There are fishery specific objectives for both Principle 1 and Principle 2.

Weaknesses:

- The fishery is not managed via Total Allowable Catch (TAC), although IOTC Resolutions 16/02 and 20/03 provide a harvest control rule (HCR) which is used to set a catch limit. Despite attempts to set catch allocations, an agreement not be reached yet at IOTC level.
- Primary species such as yellowfin tuna and bigeye tuna are considered subject to overfishing by the RFMO.
- There is a permanent lack of catch data from other fleets (e.g., gillnets, coastal longlines, etc.) that target some species also impacted by the UoA.
- There are remain uncertainties that still need to be addressed about the impact of FADs on the ecosystem.
- The decision-making process is not balanced between the different parties that comprise the IOTC. Some Parties do not have the financial resources to actively participate in all important decision-making processes in the fishery.

4 Report details

4.1 Authorship and peer review details

Peer reviewer information to be completed at Public Comment Draft Report stage

This report has been prepared by:

Giuseppe Scarcella is an experienced fishery scientist and population analyst and modeller, with wide knowledge and experience in the assessment of demersal stocks. He holds a first degree in Marine Biology and Oceanography (110/110) from the Unversità Politecnica delle Marche, and a Ph.D. in marine Ecology and Biology from the same university, based on a thesis "Age and growth of two rockfish in the Adriatic Sea". After his degree, he was offered a job as project scientist in several research programs about the structure and composition of fish assemblage in artificial reefs, off-shore platform and other artificial habitats in the Italian National Research Council – Institute of Marine Science of Ancona (CNR-ISMAR), now Institute for Biological Resources and Marine Biotechnologies (IRBIM). During the years of employment at CNR-ISMAR first and CNR-IRBIM later he has gained experience in benthic ecology, statistical analyses of fish assemblage evolution in artificial habitats, fisheries ecology and impacts of fishing activities, stock assessment, otolith analysis, population dynamic and fisheries management. Since 2018 Dr. Scarcella is in the permanent staff of CNR-IRBIM as researcher. During the same years, he attended courses of uni-multivariate statistics and stock assessment. He is also actively participating in the scientific advice process of FAO GFCM in the

Mediterranean Sea as well as in the European context. He was member of the Scientific, Technical and Economic Committee for Fisheries for the European Commission (STECF) from 2012 to 2019 and is chair of the STECF-EWG Assessment of balance indicators for key fleet segments and review of national reports on Member States efforts to achieve balance between fleet capacity and fishing opportunities.

He is author of more than 50 scientific paper peer reviewed journals and more than 150 national, and international technical reports, most of them focused on the evolution of fish assemblages in artificial habitats, stock assessment of demersal species and evaluation of fisheries management plans.

For some years now, Dr Scarcella has been working in fisheries certification applying the Marine Stewardship Council standard for sustainable fisheries, currently concentrating on Principle 1 of the Standard working in many areas on the world.

Luis Ambrosio, holds an MSc in Biology, Marine and Environmental Sciences from the University of Alicante, and Aquaculture science from the Spanish Institute (ICADE), Spain. Since 1989, he has worked as a consultant on fisheries, aquaculture and marine biosphere. In relation to Fisheries and Aquaculture, he has collaborated for different public administrations and private companies highlighting the work carried out for the General Secretariat of Marine Fisheries of Spain (SGPM) and focused, among other issues, on the extractive activity of fleets of community interest, to the control and monitoring of fishing activities, fishing subsidies, commercialization and improvement of quality of fishery products, environmental interactions of fishing and socioeconomic impact of fishing activity and illegal fishing. On the other hand, he has participated in cooperation projects and missions in the field of fisheries and aquaculture for the Spanish Agency for International Development Cooperation (AECID), United Nations Development Program (UNDP), Latin American Organization for Fisheries Development (OLDEPESCA), International Labor Organization (ILO / ILO) and other international cooperation agents.

Regarding his work in the marine environment, it is worth highlighting those carried out for the Administration of the Government of Spain in charge of environmental matters, the Higher Council for Scientific Research and different Non-Governmental Organizations, especially WWF Spain, of which he was an advisor in issues of fisheries, aquaculture and marine protected areas. His field of work in this field has been based, among other issues, on the application of the Directive of European Habitats in the Marine Environment, the identification and characterization of Marine Protected Areas, socioeconomic studies linked to marine conservation, inventoried works of marine habitats and taxa included in International Directives and Agreements, as well as in the coordination of groups of experts for the selection and characterization of new Marine Areas to be protected. His appropriate skills and experience serve as a Principle 3 for this assessment.

Diego Solé, holds a degree in Fishing Engineering and nine years of continuous experience in different fisheries. He has been Fisheries Officer of Fisheries Improvement Projects for WWF-Peru, leading the FIPs of Mahi Mahi and Jumbo Giant Squid and gathering different stakeholders in the design and completion of environmental action plans. He has provided consultancy services in fisheries sustainability for organisations such as Sustainable Fisheries Partnership (SFP) and World Wildlife Fund (WWF), regarding purse seine and longline fisheries targeting tunas and other large pelagic species in the Pacific and Indian Oceans. Also, he has conducted independent pre-assessments against the MSC Fisheries Standard in Peru for clients in Latin America.

He has management experience in industry having been executive for a multinational company dedicated to the capture, production and commercialisation of hydrobiological resources for clients around the world. Also, he counts with relevant experience regarding the operation and management of purse seine, tramps and longline fleets in Peru and the Pacific Ocean. Finally, former lecturer at the Faculty of Fisheries of the Universidad Nacional Agraria La Molina in Peru. All the above proves his capacity to meet the qualification and competency criteria for PC3 (i) Fishing impacts on aquatic ecosystems. His appropriate skills and experience serve as a Principle 1 for this assessment.

Jose Rios, holds a degree in Sea Sciences from the University of Vigo and an MSc in Fisheries and Aquaculture from the University of Wales-Bangor. He has more than 20 years of experience working in fisheries from different angles and places around the world. In 1999 he worked at the ICM-CSIC on trophic ecology of demersal fish species and participated in different research cruises on board the r/v Garcia del Cid. In 2001/02 he was hired by the University of Azores as observer and fisheries inspector assessing an experimental fishing license for Orange roughy. Between 2003 and 2010 he was responsible for designing and monitoring fisheries management plans for several marine resources (clams, cockles and barnacles) for the Regional Fisheries Authority of Galicia (Spain). In 2008-09 he developed and implemented a scientific monitoring scheme for an experimental octopus fishery in the waters of Namibia (IIM-CSIC). Between 2008 and 2012, as part of different projects funded by the Spanish International Cooperation Agency (AECID), he supported local fisheries and aquaculture management bodies to strengthen organizational and managing capacities of the fishing and rural aquaculture sector in Namibia, Cape Verde, Colombia and Mozambique. Since 2013, as part of the fisheries team of WWF Spain, he promoted different initiatives to improve fisheries management in coastal Spanish fisheries. As the WWF representative in fisheries co-management committees, he took part in the daily management of the following coastal fisheries in the Spanish Mediterranean: Catalan sandeel, Balearic boat seines, and Palamós red shrimp. Between 2016 and 2020 he was a full-time employee at Bureau Veritas Fisheries Department and then at DNV-GL, mainly acting as MSC-Fisheries and MSC-CoC auditor. Since September 2020 he is a freelance and he keeps acting as MSC-Fisheries auditor. He has participated in several MSC fisheries assessments and surveillance audits, in most of them acting as Team Leader aside from team member assessing P2 and/or P3. He has completed the MSC training in the use of the RBF.

For this reassessment he will act as Team Leader, so his main responsibility will be ensuring compliance with the MSC fisheries certification process and standard.

4.2 Version details

Details on the version of the fisheries program documents used for this assessment are presented in table below.

Table 4.2.1 – Fisheries program documents versions

Document	Version number, date of publication (and date effective)
MSC Fisheries Certification Process	Version 2.2, 25 March 2020 (25 September 2020)
MSC Fisheries Standard	Version 2.01, 31 August 2018 (28 February 2019)
MSC General Certification Requirements	Version 2.4.1, 7 May 2019 (28 September 2019)
MSC Reporting Template	Version 1.2, 25 March 2020 (25 September 2020)

5 Unit of Assessment and Unit of Certification and results overview

5.1 Unit of Assessment and Unit of Certification

This is a wild-capture fishery not based on any introduced species. The team confirmed that the assessed fishery is within the scope of the MSC fisheries certification since:

- It does not target species classified as 'out-of-scope' (amphibians, reptiles, birds, mammals) (FCP 7.4.2.1)
- The fishery does not make use of any kind of poisons or explosives (FCP 7.4.2.2)

Tuna fisheries in the Indian Ocean are managed by the IOTC, of which the European Union and Seychelles are CPCs. Therefore, the fishery is eligible for certification since it is not conducted under any controversial unilateral exemption to an international agreement (FCP 7.4.2.3) and there is no evidence of the lack of a mechanism to resolve disputes (FCP 7.4.2.11)

The two flag states of the fleet included in the UoA are Spain and Seychelles.

i. Spain has been a member of the International Labour Organization (ILO) since 1956 (click here to access the country profile at the ILO website). The country has ratified 133 conventions, including the 8 fundamental conventions and the 4 governance conventions.
ii. Seychelles has been a member of the International Labour Organization (ILO) since 1977 (click here to access the country profile at the ILO website). The country has ratified 37 conventions, including the 8 fundamental conventions and 2 out of the 4 governance conventions.

The team is not aware that none of the fishing operators included in the UoAs have been convicted for a forced or child labour in the last 2 years (FCP 7.4.2.4). The client has completed and submitted to the CAB the 'Certificate Holder Forced and Child Labour Policies, Practices and Measures Template' to detail the policies, practices and measures in place to ensure the absence of forced and child labour. This template was submitted to the CAB and it was uploaded at the MSC database together with the ACDR and the announcement of the fishery entering re-assessment, as required in FCP 7.4.2.9.

The team is not aware that any of the fishing operators included in the UoA have been convicted of a shark finning violation in the last 2 years (FCP 7.4.2.10). However, during the preparation of the ACDR the client was warned that, in the case of proceeding to the full assessment, the CAB shall check this issue with relevant stakeholders and compile evidence to confirm that no conviction confirming guilt with respect to a violation of shark finning law has occurred in the last 2 years. The intent of this requirement should apply to specific vessels or groups of vessels as defined under

7.24.5.2, which are implicated in the conviction with the legal entities, e.g. individuals or companies that have been convicted for shark finning offences.

Furthermore, the team has checked that:

- There are no catches of non-target species that are inseparable or practically inseparable (IPI) from target stock.
- The fishery is not an enhanced fishery (FCP 7.4.2.12)
- The fishery has not previously failed an assessment and has no certificate withdrawn.
- The fishery overlaps with several MSC-certified and in-assessment tuna fisheries (see **section 8.9** for more details on the harmonisation needs)

5.1.1 Unit of Assessment

Table 5.1.1.1 – Unit of Assessment (UoA)

UoA 1	Description
Species	Skipjack tuna (*Katsuwonus pelamis*)
Stock	Indian Ocean stock
Fishing gear type and, if relevant, vessel type	Industrial purse seine (including all set types: FAD and FSC)
Client group	The client group is formed by ANABAC and the vessels from 2 of ANABAC's members are involved in this UoA. Purse seiners are owned and operated by the ATUNSA group (including Atunsa and Atunsa INC) and PEVASA group (including Pevasa and Beach Fishing LTD). Currently, a total of 8 vessels from these 2 of ANABAC's members are included in the UoA. See **table 5.1.1.2.**
Other eligible fishers	There are no other eligible fishers.
Geographical area	Tropical Indian Ocean FAO areas 51 and 57. The fishing area covers both international waters (high seas), as well as the EEZs of coastal states with which the UoA has current fishing agreements.

Table 5.1.1.2 List of vessels included in the UoA. Source: the client

Company Group	**Number of vessels**	**Flag**
Atunsa	2	Spain
Atunsa Inc	1	Seychelles
Pevasa	2	Spain
Beach Fishing LTD	3	Seychelles
	8	2 flags

5.1.2 Unit(s) of Certification

To be drafted at Client and Peer Review Draft Report stage

To be completed at Public Certification Report stage

If there are changes to the proposed Unit(s) of Certification (UoC), the CAB shall include in the report a justification.

Reference(s): FCP v2.2 Section 7.5

Since there are no other eligible fishers or other entities that may share the certificate as new group members, the UoA and the UoC are the same.

Table 5.1.2.1 – Unit of Certification (UoC)

UoC 1	Description
Species	Skipjack tuna (*Katsuwonus pelamis*)
Stock	Indian Ocean stock
Fishing gear type and, if relevant, vessel type	Industrial purse seine (including all set types: FAD and FSC)
Client group	The client group is formed by ANABAC and the vessels from 2 of ANABAC's members are involved in this UoA. Purse seiners are owned and operated by the ATUNSA group (including Atunsa and Atunsa INC) and PEVASA group (including Pevasa and Beach Fishing LTD). Currently, a total of 8 vessels from these 2 of ANABAC's members are included in the UoC. See **table 5.1.1.2**
Geographical area	Tropical Indian Ocean FAO areas 51 and 57. The fishing area covers both international waters (high seas), as well as the EEZs of coastal states with which the UoA has current fishing agreements.

5.2 Assessment results overview

5.2.1 Determination, formal conclusion and agreement

To be drafted at Public Comment Draft Report stage

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

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

Reference(s): FCP v2.2, 7.20.3.h and Section 7.21

5.2.2 Principle level scores

To be drafted at Client and Peer Review Draft Report stage

Table 5.2.2.1 - Principle level scores

Principle	UoA 1
Principle 1 – Target species	>80
Principle 2 – Ecosystem impacts	>80
Principle 3 – Management system	>80

5.2.3 Summary of conditions

To be drafted at Client and Peer Review Draft Report stage

The CAB shall include in the report a table summarising conditions raised in this assessment. Details of the conditions shall be provided in the appendices. If no conditions are required, the CAB shall include in the report a statement confirming this.

Reference(s): FCP v2.2 Section 7.18

Table X – Summary of conditions

Condition number	Condition	Performance Indicator (PI)	Deadline	Exceptional circumstances?	Carried over from previous certificate?	Related to previous condition?
				Yes / No	**Yes / No / NA**	**Yes / No / NA**
				Yes / No	**Yes / No / NA**	**Yes / No / NA**
				Yes / No	**Yes / No / NA**	**Yes / No / NA**

5.2.4 Recommendations

To be drafted at Client and Peer Review Draft Report stage

If the CAB or assessment team wishes to include any recommendations to the client or notes for future assessments, these may be included in this section.

6 Traceability and eligibility

6.1 Eligibility date

The date from which product from a certified fishery is eligible to be sold as MSC certified or bear the MSC ecolabel is known as the eligibility date (FCP 7.8.1).

The eligibility date shall be any nominated date on or between the publication date of the first Public Comment Draft Report (PCDR) and the certification date (FCP7.8.1.1). If the eligibility date is set before the certification date, the CAB shall inform the fishery that any fish harvested after the eligibility date and sold or stored as under-assessment fish shall be handled in conformity with the following requirements (FCP 7.8.2):

a) All under-assessment products shall be clearly identified and segregated from certified and non-certified products.

b) The client shall maintain full traceability records for all under-assessment product, demonstrating traceability back to the UoC and including the date of harvest.

c) Under-assessment products shall not be sold as certified or labelled with the MSC ecolabel, logo, or trademarks until fishery certification and product eligibility are confirmed.

The eligibility date has still not been determined at the time of preparing the ACDR. This topic will be resolved by the team together with the client during the site visit.

6.2 Traceability within the fishery

In accordance with MSC requirements, **Table 6.2.2.1** includes a description of factors that may lead to risks of non-certified fish being mixed with certified fish prior to entering CoC. For each risk factor, there is a description of whether the risk factor is relevant for the fishery, and if so, a description of the relevant mitigation measures or traceability systems in place.

Table 6.2.2.1– Traceability within the fishery

Factor	Description
Will the fishery use gears that are not part of the Unit of Certification (UoC)? If Yes, please describe: - If this may occur on the same trip, on the same vessels, or during the same season; - How any risks are mitigated.	Large tropical tuna purse seiners are designed and built to fish using purse seine gear only. There would be no reason or justification for using a different type of gear on board. The fishing license states the industrial purse seine is the only fishing gear allowed. All set types (FADs and FSCs) are covered by the UoC. Thus, **the risk associated to this traceability factor is not considered relevant for this fishery**.
Will vessels in the UoC also fish outside the UoC geographic area? If Yes, please describe: - If this may occur on the same trip; - How any risks are mitigated.	The UoA includes all the fishing areas where the assessed operates. The traceability system in place to ensure that the assessed vessels are operating within the geographical scope of the UoA includes the following: - The assessed vessels are licensed to IOTC to fish within the Convention Area. Besides, the different bilateral agreements in place determine the EEZs where the assessed vessels can operate. These documents shall be updated and available on board in case of inspection. - All vessels are equipped with VMS and they can be easily tracked by third parties (flag and coastal states). - 100% observer coverage (human or electronic) is implemented on all vessels. - Both the vessel and the observer are required to report latitude and longitude position for every set. The captain includes this information in the fishing logbook and the observer in the trip report. - Captain's statement, fishing logbook and wells plan will be passed to the first receivers of the fish. This information should be used by the first receivers and auditors to verify MSC eligibility. Thus, **the risk associated to this traceability factor is not considered relevant for this fishery**.
Do the fishery client members ever handle certified and non-certified products during any of the activities covered by the fishery certificate? This refers to both at-sea activities and on-land activities. - Transport - Storage - Processing - Landing - Auction If Yes, please describe how any risks are mitigated.	All SKJ caught would be MSC eligible. There is no risk mixing MSC and non-MSC skipjack during any of the activities covered by the fishery certificate. YFT and BET would not be MSC eligible, but those are easily identifiable and separated from the eligible SKJ. Estimated weight per species is recorded at the Captain's statement, the fishing logbook, and wells plans. These documents will be passed to the first receivers of the fish. Final weights will be confirmed at reception of the processing plants, where segregation per species takes place. There is a traceability system in place at all different activities covered by the MSC-Fisheries certificate: Storage on board: The captain shall know that only SKJ is MSC eligible. In terms of documentation, the official records such as the DEA cannot be modified because it must follow the Spanish,

	Seychelles and IOTC requirements. In those records, the amount of SKJ is reported. Transfer to the Reefer: SKJ catches transfer could be done simultaneously with other species, since are easily identifiable. Once in the reefer, catches for the assessed vessels will be segregated from other catches contained in the reefer. This will be reflected in the Reefer storage plan. Discharge: once the fish arrives into port, a full segregation is done, and all the fish is weighted carefully so they get a more precise number of kilos per species. The batch number is kept until the end of the process so it can be used for traceability purposes. The traceability system in place, allows to consider that **the risk associated to this traceability factor is irrelevant for this fishery**. *NB transporters and reefer vessels will be covered by the MSC-Fisheries certificate (no need for a MSC CoC certificate) since there are signed statements of no manipulation.*
Does transhipment occur within the fishery? If Yes, please describe: - If transhipment takes place at-sea, in port, or both; - If the transhipment vessel may handle product from outside the UoC; - How any risks are mitigated.	There is no at sea transhipment for purse seine vessels. Transhipment, if it occurs, takes place at port, directly from purse seiners to reefer vessels. All transhipped loads are verifiable by species and quantity and no transhipment takes place without the presence of inspectors. The fish is then transported to final destinations for processing or onward marketing. Tuna transferred into reefer vessel holds are weighed on departure and arrival and are separated from others catch and are appropriately labelled and tracked. The shipping manifest also includes the cargo weight. Cargo manifests include all weights and products on board each vessel and are a standard maritime transport requirement for cargoes, frozen fish included, to ensure safe transport of cargo by weight and to meet other requirements by customs authorities. *NB transporters and reefer vessels will be covered by the MSC-Fisheries certificate (no need for a MSC CoC certificate) since there are signed statements of no manipulation.*
Are there any other risks of mixing or substitution between certified and non-certified fish? If Yes, please describe how any risks are mitigated.	No other risks of mixing or substitution between certified and non-certified fish have been identified by the team.

6.3 Eligibility to enter further chains of custody

To be drafted at Announcement Comment Draft Report stage

The MSC-certified fish caught by the vessels included in the UoA can be transhipped in ports in the Indian Ocean (mainly Port Victoria in Seychelles) onto reefers or containers for its transportation to Spain, or (occasionally) they can also be landed in Spanish ports for its transportation in trucks to the processing plant. In both cases, change of ownership to a party not covered by the fishery certificate only happen after transportation (when the product reaches the processing plant).

The client group (ANABAC associated companies and vessels described in **Table 5.1.1.1**) are the only ones eligible to use the MSC fishery certificate and sell products as MSC certificated. However, the Company will not make use of the ecolabel as whole frozen skipjack tuna is not a customer facing product. This product needs further processing to reach the customer as canned tuna or fresh tuna loins.

MSC CoC should commence at the entrance of the processing plants and prior to the first point of change of ownership, since the skipjack tuna caught by assessed fleet, and transported to the processing plants (either in reefers or containers) would be covered by the MSC-Fishery certificated.

6.4 Eligibility of IPI stock to enter further chains of custody

No IPI stocks have been identified by the CAB during the assessment.

7 Scoring

7.1 Summary of Performance Indicator level scores

To be drafted at Announcement Comment Draft Report stage

Table 7.1.1. Summary of preliminary PI scores

Principle	Component	Performance Indicator (PI)		Score
One	Outcome	1.1.1	Stock status	≥80
		1.1.2	Stock rebuilding	
	Management	1.2.1	Harvest strategy	[60-79]
		1.2.2	Harvest control rules & tools	[60-79]
		1.2.3	Information & monitoring	≥80
		1.2.4	Assessment of stock status	≥80
Two	Primary species	2.1.1	Outcome	≥80
		2.1.2	Management strategy	≥80
		2.1.3	Information/Monitoring	≥80
	Secondary species	2.2.1	Outcome	≥80
		2.2.2	Management strategy	≥80
		2.2.3	Information/Monitoring	≥80
	ETP species	2.3.1	Outcome	≥80
		2.3.2	Management strategy	≥80
		2.3.3	Information strategy	[60-79]
	Habitats	2.4.1	Outcome	≥80
		2.4.2	Management strategy	≥80
		2.4.3	Information	[60-79]
	Ecosystem	2.5.1	Outcome	≥80
		2.5.2	Management	≥80
		2.5.3	Information	≥80

Three	Governance and policy	3.1.1	Legal &/or customary framework	≥80
		3.1.2	Consultation, roles & responsibilities	≥80
		3.1.3	Long term objectives	≥80
	Fishery specific management system	3.2.1	Fishery specific objectives	≥80
		3.2.2	Decision making processes	[60-79]
		3.2.3	Compliance & enforcement	≥80
		3.2.4	Monitoring & management performance evaluation	≥80

7.2 Principle 1

7.2.1 Principle 1 background

7.2.1.1 Biology of Indian Ocean skipjack tuna and stock status

Compared to other species of tuna, skipjack tuna [*Katsuwonus pelamis* (Linnaeus, 1758)] is a short-lived species and reproduce early, leading to a high turnover of biomass. This makes skipjack stocks productive since they are able to respond quickly to seasonal or interannual changes in the environment. As a result, skipjack are resilient to fishing pressure, making them less likely to be overfished for a given level of fishing pressure than other species of tropical tuna (yellowfin, bigeye), which are longer-lived and slower to grow and reproduce (although still relatively productive). It also means that skipjack stock assessment is difficult because skipjack stock dynamics and biomass is variable, with recruitment responding to unpredictable environmental conditions rather than the biomass of spawners (IOTC, 2017a, b). The trophic level of skipjack is estimated at ~ 4.4 (https://www.fishbase.se/summary/107). Skipjack is therefore not a LTL species, and it shall not be treated as a key LTL based on requirements detailed in SA2.2.9 nor based on its status at the time of the assessment (SA2.2.10).

Indian Ocean skipjack is assumed to be a single stock. It is thought that the Indian Ocean skipjack stock is affected by the 'Indian Ocean dipole' – the Indian Ocean equivalent of El Niño–Southern Oscillation (ENSO) in the Pacific, with alternate warming and cooling in the eastern / western Indian Ocean. Tagging suggests that skipjack can rapidly move large distances (average 640 NM between tagging and recovery positions in the Indian Ocean). A major research project is ongoing to study stock structure of key tuna and shark species in the Indian Ocean. Initial results for skipjack suggest that there are low rates of exchange with the Pacific and the Atlantic, and within the Indian Ocean there is some evidence for population structure. The report presented to SC23 (Davies et al., 2020) notes that the situation is difficult to interpret but additional data, yet to be fully analysed, may shed further light.

Skipjack reproduce starting at ~40 cm, which is <2 years old. They spawn in equatorial waters, without evidence of a particular spawning season or area – it is supposed that they opportunistically take advantage of favourable conditions. The maximum size for a skipjack in the Indian Ocean is ~110 cm, with a maximum age of ~8 years (Fu, 2020).

A target and limit reference point (TRP, LRP) has been agreed by IOTC for skipjack of 40%B0 and 20%B0 respectively (Res. 16/02). The most recent stock assessment, in 2020 (Fu, 2020; IOTC, 2020a), estimated that the stock was above the TRP level: median estimate from stock assessment, SB2019 = 45%SB0; SB2019 above 40%SB0 with 80% probability and below with 20% probability (**Table 7.2.1.1.1**). The Kobe plot is shown in **figure 7.2.1.1.1.**

Table 7.2.1.1.1– Stock assessment summary of IO skipjack tuna. Source: IOTC, 2020a

Colour key	Stock overfished (SB_{2019} / $SB_{40\%SB0}$<1)	Stock not overfished (SB_{2019} / $SB_{40\%SB0}$≥ 1)
Stock subject to overfishing (E_{2019} / $E_{40\%SB0}$≥ 1)	19.5%	19.5%
Stock not subject to overfishing (E_{2019} / $E_{40\%SB0}$≤ 1)	0.6%	60.4%
Not assessed / Uncertain		

The percentages are calculated as the proportion of model terminal values that fall within each quadrant with model weights taken into account

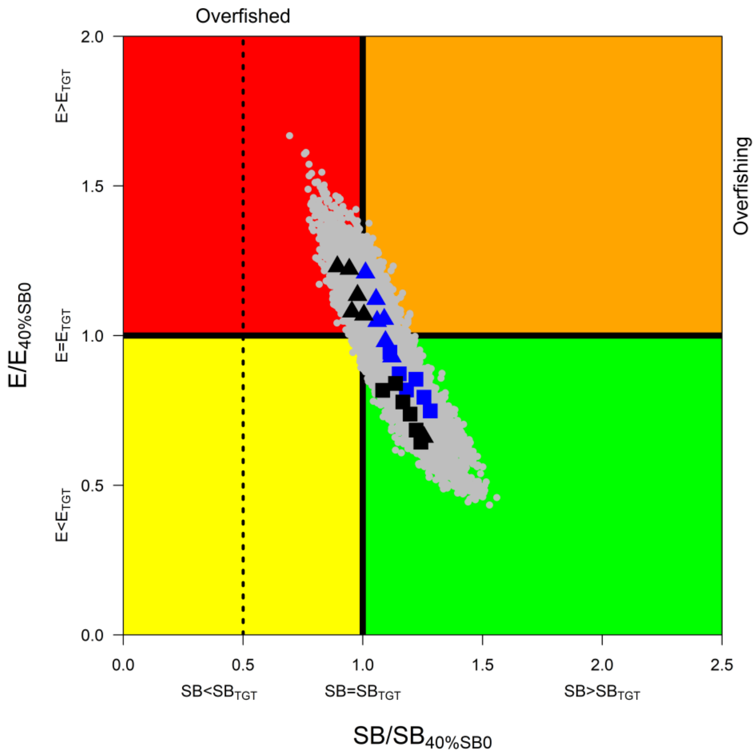

Figure 7.2.1.1.1 - Skipjack tuna: SS3 Aggregated Indian Ocean assessment Kobe plot of the 2020 uncertainty grid. Symbols represent MPD (Management Procedures Dialogue) estimates of current stock status relative to $SB_{40\%SB0}$ (x-axis) and $E_{40\%SB0}$ (y-axis) for the individual models (blue, no effort creep; black, additional effort creep; triangle, full weighting of tagging data; square, tagging data downweighted). Grey dots represent uncertainty from individual models. The vertical dashed line represents the limit reference point for Indian Ocean skipjack tuna (SB_{lim} = 20%SB_0). Source: IOTC, 2020a

The exploitation rate (E; proxy for fishing mortality) was estimated to be most likely slightly below the rate resulting in the TRP as the equilibrium biomass (Etarg: below: 61%, above: 39%) (**table 7.2.1.1.1**). Catch resulting in equilibrium biomass at the target level (C40%SB0) was estimated to be in the range 462-675 kt in 2019 (10%/90% CIs), median estimate 536 kt, compared to an estimated nominal catch in 2019 of 547 kt and a 5-year average (2015-19) of 507 kt (**Table 7.2.1.1.2**).

Table 7.2.1.1.1 - Status of skipjack tuna (Katsuwonus pelamis) in the Indian Ocean. Source: IOTC, 2020a

Area[1]	Indicator	Value	Status[23]
Indian Ocean	Catch in 2020 (t)[2]	555,211	60.4%*
	Average catch 2016-2020 (t)	546,095	
	$C_{40\%SB0}$ (t) (80% CI)	535,964 (461,995–674,536)	
	C_{2019} / $C_{40\%SB0}$ (80% CI)	1.02 (0.81–1.18)	
	$E_{40\%SB0}$ [4] (80% CI)	0.59 (0.53–0.66)	
	E_{2019} / $E_{40\%SB0}$ (80% CI)	0.92 (0.67-1.21)	
	SB_0 (t) (80% CI)	1,992,089 (1,691,710–2,547,087)	
	SB_{2019} (t) (80% CI)	870,461 (660,411–1,253,181)	
	$SB_{40\%SB0}$ (t) (80% CI)	794,310 (672,825–1,019,056)	
	$SB_{20\%SB0}$ (t) (80% CI)	397,155 (336,412–509,528)	
	SB_{2019} / SB_0 (80% CI)	0.45 (0.38-0.5)	
	SB_{2019} / $SB_{40\%SB0}$ (80% CI)	1.11 (0.95-1.29)	
	SB_{2019} / SB_{MSY} (80% CI)	1.99 (1.47-2.63)	
	MSY (t) (80% CI)	601,088 (500,131–767,012)	
	E_{2019} / E_{MSY} (80% CI)	0.48 (0.35-0.81)	

[1]Boundaries for the Indian Ocean stock assessment are defined as the IOTC area of competence
[2] Proportion of 2020 catch fully or partially estimated by IOTC Secretariat: 14.5%
[3]The status refers to the most recent years' data used in the assessment conducted in 2020, i.e., 2019
[4] $E_{40\%SB0}$ is the equilibrium annual exploitation rate (Etarg) associated with the stock at Btarg, and is a key control parameter in the skipjack harvest control rule as stipulated in Resolution 16/02. Note that Resolution 16/02 did not specify the exploitation rate associated with the stock at Blim
*Estimated probability that the stock is in the respective quadrant of the Kobe plot (shown below), derived from the confidence intervals associated with the current stock status

7.2.1.2 Data collection of Indian Ocean skipjack tuna

Compared to the other tuna RFMOs, IOTC has more problems with obtaining accurate and precise data for stock assessments, because of the higher proportion of the catch in the Indian Ocean taken by artisanal fisheries, compared to the other oceans. For skipjack, the main gears take the catch in approximately the following proportions (2015-19): 53% purse seine (nearly all FAD or other associated), 19% gillnet and 19% bait-boat (pole-and-line). IOTC report data coverage as the proportion of catch for which the data are fully reported to IOTC, following IOTC required standards. For nominal catch data, the proportion reported in some form in 2019 was ~80%, for catch/effort data ~90% and for size data ~80%, although not all of this was good quality. Note that this is a significant improvement in relation to the data quality at the time of the previous stock assessment in 2017, and the situation in general is improving over time, as can be seen by the trends the red line in **table 7.2.1.2.1**. The IOTC Secretariat make estimates and assumptions to fill in critical gaps (e.g. to estimate total catch) as far as possible (IOTC, 2020b).

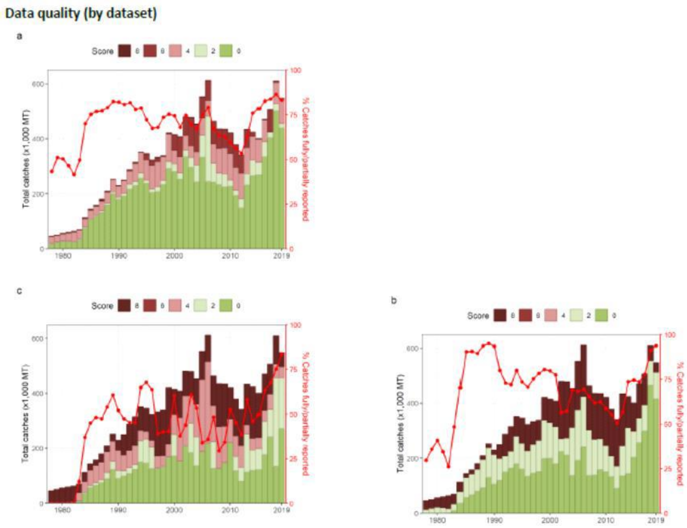

Figure 7.2.1.2.1- Skipjack data available to IOTC: barplots show data broken down by quality score (green = score zero = data provided as per requirements to brown = score 8 = not available or estimated); red line shows proportion of data reported in some form. Plot a) nominal catch; plot b) catch-effort data; plot c) size data. Source: IOTC, 2020b.

The fishery-dependent information used in the stock assessment is as follows (from Fu (2020) except where otherwise indicated):

Nominal catch: Catch is relatively certain for the industrial fleets but uncertain for several important artisanal fleets, because either the total catch is uncertain, or the catch is not sufficiently divided by species – as discussed above. The IOTC Secretariat provides a dataset for nominal catch by fleet, making estimates where required.

Catch and effort time series: The most important standardised CPUE time series available as abundance indices in the stock assessment are from the EU purse seine fleet and the Maldives pole-and-line fishery. The Maldives data analysis and standardisation was extensively revised and improved in 2019-20 (Medley et al., 2020), as were the EU catch-effort data for FADs (called 'PSLS'; Guery et al. (2020). There is also a shorter standardised time series from the Sri Lanka gillnet fishery. The three time-series show similar trends.

Echosounder buoy data: Santiago et al. (2020) (Buoy-derived Abundance Index; BAI) and Baidai et al. (2020) have developed novel abundance indices for skipjack based on acoustic data from echosounder buoys on FADs. The BAI assumes that the acoustic signal from the buoys is proportional to tuna abundance, with the data standardised to account for other potential factors. The index from Baidai et al. (2020) is based on assumptions about skipjack behaviour.

Catch-at-size: These data are generally available from the mid-1980s onwards but catch-at-size information for some gears is very limited (gillnet, handline and trolling).

Fishery-independent data are available, including tagging (101,353 skipjack tagged, 17,835 returns), and size/age information from otoliths.

7.2.1.3 Stock assessment approach

The most recent stock assessment for Indian Ocean skipjack was in 2020; conducted remotely due to the Covid-19 pandemic. Unlike in previous years, WPTT did not review a set of different models; only one model (using SS) was presented (Fu, 2020) and this was discussed and revised by WPTT (IOTC, 2020a) to provide a final version to be put forward to the SC. (This may have been a function of Covid-related limitations, or perhaps simply than in 2017, the SS model was selected as the most robust.)

The SS3 model (Fu, 2020) is age- and spatially structured and works on quarterly timesteps. Input data are categorised into 'fisheries', with the aim of having (sufficiently) constant selectivity functions over time for each fishery. In this case there were seven fisheries: Maldives pole-and-line, EU and Seychelles FAD-associated purse seine (FAD/log associated Purse Seine, hereafter PSLS), EU/Seychelles free-school purse seine, gillnet, line (handline, troll and similar coastal gears), longline (minor) and 'other' (mainly purse seine of other nations). This assessment attempts to separate out 'other' more than in previous assessments, where 'other' including the gillnet, line and longline categories.

The data inputs were catch data (all fisheries), standardised CPUE from the Maldives pole-and-line and PSLS fisheries, catch-at-size and tagging data. The BAI index and behavioural acoustic index were used in sensitivities. Virgin recruitment, recruitment deviations and selectivity and catchability functions were estimated within the model. Stock-recruit steepness (Beverton-Holt), natural mortality and the growth and maturity schedules were estimated externally and input as fixed parameters. A key assumption of SS is that catch is assumed to be known without error (potentially problematic in this case where robust catch data are more difficult to obtain than in the other tuna RFMOs).

WPTT reviewed the initial exploratory model runs and made a range of modifications to the model inputs and assumptions (e.g., removing some tagging data and one of the scenarios for tag mixing, adding a new scenario for PSLS catchability (effort creep). They eventually fixed on an uncertainty grid as per **Table 7.2.1.3.1**. No single model was designated as the 'reference case' (one was designed the basic model but did not carry proportionally more weight in the final grid); the point estimates of parameter values were derived from the median estimate across all models in the grid.

Table 7.2.1.3.1 Skipjack tuna assessment model grid, as agreed by WPTT. Source: IOTC, 2020a.

Model options	Description
Spatial structure	io – whole Indian Ocean one area model
	io2 – East and western Indian Ocean two area model
Steepness	h70 – Stock-recruitment steepness parameter 0.7
	h80 – Stock-recruitment steepness parameter 0.8
	h90 – Stock-recruitment steepness parameter 0.9
Tag weighting	TagLamda01 – Tag lambda = 0.1 for both components of tag likelihood
	TagLamda1 – Tag lambda = 1 for both components of tag likelihood
PSLS catchability	q0 – 0% catchability change
	q1 – 1.25% catchability change per annum from 1995 to 2019

In addition to the SS3 stock assessment, a new study was carried out in the framework of Sustainable Indian Ocean Tuna Initiative (SIOTI), which is a large-scale Fisheries Improvement Project (FIP) comprising the major purse seine fleets and tuna processors in the region. The study (Merino et al., 2022) reviewed the options to define multispecies (bigeye, yellowfin and skipjack tunas) management objectives and provided detail on the scientific support for the adoption of multispecies management. The study also presented a plan for developing a multispecies MSE for the Indian Ocean tropical tunas. Three different management strategies were compared, and the fleet dynamics used in this work were based on the historical behaviour. The results are preliminary and subject to the large depletion estimated for bigeye in the 2018 stock assessment.

7.2.1.4 Stock management

The fishery is not managed via a Total Allowable Catch (TAC), although IOTC Res. 16/02 and 21/03 provide harvest control rule (HCR) which is used to set a catch limit. The first time the HCR was used to calculate a catch limit was after the stock assessment in 2017, and this catch limit applied from 2018-2020, hence there was no catch limit for 2016 and 2017.

IOTC agreed a HCR for skipjack in 2016 in Resolution 16/02 which sets out the reference points given above (TRP=40%B_0, LRP=20%B_0). There is also E_{targ}, which is the exploitation rate associated with an equilibrium biomass of the TRP, and B_{safety}, which is set at 10%B_0 (and is arguably in practice the actual limit reference point). It sets out a formal HCR as follows:

- Based on a three-yearly stock assessment, a catch limit shall be calculated which will apply for three years until the next assessment;
- If B_{curr} (most recent biomass estimated from the stock assessment) is above the TRP, the catch limit shall be calculated as E_{targ} x B_{curr};

- If B_{curr} is estimated between the TRP and B_{safety}, the catch limit is calculated as E_{targ} x B_{curr} x I, where I is a vector of values between 0 and 1, set at 0 at B_{curr}= B_{safety} and 1 at B_{curr}=TRP;
- If Bcurr is below Bsafety, the catch limit is zero except for subsistence fisheries;
- The catch limit cannot be >900,000 t, regardless of the level of B_{curr};
- Catch limits cannot vary by >30% from the previous level, except where B_{curr}< B_{safety};
- If B_{curr} falls below the LRP, the HCR should be reviewed; in any case, it should be reviewed not later than 2021;
- 'Exceptional circumstances' may be defined under which management may deviate from the HCR, under advice from the Scientific Committee.

This HCR and the I vector results in the relationship between exploitation rate and biomass given in **Figure 7.2.1.4.1**.

The catch limit for 2018-2020 was calculated based on the 2017 stock assessment at 470,029 t (IOTC, 2017b). IOTC estimate the catch in 2018 at 609,156 t, and in 2019 at 547,248 t – i.e. 30% and 16% above the catch limit respectively (IOTC, 2020c). Based on the 2020 stock assessment, the catch limit as derived from the HCR has risen to 513,572 t for 2021, 2022 and 2023 (IOTC, 2020c).

Res. 16/02 did not define any tools which can be used to implement the HCR – i.e., to limit catch to the catch limit. However, there are some general tools in place via other resolutions, notably the Interim Rebuilding Plan for yellowfin (Res. 19/01) and the FAD limits (Res. 19/02).

The Res 21/03 focuses again on harvest control rules for skipjack tuna in the IOTC area of competence (IOTC, 2021a) and defines the following:

Objectives

To maintain the Indian Ocean Tuna Commission skipjack tuna stock in perpetuity, at levels not less than those capable of producing maximum sustainable yield (MSY) as qualified by relevant environmental and economic factors including the special requirements of Developing Coastal States and Small Island Developing States in the IOTC area of competence and considering the general objectives identified in Resolution 15/10 (or any subsequent revision).

To use a pre-agreed harvest control rule (HCR) to maintain the skipjack tuna stock at, or above, the target reference point (TRP) and well above the limit reference point (LRP), specified in Resolution 15/10 (or any subsequent revision).

Reference Points

Consistent with paragraph 2 of Resolution 15/10, the biomass limit reference point, Blim, shall be 20% of unfished spawning biomass (i.e. 0.2B0).

Consistent with paragraph 3 of Resolution 15/10, the biomass target reference point, Btarg, shall be 40% of unfished spawning biomass (i.e. 0.4B0).

The HCR described in paragraphs 6–12 seeks to maintain the skipjack tuna stock biomass at, or above, the target reference point while avoiding the limit reference point.

Harvest Control Rule (HCR)

The skipjack tuna stock assessment shall be conducted every three (3) years, with the next stock assessment to occur in 2023. Estimates as defined below (a-c) shall be taken from a model-based stock assessment that has been reviewed by the Working Party on Tropical Tunas and endorsed by the Scientific Committee via its advice to the Commission.

The skipjack tuna HCR shall recommend a total annual catch limit using the following three (3) values estimated from each skipjack stock assessment. For each value, the reported median from the reference case adopted by the Scientific Committee for advising the Commission shall be used.

a) The estimate of current spawning stock biomass (Bcurr);

b) The estimate of the unfished spawning stock biomass (B0);

c) The estimate of the equilibrium exploitation rate (Etarg) associated with sustaining the stock at Btarg.

The HCR shall have five control parameters set as follows:

a) Threshold level, the percentage of B0 below which reductions in fishing mortality are required, Bthresh = 40%B0. If biomass is estimated to be below the threshold level, then fishing mortality reductions, asoutput by the HCR, will occur.

b) Maximum fishing intensity, the percentage of Etarg that will be applied when the stock status is at, or above, the threshold level Imax = 100%. When the stock is at or above the threshold level, then fishing intensity (I) = Imax

c) Safety level, the percentage of B0 below which non-subsistence catches are set to zero i.e. the non-subsistence fishery is closed Bsafety= 10%B0.

d) Maximum catch limit (Cmax), the maximum recommended catch limit = 900,000t. To avoid adverse effects of potentially inaccurate stock assessments, the HCR shall not recommend a catch limit greater than Cmax. This value is based upon the estimated upper limit of the MSY range in the 2014 skipjack stock assessment.

e) Maximum change in catch limit (Dmax), the maximum percentage change in the catch limit = 30%. To enhance the stability of management measures the HCR shall not recommend a catch limit that is 30% higher, or 30% lower, than the previous recommended catch limit.

The recommended total annual catch limit shall be set as follows:

a) If the current spawning biomass (Bcurr) is estimated to be at or above the threshold spawning biomass i.e., Bcurr >= 0.4B0, then the catch limit shall be set at [Imax x Etarg x Bcurr]

b) If the current spawning biomass (Bcurr) is estimated to be below the threshold biomass i.e, Bcurr < 0.4B0, but greater than the safety level i.e.,Bcurr > 0.1B0, then the catch limit shall be set at [I x Etarg x Bcurr].

c) If the spawning biomass is estimated to be at, or below, the safety level, i.e. Bcurr <= 0.1B0 then the catch limit shall be at 0 for all fisheries other than subsistence fisheries.

d) In the case of (a) or (b), the recommended catch limit shall not exceed the maximum catch limit (Cmax) and shall not increase by more than 30% or decrease by more than 30% from the previous catch limit.

e) In the case of (c) the recommended catch limit shall always be 0 regardless of the previous catch.

The HCR described above produces a relationship between stock status (spawning biomass relative to unfished levels) and fishing intensity (exploitation rate relative to target exploitation rate. This is summarized below:

The catch limit shall by default, be implemented in accordance with the allocation scheme agreed for skipjack tuna by the Commission. In the absence of an allocation scheme, the HCR shall be applied as follows:

a) If the stock is at or above the Threshold level (i.e., Bcurr >= 0.4B0), then the HCR shall establish an overall catch limit and catches of skipjack tuna for any given year shall be maintained at or below the overall catch limit established by the HCR.

b) If the stock falls below the Threshold level (i.e., Bcurr < 0.4B0), the fishing mortality reductions shall be implemented proportionally by CPCs for catches over 1 percent of the catch limit established by the HCR with due consideration to the aspirations and special requirements of Developing Coastal States and Small Island Developing States.

c) The Commission may consider to develop and adopt Conservation and Management Measure(s) to ensure catches of skipjack tuna are maintained at or below the overall catch limit established by the HCR and to apply fishing mortality reductions if the stock falls below the Threshold level (i.e Bcurr < 0.4B0), with due consideration to the aspirations and special requirements of Developing Coastal States and Small Island Developing States, no later than the annual session of the IOTC in 2022.

d) This paragraph shall not pre-empt or prejudice future allocation negotiations.

Review and exceptional circumstances

The HCR, including the control parameters, will be reviewed through further Management Strategy Evaluation (MSE).

In the case that the estimated spawning biomass falls below the limit reference point, the HCR will be reviewed, and consideration given to replacing it with an alternative HCR specifically designed to meet a rebuilding plan as advised by the Commission.

The recommended total annual catch produced by the HCR will be applied continuously as set forth in paragraph 11 above, except in case of exceptional circumstances, such as caused by severe environmental perturbations. In such circumstances, the Scientific Committee shall advise on appropriate measures.

Scientific Advice

The IOTC Scientific Committee shall:

a) Include the LRP and TRP as part of any analysis when undertaking all future assessments of the status of the IOTC skipjack tuna stock.

b) Undertake and report to the Commission a model-based skipjack tuna stock assessment every three (3) years, commencing with the next stock assessment in 2023.

c) Undertake a programme of work to further refine Management Strategy Evaluation (MSE) for the IOTC skipjack tuna fishery as required in paragraph 12 including, but not limited to,

i. Refinement of operating model(s)/ used,

ii. Alternative management procedures,

iii. Refining performance statistics.

Final Clause

The Commission shall review this measure at its annual session in 2022 (not yet available), or before if there is reason and/or evidence to suggest that the skipjack tuna stock is at risk of breaching the LRP.

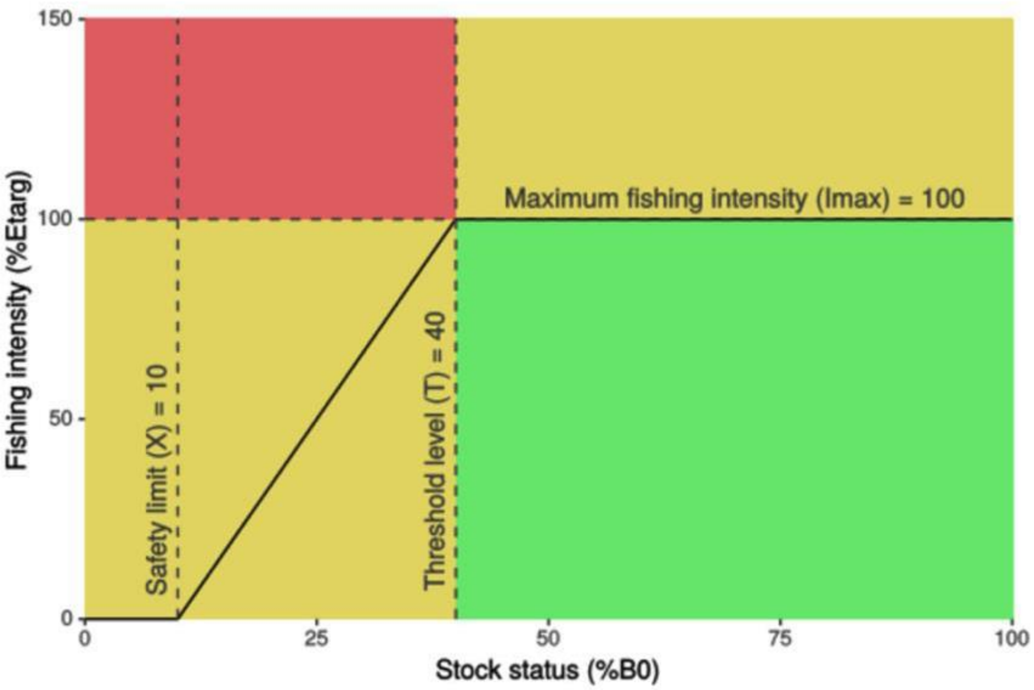

Figure 7.2.1.4.1- Relationship between exploitation rate (fishing intensity) and stock status (biomass in relation to reference points) resulting from application of the above HCR (IOTC Res. 16/02). Source: IOTC2020d.

7.2.2 Catch profiles

Catch profile of IO skipjack tuna are available in **Figure 7.2.2.1.**

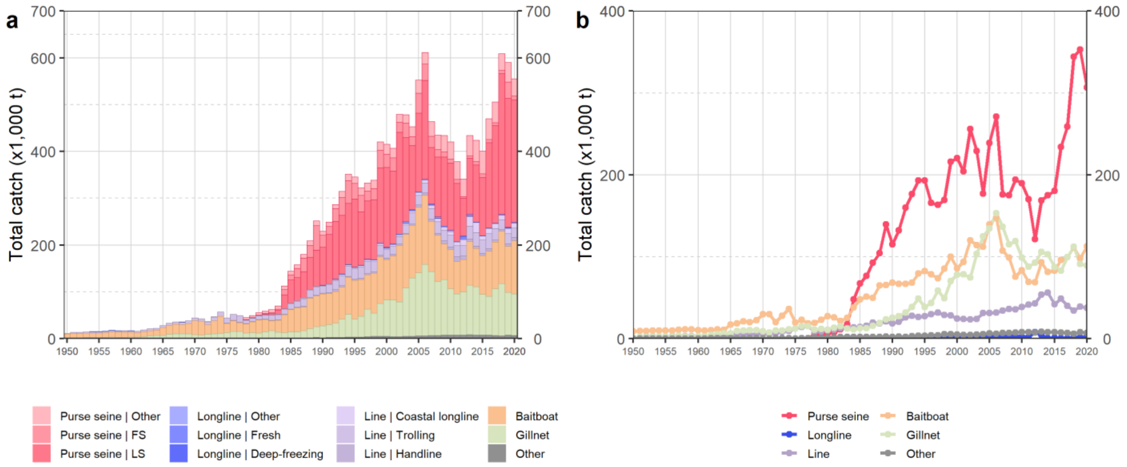

Figure 7.2.2.1- Annual time series of (a) cumulative nominal catches (t) by fishery and (b) individual nominal catches (t) by fishery group for skipjack tuna during 1950–2020. FS = free-swimming schools; LS = drifting log/ FAD-associated school. Purse seine | Other: coastal purse seine, purse seine of unknown association type, ring net; Other: all remaining fishing gears. Source: IOTC, 2020a.

7.2.3 Total Allowable Catch (TAC) and catch data

Table 7.2.3.1 – Catch limit and catch data

	Year/s	Amount (t)
Catch limit	**2021-2023**	**513,572**
	2018-2020	**470,029**
UoA share of catch limit	N/A (no further quota allocation)	
Total green weight catch by UoC	**2021**	(*)[1]
	2020	(*)

[1] Data to be collected during the site visit

7.2.4 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				

In the last stock evaluation the PRI is not estimated. However, a limit reference point LRP was defined as 20%SB_0. Thisis in agreement with the MSC's default proxy for the PRI. Moreover, the stock assessment model used also estimates SB_{MSY} to be ~23%SB_0 although this value is not used by IOTC as a reference point.According to the guidance in GSA2.2.3.1: *In the case where either B_{MSY} or the PRI are analytically determined, those values should be used as the reference points for measuring stock status unless additional precaution is sought. (…) In the case where B_{MSY} is analytically determined to be lower than 40%B_0 (as in some highly productive stocks), and there is no analytical determination of the PRI, the default PRI should be 20%B0 unless BMSY<27%B_0, in which case the default PRI should be 75%B_{MSY}.*

Taking into account this, and since SB_{MSY} is analytically determined, it is required to use this value as a reference point for scoring this SI. The median estimate of SB_{MSY} is below 27%SB_0, giving a default value for the PRI of 75% SB_{MSY} or ~17%SB_0 (**Table 7.2.1.1.1**)

SB_{2019} is estimated at 45%SB_0 (median of stock assessment uncertainty grid), with the lower 10% CI estimated at 38%SB_0. Therefore, the lower 5% CI is most likely above 17%SB_0; with a >95% probability that the biomass is above this PRI proxy. None of the models estimate SB_{2019} to be below the LRP of 20%SB0 (vertical dotted line in Kobe plot, **Figure 7.2.1.1.1**). Thus, SG60, SG80 and SG100 are met.

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**	**Yes**
Rationale				

The median estimate of the 2020 stock assessment grid estimates SB_{2019} at 45%SB_0, which is above the TRP. SB_{MSY} is estimated at ~23%SB_0, i.e. below the TRP (close to the LRP). SG80 is met.

The TRP can be used as a proxy for SB_{MSY}, but MSC guidance (GSA2.2.3.1) states that a direct estimate of SB_{MSY} should be used in preference, in the case such estimate is available. The median estimate from the uncertainty grid for SB_{2019}/SB_{MSY} was 1.99, with 10% and 90% CIs of 1.47 and 2.63 (**Table 7.2.1.1.1**). The Kobe plot (**Figure 7.2.1.1.1**) suggests that none of the model runs (grey points) estimated SB_{2019} to be below 23%SB_0 (dotted line shows LRP of 20% and solid line and colour change TRP of 40%). The model also estimates F_{2019}/F_{MSY} at 0.55 with CIs 0.31-0.78. There is therefore 'a high degree of certainty' (probability of 95% or more) that the stock is above the MSY level, considering that the spawning biomass have been above such level in all years of the last generation time (2 years according with https://www.fishbase.se/summary/107). SG100 is met.

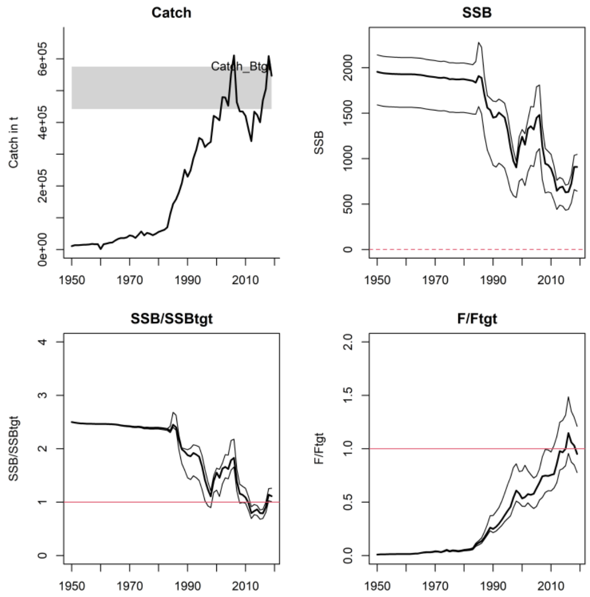

Figure 1.1.1.1 - Estimated stock trajectories for the Indian Ocean skipjack from the final model grid. Thin black lines represent 5%, 50%, 95% percentiles. In the catch plot, dotted lines represent estimate of Yield$_{40\%SSB}$, the shaded area represents 5th and 95th percentiles. SSBtgt refers to SB$_{40\%SSB0}$ and Ftgt refers to F$_{40\%SSB0}$. Source: Fu, 2020.

References

Fu (2020), IOTC (2020a, b, c)

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)	*Proxy PRI based on SB$_{MSY}$*	*75% SB$_{MSY}$ =* 17%SB$_0$	*SB$_{2019}$ = 0.45SB$_0$ = 2.6*(0.75SB$_{MSY}$) (median of uncertainty grid)*
Reference point used in scoring stock relative to MSY (SIb)	*SB$_{MSY}$*	23%SB$_0$	*SB$_{2019}$ = 1.99SB$_{MSY}$ (1.47-2.63).*

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

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

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

Overall Performance Indicator score	
Condition number (if relevant)	

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

Rebuilding is not required – not applicable

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

Rebuilding is not required – not applicable

References

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g range and information gap indicator added at Announcement Comment Draft Report stage

Draft scoring range	NA
Information gap indicator	

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

Overall Performance Indicator score	
Condition number (if relevant)	

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**	**No**	**No**
Rationale				

MSC defines a harvest strategy as a combination of monitoring (PI1.2.3), stock assessment (PI1.2.4), a harvest control rule (PI1.2.2a, b) and management tools (PI1.2.2c). Monitoring and a stock assessment process are in place for the target stock. A harvest control rule, reference points for Indian Ocean skipjack are defined by IOTC Res. 16/02. Also based on this HCR two consecutive 3-year catch limits have been set (2018-2020, 2021-2023). Considering all the above, it is clear that IOTC's objectives include the adoption, on the basis of scientific evidence, of conservation and management measures to ensure the conservation of the skip jack stock and to promote the objective of optimum utilisation throughout the Indian Ocean. Therefore, the harvest strategy objective is to maintain stock level at or above the biomass which would produce MSY. This was established as an interim threshold reference point under 15-10. Therefore, the harvest strategy is expected to achieve stock management objectives reflected in PI 1.1.1 SG80, **meeting SG60**.

The skipjack tuna harvest strategy consists of collection of monitoring data, scientific assessment of the performance of various controls on exploitation and decision making consistent with well-defined objectives and procedures. Scientific advice has been formulated relative to reference points more precautionary than MSY and is responsive to that state of the stock. Among many others, current management resolutions being applied consist of managing FADs (Res. 19/02), maintaining a list of authorised vessels (Res. 19/04), banning discarding (Res. 19/05) and managing transhipments (Res. 19/06). Resolution 15/10 establishes reference points, and although it is directed at the fisheries scientists, clearly sets out management objectives so that advice can be clarified. Further harvest strategy improvements are only in the development stage, such as establishing a quota system (Res. 14/02). Alongside direct controls on catches in accordance with catch limits set based on the HCR adopted in Res. 16/02, which do not appear to have been fully effective, indirect effects of limiting yellowfin catches (Res. 19/01) may also help limit exploitation on skipjack, as the decreasing trend of the total SKJ catches since 2020 may indicate. Moreover, IOTC implemented a specific Work Plan on allocation of fishing opportunities and a Technical Committee (TCAC) is working on this issue (see: https://www.iotc.org/sites/default/files/documents/2014/02/IOTC-2013-TCAC02-PropAE.pdf). Therefore, most of the key elements of the harvest strategy (data collection, scientific advice) appear to work together However, TAC allocation and controls on exploitation are imprecise and may not achieve the desired catches level as observed in some years. **This does not meet SG80**.

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 objective of the harvest strategy is taken to be the agreed TRP for skipjack – i.e. that biomass be maintained at 40%SB0. The most recent stock assessment estimated that the stock was above the target level (probability of being above/below 80%/20%) with exploitation rate below Etarg (probability of above/below 40%/60%). The harvest strategy objective is relatively precautionary (TRP is 1.7*SBmsy). The 2020 stock assessment suggests that stock status has improved since the previous assessment (2017) and is now above rather than at the target level. It is therefore hard to argue that the harvest strategy is not working, despite not being fully implemented. SG60 is met.

MSC define 'tested' at SG80 as follows (guidance GSA2.4.1):

> *'Testing' at the 80 level in SI1.2.1b can include the use of experience from analogous fisheries, empirical testing (for example practical experience of performance or evidence of past performance) and simulation testing (for instance using computer-intensive modelling such as Management Strategy Evaluation (MSE)). Testing and evaluation in Scoring Issue (b) at the Harvest Strategy level should consider the full interactions between different components of the harvest strategy, including the HCRs, use of information and the assessment of stock status.*

In this case is possible to rely on empirical testing (i.e. empirical evidence from the stock assessment that the stock is at the target level). However, SG80 allows that the harvest strategy 'may not have been fully tested', so analysis meeting this definition is not required to be present in full for SG80 to be met – it only requires that there is some evidence that the harvest strategy is achieving its objectives. According to the 2020 stock assessment, the harvest strategy is achieving its objective in terms of stock status, which is aboeve the target level almost for the entire time series, so **SG80 is met**.

Since a quantitative Management Strategy Evaluation (MSE) is still in progress for this stock, which can test and evaluate the full interactions between different components of the harvest strategy, including the HCRs, use of information and the assessment of stock status, a score of **100 is 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				

There is a stock assessment every three years, based on catch data, CPUE abundance indices from the Maldives pole-and-line and EU purse seine fisheries, as well as new indices derived from FAD acoustic buoys, and catch-at-size data (see PI 1.2.3 below for further details). Sufficient monitoring is in place that is expected to determine whether the harvest strategy is working. **SG60 is met**.

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

The IOTC SC reviews the elements of HS annually and provides advice to the Commission on whether it has been successful and whether it needs to be changed (see e.g. IOTC, 2016a, b). The SC 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 Resolutions.

Resolutions for the management of skipjack and other stocks under IOTC jurisdiction have generally been in line with the advice from the SC. Most recently, under advice from the SC, the Commission agreed Res 16/02 for skipjack which set/reaffirmed target and limit reference points, a HCR, and a range of accompanying implementing rules and conditions. Resolutions for other stocks and other matters are also relevant. A recent example is the agreement to Res 16/01 on the rebuilding of yellowfin tuna stocks. The resolution has instituted catch limits for yellowfin tuna aimed at rebuilding, though not quite to the extent advised by the SC because of awareness, also through SC advice, of uncertainties. Other examples related to effort control are considered at PI1.2.2c. Overall, while the process is imperfect, the HS for all tropical tuna stocks within the IOTC is periodically reviewed and improved as necessary and **SG100 is 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				

The target species is not a shark; not relevant.

	Review of alternative measures			
f	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?	**NA**	**NA**	**NA**
Rationale				

Under MSC standards, unwanted catch of P2 species is defined (SA3.1.6) as: "*(…) the part of the catch that a fisher did not intend to catch but could not avoid, and did not want or chose not to use*". Following SA2.4.8.1 this definition is also applicable to species assessed under Principle 1.

Skipjack tuna is the target species of the fishery. Discarding of tuna in the Indian Ocean is banned under IOTC Res. 19/05, except where fish is unfit for human consumption. According with the information provided by the client, the discard rate is below 3% (**Table 1.2.1.1**) and can be considered negligible. Therefore, the present SI is not scored.

Table 1.2.1.1 - Tuna catches (t) corresponding to observed sets by year. Data recorded by observers (electronic and physical) on board the assessed vessels between 2016 and 2020. Data includes the retained and discarded catches observed by year. Source: Client checklist information.

	2016			2017			2018			2019			2020		
	L	D	DR	L	D	DR	L	D	DR	L	D	DR	L	D	DR
SKJ	5.951,50	7,17	0,12%	18.179,46	120,765	0,66%	18.335,61	98,584	0,53%	16.728,63	144,47	0,86%	10.781,92	240,575	2,18%
YFT	3.797,50	6,05	0,16%	9.020,90	15,925	0,18%	7.377,84	27,651	0,37%	7.271,16	32,735	0,45%	5.805,17	101,345	1,72%
BET	721,00	1,50	0,21%	4.407,96	6,98	0,16%	4.069,12	21,885	0,53%	2.157,76	6,25	0,29%	2.177,34	32,37	1,46%
Others	670,00	2,51	0,37%	122,57	257,646	67,76%	267,98	70,33	20,79%	7,00	708,73	99,02%	81,35	600,22	88,06%
Total	**11.140,00**	**17,23**	**0,15%**	**31.730,88**	**401,32**	**1,25%**	**30.050,55**	**218,45**	**0,72%**	**26.164,55**	**892,19**	**3,30%**	**18.845,78**	**974,51**	**4,92%**
Annual product	**10.470,00**	**14,72**	**0,14%**	**31.608,31**	**143,67**	**0,45%**	**29.782,57**	**148,12**	**0,49%**	**26.157,55**	**183,46**	**0,70%**	**18.764,43**	**374,29**	**1,96%**

References

IOTC Resolutions 19/06, 19/05, 19/01, 19/02, 19/01, 19/02, 18/01, 17/01, 17/04, 16/02, 15/10, 14/02
IOTC (2019, 2020a, b), Fu (2020)
IOTC TC23 2019, IOTC WPTmT7 2019, IOTC WPTT21 2019, IOTC WPTT22 2020.
Merino et al., 2022.

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

Draft scoring range	**60-79**
Information gap indicator	**Information sufficient to score PI**

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

Overall Performance Indicator score	
Condition number (if relevant)	

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				

There is a well-defined HCR in place which ensures that the exploitation rate is reduced as the LRP and Bsafety are approached (see **Figure 7.2.1.4.1**). Under the HCR, E is reduced below Etarg as the biomass falls below the TRP, meaning that it should act to maintain the stock around the target level. The IOTC resolution 21/03 (IOTC, 2021a), defines clear objectives and reference points in the HCRs, which recommend total annual catch limit. Therefore, **SG60 and SG80 are met.**

In relation to SG100, the HCR has only been in place for 3 years (2018-20), with catch data only available for two so far. While there is an MSE process underway (see workplan – Appendix 6 of 2019 SC report; IOTC (2019b); rolled over in 2020), there is currently no information to predict stock future behaviour under this management regime (stock projections from the 2020 assessment do not appear to exist). On a precautionary basis, **SG100 is 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				

Skipjack stock status is inherently uncertain, because it is a short-lived and productive species, where recruitment is more likely to be environmentally driven that subject to a stock-recruit relationship. On the other hand, because it is a productive species, it is relatively robust to fishing mortality. The HCR is relatively precautionary in that the TRP is set at 40%SB0 which is well above SBMSY (see PI 1.1.1). The LRP is 20%SB0, which is close to estimates of SBMSY (slightly below; see 1.1.1) The stock assessment also considers purse seine effort creep, which is often not considered in tuna assessments, and uses novel sources of data (FAD acoustic buoys). Although the HCR fixes the catch to zero at Bsafety which is only 50% of the agreed LRP (10%B0), this is probably still a reasonably proxy for the PRI since skipjack is a productive stock, the catch limit at the LRP would be low even if not zero, and the LRP is close to SBMSY. On this basis, the HCR is likely to be robust; **SG80 is met**.

The ecological role of the stock is not taken into account, and there is not concrete evidence as to how the HCR functions in practice or via stock projections. Therefore, **SG 100 is not met.**

c	HCRs evaluation			
	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**	**No**	**No**

Rationale

It is possible to score tools as available under the condition that *Stock biomass has not previously been reduced below the MSY level or has been maintained at that level for a recent period of time that is at least longer than 2 generation times of the species, and is not predicted to be reduced below BMSY within the next 5 years* (SA5.2.5). Taking the target reference point adopted in IOTC Res 16/02(40%B0) as the proxy for BMSY (consistent also with the MSC default level), this is not the case, because the stock assessment time series of SB/TRP estimates that the biomass dipped below the TRP before recovering to its current level. Given that the biomass is estimated currently to be more or less exactly at the MSY proxy level, catches are at the upper level of those associated with application of the HCR adopted in Res 16/02 and no forward projections are available, it is also not possible to say whether the biomass might be reduced below this level over the next 5 years. Scoring therefore needs consideration of the tools that are *used/in use*.

There are three years where there were both catch limit in place and catch estimates. Following, the IOTC resolution 16/02, the recommended annual catch limit for the years 2018 to 2020 was 470,029 tonnes. Total catches in 2018 were 30% larger than the resulting catch limit, which raises concern in the WPTT. It is important to note that reaching the management objectives defined in Resolution 16/02 requires that the catch limits adopted by the skipjack HCR are implemented effectively. It should be noted that skipjack catches for most gears have increased from 2017 to 2018 (+44% for purse seine (log/FAD-associated), +12% for gillnet and +13% for pole-and-line). In 2019, catch was reduced considerably compared to 2018, to 590,450 tonnes. In 2020 catches decreased again and were 547,309 t. Catch data of the target stock for 2021 are not available at the time the present report was drafted.

The catch limit calculated applying the HCR specified in Resolution 16/02 was revised in 2020 and is established at 513,572 t for the period 2021-2023. The IOTC scientific committee noted that this catch limit is higher than for the previous period. This is attributed to the new stock assessment which estimates a higher productivity of the stock and a higher stock level relative to the target reference point, possibly due to skipjack life history characteristics and favourable environmental conditions. Thus, it is likely that the recent catches that have exceeded the limits established for the period 2018-2020 have been sustained by favourable environmental conditions. However, there is clear indication that the 2019 exploitation rate was estimated to be highly likely below E_{MSY} (the upper level of 80% CI of E is below E_{MSY}). This level of exploitation clearly decreased in the last three years.

MSC FCRG SA2.5.6 requires that teams examine the current exploitation levels in the fishery, as part of the evidence that the HCRs are working and states *Evidence that current F is equal to or less than F_{MSY} should usually be taken as evidence that the HCR is effective*. The SS3 stock assessment reports in 2017 and 2020 (IOTC, 2017; Fu, 2020) provided estimates of respectively F_{2016}/F_{MSY} and E_{2019}/E_{MSY} to be clearly below MSY exploitation levels (2017: F_{2016}/F_{MSY} 80% CI range 0.13-0.53; 2020: E_{2019}/E_{MSY} 80% CI 0.35-0.81). Therefore, following the guidance in MSC Fisheries Standard (Annexes S) and Guidance v2.0 on PI1.2.2 Scoring Issue (c) – Evaluating the effectiveness of HCRs (SA2.5.6 – SA2.5.7), which states: "*Section SA2.5.6 requires that teams examine the current exploitation levels in the fishery, as part of the evidence that the HCRs are working. Evidence that current F is equal to or less than F_{MSY} should usually be taken as evidence that the HCR is effective. Current F levels greater than F_{MSY} may also sometimes be accepted in cases where stock biomass is currently higher than B_{MSY} or where stock assessment information is comprehensive, and it is appropriate to treat F_{MSY} is a target reference point (see Box GSA3)*.", it is appropriate to conclude that available evidences (exploitation levels in last two assessments) indicate that the tools in use are effective in achieving the exploitation levels required under the HCRs. Such tools, are not only related to the established catch limits, which due to the issues in implementing quota allocation (see background section 7.2.1.4) were not completely effective, but are also represented by IOTC binding decisions to control fishing capacity (e.g.: Resolution 19/04), fishing effort (e.g.: Resolution 19/02) and other technical measures (e.g.: Resolutions 17/04 and 19/05).. Therefore, **SG60 is m**et.

Considering that there is not yet a quota allocation, and controls on exploitation are imprecise and may not achieve the desired catches levels exactly as observed in some years, **SG80 is not met.**

References

IOTC Resolutions 19/06, 19/05, 19/01, 19/02, 19/01, 19/02, 18/01, 17/01, 17/04, 16/02, 15/10, 14/02
IOTC (2019, 2020a, b), Fu (2020)
IOTC TC23 2019, IOTC WPTmT7 2019, IOTC WPTT21 2019, IOTC WPTT22 2020.
Merino et al., 2022.

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

Draft scoring range	**60-79**
Information gap indicator	**Information sufficient to score PI**

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

Overall Performance Indicator score	
Condition number (if relevant)	

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				

A large project is underway evaluating stock structure for tuna species in the Indian Ocean, using various lines of data including genetic analyses and otoliths (Davies et al., 2020). Tagging information is also available. Biological information such as growth, maturity and mortality is available to inform stock productivity, fleet composition is relatively well known and other data such as standardised CPUE and acoustic buoy time series are available for the stock assessment (Fu, 2020). **SG60 and SG80 are met**. Some additional information such as analyses of stock response to the environment (the Indian Ocean dipole; IOTC (2017c)) is also available. However, compared to large-scale tuna fisheries in other oceans, information is more limited; notably there are problems with catch and effort data from some significant fisheries in the Indian Ocean (e.g. gillnet and handline fisheries from India, Iran, Oman, Yemen and elsewhere). **SG100 is 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**	**No**
Rationale				

Stock abundance is evaluated via a stock assessment every three years. The assessment is able to estimate stock status relative to reference points which allows the HCR to be applied. Several stock abundance indices are available, from the Maldives pole-and-line fishery, the EU FAD-associated purse seine fishery and FAD acoustic buoy data. WPTT (2020) discussed each of these three abundance indices and made suggestions as to how they could be improved, but overall they allow trends in abundance in abundance to be evaluated up to 2019.

UoA removals are reported to IOTC following IOTC's requirements (Res. 15/01), based on the 'T3' data collection. Concerns were expressed by stakeholders about the methodology underlying this dataset, which has been in place for a number of years and was designed in the days of paper logbooks, and when the fishery was largely targeting free schools. However, these concerns were around the fine-scale requirements of managing the fishery at UoA level (e.g. in tracking yellowfin quota consumption), and not so much around the requirements of stock monitoring, which is at a much coarser spatial and temporal scale. None of stakeholders expressed concern about the role of T3 data in monitoring the stock. The IOTC Secretariat, in their review of data (IOTC, 2020e), noted that different components of the EU purse seine fleet appear to have different methodologies for estimating catch composition, giving different results. Reportedly the issue was discussed at WPTT21 in 2019, and the data were revised. In 2020, the Secretariat analysis of data availability and quality (IOTC, 2020b) notes the EU have not informed them about revisions to analysis methodologies for their data, but that apparent inconsistencies were less evident in the 2019 data provided in 2020.

Stock abundance is monitored via a stock assessment every three years, and sufficient abundance indicators are available to make the assessment relatively robust and suitable to apply the HCR (see 1.2.4). UoA removals are monitored with complete coverage, and despite some problems (currently being evaluated) with accuracy (proportional species composition) it appears that these data are sufficient to play their role in the harvest strategy. In fact, WPTT17 described the abundance index developed from the EU FAD fishery for the 2017 stock assessment as a 'major step forward'; it was also important for the 2020 assessment. **SG60 and SG80 are met.**

There is not a high degree of certainty in all the information required for the stock assessment; e.g. catch data are uncertain for some countries, and treatment of tagging data and effort creep have an impact on the outcome of the assessment and hence the application of the HCR. **SG100 is not met**.

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

While catch data are not very robust from all the fisheries in the Indian Ocean, the IOTC Secretariat estimates missing catch data (2020b, 2020e). This document also summarises the key uncertainties in catch data, to inform participants in WPTT and the SC. There are a range of uncertainties for skipjack, including uncertainty in catch from Sri Lanka, Comores and Madagascar and problems with catch composition by species (although this is more of an issue for yellowfin vs bigeye). Projects are underway with various coastal states to improve catch data (see IOTC (2020e)) and data from several countries (e.g. Indonesia, Pakistan) has improved markedly in recent years. Given the size and complexity of Indian Ocean tuna fisheries, the data can be described as good (see Figure) even if they do not have the same level of accuracy or coverage of the UoA. This scoring issue is met.

References

IOTC Resolution 15/01
IOTC (2017 a, b; 2020a-e)
Baidai et al. (2020), Davies et al. (2020), Fu (2020), Guery et al. (2020), Medley et al. (2020) and Santiago et al. (2020)

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

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

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

Overall Performance Indicator score	
Condition number (if relevant)	

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				

The assessment takes into account the biology of the species and is carried out using Stock Synthesis III (SS3, Fu 2020), basic equations and technical specifications underlying Stock Synthesis can be found in Methot (2000).

This approach uses a growth model as a basis for an age-structured model, and also uses tagging data; other biological information such as natural mortality and the Stock Recruitment relationship can be input externally or estimated within the model. It also considers the nature of the fishery, by dividing catch and effort data into fisheries with constant selectivity functions. The assessment evaluates two different options for stock structure.

SS3 is comprised of three subcomponents:

1) a population subcomponent that recreates the numbers/biomass at age using estimates of natural mortality, growth, fecundity, etc;
2) an observational sub-component that consists of observed (measured) quantities such as CPUE or proportion at length/age;
3) a statistical sub-component that uses likelihoods to quantify the fit of the observations to the recreated population.

The assessment includes catch data grouped into four separate fisheries covering the period from 1950 through to 2019, two CPUE series, length composition data, and tag-recapture data. Key elements and core assumptions in the assessment model are summarised below:

- The population model is age based, spatially aggregated, and seasonally structured.
- The model is iterated on an annual cycle consisting of four seasons.
- The model assumes that there is a shared spawning stock and total recruitment follows a Beverton-Holt relationship, with annual deviates and temporal variability in the proportional distribution of recruits among four seasons.
- Seven fleets were defined on the basis of gear and fleet of operation: 1. PL – Maldivian Pole and Line fleet. 2. PSLS - FAD/log associated Purse Seine (PS) sets from the EU/Seychelles fleets. 3. PSFS - unassociated PS sets from the EU/Seychelles fleets. 4. Gillnet - includes primarily gillnet fleets from Sri Lanka, Iran, Indonesia and Pakistan 5. Line - includes primarily handline, troll, and small coastal longline gears from Yemen, Sri Lanka, Maldivian, and Madagascar. 6. Longline – a trivial catches from Distant water longline fishing fleets 7. Other – includes all other fleets, primarily non-EU/Seychelles PS fleets, and small coastal fleets (e.g. ring nets).
- Standardised CPUE series are available from Maldives PL fleet and EU associated PS sets.
- Length composition data are available for all defined fisheries.
- Tagging data are available from the RTTPIO and small-scale tagging programmes.
- The model estimated non-parametric (cubic spline) length-based selectivity for each fleet independently (with sufficient flexibility to describe logistic, dome-shaped or polymodal functions).
- Estimated parameters include virgin recruitment, selectivity parameters, recruitment deviations, and the seasonal pattern of recruitment.
- Fixed parameters include stock recruit steepness and life history parameters describing growth and the maturity schedule.

Considering the above, the assessment takes into account the major features relevant to the biology of the species and the nature of the UoA, therefore SG80 and SG100 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				

The HCR uses depletion-based reference points (target 40% and limit 20% of SB_0) which are estimated in the stock assessment. The assessment also estimates MSY-based reference points. The reference points are appropriate for a tuna stock. The decision to use depletion-based reference points is appropriate since estimating MSY reference points requires assumptions about a stock-recruit relationship which is problematic for a stock such as skipjack (highly productive and environmentally-driven). The reference points are also relatively precautionary compared to the MSY reference points, since B_{MSY} is estimated to be a relatively low proportion of B_0 (see PI 1.1.1). Other skipjack fisheries (e.g. in the western Pacific) use similar reference points. SG60 and SG80 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				

The assessment takes uncertainty into account formally via the development of an uncertainty grid based on the sensitivity runs. The sensitivities are selected by WPTT as their expert evaluation of the elements constituting the main axes of uncertainty in the assessment: i.e. in this case spatial structure, SR steepness, tag weighting and tag mixing. The uncertainty grid is used to estimate stock status in relation to reference points probabilistically (probability of the stock being in each quartile of the Kobe plot based on the uncertainty grid). The assessment also considers wider uncertainties more qualitatively, e.g. by evaluating a range of hypotheses that do not end up in the final uncertainty grid. SG60, SG80 and SG100 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?			**No**
Rationale				

The 2017 stock assessment report (IOTC, 2017c) sets out in the discussion a series of concerns with the assessment which remain to be addressed; including poor fit to some of the data, issues around tagging data, spatial heterogeneity and structure, and whether abundance indices are a good reflection of biomass.
For the 2020 assessment (Fu, 2020) the 2017 reference model was updated sequentially to ensure a level of continuity, and to assess the influence of the additional data available. The model period was extended to 2019 with incremental changes made to the observational data and other configurations. The final model ensemble corresponds to a full combination of two spatial structures, three steepness values, two levels of tag weighting, and two tag mixing period assumptions, with a total of 24 models. However, a full exploration of spatial complexities and of CPUE data was not presented, therefore it cannot yet be said that alternative hypotheses and assessment approaches have been rigorously explored. SG100 is not 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**	**Yes**

Rationale

The stock assessment is reviewed by the Scientific Committee, which constitutes a peer review. SG80 is met. Each stock assessment meeting (i.e., WPTT22) includes an invited external expert, in this case Dr Michael Schirripa from NOAA (USA) who has provided a brief report evaluating the model, assessment and process and made some valuable suggestions (Schirripa, 2020). SG100 is met.

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

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

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

Overall Performance Indicator score	
Condition number (if relevant)	

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7.3 Principle 2

7.3.1 Principle 2 background

In accordance with the MSC Fisheries Standard v2.01, species in P2 can be defined such as Primary, Secondary or ETP species. Primary species are considered as species in the catch that are not covered under P1 (not included in the UoA), which are within the scope of the MSC program and where there are management tools and measures in place aimed at achieving a certain management objective. Secondary species are those that do not comply with the previous requirements set for primary species and also, those out of scope (amphibians, reptiles, birds and mammals) where the definition of a ETP species, accordingly with the MSC Fishery Standard SA3.1.5, is not applicable. Another important definition set by the MSC Fisheries Standard is whether a primary or secondary species should be considered as 'main' or 'minor'. The difference between both lies on the proportion (in weight) that a particular species represents in the total catch. According to the MSC Fisheries Standard SA3.4.2-3.4.5, the weight threshold to identify between 'main' or 'minor' is at least 5% (or 2% in the case of less resilient species); species accounting ≥5% in weight of the total catch shall be considered as 'main' while species below this threshold shall be classified as 'minor' (unless the total catch of the UoA is exceptionally large, such that even small proportions of a P2 species significantly impact the affected stock, according to the MSC Fisheries Standard SA3.4.4).

The UoA includes 8 vessels from 2 of ANABAC's members (ATUNSA and PEVASA). Nonetheless, the data presented during the assessment corresponds to 5 vessels. In relation to this aspect, it is important to mention that two new vessels were acquired recently by one of the companies (at the end of 2021) within the UoA and the remain vessel was previously fishing in the Atlantic Ocean (until October 2021) and certified under ANABAC's MSC Yellowfin tuna certification.

7.3.1.1 Main sources of information

Main sources of information from purse seines on catch composition are on one hand, logbooks and landing data generated during port samples. Relevant scientific data such as retained and discarded species principally comes both from observers on board and Electronic Monitoring Systems. Data reporting requirements such as catches and activities on FADs are daily completed and then transmitted to the national administration and in addition, information is also periodically submitted to the RFMO in accordance with the requirements adopted in different Resolutions such as 15/01, 19/02 and 21/01. These methods aimed at gathering relevant information for P2 are detailed below.

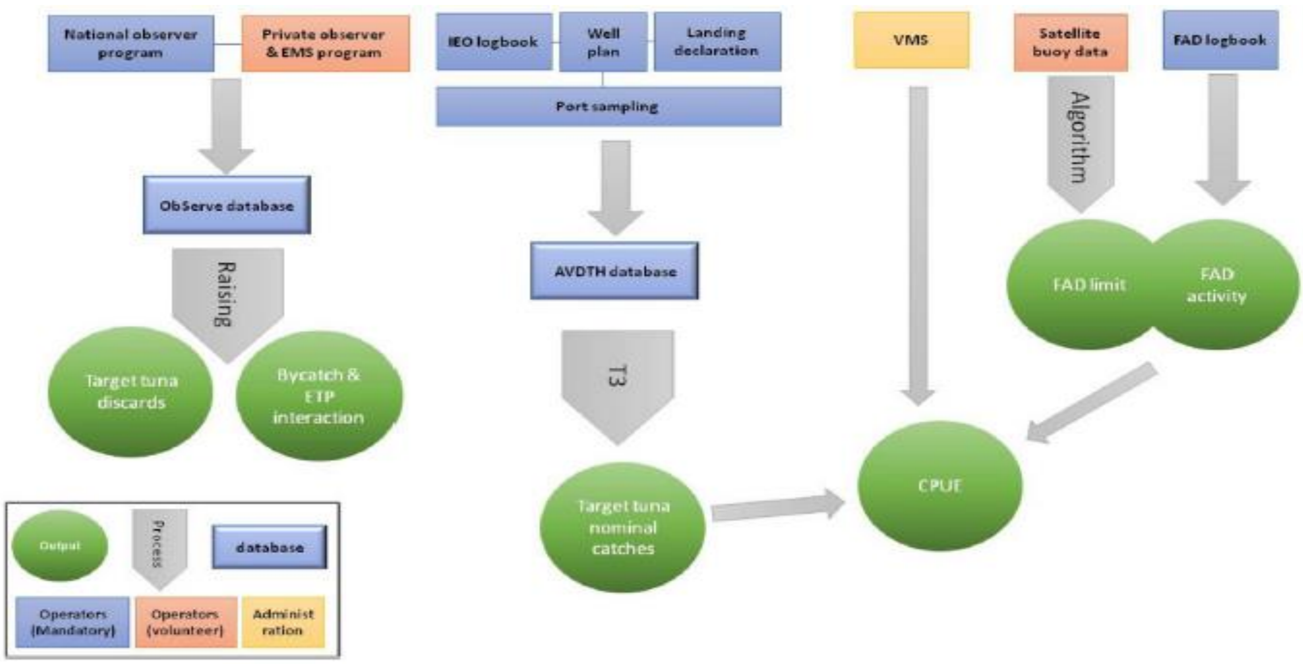

Figure 7.3.1.1a.- Data flow of data sources and outputs (Source: Báez *et al.* 2020)

a) Logbooks

Logbooks are the primary source of data and since the beginning of the purse seine fishery, the fleet has maintained two logbook system; one designed by the IEO for scientific purposes and a logbook designed by the Spanish General Secretariat of Fisheries (Báez *et al.,* 2020). Logbooks provide separate catch estimates by vessel and by set and are filled out by skippers after each fishing operation. On each set, vessels within the UoA conduct a sampling of the catch from the first or second brail. Then, species on each sample are identified and weighted. This operation allows to extract a composition that enables to separate catches by species and size class. The weakness on this procedure is that most part of sets contain combination of large and small fish, making impossible to obtain fully accurate estimates. According to Báez *et al.* (2020), the identification of species onboard is difficult for skippers and therefore, bias in logbooks on catch by species has been evidenced; this may lead to overestimation or misrepresentations. To reduce the problem, logbook data may be later cross-checked with other sources of information in order to get more accurate information such as sampling (explained on the next section) and sale bills. For example, sale bills are important tools that could account for more reliability, as fish is classified by species and sized prior to processing although does not allow to trace back the catch up to the set or fishing day (catches from different sets may be loaded and mixed in the same well).

Even though species composition of catches varies depending on the type of fishing operation, the assessed vessels target primarily the same species. **Table 7.3.1.1a** (extracted from logbook data) shows the predominance of skipjack tuna (P1) in the total capture (58.02%), but also an important composition of 28.05% yellowfin tuna, 13.56% bigeye tuna and a remaining 0.37% of other tuna species. Thus, the production of tuna tropical species represents almost 100% of the caught during 2016-2020.

Table 7.3.1.1a. Logbook catches (t) and the estimated average catch composition (%) for the period (2016-2020). Annual production corresponds to the sum of the main target species (SKJ+YFT+BET)

Species	Scientific name	2016	2017	2018	2019	2020	%
Skipjack tuna	*Katsuwonus pelamis*	21,385	20,292	35,928	27,936	23,331	**58.02%**
Yellowfin tuna	*Thunnus albacares*	14,606	9,996	12,716	12,368	12,605	**28.05%**
Bigeye tuna	*Thunnus obesus*	2,706	6,023	8,904	5,187	7,302	**13.56%**
Other Tuna		12	4	313	252	238	**0.37%**
	Total	**38,709**	**36,315**	**57,861**	**45,743**	**43,476**	
	Annual production	38,697	36,311	57,548	45,491	43,238	

b) Observers

On the other hand, the collection of scientific data is carried out by observers. Data gathered by independent observers are commonly used to complement data obtained from logbooks and port samplings and for some types of data (bycatch and discards), observer programs can be the most reliable (Ruiz *et al*., 2018). According to IOTC Resolution 11/04 the observer scheme has the objective of collecting verified catch data and other scientific data related to the fisheries for tuna and tuna-like species in the Indian Ocean (IOTC, 2011). The IOTC has adopted minimum standards for observer programmes that include levels of coverage (at least 5% of the fishing effort) as well as the type of information that shall be collected. These programmes are implemented by the flag state. These observers embark both in the frame of the European Data Collection Framework (DCF) and of the common agreement for the application of Good Practices established by the ship-owners associated to ANABAC. In the case of the ANABAC fleet, it uses a combination of human and electronic observers (EMS) to monitor the activities of its purse sein vessels. Under its Code of Good Practices all ANABAC vessels are covered either by human observers or electronic monitoring systems on board. Compliance with the Code of Good Practices is verified annually by the external third-party scientific organisation: AZTI.

The observer program on board the UoA provides detailed information on fishing operations and catch composition, including the fate of those catches (retained, released alive, discarded dead). Scientific observers produce direct information on discards of target and bycatch species such as catch and by-catch, number of individuals and size as well as activities of FADs which are a useful tool to cross-check with information provided by logbooks (Báez *et al.,* 2020). The levels of the observer coverage in the ANABAC fishery in the Indian Ocean have exceeded recommendations of the IOTC reaching 100% coverage of fishing operations, however, data is not available for all 100% of observed trips (**Table 7.3.1.1b**). The difference between the total coverage on board and the total observations available relies on the loss of trip data or their mismatch with the IOTC Regional Observer Scheme (ROS) minimum Standard reporting requirements. In this regard, **Table 7.3.1.1b** shows the annual variability of the recovered data. The coverage level (expressed as percentage) was estimated as the proportion of the production of target species (SKJ, YFT and BET) for which there are available observations, divided over the total reported production on logbooks. While the annual coverage from which data is available ranges from 27% to 87%, the average of the observed coverage during the assessed period reached 53% of production.

Table 7.3.1.1b.- Total observer coverage of production (human and electronic) of the ANABAC fleet (2016-2020). Annual production corresponds to the sum of the main target species (SKJ+YFT+BET) (Source: elaborated by client)

	2016	2017	2018	2019	2020	Average
Total reported production monitored by observers (t)	10.470	31.608	29.783	26.158	18.764	23.357
Total reported production on logbooks (t)	38.697	36.311	57.548	45.491	43.238	44.257
observed production coverage (%)	**27%**	**87%**	**52%**	**58%**	**43%**	**53%**

Observers monitor 100% of the fishing sets in order to record operational information (timing and location of the set, gear configuration etc.). Although observers also estimate the retained catches of target species, such estimates usually depend on estimates made by the crew. Providing information on bycatch is a key requirement of observers, and all bycatch interactions shall be recorded as far as possible and whether are finally retained or discarded. Human observers estimate the length, weight and/or numbers of bycatch species retained or discarded and the post-release state, while Electronic Monitoring Systems generate similar data, recording information on vessel activities, FAD designs, interactions with bycatch species and fate of the bycatch.

Table 7.3.1.1c and **Table 7.3.1.1d** have been made from data recorded by ANABAC observers. As it can be seen in **Table 7.3.1.1c,** the level of non-target species reported by the client as bycatch (retained and discarded) during 2016-2020 is considered relatively low, approximately 4.06% of total catches.

Table 7.3.1.1c.- Catch composition by weight and fate of bycatch by species groups during 2016 - 2020. Data recorded by observers of ANABAC on board assessed vessels (Source: elaborated by client)

weight (t)	Tons						t/1000 t of production	% of all catches	% of total bycatch	Fate (% weight)			
	2016	2017	2018	2019	2020	Average				Retained	Released alive	Discarded dead	Unknown
All catches	11.291,39	32.551,52	30.526,53	27.252,64	20.097,39	24.343,89							
Landings	11.140,00	31.730,88	30.050,55	26.164,55	18.845,78	23.586,35							
Production	10.470,00	31.608,31	29.782,57	26.157,55	18.764,43	23.356,57							
Total bycatch	821,39	943,21	743,96	1.095,09	1.332,96	987,32	42,27	4,06					
Billfishes	8,69	13,83	12,9	7,22	9,01	10,33	0,44	0,04	1,05	86%	0%	14%	0%
Other bony fishes	94,87	295,41	161,73	87,79	154,24	158,81	6,80	0,65	16,08	27%	3%	70%	0%
Other Tuna	672,51	380,21	338,31	715,73	681,57	557,67	23,88	2,29	56,48	41%	0%	59%	0%
Rays	0,3	9,86	4,3	11	4,91	6,07	0,26	0,02	0,62	0%	46%	54%	0%
Sharks	30,22	99,86	75,34	89,56	102,75	79,55	3,41	0,33	8,06	0%	27%	72%	0%
Target tuna	14,72	143,67	148,12	183,46	374,29	172,85	7,40	0,71	17,51	0%	0%	100%	0%
Turtles	0	0,37	0,14	0,34	0,21	0,21	0,01	0,00	0,02	0%	92%	8%	0%
Whales shark	0,07	0	3,13	0	5,99	1,84	0,08	0,01	0,19	0%	76%	24%	0%

Table 7.3.1.1d.-Catch composition and its fraction by species (t) corresponding to observed sets by year and the average of the assessed period. Data recorded by observers (electronic and physical) on board the assessed vessels between 2016 and 2020. Observed data has been raised up based on total production from logbook data. Data includes the retained and discarded catches observed by year and the average.

				Observed weight (t)						Observed weight fraction (% of catch)						Estimated weight raised to total logbook production (t)					
	species group	scientific name	FAO code	2016	2017	2018	2019	2020	Average	2016	2017	2018	2019	2020	Average	2016	2017	2018	2019	2020	Average
1	Target tuna	Katsuwonus pelamis	SKJ	5.958,67	18.300,22	18.434,20	16.873,10	11.022,49	14.117,74	52,77	56,22	60,39	61,91	54,85	57,99	22.069,15	21.034,74	35.450,38	29.601,93	25.633,70	25.668,62
2	Target tuna	Thunnus albacares	YFT	3.803,55	9.036,82	7.405,49	7.303,90	5.906,52	6.691,26	33,69	27,76	24,26	26,80	29,39	27,49	14.087,22	10.387,15	14.241,33	12.813,86	13.736,09	12.165,93
3	Target tuna	Thunnus obesus	BET	722,50	4.414,94	4.091,01	2.164,01	2.209,71	2.720,43	6,40	13,56	13,40	7,94	10,99	11,18	2.675,93	5.074,64	7.867,33	3.796,51	5.138,86	4.946,24
4	Other Tuna	Auxis sp.	FRZ	0,00	180,75	17,55	384,22	636,12	243,73	0,00	0,56	0,06	1,41	3,17	1,00	0,00	207,76	33,75	674,07	1.479,35	443,15
5	Other Tuna	Thunnus alalunga	ALB	670,00	89,10	196,00	0,00	0,00	191,02	5,93	0,27	0,64	0,00	0,00	0,78	2.481,48	102,41	376,92	0,00	0,00	347,31
6	Other Tuna	Auxis thazard	FRI	2,51	34,01	55,12	247,77	4,35	68,75	0,02	0,10	0,18	0,91	0,02	0,28	9,30	39,09	106,00	434,68	10,12	125,00
7	Sharks	Carcharhinus falciformis	FAL	28,85	95,75	37,64	74,91	101,15	67,66	0,26	0,29	0,12	0,27	0,50	0,28	106,85	110,06	72,38	131,42	235,23	123,02
8	Other bony fishes	Elagatis bipinnulata	RRU	40,15	90,23	50,88	32,99	65,19	55,89	0,36	0,28	0,17	0,12	0,32	0,23	148,70	103,71	97,85	57,88	151,60	101,62
9	Other bony fishes	Coryphaena hippurus	DOL	23,71	106,34	69,56	30,82	41,07	54,30	0,21	0,33	0,23	0,11	0,20	0,22	87,81	122,23	133,77	54,07	95,51	98,73
10	Other Tuna	Euthynnus affinis	KAW	0,00	63,46	69,54	77,02	41,10	50,22	0,00	0,19	0,23	0,28	0,20	0,21	0,00	72,94	133,73	135,12	95,58	91,31
11	Other bony fishes	Canthidermis maculata	CNT	13,46	50,57	21,65	10,63	26,86	24,63	0,12	0,16	0,07	0,04	0,13	0,10	49,85	58,13	41,63	18,65	62,47	44,78
12	Other bony fishes	Acanthocybium solandri	WAH	9,81	19,16	10,83	8,56	9,18	11,51	0,09	0,06	0,04	0,03	0,05	0,05	36,33	22,02	20,83	15,02	21,35	20,93
13	Sharks	Carcharhinidae sp.	RSK	0,00	0,50	33,90	13,20	0,10	9,54	0,00	0,00	0,11	0,05	0,00	0,04	0,00	0,57	65,19	23,16	0,23	17,35
14	Other bony fishes	Decapterus macarellus	MSD	6,76	20,38	4,94	1,37	6,71	8,03	0,06	0,06	0,02	0,01	0,03	0,03	25,04	23,43	9,50	2,40	15,60	14,60
15	Billfishes	Istiophoridae	BIL	0,24	8,44	6,02	3,93	6,49	5,02	0,00	0,03	0,02	0,01	0,03	0,02	0,89	9,70	11,58	6,89	15,09	9,13
16	Other Tuna	Auxis rochei	BLT	0,00	12,90	0,00	6,72	0,00	3,92	0,00	0,04	0,00	0,02	0,00	0,02	0,00	14,83	0,00	11,79	0,00	7,13
17	Rays	Manta birostris	RMB	0,00	6,81	0,92	7,58	2,38	3,54	0,00	0,02	0,00	0,03	0,01	0,01	0,00	7,83	1,77	13,30	5,53	6,44
18	Billfishes	Makaira indica	BLM	3,55	2,13	3,26	1,90	0,77	2,32	0,03	0,01	0,01	0,01	0,00	0,01	13,15	2,45	6,27	3,33	1,79	4,22
19	Billfishes	Makaira nigricans	BUM	1,77	2,96	3,08	1,39	1,75	2,19	0,02	0,01	0,01	0,01	0,01	0,01	6,56	3,40	5,92	2,44	4,07	3,98
20	Sharks	Carcharhinus longimanus	OCS	1,30	3,27	3,54	1,39	0,83	2,07	0,01	0,01	0,01	0,01	0,00	0,01	4,81	3,76	6,81	2,44	1,93	3,76
21	Rays	Mobula sp.	RMV	0,15	2,78	2,81	1,90	2,38	2,00	0,00	0,01	0,01	0,01	0,01	0,01	0,56	3,20	5,40	3,33	5,53	3,64
22	Whales shark	Rhincodon typus	RHN	0,07	0,00	3,13	0,00	5,99	1,84	0,00	0,00	0,01	0,00	0,03	0,01	0,26	0,00	6,02	0,00	13,93	3,35
23	Other bony fishes	Sphyraena barracuda	GBA	0,29	3,14	1,54	1,04	0,88	1,38	0,00	0,01	0,01	0,00	0,00	0,01	1,07	3,61	2,96	1,82	2,05	2,51
24	Billfishes	Xiphias gladius	SWO	3,13	0,00	0,23	0,00	0,00	0,67	0,03	0,00	0,00	0,00	0,00	0,00	11,59	0,00	0,44	0,00	0,00	1,22
25	Other bony fishes	Lobotes surinamensis	LOB	0,44	1,22	0,74	0,62	0,30	0,66	0,00	0,00	0,00	0,00	0,00	0,00	1,63	1,40	1,42	1,09	0,70	1,20
26	Other bony fishes	Coryphaena equiselis	CFW	0,00	1,07	0,34	0,02	1,68	0,62	0,00	0,00	0,00	0,00	0,01	0,00	0,00	1,23	0,65	0,04	3,91	1,13
27	Other bony fishes	Aluterus monoceros	ALM	0,16	0,13	0,34	1,29	0,45	0,47	0,00	0,00	0,00	0,00	0,00	0,00	0,59	0,15	0,65	2,26	1,05	0,85
28	Other bony fishes	Caranx sexfasciatus	CXS	0,02	1,54	0,14	0,01	0,11	0,36	0,00	0,00	0,00	0,00	0,00	0,00	0,07	1,77	0,27	0,02	0,26	0,65
29	Rays	Mobula tarapacana	RMT	0,00	0,00	0,00	1,50	0,00	0,30	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	2,63	0,00	0,55
30	Other bony fishes	Kyphosus cinerascens	KYC	0,02	0,46	0,09	0,05	0,36	0,20	0,00	0,00	0,00	0,00	0,00	0,00	0,07	0,53	0,17	0,09	0,84	0,36
31	Other bony fishes	Ruvettus pretiosus	OIL	0,00	0,00	0,00	0,00	0,90	0,18	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	2,09	0,33
32	Turtles	Tortue non identifiÃ©e	TTX	0,00	0,24	0,10	0,32	0,18	0,17	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,28	0,19	0,56	0,42	0,31
33	Sharks	Prionace glauca	BSH	0,00	0,04	0,11	0,00	0,48	0,13	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,05	0,21	0,00	1,12	0,24
34	Other bony fishes	Mola mola	MOX	0,00	0,23	0,30	0,00	0,00	0,11	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,26	0,58	0,00	0,00	0,20
35	Billfishes	Tetrapturus audax	MLS	0,00	0,25	0,25	0,00	0,00	0,10	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,29	0,48	0,00	0,00	0,18
36	Other bony fishes	Uraspis secunda	USE	0,00	0,24	0,09	0,15	0,04	0,10	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,28	0,17	0,26	0,09	0,18
37	Rays	Raie non identifiÃ©e	SRX	0,00	0,10	0,40	0,00	0,00	0,10	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,11	0,77	0,00	0,00	0,18
38	Rays	Mobula japanica (rancureli)	RMJ	0,00	0,15	0,15	0,00	0,15	0,09	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,17	0,29	0,00	0,35	0,16
39	Other bony fishes	Carangidae	CGX	0,00	0,25	0,02	0,06	0,02	0,07	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,29	0,04	0,11	0,05	0,13
40	Other bony fishes	Platax sp.	BAT	0,00	0,00	0,13	0,03	0,13	0,06	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,25	0,05	0,30	0,11
41	Other bony fishes	Scomber japonicus	MAS	0,00	0,27	0,00	0,04	0,01	0,06	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,31	0,00	0,07	0,02	0,11
42	Other bony fishes	Caranx crysos	RUB	0,00	0,04	0,00	0,00	0,20	0,05	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,05	0,00	0,00	0,47	0,09
43	Sharks	Alopias sp.	THR	0,00	0,00	0,00	0,00	0,20	0,04	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,47	0,07
44	Other bony fishes	Naucrates ductor	NAU	0,00	0,01	0,01	0,01	0,11	0,03	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,02	0,02	0,26	0,05
45	Rays	Mobula mobular	RMM	0,15	0,00	0,00	0,00	0,00	0,03	0,00	0,00	0,00	0,00	0,00	0,00	0,56	0,00	0,00	0,00	0,00	0,05
46	Sharks	Isurus oxyrinchus	SMA	0,00	0,00	0,16	0,00	0,00	0,03	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,31	0,00	0,00	0,05
47	Sharks	Squatinidae	ASK	0,00	0,13	0,00	0,00	0,00	0,03	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,15	0,00	0,00	0,00	0,05
48	Billfishes	Istiophorus platypterus	SFA	0,00	0,05	0,03	0,01	0,00	0,02	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,06	0,06	0,02	0,00	0,04
49	Other bony fishes	Kyphosus vaigiensis	KYV	0,02	0,04	0,01	0,04	0,01	0,02	0,00	0,00	0,00	0,00	0,00	0,00	0,07	0,05	0,02	0,07	0,02	0,04
50	Other bony fishes	Platax teira	BAO	0,01	0,01	0,05	0,01	0,01	0,02	0,00	0,00	0,00	0,00	0,00	0,00	0,04	0,01	0,10	0,02	0,02	0,04
51	Other Tuna	Euthynnus alletteratus	LTA	0,00	0,00	0,10	0,00	0,00	0,02	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,19	0,00	0,00	0,04
52	Sharks	Requin non identifiÃ©	2REX	0,00	0,10	0,00	0,00	0,00	0,02	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,11	0,00	0,00	0,00	0,04
53	Turtles	Lepidochelys olivacea	LKV	0,00	0,08	0,00	0,00	0,00	0,02	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,09	0,00	0,00	0,00	0,04
54	Billfishes	Tetrapturus angustirostris	SSP	0,00	0,00	0,03	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,06	0,00	0,00	0,02
55	Other bony fishes	Kyphosus sp.	KYP	0,00	0,01	0,00	0,03	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,00	0,05	0,00	0,02
56	Other bony fishes	Seriola rivoliana	YTL	0,00	0,01	0,00	0,00	0,03	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,00	0,00	0,07	0,02
57	Other bony fishes	Uraspis sp.	3CUX	0,00	0,04	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,05	0,00	0,00	0,00	0,02
58	Sharks	Alopias superciliosus	BTH	0,00	0,00	0,00	0,05	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,09	0,00	0,02
59	Sharks	Carcharhinus leucas	CCE	0,07	0,00	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,26	0,00	0,00	0,00	0,00	0,02
60	Sharks	Sphyrnidae	SPY	0,00	0,06	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,07	0,00	0,00	0,00	0,02
61	Turtles	Caretta caretta	TTL	0,00	0,00	0,00	0,02	0,03	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,04	0,07	0,02
62	Turtles	Chelonia mydas	TUG	0,00	0,00	0,04	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,08	0,00	0,00	0,02
63	Turtles	Eretmochelys imbricata	TTH	0,00	0,05	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,06	0,00	0,00	0,00	0,02
64	Other bony fishes	Ablennes hians	BAF	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00
65	Other bony fishes	Belonidae	BEN	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
66	Other bony fishes	Coryphaenidae	DOX	0,00	0,00	0,02	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,04	0,00	0,00	0,00
67	Other bony fishes	Diodontidae	DIO	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
68	Other bony fishes	Echeneidae	ECN	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
69	Other bony fishes	Ephippidae	SPA	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
70	Other bony fishes	Lagocephalus lagocephalus	LGH	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
71	Other bony fishes	Scombridae	MAX	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
72	Other bony fishes	Sphyraenidae	BAZ	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,04	0,00	0,00	0,00	0,00	0,00
73	Other bony fishes	Tylosurus crocodilus	BTS	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00
74	Rays	Dasyatidae	STT	0,00	0,01	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,02	0,00	0,00	0,00
75	Rays	Dasyatys (Pteroplatytrygon) violacea	PLS	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,02	0,00	0,00
76	Rays	Myliobatidae	EAG	0,00	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,02	0,00	0,00	0,00
77	Rays	Myliobatis aquila	MYL	0,00	0,01	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,00	0,01	0,00	0,00	0,00	0,00

7.3.1.2 UoA catch composition

According to the data obtained from different sources of information detailed above and also, by using up-to-date IOTC reports, the assessment team elaborated the most complete list of all species susceptible to interact with the UoC, and they were classified according to the MSC Fisheries Standard requirements into primary (main/minor), secondary (main/minor) and ETP species.

Table 7.3.1.2.- List of all species likely to interact with the UoA classified according to MSC Fisheries Standard SA3.1.3-3.1.5 and SA3.4.4-3.4.5. Species indicated were listed from information provided by the client (Logbook records and observer data) and some relevant information was obtained from the IOTC datasets

Species group	Common name	scientific name	FAO code	Designation	ETP regulation	Source of information	Data Deficient
Target tuna	Skipjack tuna	*Katsuwonus pelamis*	SKJ	P1	NA	Logbook Observer data IOTC	No
Target tuna	Yellowfin tuna	*Thunnus albacares*	YFT	Primary Main	NA	Logbook Observer data IOTC	No
Target tuna	Bigeye tuna	*Thunnus obesus*	BET	Primary Main	NA	Logbook Observer data IOTC	No
Other Tuna	Albacore	*Thunnus alalunga*	ALB	Primary Main	NA	Logbook Observer data IOTC	No
Other Tuna	Kawakawa	*Euthynnus affinis*	KAW	Primary Minor	NA	Logbook Observer data IOTC	No
Billfishes	Black marlin	*Makaira indica*	BLM	Primary Minor	NA	Logbook Observer data IOTC	No
Billfishes	Blue marlin	*Makaira nigricans*	BUM	Primary Minor	NA	Logbook Observer data IOTC	No
Billfishes	Swordfish	*Xiphias gladius*	SWO	Primary Minor	NA	Logbook Observer data IOTC	No
Billfishes	Striped marlin	*Tetrapturus audax*	MLS	Primary Minor	NA	Logbook Observer data IOTC	No
Billfishes	Indo-Pacific sailfish	*Istiophorus platypterus*	SFA	Primary Minor	NA	Logbook Observer data IOTC	No
Sharks	Blue shark	*Prionace glauca*	BSH	Primary Minor	NA	Logbook Observer data IOTC	No
Sharks	Silky shark	*Carcharhinus falciformis*	FAL	ETP	Bilateral /SFPA agreements between Seychelles/EU and coastal State	Logbook Observer data	No
Sharks	Oceanic whitetip shark	*Carcharhinus longimanus*	OCS	ETP	CMS Appendix I	Logbook Observer data	No

Sharks	Bigeye thresher shark	*Alopias superciliosus*	BTH	ETP	IOTC Res 12/09	Logbook Observer data	No
Whale shark	Whale shark	*Rhincodon typus*	RHN	ETP	CMS Appendix I	Logbook Observer data	No
Rays	Giant manta	*Manta birostris*	RMB	ETP	CMS Appendix I	Logbook Observer data	No
Rays	Chilean devil ray	*Mobula tarapacana*	RMT	ETP	CMS Appendix I	Logbook Observer data IOTC	No
Rays	Japanise devil ray	*Mobula japanica*	RMJ	ETP	CMS Appendix I	Logbook Observer data	No
Rays	Devil fish	*Mobula mobular*	RMM	ETP	CMS Appendix I	Logbook Observer data	No
Turtles	Loggerhead turtle	*Caretta caretta*	TTL	ETP	IUCN = VU	Logbook Observer data	No
Turtles	Green turtle	*Chelonia mydas*	TUG	ETP	IUCN = EN	Logbook Observer data	No
Turtles	Hawksbill turtle	*Eretmochelys imbricata*	TTH	ETP	IUCN = CR	Logbook Observer data	No
Turtles	Olive Ridley	*Lepidochelys olivacea*	LKV	ETP	IUCN = VU	Logbook Observer data	No
Other Tuna	Frigate tuna	*Auxis thazard*	FRI	Secondary Minor	NA	Logbook Observer data	Yes
Other Tuna	Bullet tuna	*Auxis rochei*	BLT	Secondary Minor	NA	Logbook Observer data	Yes
Other Tuna	Little tunny	*Euthynnus alletteratus*	LTA	Secondary Minor	NA	Logbook Observer data	Yes
Other bony fishes	Rainbow runner	*Elagatis bipinnulata*	RRU	Secondary Minor	NA	Logbook Observer data	Yes
Other bony fishes	Common dolphinfish	*Coryphaena hippurus*	DOL	Secondary Minor	NA	Logbook Observer data	Yes
Other bony fishes	Rough triggefish	*Canthidermis maculata*	CNT	Secondary Minor	NA	Logbook Observer data	Yes
Other bony fishes	Wahoo	*Acanthocybium solandri*	WAH	Secondary Minor	NA	Logbook Observer data	Yes
Other bony fishes	Mackerel scad	*Decapterus macarellus*	MSD	Secondary Minor	NA	Logbook Observer data	Yes
			GBA		NA		Yes

Other bony fishes	Great barracuda	*Sphyraena barracuda*		Secondary Minor		Logbook Observer data	
Other bony fishes	Tripletail	*Lobotes surinamensis*	LOB	Secondary Minor	NA	Logbook Observer data	Yes
Other bony fishes	Pompano dolphinfish	*Coryphaena equiselis*	CFW	Secondary Minor	NA	Logbook Observer data	Yes
Other bony fishes	Unicorn leatherjacket filefish	*Aluterus monoceros*	ALM	Secondary Minor	NA	Logbook Observer data	Yes
Other bony fishes	Bigeye trevally	*Caranx sexfasciatus*	CXS	Secondary Minor	NA	Logbook Observer data	Yes
Other bony fishes	Blue sea chub	*Kyphosus cinerascens*	KYC	Secondary Minor	NA	Logbook Observer data	Yes
Other bony fishes	Oilfish	*Ruvettus pretiosus*	OIL	Secondary Minor	NA	Logbook Observer data	Yes
Other bony fishes	Ocean sunfish	*Mola mola*	MOX	Secondary Minor	NA	Logbook Observer data	Yes
Other bony fishes	Cottonmouth jack	*Uraspis secunda*	USE	Secondary Minor	NA	Logbook Observer data	Yes
Other bony fishes	Chub mackerel	*Scomber japonicus*	MAS	Secondary Minor	NA	Logbook Observer data	Yes
Other bony fishes	Blue runner	*Caranx crysos*	RUB	Secondary Minor	NA	Logbook Observer data	Yes
Other bony fishes	Pilotfish	*Naucrates ductor*	NAU	Secondary Minor	NA	Logbook Observer data	Yes
Other bony fishes	Brassy chub	*Kyphosus vaigiensis*	KYV	Secondary Minor	NA	Logbook Observer data	Yes
Other bony fishes	Longfin batfish	*Platax teira*	BAO	Secondary Minor	NA	Logbook Observer data	Yes
Other bony fishes	Longfin yellowtail	*Seriola rivoliana*	YTL	Secondary Minor	NA	Logbook Observer data	Yes
Other bony fishes	Flat needlefish	*Ablennes hians*	BAF	Secondary Minor	NA	Logbook Observer data	Yes
	Oceanic puffer	*Lagocephalus lagocephalus*	LGH	Secondary Minor	NA	Logbook Observer data	Yes

Other bony fishes							
Other bony fishes	Hound needlefish	*Tylosurus crocodilus*	BTS	Secondary Minor	NA	Logbook Observer data	Yes
Billfishes	Shortbill spearfish	*Tetrapturus angustirostris*	SSP	Secondary Minor	NA	Logbook Observer data	Yes
Sharks	Bull shark	*Carcharhinus leucas*	CCE	Secondary Minor	NA	Logbook Observer data	Yes
Sharks	Shortfin mako	*Isurus oxyrinchus*	SMA	Secondary Minor	NA	Logbook Observer data	Yes
Rays	Dasyatys	*Pteroplatytrygon violacea*	PLS	Secondary Minor	NA	Logbook Observer data	Yes
Rays	Common eagleray	*Myliobatis aquila*	MYL	Secondary Minor	NA	Logbook Observer data	Yes

	P1 species
	Main primary
	Minor secondary
	Minor secondary
	ETP

7.3.2 Primary species in the UoA

Based on the data received from the client, ten primary species have been identified and described in **table 7.3.1.2** above. Among these species, 3 have been categorised as 'main' and seven as 'minor' following the criteria established in the MSC requirements. From the 3 main primary species, two of them are also target species of the fleet, i.e., yellowfin tuna (*Thunnus albacares*) and bigeye tuna (*Thunnus obesus*). Together represent approximately 41.61% of the catch during 2016 – 2020 (**table 7.3.1.1a**). The other species, Albacore (*Thunnus alalunga*) has represented a lesser participation of catch, accounting for 1.3% of catch during 2016-2020, however, it represented 5.93% during 2016 (**tables 7.3.1.1d** and **7.3.2**).

Table 7.3.2.- Estimated weight of main primary species raised to total logbook production (Source: Elaborated from the client data)

Scientific name	**Estimated weight of main primary species raised from total logbook production (t)**									
	2016		**2017**		**2018**		**2019**		**2020**	
Katsuwonus pelamis	22,069.15	52.8%	21,034.74	56.2%	35,450.38	60.4%	29,601.93	61.9%	25,633.70	54.8%
Thunnus albacares	14,087.22	33.7%	10,387.15	27.8%	14,241.33	24.3%	12,813.86	26.8%	13,736.09	29.4%
Thunnus obesus	2,675.93	6.4%	5,074.64	13.6%	7,867.33	13.4%	3,796.51	7.9%	5,138.86	11.0%
Thunnus alalunga	2,481.48	5.9%	102.41	0.3%	376.92	0.6%	0,00	0.0%	0,00	0.0%
Total catch	**41,819.89**		**37,415.53**		**58,704.83**		**47,811.61**		**46,738.19**	

Detailed information on the main primary species is provided below.

7.3.2.1 Main Primary species

a) Yellowfin tuna (*Thunnus albacares*):

Biological background

Yellowfin tuna is an epipelagic species widely distributed in the tropical and subtropical waters of the world's major oceans (Dortel *et al.,* 2014) found in waters between 35ºN and 35ºS in the Indian, Pacific and Atlantic Ocean (Shih *et al.*, 2013). Most yellowfin tuna remain at shallow depths (<50 meters) at night and do not dive to greater depths (> 100 meters) during the day. Particularly in the Indian Ocean, its preferred habitat has been described to be at depths between 100 and 180 m and water temperatures between 15 and 17.9 ºC (Artetxe-Arrate *et al.*, 2020). Whereas adult yellowfin inhabits mid-ocean waters, juveniles can be found both in coastal and offshore waters (Artetxe-Arrate *et al.,* 2020). Mean size at maturity (length at which 50% individuals are classed as mature or L50), has been estimated at 75.0 cm to 120 cm fork length (*Zudaire et al.,* 2021). As with other tuna species, spawning occurs in relation to sea-surface temperature (> 24ºC), which seems to regulate spawning activities (Zudaire *et al.,* 2013b). However, frequency seems to be unclear, according to IOTC (2021) it has not been reported in the Indian Ocean, but in other areas such as the Pacific Ocean, the mean spawning interval has been estimated at 1.53 days. Yellowfin tuna spawning seems to occur mainly in the equatorial area (0–10◦S) and different spawning periods have been described in the India Ocean, extending from December to March and from January to June (Zudaire *et al.*, 2013a; Zudaire *et al.,* 2013b). Research indicates that this species prefers warm waters and are mainly found in regions with a high concentration of primary productivity (Lan *et al.,* 2019).

Stock structure and mixing

Tag recoveries have provided evidence of large movement patterns within the western equatorial region, indicating that the western and eastern regions of the Indian Ocean may support relatively distinct populations, however, few observations of large-scale movements have been reported (Lan *et al*., 2019).

Catches and fishing dynamics

In the Indian Ocean, yellowfin tuna has been exploited since the 1950s and its total annual catch has experimented a remarkable increase since the early 1980s with the consolidation of the purse seine fishery (Zudaire *et al.,* 2013). Yellowfin tuna is mainly caught by purse seiners (~36%), handline (~29%), gillnet (~21%) and longline (~10%) (Artetxe-Arrate *et al.*, 2020). Based on data obtained from the IOTC, the total capture of yellowfin tuna in the Indian Ocean reached a maximum of 379,965.14 tons in 2005 and just considering the purse seine fleet, it accounted for 228,047.02 tons in 2004 (**Figure 7.3.2.1a**). According to IOTC (2021) the overall quality of nominal catches shows large variability and large portions of these captures have been estimated. Further, the data quality was especially poor between 1994 and 2002, where approximately less than 70% of nominal catches were fully or partially reported. It is considered that the reporting improved during the last decade, however there is a lack detailed collection procedures that determine the quality of statistics (IOTC, 2021). The average capture during 2011-2020 has been approximately 14% lower than the level estimated between 2000-2020, however, the increase in catches in recent years has considerably increased the pressure on the Indian Ocean stock (IOTC, 2021), due to this, the IOTC Scientific Committee has estimated that currently, the yellowfin tuna stock in the IO is overfished and subject to overfishing.

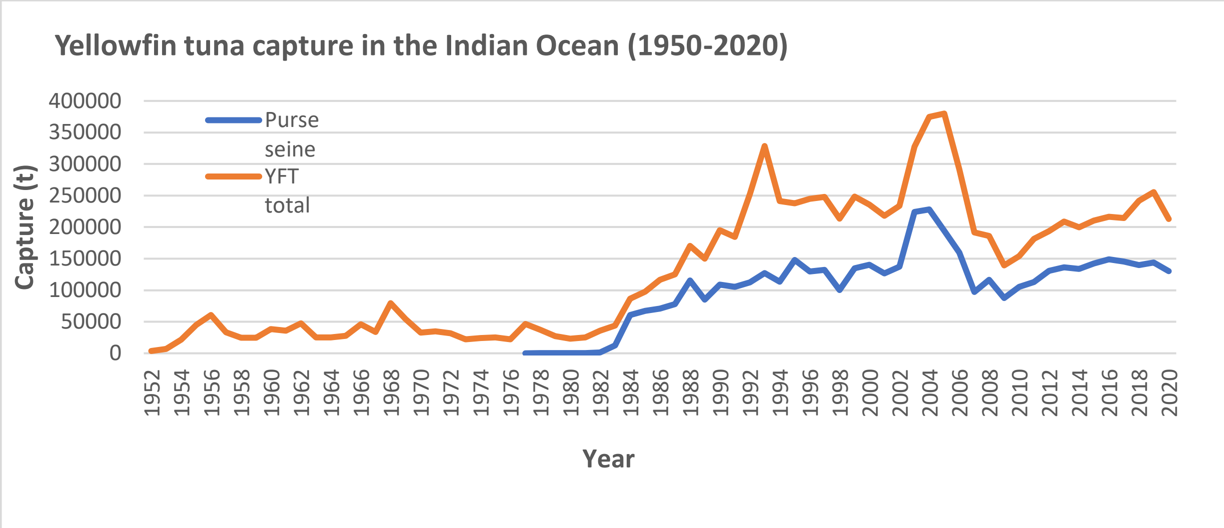

Figure 7.3.2.1a.- Capture of yellowfin tuna in the Indian Ocean (Total vs. Purse seine) during 1950-2020 (Source: IOTC data)

The purse seine fishing activity is mainly concentrated in the western and central Indian Ocean, between latitudes 20ºS-15ºN (Artetxe-Arrate *et al.,* 2020) (**Figure 7.3.2.1b**) and it can be divided into two different methods: fishing on free-swimming schools (FSC) and fishing around floating objects (FOB). The former, catches mainly large mature yellowfin (Kaplan *et al.,* 2014) and involves the detection of freely swimming schools through signs in the surface of the ocean. This activity is conducted from the boats using binoculars set on structures such as the crow's nest, and technological devices such as the bird radar, or by sightings of bird flocks through binoculars (Báez *et al.,* 2020). On the other hand, fishing on FAD captures a lesser extend of yellowfin than FSC but a large proportion of which are small juveniles (Kaplan *et al.,* 2014).

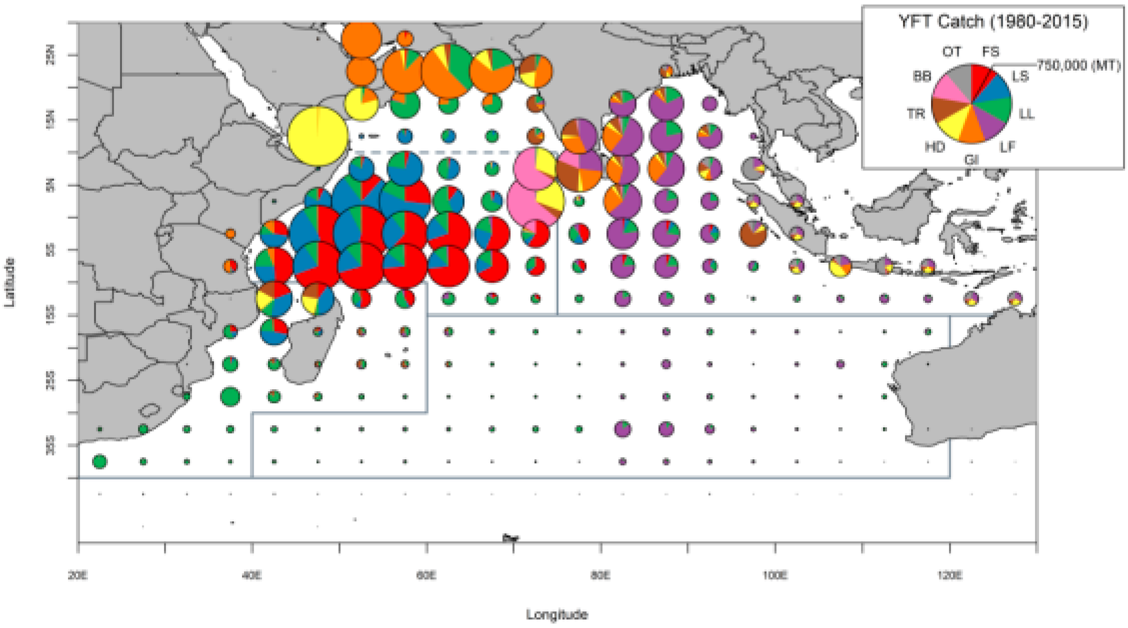

Figure 7.3.2.1b- Spatial distribution of Indian Ocean yellowfin catches by main gear types aggregated for 1980-2016. LS = drifting log or FAD-associated school and FS = free swimming school (Source: Fu *et al.,* 2018)

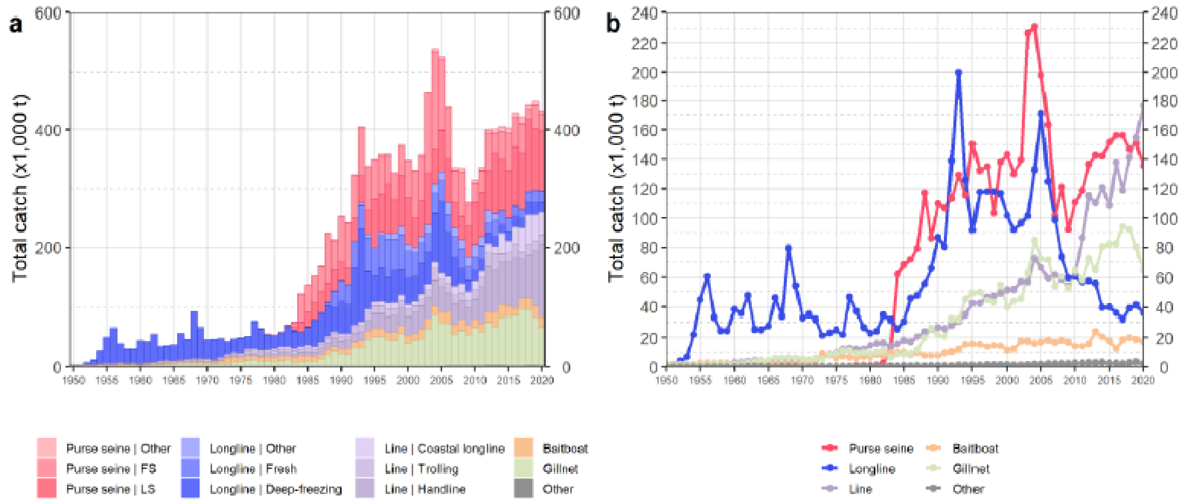

Figure 7.3.2.1c.- Annual time series of (a) cumulative nominal catches (t) by fishery and (b) individual nominal catches (t) by fishery group for yellowfin tuna during 1950–2020. FS = free-swimming school; LS = drifting log/FAD-associated school. Purse seine | Other: coastal purse seine, purse seine of unknown association type, ring net; Other: all remaining fishing gears (Source: IOTC, 2021)

Stock assessment

The Indian Ocean yellowfin tuna stock assessment by the IOTC is undertake based on the assumption of a single stock for the entire Indian Ocean (Varghese *et al.,* 2019). Nevertheless, findings obtained from other sort of approaches such as. fishery data and genetic markers have indicated a more fragmented population structure than the considered in the assessment and management of the species (Artetxe-Arrate *et al.,* 2020). The newest stock assessment for yellowfin tuna was carried out in 2021 using Stock Synthesis III (SS3). This model uses for types of data: catch, size, frequency, tagging and CPUE indices (IOTC, 2021). Further, a combination of alternatives assumptions on spatial structure, longline CPUE catchability, effects of piracy, steepness values, natural mortality, growth parameters, and tagging have been incorporated in the proposed final assessment model options (IOTC, 2021). In order to address additional uncertainty several sensitivity runs have been conducted but other key uncertainties were not explored.

Spawning biomass in 2020 was estimated to be 31% on average of the unfished levels (1950) and 87% of the level that supports the maximum sustainable yield ($SB_{2020}/SB_{MSY} = 0.87$). **Figure 7.3.2.1d** shows the decrease of the spawning biomass of yellowfin tuna approximately since 1980. In addition, the current fishing mortality is estimated to be 32% higher than F_{MSY} ($F_{2020}/F_{MSY} = 1.32$). According to these findings the yellowfin tuna stock in the IO is determined to be overfished and subject to overfishing (**figure 7.3.2.1e**).

Figure 7.3.2.1d.- Estimated time series of total spawning biomass of yellowfin tuna (Source IOTC 2021)

Colour key	Stock overfished (SB_{2020} / SB_{MSY}<1)	Stock not overfished (SB_{2020} / SB_{MSY}≥ 1)
Stock subject to overfishing (F_{2020} / F_{MSY}≥ 1)	68%	2%
Stock not subject to overfishing (F_{2020} / F_{MSY}≤ 1)	13%	17%
Not assessed / Uncertain		

Figure 7.3.2.1e.- Estimated probability that the yellowfin tuna stock is in a respective quadrant of the Kobe Plot (Source: IOTC, 2021)

Effect of current regulations and management recommendations

Despite there is an interim plan (Resolution 21/01 which superseded Resolution 19/01, 18/01 and 17/01) for rebuilding the Indian Ocean Yellowfin tuna stock (IOTC, 2021b), catches increased by around 9% in 2018 from 2014/2015 levels, the 2016-2020 average catches were above the MSY and the 2020 catch has been substantially higher than the median MSY. According to Artetxe-Arrate *et al*. (2020) although catch limitations were agreed due to the overfished status of this species, the interim plan has failed to achieve its objective. The IOTC (2021) reported that some fisheries subject to catch reduction do achieved a decrease in their catches in 2020, complying with levels of reductions specified in the interim plan but these reductions were redressed by increases in the catches from CPCs exempt from and some CPCs subject to limitations on their catches of yellowfin tuna.

Resolution 21/01 (IOTC, 2021b) On an interim plan for rebuilding the Indian Ocean yellowfin tuna stock in the IOTC area of competence became effective from 1st January 2022 to all CPCs fishing in the IOTC area of competence. Relevant management measures contained within the resolution are as follows:

- Catch limits on yellowfin tuna: CPCs whose reported catches of yellowfin tuna for 2014 were above 5000t shall reduce their catches of yellowfin tuna by 21% compared to 2014 yellowfin tuna.
- Gradual reduction on supply vessels in purse seine operations by 31st December 2022. From 1 January 2022 to 31 December 2024: 3 supply vessels in support of not less than 10 purse seiners and all of them shall be from the same flag State. In addition, no CPC is allowed to register any new or additional supply vessel on the IOTC Record of Authorized Vessel
- CPCs shall monitor the yellowfin tuna catches in conformity with Resolution 15/01 “On the recording of catch and effort data by fishing vessels in the IOTC area of competence” and Resolution 15/02 “Mandatory statistical reporting requirements for IOTC Contracting Parties and Cooperating Non Contracting Parties (CPCs)”.

b) Bigeye tuna (*Thunnus obesus*):

Biological background

Bigeye tuna inhabits tropical and subtropical waters in the Indian, Atlantic and Pacific Oceans. Its vertical distribution ranges from the surface to 400m, occasionally reaching depths over 1,000 m and it has been noted that its position in the water column varies substantially with day-night shifts, seasonal changes and changes in water temperature (Lin *et al.*, 2020). Whereas adult bigeye tunas inhabit mid-ocean waters and prefer water temperatures between 12 and 13.9ºC, juveniles can be found both in coastal and offshore waters, occupying the surface mixed layer above the thermocline at sea surface temperatures ranging from 18ºC to 31ºC (Artetxe-Arrate *et al.,* 2020). Bigeye tuna possess a well-developed vascular system for heat conservation which is function is to increase the temperature of their viscera, eyes and brain, allowing the species to explore deeper and cooler waters than other tropical tunas (Artetxe-Arrate *et al.,* 2020). Oxygen availability can affect the bathymetric range of tropical tuna species (Artetxe-Arrate *et al.,* 2020) but as pointed by Arrizabalaga *et al.,* (2015) bigeye tuna distribution can tolerate and even be favoured by less oxygenated waters (<0.2 mmol/L).
In the Indian Ocean, the analysis of important reproductive traits has remained preliminary and little information is available regarding sex-ratio, size at maturity and fecundity (Zudaire *et al.,* 2016). The maximum fork length of this species in the Indian Ocean was estimated to be approximately 170 cm in fish older than 6 years (Lin *et al.,* 2020).

Stock structure and mixing

The last stock assessment assumes that within the Indian Ocean the bigeye tuna constitutes a single stock. Differences in growth between ocean basins support the hypothesis of separate bigeye populations in both the Indian and Pacific Oceans (Farley *et al*., 2004), however, genetic differentiation has been found minimal within the Indian Ocean (Appleyard *et al.,* 2002).

Catches and fishing dynamic

Industrial fisheries account for the most part of bigeye tuna catches in the Indian Ocean, where deep-freezing and fresh longlines represented approximately 42% and purse seine 31% during 2014-2018 (Artetxe-Arrate *et al.,* 2020) (**Figure 7.3.2.1f**). In recent years, catches by gillnets also started to raise due to changes on some fleets (e.g., Iran and Sri Lanka); increase in boat sizes, development in fishing techniques and fishing grounds.

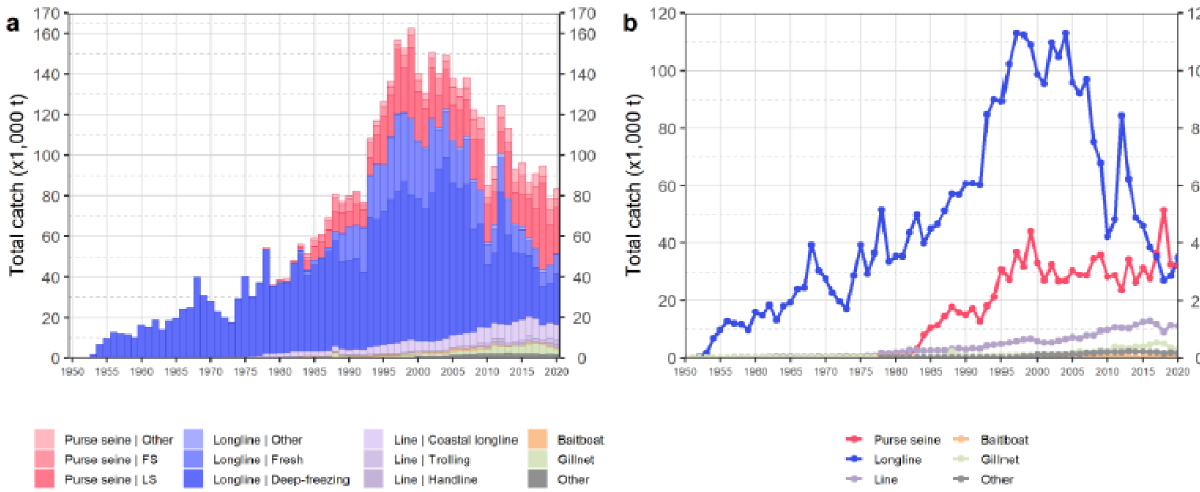

Figure 7.3.2.1f.- Annual (1950–2020) time series of bigeye tuna (a) cumulative nominal catches (MT) by gear; (b) individual nominal catches (MT) by gear group; Purse seine includes industrial purse seiners and 'Other' includes all remaining fishing gears. LS = drifting log or FAD-associated school and FS = free-swimming school (Source: IOTC, 2021)

Historically, longline has been the main gear targeting for bigeye tuna in the Indian Ocean, however, it can be noted that since the late '70s, bigeye tuna has been caught by purse seine vessels fishing on floating objects and to a lesser extent, associated with free swimming schools of yellowfin tuna (IOTC, 2020) (**Fig 7.3.2.1f**). Currently, purse seiners under the flags of EU countries and Seychelles account for the most part of purse seine catches of bigeye tuna in the Indian Ocean. Bigeye capture during 2015-2020 has remained stable, around 67,300 tons for the entire purse seine fleet (**Fig 7.3.2.1f**) and around 26,000 tons for the fleet under the flags of Spain and Seychelles (Source: IOTC database).

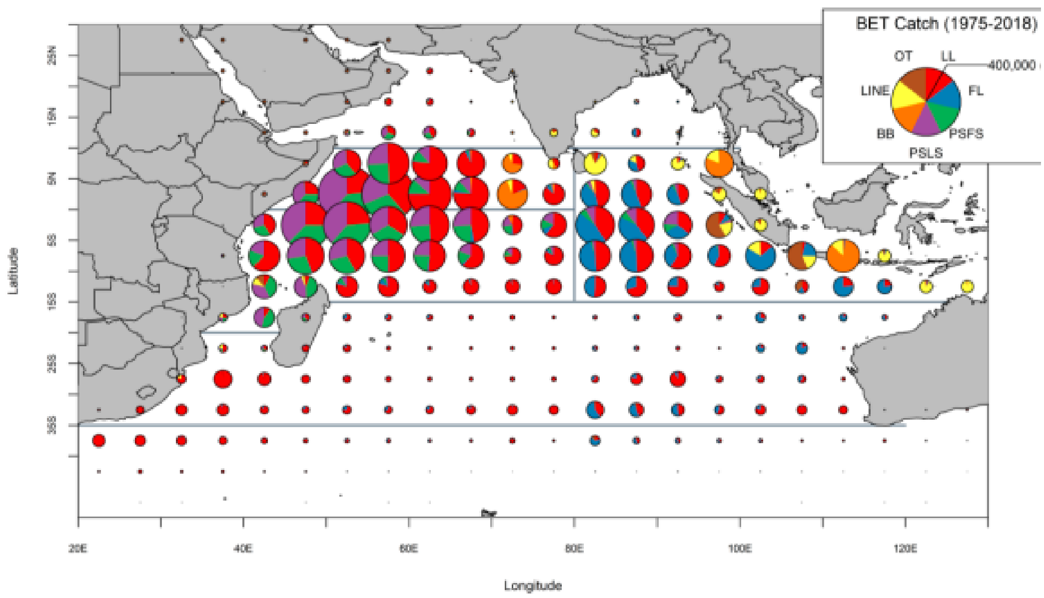

Figure 7.3.2.1g Spatial distribution of bigeye tuna catches by main gear and aggregated for 1980-2018 (Source Fu, 2019)

Figure **7.3.2.1h** shows the main fleets by flagged country targeting bigeye tuna in the Indian Ocean. There can be noted an important participation the EU (Spain, France) and Seychelles in the purse seine fishery. Other main fleets are under the flag of Indonesia (other gears, coastal longline, longline fresh and deep-freezing), Taiwan (longline fresh and deep-freezing). The most part of tropical tuna catches in the Indian Ocean are taken from the western region, with 80% of total catches occurring west of 80°E in 2018, however, location of catches can vary seasonally, interannually and between gear types (Artetxe-Arrate *et al.,* 2020). Purse seiners fishing activity is mainly concentrated in the western and central Indian Ocean, between latitudes 20°S–15°N (**Figure 7.3.2.1g**)

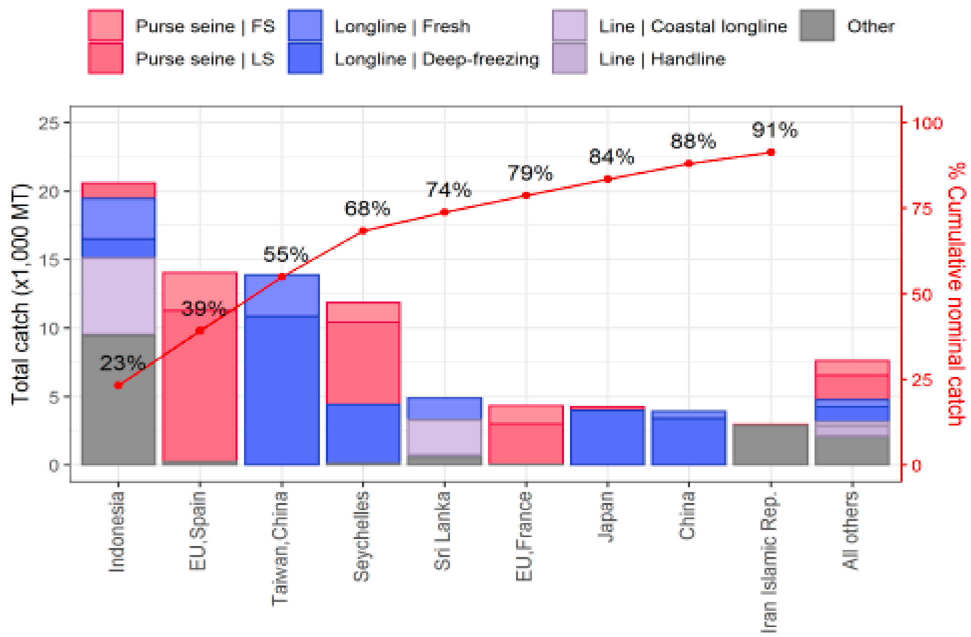

Figure7.3.2.1h .- Average nominal catches (MT) of bigeye tuna over the period 2015–2019, by gear group and CPC ordered according to the importance of catches. The red solid line indicates the cumulative percentage of the total combined catches of the species for the CPCs concerned. Purse seine includes industrial purse seiners and 'Other' includes all remaining fishing gears. LS = drifting log or FAD-associated school and FS = free swimming school (Source: IOTC 2020)

Stock assessment

In 2019 a new stock status was carried out for the bigeye tuna applying two models, SS3 (Stock Synthesis) and JABBA. Advice was provided with SS3 which consists in a fully integrated model used for the three tropical tunas in the Indian Ocean. The configuration of the model takes into consideration the uncertainty related to recruitment, the influence of tagging and the selectivity of the longline fleet and its outcome is qualitatively different to the assessment conducted in 2016 (IOTC, 2021). This is considered to occur due to changes in modelling assumptions on longline selectivity, the increase on catches of small size individuals and the abundance index developed in 2019 (IOTC, 2021). It has been estimated that catch during 2018 has remained lower than the median values of maximum sustainable yield in 2019. Taking into consideration the above-mentioned uncertainty, results indicate that both, SB2018 and fishing mortality are above the SBMSY and FMSY with high probability (65.4% and 72.8%, respectively). According to the evidence, the bigeye tuna stock is determined to be not overfished but subject to overfishing (**Fig. 7.3.2.1j**) and in order to reduce the uncertainties found in the assessment process, IOTC (2021) recommends to continue strengthening efforts in monitoring and data collection, as well as the improvement in reporting and analyses.

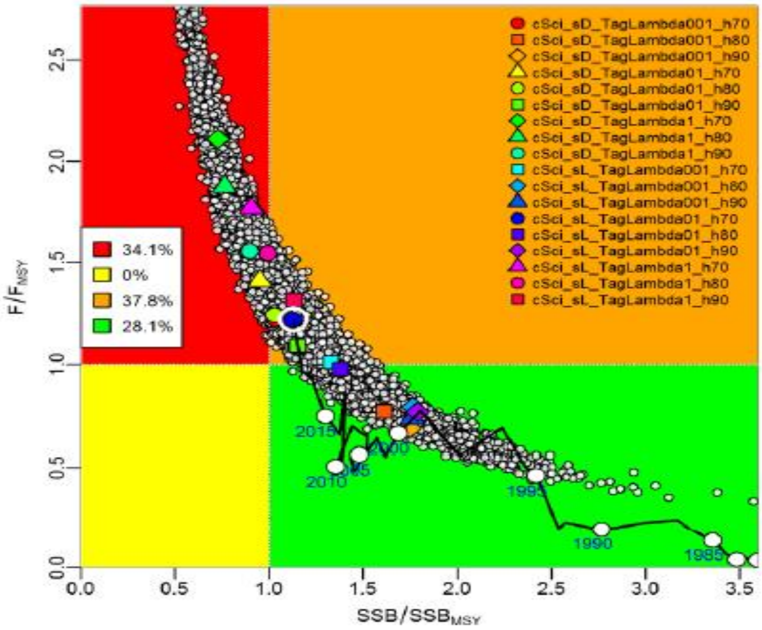

Fig 7.3.2.1i.- Bigeye tuna: SS3 Aggregated Indian Ocean assessment Kobe plot. The coloured points represent stock status estimates from the 18 model options. The grey dots represent 5,000 estimates of 2018 stock status from the multivariate normal approximation from the mean and variance-covariance of the 18 model options. The legend indicates the estimated probability of the stock status being in each of the Kobe quadrant. The white circle (around the blue dot) represents the median stock status in 2018 (Source: IOTC, 2021)

Colour key	Stock overfished (SB_{2018} / SB_{MSY}<1)	Stock not overfished (SB_{2018} / SB_{MSY}≥ 1)
Stock subject to overfishing (F_{2018} / F_{MSY}≥ 1)	34.6%	38.2%
Stock not subject to overfishing (F_{2018} / F_{MSY}≤ 1)	0%	27.2%
Not assessed / Uncertain		

Figure 7.3.2.1j.- Estimated probability that the bigeye tuna stock is in a respective quadrant of the Kobe Plot (Source: IOTC, 2021)

c) Albacore (*Thunnus alalunga*)

Stock assessment

The latest stock assessment of this stock was conducted in 2019. The model used incorporates a series of revisions to the 2016 stock assessment noted during the Working Party on Temperate Tunas (WPTmT) (IOTC, 2020). The assessment was carried out using SS3 (Stock Synthesis III) which is also employed to provide advice for the three tropical tunas in the Indian Ocean. The 2019 assessment has used data of CPUE series that differs from the utilized on the last assessment and the trends suggest that the longline vulnerable biomass has declined to around 45-50% of the levels observed in 1980-1982.

Figure 7.3.2.1k shows that prior to 1980 there were 20 years of moderate fishing, after which total catches of albacore tuna have more than doubled in subsequent years, with longlines representing the main fleet targeting the species. Purse seines catch just represents a small fraction of the total catch in the Indian Ocean, during the period 2015-2020 the average capture of purse seine vessels represented 0.9% in relation to the total catch by all fleets.

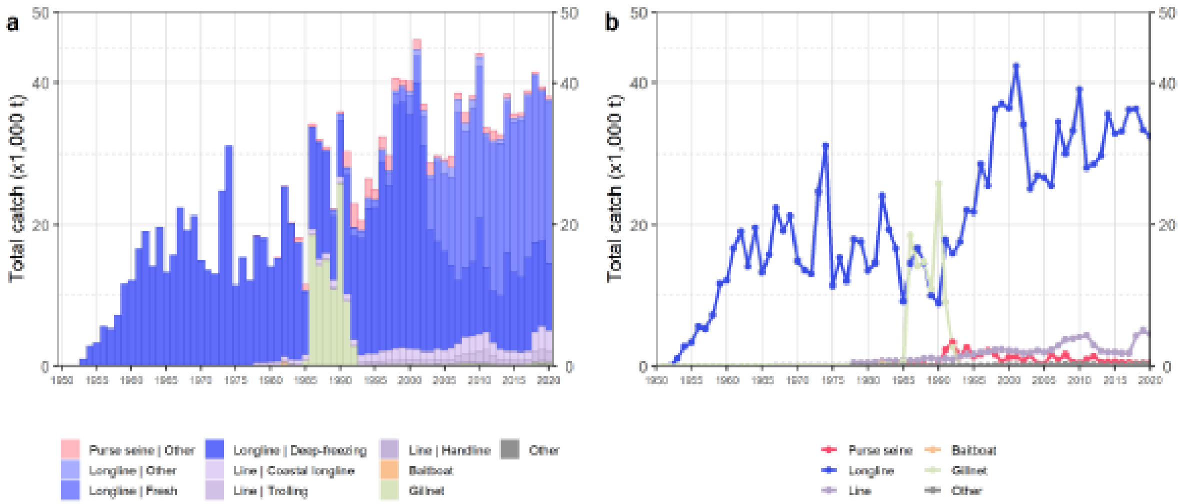

Figure 7.3.2.1k.- Annual time series of (a) cumulative nominal catches (t) by fishery and (b) individual nominal catches (t) by fishery for albacore during 1950–2020; Other: all remaining fishing gears (Source: IOTC, 2021)

Outlook

According to IOTC (2021) there is substantial uncertainty on the reliability of catch estimates. In 2017, these were marginally above the MSY levels estimated by SS3. Biomass is estimated to be above the SB_{MSY} level and fishing mortality represented as F_{2017}/F_{MSY} is above the maximum sustainable yield level as well (1.346), therefore the stock status is not overfished but is subject to overfishing (**Table 7.3.2.1**)

Table 7.3.2.1.- Status of Albacore in the Indian Ocean (source: IOTC, 2021). 1: Boundaries for the Indian Ocean stock assessment are defined as the IOTC area of competence; 2: Proportion of 2020 catch fully or partially estimated by IOTC Secretariat: 15% and :3 The stock status refers to the most recent years' data used in the last assessment conducted in 2019. i.e., 2017

Area	Indicators – 2019 assessment		Status[3]
Indian Ocean[1]	Catch 2020[2] (t)	38,082	
	Average catch 2016–2020 (t)	38,781	
	MSY (1,000 t) (95% CI)	35.7 (27.3–44.4)	
	F_{MSY} (95% CI)	0.21 (0.195-0.237)	
	SB_{MSY} (1,000 tt) (95% CI)	23.2 (17.6–29.2)	
	F_{2017}/F_{MSY} (95% CI)	1.346 (0.588–2.171)	
	SB_{2017}/SB_{MSY} (95% CI)	1.281 (0.574–2.071)	
	SB_{2017}/SB_{1950}	0.262	

It is considered that maintaining or increasing the fishing effort in the core albacore grounds is likely to reduce its biomass, productivity and the CPUE (IOTC, 2021). In addition, piracy in the western Indian Ocean has displaced a substantial portion of the longline fishing effort into the traditional albacore fishing grounds in the eastern and southern Indian Ocean. Most recent estimations consider that recruitment levels are likely to be at low levels and under the current catch assumptions, the biomass will continue to decline. The recruitment in the final years of the assessment model is estimated to be well below average levels and this is likely to cause the stock to decline considerably over the short term (IOTC, 2021). However, these recruitment estimates are poorly determined. Hence, it is cautioned that the short-term projections are more influenced by the recent low recruitment levels.

7.3.2.2 Minor Primary species

a) Swordfish (*Xiphias gladius*)

The latest stock assessment using stock synthesis (SS3) was conducted in 2020, employing data until 2018 and a spatially disaggregated, sex explicit and age structured model. Results indicate that MSY-based reference points

(F_{2018}/F_{MSY} =0.60 and SB_{2018}/SB_{MSY}=1.75) were not exceed for population in the Indian Ocean as a whole (IOTC, 2021). In addition, the spawning biomass in 2018 was estimated to be 40-93% of the unfished levels and two alternative models were also used where results indicated that the stock has been above the level that would produce the MSY (**Table 7.3.2.2a**). Most recent catches available (2020) indicate are approximately below the MSY level as well as the average catch during 2016-2020. It is concluded the swordfish stock is not overfished nor subject to overfishing (**Figure 7.3.2.2a**).

Table 7.3.2.2a.- Status of swordfish in the Indian Ocean (source: IOTC, 2021). 1: Boundaries for the Indian Ocean stock assessment are defined as the IOTC area of competence, and 2: Proportion of 2020 catch fully or partially estimated by IOTC Secretariat: 4.3% (Source: IOTC 2021)

Area[1]	Indicators		2021 stock status determination
Indian Ocean	Catch 2020[2] (t) Average catch 2016-2020 (t)	26,005 30,858	98%
	MSY (1,000 t) (80% CI) F_{MSY} (80% CI) SB_{MSY} (1,000 t) (80% CI) F_{2018}/F_{MSY} (80% CI) SB_{2018}/SB_{MSY} (80% CI) SB_{2018}/SB_{1950} (80% CI)	33 (27–40) 0.23 (0.15–0.31) 59 (41–77) 0.60 (0.40–0.83) 1.75 (1.28–2.35) 0.42 (0.36–0.47)	

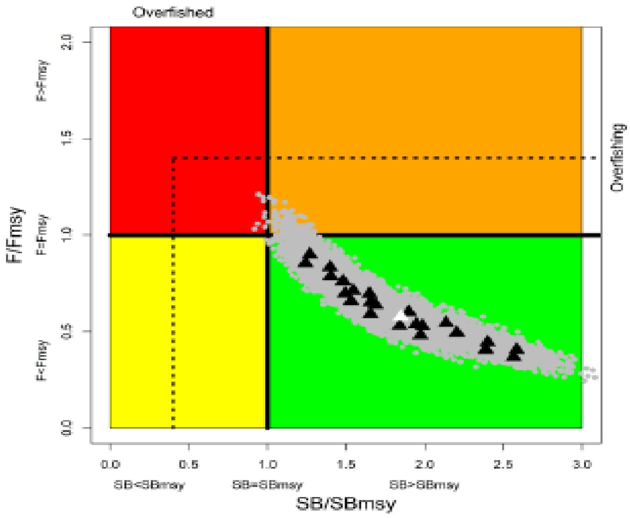

Figure 7.3.2.2a.- Swordfish: current stock status, relative to SB_{MSY} (x-axis) and F_{MSY} (y-axis) reference points for the final model grid. Triangles represent MPD estimates from individual models (white triangle represent the estimate from the basic model). Grey dots represent uncertainty from individual models. The dashed lines represent limit reference points for Indian Ocean swordfish (SBlim = 0.4 SB_{MSY} and Flim = 1.4*F_{MSY}) (Source: IOTC, 2021)

The current fishing mortality is not expected to decrease the population level to an overfished status on the next decade (IOTC, 2021). Although the Southern region of the IO exhibits declining biomass trends, indicating a higher depletion in comparison to northern regions, it is considered that there is still a very low risk of exceeding MSY-based reference points by 2028 if catches are maintained at 2018 levels (<5% risk that SB2028< SBMSY, and <10% risk that F2028> FMSY) (IOTC, 2021). Basically, sharks and swordfish-targeted longlines comprised more than 60% of total swordfish catches in the Indian Ocean in recent years whereas remaining catches mainly came from coastal longline (22%) and gillnets (13%). Purse seines just represents a negligible portion of captures (**Fig 7.3.2.2b**). According to the IOTC (2021) the main catches levels are currently coming from four fleets under the flags of Sri Lanka (longline-gillnet fleet with approximately 28% of catchy); Taiwan, China (longline fleet, approximately 21%); India (coastal longlines, approximately 8% and Spain (swordfish-targeted longlines, approximately 8%).

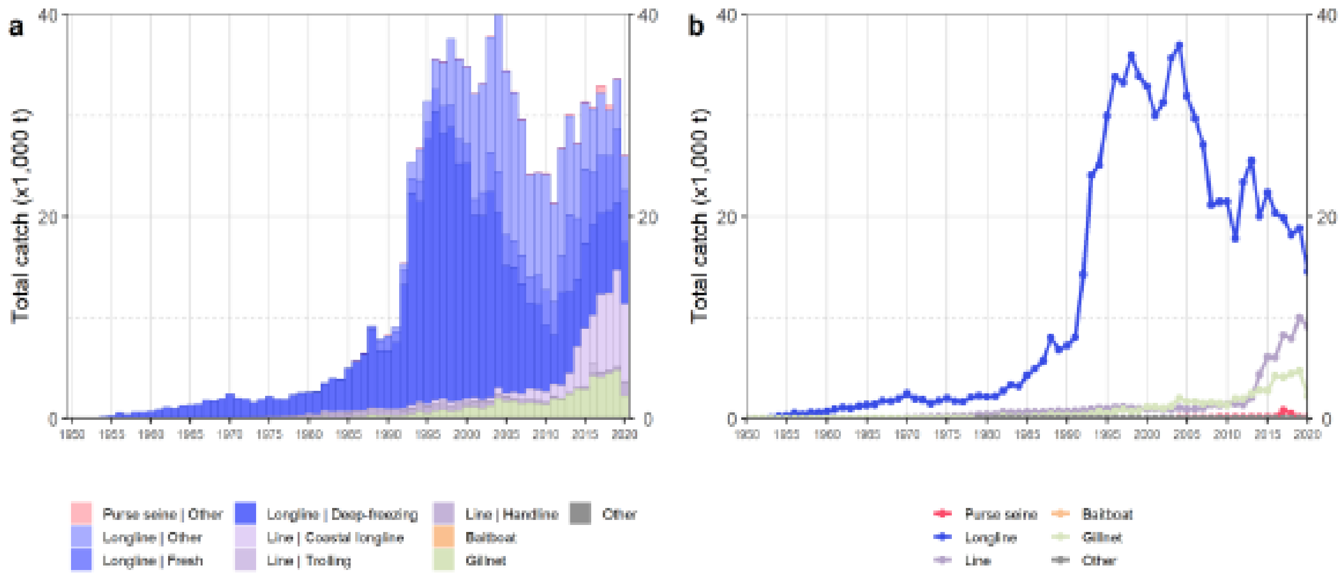

Figure 7.3.2.2b.- Annual time series of (a) cumulative nominal catches (t) by fishery and (b) individual nominal catches (t) by fishery group for swordfish during 1950–2020. Longline| Other: swordfish and sharks-targeting longlines; Other: all remaining fishing gears (Source: IOTC 2021)

b) Blue marlin (*Makaira nigricans*)

The last stock assessment carried out in the Indian Ocean was conducted in 2019 using a Bayesian State-Space Surplus Production model JABBA. Results obtained have suggested that B_{2017}/B_{MSY}=0.82 and F_{2017}/F_{MSY}=1.47, this positions the species on the red area of the Kobe plot (**Fig 7.3.2.2c**). Hence, it can be stated with 87% of probability that blue marlin in the Indian Ocean is overfished and subject to overfishing (**Table 7.3.2.2b**). This conclusion differs from the previous assessment conducted in 2015, where it was estimated that the stock was subject to overfishing but not overfished. This change has been attributed to higher catches during 2015-2017 and a standardization of CPUE indices (IOTC, 2021).

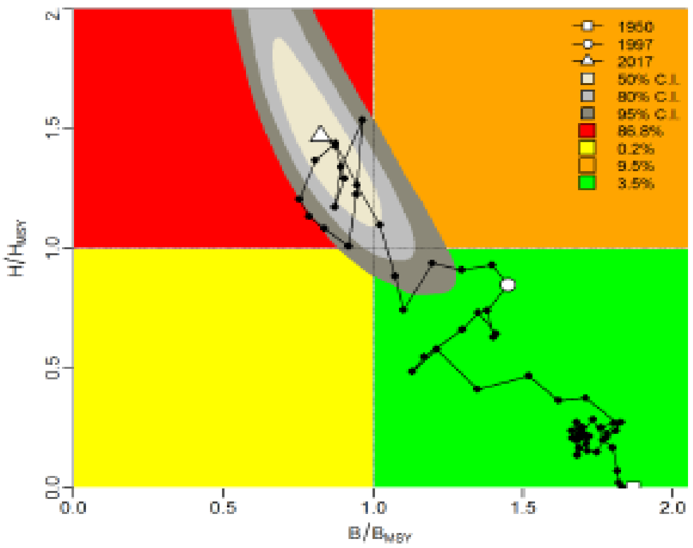

Fig 7.3.2.2c.- Kobe stock status plot for the Indian Ocean stock of blue marlin, from the final JABBA base case (the black line traces the trajectory of the stock over time. Contours represent the smoothed probability distribution for 2018 (isopleths are probability relative to the maximum) (Source: IOTC, 2021)

Table 7.3.2.2b.- Estimated probability of the blue marlin stock being in a determined quadrant of the Kobe Plot (Source: IOTC, 2021)

Colour key	Stock overfished (B_{year}/B_{MSY}< 1)	Stock not overfished (B_{year}/B_{MSY}≥ 1)
Stock subject to overfishing (F_{year}/F_{MSY}> 1)	87%	10%
Stock not subject to overfishing (F_{year}/F_{MSY}≤ 1)	0%	3%
Not assessed/Uncertain		

The most recent catch (8,486 tons) is lower than the estimation of MSY (9,984 t). Approximately, 70% of the total catches of blue marlin are taken by three fleets: Taiwan, China (longline): 36.1%; Sri Lanka (gillnet, hook and line and longline): 23.4% and India (coastal longline and gillnet): 9.7%. The capture of this species is almost negligible by purse seines and is considered a non-target species of this fleet. Longline catches account for around 61% of total catches in the Indian Ocean, followed by lines (18.6%) and gillnets (18%) (IOTC, 2021). The remaining catches taken with other gears contributed to 2.4% of the total catches in recent years.

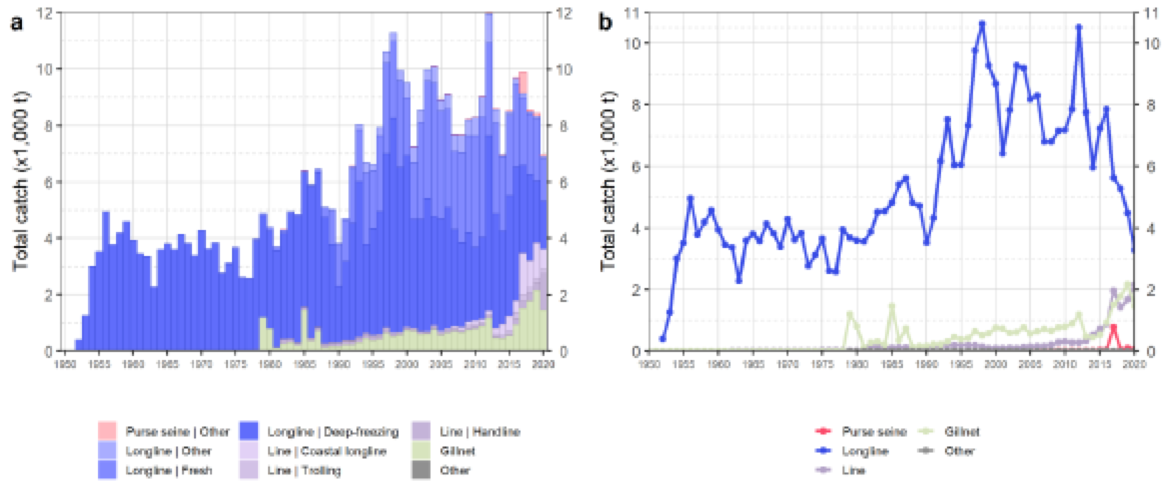

Figure 7.3.2.2d.- Annual time series of (a) cumulative nominal catch (t) by fishery and (b) individual nominal catch (t) by fishery group for blue marlin during 1950–2020. Longline | Other: swordfish and sharks-targeted longlines; Other: all remaining fishing gears (Source: IOTC, 2021)

c) Black marlin (*Makaira indica*)

A new stock assessment was conducted for this species in 2021 based on a Bayesian state-space production model (JABBA). Even though, relative reference points were estimated (F/FMSY=0.53 and B/BMSY=1.98) and results indicated that the stock is not subject to overfishing nor overfished, the status estimates are subject to a high degree of uncertainty (IOTC, 2021). According to the IOTC (2021), the outputs of the last assessment should be interpreted with caution since there has been no improvement in the available data for black marlin during the last year, therefore there is no reasonable justification to change the stock status from "Not assessed/Uncertain".

Catches have remained substantially higher than the limits stipulated in Res 18/05, principally due to developing coastal fisheries fishing in the core habitat of the species whereas CPUE indicators come from industrial fleets offshore on the edges of the species distribution. The outlook is likely to remain uncertain since there is a lack of CPUE indices from the main fleets targeting this species, mainly gillnets (approximately 56%), followed by coastal longlines, troll and handline (31.2%). Black marlin is a non-target species of industrial fishing and the contribution of purse seines to the catch is within 3.1% of its total (IOTC, 2021).

d) Striped marlin (*Kajikia audax*)

A stock assessment was carried out in 2021 based on two models: JABBA, a Bayesian state-space prediction model (age-aggregated) and Stock Synthesis (age-structured). Both showed consistent results regarding the stock status and confirmed previously obtained result during 2012 and 2018 (IOTC, 2021). It has been concluded the stock is subject to overfishing and overfished (**Table 7.3.2.2c**) furthermore, the biomass has been below the level that would produce MSY for over a decade (IOTC, 2021).

Table 7.3.2.2.c.- Stock status of striped marlin (Source: IOTC, 2021). 1: Boundaries for the Indian Ocean are defined as IOTC area of competence, 2: Proportion of 2020 catch fully or partially estimated by IOTC Secretariat: 14.5%, 3: JABBA estimates are the range of central values, 4: SS3 is

the only model that used SB/SBMSY, all others used B/BMSY * Estimated probability that the stock is in the respective quadrant of the Kobe plot (shown below), derived from the confidence intervals associated with the current stock status.

Area[1]	Indicators		2021 stock status determination
Indian Ocean	Catch 2020[2] (t)	2,587	100%*
	Average catch 2016-2020 (t)	3,292	
	MSY (1,000 t) (JABBA)	4.60 (4.12 - 5.08)[3]	
	MSY (1,000 t) (SS3)	4.82 (4.48 - 5.16)	
	F_{MSY} (JABBA)	0.26 (0.20–0.33)	
	F_{MSY} (SS3)	0.23 (0.23 - 0.23)	
	B_{MSY} (JABBA)	17.89 (14.34 - 23.11)	
	SB_{MSY} (SS3)	6.162 (6.343, 5.837)	
	F_{2019}/F_{MSY} (JABBA)	2.04 (1.35 - 2.93)	
	F_{2019}/F_{MSY} (SS3)	3.93 (2.30 - 5.31)	
	B_{2019}/B_{MSY} (JABBA)	0.32 (0.22 - 0.51)	
	SB_{2019}/SB_{MSY} (SS3)[4]	0.47 (0.35 - 0.63)	
	B_{2019}/B_0(JABBA)	0.12 (0.10 – 0.19)	
	SB_{2019}/SB_0 (SS3)	0.06 (0.05 - 0.08)	

(a) Stock status (JABBA and SS3 models)   (b) JABBA B/B_{MSY} and F/F_{MSY} trajectories

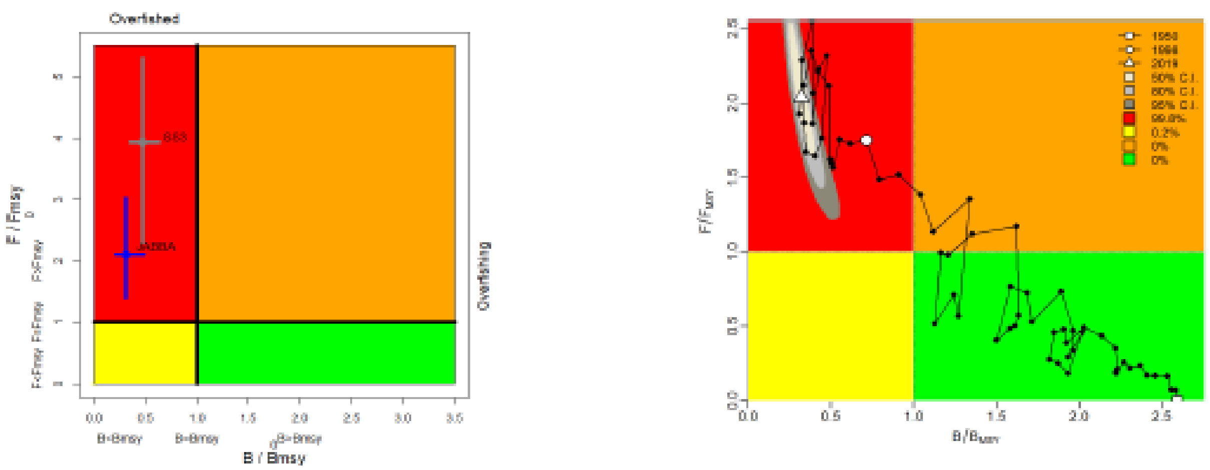

Fig 7.3.2.2e- Striped marlin: a) Stock status from the Indian Ocean assessment JABBA (Bayesian State Space Surplus Production Model) and SS3 models with the confidence intervals (left); (b) Trajectories (1950-2019) of *B/BMSY and F/FMSY* from the JABBA model. NB: SS3 refers to SB/SBMSY while the JABBA model's output refers to B/BMSY (Source: IOTC, 2021)

Even though the catches in 2020 are lower than the MSY, the stock is in a highly depleted state, thus a substantial decrease in F is required to ensure a chance for the stock to recover on the future. Gillnets and longlines account for the most part of catches in the Indian Ocean (51% and 38% respectively), followed by lines (9.2%). Other gears contributed with the remaining portion of catches (**Figure 7.3.2.2f)**

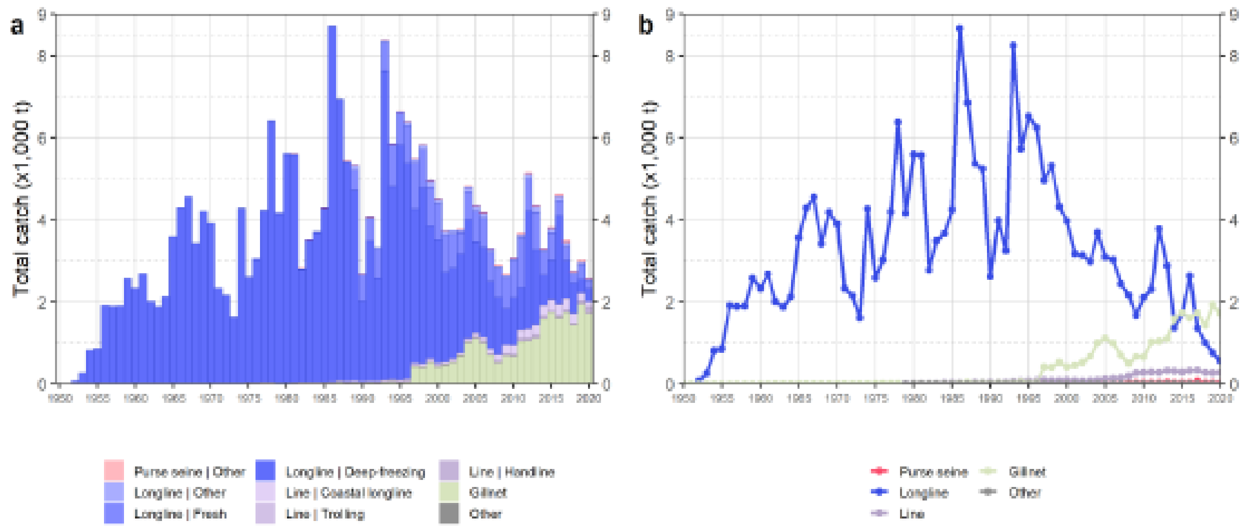

Fig 7.3.2.2f.- Annual time series of (a) cumulative nominal catch (t) by fishery and (b) individual nominal catch (t) by fishery group for striped marlin during 1950–2020. Longline | Other: swordfish and sharks-targeted longlines; Other: all remaining fishing gears (Source: IOTC 2021)

e) Indo-Pacific sailfish (*Istiophorus platypterus*)

The last stock assessment was developed in 2019 using the C-MSY model and an alternative Stock Reduction Analysis (SRA) model was also employed, leading to similar results (IOTC, 2021). It was estimated that F was above F_{MSY} (F/F_{MSY}=1.22) and B above B_{MSY} (B/B_{MSY}=1.14). However, results are based on data poor techniques and both assessments rely only on catch data with highly uncertainty on catch series. The stock status of this species has not been assessed and it has been determined to be uncertain in 2021 (**Table 7.3.2.2d**) (IOTC, 2021).

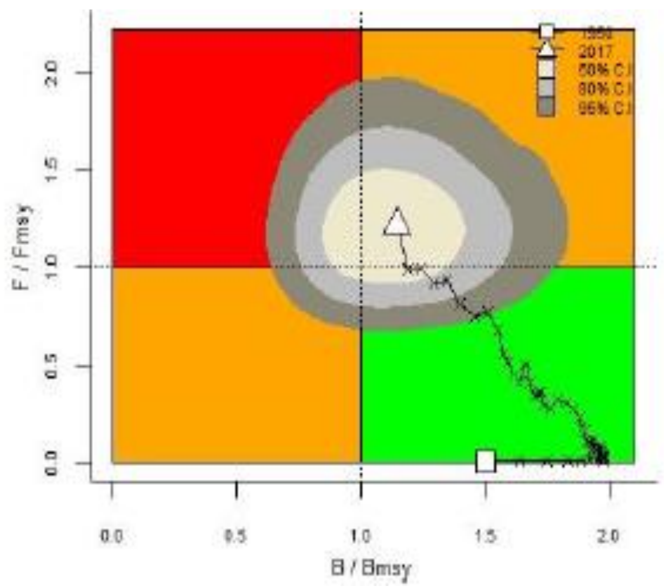

Fig.7.3.2.2g.- Indo-Pacific sailfish: Kobe plot derived from the stock reduction analysis (C-MSY method) (contours are the 50, 65 and 90 percentiles of the 2017 estimate). Black lines indicate the trajectory of the point estimates (black crosses) for the biomass ratio (B/Bmsy) and fishing mortality ratio (F/Fmsy) for each year 1950–2017 (Source: IOTC, 2021)

Table 7.3.2.2d.- Status of Indo-Pacific sailfish (*Istiophorus platypterus*) in the Indian Ocean (Source IOTC, 2021)

Area[1]	Indicators		2021 stock status determination
Indian Ocean	Catch 2020[2] (t) Average catch 2016-2020 (t)	26,890 29,897	
	MSY (1,000 t) (80% CI) F_{MSY} (80% CI) B_{MSY} (1,000 t) (80% CI) F_{2017}/F_{MSY} (80% CI) B_{2017}/B_{MSY} (80% CI) B_{2017}/B_0 (80% CI)	23.9 (16.1 – 35.4) 0.19 (0.14 - 0.24) 129 (81–206) 1.22 (1 – 2.22) 1.14 (0.63 – 1.39) 0.57 (0.31 – 0.70)	

In addition, it is considered that catches have exceed the MSY level (23,000 t), increasing by 62% between 2007 and 2019.Catches in 2019 also exceeded the 25,000 tons limit established through Resolution 18/05. The Indian Ocean stock is primarily target by gillnets, accounting for 70% of total catches from which there is limited data reported, mainly from coastal gillnet fisheries. Other important fisheries are lines (coastal longlines, troll and hand lines) with 24%participation and the remaining 16% come from records of longlines and other gears. (**Fig. 7.3.2.2h**) (IOTC, 2021).

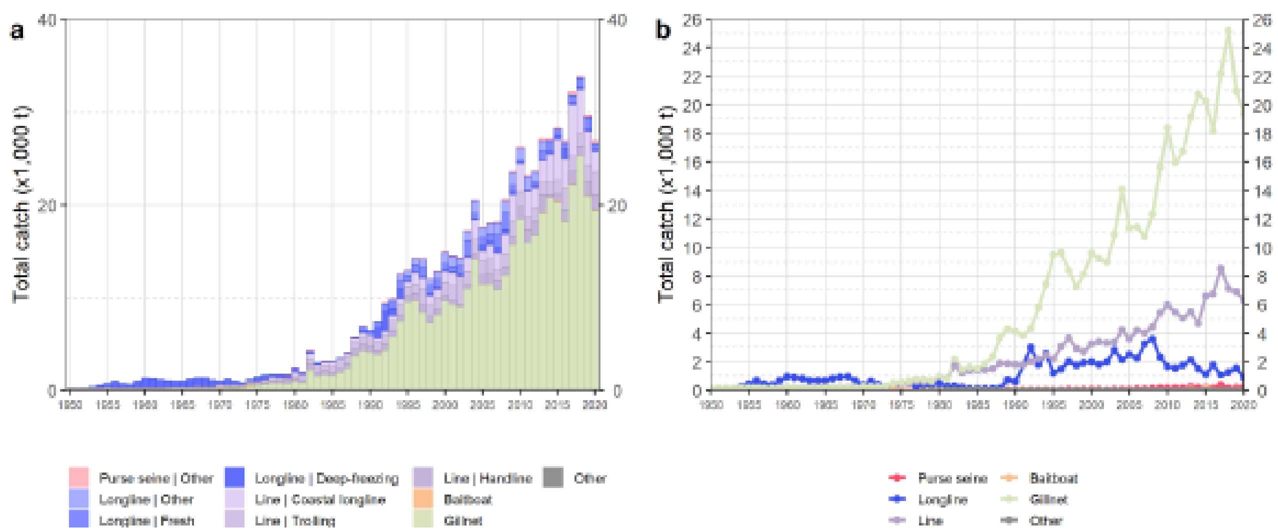

Figure 7.3.2.2h.-Annual time series of (a) cumulative nominal catch (t) by fishery and (b) individual nominal catch (t) by fishery group for Indo-Pacific sailfish during 1950–2020. Longline | Other: swordfish and sharks-targeted longlines; Other: all remaining fishing gears (Source IOTC, 2021)

f) Kawakawa (*Euthynnus affinis*)

No stock assessment was conducted for *Euthynnus affinis* in 2021. Results were based on a previous assessment developed in 2020 through data-limited techniques. The model used estimated a F close to FMSY (0.98) and B above BMSY (1.13). Currently, it is considered that there is a 50% of probability than the status of the species is in the green quadrant of the Kobe plot (**Table 7.3.2.2e**). The IOTC (2021) estimated the species is not overfished nor subject to overfishing (IOTC, 2021). However, the assessment models rely on highly uncertain catch data but despite these uncertainties, it has been noted that the stock is close to being fished at MSY levels and higher catch may not be sustained in the long term.

Table 7.3.2.2e.- Status of kawakawa (*Euthynnus affinis*) in the Indian Ocean. 1: Boundaries for the Indian Ocean stock assessment are defined as the IOTC area of competence and 2 Proportion of 2020 catch fully or partially estimated by IOTC Secretariat: 49.7% (Source: IOTC, 2021)

Area[1]	Indicators		2021 stock status determination
Indian Ocean	Catch 2020[2] (t) Average catch 2016-2020 (t)	143,211 151,150	50%
	MSY (t) (80% CI) F_{MSY} (80% CI) B_{MSY} (t) (80% CI) $F_{current}/F_{MSY}$ (80% CI) $B_{current}/B_{MSY}$ (80% CI)	148,825 (124,114 – 222,505) 0.44 (0.21–0.82) 355,670 (192,080 – 764,530) 0.98 (0.85–1.11) 1.13 (0.75–1.58)	

Further work is needed to improve the data collection and reliability of catch series with an emphasis on CPUE for the main fleets, size composition and life trait history parameters (IOTC, 2021).

According to the IOTC (2021) Kawakawa is mainly caught by gillnets (50%) followed by purse seines (30%) and lines (16%) and mostly catches belong to Indonesia (28%), Iran (23%) and India (21%), whereas the other 32 fleets contributed with the remain of the total catch during recent years.

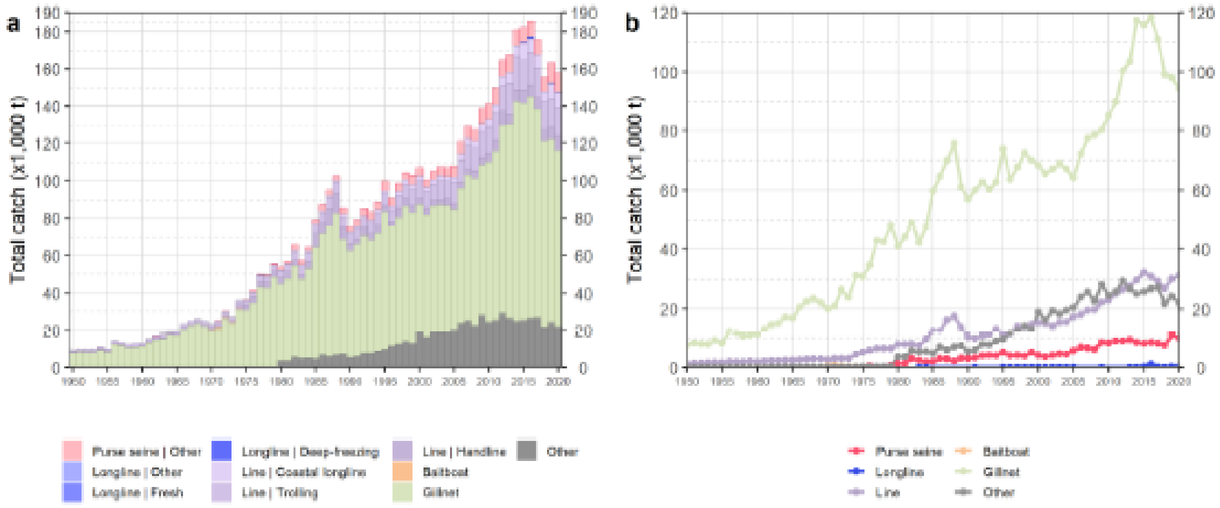

Figure 7.3.2.2i.- Annual time series of (a) cumulative nominal catch (t) by fishery and (b) individual nominal catch (t) by fishery group for narrow-barred Spanish mackerel during 1950–2020. Longline | Other: swordfish and sharks-targeted; Other: all remaining fishing gears (Source: IOTC 2021)

g) Blue shark (*Prionace glauca*)

Blue sharks are taken by a range of different fisheries in the Indian Ocean but because of its life history characteristics it is considered the most productive of pelagic shark (IOTC, 2021). A stock assessment was conducted in 2021 through SS3, an integrated age-structured model. Further, the uncertainty in relation to data and the model configuration was explored with a sensitivity analysis and results suggested that currently, the stock is not overfished nor subject to overfishing (**Table 7.3.2.2f**), however, plotted trajectories show trends towards the overfished and subject to overfishing quadrant of the Kobe plot (Fig**. 7.3.2.2j**). In addition, an ecological risk assessment (ERA) was conducted for the Indian Ocean in 2018 in order to evaluate the resilience of shark species to the impact of a given fishery by combining biological productivity and its susceptibility to each fishing gear type. In relation to purse seine gears, blue shark was estimated is not being susceptible to this particular gear (IOTC, 2021) whereas has been found it has second highest susceptibility to longlines (IOTC, 2021).

Increasing fishing effort and catch is likely to result in the stock being overfished and subject to overfishing in the near future and the stock should be closely monitored although the information available on this species has improved in recent years (IOTC, 2021).

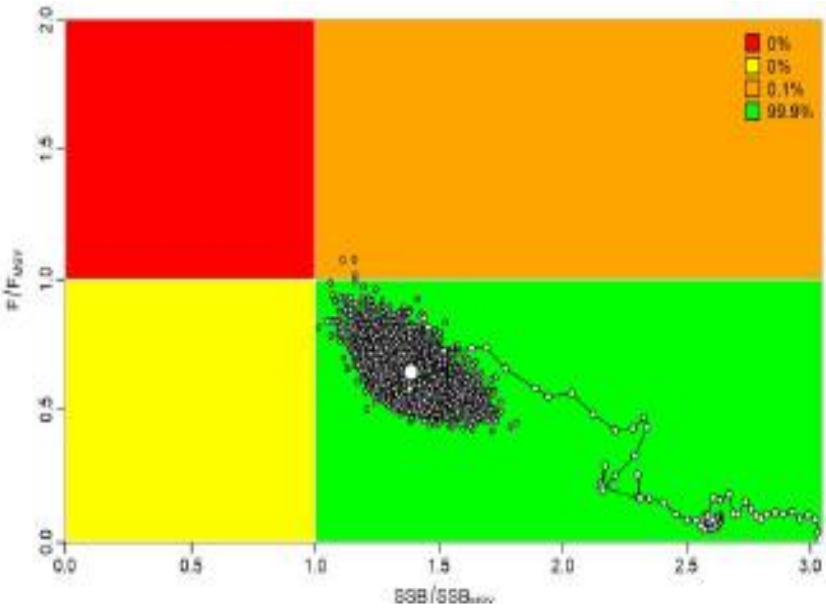

Figure 7.3.2.2j.-Aggregated Indian Ocean stock assessment Kobe plot for the 2021 assessment base case model. (Source: IOTC, 2021)

Table 7.3.2.2f.- Status of blue shark (*Prionace glauca*) in the Indian Ocean (Source: IOTC, 2021)

Area	Indicators		2021 stock status determination
Indian Ocean	Reported catch 2020 (t)	21,344	99.9%
	Estimated catch 2019 (t)	43,240	
	Not elsewhere included (nei) sharks[1] 2020 (t)	20,552	
	Average reported catch 2016-20 (t)	25,144	
	Average estimated catch 2015-19 (t)	48,781	
	Avg. not elsewhere included (nei) sharks[1] 2016-20 (t)	30,277	
	MSY (1,000 t) (80% CI)[2]	36.0 (33.5 - 38.6)	
	F_{MSY} (80% CI)[2]	0.31 (0.306 - 0.31)	
	SB_{MSY} (1,000 t) (80% CI)[2,3]	42.0 (38.9 - 45.1)	
	F_{2019}/F_{MSY} (80% CI)[2]	0.64 (0.53 - 0.75)	
	SB_{2019}/SB_{MSY} (80% CI)[2]	1.39 (1.27 - 1.49)	
	SB_{2019}/SB_0 (80% CI)[2]	0.46 (0.42 - 0.49)	

7.3.3 Secondary species

MSC defines secondary as those species that are not considered to be ‘primary’ species (i.e., where there are not “management tools and measures in place that are intended to achieve stock management reflected in either limit or target reference points” SA3.1.3.3), or species that are out of scope of the program, but where the definition of ETP species is not applicable (SA3.1.4.2).

According to data gathered from scientific observers onboard the ANABAC fleet (**Table 7.3.1.1d** the most common secondary species found are frigate tuna (*Auxis thazard*, 0.28%), rainbow runner (*Elagatis bipinnulata*, 0.23%), common dolphinfish (*Coryphaena hippurus*, 0.22%), rough triggerfish (*Canthidermis japonica*, 0.10%) and wahoo (*Acanthocybium solandri,* 0.05%), all of them comprising approximately 0.88% of catch as well as silky sharks (*Carcharhinus falciformis*) roughly accounting for 0.28% of total catch.

These very low catch levels indicate that the ANABAC Indian Ocean Tuna fishery is a relatively clean fishery with low proportions of bycatch overall.

None of these secondary species are subject to management by IOTC nor stock assessments are conducted. Measures implemented by the EU, Seychelles and ANABAC include the same as for primary species with the addition of:

- Seychelles Fishing Authority (SFA): scientific and management framework on the conservation of shark species caught in association with IOTC managed fisheries.
- Code of Good Practice implemented voluntarily by the fleet in 2012 (CGP, 2020) is aimed at improving tuna purse-seining fleet's practices with regards to reducing ecosystem impacts of FAD fishing, reducing bycatch, and improving bycatch post capture mortality using best-practice release procedures monitored by 100% observer coverage.
- Research into bycatch in the purse seine fishery was carried out by Grande *et al.,* 2019a and 2019b.
- EU: a comprehensive system of management measures covers vessel licensing and permits, catch reporting, landings restrictions, observer coverage, ban on shark finning, VMS and spatial limitations/temporal restrictions.
- IOTC Resolutions also apply though they are generally not species specific:
  - Resolution 17/05 Calls for landing of shark carcasses and fins to avoid waste.
  - Resolution 16/07 On the use of artificial lights to attract fish.
  - Resolution 16/10 To promote implementation of IOTC conservation and management measures.
  - Resolution 13/06 On a scientific and management framework on the conservation of shark species caught in association with IOTC managed fisheries.
  - Resolution 12/01 On the implementation of the precautionary approach.

In the case of shark species, IOTC Resolution 17/05 established that CPCs shall take the necessary measures to require that their fishermen fully utilize their entire catches of sharks, except for species prohibited by the IOTC. Full utilization is defined as retention by the fishing vessel of all parts of the shark excepting head, guts and skins to the point of first landing. Fins must remain attached if the sharks are landed fresh, while fins can be removed if the sharks are landed frozen, but in this case, a 5% fin/carcass ratio must be maintained.

Various shark species are prohibited from being retained in the IOTC region, such as thresher sharks (Resolution 12/09), whale sharks (Resolution 13/05), oceanic whitetip sharks (Resolution 13/06). Whale shark and oceanic whitetip shark are considered in the CMS Appendix I, whereas Resolution 12/09 notes that bigeye thresher shark is pointed out by the scientific community as endangered and vulnerable and require vessels lo release unharmed individuals and prohibits its retention, transhipment, storing, landing and selling. Thus, these shark species will be considered ETP. In the case of fisheries that do not target shark species, Resolution 2017/05 requires that, to the extent possible, CPCs encourage the release of live sharks, especially juveniles and pregnant sharks that are caught incidentally and are not used for food and/or subsistence. CPCs shall require that fishers are aware of and use identification guides (e.g. IOTC Shark and Ray Identification in Indian Ocean Fisheries) and handling practices.

7.3.4 ETP species

According to the MSC Fisheries Standard v2.01, ETP species are defined such as (SA3.1.5):

i) Species that are recognised by national ETP legislation

ii) Species listed in binding international agreements given below:
a. Appendix 1 of the Convention on International Trade in Endangered Species (CITES), unless it can be shown that the particular stock of the CITES listed species impacted by the UoA under assessment is not endangered.
b. Binding agreements concluded under the Convention on Migratory Species (CMS), including: *Annex 1 of the Agreement on Conservation of Albatross and Petrels (ACAP); Table 1 Column A of the African-Eurasian Migratory Waterbird Agreement (AEWA); Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS); Annex 1, Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS); Wadden Sea Seals Agreement; any other binding agreements that list relevant ETP species concluded under this Convention.*

iii) Species classified as 'out-of scope' (amphibians, reptiles, birds and mammals) that are listed in the IUCN Redlist as vulnerable (VU), endangered (EN) or critically endangered (CE).

Species listed in any of the agreements given above shall be considered and therefore, classified as ETP species whereas species listed in non-binding agreements (i.e., Memorandum of Understanding under the CMS) are not considered at such for MSC purposes. Classification made by the team on **Table 7.3.1.2** corresponds to the requirements in SA3.1.5.2. In GSA3.1.5.2, MSC states that Parties to the CMS are required to 'endeavour to provide immediate protection for migratory species included in Appendix I of the CMS' and to 'endeavour to conclude Agreements covering the conservation and management of migratory species included in Appendix II'. In addition, it is also established that 'Agreements are adopted to reflect the direct conservation needs of species and the requirements of regions (Sant *et al*., 2012). Species listed in any of these shall be classified as ETP for the purposes of an MSC assessment' (GSA3.1.5.2). In the case of silky shark (*Carcharihunus falciformis)* which is included in the CMS Appendix II and CITES Appendix II, ANABAC maintains either SFPA (Sustainable Fisheries Partnership Agreements) and/or Bilateral agreements with coastal States (i.e., Comoros, Mayotte, TAAF) through EU or Seychelles, where silky shark is prohibited to be fish and retained on board. The team is also aware of overlapping fisheries that have considered silky shark as ETP.

In terms of vulnerable or prone species to be caught as bycatch in purse seine fisheries (e.g. sharks, turtles) the main issue is the mortality of captured individuals and other types of indirect mortality resulting from interaction with fishing gear (e.g. FAD entanglement). According to Báez *et al.* (2020), there is a negative interaction, mainly on sharks and marine turtles associated to the entanglement of dFAD structures. Various species of sharks (mainly silky shark-*Carcharhinus falciformis*- and Oceanic whitetip shark-*Carcharhinus longimanus*-) and also marine turtles may be incidentally encircled by purse seine nets.).

ETP species management

IOTC measures relevant to purse seine fisheries and for each of the ETP species group are listed below. More detailed reference will be provided for each scoring element when scoring the respective Performance Indicators. A list of active CMMs is available at http://www.iotc.org/cmms.

Sharks:

- Resolution 12/09 prohibits the retention on board of all species of thresher sharks, a group that is thought to be particularly vulnerable due to its low productivity.
- Resolution 13/05 prohibits intentional purse seine setting on tunas associated with whale sharks.
- Resolution 13/06 prohibits the retention of oceanic whitetip sharks.
- Resolution 19/02 calls for the use of non-entangling FADs in purse seine fisheries and a transition to biodegradable FADs by 2022

Rays:

- Resolution 19/03 prohibits intentional setting on mobulid rays as well as retaining onboard, transhipping, landing, or storing any part or whole carcass. Live release handling procedures are detailed in the resolution.

Sea Turtles.

- Resolution 12-04 (which supersedes various prior measures) is specific to the conservation of sea turtles, and requires a range of measures including, to the extent practicable to avoid the encirclement of turtles and to safely release all turtles, including those observed entangled in FADs and to provide data on turtle bycatch to the SC. If a sea turtle is entangled in the net, the net roll should be stopped as soon as the animal comes out of the water; and the turtle should be disentangled without injuring it before resuming the net roll. Vessels are encouraged to adopt FAD designs that reduce the incidence of entanglement of marine turtles and report all incidents and the fate of the turtle's following application of best-practice release measures. Guidance is also provided on the handling on sea turtles as part of the Code of Good Practices (CGP, 2020).

Sea birds.

- Resolution 12/06 is developed for longline fisheries however also requires IOTC members to provide data on interactions between fisheries and sea birds to the SC.

Cetaceans.

- Resolution 13/04 prohibits deliberate purse seine sets around cetaceans and requires reporting of interactions. However, "CPCs having national and state legislation for protecting these species shall be exempt from reporting to IOTC but are encouraged to provide data for the IOTC Scientific Committee consideration."

In addition, there is a Code of Good Practices, which was implemented voluntarily by the fleet in 2012 (CGP 2020) (**Figure 7.3.4a**). It is aimed at improving tuna purse-seining fleet's practices in each of the two ocean basins in which the fishery operates in. It reflects the practices implemented by the ANABAC fleet and also, the measures recommended and required by RFMOs and International legal instruments to make tuna purse-seining more selective and sustainable. It is independently reviewed by AZTI on a yearly basis and it was most recently updated in May 2020 to include improvements based on the latest scientific findings. It is based primarily on the following points:
1. The design and use of FADs (fish aggregating devices) that do not entangle sensitive associated species (primarily turtles and sharks).

2. The development and application of release techniques that minimize risk to associated species and optimise their survival. This includes materials and equipment provided specifically for releasing associated species.
3. The application of a FAD management system through the implementation of a FAD logbook and requirement for a responsible use of FADs during their lifetime.
4. 100% observer coverage, including support vessels.
5. Training for fishing masters, crew and scientific observers.
6. Scientific verification of activities related with good practices and continuous revision by a steering committee.
7. The inclusion within the CGP for vessels and crew safe release procedures to follow for cetaceans and whale sharks.

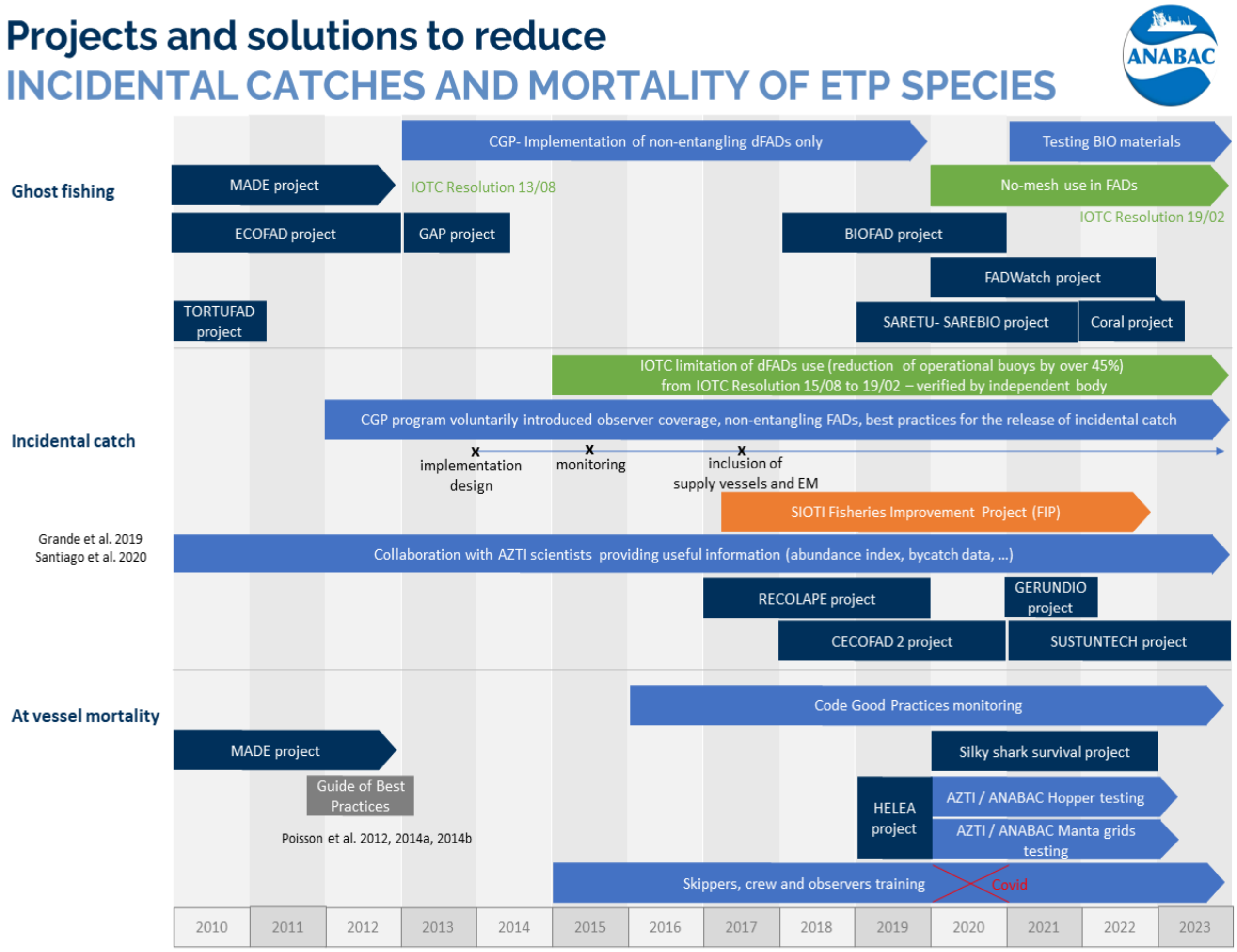

Figure 7.3..4a.- Projects and solutions from ANABAC intended to reduce incidental catches and mortality of ETP species and find better solutions to achieve minimum environmental impacts by the fleet. Key: implementations of IOTC Resolutions (green), projects in which ANABAC has participated (dark blue), FIP member (orange) and actions carried out from ANABAC's Code of Good Practices (light blue) (Source: Client)

ETP species revision

1. Sharks

Based on the data sent by the client and following the MSC criteria for the designation of ETP species mentioned on 7.3..4, silky shark, oceanic whitetip shark and bigeye thresher shark have been classified as ETP and will be scored as such during the report. **Table 7.3..4a** summarises the interactions that the ANABAC fleet had during 2016-2020 with protected shark species in the Indian Ocean. Total weight, fate and annual average number of individuals are shown.

Table 7.3.a: Fate of Shark species caught by ANABAC vessels in the Indian Ocean 2016-2020 reported by independent observers (source: ANABAC).

Scientific name	Common name	Total (2016-2020)		Fate			Annual average	
		weight (t)	n	Alive discarded (n)	Dead discarded (n)	Unknown	weight (t)	n
Alopias sp.	Tresher shark	0,20	4	0	4	0	0,04	1
Alopias superciliosus	Bigeye tresher	0,05	1	0	1	0	0,01	0
Carcharhinidae sp.	Requiem shark	47,70	954	236	718	0	9,54	191
Carcharhinus falciformis	Silky shark	338,30	14.107	3.262	10.840	5	67,66	2.821
Carcharhinus leucas	Bull shark	0,07	6	2	4	0	0,01	1
Carcharhinus longimanus	Oceanic whitetip	10,34	203	94	109	0	2,07	41
Isurus oxyrinchus	Shortfin mako shark	0,16	1	0	1	0	0,03	0
Prionace glauca	Blue shark	0,63	3	0	3	0	0,13	1
Requin non-identified	Unidentified shark	0,10	1	0	1	0	0,02	0
Sphyrnidae	Hammer shark	0,06	1	1	0	0	0,01	0
Squatinidae	Angel shark	0,13	2	1	1	0	0,03	0

1.1 Silky shark

Silky shark is considered within the Appendix II of the Convention of Migratory Species (CMS) since 2014. Although it is considered the most impacted shark species by purse seine vessels, there is no resolution in place to protect the species at the RFMO level. However, its fishing and retention is forbidden either in bilateral or SFPA agreements signed by ANABAC with few coastal States (i.e., Comoros, Mayotte and TAAF). The assessment team acknowledges that other UoAs also have considered these agreements relevant for the ETP designation.

Silky shark is commonly caught by a range of fisheries in the Indian Ocean. The main fisheries targeting this species in this area are gillnets, offshore gillnets, longline-coastal and longlines and the main fleets are under the flag of Iran, Sri Lanka, Taiwan-China and Pakistan (IOTC, 2021). It remains a considerable uncertainty on the relationship between abundance and the nominal CPUE series from the main longline fleets, as well as about the total catches over the past decade.

Despite the uncertainty regarding catch over the last decade, nominal CPUE series and abundance, several studies have been carried out in recent years. An ecological risk assessment (ERA) was conducted for the Indian Ocean in 2018 in order to evaluate the resilience of shark species to the impact of a given fishery by combining biological productivity and its susceptibility to each fishing gear type. Results showed a high vulnerability for longline gear as this species is considered one of the least productive sharks. In relation to purse seines, silky sharks were estimated to be the fifth most vulnerable shark species due to its low productivity and high susceptibility to this gear (IOTC, 2021). A preliminary stock assessment was conducted in 2018 but could not be updated in 2019 (**Table 7.3..4b**). This assessment is extremely uncertain and its population status in the Indian Ocean cannot been determined. Nevertheless, despite the lack of data, there is some anecdotal information suggesting that silky shark abundance has declined over recent decades.

Table 7.3..4b.- Status of silky shark (*Carcharhinus falciformis*) in the Indian Ocean (Source: IOTC, 2021)

Area[1]	Indicators		2018 stock status determination
Indian Ocean	Reported catch 2020 Not elsewhere included (nei) sharks[2] 2020 Average reported catch 2016-20 Av. not elsewhere included (nei) sharks[2] 2016-20	1,314 t 20,552 t 1,833 t 30,277 t	
	MSY (1,000 t) (80% CI) F_{MSY} (80% CI) SB_{MSY} (1,000 t) (80% CI) $F_{current}/F_{MSY}$ (80% CI) $SB_{current}/SB_{MSY}$ (80% CI) $SB_{current}/SB_0$ (80% CI)	unknown	

ANABAC, through the SIOTI (The Sustainable Indian Ocean tuna Initiave) FIP is also participating in the Echebastar Silky Shark Project. This project is promoting tagging studies on the silky shark which is, by far, the most impacted ETP species by the assessed fleet. Observer data collected onboard purse seiners show a large dominance of silky shark in the catches, representing 97% of all interactions recorded and submitted to the IOTC Secretariat for the period 2005-2019 Preliminary results were compiled in Echebastar- ESWG (2020) and submitted to the IOTC-WPEB in 2021.Tagging continued in 2021 and final results are expected to be taken into account within SIOTIs management strategy for silky shark's project. Once completed, these studies are expected to help increasing the information available to measure trends and support a strategy to manage impacts.

1.2 Oceanic whitetip shark

According to SA3.1.5.1, oceanic whitetip shark is classified as ETP since it is contemplated within the CMS Annex I since 2020. Main fisheries targeting this species are troll lines, gillnets and offshore gillnets under the flag of Comoros, Iran, Sri Lanka, Indonesia and India. Other countries that Reported the oceanic whitetip shark as discarded/released alive were China, Korea, France, Australia, South Africa, Sri Lanka and Japan (IOTC, 2021). In the ecological risk assessment undertaken by the Working Party on Ecosystem and Bycatch, this species was estimated to be the 11th most vulnerable species to purse seine gear. There is no quantitative stock assessment nor limited basic fishery indicators currently available for oceanic whitetip sharks in the Indian Ocean, thus its stock status is unknown (**Table 7.3..4c**)

There is scarce information available on the species and this situation is not expected to improve in the short to medium term. Moreover, available pelagic longline standardised CPUE indices from Japan and Spain indicate conflicting trends.

Table 7.3.4c.- Status of oceanic whitetip shark (*Carcharhinus longimanus*) in the Indian Ocean. 1: Boundaries for the Indian Ocean = IOTC area of competence, 2: Includes all other shark catches reported to the IOTC Secretariat, which may contain this species (i.e., SHK: sharks various nei; RSK: requiem sharks nei) (Source: IOTC, 2021)

Area[1]	Indicators		2018 stock status determination
Indian Ocean	Reported catch 2020 Not elsewhere included (nei) sharks[2] 2020 Average reported catch 2016-20 Av. not elsewhere included 2015-2019 (nei) sharks[2]	30 t 20,552 t 129 t 30,277 t	
	MSY (1,000 t) (80% CI) F_{MSY} (80% CI) SB_{MSY} (1,000 t) (80% CI) $F_{current}/F_{MSY}$ (80% CI) $SB_{current}/SB_{MSY}$ (80% CI) $SB_{current}/SB_0$ (80% CI)	unknown	

1.3 Bigeye thresher (*Alopias superciliosus*)

Resolution 12/09 bans the fishing and retention of Thresher shark, considering that it is difficult to differentiate between the many species of thresher sharks without taking them onboard and that such action might jeopardise the survival of the captured individuals; and noting that the international scientific community recognises that the bigeye thresher shark (*Alopias superciliosus*) is particularly endangered and vulnerable.

There remains considerable uncertainty in the status of the stock due to lack of information necessary for assessments nor for the development of other indicators (IOTC, 2021). In the case of bigeye thresher shark, after the ecological risk assessment, this species received a high vulnerability ranking (No. 4) for longline gear and a low vulnerability ranking to purse seine gear due to its low susceptibility to this particular gear.

2. Whale shark (*Rhincodon typus*)

Whale shark is considered within Annex I of the CMS since 2017. Therefore, according to the MSC criteria set in SA3.1.5.2, the species shall be assigned and assessed as ETP.

IOTC Resolution 13/05 on the conservation of whale sharks states that Contracting Parties and cooperating Non-Contracting Parties (CPCs) shall prohibit their fleets from intentionally setting purse seine nets around a whale shark if it is sighted prior to the commencement of the set. If the whale shark is unintentionally encircled, the master of the vessel shall take all the necessary steps to ensure its safe release, taking into consideration the safety of the crew, then the incident has to be reported to the relevant authority of the flag State. In addition, CPCs shall adopt FAD designs that reduce the incidence of entanglement.

According to data presented by the client, recorded by the observers on board the ANABAC fleet in the Indian Ocean during 2016-2020 **(table 7.3..4d**), there were 6 interactions reported with whale sharks in which 1, the result was a fatality and the individual discarded dead. The rest of individual were discarded alive.

Table 7.3.4d: Fate of Whale sharks caught by ANABAC vessels in the Indian Ocean 2016-2020 reported by independent observers (source: ANABAC)

Scientific name	**Common name**	**Total**		**Fate**			**Annual average**	
		weight (t)	n	Alive discarded	Dead discarded	Unknown	weight (t)	n
Rhincodon typus	Whale shark	9,19	6	5	1	0	1,84	1

Post-release survival often depends on whether sharks bycaught are entangled in the purse seine net or not, and on the time spent between net closure and on deck release, (e.g., first or subsequent brails), as well as on the state of the specimen at release (Grande *et al.* 2019a; Grande *et al.,* 2019b). In the case of the fleet following the Code of Good Practice in the Atlantic Ocean it was observed that animals are released by submerging the floats or by breaking the net as described in the CGP (Annex 1 and Annex 2) (Grande *et al.,* 2019a; Grande *et al.,* 2019b). For whale sharks encircled and released following the Code of Good Practice, the survival rate was estimated to be 100% (Murua *et al.,* 2014; Escalle *et al.,* 2018) and, thus, the tuna purse seiners' impact on direct mortality of this species is considered negligible if the recommended practices are applied, as is the case of the program's fleet (Grande *et al.,* 2019a).

3. Giant manta ray (*Manta birostris*) and Mobulidae species

Manta ray (*Manta birostris*) is within the Annex I of the CMS since 2011, whereas chilean devil ray (*Mobula tarapacana*), japanese devil ray (*Mobula japanica*) and devil fish (*Mobula mobular*) are in Annex I since 2014. Thus, following SA3.1.5.2 these species will be classified as ETP.

The bycatch of rays occurs across large and small-scale fisheries worldwide. Determining both the composition and levels of bycatch and associated mortality is problematic, given to problems such as the historical unimportance to its management, the poor identification at species level and an absence of recording of retained individuals and discards (Gray *et al.,* 2018).

Mobulids are mainly caught as bycatch, primarily in the industrial purse-seine fisheries, and to a lesser extent in longline fisheries (Croll *et al.,* 2016; Shahid *et al.,* 2018). On a global scale Mobulidae are commonly recorded as bycatch in coastal and high sea purse seine and it is estimated that roughly 13,000 mobulids are captured annually in tuna purse seine fisheries (Gray *et al.,* 2018). Species of the family Mobulidae, which includes manta rays and mobula rays, are extremely vulnerable to overfishing as they are slow growing, have long gestation periods and often give birth to only a few pups (IOTC Resolution 19/03).

Interaction with mantas in sets on FAD is very low, while non-associated sets have higher but still sporadic mobulid catch rates (Hall and Roman, 2013). Mobulids are particularly susceptible to incidental catch in tuna fisheries due to their epipelagic distribution in regions of high productivity, leading to a high level of distributional overlap with target species (Croll *et al.,* 2012). Post-release mortality of mobulids in tuna fisheries is currently high (Poisson *et al.,* 2014; Francis and Jones, 2017; Amandè *et al.,* 2008) due to a lack of available tools to safely manipulate mobulids (Grande *et al.,* 2019a; Grande *et al.,* 2019b), and a lack of awareness/compliance with safe handling and release guidelines. Various authors have recommended the adoption of Good Practices to decrease the fishing mortality of mobulids (Gray *et al.,* 2019), nevertheless, more tagging work should be developed in tuna purse seiners to evaluate the post release survival rates of these species under different circumstances (Gray *et al.,* 2019). According to a study carried out by Amandè *et al.* (2008) 33% of mobulids discarded from tuna purse seine fisheries in the Indian Ocean were released alive. However, even when discarded alive, they are often injured and present a high post-release mortality (Tremblay-Boyer and Brouwer, 2016; Francis and Jones, 2017). In the 2017 study by Francis and Jones, 62.5% of tagged mantas released alive (healthy and lively with minimal superficial injuries on discard) subsequently died within 2-4 days of release. mobulids are less likely to survive entanglement or landing, since they are obligate ram ventilators, these species require constant motion for respiration and asphyxiate if prevented from swimming (Stevens *et al.,* 2018).

Table 7.3.4e registers the number of individuals and fate of manta and mobula species that had interactions with the ANABAC fleet during 2016-2020. Overall, it can be noted the high rate of individuals that were discarded dead which was higher than 50% for Mobulas and Mantas combined.

Table 7.3.4e.- Fate of Manta and Mobula species caught by ANABAC vessels in the Indian Ocean 2016-2020 reported by independent observers (source: ANABAC).

Scientific name	Common name	Total		Fate			Annual average	
		weight (t)	n	Alive discarded	Dead discarded	Unknown	weight (t)	n
Dasyatidae	Unidentified rays	0,02	6	2	4	0	0,00	1
Dasyatys (Pteroplatytrygon) violacea	Pelagic stingray	0,01	4	1	3	0	0,00	1
Manta birostris	Giant Oceanic Manta Ray	17,69	39	15	24	0	3,54	8
Mobula japonica (rancureli)	Spinetail Devil Ray	0,45	3	2	1	0	0,09	1
Mobula mobular	Devil fish	0,15	1	0	1	0	0,03	0
Mobula sp.	Devil rays	10,03	64	33	31	0	2,01	13
Mobula tarapacana	Chilean devil ray	1,50	10	1	9	0	0,30	2
Myliobatidae	Unidentified rays	0,01	2	2	0	0	0,00	0
Myliobatis aquila	Eagle ray	0,01	1	0	1	0	0,00	0
Raie non identified	Unidentified rays	0,50	6	5	1	0	0,10	1

In response to growing concern for the conservation of rays, the IOTC has adopted conservation and management measures in Resolution 19/03, the most relevant are listed as follows:

- CPCs shall prohibit all vessels from intentionally setting any gear type for targeted fishing of mobulid rays in the IOTC Area of Competence, if the animal is sighted prior to commencement of the set.
- CPCs shall prohibit all vessels retaining onboard, transshipping, landing, storing, any part or whole carcass of mobulid rays caught in the IOTC Area of Competence.
- CPCs shall require all their fishing vessels, other than those carrying out subsistence fishery, to promptly release alive and unharmed, to the extent practicable, mobulid rays as soon as they are seen in the net, on the hook, or on the deck, and do it in a manner that will result in the least possible harm to the individuals captured.

- In the case of mobulid rays that are unintentionally caught by and frozen as part of a purse seine vessel's operation, the vessel must surrender the whole mobulid ray to the responsible governmental authorities, or other competent authority, or discard them at the point of landing. Mobulid rays surrendered in this manner may not be sold or bartered but may be donated for purposes of domestic human consumption.
- CPCs shall report the information and data collected on interactions (i.e. number of discards and releases) with mobulid rays by vessels through logbooks and/or through observer programs. The data shall be provided to the IOTC Secretariat by 30 June of the following year, and according to the timelines specified in Resolution 15/02 (or any subsequent revision).
- CPCs shall ensure that fishermen are aware of and use proper mitigation, identification, handling and releasing techniques and keep on board all necessary equipment for the release of mobulid rays in accordance with the handling guidelines of Annex 1.
- CPCs are encouraged to investigate at-vessel and post-release mortality in mobulids including, but not exclusively, the application of satellite tagging programs that may be provisioned primarily through the national support complementing possible funds allocation from the IOTC to investigate the effectiveness of this measure.
- Scientific observers shall be allowed to collect biological samples of mobulid rays caught in the IOTC Area of Competence that are dead at haul-back, provided that the samples are a part of a research project approved by the IOTC Scientific Committee. In order to obtain the approval, a detailed document outlining the purpose of the work, number of samples intended to be collected and the spatio-temporal distribution of the sampling effect must be included in the proposal. Annual progress of the work and a final report on completion shall be presented to the SC.

4. Marine turtles

According to SA3.1.5.3, species 'out-of-scope' (e.g., reptiles) that are listed in the IUCN Redlist as vulnerable (VU), endangered (EN) or critically endangered (EN) can be assigned as ETP. **Table 7.3..4f** below details the threat status of marine turtles usually caught in fisheries within the IOTC are of competence, four of them have been identified having interactions with ANABAC's fleet (**table 7.3..4g**): Green turtle (*Chelonia mydas*), hawksbill turtle (*Eretmochelys imbricata*), loggerhead turtle (*Caretta caretta*) and olive ridley (*Lepidochelys olivacea*).

Table 7.3.4f.- IUCN threat status for all marine turtle species reported as caught in fisheries within the IOTC area of competence

Common name	Scientific name	IUCN threat status[8]
Flatback turtle	*Natator depressus*	Data deficient
Green turtle	*Chelonia mydas*	Endangered
Hawksbill turtle	*Eretmochelys imbricata*	Critically Endangered
Leatherback turtle	*Dermochelys coriacea*	
	(N. East Indian Ocean subpopulation)	Data deficient
	(S. West Indian Ocean subpopulation)	Critically Endangered
Loggerhead turtle	*Caretta caretta*	
	(N. West Indian Ocean subpopulation)	Critically Endangered
	(S. East Indian Ocean subpopulation)	Near Threatened
Olive Ridley turtle	*Lepidochelys olivacea*	Vulnerable

Marine turtles are highly vulnerable reptiles that have been subjected to direct exploitation for centuries, resulting in severely depleted populations and even if locally, its behaviour, feeding and reproduction are well understood, the lack of a global vision, an understanding of the movement between habitats and their interactions with regional fisheries does not lead to appropriate conservation measures at the regional level (Clermont *et al.,* 2012). As noted by various authors, the knowledge of the occurrence and movements of turtles is key to describing their home range and preferred habitat, improving our understanding of their complex demography, and eventually assessing the main factors affecting their survival (Polovina *et al.,* 2000, Kobayashi *et al.,* 2008, Chassot *et al.,* 2019).

Bycatch and mortality from gillnet fisheries have greater population-level impacts on marine turtles relative to other gear types, such as longline, purse seine and trawl fisheries in the Indian Ocean (Wallace *et al.,* 2013). Interactions between marine turtles and purse seiners or FAD can occur in coastal habitats near nesting beaches and feeding zones as well as across migration roads in open sea area (Chanrachkij & Loog-on, 2003; Luschi *et al.,* 2003; Seminoff *et al.,* 2008, Clermont *et al.,* 2012).

Many reports and grey literature have emphasized that purse seine fishery has a low bycatch level (Clermont *et al.*, 2012). In 2012 Hall provided a review of available data on marine turtle bycatch in the 3 Oceans due to purse seine vessels. He noted that marine turtle bycatch is usually less than 1% of the sets, with captures numbering generally one individual, and in most part of the sets, the turtle is released alive. A valuable source of information on marine turtles in the open ocean is considered coming from the observations of interactions with high sea fisheries (Bourjea *et al.,* 2008). Although catch rates of turtles in the purse seine fishery are low (Bourjea *et al.,* 2014) and much lower than in other high seas fisheries (Nel *et al.,* 2013; Williams *et al.,* 2018), it provides a good case study to showcase how valuable information can be inferred from observer programs as the fishery covers a large spatial extent of the western Indian Ocean (Chassot *et al.,* 2019). The use of turtle bycatch in the purse seine fishery is non contentious as their survival rate is high (Bourjea *et al.,* 2014; Ruiz *et al.,* 2018; Chassot *et al.,* 2019).

According to the information reported by independent observers on board ANABAC vessels during 2016-2020 (**Table 7.3.4g**), there were encounters with 49 individuals. Most part of them were released alive but 4 of them were discarded dead representing a fatality of 8%. Furthermore, it can be noted that 75.5% of these interactions were against individual that could not be properly identified. It has been noted that even though Resolution 12/04 on the conservation of marine turtles include an annual evaluation requirement, no stock assessment has been undertaken in the IOTC due to problems to data reporting and submission (IOTC, 2021).

Table 4.3.4g Fate of Turtle species caught by ANABAC vessels in the Indian Ocean 2016-2020 reported by independent observers (source: ANABAC).

Scientific name	**Common name**	**Total**		**Fate**			**Annual average**	
		weight (t)	n	Alive discarded	Dead discarded	Unknown	weight (t)	n
Caretta caretta	Loggerhead sea turtle	0,05	2	2	0	0	0,02	0
Chelonia mydas	Green turtle	0,04	3	3	0	0	0,01	1
Eretmochelys imbricata	Hawksbill turtle	0,05	4	4	0	0	0,02	1
Lepidochelys olivacea	Olive ridley sea turtle	0,08	3	3	0	0	0,03	1
Tortue non identified	Unidentified turtle	0,84	37	33	4	0	0,34	7

Resolution 12/04 on the conservation of marine turtles sets the management and conservation measures that shall be undertaken by the CPC fishing within the IOTC area of convention. Main measures that have to be adopted are as follows:

- CPCs shall collect (including through logbooks and observer programs) and provide to the IOTC Secretariat no later than 30 June of the following year in accordance with Resolution 10/02 [superseded by Resolution 15/02] (or any subsequent revision), all data on their vessels‟ interactions with marine turtles. The data shall include the level of logbook or observer coverage and an estimation of total mortality of marine turtles incidentally caught in their fisheries.
- CPCs shall report to the IOTC Scientific Committee information on successful mitigation measures and other impacts on marine turtles in the IOTC area, such as the deterioration of nesting sites and swallowing of marine debris.
- CPCs shall require fishermen on vessels targeting species covered by the IOTC Agreement to bring aboard, if practicable, any captured marine turtle that is comatose or inactive as soon as possible and foster its recovery, including aiding in its resuscitation, before safely returning it to the water. CPCs shall ensure that fishermen are aware of and use proper mitigation, identification, handling and de-hooking techniques and keep on board all necessary equipment for the release of marine turtles, in accordance with handling guidelines in the IOTC Marine Turtle Identification Cards.

In addition, CPCs with purse seine vessels shall:

- Ensure that operators avoid encirclement of marine turtles, and if a marine turtle is encircled or entangled, to take practicable measures to safely release the turtle in accordance with the handling guidelines in the IOTC Marine Turtle Identification Cards.
- To the extent practicable, release all marine turtles observed entangled in fish aggregating devices (FADs) or other fishing gear; If a marine turtle is entangled in the net, stop net roll as soon as the turtle comes out of the

water; disentangle the turtle without injuring it before resuming the net roll; and to the extent practicable, assist the recovery of the turtle before returning it to the water; Carry and employ dip nets, when appropriate, to handle marine turtles.

- Encourage vessels to adopt FAD designs that reduce the incidence of entanglement of marine turtles according to international standards
- Require operators to record all incidents involving marine turtles during fishing operations in their logbooks and report such incidents to the appropriate authorities of the CPC.

5. Seabirds

According to IOTC (2021) the level of mortality of seabirds due to fishing gears in the Indian Ocean is poorly known; IOTC databases contain poor data on interactions of IOTC fisheries with seabirds (Garcia and Herrera, 2018). The majority of the bycatch of seabirds occurs in southern waters beyond the area of operation of purse seiners, and seabird bycatch in purse seine fisheries is extremely rare or nil (Garcia and Herrera, 2018), furthermore there were no reported seabird interactions or captures by the UoA in the observer data provided by the client from 2016-2020. Therefore, seabirds will not be considered.

6. Cetaceans

As species considered 'out of scope', following SA3.1.5.3 marine mammals shall be considered ETP if listed in the IUCN redlist as vulnerable (VU), endangered (EN) or critically endangered (CE). ANABAC registered 2 interactions with marine mammals during 2016-2020, however, the identification at species level was not undertaken (**Table 7.3..4h**) and, therefore, their status according to the IUCN classification has not been possible. The designation of cetaceans as ETP has been carried out according to the IOTC Resolution 13/04, considered a relevant legislation to comply with SA3.1.5.1.

In the case of marine mammals, it has been estimated that over 172,000 specimens are killed annually by tuna fishing gears in the IOTC area, however, mortality of marine mammals is caused almost exclusively by gillnets and driftnets, which account for over 99.8% of the catches (García and Herrera, 2018).

Ruiz *et al.,* (2018) analysed the bycatch for the European and Seychelles tuna purse seine fishery in the Indian Ocean. Information was collected through observers deployed onboard the fleet and it estimated that 15 cetacean catch events were reported during the whole studied period. Most were reported as baleen whales (*Mysticeti*) without identifying the species and a single specimen was identified as humpback whale (*Megaptera novaeangliae*). It was recorded that all of them were released/escaped alive almost always before the retrieval of the net. Garcia and Herrero (2018) concluded that regardless of the uncertainty of estimates, the contribution of industrial purse seine fisheries to the mortality of marine mammals, is very low, as it represents much less than 1% of the total mortality.**Table 7.3..4h** below gathers the information recorded on board the ANABAC fleet regarding the fate of cetaceans that interacted with its fleet.

Table 7.3.4h: Fate of Cetaceans group species caught by ANABAC vessels in the Indian Ocean 2016-2020 reported by independent observers (source: ANABAC).

Scientific name	Common name	Total		Fate			Annual average	
		weight (t)	n	Alive discarded	Dead discarded	Unknown	weight (t)	n
Mammalia	Unidentified cetacean	NA	2	0	0	2	0	0

IOTC Resolution 13/04 on the conservation of cetaceans prohibits purse seine vessels from intentionally setting a purse seine net around a cetacean in the IOTC area of competence if the animal is sighted prior to the commencement of the set. In addition, in case a cetacean is unintentionally encircled, the master of the vessel shall take all reasonable steps to ensure the safe release of the cetacean, while taking into consideration the safety of the crew. These steps shall include following the best practice guidelines for the safe release and handling of cetaceans developed by the IOTC Scientific Committee. In addition, CPCs shall adopt Fish Aggregating Device designs that reduce the incidence of entanglement, according to Resolution 13/08 or any subsequent revision.

7.3.5 Habitat

The assessed fleet operates in the western region of the Indian Ocean. The fishing areas cover international waters as well as exclusive economic zones (EEZ) of coastal States. Given the migration patterns of tuna, catches in different zones may vary significantly between years for any specific month, but commonly much of ANABAC catches are made in the high seas (**Fig 7.3.5a**). The access to fish in different EEZ is granted through bilateral agreements between the European Union and/or Seychelles and coastal States (e.g., EU sustainable fisheries partnership agreements for EU vessels). These agreements also include prohibitions for fishing in certain areas, generally near to the coast or in the vicinity of submerged reefs, local anchored FADs or oceanographic buoys. In addition, ANABAC can also have agreements in place with the governments of some countries to guarantees access.

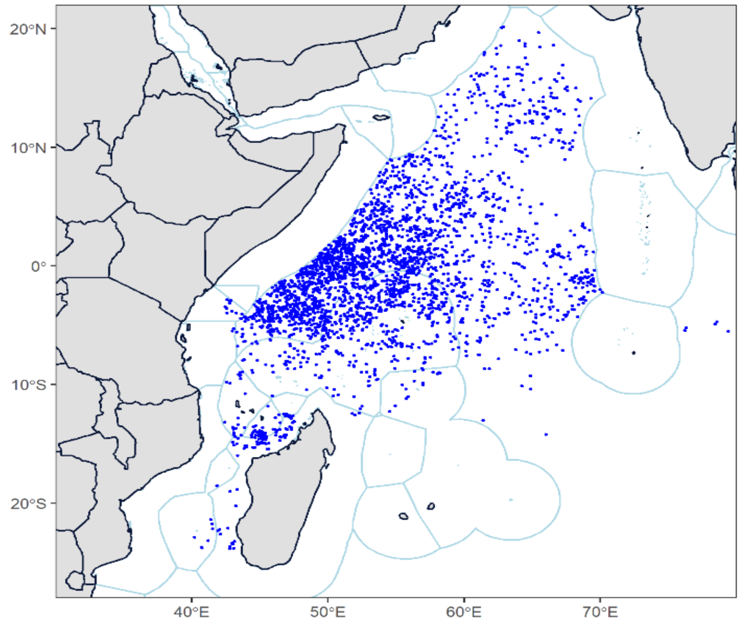

Figure 7.3.5a.- Set locations for the ANABAC UoA fishery for the period 2016-2020 combined. EEZs locations from IOTC (IOTC-2018-TCAC04-DATA05. Available at: https://iotc.org/documents/TCAC04/shp/EEZs).

The different type of fishing methods applied by the tuna purse seine fishery may affect in different manners the habitats within the Indian Ocean. In specific to the physical environment, FOB (Fishing on floating objects) fisheries are known to have the potential to severely damage fragile ecosystems when lost FOBs end up beaching on coral reefs. Drifting Fish Aggregating Devices (dFADS) typically are constituted of a floating structure such as bamboo or metal raft with buoyancy provided by buoys, corks, etc) and a submerged substructure (made of old netting, canvass, ropes, etc.) stretching up to 80 m below the surface (Imzilen *et al.,* 2019) (IOTC Resolution 19/02). In addition, an operational buoy is an instrumented located on a FAD which has the capacity to transmit position and other available information such as eco-sounder estimates.

There is an increasing concern about the use of synthetic material on the construction of FADs. The massive deployment of dFAD generates major worries regarding the creation of marine debris (Amande *et al.,* 2010; Dagorn *et al.,* 2013; Filmalter *et al.,* 2013; Maufroy *et al.,* 2015). Stranding of abandoned dFADs could frequently damage sensitive marine ecosystems such as coral reefs, seagrass beds and potentially, can continue the impairment of these areas for decades after FADs are being either abandoned or lost by fishing vessels (Burt *et al.,* 2020; Imzilen *et al.,* 2021). According to Grande *et al.* (2019) some studies carried out in the Indian Ocean provided estimates of beaching rates from 1% to 45%.

The islands and archipelagos of island nations within the Indian Ocean are characterized by an abundance of coral reefs (**Figure 7.3.5b**). Although fishing operations does not take place closely to reefs, lost or abandoned FADs may impact on these habitats. Vulnerable Marine Ecosystems (VME) habitats include coastal and island coral reef complexes as well as reefs and habitats associated with seamounts. Since the fishery takes place in deep pelagic waters, coral reefs and habitats associated with seamounts should not be affected directly. Deepwater habitats including ridges and knolls, as well as abyssal mud plains are considered minor habitats. However, as mentioned above, FADs use may result in some damage to fragile habitats since there is a possibility that not retrieved FADs could impact on coastal areas.

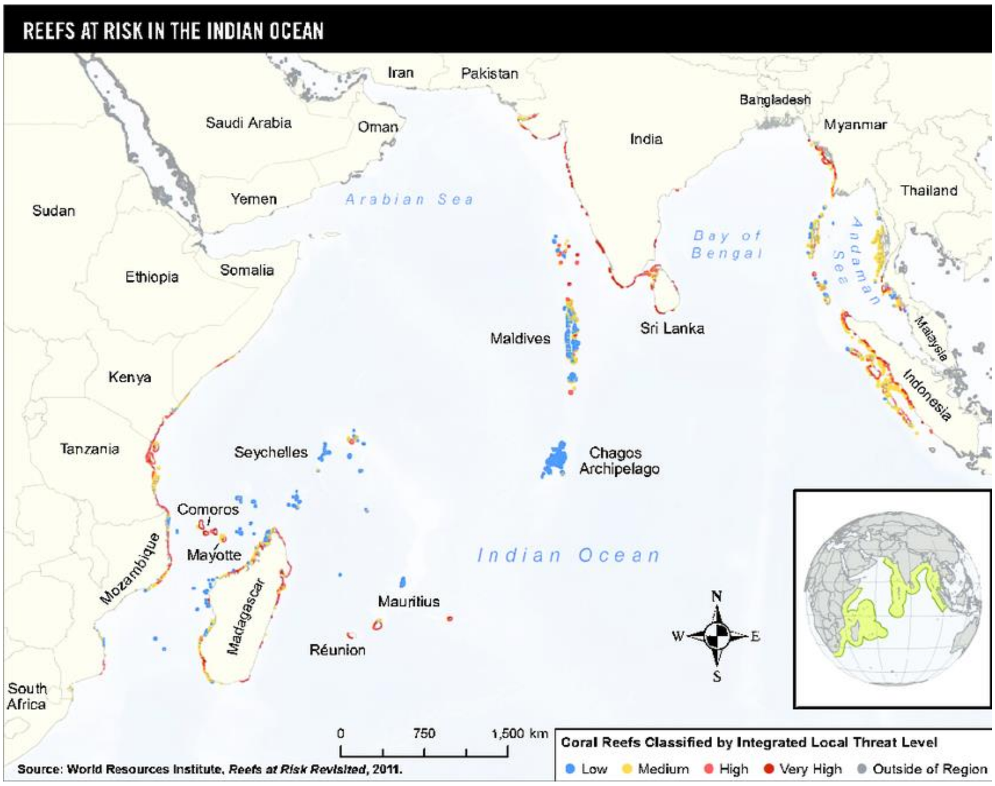

Figure 7.3.5b.- Distribution of coral reefs in the Indian Ocean, with level of local threats indicated. (Source: Burke et al., 2011)

FADs have a strong influence in shaping the spatial dynamics of the purse seine fishery in the Indian Ocean (Davies *et al.,* 2014) and its distribution is highly determined by surface currents and winds. In the northern Indian Ocean, the areas with high risk of beaching change with monsoon areas (Imzilen *et al.,* 2021), particularly the Somali coast when the Somali Current flows westwards in winter (Schott and McCreary, 2001) (Imzilen *et al.,* 2021), whereas during the summer, western Maldives become a hotspot for beaching due to monsoon driven eastwards circulation (Imzilen *et al.,* 2021). Davies *et al.* (2014) noted that FADs can have a short lifetime (less than 6 months) before they may sink or be taken by other vessels, therefore, producing the deployment of new FADs or the relocation of older ones. Thus, this may cause a permanent stage of floating objects drifting on large portions of the northwest Indian Ocean that besides having the potential to damage sensitive habitats could produce ecological disturbances, such as in the behavior of tuna species.

Some studies on FAD-drifting and beaching events have been developed and provide estimates of the likelihood of FADs having interactions with coastal ecosystems such as beaches, coral reefs or mangroves. One research carried out by Maufroy *et al.* (2015) identified the coastal stretches of Somalia, the Seychelles, the Maldives and Sri Lanka as the most likely to suffer beaching events, although data also showed individual events occurring in locations as Kenya, Tanzania and northern Mozambique (**Figure 7.3.5c**). This research estimated that 9.9% of French FADs could end up beaching on the coasts of mainland or island nations in the Indian Ocean. On the other hand, Davies *et al.* (2017) evaluated the Seychelles and a rate of 32.3% beaching likelihood during specific seasons was estimated. Finally, Zudaire *et al.* (2018), in their analysis of the FAD-watch program (focused on the AGAC fleet), recorded beaching rates of 0.8% (corresponding to 98 of 12051 buoys recorded in the EEZ) in 2016 and 0.6% (57 of 9638 buoys recorded in the EEZ) in 2017. In Zudaire *et al.* (2018) beaching events were estimated based on buoys intersecting with the land surface of the Seychelles. Prior to the beaching, the number of FADs intercepted by the Island Conservation Society (ICS) was 8 and 11 in 2016 and 2017, respectively. It is considered that the recorded beaching rate is a true reflection for the Seychelles archipelago regardless of a team in place to prevent beaching episodes (Zudaire *et al*., 2018). However, the beaching rate outside of the Seychelles was not estimated during the same period.

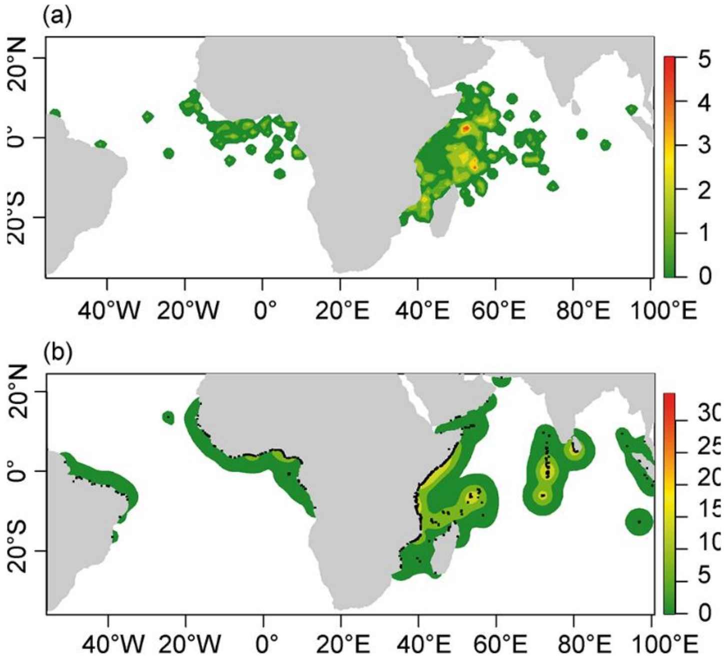

Figure 7.3.5c.- Smoothed densities of dFAD beaching events (b) and their corresponding deployments positions (a). Black dots correspond to individual beaching positions (Source: Maufroy *et al.,* 2015)

To monitor the FAD problematic, scientific observers and VMS provide a valuable source of information. There are observer programs operating in the IOTC tuna purse seine fishery. One of them, is the European Union Data Collection Framework, which is aimed to accomplish a 10% observers' coverage on effort and other, the Regional Observers Scheme, launched by the IOTC through its Resolution 11/04. The latter requires 5% coverage on board tuna purse seine vessels. In addition, under ANABAC administration there is 100% coverage on fishing trips either by human observers or electronic monitoring systems (EMS). Records from both, observers and VMS deliver information on the location of fishing. The purse fishery operates in deep pelagic waters, above in the water column, thus the gear does not get in touch with the sea bottom. Santana *et al.* (2002) showed from two vessels and 32 trips in the Atlantic and Indian Oceans that the maximum depth attained by the net was 163 m and 182 m or 74% and 67% of the draft of each vessel, respectively.

The MSC Fisheries Standard in GSA3.13.3.1 specifies on commonly encountered habitat: "Commonly encountered habitats would likely include those that the target species favours, that the UoA's gear is designed to exploit, and/or that make up a reasonable portion of the UoA's fishing area'. In this regard, pelagic water on high seas would be defined as commonly encounter habitats. There is no evidence that there is any potential for significant adverse interaction with pelagic habitats, therefore it is considered that this fishing gear does not have an impact on commonly encountered habitats. In addition, vulnerable habitats such as coral reefs are not impacted in the setting of the seine, during the fishing operation or by the movements of the vessels. Purse seine nets, due to their size, and value, are rarely, if ever, lost at sea. Discarding of trash or pollutants would be damaging to the habitat, however observer records do not indicate this to be a problem.

Observers also collect all the relevant and specific data on FAD structure and components (e.g., mesh size on the floating and underwater structure, if present, and configuration). Further, through the observers, all FADs are evaluated (those deployed by the fleet and any other one encountered at sea) either when arriving to the FAD or when leaving it at sea (Grande *et al.* 2019). Through its Code of Good Practices, ANABAC has applied a policy regarding the use of biodegradable materials on FADs, thus reducing the risk of littering on the marine and coastal ecosystem. The ANABAC fleet is committed to only deploying NEFADs (non-entangling and biodegradable).

The UoA has operating in the Indian Ocean 8 active vessels serviced by one support vessel. The activities of the supply vessel and the use of FADs are an integral part of the fishing effort exerted by the purse seine fleet. IOTC Resolution 19/02 establishes the maximum number operational buoys followed by any purse seiner at 300 and restricts the annual purchase of instrumented buoys to 500 for each purse seine vessel. Thus, for the UoA fleet a total of 2400 active buoys and maximum 4000 instrumented buoys are available annually. As also required by Resolution 19/02, both Seychelles and the EU-Spain, submitted to the Commission annual Management Plans for the use of FADs in 2020 and 2021, and later were analysed by the Commission Both CPCs have been complying with the limit on number of FADs used and instrumented buoys acquired annually, FAD marking requirements, data reporting and FAD tracking. There are methods of verification in place: FAD logbooks are completed by every ANABAC vessels and sent to the flag State to be reported to the IOTC Secretariat; and the instrumented buoy suppliers send daily data on the number of active buoys per vessels to AZTI. AZTI acts as an independent verifier, compiling this information and reporting it to the fishing companies, ANABAC and the flag States (so they later inform the IOTC Secretariat). AZTI also collects information on the acquired instrumented buoys to verify the implementation of Resolution 19/02 in this matter.

The circumstances regarding drifting Fish Aggregating Devices are considerably complex. Different types of FADs can be deployed, for example conventional FADs (i.e., entangling and non-biodegradable), NEFADs (i.e., non-entangling and non-biodegradable) and BIOFADs (i.e., non-entangling and biodegradable). The ANABAC fleet has committed to only deploying NEFADs or low entanglement risk FADs and evidence of compliance with this CGP initiative. Furthermore, ANABAC vessels are included in the ISSF ProActive Vessel Register (PVR). Compliance with sustainable-fishing practices as defined by ISSF is audited on an annual basis. According to the latest audits performed in 2021, all ANABAC vessels are following ISSF's best practices on non-entangling FADs and FAD management plans. Moreover, several projects were carried out studying biodegradable materials with the aim of replacing parts of the FADs, but further investigations are needed. ANABAC actively collaborates with different initiatives and projects aimed at transitioning to the use of biodegradable FADs, and the UoA fleet is currently testing some biodegradable materials. In this regard Restrepo *et al.* (2019) and Moreno *et al.* (2019) recommend that:

- Currently, except for the satellite buoy, biodegradable FADs should be made of only natural fibres/materials that are sustainably harvested, until other materials such as synthetic bio-materials become available and are proven to be non-toxic for the marine environment.
- Fleets should avoid the use of plastics to build FADs, except for the buoy used to track them.
- Fleets should strive to reduce the size and weight of the FADs they build as the impact is proportional to the size of the FAD (especially the tail).
- Fleets should avoid FAD deployment areas that imply high risk of stranding.
- Fleets should implement policies to reduce and control FAD loss and abandonment to the extent possible.

ANABAC has been working in research aimed at designing and testing biodegradable FADs in the Indian Ocean. The association has supported and participated in a large-scale pilot project funded by the EU (BIOFAD) with the target of deploying 1000 biodegradable and traditional FADs. The implementation was expected from August 2017 to December 2019 (https://www.azti.es/proyectos/biofad/) and the results of the project have been summarized by Zudaire *et al.,* 2019 and 2020. Zudaire *et al.* (2020) discusses in detail al the related FAD results in several areas such as environment, material performance and socio economics. Since 2019, ANABAC under the umbrella of SIOTI and AGAC, started working in the "FAD Watch programme". This a collaborative initiative to minimize the impact of FADs in coastal ecosystems of Seychelles. The FAD-Watch project was the first multi-sectorial initiative developed to prevent and mitigate FAD beaching across different islands in Seychelles. The signature of the FADWATCH MOU for year 2 was signed on May 2021. This agreement has been signed by SIOTI, OPAGAC, ICS, IDC AND SFA. The proposed activities include the following:

- Avoidance of FAD beaching events.
- Removal of FADs from reefs and beaches.
- Collection of FADs.
- Proper disposal and/or recycling of FAD materials and satellite buoys on Mahé.

Continuous data collection describing the types of FADs and the impact caused.

A summary of the most relevant measures in place at IOTC level aimed to improve FAD management and use are as follows:

- Resolution 15/09 establishes an ad hoc working group on FADs (WGFAD) with a mandate to consider reducing the ecological impacts of FADs through improved design, such as non-entangling FADs and biodegradable material. The WGFAD has the mandate from the Commission to develop a new marking scheme and to issue recommendations aimed to develop a FAD tracking and recovery policy. This policy shall define FAD tracking, reporting of lost FADs, arrangements to alert coastal States of derelict/lost FADs at risk of beaching in near real-time, how and who recovers the FADs, how the recovery costs are collected and shared.

- Res 19/02 entered into force in January 2020 and supersede Res 18/08. As previous Resolutions on FADs (Res13/08, 15/08, 17/08 and 18/08), this CMM establishes procedures on a fish aggregating device (FAD) management plan, including more detailed specifications of catch reporting from FAD sets, and the development of improved FAD designs to reduce the incidence of entanglement of non-target species. This CMM aims to: (i) reduce juvenile bigeye tuna and yellowfin tuna mortalities from fishing effort on FADs, (ii) improving FAD design to reduce the incidence of entanglement of marine turtles, sharks and other species, including the use of biodegradable materials. Some of the measures included in this CMM are listed below:

- The use of instrumented buoy is mandatory on all drifting FADs and prohibits the use of any other buoys, such as radio buoys. The maximum number of operational buoys followed by any purse seine vessel is set at 300 at any one time. The number of instrumented buoys that may be acquired annually for each purse seine vessel is set at no more than 500.No purse seine vessel shall have more than 500 instrumented buoys (buoy in stock and operational buoy) at any time.
- All purse seine vessel, supply or support vessel shall declare to its respective CPC, the number of instrumented buoys onboard, including each unique identifier of the instrumented buoy before and after each fishing trip.
- Reactivation of an instrumented buoy shall only be possible once it has been brought back to port, either by the vessel tracking the buoy/ associated supply or support vessel or by another vessel and has been authorized by the CPC.
- CPCs shall require vessels flying their flag and fishing on DFADs to annually submit the number of operational buoys followed by vessel, lost and transferred (total number of DFADs tagged at sea, by deploying an instrumented buoy on a log or another vessel DFAD already in the water) by 1° by 1° grid area and month strata and DFAD type under the confidentiality rules set by Resolution 12/02 (or any subsequent superseding Resolution).
- All CPCs shall ensure that all fishing vessels as referred to in paragraph 2 shall record fishing activities in association with FADs using the specific data elements found in Annex III (DFAD) and Annex IV (AFAD) in the section of the “FAD-logbook”
- CPCs having vessels flying their flag and fishing on FADs shall submit, to the Commission, on an annual basis, Management Plans for the use of FADs.
- CPCs shall submit to the Commission, 60 days before the Annual Meeting, a report on the progress of the management plans of FADs,
- To reduce the entanglement of sharks, marine turtles or any other species, CPCs shall require their flagged vessels to use non-entangling designs and materials in the construction of FADs
- To reduce the amount of synthetic marine debris, the use of natural or biodegradable materials in FAD construction should be promoted. CPCs shall encourage their flag vessels to use biodegradable FADs in accordance with the guidelines at Annex V with a view to transitioning to the use of biodegradable FADs, with the exception of materials used for the instrumented buoys, by their flag vessel from 1 January 2022. CPCs shall, from 1 January 2022, encourage their flag vessels to remove from the water, retain onboard and only dispose of in port, all traditional FADs encountered (e.g. those made of entangling materials or designs).
- CPCs shall ensure that the instrumented buoy attached to the DFAD contain a physical, unique reference number marking (ID provided by the manufacturer of the instrumented buoy) and the vessel unique IOTC registration number clearly visible. A new marking scheme shall be developed by the adhoc FAD working group.
- In order to support the monitoring of compliance with the limitation in the number of FADs, while protecting business confidential data, the instrumented buoy supplier company or the CPCs shall, starting 1 January 2020, report, or require their vessels to report, daily information on all active FADs to the Secretariat. Such information shall contain, date, instrumented buoy ID, assigned vessel and daily position, which shall be compiled at monthly intervals, to be submitted with a time delay of at least 60 days, but no longer than 90 days.
- The Commission shall establish a DFAD tracking and recovery policy at its annual session in 2021, on the basis of recommendations from the ad-hoc FAD working group. The policy shall define DFAD tracking, reporting of lost DFADs, arrangements to alert coastal States of derelict/lost DFADs at risk of beaching in near real-time, how and who recovers the DFADs, how the recovery costs are collected and shared. o The IOTC Secretariat shall submit a report, on an annual basis, to the IOTC Compliance Committee on the level of compliance of each CPC with operational buoy limits, annual limits of instrumented buoys purchased.

7.3.6 Ecosystem

According to MSC, “the Ecosystem component addresses system-wide issues, primarily impacted indirectly by the fishery, including ecosystem structure, trophic relationships and biodiversity” (GSA3.16). In addition, MSC defines “key” ecosystem elements as “the features of an ecosystem considerer as being most crucial to giving the ecosystem its characteristic nature and dynamics, are considered relative to the scale and intensity of the UoA” (SA3.16.3). Thus, the Ecosystem component considers the broad ecological community and ecosystem in which the fishery operates (GSA3.16).

The Indian Ocean dynamics and circulation patterns differ significantly from those found in the Pacific and Atlantic Oceans, due to unlike these, its basin is limited to the north by the Asian continent. Drivers of productivity in the western Indian Ocean are linked to its unique association with land mass. This feature produces a strong seasonal variability in wind forces (Kaplan *et al.,* 2014) generating large seasonal variations in ocean currents (Schott *et al.,* 2009) thus creating predictable patterns of circulation (**Figures 7.3.6a** and **7.3.6b**) and leading primary productivity. Hence, productivity in the Indian Ocean is not driven by coastal upwelling and there is no climatological equatorial upwelling in the eastern margin such as it occurs with the other two major oceans (Schott *et al.,* 2009; Kaplan *et al.,* 2014). In this case, the summer monsoon wind produces localized upwellings principally along the Somali and Omani coasts during boreal summer, whereas during boreal winter and spring, monsoon winds reverse driving the reversal of ocean circulation (Schott *et al.* 2009; Kaplan et al. 2014). These oscillations affect several ecological processes in marine ecosystems and thus, play an essential role controlling the distribution and abundance of top predators such as tuna (Lan *et al.,* 2019). Climate change the variation of oceanographic conditions can impact the state of ecosystem and all its components, including its productivity and the upper trophic levels of the marine food web (Juan Jorda *et al.* 2019). The effect of large scale climatic and oceanographic physical forcing, including climate change, on ecosystem productivity and the dynamics of tunas have been relatively well investigated and some aspects are well understood. Yet it remains to connect this pool of knowledge with operational fisheries management (Juan-Jorda, 2021). The Indian Ocean is climatologically active on a scale far greater than possible for the ANABAC purse seine fishery to directly or indirectly affect, there are however areas that overlap the fishing grounds that play a key role in tropical tuna fisheries, such as the Northern Mozambique Channel (Chassot *et al.*, 2018).

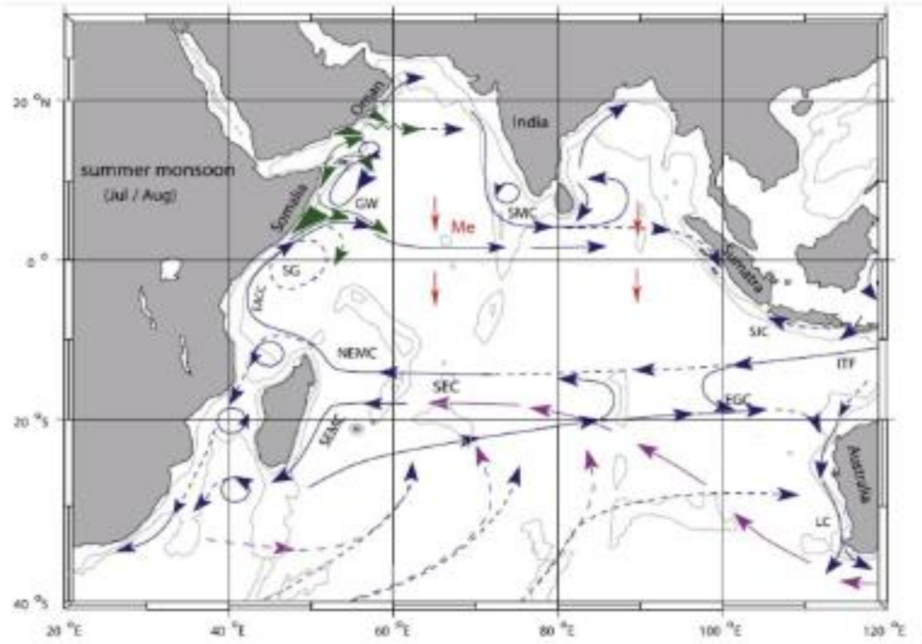

Figure 7.3.6a. Representation of identified current branches during summer. South Equatorial Current (SEC), South Equatorial Counter-current (SECC), Northeast and Southeast Madagascar Current (NEMC and SEMC), East African Coastal Current (EACC), Somali Current (SC), Southern Gyre (SG) and Great Whirl (GW) and associated upwelling wedges (green shades), Southwest and Northeast Monsoon Currents (SMC and NMC), South Java Current (SJC), East Gyral Current (EGC), and Leeuwin Current (LC). The subsurface return flow of the supergyre is shown in magenta. Depth contours shown are for 1000 m and 3000 m (grey). Updated representations are from SMC01; red vectors (Me) show directions of meridional Ekman transports. ITF indicates Indonesian Throughflow (Source: AGAC, 2021)

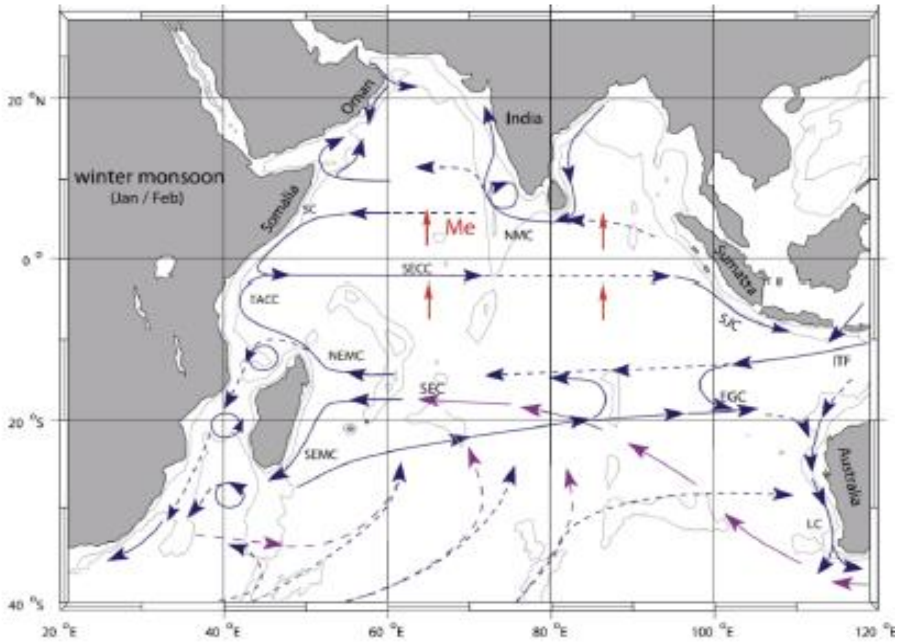

Figure 7.3.6b.- As in figure 7.3.2.5a but during winter (moonson)

Tropical tunas are highly migratory species and develop large movements across the ocean searching for preys to address their energetic needs and fuel reproduction. Chassot *et al.* (2018) found that the Northern Mozambique Channel is a major spawning area for skipjack tuna due to warm waters and a strong mesoscale activity that produces an enrichment of surface waters and efficient energy transfers thanks to short food chains. Kaplan *et al.* (2014) noted that catches on FAD indicate a concentration of tropical tuna juveniles off the west coast of Africa, with higher densities where seasonal up welling occurs off the Somali coast, in addition, that free swimming school catches suggest that the Mozambique Channel may be a secondary place of juveniles, although catches are much lower than those for FADs.

There is lots of concern regarding the impact of tuna fishing on FADs and it has been noted that this have had several consequences, also from an ecological perspective. As noted by Maufroy *et al.* (2016), there is a growing concern that the constant use of FADs has modified the dynamic and structure of tuna schools, their feeding ecology and habitats. There is a hypothesis that drifting FADs may act as ecological traps by maintaining tuna populations in suboptimal areas and/or reducing school size, although there is still limited evidence available (Maufroy *et al*. 2016). Davies *et al.* (2014) has also mentioned this hypothesis and stated that large numbers of floating objects could potentially modify the movement patterns of tuna and carry associated schools in ecologically inadequate areas and therefore, affect their growth rate or increase the natural mortality and/or predation. The use of FADs has been already associated with negative impacts on the ecosystem, such as the catch of juvenile tunas (yellowfin and bigeye tuna) and bycatch of vulnerable non-target species, which is considered a direct driver of change and loss of global biodiversity (Grande *et al.,* 2019a; Grande *et al.,* 2019b). There has been considerable research (e.g., experimental tagging and studies using fisher's echosounder buoy data) examining the effects of FADs (mostly presence of dFADs) on the behaviour, movement patterns of tunas and their consequences on the biology of the species (e.g., growth). Juan- Jorda (2021) states that more studies are required to understand better the effects of increasing number of dFADs and FAD densities on the behaviour, movement patterns of tunas. Comparatively, the ecological impact of FAD on the genetic, biology and ecology of the non-targeted tunas (e.g., sharks) remains poorly known and yet it is an expanding field of research.

The report from Juan-Jorda (2021) also highlights that there have been an increasing number of experimental studies investigating the effects of drifting FADs on pelagic species behaviour and movement patterns in the Pacific and Indian Oceans. There remains limited understanding on (i) the influence of dFADs on the residency of tunas and other non-tuna species, and (ii) how the increased number of dFADs may affect the school sizes of tunas and other species. Accordingly, there remain conflicting interpretations and results on the behavioural impacts of dFADs (and the different densities of dFADs) on tunas and tuna-related species and on the potential consequences on their biology. This lack of understanding makes it difficult to infer all the main consequences of the impact of dFAD on tuna and non-tuna species such as sharks, for which research is even more limited.The study considers 3 potential ecosystem impacts (**Table 7.3.6**):

- The ecological impacts of fishery removals of top predators on the structure and function of the marine ecosystems.
- The effect of natural environmental variability (including climate change) on ecosystem productivity and tuna dynamics.
- The ecological impacts of FAD use on the genetic, biology and ecology of species (tunas and non-tunas).

Table 7.3.6.- A summary of information and research on ecosystem impacts (source: Juan-Jorda 2021).

<table>
<tr><th>Type of ecosystem impacts relevant to tropical purse seine fisheries</th><th>Ecosystem impacts with relevant information and research in the Indian Ocean</th><th>Ecosystem impacts with relevant information and research in other equatorial oceans</th></tr>
<tr><td>The ecological impacts of fishery removals of top predators via the alteration of trophic relationships on the structure and function of the marine ecosystem</td><td>Not investigated in detail and poorly understood</td><td>EPO & WPO: Relatively well investigated and understood.
Atlantic: Not investigated in detail and poorly understood</td></tr>
<tr><td>The ecological impacts of fishery removals of species (either top predators or other species in the foodweb) via the truncation of size composition on the structure and function of marine ecosystem.</td><td>Not investigated in detail and poorly understood</td><td>North Pacific Ocean: Some size-based ecosystem models have been developed and investigated in some detail.
EPO, WPO & Atlantic Ocean: Not investigated in detail and poorly understood in the</td></tr>
<tr><td>The ecological impacts of fishery removals of species (either top predators or other species in the foodweb) via the alteration of diversity on the structure and function of marine ecosystem.</td><td>Not investigated in detail and poorly understood</td><td>EPO & WPO: Some aspects investigated.
Atlantic: Not investigated in detail and poorly understood</td></tr>
<tr><td>The effect of large scale climatic and oceanographic physical forcing (natural environmental variability) on ecosystem productivity and tuna dynamics</td><td>Relatively well investigated and some aspects understood</td><td>WPO & EPO: Relatively well investigated and understood.</td></tr>
<tr><td>The effects of climate change on ecosystem productivity and tuna dynamics</td><td>Relatively well investigated and some aspects understood</td><td>WPO & EPO: Relatively well investigated and understood</td></tr>
<tr><td>The ecological impact of FAD use via selective fishing on the genetic, biology and ecology of tunas (target catch) - FADs as ecological traps</td><td colspan="2">Some elements are well investigated and relatively well understood.

There has been considerable research (experimental tagging studies, and studies using fisher's echosounder buoy data) examining the effects of FADs (mostly presence of FADs) on the behaviour, movement patterns of tunas and their consequences on the biology of the species (e.g. growth). More studies are required to understand better the effects of increasing number of FADs and FAD densities on the behaviour, movement patterns of tunas.</td></tr>
<tr><td>The ecological impact of FAD use via selective fishing on the genetic, biology and ecology of non-tunas (non target catch) - FADs as ecological traps</td><td colspan="2">Research (experimental tagging studies, and studies using fisher's echosounder buoy data) examining the effects of FADs (mostly presence of FADs) on the behaviour, movement patterns of non-tuna species, especially ETP species such as sharks, and their consequences on the biology of the species (e.g. growth) are relatively scarce. More studies are required to understand better the effects of increasing number of FADs and FAD densities on the behaviour, movement patterns of non-tuna species.</td></tr>
<tr><td>The ecological impact of fishing via the introduction of microplastic pollution into the food web</td><td colspan="2">We did not examine the degree of research investigating the ecological impact of microplastics.</td></tr>
</table>

Even though the reason why tunas aggregate beathing floating objects is not clearly understood, there are two hypotheses mentioned in Davies *at al*. (2014) that could unveil this reason. On one hand, the "meeting point hypotheses" suggests the fish associate with floating objects to facilitate the schooling behaviour and benefit from social interactions whereas the "indicator log hypotheses" establishes that natural floating objects are indicators of productive habitats because they originate from nutrient-rich areas (e.g., river mouths, mangrove swamps) that subsequently drift with these patches of productivity into the ocean. Although vulnerable species such as sharks (mainly *Carcharhinus falciformis* and *Carcharhinus longimanus*), rays and billfishes are usually taken as bycatch, the majority of bycatch is made up of small tunas and also other bony fishes which are known to be fast growing and with a high fecundity (Davies *et al.,* 2014; Kaplan *et al.,* 2014). In contrast, according to Davies *et al.* (2014) fishing on free swimming school has been noted to be comparatively more selective, presenting bycatch 2.8-6.7 times lower than FOB sets.

Tunas are opportunistic predators that feed on roughly 45 prey families and the proportion of each, is linked to biological parameters such as vertical behaviour, ontogeny and reproduction, as well as seasonal migration across regions described by different oceanographic conditions and prey availability (Chassot *et al.,* 2018). Olson *et al.* (2016) summarized the existing knowledge about the trophic ecology of tuna species globally including in the western Indian Ocean. Tropical tunas mainly prey on fishes, crustacean and cephalopods, and their preferences depend not only on the predator species, but also on the season, bathymetry and distance from the coast (Olson *et al.,* 2016). The research highlights the key role played by tunas as both predator and prey species in the tropical western Indian Ocean ecosystem. Despite specific differences among species (such as vertical behaviour), tropical tunas often congregate on mixed chasing schools in the near surface layer and in situation, they present a similar feeding behaviour when prey diversity is low (Chassot *et al.,* 2018). Consequently, competition for food in this upper ocean layer becomes strong between skipjack and yellowfin juveniles on FADs, as well as between adult yellowfin and bigeye within free swimming schools or also, when these species are attracted by a prey bloom (Chassot *et al.,* 2018).

Biodiversity in terms of alpha (number of species) and beta diversity (change in species composition) and evenness (relative abundance of species) have been subject of investigation in the bycatch communities of the pelagic ecosystem of the western Indian Ocean by Lezama-Ochoa (2015). I was found that a higher number of species appeared in by-catch communities in FAD sets than in FSC sets. Species richness can be used as a tool to provide an inventory and baseline of the community composition that can be compared with previous and future studies to investigate changes in catch composition. An assessment of bycatch taxonomic structure changes was conducted by Baez *et al.* (2019) using observer data on board Spanish purse seiners in the Indian Ocean during 2003-2018. There were two distinct periods identified, 'pre- '(2004-2008) and 'post-' (2015-2018) increase in proportion of sets made on FADs. Between the two periods, the fish species recorded by observers changed such that the authors noted an increase in the number of species, the IOTC WPEB noted rather that there was an increase in the ratio of species within each genera or family groups (see also IOTC–2019–WPEB15–R[E], pg. 30). Baez *et al.* (2019) stated that there have been changes in the perceived structure of the pelagic ecosystem of the Indian Ocean in recent years but did not determine if the change was attributable to factors such as changes in fishing technique, overfishing, or global warming, nor did they investigate changes in the mean trophic level of the catches. In addition, the effect of mass predator release could lead to an increase in mid-trophic level species (IOTC-2009-WPEB-R[E]) but this has not been investigated in detail for the Indian Ocean purse seine fishery.

The impact of tuna fisheries on the food web structure and function have been poorly examined in the Indian Ocean which has led to a lack of documented large-scale changes in its food web structure. Juan-Jorda (2021) in a recent study considers that the ecological impacts caused by fishery removals of top predators through the alteration of trophic relationships on the structure and function of the marine ecosystem have been relatively well investigated and understood in the east and western Pacific Oceans, while the opposite occurs in the Indian Ocean. Further, it is detailed that the ecological impacts of fishery removals of species (either top predators or other species along the food web) via the truncation of size composition or via the alteration of diversity on the structure and function of marine ecosystem have not been investigated in detail and remain poorly understood in all the oceans, with few exceptions. Removing large amounts of biomass and reducing the abundance of several different species throughout the food web can potentially modify a considerable range of biological interactions, such as predatory-prey interactions and cascading effects in the food web (Juan-Jorda, 2019).

Trophic cascades are less likely in an open ocean pelagic ecosystem than in closed water bodies or demersal-linked systems (Perishing *et al.,* 2015). Perishing *et al*. 2015 suggested that, although not impossible, the low likelihood of trophic cascades occurring in open-ocean pelagic ecosystems is linked to a number of factors: 1) low ecosystem residency time due to constant flux of water through the system; (2) 'runaway consumption', where one trophic level reduces the abundance of its prey to very low levels; (3) advection or immigration to replace locally depleted lower trophic level organisms and, (4) generally high biodiversity at lower trophic levels.

7.3.7 Principle 2 Performance Indicator scores and rationales

PI 2.1.1 – Primary species outcome

PI 2.1.1	The UoA aims to maintain primary species above the point where recruitment would be impaired (PRI) and does not hinder recovery of primary species if they are below the PRI

Scoring Issue		SG 60	SG 80	SG 100
a	Main primary species stock status			
	Guide post	Main primary species are **likely** to be above the PRI. OR If the species is below the PRI, the UoA has measures in place that are **expected** to ensure that the UoA does not hinder recovery and rebuilding.	Main primary species are **highly likely** to be above the PRI. OR If the species is below the PRI, there is either **evidence of recovery** or a demonstrably effective strategy in place **between all MSC UoAs which categorise this species as main**, to ensure that they collectively do not hinder recovery and rebuilding.	There is a **high degree of certainty** that main primary species are above the PRI **and are** fluctuating around a level consistent with MSY.
	Met?	Yellowfin - Yes Bigeye - Yes Albacore - Yes	Yellowfin - Yes Bigeye - Yes Albacore - Yes	Yellowfin – No Bigeye - No Albacore - No
Rationale				

Yellowfin tuna

The most recent stock assessment of yellowfin tuna was carried out in 2021. The model used is based on the model developed in 2018 with revisions noted during the Working Party on Tropical Tunas (WPTT) in 2018, 2019 and 2020. The final assessment model incorporates four types of data: catch, size frequency, tagging and CPUE indices, as well as includes alternative assumptions about spatial structure, longline CPUE catchability, weighting of the tagging dataset, steepness values, natural mortality, and growth parameters (IOTC, 2021).

Limit reference point for yellowfin tuna according to Resolution 15/10 is Blim = $0.4B_{MSY}$.The ratio SB_{2020}/SB_0 was estimated at 0.31(0.24-0.38) and the SB_{2020}/SB_{MSY} at 0.87 (0.63-1.10) with 80%CI (IOTC, 2021). It is noted that overall status estimates do not differ substantially from the previous assessment. SB_{2017}/SB_0 was estimated before at 0.30 (0.27-0.33) and SB_{2017}/SB_{MSY} = 0.83 (0.74-0.97) (IOTC, 2020). In addition, in 2016 it was estimated SB_{2015}/SB_0 = 0.29 and SB_{2015}/SB_{MSY} =0.89 (0.79-0.99). Therefore, yellowfin tuna is highly likely to be above the PRI and **SG60 and SG80 are met.**

The increase in catches during recent years increased the pressure on the stock, resulting in fishing mortality exceeding the MSY-related levels (IOTC, 2021). Taking into consideration the stock has been fished at or above MSY levels during the last years **SG100 is not met.**

Bigeye tuna

A new stock assessment was carried out in 2019 based on the SS3 model formulation using a grid of 18 model configurations designed to capture the uncertainty on stock recruitment relationship, the influence of tagging information and selectivity of longline fleets (IOTC, 2021). The spawning biomass in 2018 was estimated to be above 31% of the unfished levels in 2018 and 122% of the level that can support the MSY (IOTC, 2021). Despite uncertainty, the assessment has indicated that SB_{2018} is above SB_{MSY} with 65.4% probability (SB_{2018}/SB_{MSY}= 1.22 (0.82-1.81) and 80%CI), thus, according to the default reference points PRI=20%Bo=1/$2B_{MSY}$ (GSA2.2.3) it is highly likely than the bigeye tuna stock is above the PRI, hence **SG60 and SG80 are both met**.

Recent increase in catch from the purse seine fleet have increased the pressure on the stock leading to an increase on the catch small size individuals despite the declines in longline effort. It has to be noted that the stock status determination changed qualitatively in 2019 to not overfished but subject to overfishing (F_{2018}/FM_{SY} =1.20 (070-2.05, 80%CI). Furthermore, it is estimated that if catches remain at the same 2018 levels, there is a risk of breaching MSY reference points with 60.8% probability in 2028, whereas maintaining catches of at least 10% below 2018 levels will likely reduce the probabilities of breaching these reference levels to 49.1% by the same year (IOTC, 2021). Therefore, it cannot be said that there is a high degree of certainty that the species is fluctuating around a level consistent with the MSY, thus **SG100 is not met**.

Albacore
The last stock assessment carried out for the albacore was undertaken in 2019 based on the model previously used in 2016 and incorporating a series of revisions noted during the Working Party on Temperate Tunas (WPTmT) preparatory meeting in 2019. The assessment estimated that SB_{2017}/SB_{MSY} (95%CI) is 1.281 (0.574-2.071). Projections indicate that under the current catch the biomass will continue to decline since the recent recruitment levels are estimated to be low (IOTC, 2021).

Maintaining or increasing fishing effort in the core albacore fishing grounds is likely to result in a decline in biomass and productivity. However, based on the results obtained from the IOTC scientific committee it can be estimated that the species is highly likely to be above the PRI, thus **SG60 and SG80 are met** but due to the high uncertainty on catch it cannot be said that there is a high degree of certainty of the species being above the PRI nor fluctuating around a level consistent with the MSY. **SG100 is not met.**

b	Minor primary species stock status			
	Guide post			Minor primary species are highly likely to be above the PRI. OR If below the PRI, there is evidence that the UoA does not hinder the recovery and rebuilding of minor primary species.
	Met?			Striped Marlin – No All other minor spp. (6)-Yes
Rationale				

Kawakawa
There is 50% of probability that the kawakawa is not facing overfishing and is not overfished (IOTC, 2021). Based on an assessment carried out in 2020 through a data-limited technique it has been estimated that F is close to the MSY related level (F/F_{MSY}=0.98) and the biomass above B_{MSY} (B/B_{MSY} = 1.13) (IOTC, 2021). Based on the evidence, it is highly likely that the kawakawa stock is above the PRI, hence **SG100 is met.**

Black Marlin
Relative reference points estimations indicate that F/F_{MSY}=0.53(0.22-1.05) and B/B_{MSY}=1.98 (1.42-2.57). In addition, B_{2019}/B_0 = 0.73 (above $0.2B_0$ threshold with 95%CI). Even though the stock assessment is subject to a high degree of uncertainty (IOTC, 2021), overall F has been estimated below F_{MSY} and the catch proportion of the species made by the UoA is almost negligible (0,01 % of total catch of the UoA catch and roughly 1% of capture made by Industrial purse seines in the Indian Ocean, according to IOTC database). Therefore, **SG100 is met.**

Blue Marlin
The stock status is based on the 2019 assessment conducted using a Bayesian State-Space surplus Production model Jabba. Results suggest 87% probability that in 2017 the stock is overfished and subject to overfishing (IOTC, 2021). According to this assessment F_{2017}/F_{MSY} (80%CI) = 1.47 (0.96-2.35), B_{2017}/B_{MSY} (80%CI) = 0.82(0.56-1.15) and B_{2017}/Bo (80%CI) = 0.41(0.28-0.57). In addition, total annual catches since 2014 have remained lower than the estimated MSY (9,984 t) and the proportion of this annual catch by purse seiners in the Indian Ocean during 2016-2020 have represented less than 2.4% of total capture (IOTC, 2021). Also considering PRI=$0.2B_o$=$1/2B_{MSY}$, it is highly likely that the species is above the PRI, thus, **SG100 is met**.

Striped Marlin
A stock assessment was conducted in 2021 based on two different models: a Bayesian state-space production model (JABBA) and SS3. It was found that results using both models were consistent with regards to stock status and confirmed results previously obtained from 2012, 2013, 2015, 2017 and 2018 (IOTC, 2021), which indicated that the stock is overfished and facing overfishing. F_{2019}/F_{MSY} were estimated with JABBA and SS3 at 2.04(1.35-2.03) and

3.93(2.30-5.31) respectively. Furthermore, reference values B_{2019}/B_{MSY} = 0.32 (0.22-0.51) and B_{2019}/B_0 = 0.06(0.05-0.08) through JABBA. Thus, in this case PRI = $0.2B_0$=1/2BMSY is not accomplished, therefore it is considered that it is not highly likely that striped marlin stock is above the PRI, and **SG100 is not met.**

Swordfish

A stock assessment was undertaken in 2020 using stock synthesis with fisheries data up to 2018. Results indicated that MSY-based reference points were not exceeded for the population as a whole and two alternative models (ASPIC and JABBA) indicated as well that the stock was above a biomass level that would produce MSY. Thus, it was determined that the stock is not overfished and not subject to overfishing (IOTC, 2021). It was estimated that fishing mortality was below F_{MSY}: F_{2018}/F_{MSY} (80%CI)=0.60(0.40-0.83). Despite a recent increase in total recorded catches, the current fishing mortality is not expected to reduce the population to an overfished state over the next decade (IOTC, 2021). Furthermore, SB_{2018}/SB_{MSY} (80%CI)=1.75(1.28-2.35). It is highly likely that the stock is above the PRI thus, **SG100 is met.**

Indo-Pacific Sailfish

The stock status is based on the results of the 2019 assessment which was carried out using C-MSY model, with similar results obtained from a Stock Reduction Analysis (SRA). Both models relay only on catch data and the catch series are highly uncertain, in addition, there is increasing concern on catch levels becoming too high (IOTC, 2021). The stock status could not be assessed in 2021, and it has been determined to be uncertain.

According to IOTC (2021) there is 60% probability that the stock is not overfished but subject to overfishing. F_{2017}/F_{MSY} (80%CI)=1.22(1-2.22), B_{2017}/B_{MSY} (80%CI)=1.14(0.63-1.39) and B_{2017}/Bo (80%CI)=0.57(0.31-070). The catches from 2016-2020 by the UoA have been negligible as well as the proportion of capture on board industrial purse seiners on the Indian Ocean. On the weight of evidence and the given uncertainties, the UoA does not hinder the recovery and rebuilding of this species, thus **SG100 is met.**

Blue shark

A new stock assessment was conducted in 2021. All models suggested similar results indicating the stock is currently not overfished nor subject to overfishing, but trajectories in the Kobe plot show a trend towards the overfished and subject to overfishing area (Fig 7.3.2.2h). Uncertainty in data inputs and model configuration were explored through sensitivity analysis (IOTC, 2021). It is highly likely that blue shark is above the PRI; F_{2019}/F_{MSY}(80%CI)=0.64(0.53-0.75), SB_{2019}/SB_{MSY}(80%CI) = 1.39(1.27-1.49), moreover SB_{2019}/SBo (80%CI)=0.46(0.42-0.49).

Blue shark was estimated as not being susceptible thus not vulnerable to purse seine gear through an ecological risk assessment conducted by the Working Party on Ecosystem and Bycatch (WPEB) and the scientific committee in 2018 (IOTC, 2021).**SG100 is met.**

Table 7.3.7a Scoring calculation for each scoring element:

Scoring elements	Main/Minor	SIa (60, 80, 100)	SIb (100 only)	Element score	PI score
Yellowfin tuna	Main	80	NA	80	≥80
Bigeye tuna	Main	80	NA	80	
Albacore tuna	Main	80	NA	80	
Minor primary spp. (n=7)	Minor	NA	≥80	≥80	

References

IOTC (2021); IOTC (2020)

g range and information gap indicator added at Announcement Comment Draft Report stage

Draft scoring range	**≥80**
Information gap indicator	Ensure that client will gather catch data from the new 3 vessels, as well as ensuring that this information will be delivered to the CAB in case certification is achieved.

	Catch composition and relative contribution to capture for each vessels in the UoA will be reviewed based on this new data.

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

Overall Performance Indicator score	
Condition number (if relevant)	

PI 2.1.2 – Primary species management strategy

PI 2.1.2		There is a strategy in place that is designed to maintain or to not hinder rebuilding of primary species, and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place			
	Guide post	There are **measures** in place for the UoA, if necessary, that are expected to maintain or to not hinder rebuilding of the main primary species at/to levels which are likely to be above the PRI.	There is a **partial strategy** in place for the UoA, if necessary, that is expected to maintain or to not hinder rebuilding of the main primary species at/to levels which are highly likely to be above the PRI.	There is a **strategy** in place for the UoA for managing main and minor primary species.
	Met?	All main primary species - Yes	All main primary species - Yes	All primary species - No
Rationale				

As mentioned in section 7.3.2.1 for the purpose of this assessment yellowfin tuna, bigeye tuna and albacore are considered main primary species.

According to table SA8 in SA3: General requirements for Principle 2 **measures** are defined as "actions or tools in place that either explicitly manage impacts on the component or indirectly contribute to management of the component under assessment having been designed to manage impact elsewhere".

Currently active measures in place for main primary species are as follows:

- Resolution 21/01 On an interim plan for rebuilding the Indian Ocean yellowfin tuna stock in the IOTC area of competence
- Resolution 21/02 On establishing a programme for transhipment by large-scale fishing vessels
- Resolution 19/02 Procedures on a Fish Aggregating Devices (FADs) management plan
- Resolution 19/05 On a Ban on discards of bigeye tuna, skipjack tuna, yellowfin tuna and non-targeted species caught by purse seine vessels in the IOTC area of competence
- Resolution 16/07 On the use of artificial lights to attract fish
- Resolution 16/11 On port state measures to prevent, deter and eliminate illegal, unreported and unregulated fishing
- Resolution 15/01 On the recording of catch and effort data by fishing vessel in the IOTC area of competence
- Resolution 15/02 Mandatory statistical reporting requirements for IOTC contracting parties and cooperating non-contracting parties (CPCs)
- Resolution 15/10 On target and limit reference points and a decision framework
- Resolution 15/11 On the implementation of a limitation capacity
- Resolution 14/02 For the conservation and management of tropical tuna stocks in the IOTC area of competence
- Resolution 14/05 Concerning a record of licensed foreign vessels fishing for IOTC species in the IOTC area of competence
- Resolution 13/09 On the conservation of albacore caught in the IOTC area of competence
- Resolution 12/01 On the implementation of the precautionary approach
- Resolution 11/04 On a regional observer scheme
- Resolution 10/08 Concerning a record of active vessels fishing for tunas and swordfish in the IOTC area
- Resolution 07/05 Limitation of fishing capacity of IOTC Contracting Parties and Cooperating Non-Contracting Parties in terms of number of longline vessels targeting swordfish and albacore
- Resolution 05/01 On conservation and management measures for bigeye tuna
- Resolution 03/01 On the limitation of fishing capacity of Contracting Parties and Cooperating Non-Contracting Parties

Yellowfin tuna
There is an interim plan in place for the rebuilding of the yellowfin tuna stock in the Indian Ocean through the implementation of Resolution 21/01, which supersedes Resolutions 19/01 and 18/01. Resolution 21/01 sets catch limits and reductions on catch regarding reported yellowfin catches for 2014 (or 2015 in the case of SIDs). Through this resolution, there is a gradual reduction established for supply vessels in purse seine operations targeting tropical tunas by December 2022 as well as reporting requirements for these operations. Furthermore, also noting the existence of other resolutions such as Res 19/05 on a ban on discards of targeted tunas and other non-targeted species (purse seiners), Res 19/02 on FADs management plan and Res 12/01 on the application of a precautionary approach it can be established that there are measures expected to maintain or not to hinder rebuilding of this species at/to levels which are likely to be above the PRI. Therefore, **SG60 is met.**

In addition to regional measures, since 2017 the EU council sets a TAC for the EU and provides an allocation for its member States fishing in the IOTC. In January 2021 the Council Regulation (EU) 2021/92 fixed the fishing opportunities for 2021 with a TAC for the EU at 77,698 t and the quota allocated to Spain at 45,682 tons in the IOTC are of competence. The TAC for the EU (77,698 tons) and the quota allocated to Spain (45,682 tons) has remained the same since 2017. Later, through Council Regulation (EU) 2022/515 from March 2022, a provisional quota was also allocated to the European Union. It shall apply provisionally up to June 2022 without prejudice to the setting of definitive quotas for 2022 in accordance with the EU quota for 2022

According to Table SA8 of the MSC Fisheries Standard, a **partial strategy** "represents a cohesive arrangement which may comprise one or more measures, and understanding of how it/they work to achieve an outcome and an awareness of the need to change the measures should they cease to be effective; it may not have been designed to manage the impact on that component specifically". Considering that regional and national frameworks contemplate the adoption measures such as catch limits, regulations on supply limits, record of vessels and the gathering fishing related data along with regular stock assessments and further, that these work in a manner aimed at managing a specific component of the fishery with a clear objective, it is considered, therefore, that **SG80 is met.**

Bigeye tuna
Resolution 22/03 on a management procedure for bigeye tuna in the IOTC area of competence set out the following objectives: (i) achieving 60% probability that the bigeye tuna spawning biomass reaches the target reference point of SB_{MSY} by 2034-2038; and (ii) avoid breaching the interim limit reference point species in Resolution 15/10 with high probability. Besides clear objectives, this resolution also includes a schedule for setting a total allowable catch, as well as a review of its performance (see **section 4.2.4.3(ii)** for more details). Also, Resolution 19/02 on procedures on a Fish Aggregating Devices (FADs) management plan aims at reducing the mortality of bigeye juveniles associated to FAD operations: setting a maximum number of operational buoys, requesting the record of fishing activities on FADs, establishing the development of management plans by purse-seine fleet and reporting and tracking procedures. Resolution 19/05 on a ban on discards on inter alia bigeye tuna, it is also considered as a relevant regulation affecting this stock.

The above mentioned Resolutions, along with the IOTC applicable regulatory framework (i.e Resolutions 10/08, 14/02, 14/05, 15/10, 15/11), and the monitoring and data recording requirements set in Resolutions 15/01 and 15/02, as well as the results and projections included in the latest stock assessment (IOTC, 2019), the team considers that there is a set of measures that conforms a partial strategy for the UoA that is expected to maintain the species at a level which is highly likely to be above the PRI, therefore **SG60 and SG80 are met**.

Albacore
Resolution 13/09 on the conservation of Albacore caught in the IOTC area of competence establishes, at least by the end of 2014, the setting of target and limit reference points used when assessing the albacore tuna stock. Furthermore, on the development of management measures aimed to ensure the achievement of conservation and optimal utilisation of stocks in the short period as possible, ensuring that in a period no later than 2020, the fishing mortality rate does not exceed F_{MSY}, as well as maintains the spawning biomass above the MSY-related level. The species is subject to stock assessments by the IOTC and results are provided according to Resolution 15/10 On target and limit reference points and a decision framework and Res 13/09, thus interim target and limit reference points have been established.

In addition, alternative TRPs and LRPs are proposed in cases when the Scientific Committee considers that MSY-based reference points cannot be robustly estimated. In such cases limit reference points will be set at a rate of Bo and by default will be equal to B_{LIM}=0.2Bo and fishing mortality rate limit at $F_{0.2Bo}$.

Additional measures that support the albacore management in the Indian Ocean correspond to Resolution 19/05 On a Ban on discards of bigeye tuna, skipjack tuna, yellowfin tuna and non-targeted species caught by purse seine vessels in the IOTC area of competence aimed at reducing discards and collecting information from purse seine operations, Resolution 11/04 on a regional observer scheme, Resolution 15/01 on the recording of catch and effort data by fishing vessels and Resolution 15/02 on mandatory statistical reporting requirements for IOTC CPC's. Actions taken also by ANABAC through the application of the Code of Good Practices (i.e., 100% coverage of observation on board) ensures the gathering of data on interactions between the albacore stock and the UoA as well as provide an input to the commission to develop a stronger strategy for future. Considering that in average the albacore catch by purse seine is 1.3% (IOTC, 2021), the 0.78% that Albacore is captured by the assessed fleet and the monitoring and assessment of the stock, it is considered that there is a **partial strategy** expected to maintain or not to hinder the rebuilding of the stock at/to levels which are highly likely to be above the PRI, thus **SG60 and SG80 are met.**

The MSC Fisheries Standard v2.01 defines strategy as a "cohesive and strategic arrangement which may comprise one or more measures, an understanding of how it/they work to achieve an outcome and which should be designed to manage impact on that component specifically. A strategy needs to be appropriate to the scale, intensity and cultural context of the fishery and should contain mechanisms for the modification of fishing practices in the light of the identification of unacceptable impacts."

There are management measures in place aimed to manage the impact on some minor primary species within the Indian Ocean:

- Resolution 18/02 on management measures for the conservation of blue shark caught in association with IOTC fisheries.
- Resolution 18/05 on management measures for the conservation of the billfishes: striped marlin, black marlin, blue marlin and indo-pacific sailfish
- Resolution 17/05 on the conservation of sharks caught in association with fisheries managed by IOTC
- Resolution 13/06 on a scientific and management framework on the conservation of shark species caught in association with IOTC managed fisheries.

In addition, stock assessments are carried out but the current status of some species are subject to high levels of uncertainty and cannot be properly determined. There is an important gap in relation to data coming from relevant fishing fleets targeting this species (e.g., longline, gillnets). Even though there are specific measures aimed at managing some minor species and these are supported by additional IOTC Resolutions such as 19/05, 15/01 and 15/02 it cannot be stated that there is a **strategy** in place. Thus, **SG100 is not met.**

b	Management strategy evaluation			
	Guide post	The measures are considered **likely** to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species).	There is some **objective basis for confidence** that the measures/partial strategy will work, based on some information directly about the fishery and/or species involved.	**Testing** supports **high confidence** that the partial strategy/strategy will work, based on information directly about the fishery and/or species involved.
	Met?	All primary species - yes	All primary species - Yes	All primary species - No
Rationale				

Yellowfin tuna

The following resolutions provide a confidence framework for the functioning of the yellowfin tuna partial management strategy: Resolution 12/01 On the implementation of the precautionary approach, Resolution 15/10 On target and limit reference points and Resolution 21/01 On an interim plan for rebuilding the Indian Ocean yellowfin tuna stock in the IOTC Area of Competence.

The set of both, limit and target reference points is a precautionary tool that enables management decisions to lead the status of species to appropriate levels of sustainability in accordance with the Code of Conduct for Responsible Fisheries and UNFSA. These reference points are expected to allow the long-term sustainable exploitation of the stock while ensuring conservation of the resource. Limit and target reference points are established by Resolution 15/10, are part of the management strategy for tropical tunas and considered by IOTC to provide advice and management decisions. Furthermore, advice provided by the Scientific Committee is based on MSY-based reference points as result of stock assessments that are regularly undertaken. Measures set in Resolution 21/01 are consistent with scientific advice and aims at rebuilding the status of yellowfin to levels consistent with maximum sustainable yield. Thus, it can be stated that these measures are considered likely to work based on plausible argument, general experience and theory, therefore, **SG60 is met.**

In 2014, when the global tropical tuna catches in the Indian Ocean reached its maximum, approximately 57,892 tonnes of yellowfin tuna were caught by the Spanish fleet (Báez *et al.,* 2020). Since 2017, the EU has been assigning quotas to the European fleet. Approximately 45,682 tons have been allocated in an annual basis to Spain, which represents roughly 79% of its catch in 2014, complying with reduction levels that have been establish through Resolution 18/01 (superseded later by 19/01 and 21/01). Furthermore, data obtained from IOTC shows that capture from the Spanish purse seine fleet has been decreasing since 2014, representing in 2017, 2018 and 2019 76%, 78% and 73% respectively, of the total capture in 2014. As it can be noted in **table 7.3.7b,** the Seychelles-flagged purse seine fleet also has been consistent with catch reductions in relation to the 2015 reference level (as stated in Res 19/01 and subsequent Res 21/01). Increase on the pressure against the stock is likely to be an effect of several artisanal fisheries that have substantially rise their catches on recent year and from which data is subject to uncertainty (IOTC, 2021).

Therefore, it is considered that there is some objective basis for confidence that the partial strategy will work based on some information directly about the fishery, thus, **SG80 is met.** Due to the uncertainties that persist in stock assessment (e.g., nominal catch quality and data collection procedures), the increased of catches above mentioned, it cannot be said with high confidence that the partial strategy will work based on information directly from the fishery, thus **SG100 is not met.**

Bigeye tuna

Overall results indicate that currently the bigeye tuna stock in the Indian Ocean is not overfished, with SB2018 been above the MSY-related level (1.22) but subject to overfishing, with F2018/FMSY = 1.20. However, according to the figure shown below there has been a high probability of the stock being at the green quadrant of the Kobe plot, with the stock being well above the PRI.

Stock projections were conducted for the reference model over a 10-year period (2016–2025) at a constant level of catch set as a multiple of the fishery catches in 2015. Three levels of catch were investigated representing 80% (74,200 mt), 100% (92,700 mt) and 120% (111,300 mt) of the 2015 catch level. For each stock scenario, the probability of the biomass being below the SB_{MSY} level was determined after 3 years (2018), 5 years (2020) and 10 years (2025). Catches 20% higher than the 2015 level resulted in the biomass being maintained at approximately the SB2015 for the entire projection period. The overall bigeye catches in the Indian Ocean have been maintained below the 2015 level (see **table 2.1.2.1** and **figure 2.1.2.2** -left panel-).

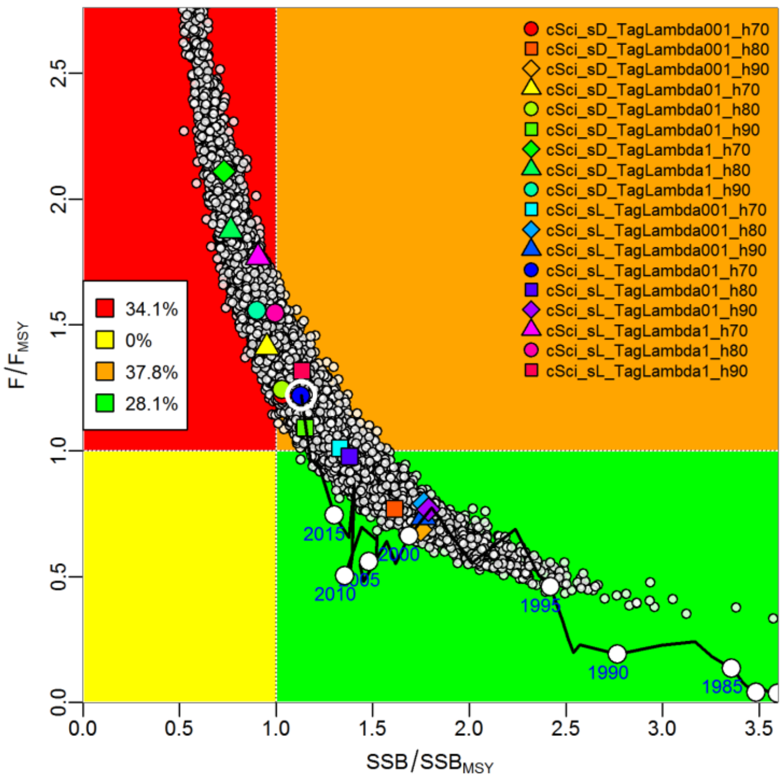

Figure 2.1.2.1. Bigeye tuna: SS3 Aggregated Indian Ocean assessment Kobe plot. The coloured points represent stock status estimates from the 18 model options. The grey dots represent 5,000 estimates of 2018 stock status from the multivariate normal approximation from the mean and variance-covariance of the 18 model options. The legend indicates the estimated probability of the stock status being in each of the Kobe quadrant. The white circle (around the blue dot) represents the median stock status in 2018. Source: IOTC, 2019

Table 2.1.2.1. Catch in tonnes of bigeye tuna in the Indian Ocean during 2016-2020. Sources: IO, Spain and Seychelles BET catches were retrieved from the IOTC nominal catches database (available at: IOTC.org); Echebastar BET catches were provided by the client.

Year	Total catch Indian Ocean (t)
2015	96,333
2016	86,822
2017	90,897
2018	94,744
2019	80,375
2020	90,471

Besides, through Resolution 22/03, a new management procedure for bigeye tuna has been recently adopted by the IOTC Commission at its 26th Session in May 2022. In accordance with the management objectives set by the Commission in Resolution 15/10 and the application of a precautionary approach in Resolution 12/01, Resolution 22/03 has been established with the aim to avoid the bigeye tuna biomass being below Blim and to maintain the fishing mortality rate at or below the F_{MSY} level. The new management procedure includes clear objectives for the stock and it has been designed to achieved the following:

a) a 60% probability that the bigeye tuna spawning stock biomass achieves the target reference point of SB_{MSY} by 2034-2038 and;
b) the bigeye tuna spawning stock biomass avoids breaching the interim limit reference specific in Resolution 15/10 with a high probability.

In addition, there is a first total allowable catch setting expected to apply in 2024 and 2025. After 2025, the TAC shall apply in each of the subsequent three years following the year it is set by the Commission. The allocation of the TAC among different CPCs will take place according to a process agreed external to this measure. If an allocation scheme has not yet been agreed and implemented, the Commission will develop a mechanism to constrain catch to the derived TAC for bigeye no later than 2025. Finally, a review of performance of the management procedure has been set to occur in 2030, where it will be assessed if it is performing as expected.

At this point, it is considered that there is some objective basis for confidence that the partial strategy will work on some information directly about the UoA and species involved, therefore **SG60 and SG80 are met.**

However, bigeye tuna in the Indian Ocean is currently facing overfishing and recent increase in catches from the purse seine fleet (**figure 2.1.2.2** -right panel-) have increased the pressure on the stock.

Resolution 22/03 has only been adopted in 2022, so no testing or performance evaluation have been carried out, and it cannot be stated with high confidence that the strategy will work.

SG100 is not met.

<u>Albacore</u>

Stock assessments are regularly undertaken, the last one was carried out in 2019 to update the model developed in 2016. Interim target and reference points were agreed for Albacore through IOTC Resolution 15/10. The current fishing mortality is considered above the provisional target reference point of F_{MSY}, but below the provisional limit reference point of 1.4*F_{MSY}, whereas the current spawning biomass is considered to be above the target reference point of SB_{MSY}, and therefore, above the limit reference point of 0.4*SB_{MSY} (IOTC, 2021). There are management measures that are considered likely to work based on plausible argument, thus, it is considered that **SG60 is met**.

Captures of albacore made by the ANABAC fleet have decreased from 670 tonnes in 2016 to zero in 2020. Just during 2016, 2017 and 2018, it represented 5.93, 0.27 and 0.64% of observed capture. According to the IOTC dataset available, the amount of albacore caught by the EU Spanish purse flee represented only 12.28 tonnes in 2020.Since the total capture of albacore on the purse seine fishery is quite low, it can be considered that there is objective basis for confidence that the measures already established to manage the impact of this fleet on the species are working based on the information directly about the UoA. Albacore is not commonly fished by purse seine vessels and their schools may be associated with floating objects and associations are not frequent (Chumchuen *et al*., 2019). Statistics show that this species is commonly caught by longlines (88.5%), followed by lines (9.1%) and purse seines (1.3%), while the remaining catches taken with other gears contributed to 1.1% of the total catch in recent years (IOTC, 2021). Therefore, it is considered that **SG80 is met**.

The primary sources of data that drive the assessment, total catches, CPUE and length data are highly uncertain, and the IOTC (2021) noted that should be developed further as a priority. Uncertainties do not support testing of management strategies and it cannot be stated that with high confidence the partial strategy will work based on information directly about the species involved. Thus, **SG100 is not met**.

Minor primary species

There are management measures in place for minor primary species such as Resolution 18/05 for striped marlin, black marlin, blue marlin and indo-pacific sailfish. This resolution sets catch limits and a release requirement of juveniles. Regarding blue shark, Resolution 18/02 also sets few measures as reporting requirements, that enables to conduct updated stock assessments that resulted on the stock not being overfished nor subject to overfishing. The application of good practices, the coverage of observers to monitor compliance and the low level of interaction with this minor primary species, provide some objective confidence that there are measures in place considered likely to work based on the information from the UoA, thus **SG60 and SG80 are met. SG100 is not met** since there is no management strategy for minor primary species.

c	Management strategy implementation			
	Guide post		There is **some evidence** that the measures/partial strategy is being **implemented successfully**.	There is **clear evidence** that the partial strategy/strategy is being **implemented successfully and is achieving its overall objective as set out in scoring issue (a).**
	Met?		All primary species- Yes	Yellowfin- No Bigeye - No Albacore - Yes Minor primary species - No
Rationale				

Yellowfin tuna

After 2014 yellowfin tuna stock assessment determined that the yellowfin tuna stock in the Indian Ocean was overfished and facing overfishing, the IOTC established through resolution 16/01 (later superseded by Res 18/01, 19/01 and 21/01) that CPCs that caught more than 5,000 tonnes in 2014 should reduce their catches by 15% from the 2014 levels. Following the IOTC determination, the European Union started to implement quotas among the EU flagged fleets that were targeting the species, of which Spain has been allocated since 2017 with 45,682 tonnes. According to official data obtained from IOTC, yellowfin tuna catches from 2018 to 2020 by Spanish-flagged vessels have remained below this quota (**Table 7.3.7b**), complying both with RFMOs and European legislation. In the case of SIDS (such as the Seychelles), in applying the catch reduction 2015 catches can be used (instead of 2014). As shown in table 7.3.7b, the Seychelles has complied with catch reductions adopted in Res 19/01 and Res 21/01.

Table 7.3.7bYellowfin tuna catches by EU Spanish-flagged purse seine (PS) fleet in the Indian Ocean

Year	EU-Spain Yellowfin tuna catch (MT)-PS	Reduction from 2014 level (EU-Spain)	Seychelles Yellowfin tuna catch (MT)-PS	Reduction from 2014 level (Seychelles)
2014	57,892	Reference	NA	NA

2015	52,631	9%	39,072	Reference
2018	45,318	22%	35,023	10%
2019	42,273	27%	33,006	16%
2020	44,246	24%	30,502	22%

Since 2018, relevant reductions in the capture levels have been obtained, with a 27% reduction in 2019 and 24% in 2020 for Spanish-flagged vessels while 16% and 22% were achieved by Seychelles in 2019 and 2020, respectively(**Table 7.3.7b**

The data provided by ANABAC on the total catch of yellowfin tuna by the UoA shows a reduction of catch in 2020 of almost 14% in comparison to 2016 (see **table 7.3.1.1a**) since the catch restrictions were set. Therefore, there is some evidence that the partial strategy is being implemented successfully, thus **SG80 is met.**

However, the successful application of interim plans has been facing difficulties due to the objections received from some CPCs. For instance, Res 21/01 was objected by India, Indonesia, Iran, Madagascar, Oman and Somalia, thus, it is not applicable to these countries. In the same way, previous Resolution 19/01 was objected by India. It is stated by IOTC (2021) that the considerable uncertainty in the reported catches is due to several artisanal and coastal fisheries which in addition, have increased their catches substantially during recent years. The purse seine catch of yellowfin during 2016-2020 has represented approximately just 34.3% of removals in the Indian Ocean, while other fisheries such as lines, gillnets, longline and other gears accounted for 65.7% (IOTC, 2021).
Besides, results of the latest stock assessment show that the yellowfin tuna is overfished and subject to overfishing. Thus, cannot be said that there is clear evidence that the strategy is currently being implemented successfully and is achieving its overall objective, achieving its overall objective, thus **SG100 is not met**.

Bigeye tuna

Res 05/01 sets that: (i) CPCs shall limit their catch of bigeye tuna to their recent levels of catch (at that time); (ii) the Commission shall establish interim catch levels for a three-year period for CPCs catching more than 1000t of bigeye tuna; (iii) A mechanism to allocate quotas shall be developed. However, this Resolution was adopted on the basis of scientific advice issued in 2004 and pending its review in the 10th IOTC Commission. In 2006, the BET's advice was more optimistic than in 2004, and the Resolution was never implemented. Although the Resolution remains in the Active Compendium, it has not been cited in any Scientific Committee or Commission since 2005. Res 22/03 was never revised and updated (until the recent adoption of Res 22/03), and therefore the proposed measures refer to past circumstances in relation to the bigeye stock.

In any case, compared to the period 2000-2009, the catch of bigeye until 2020 showed a significant decline (see **figure 2.1.2.2** -left panel-), and recent levels are consistent with maintaining the stock at levels consistent with SB_{MSY} as detailed in SI(b). Besides, there is evidence that other elements of the harvest strategy (i.e., data reporting requirements, stock assessments and scientific advice, etc.) are being implemented successfully. Thus, **SG80 is met.**

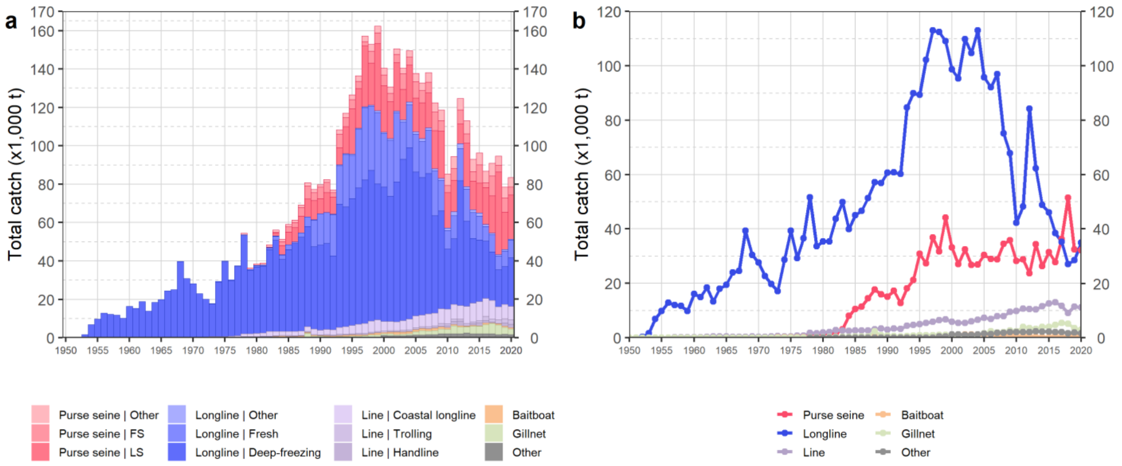

Figure 2.1.2.2. Annual time series of (a) cumulative nominal catches (t) by fishery group and (b) individual nominal catches (t) by fishery for bigeye tuna during 1950–2020. FS = free-swimming school; LS = drifting log/FAD-associated school; Purse seine | Other: coastal purse seine, purse seine of unknown school association type, ring net; Other: all remaining fishing gears. Source: IOTC 2021

However, Res 22/03 has been just recently adopted, and the first TAC derived from the MP shall apply in 2024 and 2025 (see **section 4.2.7(ii)** for more details on the work plan adopted). Thus, there is still no evidence of its implementation. **SG100 is not met.**

Albacore

Measures include Res 13/09, Res 19/05 and Res 11/04. Reference points were adopted as required by Resolution 13/09 through Resolution 15/10 and are estimated to assess the status of the species and to enable management advice. Discards are banned through Resolution 19/05 and as registered by ANABAC data albacore is stored when captured. The implementation of observers and EMS above the level set by Res 11/04 provide evidence of compliance with Resolution 19/05. Therefore, there is clear evidence that the partial strategy its being implemented successfully and achieving its objective of maintaining the resource above the PRI. Therefore, **SG80 and SG100 are met.**

Minor primary species

As stated in SIb, it is considered that there are measures in place aimed at maintaining or not hinder the rebuilding of species, but not a partial strategy/strategy working in a cohesive and strategic manner. It is not clear if the review of measures is constantly reviewed and responds to the scale and cultural context of the Indian Ocean. Data from the UoA provides some evidence that on board these measures are implemented, when necessary (e.g., catch limits, recording, ban on discards), thus **SG80 is met**, nevertheless There is not a management strategy implementation for minor primary species, therefore it is considered that **SG100 is not met**.

d	Shark finning			
	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?	Yes	Yes	Yes
Rationale				

Regionally, Resolution 17/05 On the conservation of sharks caught in association with fisheries managed by IOTC calls CPCs to adopt measures to fully utilise the entire catches of sharks with the exception of species prohibited by the IOTC. It prohibits fleets under the flag of CPCs, to remove shark fins onboard vessels as well as prohibits the landing, retention on board, transhipment and carrying of shark fins which are not attached to shark carcass until the first point of landing. Also encourages those fisheries where sharks are not target species to release alive sharks and the use of identification guides and handling practices.

Through the implementation of its Code of Good Practices, vessel's members of the Vessel Owners' Association ANABAC, have a 100% observer coverage and it has been voluntarily implemented a since 2013. These observers embark both in the frame of the European Data Collection Framework (DCF) and of the common agreement for the application of Good Practices established by the ship-owners associated to ANABAC. This exhaustive coverage can either be achieved with observers physically present onboard (onboard observers) or remotely using recordings of Electronic Monitoring Systems (EMS, electronic observers). Thus, it is highly likely that shark finning is not taking place, thus **SG60 and SG80 are met**. The ANABAC purse seine fleet does not target nor processes sharks. As it can be noted on the **table 7.3.4a** on the fate of shark species caught by the fleet, all individuals are released and there is no retention onboard. The application of the Code includes the development and use of release techniques that minimize risk to sharks and optimise their survival, including tools and equipment provided specifically for releasing. This information is gathered from scientific observers in compliance with the Code of Good Practice. A proportion of data is reviewed by IEO and the remaining reviewed by AZTI to assess the implementation and compliance. Furthermore, total retained catches reported as landing data are accurate and shark landings are not registered. Therefore, there is a high degree of certainty that shark finning is not taking place, thus **SG100 is met.**

e	Review of alternative measures			
	Guide post	There is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-	There is a **regular** review of the potential effectiveness and practicality of alternative measures to minimise UoA-	There is a **biennial** review of the potential effectiveness and practicality of alternative measures to minimise UoA-

		related mortality of unwanted catch of main primary species.	related mortality of unwanted catch of main primary species and they are implemented as appropriate.	related mortality of unwanted catch of all primary species, and they are implemented, as appropriate.
	Met?	Main primary species - NA Minor primary species- Yes	Main primary species - NA Minor primary species-Yes	Main primary species - NA Minor primary species-No
Rationale				

Main primary species

Since yellowfin tuna, bigeye tuna and albacore are considered target species and not as unwanted, these are retained on board for commercial purposes (Resolution 19/05). In case where juveniles are caught, it is considered that there are measures in place that are regularly reviewed in order to minimise the impact of the ANABAC fleet on unwanted individuals that are implemented and reviewed through IOTC competences and the annual revision of the Code of Good Practices performed by AZTI. Therefore, the SIe is no applicable for this species.

Minor primary species

Since **SG60 and SG80** apply just for main primary species, **both are met by default**. However, in the absence of a biennial review to address the impact on minor primary species, **SG100 is not met**.

Table 7.3.7.d.-Scoring calculation for each scoring element

Scoring element	SIa	SIb	SIc	SIe (Shark finning)*	SIe	Element score	Final PI score
YFT	80	80	80	100	NA	85	85
BET	80	80	80		NA	85	
ALB	80	80	100		NA	90	
Minor Species	80	80	80		80	85	

*Sid applies for blue shark

References

IOTC (2021); Code of Good Practice (2020); Báez *et al.*, (2020); Chumchuen *et al.*, (2019)

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

Draft scoring range	**≥80**
Information gap indicator	*Information on compliance with new management procedure set for bigeye tuna from the 8 vessels include in the UoA; Detailed information on the compliance of Seychelles with catch reductions set for 2017 and 2018*

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

Overall Performance Indicator score	
Condition number (if relevant)	

PI 2.1.3 – Primary species information

PI 2.1.3		Information on the nature and extent of primary species is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage primary species		
Scoring Issue		SG 60	SG 80	SG 100
a		Information adequacy for assessment of impact on main primary species		
	Guide post	Qualitative information is **adequate to estimate** the impact of the UoA on the main primary species with respect to status. **OR** **If RBF is used to score PI 2.1.1 for the UoA:** Qualitative information is adequate to estimate productivity and susceptibility attributes for main primary species.	Some quantitative information is available and is **adequate to assess** the impact of the UoA on the main primary species with respect to status. **OR** **If RBF is used to score PI 2.1.1 for the UoA:** Some quantitative information is adequate to assess productivity and susceptibility attributes for main primary species.	Quantitative information is available and is **adequate to assess with a high degree of certainty** the impact of the UoA on main primary species with respect to status.
	Met?	Yes	Yes	No
Rationale				

Data of catch composition recorded by observers is similar to those reported in logbooks during 2016-2020 (**tables 7.3.1.1a and 7.3.1.1d**). There is reliable and adequate information of the catch that is gathered through logbooks, sale slips and port samplings carried out by the EU. The later covers most of the flag states and purse seiners in the Indian Ocean. The difference between official landing estimates and logbook catches is usually within a 5-10% error for species composition, and almost null for total retained catch (client pers.comm.). All the data are reported to the IOTC in order to develop stock assessments. In addition, there is also adequate data from scientific observation since this covers 100% of the fleet and in average, 53% of information from trips is available (**Table 7.3.1.1b**). The observer program on board the assessed vessels provides detailed information on fishing operations and catch composition, including fate of those catches. As mentioned, 100% of the fishing sets are monitored to record operational information, the difference from the existing coverage and the total observations relies on the no recovery of the trip data or the mismatch with the standard quality required (as mentioned in section 7.3.1.1). While the coverage ranged from 27% to 87%, during 2016 and 2020, the average observed coverage for the assessed period reached 53%. Therefore, it is considered that quantitative information is available and adequate to assess the impact of the fleet on main primary species, thus, **SG60** and **SG80 are met.** However, the IOTC scientific committee has noted that there are persistent uncertainties regarding the quality of data used to provide stock status of all main primary species, thus the impact of the purse seine fleet cannot be estimated with a high degree of certainty. **SG100 is not met**.

b		Information adequacy for assessment of impact on minor primary species		
	Guide post			Some quantitative information is adequate to estimate the impact of the UoA on minor primary species with respect to status.
	Met?			Yes
Rationale				

There is an adequate level of scientific observer coverage on board the fleet that provide reliable information of catch composition and on interactions of the purse seine fleet with minor primary species. Nevertheless, it is noted that identification of some species could be problematic in certain situations (e.g., identification at species level). However, it is considered that there is some quantitative information adequate to estimate the impact of the UoA on minor primary species, thus **SG100 is met**.

c	Information adequacy for management strategy			
	Guide post	Information is adequate to support **measures** to manage **main** primary species.	Information is adequate to support a **partial strategy** to manage **main** primary species.	Information is adequate to support a **strategy** to manage **all** primary species, and evaluate with a **high degree of certainty** whether the strategy is achieving its objective.
	Met?	Yes	Yes	No
Rationale				

It is considered that logbooks and observation on board provides adequate qualitative and quantitative information to estimate the impact of the UoA on the outcome of primary species. The estimate of coverage of observation during 2016-2020 on board was 53% with a range covered from 27% to 87%. Observation on board ANABAC vessels exceeds recommendations made by the IOTC. Both, human and electronic observation provide bycatch data and ecosystem interactions, as well as target species capture, retained and discarded species, catch composition and FAD operations. Therefore, it is considered that information is adequate to support a partial strategy to manage main primary species, thus **SG60 and SG80 are met** . On the other hand, due to uncertainties on the outcome of minor primary species and a lack of a strategy to manage the impact on these strategies **SG100 cannot be met.**

References

IOTC (2021); IOTC (2020)

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

Draft scoring range	**≥80**
Information gap indicator	Ensure that client will gather catch data from the new 3 vessels, as well as ensuring that this information will be delivered to the CAB in case certification is achieved. Catch composition and relative contribution of each vessel on capture will be reviewed based on this new data.

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

Overall Performance Indicator score	
Condition number (if relevant)	

PI 2.2.1 – Secondary species outcome

PI 2.2.1		The UoA aims to maintain secondary species above a biologically based limit and does not hinder recovery of secondary species if they are below a biological based limit		
Scoring Issue		SG 60	SG 80	SG 100
a	Main secondary species stock status			
	Guide post	Main secondary species are **likely** to be above biologically based limits. OR If below biologically based limits, there are **measures** in place expected to ensure that the UoA does not hinder recovery and rebuilding.	Main secondary species are **highly likely** to be above biologically based limits. OR If below biologically based limits, there is either **evidence of recovery** or a **demonstrably effective partial strategy** in place such that the UoA does not hinder recovery and rebuilding. AND Where catches of a main secondary species outside of biological limits are **considerable**, there is either **evidence of recovery** or a, **demonstrably effective strategy in place between those MSC UoAs that have considerable catches of the species**, to ensure that they collectively do not hinder recovery and rebuilding.	There is a **high degree of certainty** that main secondary species are above biologically based limits.
	Met?	NA	NA	NA
Rationale				

After the classification of species made in 7.3.1.2, no main secondary species have been found, therefore, and following MSC interpretation guidance (available at: https://mscportal.force.com/interpret/s/article/P2-species-outcome-PIs-scoring-when-no-main-or-no-minor-or-both-PI-2-1-1-1527262009344) this SI is NA.

b	Minor secondary species stock status			
	Guide post			Minor secondary species are highly likely to be above biologically based limits. OR If below biologically based limits', there is evidence that the UoA does not hinder the recovery and rebuilding of secondary species
	Met?			No (RBF needed but PF5.3.2.1 invoked)

Rationale

There are no biologically based limits established and the status remain unknown for all these species and taxa. Therefore, they are all classified as Data Deficient species according to FCP 7.7.3, and RBF shall be triggered for assessing their status against this SI. However, PF4.1.4 allows the team to avoid conducting RBF on 'minor' species when evaluating PI2.1.1 or 2.2.1 as far as final PI score is adjusted downward according to clause PF5.3.2. Due to the high number of different taxa to be assessed as minor secondary species the assessment team decided to take this option. Therefore, in accordance with PF5.3.2.1 the final PI score shall not be greater than 80.

References

MSC Fisheries Standard v2.01 (2018); MSC Fishery Certification Process v.2.2 (2020)

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

Draft scoring range	**≥80**
Information gap indicator	*Despite that minor species are DD, the team considers that information is enough to score due to the application of PF4.1.1*

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

Overall Performance Indicator score	
Condition number (if relevant)	

PI 2.2.2 – Secondary species management strategy

PI 2.2.2		There is a strategy in place for managing secondary species that is designed to maintain or to not hinder rebuilding of secondary species and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place			
	Guide post	There are **measures** in place, if necessary, which are expected to maintain or not hinder rebuilding of main secondary species at/to levels which are highly likely to be above biologically based limits or to ensure that the UoA does not hinder their recovery.	There is a **partial strategy** in place, if necessary, for the UoA that is expected to maintain or not hinder rebuilding of main secondary species at/to levels which are highly likely to be above biologically based limits or to ensure that the UoA does not hinder their recovery.	There is a **strategy** in place for the UoA for managing main and minor secondary species.
	Met?	Yes	Yes	No

Rationale

After the identification of species carried out by them team in 7.3.1.2, it was determined that there were no main secondary species caught by the UoA, thus the **SG60 and SG80 are met by default**, following the MSC interpretation guide (available at: https://mscportal.force.com/interpret/s/article/Use-of-if-necessary-in-P2-management-PIs-2-1-2-2-2-2-2-4-2-2-5-2-PI-2-1-2-1527262011402).

It is considered that there are actions taken in order to manage the impact of the UoA on all the secondary species, which represents a negligible portion of capture (<1%) (**Table 7.3.1.1d**). First, through the application of the Code of Good Practice, implemented voluntarily by the fleet since 2012, aims to improve practices on board tuna purse-seining vessels with the objectives of reducing ecosystem impacts of FAD fishing, reducing bycatch, and improving bycatch post capture mortality using appropriate release procedures, monitored by 100% observer coverage (from which 53% of information is available – **table 7.3.1.1b**). This comprehensive monitoring ensures that the bycatch reporting systems are adequate to produce estimates for the total catch composition. There is a set of regional measures in place that improve the management of secondary species such as Resolution 19/05 On a ban on discards of bigeye tuna, skipjack tuna, yellowfin tuna and non-targeted species caught by purse seine vessels in the IOTC area of competence which states that Contracting Parties and Cooperating Non-Contracting Parties shall require all purse seine vessels to retain on board and then land, to the extent practicable species such as other tunas, rainbow runner, dolphinfish, triggerfish, billfish, wahoo, and barracuda. Other relevant conservation and management measures are as follows:

- Resolution 19/06 On Establishing a Programme for Transhipment by Large-Scale Fishing Vessels
- Resolution 16/07 On the use of artificial lights to attract fish
- Resolution 15/01 On the recording of catch and effort by fishing vessels in the IOTC area of competence
- Resolution 15/02 Mandatory statistical reporting requirements for IOTC Contracting Parties and Cooperating Non-Contracting Parties (CPC's)
- Resolution 12/01 On the implementation of the precautionary approach
- Resolution 10/08 concerning a record of active vessels fishing for tunas and swordfish in the IOTC area
- Resolution 03/01 On the limitation of fishing capacity of Contracting Parties and Cooperating Non-Contracting Parties

Therefore, it is considered that there is a partial strategy in place that is expected to maintain or not hinder the rebuilding of main secondary species, However, the majority of minor secondary species are not managed and it cannot be considered that there is a strategy in place for managing main and minor secondary species, therefore **SG100 is not met**.

b	Management strategy evaluation			
	Guide post	The measures are considered **likely** to work, based on	There is **some objective basis for confidence** that the	**Testing** supports **high confidence** that the partial

		plausible argument (e.g. general experience, theory or comparison with similar UoAs/species).	measures/partial strategy will work, based on some information directly about the UoA and/or species involved.	strategy/strategy will work, based on information directly about the UoA and/or species involved.
	Met?	Yes	Yes	No

Rationale

Since there are no secondary main species in the fishery, and following the MSC interpretation guide (available at: https://mscportal.force.com/interpret/s/article/Use-of-if-necessary-in-P2-management-PIs-2-1-2-2-2-2-4-2-2-5-2-PI-2-1-2-1527262011402), **SG60 and SG80 are met by default**. In addition, even though it has been set that there is a partial strategy in place (see above SIa), it cannot be considered that testing supports high confidence that the partial strategy will work, thus, **SG100 is not met**.

c	Management strategy implementation			
	Guide post		There is **some evidence** that the measures/partial strategy is being **implemented successfully**.	There is **clear evidence** that the partial strategy/strategy is being **implemented successfully and is achieving its objective as set out in scoring issue (a).**
	Met?		Yes	No

Rationale

There is some evidence on measures that have been implemented by the UoA following regional resolutions (e.g., Res 19/05) and the Code of Good Practice in order to decrease the impact of the fleet on secondary species, therefore it is considered that **SG80 is met**. However, **SG100 is not met** due to the lack of a strategy including all secondary species.

d	Shark finning			
	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?	Yes	Yes	Yes

Rationale

As mentioned in the PI 2.1.2 SId, there are measures and monitoring procedures set in place that provide certainty that shark finning is not taking place. First, the implementation of the ANABAC Code of Good Practices which includes a 100% observer coverage and it has been voluntarily implemented since 2013. Through its implementation, scientific data have been gathered through independent observation and EMS. **Table 7.3.4a** demonstrates that all sharks are released and there is no retention of sharks onboard. The Code includes the use of release techniques that minimize the risk to sharks and optimise their survival. Data is also reviewed by IEO and by AZTI to assess the level of compliance. Furthermore, the EU has established a comprehensive system of management measures which covers not just vessel licensing and permits, catch reporting, landings restrictions and observer coverage, but also sets a ban on shark finning.

The EU Council of Ministers strengthened their support to IOTC in 2019, pledging that the Union shall, where appropriate, endeavour to support the IOTC conservation and management measures (CMM) and resolutions including, amongst others, the prohibition of fisheries conducted solely for the purpose of harvesting shark fins and requiring that all sharks are landed with all fins naturally attached.

In addition, IOTC Resolution 17/05 calls to CPCs to adopt measures to fully utilise the entire catches of sharks except for species prohibited by the IOTC. It prohibits the removal of shark fins onboard vessels as well as the landing, retention on board, transhipment and carrying of shark fins which are not attached to shark carcass until the first point of landing. However, this does not occur since sharks are not a target species of ANABAC purse seine vessels.

Therefore, it is considered that there is a high degree of certainty that shark finning is not taking place, thus **SG60, SG80 and SG100 are met.**

e	Review of alternative measures to minimise mortality of unwanted catch			
	Guide post	There is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of **unwanted** catch of main secondary species.	There is a **regular** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of **unwanted** catch of main secondary species 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 all secondary species, and they are implemented, as appropriate.
	Met?	Yes	Yes	No

Rationale

Since there are no main secondary species in the fishery, **SG60 and SG80 are met by default.** On the other hand, the team is aware that there is a regular review of measures to avoid the unwanted catch of species such as sharks,(e.g., the use alternative materials for construction of FADs, provision of tools and equipment to release species, research on structures on board aimed to improve survival) however, it is considered that there not is a biennial review of measures regarding all minor secondary species. Therefore**, SG100 is not met.**

References

Code of Good Practice (2020); Compendium of active Conservation and Management Measures for the Indian Ocean Tuna Commission (available at: https://www.iotc.org/)

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

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

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

Overall Performance Indicator score	
Condition number (if relevant)	

PI 2.2.3 – Secondary species information

PI 2.2.3		Information on the nature and amount of secondary species taken is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage secondary species		
Scoring Issue		SG 60	SG 80	SG 100
a	Information adequacy for assessment of impacts on main secondary species			
	Guide post	Qualitative information is **adequate to estimate** the impact of the UoA on the main secondary species with respect to status. OR **If RBF is used to score PI 2.2.1 for the UoA:** Qualitative information is adequate to estimate productivity and susceptibility attributes for main secondary species.	Some quantitative information is available and **adequate to assess** the impact of the UoA on main secondary species with respect to status. OR **If RBF is used to score PI 2.2.1 for the UoA:** Some quantitative information is adequate to assess productivity and susceptibility attributes for main secondary species.	Quantitative information is available and **adequate to assess with a high degree of certainty** the impact of the UoA on main secondary species with respect to status.
	Met?	Yes	Yes	Yes

Rationale

Fishery dependent information (positions and duration of the hauls, other effort indicators, catches, landings, discards, …) on secondary species impacted by the UoA is being collected mainly through:

- Information generated by the fishing vessels: electronic logbooks, VMS.

- Data collected by the observers:

The quantitative information collected through these means is detailed, and the observer coverage is high. Based on this information it was found that no main secondary species are impacted by the UoA. Thus, **SG60, SG80 and SG100 are met**.

b	Information adequacy for assessment of impacts on minor secondary species			
	Guide post			Some quantitative information is adequate to estimate the impact of the UoA on minor secondary species with respect to status.
	Met?			No

Rationale

As mentioned in the previous SI, there is detailed information on the impact of the UoA on secondary species. However, the stock status of these species unknown. **SG100 is not met.**

c	Information adequacy for management strategy			
	Guide post	Information is adequate to support **measures** to manage **main** secondary species.	Information is adequate to support a **partial strategy** to manage **main** secondary species.	Information is adequate to support a **strategy** to manage **all** secondary species, and **evaluate** with a **high degree**

				of certainty whether the strategy is **achieving its objective**.
	Met?	Yes	Yes	No

Rationale

As noted in SIa, information is available on catches of non-target species from the UoA. Through the analysis of available data, it was identified that there are no main secondary species in the UoA and catches of non-target species are consistently very low in the UoA. This information is considered adequate for the team in order to **meet the SG60 and 80 requirements** in this SI. Nevertheless, **SG100 is not met** because this information is not considered adequate to support a strategy to manage both, all main and minor secondary species and to evaluate with a high degree of certainty whether or not the strategy is achieving its objective.

References

IOTC (2021), IOTC (2020), Compendium of active Conservation and Management Measures for the Indian Ocean Tuna Commission (available at: https://www.iotc.org/)

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

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

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

Overall Performance Indicator score	
Condition number (if relevant)	

PI 2.3.1 – ETP species outcome

PI 2.3.1		The UoA meets national and international requirements for the protection of ETP species The UoA does not hinder recovery of ETP species		
Scoring Issue		SG 60	SG 80	SG 100
a	Effects of the UoA on population/stock within national or international limits, where applicable			
	Guide post	Where national and/or international requirements set limits for ETP species, the **effects of the UoA** on the population/ stock are known and **likely** to be within these limits.	Where national and/or international requirements set limits for ETP species, the **combined effects of the MSC UoAs** on the population /stock are known and **highly likely** to be within these limits.	Where national and/or international requirements set limits for ETP species, there is a **high degree of certainty** that the **combined effects of the MSC UoAs** are within these limits.
	Met?	NA	NA	NA
Rationale				

There are no national and/or international requirements where limits for ETP species are set. There, given its absence, **SIa is scored as NA**.

b	Direct effects			
	Guide post	Known direct effects of the UoA are likely to not **hinder recovery** of ETP species.	Direct effects of the UoA are **highly likely** to not **hinder recovery** of ETP species.	There is a **high degree of confidence** that there are no **significant detrimental direct effects** of the UoA on ETP species.
	Met?	All ETP species - Yes	All ETP species - Yes	All ETP species - No
Rationale				

Sharks:

Silky shark (*Carcharhinus falciformis*): According to the data reported by independent observers on board the ANABAC fleet, silky shark is by far the most impacted shark species by the UoA, accounting for 66,67 tons annual average during 2016-2020, representing roughly 0,28% of the observed weight fraction of catch during the same period. According to Restrepo *et al.,* (2017) recent estimates suggest that the annual catch of silky shark within the purse seine tropical tuna fisheries can reach up to 1280 tons in the Indian Ocean. Research carried out by Garcia and Herrera (2018) found that gillnet and longline are the main gears that support the silky shark catch (57% and 42%, respectively), whereas the purse seine fishery is responsible for just 1.3%. Spanish purse seiners account for near 0.5% of the overall silky shark mortality in the Indian Ocean (Garcia and Herrera, 2018). Given the silky shark aggregating behaviour around FAD and the overlap of the juvenile individual's habitat with the purse seine fishery, this species is commonly encountered in FAD sets (Onandia *et al.,* 2021).

There was a preliminary data poor stock assessment conducted for silky shark in 2018 using a time-series of reconstructed catches (Onandia *et al.,* 2021), nevertheless could not be updated in 2019. It is considered that this assessment is extremely uncertain and the population status of the species in the Indian Ocean remains uncertain (IOTC, 2021). It has been considered that increasing effort could lead to a decline in biomass, productivity and CPUE (IOTC, 2021). According to Onandia *et al.,* (2021) the post-release mortality is at its lowest when sharks are in good shape and when individuals are swimming in the net. Also, mortality raises from the moment the sac is formed and with the number of brails. The fishing operation and the time spent from the catch to release (which can be influenced for example by set size, brail size or environmental conditions) or shark biological characteristics could represent a relevant issue (e.g. size, age). It is also pointed out the importance of the experience gained by the crew over time, the application of best releasing practices and the adaptation of the deck through the installation of release structures which may have a positive influence to reduce the mortality on board. According to information sent by the client for the period 2016-

2020, the mortality rate for silky shark was 75%. The Code of Good Practices reflects the practices implemented by the ANABAC fleet and also the measures recommended and required by RFMOs and International legal instruments to make tuna purse-seining more selective and sustainable. Among its objectives the development and application of release techniques that minimize risk to associated species and optimise their survival and training for fishing masters, crew and scientific observers. Diallo *et al.,* (2019) based on data obtained from the European tropical tuna purse seine fishery and on the associative behaviour of the species with floating objects developed estimated abundance trends for silky shark. Relative abundance indices were derived for the Seychelles area and the Mozambique Channel and for both areas it was observed an upward trend was observed. In the Seychelles area, the abundance index increased by a factor of 3 from 2006 to 2018 and in the Mozambique Channel the increase reached a factor of 15.

ANABAC, through the SIOTI FIP, is participating in the Echebastar Silky Shark Project. This project is promoting tagging studies on the silky shark (see section 4.1.7 for Echebastar 2 SA more details). Preliminary results were submitted to the IOTC-WPEB in 2021 (Onandia *et al.,* 2021). Tagging continued in 2021 and final results are expected to be taken into account within SIOTIs management strategy for silky shark's project. Once completed, these studies help to increase the information available to support a strategy to manage impacts.

Given that the proportion of the capture made by all the MSC UoA and the ANABAC fleet are very low, due to the application of measures and studies to increase survival of the species and a likely increased abundance of the species in the IO, direct effects of the UoA are highly likely to do not hinder the recovery of the species (GSA3.4.6), therefore it is considered that **SG60 and SG80 are met.** However, given the lack of results on the stock assessment and the abundance indices, there is not a high degree of confidence that there are no significant detrimental effects of the UoA**,** therefore **SG100 is not met.**

Oceanic whitetip shark (*Carcharhinus longimanus*): It has been estimated as being the 11th most vulnerable shark species to purse seine gear (IOTC 2021). According to the IOTC (2021), main fisheries targeting oceanic whitetip shark are troll line, gillnet and offshore gillnet. This species is reported in the Indian Ocean usually as a low-prevalent bycatch of the purse seine fishery (Ramos-Cartelle *et al.,* 2012). According to data sent by the client and gathered through independent observers on board the ANABAC vessels, the observed weight fraction (% of catch) during 2016-2020 was roughly 0,01%, which represents a negligible portion of total capture. Furthermore, during the same period the survival rate of the species was approximately 46%.

There is no quantitative stock assessment and limited basic fishery indicators available, therefore its stock status is unknown (IOTC, 2021). The IOTC reports that despite limited data, oceanic whitetip shark abundance has likely declined over recent years (IOTC, 2021). Tolotti *et al.,* (2015) reported a decline in the proportion of FADs with oceanic whitetip sharks present in the French tuna purse seine fishery operating in the western Indian Ocean, from 20% in the mid 1980s– 1990s, to less than 10% from 2005 to 2014. Due to the significant increase in FADs since the 1990s, this could be indicative of a significant population decline (Young and Carlson, 2020).

Nonetheless, given that the UoA is responsible for a small quantity of the total catches of oceanic whitetip in the Indian Ocean and there have been a 46% survival rate after capture and release through handling and release procedures, the known direct effects of the UoA are considered highly likely not to hinder recovery, **thus SG60 and SG80 are both met.** However, due to the very limited data of the fishery and uncertainty related to the status of the population, there is not a high degree of confidence that there are no significant detrimental effects of the UoA on the species**,** therefore **SG100 is not met**

Bigeye thresher shark *(Alopias superciliosus):* There is considerable uncertainty in the stock status given a lack of information necessary for assessment and the development of other indicators of the stock (IOTC, 2021). An ecological risk assessment (ERA) was conducted for the Indian Ocean in 2018 and it was determined that bigeye thresher shark has a low vulnerability ranking to purse seine gear due to its low susceptibility to this particular gear (IOTC, 2021). According to the data presented by the client, the average capture of this species by the fleet during 2016-2020 was 0,01 tonnes while other species identified as from the *Alopiidae* family comprised 0,04 tonnes in total during the same period. Therefore, due to the very low interaction that this species has with the UoA it is considered that direct effects of the UoA are highly likely to not hinder recovery of the species. **SG60 and SG80 are met**. However, due to considerable uncertainty in the stock status given a lack of information and misreporting, there is not a high degree of confidence that there are no significant detrimental effects of the UoA on the species**,** therefore **SG100 is not met**

Marine turtles: No stock assessments have been undertaken by the WPBE for marine turtles in the IO, due to the lack data submitted by CPCs, furthermore, current reported interactions are known to be severe underestimated (IOTC, 2021). Nonetheless, an Ecological Risk Assessment (Nel *et al.* 2013) estimated that approximately 250 marine turtles are caught by purse seine vessels with an estimated 75% of turtles released alive. Information provided by the client from on board observers reported interaction with 45 individuals during 2016-2020, from which approximately 91% of these were released alive (**Table 7.3.4g**). All marine turtles discarded death corresponded to non-identified species.

According to Garcia and Herrera (2019), purse seiners in the Indian Ocean are responsible for 0.3% fishing mortality for marine turtles between 2014-2016, this quantity is negligible when compared to other gears such as gillnets and coastal fisheries, where it is considered that reported interaction are severely underestimated.

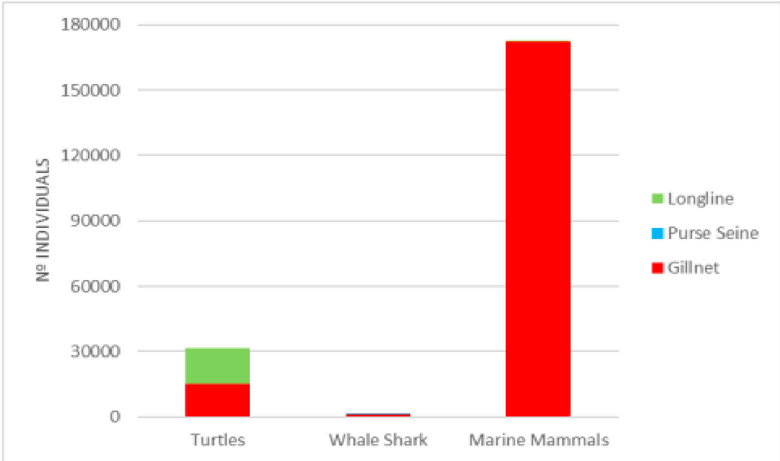

Fig.7.3.2.6a- preliminary estimates or marine turtles and other ETP species as incidental catch mortality to IOTC during 2014-16 (Source: Garcia and Herrera 2019)

According to this same research the contribution of purse seine fisheries to overall levels of marine turtle bycatch mortality vary depending on the species with Olive Ridley's accounting for 0.18% of the total mortality estimated, green turtle for 0.45%, loggerhead turtle for 0.78%, leatherback turtle for 0.48% and hawksbill turtle for 1.6%. However, these figures may overrepresent the contribution of purse seiners to marine turtle mortality because many fisheries and other sources of marine turtle mortality have not been covered (Garcia and Herrera, 2019).

Even though the impact of the UoA is low, ghost fishing also represents a risk since marine turtles have also been reported entangled on these devices. In that line, IOTC Resolution 19/02 entered into force in January 2020 and superseding Res 18/08. As previous Resolutions on FADs (Res13/08, 15/08, 17/08 and 18/08), Resolution 19/02 establishes procedures on a fish aggregating device (FAD) management plan, including more detailed specifications of catch reporting from FAD sets, and the development of improved FAD designs to reduce the incidence of entanglement of non-target species such as marine turtles. This CMM states that in order to reduce the entanglement of sharks, marine turtles or any other species, CPCs shall require their flagged vessels to use non-entangling designs and materials in the construction of FAD. Under the Code of Good Practice, it is contemplated the use of non-entangling FADs (NEFADs) as well as the application of best release operations for sensitive fauna, among others. Human observers must record data related to FAD, including not just FADs deployed but also FADs encountered on sea, which allows to register any entanglement and generate data on ghost fishing. These measures are aligned with Resolution 12/04 on the conservation of sea turtles, which requires a range of measures including, to the extent practicable to avoid the encirclement of turtles and to safely release all turtles, including those observed entangled in FADs. Vessels are encouraged to adopt FAD designs that reduce the incidence of entanglement of marine turtles and report all incidents and the fate of the turtle's following application of best-practice release measures. Guidance is also provided on the handling on sea turtles as part of the Code of Good Practices. Regarding marine turtles, the team considers that direct effects of the UoA are highly likely to not hinder recovery of the species, thus, **SG60 and SG80 are met**. However, given the absence of information coming from most part of the fisheries, which impedes to perform stock assessments and the critical misreporting of interaction there is not a high degree of confidence that there are no significant detrimental effects of the UoA on the species**, therefore SG100 is not met.**

Whale shark (*Rhincodon typus*): There are many large and well documented aggregations of whale sharks in the Indian Ocean (Reynolds *et al.,* 2021).Whale sharks are considered to aggregate several fish species due to their low swimming speed and surface behaviour such as tuna species and sometimes other sharks or mobulids (Escalle *et al*., 2018).Observers on board the ANABAC fleet during 2016-2020 reported interaction with 6 whale shark individuals from which one fatality was registered and 5 released alive. There are two reports that provide information of whale sharks interaction with the purse seine fleet in the Indian Ocean and could help to estimate the impact of the UoA on this species. The first one, one research made by Garcia and Herrera in 2018 estimated an average annual catch of whale sharks for all the IOTC fisheries during 2014 and 2016 at 1232 individuals per year, with an estimation of attributing roughly 2 individuals/years to purse seiners. On second one, developed by Ruiz *et al.,* (2018) reported a total of 24 whale shark interactions with EU fleet along 2008-2017, in this case one single mortality was registered.

Resolution 13/05 prohibits intentional purse seine setting on tunas associated with whale sharks, this provide a mechanism to avoid the fishing operation when this species is found and it is likely that along with the practices established in the Code of Good Practice have contributed to avoid high mortality rates. Given the information provided it is considered that direct effects of the UoA are highly likely to not hinder recovery of the species, thus, **SG60 and SG80 are met**. There is not a high degree of confidence that there are no significant detrimental effects of the UoA on the species**, SG100 is not met.**

Mantas and rays: According to Garcia and Herrera (2018), through research carried out to assess the contribution of purse seines to the overall bycatch in the IOTC during 2014-2016, it was estimated that the total mortality from purse seiners on this group is 0.1%. In relation to pelagic stingray, I was estimated that mortality originating from purse seines represented 0.001%, roughly 0.05 tonnes.

According to data obtained from observers on board the ANABAC fleet during 2016-2020, a total of 30,37 tons of mantas and rays were recorded as bycatch with a 55% mortality. Most captured species were devil rays and giant manta rays with an incidence of 64 and 39 individuals. Specific mortality for each group was registered at 48% and 62% respectively. Resolution 19/03 On the conservation of mobulid rays caught in association with fisheries in the IOTC area of competence asks to CPCs to prohibit all vessels from intentionally setting any gear type for targeted fishing of mobulid rays in the IOTC Area of Competence, if the animal is sighted prior to commencement of the set. In addition, the Code of Good Practice aims at reducing the associated mortality of this species and to apply the best handling and releasing techniques as well as the observer coverage on board is considered to provide a reliable source of data on mantas and rays interaction. Due to the low levels of interactions registered by the observers, it is considered that direct effects of the UoA are highly likely to not hinder recovery of the species, thus, **SG60 and SG80 are met**.

While there has been a global increase in research and data on mobulid rays in recent years, the existent knowledge of their interactions with pelagic tuna and tuna-like fisheries is still relatively limited (Martin, 2020). In addition, given the lack of assessments of manta or mobula populations in the IOTC, the rate of population reduction which appears to be high in several regions and the lack of sufficient knowledge of the ecology and spatial distribution of the species there is not a high degree of confidence that there are no significant detrimental effects of the UoA on the species**,** therefore **SG100 is not met.**

c	Indirect effects			
	Guide post		Indirect effects have been considered for the UoA and are thought to be **highly likely** to not create unacceptable impacts.	There is a **high degree of confidence** that there are no **significant detrimental indirect effects** of the UoA on ETP species.
	Met?		All ETP species - Yes	All ETP species - No
Rationale				

Potential indirect effects for ETP species may include:
a) Reduce availability of preys due to removal by the UoA;
b) Disturbance of nesting and,
c) Habitat modifications (Discussed in the Habitat PI).

Due to almost all the volume of capture is comprised by tuna species (less <1% corresponds to species different than tropical tunas) it is very unlikely that the UoA could disturb, for example, the feeding of planktivorous species such as whale sharks and giant manta rays. Also, species such as marine turtles feed mainly on algae, seaweed, seagrass, invertebrates and small fish. Mobula rays feed on small fish and crustaceans while sharks are considered opportunistic feeders with a varied diet including a range of teleosts other than tuna, stingrays, turtles, crustaceans, cephalopods, sea birds, etc. Given the fact that sharks are apex predators it is very unlike that the UoA affects the availability of its preys due to a significant removal by the UoA.

On the other hand, the fishery takes place in deep pelagic habitats, far from coastal areas where the nesting of ETP species such sea turtles occur. Also, the fishery does not take place in coral reefs which also could provide rest, feeding and shelter to many species. Thus, it is considered very unlikely that the UoA is producing indirect effects. Therefore, these indirect effects have been considered for the UoA and are thought to be **highly likely** to not create unacceptable impacts, **thus SG80 is met.** However**,** no available evidence or specific research have been found aimed at describing the potential for indirect effects, thus**SG100 is not met.**

References

Code of Good Practice (2020); Diallo *et al.,* (2019); Escalle *et al*., (2018); Garcia and Herrera (2018); IOTC (2021); Martin (2020); Nel *et al.,* (2013); Onandia *et al.,* (2021); Ramos-Carterlle *et al.,* (2021); Restrepo (2017); Reynolds *et al.,* (2021); Ruiz *et al.,* (2018); Tolotti *et al.,* (2015); Young and Carlson (2020).

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

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

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

Overall Performance Indicator score	
Condition number (if relevant)	

PI 2.3.2 – ETP species management strategy

PI 2.3.2	**The UoA has in place precautionary management strategies designed to:** - **meet national and international requirements;** - **ensure the UoA does not hinder recovery of ETP species.** **Also, the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of ETP species**			
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place (national and international requirements)			
	Guide post	There are **measures** in place that minimise the UoA-related mortality of ETP species, and are expected to be **highly likely to achieve** national and international requirements for the protection of ETP species.	There is a **strategy** in place for managing the UoA's impact on ETP species, including measures to minimise mortality, which is designed to be **highly likely to achieve** national and international requirements for the protection of ETP species.	There is a **comprehensive strategy** in place for managing the UoA's impact on ETP species, including measures to minimise mortality, which is designed to **achieve above** national and international requirements for the protection of ETP species.
	Met?	NA	NA	NA
Rationale				

According to MSC Fisheries Standard v2.01 SA3.11.2, "the team shall evaluate either scoring issue (a) or scoring issue (b) on the ETP management strategy". The UoA is not impacting ETPs species with national or international limits established, thus, SIa shall not be scored. SA 3.11.2.2 sets that where there are no requirements for protection and rebuilding provided through national ETP legislation or international agreements, SIb shall be scored.

b	Management strategy in place (alternative)			
	Guide post	There are **measures** in place that are expected to ensure the UoA does not hinder the recovery of ETP species.	There is a **strategy** in place that is expected to ensure the UoA does not hinder the recovery of ETP species.	There is a **comprehensive strategy** in place for managing ETP species, to ensure the UoA does not hinder the recovery of ETP species.
	Met?	Yes	Yes	No
Rationale				

IOTC measures relevant to purse seine fisheries and for each of the ETP species group are listed here below. A list of active CMMs is available at http://www.iotc.org/cmms.

Sharks:

- Resolution 17/05 established that CPCs shall take the necessary measures to require that their fishermen fully utilize their entire catches of sharks, with the exception of species prohibited by the IOTC.
- Resolution 18/02 asks CPCs to ensure that effective management measures are in place to support the sustainable exploitation of blue shark by improving data reporting and scientific research.
- Resolution 12/09 prohibits the retention on board of all species of thresher sharks, a group that is thought to be particularly vulnerable due to its low productivity.
- Resolution 13/05 prohibits intentional purse seine setting on tunas associated with whale sharks.
- Resolution 13/06 prohibits the retention of oceanic whitetip sharks.

- Resolution 19/02 calls for the use of non-entangling FADs in purse seine fisheries and a transition to biodegradable FADs by 2022.

Rays:

- Resolution 19/03 prohibits intentional setting on mobulid rays as well as retaining onboard, transhipping, landing, or storing any part or whole carcass. Live release handling procedures are detailed in the resolution.

Sea Turtles:

- Resolution 12-04 (which supersedes various prior measures) is specific to the conservation of sea turtles, and requires a range of measures including, to the extent practicable to avoid the encirclement of turtles and to safely release all turtles, including those observed entangled in FADs and to provide data on turtle bycatch to the SC. If a sea turtle is entangled in the net, the net roll should be stopped as soon as the animal comes out of the water; and the turtle should be disentangled without injuring it before resuming the net roll. Vessels are encouraged to adopt FAD designs that reduce the incidence of entanglement of marine turtles and report all incidents and the fate of the turtle's following application of best-practice release measures. Guidance is also provided on the handling on sea turtles as part of the Code of Good Practices (CGP, 2020).
- Resolution 19/02 calls for to the use of non-entangling FADs in purse seine fisheries and a transition to biodegradable FADs by 2022.

Sea birds:

- Resolution 12/06 is developed for longline fisheries however also requires IOTC members to provide data on interactions between fisheries and sea birds to the SC.

Cetaceans:

- Resolution 13/02 prohibits deliberate purse seine sets around cetaceans and requires reporting of interactions. However, "CPCs having national and state legislation for protecting these species shall be exempt from reporting to IOTC but are encouraged to provide data for the IOTC Scientific Committee consideration."

Monitoring and mitigation research:

- Resolution 10/04 established a regional observer program that requires at least 5% coverage for vessels over 24 m, and for smaller vessels operating in the high seas.

In addition, as mentioned before there is a Code of Good Practice in place. It reflects the practices implemented by the ANABAC fleet and also, the measures recommended and required by RFMOs and International legal instruments to make tuna purse-seining more selective and sustainable. It was most recently updated in May 2020 to include improvements based on the latest scientific findings. It is based primarily on the following points:
1. The design and use of FADs (fish aggregating devices) that do not entangle sensitive associated species (primarily turtles and sharks).
2. The development and application of release techniques that minimize risk to associated species and optimise their survival. This includes materials and equipment provided specifically for releasing associated species.
3. The application of a FAD management system through the implementation of a FAD logbook and requirement for a responsible use of FADs during their lifetime.
4. 100% observer coverage, including support vessels.
5. Training for fishing masters, crew and scientific observers.
6. Scientific verification of activities related with good practices and continuous revision by a steering committee.
7. The inclusion within the CGP for vessels and crew safe release procedures to follow for cetaceans and whale sharks.

Furthermore, the HELEA project is aimed to develop and test new tools that help to maximize the survival of sharks and rays when caught by tuna purse seiners and are practical to use onboard. Structures like metallic frame grids to release species manta rays and manual tools like handles and specially designed fasteners are being tested. This testing will help to measure their efficiency for manipulating tis bycatch while minimizing injury (thus increasing the likely to survive after released) and assuring crew safety. In addition, the efficiency of shark releases with and without hoppers and/or ramps will be evaluated. ANABAC, through the SIOTI FIP is also participating in the Echebastar Silky Shark Project. This project is promoting tagging studies on the silky shark, which is considered by far, the most impacted ETP species by the UoA.

Due to the group of regional conservation and management measures presented above that are considered to work in a cohesive and consequent manner with those developed and applied by the ANABAC fleet, it is considered that there is a **strategy** in place that is expected to ensure the UoA does not hinder the recovery of ETP species, therefore **SG60 and SG80 are met.** However, since more testing is needed to assure its compliance and the lack of information that exist of the status of many ETP species in the IO, it **cannot** be established that **SG100 is met.**

	Management strategy evaluation			
c	Guide post	The measures are **considered likely** to work, based on **plausible argument** (e.g. general experience, theory or comparison with similar fisheries/species).	There is an **objective basis for confidence** that the measures/strategy will work, based on **information** directly about the fishery and/or the species involved.	The strategy/comprehensive strategy is mainly based on information directly about the fishery and/or species involved, and a **quantitative analysis** supports **high confidence** that the strategy will work.
	Met?	Yes	Yes	Yes
Rationale				

The Code of Good Practice is independently reviewed by AZTI on a yearly basis. Its most recent update was in May 2020 and incorporates improvements based on the latest scientific findings. The availability of validated data of scientific observers' and its subsequent analysis allows the reliable assessment of the impact of the UoA. One of the strengths of the ANABAC Code of Good Practices and critical to test if the management strategy is achieving its objectives, is the coverage of the observer program. There has been a gradual implementation of the observer coverage on board ANABAC tuna purse seiners and in 2014, the Association voluntary agreed to have 100% observer coverage on board purse seiners and support vessels. In addition, coastal State observers are usually trained in monitoring compliance with the Code of Good Practices. In cases where coastal country observers do not follow the training, the coastal State observers reports against the requirements established by the coastal State that may include the collection of scientific data which is usually in accordance with the RFMO requirements.

The levels of observer coverage in the ANABAC fishery in the Indian Ocean have exceeded by far the recommendations of the IOTC (5%). As it has been mentioned, the difference from the existing coverage and the total observations available relies on the no recovery of the trip data or the no compliance with the standard quality required for the data to be included in the database. By removing sets where such discrepancies are found it has been estimated that the coverage represents the most conservative while still being on average 53% for the years 2016-2020. In 2016 the coverage was 27% of the production, raising to a maximum of 87% in 2017. The current strategy is mainly based on validated information coming directly from the fishery and its analysis supports an objective basis of confidence that the strategy will work, thus it is considered that **SG60 and SG80 are met.**

There is quantitative analysis that has been developed thanks to the availability of reliable information gathered by the Observers Program, some results have been presented to the WPDCS and have allowed to evaluate the impact of the Spanish fleet in the Indian Ocean, as well as provide a valuable source of information to address other fisheries. Therefore**,** quantitative analysis supports high confidence that the strategy will work**, thus SG100 is met.**

	Management strategy implementation			
d	Guide post		There is some **evidence** that the measures/strategy is being implemented successfully.	There is **clear evidence** that the strategy/comprehensive strategy is being implemented successfully and **is achieving its objective as set out in scoring issue (a) or (b).**
	Met?		Yes	No
Rationale				

AZTI is responsible for evaluating the implementation of the Code of Good Practice, and it does it in a yearly basis. Grande *et al.* (2019) gathered information on the progress made in terms of FAD use and the application of methods to release fauna during the period from 2015 to 2017 and presented alternative solutions within the context of the HELEA project. Results show that the voluntary implementation of the Good Practices is replacing traditional FADs with non-entangling FADs. It is noted that the ANABAC fleet is currently working on different projects in the Indian Ocean to test new FAD, where structures are made up with biodegradable non-entangling materials. According to the same research, bycatch release equipment has been designed in a collaborative work with fishers and is currently being tested. Grande *et al.* (2019) states that: “Based on the IATTC observer data, it was established that during the study period the percentage of specimens released alive increased in all species groups or at least was maintained at high levels”. It is considered that there is some evidence that the measures are being implemented successfully, thus **SG80 is met.** However, there is still a lack on the knowledge in the Indian Ocean related to mortality rates when specimens are released from FADs or discarded alive at sea. More research on these topics and necessary to the total UoA impact on ETP species mortality, therefore, cannot be stated that the strategy is achieving objectives set in SIa; **SG100 is not met.**

e	Review of alternative measures to minimise mortality of ETP species			
	Guide post	There is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of ETP species.	There is a **regular** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of ETP species 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 ETP species, and they are implemented, as appropriate.
	Met?	Yes	Yes	Yes
Rationale				

ANABAC reviews the different actions and activities undertaken in the Indian Ocean fishery through regular meetings of the ANABAC-Code of Good Practices Steering Group. There, measures are evaluated and then implemented as appropriate. Also, the Scientific Advisory Group (SAG) of the SIOTI-FIP meets on an annual basis to review the progress of the FIP. Then, results are discussed and where possible, new approaches are suggested.

A continuous review to test the potential effectiveness and possible use of alternative measures to minimise UoA-related mortality of ETP species is conducted in a continuous basis. This is carried out through the collaboration of ANABAC on several projects such as the HELEA, BIOFAD and FADWatch (Figure 7.3.2.6b). Also, within the framework of the SIOTI FI and collaboration with several stakeholders (ISSF, WWF, etc).

Implementation of this alternative measures has been realised thanks to the development of research studies, projects and the SIOTI-FIP. Also, when combined with the monitoring and reporting requirements along with species-specific measures adopted by the IOTC.

Given the information provided above, it is considered that there is a review of the potential effectiveness and practicality of alternative measures in a timeframe smaller than every two years. Also, the team considers that these measures are implemented as appropriate following the objectives of minimising the UoA-related mortality, therefore **SG60, SG80 and 100 are met**.

References

Code of Good Practice (2020); Grande *et al.,* (2019a); Grande *et al.* (2019b)

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

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

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

Overall Performance Indicator score	
Condition number (if relevant)	

PI 2.3.3 – ETP species information

<table>
<tr><td colspan="2">PI 2.3.3</td><td colspan="3">Relevant information is collected to support the management of UoA impacts on ETP species, including:
- Information for the development of the management strategy;
- Information to assess the effectiveness of the management strategy; and
- Information to determine the outcome status of ETP species</td></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td colspan="4">Information adequacy for assessment of impacts</td></tr>
<tr><td>Guide post</td><td>Qualitative information is adequate to estimate the UoA related mortality on ETP species.

OR

If RBF is used to score PI 2.3.1 for the UoA:
Qualitative information is adequate to estimate productivity and susceptibility attributes for ETP species.</td><td>Some quantitative information is adequate to assess the UoA related mortality and impact and to determine whether the UoA may be a threat to protection and recovery of the ETP species.

OR

If RBF is used to score PI 2.3.1 for the UoA:
Some quantitative information is adequate to assess productivity and susceptibility attributes for ETP species.</td><td>Quantitative information is available to assess with a high degree of certainty the magnitude of UoA-related impacts, mortalities and injuries and the consequences for the status of ETP species.</td></tr>
<tr><td>Met?</td><td>All ETP species - Yes</td><td>All ETP species - Yes</td><td>All ETP species - No</td></tr>
<tr><td colspan="5">Rationale</td></tr>
</table>

The average observer coverage during the period 2016-2020 on board the ANABAC fleet was 53%, comprising both EMS and human observers. This coverage surpasses the recommended level stipulated by the IOTC and allows to gather relevant quantitative data to assess the impact of the UoA on several species.

The observers program implemented by ANABAC provides detailed information on fishing operations, catch composition and its fate. Information considered for quantitative analysis has to comply with the minimum standards set by the IOTC. Human observers prioritise observations that collect data against the IOTC Regional Observer Scheme (ROS) minimum Standard reporting requirements. Electronic monitoring also allows for data collection with respect to bycatch and ecosystem and monitoring activities related to FAD operation. According to to Ruiz *et al*., (2016) EMS have been able to identify also FADs structure and the materials used for its construction.
The collected data has allowed to develop a research evaluating the specific impacts of the Spanish fishery in the Indian Ocean (Grande *et al.,* 2019a) as well as to support studies to address ETP impacts in other fisheries using observer data and other data requested from RFMOs. Therefore, it is considered that some quantitative information is adequate to assess the UoA related mortality and impact and to determine whether the UoA may be a threat to protection and recovery of the ETP species, thus **SG60 and SG80 are met**.

In order to have a high degree of certainty, at SG100 it is required that estimates of catch and UoA-related mortality of all species are quantitative and available with a high degree of certainty (GSA3.6.3). Given the absence of catch statistics, incomplete/poor quality datasets, it cannot be stated that the available information allows an assessment that provides a high degree of certainty of the effect of the UoA on ETP species, therefore **SG100 is not met**.

<table>
<tr><td rowspan="2">b</td><td colspan="4">Information adequacy for management strategy</td></tr>
<tr><td>Guide post</td><td>Information is adequate to support measures to</td><td>Information is adequate to measure trends and support</td><td>Information is adequate to support a comprehensive strategy to manage impacts,</td></tr>
</table>

		manage the impacts on ETP species.	a **strategy** to manage impacts on ETP species.	minimise mortality and injury of ETP species, and evaluate with a **high degree of certainty** whether a strategy is achieving its objectives.
	Met?	All ETP species - Yes	All ETP species - No	All ETP species- No

Rationale

Information is considered adequate to support measures, this is monitored and then regularly reported and reviewed. Thus, **SG60 is met**. But there is still a lack of data regarding survival of ETP species after releasement. Furthermore, there is only information available from 5 vessels of the UoA. It is not possible to say that information is adequate to measure trends a support a strategy to manage impacts on ETP species. Therefore, **SG80 is not met.**

References

Grande *et al.,* (2019a) Grande *et al.,* (2019b); Ruiz *et al.,* (2016)

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

Draft scoring range	**60-79**
Information gap indicator	*More data to be collected, statistics or/and research regarding the survival of ETP species after releasement; monitoring of interactions in the new vessels*

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

Overall Performance Indicator score	
Condition number (if relevant)	

PI 2.4.1 – Habitats outcome

PI 2.4.1		The UoA does not cause serious or irreversible harm to habitat structure and function, considered on the basis of the area covered by the governance body(s) responsible for fisheries management in the area(s) where the UoA operates		
Scoring Issue		SG 60	SG 80	SG 100
a	Commonly encountered habitat status			
	Guide post	The UoA is **unlikely** to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm.	The UoA is **highly unlikely** to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm.	There is **evidence** that the UoA is highly unlikely to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm.
	Met?	Yes	Yes	Yes
Rationale				

Both the FAD and FSC purse seine fishery take place in the epipelagic zone. The gear is set in deep water and does not come into contact with the seabed; also given their operational nature, size, and value, nets are rarely lost at sea. There is no evidence that there is any potential for significant adverse interaction with pelagic habitats and both Vessel Monitoring System (VMS) as well as observer records provide information on the location of fishing operations which are mainly located on the high seas. Pelagic waters are therefore, defined as the commonly encountered habitat and it is considered that the UoA is highly unlikely to reduce that structure and function of commonly encountered habitats, thus **SG60 and SG80 are met.**

Since quantitative evidence such as VMS records, logbooks and observers records clearly demonstrate the timing, depth and location of fishery as well as there are no records of vessel infringing the area restrictions outlined in the bilateral agreements there is evidence that the UoA is highly unlikely to reduce structure and and function of commonly encountered habitats, therefore **SG100 is met**.

b	VME habitat status			
	Guide post	The UoA is **unlikely** to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm.	The UoA is **highly unlikely** to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm.	There is **evidence** that the UoA is highly unlikely to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm.
	Met?	Yes	Yes	No
Rationale				

Coral reefs are considered as VME habitats due to their fragility, functional significance, and structure complexity (GSA3.13.3.2).

The Indian Ocean islands and archipelagos of island nations are characterized by an abundance of coral reefs. The use of FADs may result in damage to fragile habitats since it is likely that a drifting FAD could be lost and will eventually impact on coastal areas or reefs, if not retrieved on time. A drifting Fish Aggregating Device is defined as a device not tethered to the bottom of the ocean. It typically consists of a floating structure (such as a bamboo or metal raft with buoyancy provided by buoys, corks, etc.) and a submerged structure (made of old netting, canvass, ropes, etc.). According to Moreno *et al.,* 2019, FADs have two components: the raft or floatation component, and the tail, submerged under the raft. This research states that the impact of this objects is mainly a function of its size (volume and length) and mostly produced by the tail (which was shown to be increasing in length in some fleets.

Tuna catches associated to FADs, in case of the Spanish fleet, accounted for around 80% of the yearly catches in the Indian Ocean (Báez *et al.,* 2018). The concerns over the use of FADs are the same in each ocean basin, being considered a source of marine debris and causing potential impacts on coastal habitats as result of beaching events (Moreno *et al.,* 2019, Grande *et al.,* 2019a, Grande *et al.,* 2019b, Bromhead *et al.,* 2003; Hallier and Gaertner, 2008; Dagorn *et al.,* 2012; Filmalter *et al.,* 2013). The UoA has operating in the Indian Ocean 8 active vessels serviced by one support vessel. The activities of the supply vessel and the use of FADs are an integral part of the fishing effort exerted by the purse seine fleet. Resolution 19/02 establishes the maximum number operational buoys followed by any purse seiner at 300 and restricts the annual purchase of instrumented buoys to 500 for each PS vessel. Thus, for the UoA fleet a total of 2400 active buoys and maximum 4000 instrumented buoys are available annually. According to research by Maufroy *et al.* (2015) it was estimated that 9.9% of French FADs could end up beaching on the coasts of mainland or island nations in the Indian Ocean. Later, Davies *et al.* (2017) focused on the Seychelles and estimated a rate of 32.3% beaching likelihood during specific seasons. On the other hand, Zudaire *et al.* (2018), analysed the FAD-watch program focusing on the AGAC fleet and recorded beaching rates of 0.8% (98 of 12051 buoys recorded in the EEZ) and 0.6% (57 of 9638 buoys recorded in the EEZ) in 2016 and 2017 respectively.

The UoA has made efforts to reduce the impact of drifting Fish Aggregating Devices (FADs) on vulnerable habitats and the ecosystem by spearheading the transition to non-entangling and biodegradable FADs and by participating in the FAD Watch Program, a multi-sectorial initiative developed to prevent and mitigate FAD beaching across islands in Seychelles, in which the coastal recovery is applied as a mitigation measure. According to Zudaire *et al.,* (2018) the coastal FAD recovery, in combination with other mitigation measures, such as the use of biodegradable FADs and limitation of number of FADs, is one of the best options to be implemented in order to reduce the potential beaching events and the associated impacts. In the same research results showed that the beaching episodes in Seychelles differ from those predicted before by Maufroy *et al*. (2015) and Davis *et al*. (2017). Though a buoy track analysis, it was showed that from FADs tracked in EEZ of Seychelles, only 0.8% in 2016 and 0.5% in 2017 impacted the coast of the archipelago.

FADs are small and their potential impact would be proportionally on a small area of coast and/or coral reef. Taking into consideration a total coral reefs area of 27960 km^2 (https://www.icriforum.org/wp-content/uploads/2019/12/ICRI%20Indian%20Ocean%20Factsheet_0.pdf) and the small rate of FAD beaching events estimated, it is considered that the UoA is highly unlikely to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm, thus, **SG60 and SG80 are met.** Given the potential impact over a number of years and still limited understanding of the nature and extend of FAD impacts and beaching events, more evidence is needed to reach SG100.

c	Minor habitat status			
	Guide post			There is **evidence** that the UoA is highly unlikely to reduce structure and function of the minor habitats to a point where there would be serious or irreversible harm.
	Met?			No

Rationale

Rocky, sandy and muddy shorelines as well as abyssal plains, ridges and knoll are considered minor habitats. The possibility of the UoA having an impact on deep demersal habitats is quite low.

It is considered highly unlikely that lost FADs could reduce the structure and function of minor habitats as well as other deep, demersal habitats to a point where there would be serious or irreversible harm. However, it is likely that if FADs lost, they could eventually sink in deep water if they are not retrieved and do not ground on a coastline The team considers that still there is not enough evidence to meet **SG100.**

References

Báez *et al.,* (2018); Dagorn *et al.,* (2012); Davies *et al.,* (2017); Filmalter *et al.,* (2013); Grande *et al.,* (2019b);Halier and Gaertner (2008); Maufroy *et al.* (2015); Moreno *et al.,* (2019); Zudaire et al. (2018).

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

Draft scoring range	**≥80**
Information gap indicator	**More information sought / Information sufficient to score PI** *If more information is sought, include a description of what the information gap is and what is information is sought* • *FADs size and its potential impact on coral reefs (research, scientific literature)* • *Review updated rationals for 3SA Echebastar report*

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

Overall Performance Indicator score	
Condition number (if relevant)	

PI 2.4.2 – Habitats management strategy

PI 2.4.2		There is a strategy in place that is designed to ensure the UoA does not pose a risk of serious or irreversible harm to the habitats		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place			
	Guide post	There are **measures** in place, if necessary, that are expected to achieve the Habitat Outcome 80 level of performance.	There is a **partial strategy** in place, if necessary, that is expected to achieve the Habitat Outcome 80 level of performance or above.	There is a **strategy** in place for managing the impact of all MSC UoAs/non-MSC fisheries on habitats.
	Met?	All habitats - Yes	All habitats -Yes	No
Rationale				

Commonly encountered habitats: It is considered that that purse seiners targeting tuna does not have an impact on commonly encountered habitats (e.g., pelagic zone in deep oceanic waters). There is VMS information available that permits to track the vessels activity as well as a deployment of observers on board that ensures the location, depth and timing of fishing. A likely impact could result from the loss the loss of FADs that eventually could sink in deep water. However, vessels operating in the Indian Ocean are limited to 300 active FADs and CPCs (Spain and Seychelles) have been complying with the limit on number. This is verified through FAD logbooks and data coming from the suppliers of instrumented buoys. It is considered that these measures constitute a partial strategy for managing impacts on commonly encountered and minor habitats. Therefore**, SG60 and SG80 is met**.

Vulnerable Marine Ecosystem (VME): It is considered that the impact on this habitat may be caused by the loss of FADs that could sink or lead to beaching events. The management of FADs in place in the Indian Ocean, bolstered by the efforts of the ANABAC fleet, aims to reduce the likelihood and consequences of beaching events and other ecological effects of FADs through several specific measures which conforms a partial strategy:

Resolution 19/02 [which superseded Resolution 12/08, 13/08, 15/08, 17/08 and 18/08] relates to the established procedures for FAD management plans. CPCs are required to report the number of FADs deployed, transferred and lost annually and to complete the FAD logbook relating to fishing activities associated with FADs. FAD management plans include plans to prevent the loss or abandonment of FADs. Res. 19/02 further outlines the requirements for the use of non-entangling FADs and encourages the development and use biodegradable FADs. FAD tracking and recovery procedures are also detailed and are effective since 01 January 2020.

Since 2015 ANABAC has been involved in research intended to design and test biodegradable FADs and has supported and participated in the EU funded BIOFAD project in the Indian Ocean, a large-scale pilot to test biodegradable FADs with the target of deploying 1000 biodegradable and traditional FADs in the Indian Ocean.
Since 2019, ANABAC under the umbrella of SIOTI and AGAC, started working in the “FAD Watch programme”. This is a collaborative initiative developed to minimize the impact of FADs in the coastal ecosystems of Seychelles. The FAD-Watch project was the first multi-sectorial initiative developed to prevent and mitigate FAD beaching across islands in Seychelles. The proposed activities include the following:

- Avoidance of FAD beaching events.
- Removal of FADs from reefs and beaches.
- Collection of FADs.
- Proper disposal and/or recycling of FAD materials and satellite buoys.
- Continuous data collection describing the types of FADs and the impact caused.

All habitats: It cannot be considered and there is no evidence of such, that all the MSC UoA/ non-MSC fisheries apply the same measures mentioned above as part of a coordinated strategy, thus **SG100 is not met**.

b	Management strategy evaluation

	Guide post	The measures are **considered likely** to work, based on plausible argument (e.g. general experience, theory or comparison with similar UoAs/habitats).	There is some **objective basis for confidence** that the measures/partial strategy will work, based on **information directly about the UoA and/or habitats** involved.	**Testing** supports **high confidence** that the partial strategy/strategy will work, based on **information directly about the UoA and/or habitats** involved.
	Met?	Yes	Yes	No
Rationale				

<u>Common encountered habitats</u>: The purse seine fishery does not have an impact on commonly encountered habitats. There is no evidence that pelagic habitats may be impacted by purse seine net, and furthermore, there is negligible possibility that the gear would come in to contact with the seabed, due to the location and depth where fishing operations occurs. It is considered that there is objective basis for confidence that the partial strategy will work based on information directly about the UoA, therefore **SG60 and SG80 are met.**

<u>VME</u>: ANABAC complies in the implementation of the IOTC measures to reduce both the number of FADs deployed, it collaborates with different initiatives and projects aimed at transitioning to the use of biodegradable FADs and it is testing the use 100% non-entangling and biodegradable FADs to reduce the impact coral reefs.
Since 2019, ANABAC under the umbrella of SIOTI and AGAC, started working in the “FAD Watch programme”. This project is a initiative to minimize the impact of FADs in coastal ecosystems of Seychelles.

It is considered that there is objective basis for confidence that the partial strategy will work based on information directly from the UoA, thus **SG60 and SG80 are met**.

There has no been testing of the strategy for common encountered habitats and further testing need to be undertaken for VME, thus **SG100 is not met.**

c	Management strategy implementation			
	Guide post		There is **some quantitative evidence** that the measures/partial strategy is being implemented successfully.	There is **clear quantitative evidence** that the partial strategy/strategy is being implemented successfully and is achieving its objective, as outlined in scoring issue (a).
	Met?		Yes	No
Rationale				

<u>Commonly encountered, minor habitats and VME:</u> As required by Resolution 19/02, both CPCs Seychelles and the EU-Spain, submitted to the Commission annual Management Plans for the use of FADs in 2020 and 2021, these were analysed by the Commission. Both States have been complying with the limit set on the number of FADs and instrumented buoys to be acquired annually, FAD marking, data reporting and FAD tracking requirements.

In order to verify the implementation of the partial strategy there are several ways of verification:

(i) FAD logbooks are completed by every ANABAC fleet and sent to the flag State to be reported to the IOTC Secretariat;

(ii) The instrumented buoy suppliers send daily data on the number of active buoys per vessels and day to AZTI. AZTI acts as an independent verifier, compiling this information and reporting it to the fishing companies, ANABAC and the flag States. AZTI also collects information on the acquired instrumented buoys to verify the implementation of Res 19/02 in this regard.

Furthermore, there is quantitative evidence such as VMS and observers records that clearly demonstrate that the fishery operates in deep pelagic waters and there are no records of vessel not complying with the area restrictions outlined in the bilateral agreements. As mentioned before, several activities are carried out as part of multi-stakeholder initiatives (e.g, BIOFAD, FAD Watch program). Some results have been presented by Zudaire et al. (2019), providing some quantitative evidence that the partial strategy is being implemented Therefore, **SG60 and SG80 are met**. However, there is not enough clear evidence that these are reaching the objectives, thus **SG100 is not met.**

d	Compliance with management requirements and other MSC UoAs'/non-MSC fisheries' measures to protect VMEs			
	Guide post	There is **qualitative evidence** that the UoA complies with its management requirements to protect VMEs.	There is **some quantitative evidence** that the UoA complies with both its management requirements and with protection measures afforded to VMEs by other MSC UoAs/non-MSC fisheries, where relevant.	There is **clear quantitative evidence** that the UoA complies with both its management requirements and with protection measures afforded to VMEs by other MSC UoAs/non-MSC fisheries, where relevant.
	Met?	Yes	Yes	No

Rationale

Bilateral agreements signed between the European Union/Seychelles and coastal States allow the ANABAC fleet for fishing within the EEZs of those States but also, include prohibitions to fish in certain critical areas, such near to the coast or in the vicinity of submerged reefs, local anchored FADs or oceanographic buoys. There is quantitative evidence available such as VMS and observers records to support that the fishery does not operate in these areas infringing restrictions outlined in the bilateral agreements.

Although fishing does not take place in in close proximity to reefs, lost or abandoned FADs may impact on those habitats, in this regard both CPCs have been complying with the limit on number of FADs and instrumented buoys, FAD marking, data reporting and FAD tracking. Resolution 19/02 establishes the maximum number operational buoys followed by any purse seiner at 300 and restricts the annual purchase of instrumented buoys to 500 for each PS vessel. Thus, for the UoA fleet a total of 2400 active buoys and maximum 4000 instrumented buoys are available annually.
In order to verify the compliance, FAD logbooks are completed by every ANABAC vessels and then sent to the flag State which later submits the information to the IOTC Secretariat; in addition, the instrumented buoy suppliers report daily to AZTI on the number of active buoys per vessels and day.

Other MSC UoAs overlapping with the fishery include the the Echebaster Indian Ocean skipjack tuna purse seine fishery the CFTO Indian Ocean purse seine fishery and the AGAC Indian Ocean integral purse seine tropical tuna fishery. It is considered that there is some quantitative evidence that the UoA complies with both its management requirements and with protection measures afforded to VMEs by other MSC UoAs, therefore **SG60 and SG80 are met**. However, it cannot be said with high confidence that the fleet complies with other protection measures afforded to VME in the region by other MSC UoAs and non-MSC fisheries, thus **SG100 is not met.**

References

Juan Jorda (2019); Grande *et al.,* (2019a); Grande *et al.,* (2019b); Zudaire *et al.,* (2019)

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

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

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

Overall Performance Indicator score	
Condition number (if relevant)	

PI 2.4.3 – Habitats information

<table>
<tr><td colspan="2">PI 2.4.3</td><td colspan="3">Information is adequate to determine the risk posed to the habitat by the UoA and the effectiveness of the strategy to manage impacts on the habitat</td></tr>
<tr><td colspan="2">Scoring Issue</td><td>SG 60</td><td>SG 80</td><td>SG 100</td></tr>
<tr><td rowspan="3">a</td><td colspan="4">Information quality</td></tr>
<tr><td>Guide post</td><td>The types and distribution of the main habitats are broadly understood.

OR

If CSA is used to score PI 2.4.1 for the UoA:
Qualitative information is adequate to estimate the types and distribution of the main habitats.</td><td>The nature, distribution and vulnerability of the main habitats in the UoA area are known at a level of detail relevant to the scale and intensity of the UoA.

OR

If CSA is used to score PI 2.4.1 for the UoA:
Some quantitative information is available and is adequate to estimate the types and distribution of the main habitats.</td><td>The distribution of all habitats is known over their range, with particular attention to the occurrence of vulnerable habitats.</td></tr>
<tr><td>Met?</td><td>All habitats -Yes</td><td>All habitats -Yes</td><td>All habitats - No</td></tr>
<tr><td colspan="5">Rationale</td></tr>
</table>

The commonly encountered habitat is considered the epipelagic area of the Indian Ocean, where fishing takes place. Features of the pelagic area and oceanographic processes are documented (see 7.3.6 -Ecosystem).

Vulnerable Marine Ecosystem habitats are considered coastal and island coral reef, as well as reefs and habitats associated with seamounts. The distribution of coral reefs and the level of threat at which these are exposed its well documented (Figure 7.3.5b), and its vulnerability has been subject of different studies (see section 7.3.5 – Habitat). In addition, the nature and extent of fishing operations by the fleet is known and monitored through observers, VMS and EMS. The number and deployment of FADs is controlled and complies with relevant management measures. The ANABAC fishery only accounts for a small proportion (about 12 %) of the dFADs deployed in the IO. The team considered that the nature, distribution and vulnerability at a level of detail to the scale and intensity is known. Therefore,**SG60 and SG80 are met**. However, it cannot be affirmed that the distribution of all habitats is known over the range with particular attention to the occurrence of vulnerable habitats, thus **SG100 is not met.**

<table>
<tr><td rowspan="2">b</td><td colspan="4">Information adequacy for assessment of impacts</td></tr>
<tr><td>Guide post</td><td>Information is adequate to broadly understand the nature of the main impacts of gear use on the main habitats, including spatial overlap of habitat with fishing gear.

OR

If CSA is used to score PI 2.4.1 for the UoA:
Qualitative information is adequate to estimate the consequence and spatial attributes of the main habitats.</td><td>Information is adequate to allow for identification of the main impacts of the UoA on the main habitats, and there is reliable information on the spatial extent of interaction and on the timing and location of use of the fishing gear.

OR

If CSA is used to score PI 2.4.1 for the UoA:
Some quantitative information is available and is adequate to estimate the consequence</td><td>The physical impacts of the gear on all habitats have been quantified fully.</td></tr>
</table>

			and spatial attributes of the main habitats.	
	Met?	Commonly encountered habitats – Yes VME – Yes Minor - Yes	Commonly encountered habitats – Yes VME – No Minor - Yes	All habitats - No
Rationale				

Commonly encountered and minor habitats: Due to the features of commonly encountered and minor habitats, it is highly unlikely that there will be any main impacts of the gear on the pelagic and demersal ecosystem. VMS and the level of observer coverage on board is considered to effectively track the vessel movements and operations as well as providing information on likely impacts. Therefore, in the case of this type of habitat, information is adequate to allow for the identification of main impacts, furthermore information is reliable on the spatial interaction, timing and location, thus **SG60 and SG80 are met.**

VME: The documented distribution of coral reefs in the Indian Ocean and the data from observers and VMS provide reliable information on location and timing of fishing operation, hence some evidence on the likely spatial overlap of VME habitats with lost FADs. However, information on lost or sink drifting FADs may not be completely available. Also, the impact of beaching events and retrieve rates has been subject of research in some areas of the Indian Ocean (i.e., Seychelles) but just provide estimates that have to be further analyzed in deep. It is considered that at this point, information is adequate just to broadly understand the nature of gears on the habitat. Thus, **SG60 is met** but **SG80 cannot be met.**

The physical impact of the gear on all habitats have not yet been fully qualified, therefore **SG100 is not met**.

c	Monitoring			
	Guide post		Adequate information continues to be collected to detect any increase in risk to the main habitats.	Changes in all habitat distributions over time are measured.
	Met?		All habitats - Yes	All habitats - No
Rationale				

There are tools in place that permit to continuously collect quantitative and qualitative information and to detect any increase in risk to main habitats, such fishing and FAD logbooks, VMS, daily records from human and electronic observers and FAD management plans. AZTI acts as verifier and receives daily data on the number of active buoys per vessels and day, then, compiles and reports this information it to the fishing companies, ANABAC and the flag States. In addition, AZTI also collects information on the acquired instrumented buoys to verify the implementation of Res 19/02.

Information about the interactions with FADs are compiled routinely by human observers, including fishing area, number of FADs set and retrieved and features. Thus, the team considers that **SG80 is met,** however, changes in all habitat distributions over time are not measured; little information is available for pollution coming from fishing vessels and here is almost no monitoring of coastal and deep-ocean habitats thus **SG100 cannot be met.**

The CAB shall list any references here, including hyperlinks to publicly-available documents.

Table 7.3.7e.- Scoring calculation for each scoring element:

Scoring elements	SIa	SIb	SIc	PI score	Final score
Commonly encountered habitats	80	80	80	80	75
VME	80	60	80	75	
Minor habitats	80	80	80	80	

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

Draft scoring range	**60-79**
Information gap indicator	• Data on lost and location of sinking FAD • Complete map of VME in the Indian Ocean

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

Overall Performance Indicator score	
Condition number (if relevant)	

PI 2.5.1 – Ecosystem outcome

PI 2.5.1		The UoA does not cause serious or irreversible harm to the key elements of ecosystem structure and function		
Scoring Issue		SG 60	SG 80	SG 100
a	Ecosystem status			
	Guide post	The UoA is **unlikely** to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	The UoA is **highly unlikely** to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.	There is **evidence** that the UoA is highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.
	Met?	Yes	Yes	No
Rationale				

According to Table SA8 (MSC Fisheries standard v2.01), serious or irreversible is understood as the reduction of key features most crucial to maintaining the integrity of its structure and function and ensuring that ecosystem resilience and productivity is not adversely impacted. The ecosystem component addresses system-wide issues, primarily impacted indirectly by the fishery, including ecosystem structure, trophic relationship and biodiversity (GSA3.13). Key ecosystem elements may include *trophic structure and function* (in particular key prey, predators, and competitors), *community composition, productivity pattern and characteristics of biodiversity* (GSA3.18.1).

The variability of oceanographic conditions and climate change can impact the state of the ecosystem and all its components, including the productivity of the system and the upper trophic levels of the marine food web (Juan-Jorda *et al.,* 2019).The long-term analysis of oceanographic data has already showed that the western Indian Ocean has been warming up for more than a century at a rate faster than any other ocean (Chassot *et al.,* 2018), resulting in a decrease of primary productivity. Drivers of productivity in the western Indian Ocean are linked to its unique association with the northern land mass boundary creating characteristic differences in upwelling processes when compared to other ocean basins. For example, projection under different warming scenarios have suggested the strengthening of the Somali coastal upwelling due to a stronger difference in the ocean-land thermal gradient and a weakened mixing of nutrients at a regional scale caused by an enhanced ocean stratification (Roxy *et al.,* 2016; deCastro *et al.,* 2016). Changes in marine ecosystems due to warming could deteriorate the habitat of tuna and modify their abundance and distribution (Chassot *et al.,* 2018). The effect of large scale climatic and oceanographic physical forcing, including climate change, on ecosystem productivity and the dynamics of tunas have been relatively well investigated and some aspects are well understood but t it remains to connect this pool of knowledge with operational fisheries management (Juan-Jorda, 2021). The Indian Ocean is climatologically active on a scale far greater than possible for the ANABAC purse seine fishery to directly or indirectly affect its productivity, however, there are areas that overlap the fishing grounds that play a key role in tropical tuna fisheries, such as the Northern Mozambique Channel (Chassot *et al.,* 2018).

The degree in which a fishery can affect the structure and function of marine ecosystems not just depends on the total biomass removed but also on the catch composition, the ecological role of species in the food web and their life history characteristics (Gerrodette *et al.,* 2012). In the case of purse seiners, catch from sets on FSC and FOB differ in the amount of biomass removed and the species composition. Andonegi *et al.* (2019) examined the effects of the EU-Seychelles purse seine fishery targeting tunas in the western Indian Ocean and addressing the food web/trophic relationship component using a set of ecosystem metrics based on the total removal by the fishery (retained and non-retained catches) and the ecological role of the species being removed. Data was composed of detailed fishery statistics and observer data from the purse seine fishery (composed by the Spanish, French and Seychellois fleets operating in the western Indian Ocean as available. IOTC data set provided annual landings from the 1980's for the purse seine fishery including the retained catch of the targeted tropical tunas and the retained catch of some of the non-targeted fish species such as small tunas, other bony fish, sharks, rays, etc. In addition, to monitor the total biomass removed by the fishery, the total bycatch of the purse seine fishery operating in the western Indian Ocean from 2008 to 2017 was estimated using the data collected by observers onboard. It was found that within the last 10 years, the target species (skipjack, yellowfin and bigeye tuna) contributed to 99.09% of the total retained catch, while the non-targeted retained component of the catch (principally small tunas and other bony fishes) contributed to 0.9%. Fishing on floating objects shows the highest catch ratios and total discards in weight contributed to 2% on average of the total biomass removed. The quantity of discards in weight in the purse seine tuna fisheries targeting tropical tunas is relatively low (less than 3% on average between 2008 and 2017) compared to the discards of other gears, however, the fishery still needs to continue improving the survival rates of the sensitive species that are released at sea, and it also remains to be understood the impacts of the total removal by the fishery on the ecosystem with regards to the total biomass removed, its size composition and the trophic levels and life history of the species (Gerrodette *et al.,* 2012; Andonegi *et al.,* 2019). On the same study made by Adonengi *et al.,* (2019) it was analyzed the mean trophic level of catches (MTLc) and it was found that for the retained component of the catch, the MTLc removed by FSC was 5.2 whereas for fishing on FOB it was 4.9. Also, it was observed a decrease in the MTL of catches made on the FOB sets since 2011. Both differences can be explained by the increase in catches of skipjack tuna that occupies a lower trophic level and is the main species target by FAD-fishing and furthermore by the increasing proportion of species with even lower trophic levels (such small tunas, juvenile tunas, mackerels etc). In the case of the non-retained component of the catch, the mean trophic levels removed by the two fishing methods was the same (4.69 for both, FSC and FOB), with a slightly decreasing trend in FOBs. This was attributed due to the decrease in the discards of species with higher trophic levels (YFT, BET, SKJ) and an increasing tendency in discarding albacore, small tunas, mackerels and Carangidae species (Adonengi et al 2019). It is not clear that a decline in the mean trophic level of the catches would not create serious or irreversible harm to the ecosystem structure and functioning.

A topic that has been raised in tuna purse seine fisheries is the development of an ‘ecological trap' as a result of the extensive use of FADs. The ecological trap results from species choosing habitats that previously conferred an evolutionary advantage, but which have become maladaptive owing to recent changes in the environment (Marsac *et al.,* 2000, Dagorn *et al.,* 2012). It concerns that high levels of FADs deployment could alter the migratory paths of tunas and other species and hence, influence on features such as growth and reproduction (e.g., Marsac *et al.,* 2000). There has been considerable research (experimental tagging studies, and studies using fisher's echosounder buoy data) examining the effects of FADs (mostly presence of dFADs) on the behaviour, movement patterns and their consequences on the biology of una species (e.g., growth). However, Juan- Jorda (2021) states that more studies are required to better understand the effects of the increasing number of dFADs and FAD densities on the behaviour and movement patterns of tunas. Comparatively the ecological impact that FAD may have on the genetic, biology and ecology of the non-targeted tunas (e.g. sharks) remains poorly known.

In perspective, as the ANABAC fishery only accounts for a small proportion (about 12 %) of the dFADs deployed in the IO, it may be inferred that it is highly unlikely to disrupt the behaviour, movements patterns and condition of pelagic species to a point where there would be a serious irreversible hard, therefore **SG60 and SG80 are met**. However, there is no hard evidence of this, thus **SG100 is not met.**

References

Andonegi *et al.* (2019); Chassot *et al.,* (2018); Dagorn et al., (2012); Juan Jorda (2019); Juan Jorda (2021); Marsac *et al.,* (2000)

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

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

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

Overall Performance Indicator score	
Condition number (if relevant)	

PI 2.5.2 – Ecosystem management strategy

PI 2.5.2	**There are measures in place to ensure the UoA does not pose a risk of serious or irreversible harm to ecosystem structure and function**

Scoring Issue		SG 60	SG 80	SG 100
a	**Management strategy in place**			
	Guide post	There are **measures** in place, if necessary which take into account the **potential impacts** of the UoA on key elements of the ecosystem.	There is a **partial strategy** in place, if necessary, which takes into account **available information and is expected to restrain impacts** of the UoA on the ecosystem so as to achieve the Ecosystem Outcome 80 level of performance.	There is a **strategy** that consists of a **plan**, in place which contains measures to **address all main impacts of the UoA** on the ecosystem, and at least some of these measures are in place.
	Met?	Yes	Yes	No
Rationale				

There is a set of measures that collectively constitute a partial strategy to restrain the potential impact of the UoA on the ecosystem:

Management of FADs has been set since 2012 when Resolution 12/08 was enacted. Currently Resolution 19/02 on Procedures on a Fish Aggregating Devices (FADs) Management Plan restricts the number of dFADs equipped with instrumented buoys deployed by any vessel. In addition, establish that CPC shall require to their flagged vessels to use non-entangling designs and materials in the construction of FADs, apply a FAD marking scheme, FAD tracking and recovery procedures.

Resolution 19/05 on a ban on discards of bigeye tuna, skipjack tuna, yellowfin tuna and non-targeted species caught by purse seine vessels in the IOTC area of competence. The resolution further requires all CPC purse seine vessels to retain on board and then land, to the extent practicable, other tunas, rainbow runner, dolphinfish, triggerfish, billfish, wahoo, and barracuda with the same exceptions as for the target species.
IOTC Resolution 11/04 on a regional observer scheme requires an observer coverage of at least 5 % on the number of operations/sets for each gear type by the fleet of each CPC. ANABAC, through the Code of Good Practice complies and exceed this requirement applying a 100% coverage.

Additional measures are set under the framework of the Code of Good Practice. Within the code, ANABAC compromises to comply with measures aimed at applying the best fishing practices, for example, by reducing incidental mortality of sensitive species (sharks, rays, mantas, whale sharks, and sea turtles) and the obligatory use of non-entangling FADs. The good practices defined in this agreement also comprises best releasing practices for vulnerable fauna, 100% observer coverage in purse seines, continued training of fishing crew and scientific observers, and the implementation of a FAD logbook (Lopez *et al.,* 2017). the code was reviewed in 2015, 2017, 2019 and 2020 (current version). The agreement deals with the following topics:
1) The design and use of non-entangling FADs (fish aggregating devices) to minimize direct impacts on sensitive non-target species (mainly turtles, sharks and cetaceans).
2) The development, training and adoption of good practices on board to ensure the application of releasing techniques that minimize risk to associated species and optimize their survival. This includes materials and equipment provided specifically for releasing associated species.
3) The implementation of a FAD management system through the implementation of a FAD logbook.
4) 100% observer coverage.
5) Training of skippers, crew and scientific observers.
6) Scientific verification of activities related with good practices and continuous revision by a Steering Committee.

There is a partial strategy in place which takes into account available information and is expected to restrain impacts, therefore **SG60 and SG80 are met**, however, a clear strategy consisting of a plan which contains measure to address all main impacts of the UoA on the ecosystem has not been defined. **SG100 is not met**.

b	**Management strategy evaluation**			
	Guide post	The **measures** are considered likely to work,	There is **some objective basis for confidence** that	**Testing** supports **high confidence** that the partial

		based on plausible argument (e.g., general experience, theory or comparison with similar UoAs/ ecosystems).	the measures/ partial strategy will work, based on some information directly about the UoA and/or the ecosystem involved.	strategy/ strategy will work, based on information directly about the UoA and/or ecosystem involved.
	Met?	Yes	Yes	No
Rationale				

It is considered that there is a set of measures that address some potential issues that could impact on the Indian Ocean ecosystem. In addition, continuous efforts in research and investigations about the purse seine fishery in the IO are carried out with AZTI, in order to improve the knowledge and understanding of the impacts on key components of the ecosystem.

Firstly, ANABAC and the flag States (EU and Seychelles) are involved in the IOTC decision making process and has taken a precautionary approach in their harvest policy and fishing practices. In the case of FADs, ANABAC has taken part in initiatives regarding its construction, recovery and tracking, FAD-fishing. These initiatives are aimed to reduce the potential impacts of FADs on the habitat, bycatch and behaviour of species, and are part of the objectives set within the Code of Good Practice.

ANABAC fully applies the IOTC management measures to control the total removals of yellowfin, bigeye and skipjack There are also specific management measures in place for other species caught by the fishery that also play an important role in the ecosystem (see ETP, primary and secondary species). By regulating, recording the mortality and identifying the target and non-target species as well as applying the precautionary approach, the management measures consider the potential impacts of the UoA on the ecosystem. These measures and methods are analysed, partial results tracked on regular meetings, updates of assessments developed to support scientific research and are expected to restrain the impacts of the fishery.

ANABAC also complies with reporting requirements set by the IOTC, has a 100% coverage of observers and holds valid licenses for its fleet. This fishing activity is fully monitored by the EU and the Seychelles and there has been no suggestion nor evidence that it is engaging in any IUU fishing.

There is an objective basis for confidence that the measures to reduce the impact of purse seine on the environment will work and that is based on information directly about the fishery thus, **SG60 and SG80** are met. However, testing does not support yet for high confidence**, SG100 is not met.**

c	Management strategy implementation			
	Guide post		There is **some evidence** that the measures/partial strategy is being **implemented successfully**.	There is **clear evidence** that the partial strategy/strategy is being **implemented successfully and is achieving its objective as set out in scoring issue (a).**
	Met?		Yes	No
Rationale				

ANABAC is successfully implementing the different measures enacted by the IOTC and its Code of Good Practice. These measures have allowed to reduce the overall bycatch rate, to decrease interaction and mortality of ETP species and to avoid harm on different habitats within the Indian Ocean. This information has been specifically presented in detail on the previous PI of Primary species, Secondary species, ETP and Habitat.
The compliance of the fleet with best practices is monitored by AZTI programme which also verifies compliance with the Code of Good Practice. Also, compliance with IOTC conservation and management measures (such as FAD limits etc) is reported by flag States within annual reports to the RFMO. All other activities are carried out as part of multi-stakeholder initiatives (BIOFAD, INNOV FAD, FAD Watch) where quantitative results are presented on a regular basis (e.g. Zudaire *et al.* (2019)). The team considers that **SG80 is met**, however there is still a lack of clear evidence that the partial strategy/strategy is being implemented successfully, therefore **SG100 is not met.**

References

Code of Good Practice (2020); Juan Jorda (2019); Juan Jorda (2021); López *et al.,* (2017); Zudaire *et al.,* (2019)

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

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

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

Overall Performance Indicator score	
Condition number (if relevant)	

PI 2.5.3 – Ecosystem information

PI 2.5.3		There is adequate knowledge of the impacts of the UoA on the ecosystem		
Scoring Issue		SG 60	SG 80	SG 100
a	Information quality			
	Guide post	Information is adequate to **identify** the key elements of the ecosystem.	Information is adequate to **broadly understand** the key elements of the ecosystem.	
	Met?	Yes	Yes	
Rationale				

Over recent years, data has been collected and studies completed to improve understanding of the ecological impacts of fishing on the structure and function of the IO pelagic ecosystem. Examples are: data on bycatch composition and quantities through the fishery observer programme, trophic analyses (e.g. stomach contents, stable isotopes), behavioural studies with tagging programs, and the definition of ecological indicators (e.g. trophic based and size based indicators) to monitor the potential impact of tuna removals from the ocean (Andonegi et al. 2019; Juan-Jordá et al. 2019).

According to Juan-Jordá (2021), this information indicates that it is possible to identify and describe what are the main ecological impacts of the fishery and what ecosystem elements and attributes need to be monitored to assess the impacts:

• The ecological impacts of fishery removals of top predators on the structure and function of marine ecosystem (ecosystem elements: i.e., the impact of removals on the biomass of ecological community, size structure of the ecological community, trophodynamics of ecological community)
• The effect of natural environmental variability (including climate change) on ecosystem productivity and tuna dynamics (ecosystem elements: i.e, effect of environmental and climate scenarios of temperature, salinity, chlorophyl-a, oxygen, on tuna dynamics)
• The ecological impact of FAD uses on the genetic, biology and ecology of species (tunas and non-tunas) on the genetic, biology and ecology of species (ecosystem elements: i.e. the impact of FAD use on the genetic, biology and ecology of species)

Thus, **SG60 is met**.

100% observer coverage for the UoA and many other industrial purse seine fleets operating in the IO (including all those certified by the MSC) has improved the understanding of bycatch composition and quantities, is increasing the availability of relevant data and is allowing bycatch studies to be conducted at relevant temporal and spatial scales.

At the scale of the IO, considerable research has focused on understanding (i) the changes in ocean circulation, temperature, salinity, stratification and production in the IO (Marsac 2017) and (ii) how natural environmental variability and climate change affect the dynamics of top predators such as tunas (Marsac 2017; Erauskin-Extramiana et al. 2019). In addition, (i) experimental tagging studies have examined the effects of dFADs on tuna species behaviour and (ii) studies using the fisher's echo-sounder buoys data to study collective dynamics of fish aggregations (instead of using the data from tagging individuals) around dFADs (Hall & Roman 2013; Lopez et al. 2017; Pérez et al. 2020).

On the other hand, trophic and ecological indicator analysis continue to be conducted on a project-by-project basis by individual. This has resulted in studies that are not continuous in space and time, which limits the integration of knowledge at the regional level of IOTC (Juan-Jordá, 2021). Extensive trophic studies have not been undertaken on tropical tuna species to understand their role as a key predator and prey species within foodweb in the IO. Compared to the Atlantic and Pacific Ocean, there have been relatively few research studies studying the trophic ecology for IO tuna species, species interactions and their ecological role in the food web (Olson et al. 2016). The development and use of ecosystem models in the Indian Oceans to inform fisheries management of top predatory species is still at its infancy (Juan-Jordá et al. 2019). This means there is relatively limited understanding of the linkages between functional groups and how these may be affected by IO fisheries.

Despite current constraints in certain topics, the review prepared by Juan-Jordá (2021) indicates that current level of information is adequate to broadly understand the key elements of the ecosystem. Thus, **SG80 is met.**

b	Investigation of UoA impacts			
	Guide post	Main impacts of the UoA on these key ecosystem elements can be inferred from existing information, but **have not been investigated** in detail.	Main impacts of the UoA on these key ecosystem elements can be inferred from existing information, and **some have been investigated in detail**.	Main interactions between the UoA and these ecosystem elements can be inferred from existing information, and **have been investigated in detail**.
	Met?	Yes	Yes	No
Rationale				

As already presented in SI(a), Juan-Jorda (2021) identifies the following key ecosystem elements in the IO in relation to assessing the impact of tuna fisheries:

1) The ecological impacts of fishery removals of top predators on the structure and function of marine ecosystem (ecosystem elements: i.e. the impact of removals on the biomass of ecological community, size structure of the ecological community, trophodynamics of ecological community)
2) The effect of natural environmental variability (including climate change) on ecosystem productivity and tuna dynamics (ecosystem elements: i.e. effect of environmental and climate scenarios of temperature, salinity, chlorophyl-a, oxygen, on tuna dynamics)
3) The ecological impact of FAD uses on the genetic, biology and ecology of species (tunas and non-tunas) on the genetic, biology and ecology of species (ecosystem elements: i.e. the impact of FAD use on the genetic, biology and ecology of species)

An assessment of whether the main impact of the UoA on these key ecosystem elements can be inferred from existing information, together with the level of investigation achieved on each of them, is presented below. The assessment is based on the review prepared by Juan-Jordá (2021).

1) The ecological impacts of fishery removals:

Trophic-based or size-based ecosystems of the pelagic food web in the IO is in its infancy. Thus the western IO lacks a reliable ecosystem model that examines the potential ecological impacts of fishery removals of top predators (or the effects of the environment) on the ecosystem function and structure of the ecosystem. However, modelling work in other oceans, mainly the PO, allows understanding of the pelagic food web dynamics and the impact of predatory removals on the foodweb dynamics in the IO.

The main impacts of Echebastar fishery removals of top predators may be inferred from:

- Vessel logbooks and observer data,
- IOTC tuna stock assessments,
- Some preliminary ecological indicators from the monitoring of impacts of purse serine biomass removals, and
- Understanding of ecosystem dynamics using several ecosystem models carried out in other oceans, that together contribute an understanding of the potential ecological effects of purse seine fishery removals of predatory fishes on the structure and function**.**

2) The effect of natural environmental variability:

The Standard states that "*UoAs should be capable of adapting management to environmental changes as well as managing the effect of the UoA on the ecosystem*" and "*Monitoring the effects of environmental change on the natural productivity of the UoAs should be considered best practice and should include recognition of the increasing importance of climate change*".

Considerable research allows understanding of the importance of physical and biological drivers in tuna distributions, tuna dynamics (recruitment processes) and tuna catchability in the IO (Marsac 2017).

Based on current knowledge and research, a qualitative expert system approach can infer the potential impacts of environment and climate on tuna (Marsac 2017), despite the absence of quantitate integrated ecosystem models for the IO.

3) The ecological impact of FAD use:

Experimental tagging studies have examined the effects of dFADs on tuna species behaviour. In addition, research using data from fisher echo-sounder buoys has studied the collective dynamics of fish aggregations around dFADs in the IO and elsewhere (Lopez *et al.* 2017; Pérez *et al.* 2020). These allow inference of the impact of dFAD use on species behaviour, migrations and biology.

Based on all the information presented above, the team considers that **SG60 and SG80 are met**, since main impacts of the UoA on the 3 key ecosystem elements identified can be inferred from existing information, and some have been investigated in detail.

However, there is a lack of ecosystem models (EwE, SEAPODYM, APECOSM) in the IO to (i) investigate the joint effect of environment and fishing on tuna species, and (ii) project changes in tuna distributions in response to climate change. Besides, incorporating environmental and climate change into the fisheries management decision making process requires the support of research to understand the links between environmental variability and climate change on the productivity of the ecosystem, including the potential impact on tuna distribution and populations dynamics, and monitor any changes. To-date this has not been investigated in detail.

Also, there remain conflicting interpretations and results on the behavioural impacts of dFADs on tunas and the potential consequences on their biology (Dagorn *et al.* 2013; Lopez *et al.* 2017). While the Echebastar fishery only accounts for a small proportion of the dFADs deployed in the IO, there is limited understanding of (i) the influence of dFADs on the residency of tunas and other non-tuna species, and (ii) how the increased number of dFADs is affecting the school sizes of tunas and other species that may impact their behaviour, migration and biology. The impacts of FAD use on behaviour, migrations and biology, and the effects of increasing number of dFADs and dFAD density on the behaviour and biology of the species being aggregated are subject of active research and only some have been investigated in detail.

Thus, **SG 100 is not met.**

c	Understanding of component functions			
	Guide post		The main functions of the components (i.e., P1 target species, primary, secondary and ETP species and Habitats) in the ecosystem are **known**.	The impacts of the UoA on P1 target species, primary, secondary and ETP species and Habitats are identified and the main functions of these components in the ecosystem are **understood**.
	Met?		Yes	No
Rationale				

The main functions of the components of the ecosystem (P1 target species, primary, secondary and ETP species and Habitats) are known as related to the FAD and FSC sets types. Sufficient information is available to identify the range of species that are impacted and know their respective roles e.g. as key low trophic level species, higher trophic level prey species, forage species, predators and potential roles in transfer of energy and nutrients between various pelagic habitats (epipelagic, mesopelagic, bathy-pelagic) or between pelagic and demersal habitats. Additionally the habitats functions are known. Thus, **SG80 is met.**

The impacts of the UoA on P1 target species, primary, secondary and ETP species and Habitats have been identified and quantified. However, the main functions of those components in the ecosystem are not fully understood. **SG100 is not met.**

d	Information relevance			
	Guide post		Adequate information is available on the impacts of the UoA on these components to allow some of the main consequences for the ecosystem to be inferred.	Adequate information is available on the impacts of the UoA on the components **and elements** to allow the main consequences for the ecosystem to be inferred.

	Met?		Yes	No
Rationale				

Information is available from a number of sources including dedicated research projects regarding the impact of FAD fishing on the ecosystem. Significant quantities of data are available from the observer program that monitors over 60% all sets made by the Echebastar fleet thus allowing for bycatch and interaction trates and shifts in bycatch composition to be measured. Consequences for some of the ecosystem components can be inferred from the information collected. **SG80 is met.**

Not all elements of the ecosystem are fully understood and there is likely additional information that can be collected and subsequent research to be undertaken (such as understanding ecosystem impacts of changes to the mean trophic level of catches, changes in abundance of mid-trophic level species) and further research regarding the potential impacts of high FAD densities in certain regions of the fishing grounds that could aid in understanding the impacts of the UoA on the elements of the ecosystem. **SG100 is not met**

e	Monitoring			
	Guide post		Adequate data continue to be collected to detect any increase in risk level.	Information is adequate to support the development of strategies to manage ecosystem impacts.
	Met?		Yes	No
Rationale				

An assessment for each of the 3 key ecosystem elements identified in Juan-Jordá (2021) (see SI(a)) is presented below. The assessment is based on the review prepared by Juan-Jordá (2021).

1) **The ecological impacts of fishery removals:**

While the observer programs have been designed mainly to monitor the impacts of the fishery on target and non-target species rather than monitoring ecosystem impacts, this together with logbooks and data on dFADS is sufficient to detect any increase in risk level.
SG80 is met.

Trophic studies that have taken place are typically not continuous in space and time. Extensive studies have not been undertaken to understand the role of tropical tuna species as key predator and prey species within the IO foodweb. Compared to the Atlantic and Pacific Ocean, there have been relatively few research studies studying the trophic ecology for IOTC tuna species, species interactions and their ecological role in the food web (Olson et al. 2016).

While the data collected by the UoC might be sufficient to support the development of strategies to manage its ecosystems impacts, this would need to incorporate broader ecosystem information (e.g., size structure of the species, trophic ecology of the species) than currently available.
SG 100 is not met.

2) **The effect of natural environmental variability:**

Extensive environmental data is available and continues to be collected (e.g., World Ocean atlas, remote sensing data, ocean circulation models, climate models) that would allow any increase in risk to be detected.
SG80 is met.

This data needs to be supported by extensive research to understand the links between environmental variability and climate change on the productivity of the ecosystem, and the effect on tuna distribution and populations dynamics. The links need to be understood and monitored so management strategies may be developed to account for the effect of natural variability and climate change on the tuna species under management.
SG100 not met.

3) **The ecological impact of FAD use:**

Data collection by the UoC is sufficient to detect any increase in risk level associated with it, but not at the scale of all purse fisheries operating in the IO. The observer programme provides adequate data to monitor ecosystem impacts

(e.g., understanding FAD use on the behaviour, migrations and biology of pelagic species), and is sufficient to detect any increased risk at the scale of UoC.
SG80 is met.

SG100 is not met.
Current monitoring lacks the capacity to integrate cumulative studies analyzing the total impact of all FADs lost by all industrial purse seine fleets since the early 90s when the use of FADs came into prominence. Also, additional information on the extend and impacts of the coastal beaching is needed. **SG 100 is not met.**

References

Andonegi et al., (2019); Dagorn et al., (2012); Dagorn et al (2013); Juan Jorda (2019); Juan Jorda (2021); Lopez et al (2017); Marsac (2017); Olson et al (2016)

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

Draft scoring range	**≥80**
Information gap indicator	**More information sought / Information sufficient to score PI** *Review updated rationales 3SA Echebastar report*

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

Overall Performance Indicator score	
Condition number (if relevant)	

7.3.8 References P2

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7.4 Principle 3

7.4.1 Principle 3 background

With respect to the overall governance regime, the common thread throughout this assessment is the overarching management framework of the Indian Ocean Tuna Commission (IOTC) and the associated commitments of the European Union and Seychelles to this RFMO as full members of the IOTC (**Figure 7.4.1.1**).

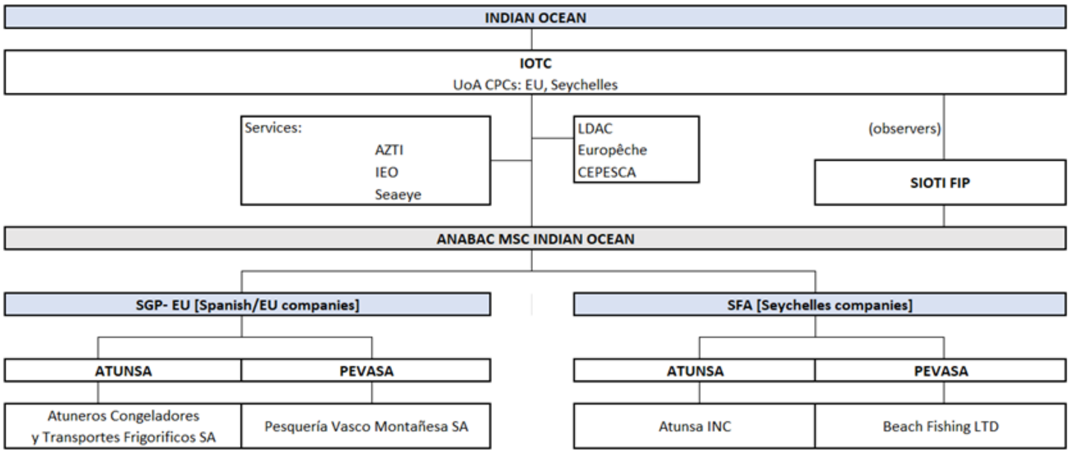


Figure 7.4.1.1. Structure of the ANABAC fleet included in the UoA, and the pertinent organisations in the IO.

On the other hand, there are bilateral agreements with different countries in the Western Indian Ocean that allow tuna fishing by foreign vessels in their Exclusive Economic Zones. These fishing agreements, given their different dates of entry into force and duration, are both in force and pending renewal.

In addition, fisheries management in the region is supported by global fisheries agreements such as UNCLOS and UNFSA through the IOTC and coastal countries, as they are generally signatories to, support and must comply with the obligations contained in these international instruments (**Table 7.4.1.1**).

7.4.1.1 UOA and Jurisdiction

This assessment for the ANABAC tuna purse seine fishery encompasses the jurisdiction of the Indian Ocean and specifically the area under IOTC management (**Figure 7.4.1.2**). Jurisdiction is therefore as follows:

a) Regional Level – management of tuna and highly migratory stocks is undertaken by the Regional Fishery Management Organisation (RFMO) – the Indian Ocean Tuna Commission. The IOTC area is broadly separated between the Western and Eastern areas and includes FAO areas 51 and 57 (see **Figure 7.3.1.2**). The southerly border of the IOTC overlaps with two other RFMOs, namely CCSBT and CCAMLR. Within the IOTC area there are two others functional RFMOs focused on non-migratory species, namely the South West Indian Ocean Fishery Commissions (SWIOFC) and the Southern Indian Ocean Fishery Agreement (SIOFA). Further, the Commission (IOTC), at its 4th Session in 1999 agreed to modify the western boundary of the IOTC area of competence from 30º E to 20ºE, thus eliminating the gap between the areas covered by IOTC and ICCAT.

b) There are no sub-regional agreements, similar those in the WCPFC (e.g. the PNA), although the Indian Ocean Commission (IOC), based in Mauritius, is an intergovernmental organization that links African Indian Ocean nations: Comoros, Madagascar, Mauritius, Réunion, and Seychelles and collaborates with the IOTC on matters of common interest.

c) At national level the IOTC comprises of 31 Contracting Parties (CPCs) and two Cooperating Non-Contracting Parties (CNCP) parties (Senegal and Liberia). Of these states, in addition to fishing on the high seas, ANABAC fishes using vessels with two flags (Spain/EU and Seychelles) in the EEZs of several West Indian Ocean states through either EU-SFPAs or bilateral agreements. ANABAC operations assessed here are those restricted to the 8 tuna industrial purse seiners owned by ANABAC members (**Table 5.1.1.1**).

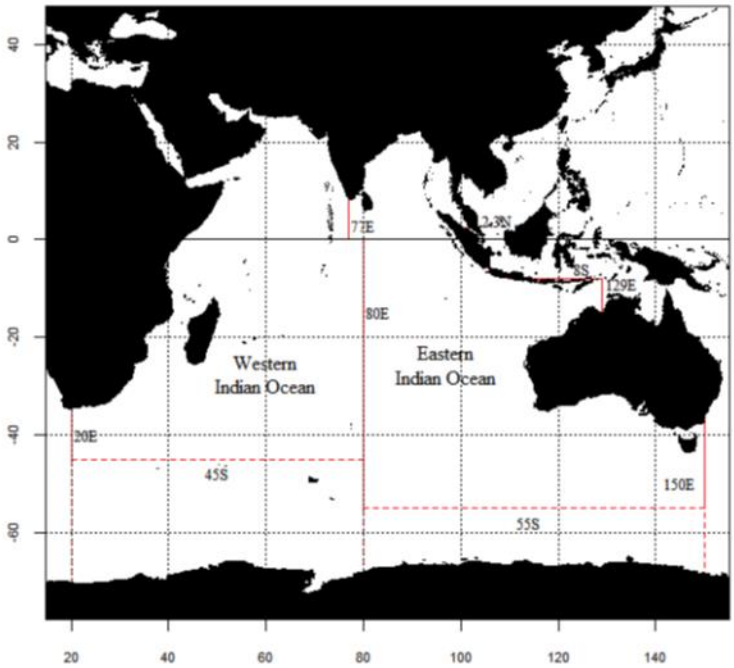


Figure 7.4.1.2. Jurisdiction area of the IOTC (source: https://www.iotc.org/)

In summary, the jurisdiction of the UoA 1 applies to a single stock of a highly migratory tuna species in the IOTC area that straddles the high seas and the EEZs of several coastal states in both the western and eastern Indian Ocean.

7.4.1.2 Area of operation and ANABAC

The ANABAC Shipowners' Association has 8 tuna vessels fishing in the Indian Ocean (**Table 5.1.1.1**). These 8 vessels belong to 2 different companies (ATUNSA and PEVASA) with respective subsidiaries in Seychelles. Thus, 4 of the vessels are flagged in Spain and 4 in Seychelles. Through different types of agreements between countries, vessels can fish in different national jurisdictions and in international waters.

The table below lists all the national jurisdictions were the ANABAC fleet is operating. The table also presents details on the fishing agreements, relevant governing bodies, applicable regulations and international agreements.

Table 7.4.1.1. National jurisdictions were the ANABAC operates, including details on the fishing agreements, relevant governing bodies, applicable regulations and international agreements

Coastal state	Bilateral (&/or SFPA) basic detail	Relevant governing body	Main Fisheries Act and other high seas legislation on tuna	NPOAs	Regional Member	UNCLOS	UNFSA	PSMA	FAO Comp. Agmnt
Comoros	SFPA exp 2016. Bilateral with Seychelles to 2022.	Dept. of Fishing of the Ministry of Agriculture, Fishing & Environment	Law No. 82-015 relating to the activity of foreign fishing vessels in the Comorian maritime zones.		IOTC SIOFA SWIOFC WIOTO	Yes	Not party	No	No
Madagascar	SFPA protocol expired 2018, ANABAC Seichellese vessels directl agreement.	Ministry of Fisheries and Fishery Resources	Law No. 2015-053 of December 16, 2015 on the Fisheries and Aquaculture		IOTC SWIOFC WIOTO	Yes	Not party	Yes	Yes
Mauritius	SFPA protocol until December 2021 (extension until 2022); Bilateral with Seychelles expired 2019 (extension until 2022).	Ministry of Blue Economy, Marine Resources, Fisheries and Shipping	Fisheries and Marine Resources Act 2007	NPOA for IUU (2010) NPOA for sharks (2016.)	IOTC SIOFA SWIOFC WIOTO	Yes	Yes	Yes	Yes
Mayotte (France: TAAF))	Spanish flag no agreement needed. Seychelles bilateral exp June 2020 (extension until 2022).	French Ministry of Agriculture and Food	France: Loi n° 2010-874 de modernisation de l'agriculture et de la pêche.		EU – all Tuna RFMOs	Yes	Yes	Yes	Yes (EU)
Seychelles	SFPA valid until February 2026; Seychelles flagged vessels can fish	Ministry of Fisheries and Agriculture and SFA	Fisheries Act of 2014 Seychelles Fishing Authority (Establishment) Act, 1984 Fisheries Regulations 1987 Fisheries Comprehensive plan (2019)	SFA to develop IUU NPOA 2020 NPOA shark 2007	IOTC SIOFA SWIOFC WIOTO	Yes	Yes	Yes	Yes
Terres Australes et Antarctiques Françaises (TAAF) (Fr) illes Éparses	Spanish vessels can fish without bilateral; No document for Seychelles **NONE will fish in 2022**	French Ministry of Agriculture and Food	France: Loi n° 2010-874 de modernisation de l'agriculture et de la pêche.		EU all Tuna RFMOs	Yes	Yes	Yes	Yes
Tanzania Mozambique Kenya	Have had agreements in the past but none currently active								

7.4.2 Legislative and Customary Framework

The key legislative framework applicable to the UoA's fishing operations in the IO FAO areas 51 and 57 has the following components (see also **table 7.4.1.1**):

a) The regional component of which the IOTC is the managing RFMO.

b) The European Union component which is responsible for its flag-state vessels (Spain here) that operates in the IOTC area, as well as in the various EEZs of the states that comprise members of the IOTC.

c) The National components to be assessed are those of the two flag States of the fleet included in the UoA: Spain and Seychelles. The ANABAC fleet must comply with the fishing regulations applicable to these two flag-state. Besides, the fishing agreements signed with the different coastal States are also applicable.

d) Adding to the above matrix of governance aspects, both Spain (EU) and Seychelles have either bilateral agreements with WIO countries or in the case of the EU/ Spain, Sustainable Fishery Partnership Agreements (EU, 2019) negotiated with the EU (see **table 7.4.1.1** above relating to these agreements that are or are not in force). It is important to note the following particularities:

(i) While Spanish vessels can fish in the waters of the French territory of Mayotte without agreement (the French islands of La Réunion and Mayotte are ultra-peripheral territories part of the EU so their waters may be fished by EU vessels).

(ii) A further separate agreement is required for the Seychelles to operate in other French-controlled areas under the French authority Terres Australes et Antarctiques Françaises (TAAF) including the islands (Îles Éparses) of Glorieuses, Juan de Nova, Bassas de India, Europa and Tromelin.

All of the above legislative frameworks will therefore apply in one form or the other and need consideration for this assessment.

In the EEZ, coastal States have exclusive jurisdiction over resource related activities, and other States shall have due regard to this. In practice, coastal States generally refrain from exercising criminal jurisdiction over foreign ships as regards matters that are purely internal to the ship (whether as a matter of comity or legal duty), leaving such matters to the flag State. Flag States also remain responsible for the operational standards outlined in Article 94(5) of the LOSC within all of these zones. However, it is important to note that flag States cannot exercise enforcement jurisdiction within the territory or territorial sea.

Specifically relating to fisheries, coastal States have exclusive authority for fisheries conservation and management within the territorial sea and EEZ i.e. there is no reason why they should not take steps to ensure fishing vessels flying their flag comply with conservation and management requirements. This underlies the importance of any bilateral agreements in force between ANABAC and Flag States where conditions set under these agreements relate to both national legislation as well as the responsibility of the Flag State to comply with its commitments to, for example, membership of an RFMO. On the high seas however, Flag States are subject to a general duty to take such measures, either individually or in cooperation, as are necessary for the conservation and management of living resources

7.4.2.1 Indian Ocean Tuna Commission

The **Commission** has four key functions and responsibilities which enable it to achieve these objectives:

i. to keep under review the conditions and trends of the stocks and to gather, analyse and disseminate scientific information, catch and effort statistics and other data relevant to the conservation and management of the stocks and to fisheries based on the stocks;

ii. to encourage, recommend, and coordinate research and development activities in respect of the stocks and fisheries covered by the IOTC, and such other activities as the Commission may decide appropriate,

iii. to adopt – on the basis of scientific evidence – Conservation and Management Measures (CMM) to ensure the conservation of the stocks covered by the Agreement and to promote the objective of their optimum utilization throughout the Area;

iv. to keep under review the economic and social aspects of the fisheries based on the stocks covered by the Agreement bearing in mind, in particular, the interests of developing coastal States and respect for rights.

Structure of the Commission: Membership of IOTC is open to Indian Ocean coastal countries and to countries or regional economic integration organisations which are members of the UN or one of its specialised agencies, and are fishing for tuna in the Indian Ocean. There are currently 31 Contracting Parties (Members), the majority of which are Nation States. In addition, there are two Cooperating Non-Contracting parties (CNCs) (Senegal and Liberia). This status is granted for a period of one year, upon request from the State. CNCs are not obliged to pay a financial contribution, but they do not enjoy voting rights on IOTC matters, and they are subject to the same regulations as the full Members. CNC status is reviewed annually by the Commission.

Observers to IOTC meetings: Meetings of the Commission and all of its subsidiary bodies are open to Observers. The list of current, pre-approved observers who may attend IOTC meetings, as well as the processes for applying to be an observer at IOTC meetings may be consulted on the Observers page.

Resolution of Disputes: IOTC provides through Article XXIII of the Agreement (Interpretation and Settlement of Disputes) the basis for dispute resolution. Disputes are ordinarily solved with IOTC subsidiary bodies or may be referred to an expert panel that considers the issues and reports back to the Commission. Ultimately, if disputes cannot be resolved internally, they could be referred to independent international arbitration through the International Court of Justice or the International Tribunal for the Law of the Sea, although this has not been tested (Medley et al., 2019).

Subsidiary Bodies: Within the IOTC the following subsidiary bodies include:

- The Compliance Committee (CC) – this body meets annually and monitors the compliance of the IOTC Contracting Parties and Cooperating Non-Contracting Parties with adopted Conservation and Management Measures (CMM).
- Standing Committee on Administration and Finance (SCAF) which meets annually and advises the Commission on administrative and financial matters, in particular the operational budget for the current year and the provisional budget for the ensuing year.
- Scientific Committee (SC) which meets annually and provides advice to the Commission on the status of stocks and the management actions necessary to ensure sustainability of the fishery.
- Working Parties whose primary function is to analyse technical problems related to the management goals of the Commission. Examples of working parties include those on Billfish (WPB), Data Collection and Statistics (WPDCS), Methods (WPM), Neritic Tunas (WPNT), Temperate Tunas (WPTmT), Tropical Tunas (WPTT), and Ecosystems and Bycatch (WPEB).

There are no known legal challenges to the IOTC or disputes which have had to be settled through Article XXlll.

7.4.2.2 European Union and Spain

The **European Union (EU)** is a contracting party (CP) of the IOTC acting primarily for the EU Distant Water Fishing Fleet (Spain in this case). The Long Distance Advisory Council (LDAC) is instrumental in advising the Commission regarding management of the EU fleet outside of EU waters. ANABAC also operate Seychelles-registered purse seiners, so while these are not directly the responsibility of the EU, ANABAC has a responsibility nevertheless to harmonise operations in accordance with the EU authority, as well as with the Seychelles Fishing Authority (SFA) and any other national authority with which they might have fishing agreements.

The Spanish flag vessels (4) are: Doniene, Izurdia, Playa de Aritzatxu and Playa de Ris (see **table 5.1.1.1**). All pertinent IOTC CMMs and other fishery-specific management measures adopted as Resolutions are translated into European legislation and updated annually as necessary. The same applies to national fishing vessel licensing authorities, and to EU-Tuna Associations for any EU quota allocation sharing.

The European Union enables the management of their fleets, including distant water vessels, through the Common Fisheries Policy (CFP). This is the main legal (fisheries) instrument that underpins the development of any specific new policies including those that might apply to waters external to the EU (External Waters). The new CFP was adopted in 2013 and has underpinned the EU approach to fisheries since 1983. Activities of European fishing vessels outside EU waters have been framed by Council Regulation (EC) No 1006/2008 (EU, 2008) of 29 September 2008 (FAR), which establishes a fishing activities registry and clearly sets out the responsibilities of the EU and EU member states. The FAR was repealed in 2017 and replaced by Regulation (EU) 2017/2403 (EU, 2017) of the European Parliament incorporating the sustainable management of “external fishing fleets” in waters that include those vessels which are, i) under the sovereignty or jurisdiction of a third country in the framework of a Sustainable Fisheries Partnership Agreement (SFPA) concluded between the Community and that country, ii) under the auspices of an RFMO to which the Union is a contracting party, and iii) on the High Seas.

SFPAs are the main tool by which EU fishing policy facilitates access to international fisheries. Through SFPAs, EU gives financial and technical support in exchange for fishing rights, with partner countries. In the Seychelles’ case, there is a SFPA signed between EU and Seychelles Government in force since 2006 (Gouldihng, et. al. 2019), renewed from 2014-2020 and in February 2020 renewed the latest one valid for 6 years (2020-2026). This Agreement (SFPA) establishes the principles, rules and procedures governing the following topics:

- economic, financial, technical and scientific cooperation in the fisheries sector with a view to introducing responsible fishing in the waters of Seychelles to guarantee the conservation and sustainable exploitation of fisheries resources, and developing the Seychelles fisheries sector,
- the conditions governing access by community fishing vessels to Seychelles’ waters (customary rights),
- the arrangements for policing fisheries in Seychelles waters with a view to ensuring that the above rules and conditions are complied with, the measures for the conservation and management of fish stocks are effective and illegal, unreported and unregulated fishing is prevented,
- partnerships between companies aimed at developing economic activities in the fisheries sector and related activities, in the common interest.

A Joint Committee shall be set up to monitor the application of this Agreement. The agreement and the two subsequent Council Regulations (Council Regulation 2020/272 and Council Regulation 2020/271) were published at the Official Journal of the European Union. Council Regulation 2020/271 sets the allocation of fishing opportunities under the Protocol on the implementation of the sustainable fisheries partnership agreement between the EU and Seychelles (2020-2026).

The core elements of Regulation (EU) 2017/2403 (fishery-specific measures) are as follows:

• any Union vessel fishing outside Union waters should be authorised by its flag Member State and monitored accordingly, irrespective of where it operates and the framework under which it does so.

• the issuing of an authorisation should be dependent on a basic set of common eligibility criteria being fulfilled.

• the information gathered by the Member States and provided to the Commission should allow the Commission to intervene in the monitoring of the fishing operations of all Union fishing vessels in any given area outside Union waters at any time.

• in the absence of a Member State appropriate action including amending or withdrawing the authorisation and, if necessary, imposing effective, proportionate, and dissuasive sanctions, the Commission should take additional action to make sure that the vessel concerned should no longer fish.

• support vessels may have a substantial impact on the way fishing vessels are able to carry out their fishing operations and on the quantity of fish they can retrieve. It is therefore necessary to take them into account in the authorisation and reporting processes set out in this Regulation.

• in third-country waters, EU vessels may operate either under the provisions of SFPAs concluded between the Union and third countries or by obtaining direct fishing authorisations from third countries if no SFPA is in force. In both cases these activities should be carried out in a transparent and sustainable way. Flag Member States may authorise the vessels flying their flag to seek and obtain direct authorisations from third countries which are coastal states, under a defined set of criteria and subject to monitoring. The fishing operation should be authorised once the flag Member State is satisfied that it will not undermine sustainability and where the Commission has no duly justified objection. The operator should be allowed to start its fishing operation only after having been given the authorisation from both the flag Member State and the coastal state.
• EU fishing vessels are not allowed to fish in waters under the jurisdiction or sovereignty of third countries with which the Union has an agreement but no protocol in force.
• fishing operations under the auspices of RFMOs and on the high seas should also be authorised by the flag Member State and comply with RFMO-specific rules or Union law governing fishing operations on the high seas.
• the exchange of data in electronic form between Member States and the Commission, as provided for by the Control Regulation (Council Regulation (EC) No 1224/200912), should be ensured. Member States should collect all requested data about their fleets and their fishing operations, manage those data and make them available to the Commission. Moreover, they should cooperate with each other, the Commission and third countries where relevant to coordinate those data collection activities.

In addition, the EU Council of Ministers strengthened their support to IOTC in 2019, pledging that the Union shall, where appropriate, endeavour to support (EU, 2019b) the IOTC CMMs and resolutions including, amongst others, measures to deter IUU fishing, data collection, MCS, protection of biodiversity, the management of FADs, the reduction of the impact of Abandoned, Lost or Otherwise Discarded Fishing Gear (ALDFG) and the prohibition of fisheries conducted solely for the purpose of harvesting shark fins and requiring that all sharks are landed with all fins naturally attached.
In view of the yellowfin tuna rebuilding plan and the catch limit established by the IOTC Res 16/01, since 2017 the EU Council sets a Total Allowable Catch (TAC) for the EU and establishes an allocation by Member State. The Council Regulation (EU) 2020/123 of 27 January 2020 fixes for 2020 the fishing opportunities for yellowfin tuna in the IOTC Area (among many other stocks in Union waters for Union fishing vessels in certain non-Union waters), while the Council Regulation (EU) 2021/92 of January 2021 fixes the fishing opportunities for 2021. The TAC for the EU (77,698 tons) and the quota allocated to Spain (45,682 tons) has remained the same since 2017. Since the introduction of Res 21/01, the TAC for EU for 2022 has decreased to 73,146 tons;
Regulation (EU) 2022/109 of 27 January transposed the revised catch limits for yellowfin tuna (Thunnus albacares) in the area of competence of the IOTC ("Indian Ocean Tuna Commission") into Union law. However, this regulation did not fix the allocation of the quota among the member states and although it was amended by Regulation 2022/515 of 31 March, the definitive allocation mechanism was not included.

The Spanish Ministry of Agriculture, Fisheries and Food (MAPA) issues an annual regulation for the management of the yellowfin tuna and tropical tuna fishery in the Indian Ocean. The regulation sets catch limits for each of the authorised vessels, trying to prevent the Spanish fleet from exceeding the yellowfin tuna quota allocated to Spain. The regulation started to be implemented in 2020 (Order APA/93/2020, of 4 February, regulating the exercise of yellowfin tuna and tropical tuna fishing in the Indian Ocean in the 2020 campaign) established that vessels with a GT ≥ 3,500 GT could catch up to 3,377 t of yellowfin tuna, while vessels with a GT ≤ 3,500 GT could catch up to 2,658 t of yellowfin tuna. In addition, this Order also establishes a limitation in relation to the total volume of catches of the 3 main tropical tuna species: yellowfin tuna, bigeye tuna and skipjack tuna. The regulation allows for adjustments to be requested between fishing vessels (up to a maximum of 10%). However, due to the pandemic, the Spanish fleet had serious difficulties in carrying out its usual operations and this resulted in the activity of some vessels being prevented or severely hampered. For this reason, the associations representing the sector asked the Spanish authorities for the possibility of making the calculation of fishing limits more flexible and for exceptional joint management. This was accepted by the SGP, on an exceptional basis, through Order APA/811/2020 and subsequently in 2021 and 2022, through Orders APA 914/2021 and 332/2022 also due to the state of alarm and the situation generated by COVID-19.

The catch limit of tropical tunas per vessel was established based on scientific reports provided by the Spanish Institute of Oceanography (IEO) regarding the proportions of different species in tropical tuna fishing, in which yellowfin accounts for at least 30% of the tropical tuna catches. This establishes a catch limitation for the 3 tuna species, calculated as the ratio between the yellowfin catch limitation and the 0.30 rate. The objective of this limitation in the total catch was to avoid yellowfin overfishing, in a fishery where it is not possible to exclude this species from the rest.

The latest annual regulation issued by the MAPA regulating the fishery for 2021 is “Orden APA/25/2021, de 19 de enero, (y sus posteriores modificaciones) por la que se regula el ejercicio de la pesca de túnidos tropicales en el Océano Indico y se crea un censo de atuneros cerqueros congeladores autorizados a la pesca de tunidos tropicales en el Océano Indico”. **Table 7.4.2.1** sets a census of authorised vessels to fish for tropical tunas in the IO, together with the allocated percentage of the Spanish quota for IO yellowfin. This regulation includes several modifications compared to previous years:

- A specific Census of freezer purse seiners authorized to fish for tropical tuna in the Indian Ocean (CATI) is created. The CATI includes freezer tuna purse seine vessels in the General Registry of the Fishing Fleet with catches of yellowfin in the Indian Ocean in any of the years of the 2012-2016 period, as well as new fishing vessels that have been registered. registration in the General Registry of the Fishing Fleet in substitution of vessels with historical catches in said period. The General Secretariat for Fisheries will update the CATI (including auxiliary vessels) during the first quarter of each year.
- The percentage of yellowfin catches by the Spanish freezer tuna fleet in the Indian Ocean with respect to the total catches ranges between 37.8% and 53.2% in the period 2012-2016. Based on these data and, in accordance with the scientific reports provided by the Spanish Institute of Oceanography (IEO) regarding the proportions of the different species in the tuna fishery, which allows the fleet to have the flexibility to divert effort to other species, a total catch limitation per vessel is established, calculated as the quotient between the catch limitation for yellowfin tuna and a minimum rate of 28% for yellowfin tuna. The objective of this limitation on the total catch is to avoid overfishing of yellowfin, in a fishery in which it is not possible to exclude this species from the rest. This minimum rate will be updated according to the decisions that may be taken in this regard in the IOTC.

These regulations were modified after the COVID-19 pandemic, making the calculation of fishing limits and the joint management of fleets more flexible. Although this situation was exceptional due to the pandemic, by means of Order APA/332/2022 this concept disappears and this management mechanism is normalised.

Table 7.4.2.1. list of authorised vessels to fish for tropical tunas in the IO, together with the allocated percentage of the Spanish quota for IO yellowfin

Código	Buque	% cuota de rabil España
26547	ALAKRANA	8,908351
22090	ALBACAN	5,577146
755	ALBACORA CUATRO	5,995828
23164	ALBACORA UNO	3,342036
25923	ALBATUN DOS	8,512197
26123	ALBATUN TRES	3,793354
100101	ATERPE ALAI	5,144659
23194	DONIENE	5,755224
22462	ELAI ALAI	4,887882
27547	ITSAS TXORI	4,637273
26158	IZURDIA	7,933852
27578	PLAYA DE RIS	2,587639
25179	PLAYA DE ARITZATXU	4,374856
20232	PLAYA DE NOJA	2,848669
25911	TXORI ARGI	9,505596
27068	TXORI GORRI	7,680655
27691	TXORI ZURI	7,514783
	Fondo no asignado	1,000000
		100,000000%

7.4.2.3 Seychelles

The **Seychelles** is a signatory to UNCLOS and to the related of Straddling Fish Stocks and Highly Migratory Fish Stocks agreement (ratified in 1998). Seychelles established its 200-mile Exclusive Economic Zone in 1972, founded under UNCLOS, where it has full jurisdiction over natural resources (effectively long-term objectives). In national context the main legislation regulating the fisheries and aquaculture sector in Seychelles is the Fisheries Act (1986), as amended in 2001 and the Fisheries Regulations (1987), as amended in 2007. In addition, Seychelles has recently published a comprehensive policy (SFA, 2019) and fishery plan (SFA, 2019b) “Seychelles Fisheries Sector Policy and Strategy, 2019” which entrenches ownership and protection of the environment e.g. “The fisheries of Seychelles are owned by all Seychellois and shared between numerous stakeholders. Commercial and sports fishing contribute significantly to the economy. The industry must explore all opportunities to sustainably grow the economic return from the fisheries. It must ensure no overfishing occurs, eliminate IUU fishing and everyone is committed to sustainability. All must continue to drive innovation and adoption of new technologies, in the effort to maintain healthy fish stocks and look after the marine environment”.

The overall responsibility for the fisheries sector and its development is the Ministry for Environment and Natural Resources which is administered through the Seychelles Fishing Authority (SFA). SFA, being the Government’s executive arm for fisheries and marine resources matters implements its responsibilities and functions as defined by the Seychelles Fishing Authority (Establishment) Act, 1984. This includes both long-term objectives and fishery-specific measures. The principal objective of the Act is to develop the fishing industry to its fullest potential and to safeguard the resource base for sustainable development. The long-term policy of the Government of Seychelles for the fishing industry is as stated in the policy as: “the promotion of sustainable and responsible fisheries development and optimization of the benefits from this sector for present and future generations”.

Four of the ANABAC fishing fleet in the Indian Ocean are flagged in Seychelles through local owner companies. The four vessels are: Artza, Morne Blanc, Morn Seselwa and Playa de Anzoras (see **table 5.1.1.1**). These vessels are subject to the Seychellois fishery’s legal framework. About the quota allocation of these Seychelles flagged vessels, it is strictly controlled and managed by the SFA. This includes fishery-specific measures that have been applied since 2017 by the IOTC for the management of yellowfin tuna related to the “interim harvest control” which refers to IOTC Resolution 16/01 for the reduction of yellowfin tuna catches in the Indian Ocean.

In 2020, the Seychelles' purse seiner fleet was allocated a yellowfin tuna annual quota of 33,211 metric tonnes, which was equally divided among the 13 vessels flying the flag of Seychelles.

7.4.2.4 France and Mayotte

France is also a coastal Contracting State through its overseas territories (OTs) of Réunion, Mayotte and the uninhabited territories administered by the TAAF (Terres Australes et Antarctiques Françaises). Spain and Seychelles have bilateral agreements to fish in these waters. Spain can fish in these areas controlled by France as an EU partner, while Seychelles-flagged vessels have an agreement with the EU to fish in these areas. Therefore, the predominant governance regime is the CFP, which is harmonised with the CMMs and IOTC resolutions on fisheries. In addition, France imposes specific measures on fishing in these waters. The Centre National de Surveillance des Pêches (CNSP) is the National Fisheries Surveillance Centre (CSP), responsible for satellite monitoring of French vessels in the Indian Ocean, and also monitors vessels, whatever their nationality, present in the French EEZs and the Indian Ocean TAAF or on the high seas in the vicinity of French territories.

7.4.2.5 Mauritius, Madagascar, and Comoros

There is a bilateral agreement between Mauritius and the Seychelles, while the SFPA protocol between the EU and Mauritius signed in 2018 expired in 2021. A new SFPA protocol is about to be signed.

Similarly, in the case of Madagascar, there is a bilateral agreement with Seychelles while the SFPA expired in 2018 and the discussion are still going on.

In the case of Comoros, only Seychelles vessels have access through a bilateral that also applies the CMMs and IOTC resolutions. The EU SFPA has expired, thus closing access to Spanish flag vessels of the OPAGAC fleet.

7.4.2.6 Mozambique, Kenya, Comoros, and Tanzania

There are no EU bilateral agreements or SFPAs in force, so they have not been included in this assessment.

7.4.3 Applicable Fishery-specific Management Measures

The IOTC makes available to everyone, through its website, all CMMs in force and repealed related to tuna purse seine fisheries. A downloadable compendium of all measures in force is available and regularly updated (click here to access to the compendium).

In addition to the CMMs issued by the IOTC through Resolutions, there are CPCs that reinforce compliance through their national legislation. This is the case of the European Union and Spain, which, through specific Directives and Ministerial Orders, regulate the activities of the industrial purse seine fleet in the Indian Ocean. For example, the EU Council fixed a Total Allowable Catch of YFT for EU vessels as a whole and has established an allocation per Member State. The amount (quota) allocated to Spain was 45,682 t for 2017, 2018, and 2019. Besides, since 2018 the Spanish fleet, independently of the IOTC, is also managed through a national regulation that is revised annually (Ministerial Order) issued by the Ministry of Agriculture, Fisheries and Food. This Order establishes catch limits per vessel based on their Gross Tonnage (GT) and effectively consolidates the yellowfin tuna catches of the Spanish fleet as a whole.

In relation to Principle 2, discards of bigeye, skipjack, yellowfin, and non-target species caught by purse seine vessels are also prohibited (Res. 19/05) to ensure the achievement of IOTC objectives to conserve and manage bigeye, skipjack and yellowfin tuna. Measures are also in place to manage fish aggregating devices (FADs) through Resolution 19/02, which requires specific management plans for FADs, including a limitation on the number of FADs, more detailed specifications for the reporting of catches from sets on FADs and the development of improved FAD design to reduce the incidence of entanglement of non-target species (ref. Code of Best Practice, 2020). FAD-related measures also include:

- developing/improving FAD designs to facilitate management procedures to control the number, type and use of FADs, and.
- mitigating potential negative impacts on the ecosystem, including juvenile and incidental catches of non-target species, in particular sharks and sea turtles (Resolution 18/04 on the bioFAD pilot project)
- reduce the incidence of entanglement of sea turtles, including the use of biodegradable materials (Resolution 12/04) and the development of improved FAD designs to reduce the incidence of entanglement of non-target species;
- the use of instrumented buoys on all FADs (Resolution 19/02), including more detailed specifications on the reporting of FAD catches.
-

Other measures that apply to FADs and IOTC fisheries in general include Resolution 13/04 on the conservation of cetaceans, Resolution 17/05 on the conservation of sharks caught in IOTC fisheries, Resolution 19/03 on the conservation of mobulid rays and Resolution 18/02 on management measures for the conservation of blue sharks caught in association with IOTC fisheries.

7.4.4 Monitoring, Compliance and Surveillance

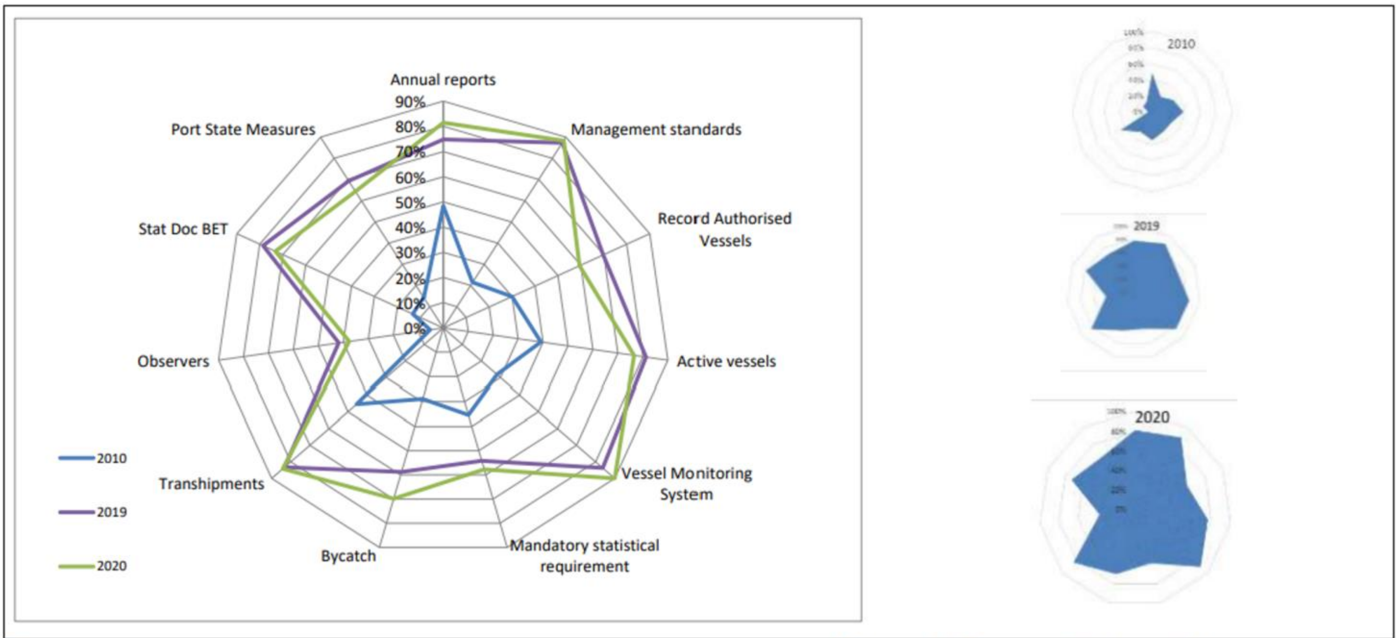
The IOTC has a well-established Compliance Committee which, at the regional level, has the primary responsibility for monitoring CPCs' compliance with IOTC conservation and management measures. This monitoring is carried out through the evaluation of reports submitted by the CPCs. These evaluations are carried out annually.

The Compliance Committee is an advisory body of the Commission, which was set up in 2003. With more emphasis being placed on compliance in the recent years, the Commission decided to strengthen the Compliance Committee in 2009, by redefining its terms of reference. It is constituted of policy makers (Commissioners) and fisheries monitoring, control, and surveillance (MCS) practitioners.

The main activities of the Compliance Committee are as follows:

- Review all aspects of CPCs individual compliance with IOTC Conservation and Management Measures.
- Review information relevant to compliance from IOTC subsidiary bodies and from Reports of Implementation submitted by CPCs,
- To identify and discuss problems related to the effective implementation of, and compliance with, IOTC Conservation and Management Measures, and to make recommendations to the Commission on how to address these problems.

Overall, the level of compliance is satisfactory. Every year, the Compliance Committee publishes annual reports, in which information from each CPC and at the global level is analysed. The following table shows the overall compliance percentages for the different management tools existing in the IOTC for 2020 and their comparison with other years.



Notes

Annual reports = Implementation report, compliance questionnaire, national scientific report, feedback letter - 4 reporting requirements.
Record of authorised vessels = Resolution 19/04 - 2 reporting requirements.
Management Standard = Resolutions 19/01, 19/07, 19/04, 15/01, 17/07, 19/02 and 14/05 (Denial of license, agreement, coastal State license) – 24 reporting requirements.
Domestic & foreign active vessels = Resolution 10/08 and 14/05 (foreign vessels licensed in EEZ) – 2 reporting requirements.
Mandatory statistical requirement = Resolution 15/02 - 14 reporting requirements.
Vessel Monitoring System = Resolution 15/03 -3 reporting requirements.
Bycatch = Resolutions 19/03, 18/05, 18/02, 17/05, 13/06, 13/05, 13/04, 12/09, 12/06 and 12/04,– 21 reporting requirements.
Transhipment = Resolution 19/06 – 5 reporting requirements.
Observers = Resolution 11/04 – 4 reporting requirements.
Stat Doc BET = Resolution 01/06 – 4 reporting requirements.
Port State Measures = Resolutions 05/03, 16/11 – 7 reporting requirements.

Note: Res. 18/03 & 07/01 not included.

Figure 7.4.4.1: Trends in compliance levels with the different fisheries management tools, 2020. IOTC.

The regional level is coordinated through the IOTC and various projects, including the EU-funded Regional Monitoring activities based at the Indian Ocean Commission (IOC) in Mauritius, together with the World Bank-funded regional component of the SWIOFISH2 project (Southwest Indian Ocean Fisheries Governance and Shared Growth Project), which supports, among other components, eligible CPCs to strengthen their capacity to comply with IOTC Resolutions and to build MCS capacity.

The IOTC provides, also, support and guidance to improve surveillance processes and provides training, mainly through recommendations and support for the implementation of FAO Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing. (PSMA). Both Spain, through the European Union, and Seychelles are signatories to this Agreement.

France has historically provided critical MCS support, including regional patrols and the establishment of VMS (mainly CLS). In addition, through its territories, it maintains a strict MCS capacity and monitors the fishing activities of all vessels fishing through EU SFPAs or through bilateral agreements.

Seychelles provides the basis for IOTC MCS capacity, including regional networking.

Spain and Seychelles, through the EU and national systems, comply with all obligations, including mandatory reporting and data submission.

In March 2021 Seychelles has become the first country to submit its report to the Fisheries Transparency Initiative (FiTI; https://www.fiti.global/about-the-initiative. The FiTI is a global partnership that seeks to increase transparency and participation for a more sustainable management of marine fisheries. By making fisheries management more transparent and inclusive, the FiTI promotes informed public debates on fisheries policies and supports the long-term contribution of the sector to national economies and the well-being of citizens and businesses that depend on a healthy marine environment. The FiTI is not operated by one organisation, nor does it represent the work of a single interest group. Instead, the diversity of different stakeholders (ensuring equal participation from government, companies, and civil society) is a central feature of how the FiTI works, for national implementations as well as international governance. The FiTI is a voluntary initiative; however, once a country has decided to participate, mandatory requirements must be followed. The Seychelles first report to the FiTI is available online (https://www.fiti.global/fiti-reports). The figure below summarises the main transparency observations found in the first Seychelles report to FiTI. The FiTI report highlights several opportunities for improvement. Seychelles National multi-stakeholder Group has determined 34 recommendations on how to further strengthen fisheries transparency in the country.

ANABAC vessels must comply with EU and Seychelles management arrangements through EU SFPA protocols, and other bilateral agreements.

All vessels must report/collect unmarked FADs, report unknown vessels encountered at sea, and implement the SSC, and Report port state control measures, cross-check with VMS, electronic logbooks, reported catches and landings.

UoA vessels have an information system that is updated in real time from electronic logbooks centrally in Spain. ANABAC vessels are equipped with satellite vessel monitoring systems (VMS) that inform the Spanish and EU authorities (Spanish flag vessels) or the Seychelles authorities (Seychelles flag vessels) of the vessel's position at any time. The fleet must report its catches to the SFA or to the Spanish Administration. The Spanish Administration maintains strict control of its international fleets, including compliance and enforcement and integrated control of fishing activity throughout the production, import and marketing chain, the collection, processing, and verification of information on activities under the Common Fisheries Policy and the functions of the fisheries inspectorate. The fishery data, provided by ANABAC, are analysed by AZTI (https://www.azti.es/en/about-azti/) and the IEO (Spanish Institute of Oceanography). Together, this information provides a detailed analysis of the fleet's activities and compliance with obligations, including FAD management.

France also carries out monitoring of fishing activities in its waters through the Système d'Information Halieutique (SIH) in France, where VMS position and catch data can be checked, validated, and coded in IOTC statistical rectangles by the fisheries control and management authorities.

7.4.5 Monitoring and management performance evaluation

The IOTC has implemented mechanisms to assess all parts of the management system. These consist of committees and working groups that meet regularly and report on their progress to the Commission.

In addition, there is a Performance Review Panel (PRP) which has also evaluated all parts of the management system. At national level, Spain also reports regularly to the European Commission on the relevance, coherence, efficiency, and effectiveness of its fisheries management system. The EU administration is subject to regular external audits by the European Court of Auditors (ECA), which focus on financial management, but also consider other issues. SFPAs are subject to regular review by the EU. While some have been renewed, other SFPAs, such as those of Comoros, Mozambique, Kenya, and Tanzania, have not been renewed.

7.4.6 Principle 3 Performance Indicator scores and rationales

PI 3.1.1 – Legal and/or customary framework

PI 3.1.1		The management system exists within an appropriate legal and/or customary framework which ensures that it: - Is capable of delivering sustainability in the UoA(s); - Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and - Incorporates an appropriate dispute resolution framework		
Scoring Issue		SG 60	SG 80	SG 100
a	Compatibility of laws or standards with effective management			
	Guide post	There is an effective national legal system **and a framework for cooperation**	There is an effective national legal system and **organised and effective cooperation**	There is an effective national legal system and **binding procedures governing**

		with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2	with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2.	**cooperation with other parties** which delivers management outcomes consistent with MSC Principles 1 and 2.
	Met?	**Yes**	**Yes**	**Yes**
Rationale				

The jurisdiction of this UoA applies to a single stock of highly migratory species in the IOTC area that straddle the high seas and the EEZs of states in only the Western Indian Ocean.

ANABAC vessels operate at two levels. The first is the regional level in international waters under the management framework of the IOTC and, secondly, within the EEZs of several CPCs which themselves belong to the IOTC.

In addition, because ANABAC vessels operate under two flags, Spain, and Seychelles (which are both IOTC CPCs), the responsible governance regime of these two States must also have effective management laws and rules that are consistent with the regional authority (IOTC).

The following possibilities exist for the 8 ANABAC vessels to fish in international waters and in the EEZs of other countries in the Indian Ocean:
1) The EU SFPAs. There are 3 European Union Fisheries Agreements with Seychelles, Mauritius, and Madagascar. However, the agreement with Madagascar has not been renewed since 2018. This allows ANABAC vessels flying the Spanish flag to fish in their EEZs. Access for EU vessels to the waters of Kenya, Comoros, Tanzania, and Mozambique is currently not possible since, although Fisheries Agreements have existed, they are currently not renewed.
2) Bilateral agreements: For ANABAC's Spanish flag fleet, since France is a member of the European Union, EU vessels can fish within its waters without the need for a special agreement as they are part of the management regime under the umbrella of the European Common Fisheries Policy. This is the case for the waters off the island of Mayotte. On the other side, ANABAC vessels flying the Seychelles flag, access to certain areas requires the need for specific agreements. Thus, there is an agreement to operate in the areas controlled by France under the French authority Terres Australes et Antarctiques Françaises (TAAF), including the islands (Îles Éparses) of Glorieuses, Juan de Nova, Bassas de India, Europa and Tromelin. Besides, bilateral agreements exist between Seychelles and other countries in the region allowing access of Seychelles vessels (ANABAC and others) to the waters of Comoros, Madagascar, Mayotte, and Mauritius.

All these possibilities for regulated access are considered as an effective legal framework and provide a mechanism for cooperation between the parties (European Union and Seychelles together with the nations in which ANABAC vessels fish), which is consistent with Article 10 of the UNFSA. Furthermore, all these Agreements are consistent with the CMMs of the IOTC and fit, appropriately, into the broader Governance framework of this RFMO and at the national level.

This includes the management of the SKJ stock (P1) and numerous measures related to the components of Principle 2 of the MSC.

In some cases, specific measures additional to those existing within the IOTC framework are included in the Agreements. **SG60 is met**.

The IOTC is a regional fisheries management organisation established and supported by UNFSA. The IOTC Convention is based on all the key provisions of the UNFSA. It is well organised and designed to reflect the regional political, socio-economic, geographical, and environmental characteristics of the Indian Ocean States. The provisions set out in the IOTC Convention and implemented through the MSCs are designed to deliver outcomes consistent with MSC principles 1 and 2.

Moreover, to comply with SG80, the legal system at the national level must demonstrate "organised and effective cooperation".

Existing fisheries agreements, some of which have just been renewed, have historically been in place and have proven effective to date. They are also supported by national legislation (Seychelles) or by Spain's EU obligations. In the case of Seychelles, for example, the recent IOTC resolution on yellowfin tuna recovery has been strictly applied by the

Seychelles Fishing Authority (SFA) to vessels fishing under its flag. Similarly, vessels fishing under the EU flag have enforced the IOTC measures through EU agreements and through the Spanish fisheries authorities. **SG80 is therefore met.**

The IOTC, together with the detailed agreements and SFPAs between the parties, commitments to the IOTC, bilateral and Spain's commitments to the EU, are all binding procedures that ensure that the ANABAC fleet achieves management results consistent with MSC Principles 1 and 2. However, there are some elements of concern in the management system and, in particular, the ability of countries to comply with the resolution related to the recovery of the yellowfin tuna stock or, the effectiveness of the system used to monitor and estimate catches. Therefore, it cannot be said that **SG100 is met**.

b	Resolution of disputes			
	Guide post	The management system incorporates or is subject by law to a **mechanism** for the resolution of legal disputes arising within the system.	The management system incorporates or is subject by law to a **transparent mechanism** for the resolution of legal disputes which is **considered to be effective** in dealing with most issues and that is appropriate to the context of the UoA.	The management system incorporates or is subject by law to a **transparent mechanism** for the resolution of legal disputes that is appropriate to the context of the fishery and has been **tested and proven to be effective**.
	Met?	**Yes**	**Yes**	**No**

Rationale

The management system is implemented at three key levels: –IOTC (regional), common fisheries policy (EU) and national (Seychelles, Madagascar, Mauritius, France, Comoros).
The IOTC provides, through Article XXIII of the Agreement (Interpretation and Dispute Settlement), the basis for dispute settlement. Similarly, there are mechanisms in deep-sea fisheries agreements for dispute resolution. Seychelles fisheries legislation, specifically the Fisheries Act 2014, which entered into force on 13 January 2015, is implemented through the Seychelles Fisheries Authority (SFA). The SFA has the power to cancel or revoke licences and there is an appeal board that resolves disputes, and its procedures are defined (Poseidon, 2019). **SG60 is met**.

In relation to the IOTC, there are three mechanisms for dealing with disputes at the international level.

Firstly, disputes can be dealt with an annual CPC meeting through consultation and conciliation. Secondly, technical disputes can be resolved by an appropriately technical or expert panel. Thirdly, unresolved disputes can go through the International Court of Justice or the International Tribunal for the Law of the Sea.
The IOTC does not have a formal dispute settlement procedure within the convention, but the meetings provide a means of resolving disputes informally. These disputes are still considered legal to the extent that they are intended to resolve issues defined in the 1982 UN Convention on the Law of the Sea.

The system(s) are transparent (in law) and are considered effective. **SG80 is met.**

About bilateral and partnership agreements with the Seychelles and many other IPA countries, some are inactive or suspended. Although the agreements are available and therefore transparent, not all agreements can be said to have been tested and proven effective (Medley et al., 2022). **SG100 is not met**.

c	Respect for rights			
	Guide post	The management system has a mechanism to **generally respect** the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.	The management system has a mechanism to **observe** the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.	The management system has a mechanism to **formally commit** to the legal rights created explicitly or established by custom of people dependent on fishing for food and livelihood in a manner consistent with the objectives of MSC Principles 1 and 2.

	Met?	Yes	Yes	No

Rationale

At the regional level, the IOTC was established based on the United Nations Convention on the Law of the Sea (UNCLOS). Thus, Article 5(D) of the Agreement establishing the Commission states that "to keep under review the economic and social aspects of the fisheries based on the stocks covered by this Agreement bearing in mind, in particular, the interests of developing coastal states".

In this sense, the SKJ management system establishes mechanisms that allow the fishery to be stopped if Bcurr is lower than Bsafety, except for subsistence fishing" (CMM 16-02 - IOTC (2019)), thus recognising the fundamental right to food of coastal populations (see Birdlife, CFFA and WWF, 2020).

Vessels in the fishery can only operate in coastal state waters through formal agreements negotiated at EU level (SFPA) or, in the absence of an EU agreement and protocol, through a private licensing agreement between the vessel owners and the coastal state.

Mechanisms are in place to observe the legal rights created by fishing customs for the main target and non-target species and by gear type. Within coastal state waters, the IOTC takes into account the legal rights of people who depend on fishing for their food or livelihood, to the extent that coastal states collect, and report catch data.

On the other hand, in the EU-Seychelles agreement, although no explicit reference is made to legal rights established by custom, etc., it is implicit, mainly through Article 3:

"The Parties hereby undertake to promote sustainable fisheries in the Seychelles fishing zone on the basis of the principle of non-discrimination between the different fleets fishing in that fishing zone, without prejudice to the agreements concluded between the developing countries in that geographical region, including reciprocal fisheries agreements**" SG60 is met.**

In addition, both the EU CFP and the Seychelles Fisheries Act, fisheries policy and fisheries management plans recently developed in Seychelles (2019), explicitly emphasise the autonomy of Seychelles and the rights of its people to benefit from its fisheries resources. The same applies to other parts of the EU with which Seychelles and the EU have fisheries agreements, as described above (France, Mayotte, Comoros, Mauritius, Madagascar). These management systems therefore respect the legal rights of the states in the Indian Ocean region with which agreements exist and these agreements apply the IOTC CMMs (including addressing stock issues (P1) and other measures related to ecosystem management.**SG80 is met.**

In relation to SG100, work is underway through the IOTC Technical Committee on Allocation Criteria (IOTC, 2019i). However, there is still no final global IOTC agreement on access rights and allocations between distant water fleet and coastal states, **SG100 is not met.**

References

Akroyd, J. et al. 2022. AGAC four oceans Integral Purse Seine Tropical Tuna Fishery (Indian Ocean) – MSC Certification - Final Draft Report.
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Draft scoring range and information gap indicator added at Announcement Comment Draft Report stage

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

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

Overall Performance Indicator score		
Condition number (if relevant)		

PI 3.1.2 – Consultation, roles and responsibilities

PI 3.1.2		The management system has effective consultation processes that are open to interested and affected parties The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties		
Scoring Issue		SG 60	SG 80	SG 100
a	Roles and responsibilities			
	Guide post	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are **generally understood**.	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are **explicitly defined and well understood for key areas** of responsibility and interaction.	Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are **explicitly defined and well understood for all areas** of responsibility and interaction.
	Met?	**Yes**	**Yes**	**Yes**
Rationale				

There are three management entities involved in the fishery: at regional level the IOTC and at national level the EU and the Seychelles. In addition, there are specific bilateral agreements with Comoros and Madagascar, as independent states, and with the TAAF territories and France. These organisations and parties are strongly linked to the management process through binding agreements. **SG60 is met**.

The IOTC Regulations define the roles and responsibilities of its contracting parties and cooperating non-contracting parties, ensuring that all organisations and individuals involved in the management process are identified and have explicitly defined roles, functions, and responsibilities. All are adequately covered in the key areas (provision of basic catch and sampling data, implementation of research programmes, stock assessment and scientific advice). (https://iotc.org/about-iotc/basic-texts). These key areas include, for example, provision of basic catch data and catch sampling, implementation of research programmes and stock assessments, and scientific advice. The IOTC provides guidance, CMMs and other tools to demonstrate its roles and responsibilities, as well as those of its members.

At the national level, Seychelles has well-developed fisheries management policies and plans consistent with IOTC requirements. The EU, as a Member State representing Spain, France, and other IOI countries, has clearly defined codes of conduct and legislation in relation to the fishing activities of its nationals in general, including those of the IOI. **Therefore, SG80 is met.**

As compliance with SG100 requires clear identification of all areas of responsibility and interaction, ANABAC must have access mechanisms at all levels of governance (IOTC, SFA; TAAF, EU). In general, fisheries operations are mainly managed through the IOTC, through the CMMs and different resolutions, and through the SFA with the European Union. On the other hand, there are bilateral agreements that are essentially Trade Partnership Agreements (TPAs), and although the details are generally confidential, they should be made available on request. This information would be pending for Site Visit.

Medley et al. (2022) consider that roles, functions, and responsibilities are not well defined and/or well understood in many areas. In addition, while this author considers that the IOTC has had problems with some flag states not applying adequate controls on their vessels or not submitting data on time, among other issues, no evidence is available that the role of ANABAC and represented by two flags states as a group is not explicitly defined or is not understood.
SG100 is met

b	Consultation processes			
	Guide post	The management system includes consultation processes that **obtain relevant information** from	The management system includes consultation processes that **regularly seek and accept** relevant	The management system includes consultation processes that **regularly seek and accept** relevant

		the main affected parties, including local knowledge, to inform the management system.	information, including local knowledge. The management system demonstrates consideration of the information obtained.	information, including local knowledge. The management system demonstrates consideration of the information and **explains how it is used or not used**.
	Met?	**Yes**	**Yes**	**No**

Rationale

Regional context:

The IOTC governance mechanism is open to stakeholders. Stakeholders may participate through national delegations or as observers, including specific committees and working groups (https://iotc.org/about-iotc/basic-texts).
Several MOUs facilitate cooperation and information exchange through their subsidiary bodies, notably the Working Group on Ecosystems and Bycatch and the Scientific Committee, in relation to the protection of marine turtles (IOSEA https://www.cms.int/iosea-turtles/) and seabirds (ACAP https://www.acap.aq).
Therefore, **SG60 is met**

The IOTC management system is fed by information provided by IOTC member countries in accordance with IOTC protocols and standards. Moreover, coastal countries are considered to consider relevant information for the management of the fishery including local knowledge.

All this information is used by the management system in the preparation of its reports and in the drafting of its Resolutions and Recommendations. The management system demonstrates consideration of the information obtained. The scientific reports indicate exactly what information is used, how it is used and justify any information that is rejected. Thus, the IOTC holds annual plenary meetings, and IOTC specialist working groups (made up of scientists from the contracting parties) convene technical meetings on an annual basis. The information derived from the CPCs and the input from the specialist working groups is considered and this consideration forms the basis of the management advice provided by the IOTC. All relevant documents generated by the IOTC are available to all parties through its website.
SG80 is met.

For the European Union, the main consultation mechanism is the Fisheries Advisory Councils. The Long Distance Regional Advisory Council (LDAC) deals with fisheries outside the European EEZ and includes international waters and Fisheries Agreements with third countries. This Council involves countries with an interest in distant water fisheries, including the local fishing sector, NGOs, scientists and fishery managers.
This element is therefore considered to met SG60 and SG80.

In relation to SG100, the management system needs to demonstrate that it includes consultation processes that regularly seek and accept relevant information, including local knowledge, and that it considers all information and explains how it is or is not used. In general, it can be stated that the management system does use existing information and explains how it is used. Thus, both the Scientific Committee and other Working Groups participate in active discussions and the documents they produce (scientific papers or minutes of meetings) show what information they have used and how it has been applied to obtain the results of these documents.

However, the information used by management, apart from scientific information, is not so clearly communicated. While much of this information may come from various sources, it is not necessarily clear how the various sources of information are weighted. This includes information on compliance, economics, and social issues. Therefore, **SG100 is not met**. As the management system cannot demonstrate that it has taken all information into account in all cases, nor explain how it uses it in all its decisions.

	Participation			
c	Guide post		The consultation process **provides opportunity** for all interested and affected parties to be involved.	The consultation process provides **opportunity and encouragement** for all interested and affected parties to be involved, and

				facilitates their effective engagement.
	Met?		**Yes**	**Yes**

Rationale

At the regional level, the IOTC provides the opportunity for all parties with an interest in the fishery to participate in the meetings. Commission meetings are open to registered observers (see https://www.iotc.org/about-iotc/structure-commission). Although observers do not play a direct role in decision-making, they submit information and evidence that is used prior to the meetings.

At the European level the Distant Water Regional Advisory Council (LDAC) constitutes an appropriate consultation tool for all parties in the management system giving all parties the opportunity to be consulted.

At the national level, the SFA, in addition to participating in IOTC meetings, also works in collaboration with different ministries in the country (Education, Environment and Energy) and other public and private entities, such as the Seychelles Coast Guard, the Seychelles Port Authority, fishermen and shipowners' associations and NGOs, as reflected in the policy, strategy and plan documents for the fisheries sector published in 2019. This demonstrates that there is a level of consultation of all stakeholders interested and affected by the fishery (SFA, 2019a, SFA,2019b and http://www.sfa.sc/Legislations/SFA Establishment Act.pdf).
SG80 is met.

In addition, the EU is a bilateral partner of Seychelles through the Fisheries Agreement and is a Party to the IOTC, so consultation processes are conducted through meetings of the parties, in the case of the Agreement, and between the CPCs in the IOTC.
SG100 is met.

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IOTC–2022–CoC19–R[E]. Report of the 19th Session of the Compliance Committee. In person (limited) & by videoconference, 8 to 10 & 12 May 2022United Nations Convention on the Law of the Sea (UNCLOS). 1982; UNFSA 1995. United Nations Fish Stocks Agreement (UNFSA).

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

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

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

Overall Performance Indicator score	
Condition number (if relevant)	

PI 3.1.3 – Long term objectives

PI 3.1.3		The management policy has clear long-term objectives to guide decision-making that are consistent with MSC Fisheries Standard, and incorporates the precautionary approach		
Scoring Issue		SG 60	SG 80	SG 100
a	Objectives			
	Guide post	Long-term objectives to guide decision-making, consistent with the MSC Fisheries Standard and the precautionary approach, are **implicit** within management policy.	**Clear** long-term objectives that guide decision-making, consistent with MSC Fisheries Standard and the precautionary approach are **explicit** within management policy.	**Clear** long-term objectives that guide decision-making, consistent with MSC Fisheries Standard and the precautionary approach, are **explicit** within **and required by** management policy.
	Met?	**Yes**	**Yes**	**Yes**
Rationale				

To score this indicator, it is necessary to know the extent to which the precautionary approach is applied at the regional level (IOTC). According to UNCLOS, articles 61-63 explicitly refer to conservation measures on the high seas, and article 6 of UNFSA (article 6) emphasises the precautionary approach as a management tool.

In the case of the IOTC, its founding agreement states that its objective is "to promote cooperation among its members to ensure, through proper management, the conservation and optimum utilisation of the stocks covered by this Agreement and to promote the sustainable development of fisheries based on such stocks (art. 5)". Overall, it is considered that, although the precautionary principle is not explicitly mentioned, it is implicit in this article and therefore **SG60 is met.**

The IOTC's second performance review was published in 2016. It includes a comparison of the content of the IOTC Agreement with UNCLOS and UNFSA articles. Among other elements found in the Review, it is considered that, although the UNFSA contains direct references to the application of the precautionary approach in its article 5 on general principles which includes, in its point I that coastal States and States fishing on the high seas should apply the precautionary approach in accordance with article 6) the application of the precautionary principle to the conservation and management of straddling fish stocks and highly migratory fish stocks. Annex II of UNFSA provides guidance for the application of precautionary reference points in the conservation and management of the stocks concerned. None of these elements is explicitly included in the IOTC Agreement, but the Commission adopted a resolution to give effect to the precautionary approach (Resolution 12/01 on the application of the precautionary approach). This Resolution requires the IOTC to apply the precautionary approach, in accordance with relevant internationally agreed standards". According to the MSC, to achieve SG100 in PI3.1.3 it is necessary that clear long-term objectives guiding decision-making and the precautionary approach are explicit within, and required by, management policy.

At the regional level, the starting point for assessing this level of scoring is Resolution 12-01. Point 2 of this Resolution indicates that the Commission, in applying the precautionary approach, will adopt, after due consideration of advice provided by the IOTC Scientific Committee

> (a) stock-specific reference points (including, inter alia, target and limit reference points) for fishing mortality and biomass; and
> (b) the associated harvest control rules, i.e. the management measures to be taken on the basis of the stock status reference points or in the event of non-compliance with them.

In this respect, within the IOTC, the Commission has adopted different resolutions establishing, after due advice from the organisation's Scientific Committee, specific stock reference points and harvest monitoring rules (Resolution 16/02 on skipjack tuna and 16/01, 17/01, 18/01, 19/01 on an interim plan for the recovery of the Indian Ocean yellowfin tuna stock).
In addition, IOTC Resolution 15/10 establishes interim targets and limit reference points for individual tuna and tuna-like species, to be applied when recommended by the Standing Committee to the Commission.

In relation to the national level of management. EU Regulation 1380/2013 reforming the CFP establishes in Article 2 the need to ensure that fishing and aquaculture activities are environmentally sustainable in the long term and that the precautionary approach to fisheries management is applied, as well as to ensure that the exploitation of living marine biological resources restores and maintains populations of harvested species above levels that can produce the maximum sustainable yield.

In relation to Seychelles, neither the Seychelles Fisheries Policy nor the "Integrated Fisheries Plan" makes direct reference to the Precautionary Principle. However, in both cases, reference is made to the sustainability of fisheries as one of the objectives of the fisheries policy. This commitment and the existing regional framework mean that there are adequate governance mechanisms compatible with the Precautionary Principle. Therefore**, SG80 and SG100 are met**.

References

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FAO Council. 1993. AGREEMENT FOR THE ESTABLISHMENT OF THE INDIAN OCEAN TUNA COMMISSION

REGULATION (EU) 2017/2403 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 12 December 2017 on the sustainable management of external fishing fleets, and repealing Council Regulation (EC) No 1006/2008

COUNCIL DECISION (EU) 2019/860 of 14 May 2019 on the position to be taken on behalf of the European Union in the Indian Ocean Tuna Commission (IOTC), and repealing the Decision of 19 May 2014 on the position to be adopted, on behalf of the Union, in the IOTC

Medley, P., Gascoigne, J. and Scarcella, G. (2022). An Evaluation of the Sustainability of Global Tuna Stocks Relative to Marine Stewardship Council Criteria (Version 9.0). ISSF Technical Report 2022-01. International Seafood Sustainability Foundation, Washington, D.C., USA.

Seychelles Fishery Sector Policy and Strategy, 2019; SFA; Seychelles Fisheries Comprehensive Plan, 2019; SFA

IOTC–2022–CoC19–R[E]. Report of the 19th Session of the Compliance Committee. In person (limited) & by videoconference, 8 to 10 & 12 May 2022

United Nations Convention on the Law of the Sea (UNCLOS). 1982; UNFSA 1995. United Nations Fish Stocks Agreement (UNFSA).

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

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

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

Overall Performance Indicator score	
Condition number (if relevant)	

PI 3.2.1 – Fishery-specific objectives

PI 3.2.1		The fishery-specific management system has clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2		
Scoring Issue		SG 60	SG 80	SG 100
a	Objectives			
	Guide post	**Objectives**, which are broadly consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are **implicit** within the fishery-specific management system.	**Short and long-term objectives**, which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are **explicit** within the fishery-specific management system.	**Well defined and measurable short and long-term objectives**, which are demonstrably consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are **explicit** within the fishery-specific management system.
	Met?	**Yes**	**Yes**	**Partial**
Rationale				

The specific objectives of the fishery are analysed in the management framework of the assessed UoA, including the CMMs related to Principles 1 and 2 and the status of the skipjack tuna stock in the Indian Ocean.

This management framework is determined by the following 4 resolutions

- RESOLUTION 19/02 ON A MANAGEMENT PLAN FOR FISH AGGREGATING DEVICES (FADS)
- RESOLUTION 19/05 ON THE PROHIBITION OF DISCARDS OF BIGEYE TUNA, SKIPJACK TUNA, YELLOWFIN TUNA AND NON-TARGET SPECIES CAUGHT BY PURSE SEINE VESSELS IN THE IATTC AREA OF COMPETENCE
- RESOLUTION 21/03 ON THE RULES FOR THE CONTROL OF CATCHES OF SKIPJACK TUNA IN THE IOC AREA OF COMPETENCE.
- RESOLUTION 15/10 ON TARGET AND LIMIT REFERENCE POINTS AND DECISION FRAMEWORK.
-

Apart from those included in the Resolutions specific to or related to the SKJ fishery, there are other measures applicable to the UoA that can be defined as fishery-specific measures, but which are collectively related to the general objectives of the UoA. In this respect, the measures relating to FADs (19/02) and Bio-FADs (18/04) and discards (19/05) are important.

In addition, there are other measures related to other commercial species that are caught in the UoA such as YFT (Resolution 21/01 on an interim plan for rebuilding the Indian Ocean yellow fin tuna stock in the IOTC area of competence), or billfishes (Resolution 18/05 On Management Measures for the Conservation of the Billfishes: Striped Marlin, Black Marlin, Blue Marlin and Indo-Pacific Sailfish).

In relation to by-catch, there are Resolutions concerning the conservation of cetaceans, sharks and manta rays among others (eg. Resolution 13/04 on the conservation of cetaceans, Resolution 17/05 on the conservation of sharks caught in IOTC fisheries, Resolution 19/03 on the conservation of mobulid rays, Resolution 12/04 on the conservation of marine turtles and Resolution 18/02 on management measures for the conservation of blue sharks caught in association with IOTC fisheries).

This set of resolutions and measures is considered to include implicit objectives in the fishery-specific management system and therefore **SG60 for Principle 1 and Principle 2 is met.**

In relation to Principle 1, Resolution 21/03 defines explicit HCRs for the SKJ that include reference points based on MSY. These Benchmarks include a Blim=20%B0 and a Btarg=40%B0.
Regarding Principle 2, IOTC Resolution 12/01 obliges the application of the Precautionary Principle in the adoption of stock-specific reference points and corresponding HRCs (Res 12/01 2.a and b). This concerns catches of bigeye and yellowfin tuna. In addition, there are specific Resolutions for the main by-catch species and ETP.

On the other hand, the Common Fisheries Policy of the European Union (Reg. (EC) 1380/2013 lists several principles to be achieved in fisheries where EU vessels are present, including in external waters. These principles and rules are the basis for the national fisheries policy of the different member countries. These principles include sustainable exploitation of marine resources, marine environmental protection, sustainable management of commercially exploited species and the need to achieve good environmental status by 2020.

Therefore, **SG80 is met for P1 and P2.**

According to the MSC, to achieve SG100 on this indicator, the objectives of the fishery must be well defined and measurable.

In relation to Principle 1, the short-term objectives for the SKJ are explicit, well defined, and measurable. Resolution 21/03 limits the total annual catch, a maximum change in the annual catch limit and the possibility to revise the HRCs if the estimated spawning stock biomass falls below the limit reference point. Furthermore, these targets are fully transposed in the EU CFP regulation (EU, 2013).

For Principle 2 outcomes, Resolution 12/01 requires the application of the precautionary approach to adopt stock-specific reference points and corresponding HCRs. However, while catch and effort limits are clearly defined for yellowfin tuna, given its worrying stock status, this is not the case for bigeye tuna.

In relation to other species and the ecosystem, in addition to the above-mentioned species Resolutions, other examples of long-term objectives with a precautionary approach apply to this fishery. **SG100 is only partially met**.

References

Akroyd, J. et al. 2022. AGAC four oceans Integral Purse Seine Tropical Tuna Fishery (Indian Ocean) – MSC Certification - Final Draft Report.

Medley, P., Gascoigne, J. and Scarcella, G. (2022). An Evaluation of the Sustainability of Global Tuna Stocks Relative to Marine Stewardship Council Criteria (Version 9.0). ISSF Technical Report 2022-01. International Seafood Sustainability Foundation, Washington, D.C., USA

RESOLUTION 19/02 PROCEDURES ON A FISH AGGREGATING DEVICES (FADS) MANAGEMENT PLAN

RESOLUTION 19/05 ON A BAN ON DISCARDS OF BIGEYE TUNA, SKIPJACK TUNA, YELLOWFIN TUNA, AND NON- TARGETED SPECIES CAUGHT BY PURSE SEINE VESSELS IN THE IOTC AREA OF COMPETENCE

RESOLUTION 21/03 ON HARVEST CONTROL RULES FOR SKIPJACK TUNA IN THE IOTC AREA OF COMPETENCE

RESOLUTION 15/10 ON TARGET AND LIMIT REFERENCE POINTS AND A DECISION FRAMEWORK

RESOLUTION 12/04 ON THE CONSERVATION OF MARINE TURTLES

RESOLUTION 13/04 ON THE CONSERVATION OF CETACEANS

RESOLUTION 13/05 ON THE CONSERVATION OF WHALE SHARKS (RHINCODON TYPUS)

RESOLUTION 21/01 ON AN INTERIM PLAN FOR REBUILDING THE INDIAN OCEAN YELLOWFIN TUNA STOCK IN THE IOTC AREA OF COMPETENCE

EU FAD Management Plan. Ref. Ares(2010)734388 - 22/10/2010. EUROPEAN COMMISSION DIRECTORATE-GENERAL FOR MARITIME AFFAIRS AND FISHERIES

ANABAC/OPAGAC. Codes of Good Practice (2020): https://atundepescaresponsableaenor.com/la-certificacion-apr/

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

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

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

Overall Performance Indicator score	
Condition number (if relevant)	

PI 3.2.2 – Decision-making processes

PI 3.2.2		The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery		
Scoring Issue		SG 60	SG 80	SG 100
a	Decision-making processes			
	Guide post	There are **some** decision-making processes in place that result in measures and strategies to achieve the fishery-specific objectives.	There are **established** decision-making processes that result in measures and strategies to achieve the fishery-specific objectives.	
	Met?	**Yes**	**Yes**	
Rationale				

Within the fishery management framework, there are established, responsive and largely transparent decision-making processes at different levels of management. In the case of the IOTC, this process is well established, defining measures and strategies with the objective of bringing the SKJ fishery in the Indian Ocean to a sustainable level of catches.

In the 1993 Agreement establishing the Commission, specific decision-making mechanisms already appear. Resolutions are based on scientific advice and can be drafted by sub-commissions and subsidiary bodies and on the initiative of a CPC. The EU, its Member States, and coastal and island states (including the Seychelles) are represented in the decision-making process at IOTC level, **SG60 is met**.

The IOTC Rules of Procedure, adopted in 1997 and updated in 2004 (https://www.iotc.org/node/5065), established clear decision-making processes within the IOTC. The decision-making mechanisms allow for the formulation of binding Resolutions that include the mechanisms and strategies necessary to achieve the specific objectives of the fishery. IOTC Regulation 16/01 (on an interim plan for the recovery of the IO stock of yellowfin tuna) and IOTC Regulation 16/02 (on HCRs for skipjack) are the best recent examples. Also relevant is the working group on FADs (Reg IOTC 15/09) and Resolution 19/02 on procedures for a management plan for FADs refers to the relevant CMMs already in place and points to the relevant elements of advice from the Scientific Committee.

In addition, Article IX of the 1993 Agreement Establishing the Commission establishes the mechanisms for the formulation of recommendations (voluntary and/or transitional) and binding resolutions that are mandatory.

However, there are some weaknesses, which have been highlighted in the performance evaluations. Members can vote, but cooperating non-members are not entitled to participate in voting. Most, if not all, decisions are reached by consensus rather than majority vote (Medley et al, 2022). Even so **SG80 is met**.

SG80 is met

b	Responsiveness of decision-making processes			
	Guide post	Decision-making processes respond to **serious issues** identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take some account of the wider implications of decisions.	Decision-making processes respond to **serious and other important issues** identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.	Decision-making processes respond to **all issues** identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.

	Met?	Yes	No	No

Rationale

To score this SI effectively, it is necessary to show responsiveness to decision-making processes at different levels. The IOTC has internal response mechanisms that allow serious problems identified in the fishery to be addressed and considered in the decision-making process. The implementation of IOTC resolutions by all parties is a fundamental part of the management system.

IOTC decisions are, for the most part, timely and taken in an organised and systematic manner (Medley et al. 2022). Working groups are set up within the Commission on specific issues that may arise, and CPCs also participate in these groups, which, in the case of the ANABAC, is of great importance given that, both because of the flag status of the vessels and the existing fisheries agreements, the participation of the EU and Seychelles, France, Madagascar, Comoros and other states is necessary.

The IOTC's decision-making process is transparent, and most disputes are resolved at the annual meetings by consensus. Prior to the meetings, the parties have the necessary information (Medley et al, 2022). The level of transparency allows the parties to have all the information they need to be able to decide.

On the other hand, (Medley 2022) objections have not in practice prejudiced the decision-making processes for tuna stocks managed by the IOTC. Thus, it does not appear that the objection process is an impediment to the most contentious issues being raised at meetings and thus not resolved. Although this does not seem likely to happen. Therefore, **SG60 is met**.

In addition to the serious issues, other important issues arise within the IOTC, for example in relation to voluntary measures such as those related to the use of biodegradable FADs, observers, or active monitoring of buoys.

However, important issues are not always adequately addressed. Thus, in 2017, a total catch limit for skipjack tuna was set based on the Harvest Control Rules included in Resolution 16/02, based on the recommendations of the Scientific Committee (SC). However, this limit was exceeded by 30% in 2018, and by 16% in 2019. A new assessment determined that the stock was in good status in both 2020 and 2021. The AC noted that this good status, despite the exceeded limits, could be related to favourable environmental conditions and concluded that the "Commission should ensure that catches of skipjack tuna during this period (2021 - 2023) do not exceed the agreed limit" (IOTC, 2020). On this point, the overlapping fisheries have harmonised the scoring following this criterion. Thus, it is considered that, given that the stock is found to be in good condition, overfishing is a significant but not yet serious problem and that IOTC decision-making processes are therefore not adequately responsive to this issue, which is important.

On the other hand, the lack of financial resources of some of the CPCs means that some coastal and developing countries do not have the financial capacity to attend all meetings of the Commission (Medley, 2022). While this is not the case for the European Union or the Seychelles, which do have such resources, this limiting factor leads to a lack of effective decision-making and implementation. Consequently, **SG80 is not met.**

c	Use of precautionary approach			
	Guide post		Decision-making processes use the precautionary approach and are based on best available information.	
	Met?		**Yes**	

Rationale

The IOTC Agreement does not explicitly refer to the application of the Precautionary Principle, although Resolution 12/01 (On the Implementation of the Precautionary Approach) determines its application in the framework of the Commission's decision-making process.

Implicit in the application of the precautionary approach is that its application leads to improved decision-making processes through, inter alia, the application of best available techniques to reduce risk and uncertainty. In this regard, Resolution 12/01 urges the IOTC to apply the precautionary approach in accordance with relevant internationally agreed standards. In addition, for the implementation of this approach, the Commission should adopt reference points for fishing mortality and biomass and associated harvest control rules considering the main uncertainties, including uncertainty about the status of stocks in relation to the reference points, uncertainty about biological, environmental, and socio-economic developments and the effects of fishing activities on non-target and associated or dependent species.

In this regard, this approach also includes the adoption of interim target and limit reference points through IOTC Resolution 15/10 and Recommendation 12/14 and the specific skipjack Resolution 21/03 (on harvest control rules for skipjack tuna in the IOTC area of competence)

In relation to the European Union, the Common Fisheries Policy Regulation establishes, both in the preamble and in Article 2, that the Precautionary Principle shall be applied to fisheries management, with the objective of rebuilding stocks of overexploited species and keeping them all above the levels necessary to achieve Maximum Sustainable Yield.

In relation to Seychelles, there is no direct mention of the application of the Precautionary Approach in its fisheries legislation. However, there are legislative tools that, although they do not explicitly mention this approach, do consider that fisheries should be carried out in a scenario of resource sustainability.

In either case, decisions are all based on the best available information. Therefore, **SG80 is met**.

	Accountability and transparency of management system and decision-making process			
d	Guide post	Some information on the fishery's performance and management action is generally available on request to stakeholders.	**Information on the fishery's performance and management action is available on request**, and explanations are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.	Formal reporting to all interested stakeholders **provides comprehensive information on the fishery's performance and management actions** and describes how the management system responded to findings and relevant recommendations emerging from research, monitoring, evaluation and review activity.
	Met?	**Yes**	**Yes**	**Yes**
Rationale				

All relevant information related to the work of the IOTC is appropriately published on the organisation's website (https://www.iotc.org).

All Resolutions and Recommendations, as well as other relevant reports or documents are publicly accessible and available to all interested parties on this page. It also includes information on the register of fishing vessels and reefers authorised to operate in IOTC waters and a list of vessels accused of IUU fishing.

About the European Union, member countries only apply existing management measures within the framework of the Union's fisheries management system. All countries, including Spain, report the activity of their vessels to the EU. It is possible to have access to information on the fishing activity of European vessels even if they are operating in external, non-EU waters. The texts of the negotiations of the Fisheries Agreements can be consulted and the evaluation reports of these agreements are also available on the website of the European Commission or Parliament. Moreover, the Long-Distance Advisory Council, as a consultative member of the European Commission, also makes its opinions and other documentation available to all parties in a transparent and accessible manner.

Spain also reports and shares information with other CPCs with which it has fishing agreements, including Seychelles. **SG60 and SG80 are met**

To achieve SG100, it is necessary to ensure that formal reporting to all stakeholders provides comprehensive information on the fishery's performance and management actions. In addition, it is necessary to describe how the management system responds to findings and recommendations derived from scientific research, monitoring, assessment, and review. The IOTC makes available to all parties the relevant reports produced from meetings, working groups or different Committees. In addition, all information is available on the Commission's website:

http://www.iotc.org/. At EU level, evaluations of agreements and legal texts can be downloaded from the website of the Directorate-General for Maritime Affairs and Fisheries. The LDAC Opinions are also available. In the case of Seychelles, information on Fisheries Agreements is available on request from interested parties (AGAC, 2022). Therefore, **SG100 is met.**

	Approach to disputes			
e	Guide post	Although the management authority or fishery may be subject to continuing court challenges, it is not indicating a disrespect or defiance of the law by repeatedly violating the same law or regulation necessary for the sustainability for the fishery.	The management system or fishery is attempting to comply in a timely fashion with judicial decisions arising from any legal challenges.	The management system or fishery acts proactively to avoid legal disputes or rapidly implements judicial decisions arising from legal challenges.
	Met?	**Yes**	**Yes**	**No**

Rationale

The IOTC Agreement includes an article (XXIII) on interpretation and dispute settlement, the basis for dispute resolution. (https://iotc.org/about-iotc/basic-texts)
Normally, when there is a dispute, it is usually dealt with and resolved in the subsidiary bodies of the Commission, or it may be escalated through a panel of experts who make an analysis and report back to the Commission (Medley, 2022). **SG60 is met.**
CPCs have so far avoided resorting to international law to resolve disputes. If disputes cannot be resolved internally, they could be referred to independent international arbitration through the International Court of Justice or the International Tribunal for the Law of the Sea, although these mechanisms have not yet been tested. (Medley, 2022).
IOTC Resolution 16/11 on port state measures includes in paragraph 6 a mechanism to assist States in developing CPCs to implement the application of CPCs, including dispute settlement. IOTC CPCs cooperate to establish appropriate funding mechanisms to assist developing CPC States to implement the Resolution.
No evidence of court challenges to the skipjack tuna fishery management system by IOTC CPCs, including the EU, has been found. **SG80 is met**.
IOTC has an opt-out clause when CPCs do not agree with resolutions. The consultation processes (Working Groups, Commission meetings) and the opt-out clause are elements that determine a proactive system for dealing with disputes that may exist. Although there are mechanisms in place for regular review of the management system and its monitoring, there is no clear evidence to demonstrate the proactivity of the system in dealing with potential disputes**. SG100 is not met.**

References

Akroyd, J. et al. 2022. AGAC four oceans Integral Purse Seine Tropical Tuna Fishery (Indian Ocean) – MSC Certification - Final Draft Report.
Medley, P., Gascoigne, J. and Scarcella, G. (2022). An Evaluation of the Sustainability of Global Tuna Stocks Relative to Marine Stewardship Council Criteria (Version 9.0). ISSF Technical Report 2022-01. International Seafood Sustainability Foundation, Washington, D.C., USA
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REGULATION (EU) No 1380/2013 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 11 December 2013 on the Common Fisheries Policy
Terje Løbach, T., Petersson, M., Haberkon, E. & Mannini, P. 2020. Regional fisheries management organisations and advisory bodies. Activities and developments, 2000-2017. FAO Fisheries and Aquaculture Technical Paper No. 651. Rome, FAO. https://doi.org/10.4060/ca7843en
Seychelles FISHERIES ACT, 2014. (Act 20 0/2014). SFA

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

Draft scoring range	**60-79**

Information gap indicator	**More information sought** *More information on decision making processes will be collected and assessed as part of the site visit*

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

Overall Performance Indicator score	
Condition number (if relevant)	

PI 3.2.3 – Compliance and enforcement

PI 3.2.3		Monitoring, control and surveillance mechanisms ensure the management measures in the fishery are enforced and complied with		
Scoring Issue		SG 60	SG 80	SG 100
a	MCS implementation			
	Guide post	Monitoring, control and surveillance **mechanisms** exist, and are implemented in the fishery and there is a reasonable expectation that they are effective.	A monitoring, control and surveillance **system** has been implemented in the fishery and has demonstrated an ability to enforce relevant management measures, strategies and/or rules.	A **comprehensive** monitoring, control and surveillance system has been implemented in the fishery and has demonstrated a consistent ability to enforce relevant management measures, strategies and/or rules.
	Met?	**Yes**	**Yes**	**No**
Rationale				

Monitoring, Control and Surveillance (MCS) is one of the main functions of the IOTC. However, the Organisation does not directly carry out punitive actions against these practices; it is the Member States, with their capacities and means, who do so. The IOTC provides support and guidance to improve surveillance processes and provides training, mainly through recommendations and support for the implementation of Port State Measures (PSMA).

In addition, the directives on this matter, integrated in Resolutions and other IOTC measures, are implemented by the CPCs at national level. In addition, Member States are responsible for reporting on their compliance to the IOTC, which in turn measures their effectiveness.

The IOTC also supports the integration of all elements of the MCS such as VMS, Catch Documentation, Port State Measures, Observer standards and other catch reporting systems.

The IOTC has a compliance committee responsible, among other things, for consolidating compliance activities and assessing the performance of CPCs.

SG60 is met.

In relation to SG80, the MSC system needs to be able to enforce existing Management and Conservation Measures. There are two levels of reference in this respect. On the one hand, the monitoring of fishing activities within the Parties' EEZs and on the other hand, those in international waters.

CPCs inform the IOTC, through the compliance reports they are required to submit, of the situation within their EEZs and of their vessels fishing in international waters. The IOTC Compliance Committee meets annually. At this meeting, a review is made of the contributions made by the CPCs throughout the year and the problems that exist are analysed. (Report of the 19th Session of the Compliance Committee)

At the national level, CPCs with which fisheries agreements or conventions exist in the area are considered. **Table 7.4.4.1** shows that, for most of these CPCs, international and regional legislation and governance is in place.

In Seychelles, the SFA's Fisheries Monitoring Centre (FMC) is responsible for ensuring compliance of all fishing vessels within its jurisdiction. This includes ANABAC vessels flying the Seychelles flag. The FMC has, among other duties, the processing of fishing licences.

In addition, the IOTC rigorously monitors electronic reporting and monitoring of catches, and the Compliance Committee's annual reports identify deficiencies in the system, as well as CPCs that have not fulfilled their obligations.

The FMC_SFA is a comprehensive regional catch monitoring system (VMS) and communicates with other states in the region, with the French island states.

MCS-related activities are also carried out in the region, such as regional patrols, other patrols organised by the NGO Sea Shepard and coordination with other international groups monitoring IUU fishing activities in the area and sensitive areas (vessel hijacking) in Somali waters. Vessels that do not comply with IOTC standards or in other RFMOs are included in a shared IUU vessel register.

For the European flagged ANABAC fleet, all geographical information related to fishing operations carried out during fishing trips is recorded in electronic logbooks. VMS data are continuously sent and transmitted to the respective Fisheries Monitoring Centres of each CPC in whose waters they are fishing. In addition, to facilitate the monitoring and tracking of all ANABAC vessels, all VMS data is also transmitted to the General Secretariat for Fisheries in Madrid, which is responsible for transforming the data into a standardised format and sending it to the IOTC. Each entry into and exit from the different EEZs is notified to the States where the vessels operate, and VMS transmits continuously.

In addition, for commercial purposes, to import tuna into the EU, improve transparency and facilitate the tracking and tracing of all ANABAC vessels; VMS, fishing licences made available by the flag state and copies of logbooks and landing, and transhipment declaration are delivered to the General Secretariat for Fisheries in Madrid. VMS and comprehensive observer coverage effectively and independently track ANABAC vessels and fishing activity and provide reliable information on the spatial extent of interaction and on the timing and location of gear use. VMS data for all ANABAC fishing vessels are available from AZTI.

SG80 is met

However, the system is dependent on the action of CPCs and coastal states to enforce the law, implement the PSMA, have observers, among others. Besides, according to the IOTC annual compliance reports there are weaknesses in the system especially in deterring IUU fishing by certain coastal states. Although this is not the case in the European Union, France, or Seychelles, where all vessels are monitored through VMS, the difficulty in knowing the impact of the above weaknesses on the performance of the fishery prevents the SG100 from being achieved for this scoring element.

SG100 is not met.

b	Sanctions			
	Guide post	Sanctions to deal with non-compliance exist and there is some evidence that they are applied.	Sanctions to deal with non-compliance exist, **are consistently applied** and thought to provide effective deterrence.	Sanctions to deal with non-compliance exist, are consistently applied and **demonstrably** provide effective deterrence.
	Met?	**Yes**	**Yes**	**No**
Rationale				

Analysis of the IOTC Compliance Committee reports (2019, 2021 and 2022) indicates that, in all years, there are numerous minor non-compliances, although there is insufficient evidence that all parties involved have been sanctioned (Medley et al, 2022).

IOTC Resolution 19/01 On a plan for rebuilding the Indian Ocean yellowfin tuna stock in the IOTC Area of Competence introduced a "payback" system for fleets that exceed their catch limits in 2017, 2018 and 2019.

In this regard, the AC reports also state that the European Union imposed sanctions on Spain for exceeding the Yellowfin Tuna fishing quota in 2017 (applied in 2018 and 2019) EU Regulation 2019/1726. These sanctions were applied to ANABAC vessels and other EU-flagged vessels.

As such, sanctions are in place to address non-compliance and there is some evidence that they are applied. **SG60 is met**

Although, as noted above, sanctions exist within the IOTC management framework, it is difficult to assess the extent to which they are an effective deterrent, although they are at least considered to provide deterrence. Both European and Seychelles-flagged ANABAC vessels are not included in IOTC non-compliance registers. Deterrence is therefore considered to be effective. **SG80 is met**

With the information provided it is not possible to identify whether sanctions are systematically applied and can be shown to provide effective deterrence. There is also no information on whether the payback imposed on EU and Seychelles fleets is being effective in rebuilding YFT stocks. **SG100 is not met**

This point will be reviewed during the Site Visit.

	Compliance			
c	Guide post	Fishers are **generally thought** to comply with the management system for the fishery under assessment, including, when required, providing information of importance to the effective management of the fishery.	**Some evidence exists** to demonstrate fishers comply with the management system under assessment, including, when required, providing information of importance to the effective management of the fishery.	There is a **high degree of confidence** that fishers comply with the management system under assessment, including, providing information of importance to the effective management of the fishery.
	Met?	**Yes**	**Yes**	**No**
Rationale				

Summary information on the actions of the different CPCs is available in the annual reports of the IOTC Compliance Committee. In addition, they integrate and consolidate the compliance issues that have been reported in the national reports by each individual CPC. In these implementation reports, CPCs describe the actions they have taken, under national legislation, during the previous year to implement the conservation and management measures adopted by the Commission (including the imposition of appropriate sanctions for infringements).

In the case of ANABAC, the EU and Seychelles reports suggest that the ANABAC fleet complies with the management system and with the obligation to report on request. The EU compliance reports (IOTC, 2019, 2020 and 2022) is detailed and provides information demonstrating that fishermen comply. **SG60 is met**.

To achieve SG80, some evidence of fishermen's compliance with the management system under assessment must be demonstrated, including, where necessary, the provision of information important for the effective management of the fishery.
According to IOTC, there is evidence of a certain level of compliance (IOTC IOTC-2022-CoC19-11_Rev2 [E]; IOTC-2021-CoC18-12_Rev3 [E]). However, the overall compliance level, after an improvement of more than 10% in the period 2016-1020, the trend has been interrupted in 2021 where, the overall compliance percentage dropped to 69.9%. This is nearly 4 percentage points lower than in 2020 when the historical maximum was reached (73.4%).
Regarding the level of compliance of the European Union and Seychelles, according to data published by the IOTC (Compliance Rate = number of requirements compliant / number of requirements applicable), the European Union went from 71% (2021) to 79% (2021). Seychelles maintained 80% in both years. In this sense, it is considered that there is evidence that fishermen are complying with the management system.

The most recent compliance reports from the last IOTC compliance meeting reviewed (2021) identify several key issues and discuss the status of the level of compliance. There are no non-compliances or partial compliances in relation to the CMMs specific to the SKJ fishery. The main problem detected is in the reporting of mandatory statistics (Resolution 15/02 and 17/05). According to the Commission, a decrease in data reporting was observed in 2021 in terms of timeliness of data submissions and in the proportion of data sets fully or partially reported by CPCs.

Delays in the submission of this information compromise the quality of the data available for the most recent year due to the lack of time to validate and verify the information for use in different tasks. In 2021, 43% of all data were reported late. There are other CMMs whose non-compliance or partial compliance is indicated in the IOTC CC reports. For example, non-compliance with Resolution 17/05 on the mandatory submission of shark catch statistics for the EU and Seychelles fleet.
Problem areas are recognised and are being addressed, although the level of compliance cannot be said to be fully acceptable, as these inadequacies may undermine the IOTC's ability to assess stocks (P1) and the implementation of the management system. As a result, **SG80 is met at regional and flag States' level, but no SG100.**

For the ANABAC fleet, geographical information related to fishing operations conducted during fishing trips is recorded in electronic logbooks. The VMS data are continuously sent and transmitted to the respective fisheries monitoring centres of each CPC. In addition, to facilitate the tracking and tracing of all ANABAC vessels, all VMS data are also transmitted to the General Secretariat for Fisheries in Madrid, which is responsible for transforming the data into a standardised format and sending it to the IOTC. All entries into and exits from the different EEZs are reported to the States in which the vessels operate, and the VMS are transmitted continuously.

All vessels are equipped with VMS and can be easily tracked by third parties (flag and coastal states). In addition, observer coverage (human or electronic) is 100% on all vessels. VMS and extensive observer coverage effectively and independently monitor vessels and fishing activity for ANABAC fleet and provide reliable information on the spatial extent of interaction and on the timing and location of gear use.
Therefore, if there is some evidence that fishermen comply with the management system.
SG80 is met at client's level.

Compliance issues are difficult to fully assess and to have high confidence that fishermen comply with the management system requires an on-site assessment. **Therefore, SG100 is not met**.

d	Systematic non-compliance			
	Guide post		There is no evidence of systematic non-compliance.	
	Met?		**Yes**	
Rationale				

The analysis of recent IOTC Compliance Committee reports (2019, 2020 and 2021) does not contain information that would support a finding of systematic non-compliance in the fishery. This analysis includes both the compilation reports and the national reports of CPC parties.

In addition, CC reports include an updated (and coordinated with other RFMOs) list of IUU vessels, the obligation to record and report data (including VMS), observer monitoring of catches and fishing activities, diplomatic and other pressures applied to CPCs, as well as to non-Contracting Parties.

However, it is considered that further analysis is needed during the on-site visit.

Besides, this is subject to harmonisation with other overlapping fisheries whose UoAs include EU industrial purse seiners, such as the AGAC and the CFTO fisheries. The certification called "AGAC four oceans Integral Purse Seine Tropical Tuna Fishery (Indian Ocean)" recently certified in the same UoA, had a Notice of Objection from the Coalition for Transparent Tuna Fisheries (CTTF). This objection took into account information published in the report "Automatic Identification System (AIS) usage by Spanish and French-flagged vessels" by the Blue Marine Foundation (BLUE) in 2020. This analyses the AIS transmissions of French and Spanish tuna vessels in the Indian Ocean between January 2017 and April 2019. The independent adjudicator accepted these reasons, and therefore a new condition on PI 3.2.3(d) was set to the fishery (Akroyd et al, 2022). The new condition points to the irregular use of AIS of the industrial tuna fleets in the Indian Ocean. In particular as it relates to EU vessels and non-compliance with the EU Directive 2002/59/EC (as amended) and Council Regulation (EC) No 1224/2009.

In relation to this issue, this team acknowledges that AIS is a universally mechanism used primarily for safety purposes since the 1974 SOLAS Convention. However, the European Union, in point 3 of Article 10 of Regulation 1224/2009 on control to ensure compliance with the Common Fisheries Policy, states that "Member States may use AIS data, where such data are available to them, for the purpose of cross-checking with other data available to them, Article 11 on Vessel Detection System includes that Member States may use AIS "in order to determine the presence of fishing vessels in a specific area, where there is clear evidence that this procedure has cost advantages compared to traditional means of detection of fishing vessels". Article 109, to which Article 10 refers, includes in point 2bv a reference to this system: "where appropriate, cross-checks, analyses and verifications shall be carried out on the following data: (v) data from the automatic identification system. Thus, although AIS is mentioned is mentioned in the Control Regulation 1224/2009, it is not considered as the key element of the monitoring. control and surveillance system of the fishing activities of vessels flying the flag of a European Union country. It is just referred to as a complementary source of information to be used if available and necessary. Therefore, AIS is not considered to be part of the EU fisheries management system and should not be analysed in this context.

In conclusion, despite ANABAC, as AGAC, also have EU vessels included in its UoA, **the team decided not to re-score PI 3.2.3(d) based on the consideration that AIS is used for maritime security purposes and it is not element to be considered in relation to compliance of the fishery management system.** However, the team is aware that this PI is subject to the result harmonization discussions. In the case that no agreement is reached, PB 1.3.4.5 will be applied (i.e. the lower score shall be applied), the PI would be re-scored and a condition would be set.

SG80 is met (pending on-site visit and the result of the harmonisation discussion).

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

Draft scoring range	**≥80**
Information gap indicator	**More information sought** *This PI will be reviewed during the Site Visit and more information from Harmosation outcome meetings is needed to score.*

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

Overall Performance Indicator score	
Condition number (if relevant)	

PI 3.2.4 – Monitoring and management performance evaluation

PI 3.2.4		There is a system of monitoring and evaluating the performance of the fishery-specific management system against its objectives There is effective and timely review of the fishery-specific management system		
Scoring Issue		SG 60	SG 80	SG 100
a	Evaluation coverage			
	Guide post	There are mechanisms in place to evaluate **some** parts of the fishery-specific management system.	There are mechanisms in place to evaluate **key** parts of the fishery-specific management system.	There are mechanisms in place to evaluate **all** parts of the fishery-specific management system.
	Met?	**Yes**	**Yes**	**No**

Rationale

IOTC has established mechanisms to evaluate all parts of the management system. The assessment mechanisms are based on the organisation's own structure through committees and working groups among others. In addition, there is a Performance Review Panel (PRP) that assesses all parts of the management system.

In this regard, the IOTC agreed in 2007 to launch a Performance Review process. The IOTC formed a Review Panel, composed of an independent legal expert, an independent scientific expert, six members of the Commission and one NGO observer. The first review was completed in 2009 and is conducted every 5 years. The second review was carried out in 2015 and the report was published in 2016.

In relation to the European Union, it periodically evaluates the performance of Fisheries Agreements to, among other things, assess their performance and determine the feasibility or otherwise of maintaining SFPA protocols. These Agreements are usually in place for 5 years and an ex-post and ex-ante evaluation is carried out prior to any renewal (Goulding, 2019). In addition, at a more general level, the EU Fisheries Policy is reviewed every 10 years. The results of the last evaluation resulted in the reform of the Common Fisheries Policy in 2013.

In relation to Seychelles, in 2019, it published the Policy and Strategy documents for the fisheries sector and the Fisheries Comprehensive Plan in which an analysis of the fisheries policy is carried out and recommendations and objectives for its improvement are set out. As a result, **SG60 and SG80 are met**.

Although it can be inferred from the documentation analysed that all parts of the management system are assessed, the criteria and objectives are not homogeneous. Thus, in the case of Seychelles, the assessment of its management system cannot be considered to include all parts and therefore the **SG100 is not met**.

b	Internal and/or external review			
	Guide post	The fishery-specific management system is subject to **occasional internal** review.	The fishery-specific management system is subject to **regular internal** and **occasional external** review.	The fishery-specific management system is subject to **regular internal and external** review.
	Met?	**Yes**	**Yes**	**No**

Rationale

In the case of the IOTC there is a Performance Review Panel (PRP) that has assessed all parts of the management system. Reviews of EU Fisheries Agreements are commissioned from external experts. In the Seychelles, the Fisheries Management Policy and Planning Reports published by the Seychelles provide a comprehensive overview of the Seychelles' mechanism for evaluating its fisheries system. Therefore, the fisheries specific management system is occasionally reviewed. **SG60 is met**.

These reviews are regularly carried out by the IOTC and the EU. Some parts of the management system (IOTC, EU-SFPA, LDAC) are also subject to external reviews. The reviews carried out by the EU, in which Seychelles is mainly assessed to meet the strict requirements of the SFPA (which include both SFA and IOTC management) are therefore qualified as occasional external review, as the frequency of these reviews is irregular. There has also been an occasional external review by FAO [RFMO performance review (FAO, 2018)], which, according to the MSC, would qualify as a "peer organisation" and is an occasional external review. **SG80 is met**.

However, there is no evidence of regular internal and external reviews (explicitly external to the fisheries management system), so **SG100 is not met**.

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

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

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

Overall Performance Indicator score	
Condition number (if relevant)	

7.4.7 References P3

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IOTC. RESOLUTION 12/04 ON THE CONSERVATION OF MARINE TURTLES

IOTC. RESOLUTION 13/04 ON THE CONSERVATION OF CETACEANS

IOTC. RESOLUTION 13/05 ON THE CONSERVATION OF WHALE SHARKS (RHINCODON TYPUS)

IOTC. RESOLUTION 15/10 ON INTERIM TARGET AND LIMIT REFERENCE POINTS AND A DECISION FRAMEWORK

IOTC. RESOLUTION 16/02 ON HARVEST CONTROL RULES FOR SKIPJACK TUNA IN THE IOTC AREA OF COMPETENCE

IOTC- RESOLUTION 16/11 ON PORT STATE MEASURES TO PREVENT, DETER AND ELIMINATE ILLEGAL, UNREPORTED AND UNREGULATED FISHING

IOTC. RESOLUTION 18/02 ON MANAGEMENT MEASURES FOR THE CONSERVATION OF BLUE SHARK CAUGHT IN ASSOCIATION WITH IOTC FISHERIES

IOTC. RESOLUTION 18/04 ON BIOFAD EXPERIMENTAL PROJECT

IOTC. RESOLUTION 18/05 ON MANAGEMENT MEASURES FOR THE CONSERVATION OF THE BILLFISHES: STRIPED MARLIN, BLACK MARLIN, BLUE MARLIN AND INDO-PACIFIC SAILFISH

IOTC. RESOLUTION 19/01 ON AN INTERIM PLAN FOR REBUILDING THE INDIAN OCEAN YELLOWFIN TUNA STOCK IN THE IOTC AREA OF COMPETENCE

IOTC. RESOLUTION 19/02 PROCEDURES ON A FISH AGGREGATING DEVICES (FADS) MANAGEMENT PLAN

IOTC. RESOLUTION 19/03 ON THE CONSERVATION OF MOBULID RAYS CAUGHT IN ASSOCIATION WITH FISHERIES IN THE IOTC AREA OF COMPETENCE

IOTC. RESOLUTION 19/05 ON A BAN ON DISCARDS OF BIGEYE TUNA, SKIPJACK TUNA, YELLOWFIN TUNA, AND NON- TARGETED SPECIES CAUGHT BY PURSE SEINE VESSELS IN THE IOTC AREA OF COMPETENCE

IOTC. RESOLUTION 21/01 ON AN INTERIM PLAN FOR REBUILDING THE INDIAN OCEAN YELLOW FIN TUNA STOCK IN THE IOTC AREA OF COMPETENCE

IOTC. RESOLUTION 21/03 ON HARVEST CONTROL RULES FOR SKIPJACK TUNA IN THE IOTC AREA OF COMPETENCE

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8 Appendices

8.1 Assessment information

8.1.1 Small-scale fisheries

N/A as the assessed fleet consists of industrial purse seine fishing vessels operating in the Indian Ocean; and the fishing area covers both international waters (high seas) as well as the EEZs (exclusive economic zones) of several coastal states.

8.2 Evaluation processes and techniques

8.2.1 Site visits

The CAB shall include in the report:

- An itinerary of site visit activities with dates.
- A description of site visit activities, including any locations that were inspected.
- Names of individuals contacted.

Reference(s): FCP v2.2 Section 7.16

If the client proceeds to announce the assessment of the fishery, this ACDR will be published at the MSC website together with the announcement that the fishery is entering the assessment process, in accordance with FCP7.12.1. Dates, type (on-site/off-site) and itinerary of the site visit will be detailed at the announcement of the fishery. Thus, **this section will be completed at Client and Peer Review Draft Report**.

8.2.2 Stakeholder participation

The CAB shall include in the report:

- Details of people interviewed: local residents, representatives of stakeholder organisations including contacts with any regional MSC representatives.
- A description of stakeholder engagement strategy and opportunities available.

Reference(s): FCP v2.2 Section 7.16

Stakeholder engagement and participation will only be triggered after the publication of the ACDR. Thus, **this section will be drafted at Client and Peer Review Draft Report and completed at Public Certification Report.**

8.2.3 Evaluation techniques

At Announcement Comment Draft report stage, if the use of the RBF is triggered for this assessment, the CAB shall include in the report:

- The plan for RBF activities that the team will undertake at the site visit.
- The justification for using the RBF, which can be copied from previous RBF announcements, and stakeholder comments on its use.
- The RBF stakeholder consultation strategy to ensure effective participation from a range of stakeholders including any participatory tools used.
- The full list of activities and components to be discussed or evaluated in the assessment.

At Client Draft Report stage, if the RBF was used for this assessment, the CAB shall include in the report:

- A summary of the information obtained from the stakeholder meetings including the range of opinions.
- The full list of activities and components that have been discussed or evaluated in the assessment, regardless of the final risk-based outcome.

The stakeholder input should be reported in the stakeholder input appendix and incorporated in the rationales directly in the scoring tables.

Reference(s): FCP v2.2 Section 7.16, FCP v2.2 Annex PF Section PF2.1

This section will be completed at Client and Peer Review Draft Report

The assessment process will follow the MSC Fisheries Certification Process v2.2. The default assessment tree (Annex SA) of the MSC Fisheries Standard v2.01, will be used. All public announcements will comply with FCP v2.2.

The assessment team has completed this ACDR using the information provided in the Client Document Checklist, and also all public information such as scientific papers, the IOTC website and other relevant sources.

Each assessor drafted his own background and scoring sections (i.e. Giuseppe Scarcella prepared **section 7.2**, Diego Solé prepared **Section 7.3**, Luis Ambrosio prepared **Section 7.4,** while all other sections were prepared by the TL with the assistance of the team and the CAB staff). These drafts were exchanged through email, so all team members had the chance to provide feedback on others' sections. Specific meetings were held in case of disagreement. All scores in this ACDR were adopted by consensus among all the team members. Once all background and scoring sections were agreed, the Team Leader compiled all documents in a single draft report which was shared among all team members for a final review and feedback.

8.3 Peer Review reports

To be drafted at Public Comment Draft Report stage

The CAB shall include in the report unattributed reports of the Peer Reviewers in full using the relevant templates. The CAB shall include in the report explicit responses of the team that include:

- Identification of specifically what (if any) changes to scoring, rationales, or conditions have been made; and,
- A substantiated justification for not making changes where Peer Reviewers suggest changes, but the team disagrees.

Reference(s): FCP v2.2 Section 7.14

8.4 Stakeholder input

To be drafted at Client and Peer Review Draft Report stage

The CAB shall use the 'MSC Template for Stakeholder Input into Fishery Assessments' to include all written stakeholder input during the stakeholder input opportunities (Announcement Comment Draft Report, site visit and Public Comment Draft Report). Using the 'MSC Template for Stakeholder Input into Fishery Assessments', the team shall respond to all written stakeholder input identifying what changes to scoring, rationales and conditions have been made in response, where the changes have been made, and assigning a 'CAB response code'.

The 'MSC Template for Stakeholder Input into Fishery Assessments' shall also be used to provide a summary of verbal submissions received during the site visit likely to cause a material difference to the outcome of the assessment. Using the 'MSC Template for Stakeholder Input into Fishery Assessments' the team shall respond to the summary of verbal submissions identifying what changes to scoring, rationales and conditions have been made in response, where the changes have been made, and assigning a 'CAB response code'.

Reference(s): FCP v2.2 Sections 7.15, 7.20.5 and 7.22.3

8.5 Conditions

To be drafted at Client and Peer Review Draft Report stage

The CAB shall document in the report all conditions in separate tables.

Reference(s): FCP v2.2 Section 7.18, 7.30.5 and 7.30.6

Table X – Condition 1

Performance Indicator	
Score	*State score for Performance Indicator.*
Justification	*Cross reference to page number containing scoring template table or copy justification text here.*
Condition	*State condition.*
Condition deadline	*State deadline for the condition.*
Exceptional circumstances ☐	*Check the box if exceptional circumstances apply and condition deadline is longer than the period of certification (FCP v2.2 7.18.1.6). Provide a justification.*
Milestones	*State milestones and resulting scores where applicable.*
Verification with other entities	*Include details of any verification required to meet requirements in FCP v2.2 7.19.8.*
Complete the following rows for reassessments.	
Carried over condition ☐	*Check the box if the condition is being carried over from a previous certificate and include a justification for carrying over the condition (FCP v2.2 7.30.5.1.a).* *Include a justification that progress against the condition and milestones is adequate (FCP v2.2 7.30.5.2). The CAB shall base its justification on information from the reassessment site visit.*
Related condition ☐	*Check the box if the condition relates to a previous condition that was closed during a previous certification period but where a new condition on the same Performance Indicator or Scoring Issue is set.* *Include a justification – why is a related condition being raised? (FCP v2.2 7.30.6 & G7.30.6).*
Condition rewritten ☐	*Check the box if the condition has been rewritten. Include a justification (FCP v2.2 7.30.5.3).*

8.6 Client Action Plan

To be drafted at Public Comment Draft Report stage

The CAB shall include in the report the Client Action Plan from the fishery client to address conditions.

Reference(s): FCP v2.2 Section 7.19

8.7 Surveillance

To be drafted at Client and Peer Review Draft Report stage

The CAB shall include in the report the program for surveillance, timing of surveillance audits and a supporting justification.

Reference(s): FCP v2.2 Section 7.28

Table X – Fishery surveillance program				
Surveillance level	Year 1	Year 2	Year 3	Year 4
e.g. Level 5	e.g. On-site surveillance audit	e.g. On-site surveillance audit	e.g. On-site surveillance audit	e.g. On-site surveillance audit & re-certification site visit

Table X – Timing of surveillance audit			
Year	Anniversary date of certificate	Proposed date of surveillance audit	Rationale
e.g. 1	e.g. May 2018	e.g. July 2018	e.g. Scientific advice to be released in June 2018, proposal to postpone audit to include findings of scientific advice

Table X – Surveillance level justification			
Year	Surveillance activity	Number of auditors	Rationale
e.g.3	e.g. On-site audit	e.g. 1 auditor on-site with remote support from 1 auditor	e.g. From client action plan it can be deduced that information needed to verify progress towards conditions 1.2.1, 2.2.3 and 3.2.3 can be provided remotely in year 3. Considering that milestones indicate that most conditions will be closed out in year 3, the CAB proposes to have an on-site audit with 1 auditor on-site with remote support – this is to ensure that all information is collected and because the information can be provided remotely.

8.8 Harmonised fishery assessments

To be drafted at Announcement Comment Draft Report stage

To be completed at Public Certification Report stage

The MSC Fisheries Certification Process v2.2 (FCP) sets out procedures for ensuring consistency of outcomes in overlapping fisheries (see Annex PB of the FCP). The intention of this process is to maintain the integrity of MSC fishery assessments. To assess the harmonisation requirements per PI, the team applied the table GPB1 in FCP2.2.

MSC overlapping fisheries have been identified as fisheries targeting tropical tunas and operating in the Indian Ocean. MSC Fisheries with overlapping UoAs are detailed below in **table 8.9.1** and the relevant PIs requiring harmonisation are detailed. A summary of the information supporting the decision of which PIs are subject to harmonisation is presented in **Table 8.9.2.**

Table 8.8.1- Overlapping fisheries: status and PIs to harmonise. Source: MSC website consulted on 22/08/2022

Fishery name (& CAB)	Certification status and latest report available	PIs to harmonise
Maldives pole & line skipjack tuna	Certified since 2012 (Global Trust Certification, Ltd.) *Latest report published: Surveillance report (15 Nov 2021)*	**P1**: all **P2**: 2.1.1a (main components), 2.2.1a (main components), 2.3.1a (limits), **P3**: all at IOTC level of jurisdiction
Echebastar Indian ocean skipjack purse seine fihsery	Certified since 2018 (Bureau Veritas) *Latest report published: Surveillance report (25 August 2021)*	**P1**: all **P2**: 2.1.1a (main components), 2.2.1a (main components), 2.3.1a (limits), 2.4.1b (VME recognition), 2.4.2a, c (at SG100) **P3**: all at IOTC and flag States levels of jurisdiction.
CFTO Indian Ocean Purse Seine skipjack Fishery	Certified in June 2021 (Control Union) *Latest report published: Public Certification Report (02 June 2021)*	**P1**: all **P2**: 2.1.1a (main components), 2.2.1a (main components), 2.3.1a (limits), 2.4.1b (VME recognition), 2.4.2a, c (at SG100). *Apart from those PISGs, the scores and rationales of other PIs might be considered applicable, but it is not considered that they shall be harmonized.* **P3**: all at IOTC level of jurisdiction
AGAC four oceans integral purse seine tropical tuna fishery –Indian ocean skipjack UoA-	The Indian Ocean Unit is still in assessment (Lloyds Register). *Latest report published: Public Certification Report (06 July 2021)*	**P1**: all **P2**: 2.1.1a (main components), 2.2.1a (main components), 2.3.1a (limits), 2.4.1b (VME recognition), 2.4.2a, c (at SG100). *Apart from those PISGs, the scores and rationales of other PIs might be considered applicable, but it is not considered that they shall be harmonized.* **P3:** all at IOTC and flag States levels of jurisdiction.

Table 8.8.2.- Overlapping fisheries: supporting information

Supporting information
P1: The target stock is the same, hence harmonisation on all PIs is required. **P2:** Apart from using the harmonisation requirements listed in Table GPB1 in FCP 2.2., P2-PIs were assessed in respect to Table provided in the MSC directions for harmonisation between overlapping fisheries (see https://mscportal.force.com/interpret/s/article/What-are-the-MSC-requirements-on-harmonisation-multiple-questions-1527586957701). **P3:** The international component of the management system (IOTC) is the same, so it must be harmonised. The national/flag State component differs with 2 of the overlapping fisheries (Maldives and CFTO fisheries), but it is identical in the case of the Echebastar and the AGAC fisheries (all vessels are flying Spanish and Seychelles flags).

Therefore, in the case of the Echebastar and AGAC fisheries harmonisation is needed for those management arrangements at national level that apply to all the assessed fleets.	
Was either FCP v2.2 Annex PB1.3.3.4 or PB1.3.4.5 applied when harmonising?	PB 1.3.4.5 was applied in relation to PI 1.2.1(a), PI 1.2.2(c) and PI 3.2.3(d)
Date of harmonisation meeting	Exchange of emails between September 1st and 20th, 2022
If applicable, describe the meeting outcome	
The team has prepared for harmonisation with overlapping UoAs during the preparation of the ACDR, in accordance with PB1.3.2. To do so, actions listed in PB1.3.4.1-4 were followed. Since some of the conclusions reached by the team for some of the PIs subject to harmonisation (see **table 8.9.1**) lead to material differences in scoring (e.g PI 1.2.1, 1.2.2 and 3.2.3), and taking advantage the BV was performing the surveillance audit of the Echebastar fishery (with José Rios and Giuseppe Scarcella as the assessing team), an exchange of emails with the other CABs and teams involved in the assessments of the other overlapping fisheries listed in table 7.4.1 took place between September 1st and 20th. The BV team expressed the following arguments in favour of PI 1.2.1(a), PI 1.2.2(c) and 3.2.3(d) scoring 80: - **PI 1.2.1:** the current HC has probed to maintain the stock in good conditions and has avoided overfishing; and a quota allocation system in place is not a requisite for scoring 80 (there are many examples). - **PI 1.2.2:** The latest stock assessment confirms that F is below Fmsy, and according to GSA2.5 this can be taken as evidence that HCR is effective, in particular in the case of the IO-SKJ which has been maintained above SSBmsy and below Fmsy in recent years. - **PI 3.2.3:** The Echebastar fishery does not consider the AIS as part of the fisheries management system. VMS is the key tool in this case, and there are no issues related to non-compliance in relation to VMS. In relation to PI 1.2.1 and 1.2.2, the other teams considered that re-scoring was no justified since there is no new information since the conditions were set (7.28.15.1). In relation to PI 3.2.3, this condition was set based on the final decision of the Independent Adjudicator for the objection process of the AGAC fishery. At the time of publishing this ACDR, the discussions were still focused on the P1 issues, while this topic has not yet been covered.	

The scores awarded by the different MSC overlapping fisheries to the PIs subject to harmonisation are presented in **Table 8.8.3**, and any differences in scoring are explained in **Table 8.8.4**.

Table 8.8.3- Overview of PI scores for overlapping fisheries with explanation for those PIs where there are material differences in outcome. (*) Not harmonised for P2-habitat components as completely different fishery (pole and line versus purse seine)

PIs	**Maldives**	**ANABAC**	**Echebastar**	**AGAC**	**CFTO**	**Rationale for scoring differences**
1.1.1	100	100	100	100	100	N/A
1.2.1	70	70	70	70	70	N/A
1.2.2	75	75	75	75	75	N/A
1.2.3	90	80	80	80	80	NA
1.2.4	95	95	90	90	95	This non-material difference is based on the consideration on whether the stock assessment is being externally reviewed, SG(e).

2.1.1(a)	YFT-80 BET-80	YFT-80 BET-80 ALB- 80	YFT-80 BET-80	YFT-80 BET-80	YFT-80 BET-80	N/A
2.2.1(a)	No main secondary species are impacted by the ANABAC fishery, so harmonisation for this P2-component is not triggered.					N/A
2.3.1(a)	None of the assessments have limits; cumulative impacts not triggered.					N/A
2.4.1(b)	(*)	Coral reefs as VMEs recognised among all fisheries industrial purse seine fisheries.				N/A
2.4.2(a)	(*)	Harmonisation of scoring at SG100 not triggered (SG100 not met for any of the overlapping fisheries)				N/A
2.4.2(c)	(*	Harmonisation of scoring at SG100 not triggered (SG100 not met for any of the overlapping fisheries)				N/A
3.1.1	90	85	80	80	80	Non-material differences
3.1.2	95	95	75	95	85	Echebastar is now facing its 3rd surveillance audit and this score will be re-score at or above 80. Thus, no-material differences exist.
3.1.3	80	100	100	100	100	Maldives-specific differences
3.2.1	80	90	75	90	80	Echebastar is now facing its 3rd surveillance audit and this score will be re-score at or above 80. Thus, no-material differences exist.
3.2.2	75	75	75	75	75	N/A
3.2.3	75	80	75	75	80	Maldives-specific condition on SId because of systematic non-compliance on artisanal vessels logbook completion. Score differences on SI© for the three purse seine fisheries are based on different evidence provided by the different clients and flags. The condition in the case of the AGAC and Echebastar fishery is related to the use of the AIS. Echebastar disagreed but accepted to apply the lowest score. At the time of preparing this ACDR,

						the debate on this matter was still opened, so the position of the CFTO fishery is still unknown.
3.2.4	80	80	80	80	80	N/A

Table 8.4.4- rationale for scoring differences

If applicable, explain and justify any difference in scoring and rationale for the relevant Performance Indicators (FCP v2.2 Annex PB1.3.6)
There only material differences in the scoring of the PIs listed in **Table 7.4.3** are restricted to PI 3.2.3. These discussions are still open at the time of preparing this ACDR
If exceptional circumstances apply, outline the situation and whether there is agreement between or among teams on this determination
So far, no exceptional circumstances apply

8.9 Objection Procedure – delete if not applicable

To be added at Public Certification Report stage

The CAB shall include in the report all written decisions arising from the Objection Procedure.

Reference(s): MSC Disputes Process v1.0, FCP v2.2 Annex PD Objection Procedure

9 Template information and copyright

This document was drafted using the 'MSC Reporting Template v1.2'.

Template version control		
Version	Date of publication	Description of amendment
1.0	17 December 2018	Date of first release
1.1	29 March 2019	Minor document changes for usability
1.2	25 March 2020	Release alongside Fisheries Certification Process v2.2

A controlled document list of MSC program documents is available on the MSC website (msc.org).

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