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Marine Stewardship Council (MSC) Public Certification Report

CFTO Indian Ocean Purse Seine Skipjack fishery

On behalf of

Compagnie Française du Thon Océanique S.A.S. (CFTO)

Prepared by

Control Union UK Ltd.

June 2021

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PCR

Role	Signature and date	Date
Originator:	C. Sieben	27th May 2021
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Approver:	T Tsuzaki	1st June 2021

Glossary

Acronym	Definition
AEP	Autorisation européenne de pêche et d'appui
ALDFG	Abandoned, Lost or Otherwise Discarded Fishing Gear
BIOFAD	Biodegradable Fish Aggregating Devices
CAT	Contrats d'Avenir Thoniers
CCNP	Centro Controllo Nazionale Pesca
CDC	Catch documentation scheme
CECOFAD	Catch, Effort and eCOsystem impacts of FAD-fishing
CFP	Common Fisheries Policy
CFTO	Compagnie Française du Thon Océanique
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMM	Conservation and Management Measure
CNSP	Centre national de surveillance des pêches
CPC	IOTC contracting parties and cooperating non-contracting parties
CROSS-RU	Centre Régional Opérationnel de Surveillance et de Sauvetage - Réunion
CU UK	Control Union UK (Formerly. Control Union Pesca (CUP)
DCP	Dispositifs de Concentration de Poissons
DCPT	Dispositifs de Concentration de Poissons Traçables
dFAD	Drifting Fish Aggregating Device
DMSOI	Direction de la mer sud de l'Océan Indien
DPMA	Ministère de l'Agriculture et de l'Alimentation
EBFM	Ecosystem-based fisheries management
EEZ	Exclusive Economic Zone
EFCA	European Fisheries Control Agency
EM	Electronic Monitoring
ETP	Endangered, Threatened, or Protected (species)
FAD	Fish Aggregating Device
FAO	Food and Agriculture Organisation
FCP	Fisheries Certification Process
FMC	Fisheries Monitoring Centre
FSC	Free Schooling Tuna
ILO	International Labour Organisation
IOTC	Indian Ocean Tuna Commission
IRD	Institut de Recherche et de Développement
IUCN	International Union for Conservation of Nature
LDAC	Long-Distance Advisory Council

Acronym	Definition
MADE	Mitigating Adverse Ecological Impacts of Open Ocean Fisheries
MARPOL	The International Convention of the Prevention of Pollution from Ships
MIPAAFT	Ministro delle politiche agricole alimentari, forestali e del turismo
MS	Member State
MSC	Marine Stewardship Council
OCUP	Observateur Commun Unique et Permanent
PEMAC	Direzione generale della Pesca marittima e dell'Acquacoltura
PI	Performance Indicator
PO	Producer Organisation
PRI	Point of Recruitment Impairment
PSMA	FAO Agreement on Port State Measures
RBF	Risk-Based Framework
SFA	Seychelles Fisheries Authority
SFPA	Sustainable Fisheries Partnership Agreements
SG	Scoring Guidepost
SIDS	Small Islands Developing State
TAAF	Terres Australes et Antarctiques Françaises
TAC	Total Allowable Catch
TCAC	Technical Committee on Allocation Criteria
UNCLOS	United Nations Convention on the Law of the Sea
UNFSA	United Nations Fish Stocks agreement
UoA	Unit of Assessment
VME	Vulnerable Marine Ecosystem
WPDCS	IOTC Working Party on Data Collection and Statistics
WPEB	IOTC Working Party on Ecosystems and Bycatch
WPM	IOTC Working Party on Methods
WPTT	IOTC Working Party on Tropical Tunas
WWF	World Wide Fund for Nature

1 Executive Summary

This report covers the MSC full assessment of the Compagnie Française du Thon Océanique (CFTO) Indian Ocean Purse Seine Skipjack fishery. The assessment team consists of Chrissie Sieben (Team Leader, Principle 2), Dr. Jo Gascoigne (Principle 1) and Dr. Sophie des Clers (Principle 3). The site visit took place remotely during the week of the 23rd April 2020.

The assessment was undertaken in accordance with the MSC Fisheries Certification Procedure (FCP) v2.1 and the MSC Standard 2.01. The Risk-Based Framework was not applied.

CFTO is a member of the Producer Organisation Orthongel which represents all French tropical tuna fishing companies, as well as the Italian company Industria Armatoriale Tonniera. This assessment covers the CFTO Indian Ocean fleet, consisting of eight vessels based in Port Victoria, Seychelles. The vessels operate in the Western Indian Ocean (FAO areas 51 and 57), in the Exclusive Economic Zones (EEZs) of the Seychelles, Mauritius, France (Mayotte and French Southern and Antarctic Lands (TAAF)) and the High Seas. The UoA vessels offload their catch in the Seychelles (Victoria) and Mauritius (Port Louis), for processing in local factories, or for onward transport to a range of international destinations. The fishery is subject to a multi-layered management system involving the EU's Common Fisheries Policy, the flag states' (France and Italy) fisheries policies, the CFTO company policy, the PO (Orthongel) management measures and projects, the IOTC at the Indian Ocean regional level (including the High Seas) and any coastal states national measures that apply depending on where fishing takes place.

The purse seines in this fishery are deployed in two ways. They are either set on free-schooling tuna, or on schools associated with naturally occurring (e.g. log) or artificial drifting Fish Aggregating Devices (FAD). All set types are considered under a single Unit of Assessment (UoA). CFTO, through its membership of Orthongel, participates in several initiatives aimed at improving the overall sustainability of their Indian Ocean tuna purse seine fleet. These initiatives are either funded and implemented through the *Contrats d'Avenir thoniers (CAT)* or through separate research partnerships. The various initiatives are detailed further in this report and aim, amongst others, at improved observer coverage, systematic FAD tracking and innovative FAD design including the use of non-entangling FADs and biodegradable materials.

The Principle 1 target species is Indian Ocean skipjack (*Katsuwonus pelamis*). A target and limit reference point (TRP, LRP) have been agreed by IOTC at 40%B_0 and 20%B_0 respectively. The most recent stock assessment, carried out in 2017, estimated that the stock was at the target reference point: median estimate from stock assessment SB_{2016} = 40%SB_0; with SB_{2016} above 40%SB_0 with 49% probability and below with 51% probability. The fishery is not managed via Total Allowable Catch (TAC), although IOTC Resolution 16/02 provides a harvest control rule (HCR) which is used to set a catch limit. Despite attempts to set catch allocations, an agreement has yet to be reached at IOTC level. 2018 was the first year in which the HCR was applied; however, the 2018 catch was estimated to have been 129% the catch limit. The team considered that the management tools in place have so far not shown that they can constrain skipjack catch sufficiently to comply with the HCR and that they are not working together with other elements of the harvest strategy. This was identified as a key weakness in the assessment of Principle 1.

For Principle 2, the assessment team relied on UoA logbook data and observer data collected through both on-board observers and electronic monitoring. Total UoA observer coverage for 2018 was estimated at 77%. Main primary species include Indian Ocean yellowfin tuna (which constitutes the bulk of the catch, exceeding catches of skipjack) and Indian Ocean bigeye tuna. Both stocks are considered highly likely above the point of recruitment impairment (PRI). No main secondary species were identified. ETP species found to interact with this fishery include elasmobranchs (7 species), sea turtles (4 species) and cetaceans (2 species). The team concluded that based on the data provided, the direct and indirect effects of the UoA are highly likely to not hinder recovery or create unacceptable impacts for ETP species. However, weaknesses were identified regarding the data availability on observed mortality (based on electronic monitoring mainly) and unobserved mortality due to entanglement in dFADs and a condition was raised accordingly. Regarding habitats, the purse seine gear in this fishery is strictly pelagic, and therefore the fishing operation itself does not impact on benthic habitats. However, with FAD sets an important component of this fishery, impacts may result from the FADs themselves when they become abandoned or lost. Impacts include benthic habitat impacts as the FADs become stranded causing damage to coral reefs through entanglement and localised marine pollution. Although FADs impact coral reefs on a localized basis, the team did not consider that at the scale of the UoA, the fishery is likely to cause irreversible impacts on coral reef habitats in the western Indian Ocean. However, owing to the lack of monitoring of UoA FAD deployments and losses, use of synthetic materials combined with lower-entanglement risk (as opposed to non-entangling) FAD designs, and limited FAD recovery strategies, conditions have been raised in relation to the Habitats Outcome, Management and Information Performance Indicators. At a wider ecosystem level, the team considered the effect of removals by the UoA and the effects associated with the use of FADs on tuna migratory behaviour, neither of which were thought to be highly likely to lead to irreversible ecosystem impacts at the scale of the fishery although some information gaps were identified, leading to a condition.

For Principle 3, the tuna fishery is managed through the IOTC Regional Fisheries Management Organisation, which provides an organised and effective international cooperation framework for the flag state (the EU for France and Italy) and island and coastal states including Seychelles, Mauritius and the French territories (TAAF), who are all contracting parties. Management measures, in the form of binding IOTC resolutions, are consistent with the MSC Principles 1 and 2. The management system includes transparent and effective dispute resolution mechanisms, not tested at regional level. There are mechanisms that recognise historic fishing rights for distant fleets, and allocation mechanisms for coastal states are being discussed. The different jurisdictions involved in the management system have clearly defined and well-understood roles. EU Fisheries Partnership arrangements define conditions and obligations for EU vessels to fish in the waters of coastal states in the IOTC area, these conditions are not always defined explicitly in the national management system of all coastal states. Consultation processes through EU-institutions (PO, EU-LDAC) are well-established and provide opportunities and encouragement for all interested and affected parties to get involved. The management policy has clear long-term objectives to guide decision-making based on a precautionary approach. Long and short-term objectives are explicit and consistent with achieving the outcomes expressed by Principles 1 and 2 of the MSC. Although precautionary decision-making processes are well established and ensure that measures and strategies are set to achieve the fishery objectives, short-comings were identified in relation to the management system’s responsiveness to skipjack stock management, in particular the fact that skipjack catches have exceeded the annual catch limit over the last two years. A condition has been raised accordingly. The fishery management system was generally found to act in a proactive manner to avoid legal disputes or rapidly implements judicial decisions. Presently, there are no regional fisheries surveillance system or patrols at sea, but the EU-registered UoA vessels are controlled through daily e-logbook reports, factory declarations, landing inspections and catch certification able to enforce management measures, strategies and rules. In case of non-compliance, sanctions exist at EU and national levels that appear to be consistently applied and provide effective deterrence. Evidence exists to demonstrate that fishers comply with the management system and provide information of importance to the management of system. Finally, some mechanisms are in place to evaluate key parts of the fishery-specific management system through regular internal and occasional external reviews.

The team's final determination is that the fishery meets the criteria for MSC certification. Aggregate scores for each Principle are as shown in the following table:

Principle	Score
Principle 1 – Target Species	86.7
Principle 2 – Ecosystem Impacts	80.3
Principle 3 – Management System	83.5

Eight conditions were raised, in relation to Principles 1, 2 and 3:

Condition number	Condition	Performance Indicator
1	By the end of Year 5, the client fishery should demonstrate that 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 (i.e., it is highly likely that the stock is above the PRI and is at or fluctuating around a level consistent with MSY).	1.2.1
2	By the end of Year 5, the client must demonstrate that available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the HCRs.	1.2.2
3	By the end of Year 4, the client must demonstrate 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 in terms of observed mortality, as gathered through human observers and electronic monitoring, and in terms of unobserved mortality as a result of entanglement in dFADs.	2.3.3
4	Within 4 years, the client fishery needs to demonstrate that the risk of reducing structure and function of coral reef habitats to a point where there would be serious or irreversible harm, associated with lost and/or abandoned UoA FAD beaching events, is sufficiently low for SG80 to be met.	2.4.1
5	By the end of Year 3, there should be an objective basis for confidence that the partial strategy in place for managing UoA impacts on VME habitats, associated with lost and/or abandoned UoA FAD beaching events, will work based on information directly about the UoA and/or habitats involved.	2.4.2
6	By the end of Year 3, information availability is adequate to allow for identification of the main impacts of the UoA on coral reef habitats, associated with the beaching of lost and/or abandoned UoA FADs, and provides reliable information on the spatial and temporal extent of UoA FAD beaching events.	2.4.3
7	By the end of Year 4, some of the main impacts of the UoA on the key ecosystem elements, and in particular in relation to the ecological trap theory, should have been investigated in detail.	2.5.3
8	By the end of Year 5, the client fishery should demonstrate that at IOTC level, decision-making processes regarding skipjack stock management respond to important issues, specifically to skipjack catches in excess of the annual catch limit corresponding to the HCR, in a transparent, timely and adaptive	3.2.2

Condition number	Condition	Performance Indicator
	manner. This could be done by implementing the harvest strategy set out in Resolution 16/02 and in Condition 1, or by some other means as appropriate.	

One recommendation was made by the team, in relation to non-entangling FAD designs:

From the early 2010s, 'sausage nets' have been in use in the UoA fishery to prevent accidental entanglements of turtles, sharks and other species in the netting. According to ISSF guidance (ISSF, 2019), these FAD types conform to lower-entanglement risk designs and the UoA is moving towards full adoption of non-entanglement risk designs which use rope instead of netting in its subsurface structure (Figure 3). In order to further reduce any remaining impacts on ETP and non-ETP species, the team recommends that the truly non-entangling FAD designs are adopted in full by the UoA, concomitant with the adoption of biodegradable materials.

Note: the client has adopted fully non-entangling FAD designs from 2020-2021; this will be verified at the next available opportunity (e.g. surveillance).

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2 Report Details

2.1 Authorship and Peer Reviewers

Chrissie Sieben (Team Leader, Principle 2)

Chrissie Sieben has a Master's Degree in Marine Environmental Protection which she obtained at the University of Wales, Bangor, and specialises in marine and fisheries ecology, marine environmental impact assessments and sustainable fisheries development. She was the MSC fisheries scheme manager at ME Certification Ltd (which later became CU Pesca and is now CU UK) up until December 2018. Previous to joining MEC, she worked as a fisheries consultant and marine ecologist on UK-based and international projects. Chrissie is now an independent assessor with over ten years' experience with the MSC certification requirements and has acted as team leader and P2 assessor on a range of preassessments, surveillance audits and full assessments of demersal and pelagic fisheries in the Atlantic, Mediterranean, Indian Ocean, Southern Ocean and Pacific. She also regularly participates in MSC training sessions and workshops. Chrissie speaks fluent French and Dutch in addition to English. She acts as the Team Leader for this assessment and is responsible for Principle 2. Chrissie has successfully completed the MSC online training on the application of the Risk-Based Framework (RBF), FCRv2.0 and FCPv2.1. Chrissie is ISO19011 certified and has no conflict of interest for this assessment.

Dr Jo Gascoigne (Principle 1)

Dr Gascoigne is a former research lecturer in marine biology at Bangor University, Wales and a shellfish and tuna fisheries expert, with over 25 years' experience working in the fisheries sector. On 20 May 2016 a variation request was granted by MSC, qualifying Dr Gascoigne as Principle 1 (P1) assessor for tuna fisheries, her main responsibility for this assessment. Dr Gascoigne is a fully qualified MSC Team Leader and has been involved as expert and lead auditor in MSC pre- and full assessments for the last 10 years. Dr Gascoigne has completed the required Fishery Team Leader MSC training modules for the new V2.0 Fisheries Certification Requirements. In addition, she has also completed the fisheries traceability version 2.0 MSC online training module. Jo has no conflict of interest for this assessment.

Dr Sophie Des Clers (Principle 3)

Sophie is an independent scientific expert in fisheries management systems. She is a qualified MSC auditor and a member of the MSC peer review college. She has over 30 years' experience in the formulation, monitoring, and evaluation of fisheries and aquaculture projects to build management capacity in the public and the private sector. Sophie is trained in databases, applied statistics, population dynamics, economics, law and public policy and has a PhD in Biometrics and a Master's degree in Public Policy. Her past research and consultancy projects have taken her to fishing ports around the UK, EU, Norway, Africa, the North Sea, Mediterranean, Atlantic, Pacific, Indian oceans and the Caribbean. She has been involved in a number of previous MSC assessments and pre-assessments including lobster, cod, haddock, saithe, sole, herring, blue whiting, sardine, whelks (within the EU) and tuna and billfish fisheries. Sophie meets the following competency criteria in Table PC3: Fishery management and operations. She has also completed the required Fishery Team member MSC training modules for the V2.0 Fisheries Certification Requirements. Sophie was responsible for the assessment of Principle 3.

Peer Reviewers:

The MSC Peer Review College compiled a shortlist of potential peer reviewers to undertake the peer review for this fishery. Two peer reviewers were selected from the following list:

- Alice McDonald
- Joe Powers
- Sandra Diamond-Tissue
- Tristan Southall

A summary of their experience and qualifications is available via this link: https://fisheries.msc.org/en/fisheries/cfto-indian-ocean-purse-seine-skipjack-fishery/@@assessments

2.2 Version details

The fisheries programme documents used during the MSC assessment of this fishery are shown in Table 1.

Table 1. Fisheries programme documents versions

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

3 Unit(s) of Assessment and Certification

3.1 Unit(s) of Assessment (UoA)

CU UK confirms that the fishery under assessment is within the scope of the MSC Fisheries Standard (7.4 of the MSC Fisheries Certification Process v2.1):

- The target species is not an amphibian, reptile, bird or mammal;
- The fishery does not use poisons or explosives;
- The fishery is not conducted under a controversial unilateral exemption to an international agreement;
- The client or client group does not include an entity that has been successfully prosecuted for a forced or child labour violation in the last 2 years;
- The fishery has in place a mechanism for resolving disputes, and disputes do not overwhelm the fishery;
- The fishery is an enhanced fishery as per the MSC FCP 7.4.6 (see Section 3.3) and
- The fishery is not an introduced species-based fishery as per the MSC FCP 7.4.7.

CU UK confirms that the client group has submitted the completed ‘Certificate Holder Forced and Child Labour Policies, Practices and Measures Template’ prior to the start of this assessment.

There are no other eligible fishers. The UoA is therefore the same as the UoC (7.5.2 and 7.5.3 of the FCPv2.1).

The proposed Unit of Assessment (UoA) is given in Table 2.

Table 2. Unit of Assessment (UoA)

Species and stock	Indian ocean skipjack tuna (*Katsuwonus pelamis*)
Geographical range of fishery	Indian Ocean (FAO 51 and 57) to include the Exclusive Economic Zones (EEZ) of the Seychelles, Mauritius, France (Mayotte and French Southern and Antarctic Lands (TAAF)) and the High Seas
Harvest method / gear	Purse seine (free-school and FAD sets combined under a single Unit of Assessment)
Client group	CFTO member vessels fishing for skipjack tuna in the Indian Ocean using purse seine (free-school and FAD sets combined)
Other eligible fishers	None

3.2 Unit(s) of Certification (UoC)

As there are no other eligible fishers, the provisional UoC is the same as the UoA.

Table 3. Unit of Certification (UoC)

Species and stock	Indian ocean skipjack tuna (*Katsuwonus pelamis*)
Geographical range of fishery	Indian Ocean (FAO 51 and 57) to include the Exclusive Economic Zones (EEZ) of the Seychelles, Mauritius, France (Mayotte and French Southern and Antarctic Lands (TAAF)) and the High Seas
Harvest method / gear	Purse seine (free-school and FAD sets combined under a single Unit of Assessment)
Client group	CFTO member vessels fishing for skipjack tuna in the Indian Ocean using purse seine (free-school and FAD sets combined)

3.3 Scope of assessment in relation to enhanced fisheries

The criteria for determining whether the fishery is enhanced are shown in Table 4. Note: An enhanced fishery shall only be eligible for assessment if it conforms to all of the scope criteria.

Table 4. MSC scope criteria for enhanced fisheries. Red text indicates whether these are met by the UoA (specifically the FAD set-types)

A	**Linkages to and maintenance of a wild stock**
i	At some point in the production process, the system relies upon the capture of fish from the wild environment. Such fish may be taken at any stage of the life cycle including eggs, larvae, juveniles or adults. The 'wild environment' in this context includes marine, freshwater and any other aquatic ecosystems. Met
ii	The species are native to the geographic region of the fishery and the natural production areas from which the fishery's catch originates unless MSC has accepted a variation request to include introduced species for the pilot phase. Met
iii	There are natural reproductive components of the stock from which the fishery's catch originates that maintain themselves without having to be restocked every year. Met
iv	Where fish stocking is used in hatch-and-catch (HAC) systems, such stocking does not form a major part of a current rebuilding plan for depleted stocks. Note: This requirement shall apply to the "current" status of the fishery. Wild stocks shall be managed by other conventional means. If rebuilding has been done by stocking in the past, it shall not result in an out-of-scope determination as long as other measures are now in place. Not relevant
B	**Feeding and Husbandry**
i	The production system operates without substantial augmentation of food supply. In HAC systems, any feeding is used only to grow the animals to a small size prior to release (not more than 10% of the average adult maximum weight), such that most of the total growth (not less than 90%) is achieved during the wild phase. In catch-and-grow (CAG) systems, feeding during the captive phase is only by natural means (e.g., filter feeding in mussels), or at a level and duration that provide only for the maintenance of condition (e.g., crustacean in holding tanks) rather than to achieve growth. Met
ii	In CAG systems, production during the captive phase does not routinely require disease prevention involving chemicals or compounds with medicinal prophylactic properties. Met
C	**Habitat and ecosystem impacts**

i	Any modifications to the habitat of the stock are reversible and do not cause serious or irreversible harm to the natural ecosystem's structure and function. Note: Habitat modifications that are not reversible, are already in place and are not created specifically, for the fishery shall be in scope. This includes: Large-scale artificial reefs. Structures associated with enhancement activities that do not cause irreversible harm to the natural FADs enhance fishing operations by aggregating fish to more efficiently capture them. These aggregating effects disappear when the FADs are removed. The UoA therefore meets this scope requirement.

If the scope of the fishery contains an enhanced fishery that is not covered in Annexes SB (bivalves) and SC (salmon), the CAB is required to review and if necessary modify the default tree taking into account the performance indicators (PIs) required to assess the enhancements. DeAlteris et al. (2018) set a precedent for this in their assessment of the Echebastar fishery in that they determined that no modifications to the default assessment tree were required. This conclusion was reached based on the following:

- There is no unequivocal empirical evidence that FADs represent an 'ecological trap' that inherently disrupts tuna biology (see Dagorn et al (2012) cited in DeAlteris et al. (2018)). As explained in detail in the scoring rationale for performance indicator 2.5.1 (Ecosystem Outcome), the team agrees with this determination;
- The potential for lost or abandoned FADs causing benthic habitat damage is sufficiently addressed in the scoring of the Habitats Component (2.4).

The likely stock-level and ecosystem impacts caused by the enhanced fishery components of the UoA are therefore sufficiently captured by the default assessment tree for Principles 1 and 2. No modifications to the default assessment tree were made.

4 Assessment results overview

4.1 Determination, formal conclusion and agreement

Following consideration of all stakeholders' inputs and comments to the Public Comment Draft Report (PCDR), the fishery assessment team concluded that the fishery should be certified against the MSC standard. This determination remained a recommendation pending the completion of the formal objections process and the final certification decision by the Control Union UK Ltd. official decision making entity.

The final Control Union UK Ltd. Certification Decision was made on the 2nd June 2021 with the Certification Decision Maker approving the decision to certify the fishery.

4.2 Principle level scores

Table 5. Principle level scores

Principle	Score
Principle 1 – Target Species	86.7
Principle 2 – Ecosystem Impacts	80.3
Principle 3 – Management System	83.5

4.3 Summary of conditions

A summary of conditions raised in this assessment is provided in Table 6. Further detail on the conditions as well as the corresponding Client Action Plan is given in Appendix 5.

Table 6. Summary of conditions

Condition number	Condition	Performance Indicator
1	By the end of Year 5, the client fishery should demonstrate that 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 (i.e., it is highly likely that the stock is above the PRI and is at or fluctuating around a level consistent with MSY).	1.2.1
2	By the end of Year 5, the client must demonstrate that available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the HCRs.	1.2.2
3	By the end of Year 4, the client must demonstrate 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 in terms of observed mortality, as gathered through human observers and electronic monitoring, and in terms of unobserved mortality as a result of entanglement in dFADs.	2.3.3
4	Within 4 years, the client fishery needs to demonstrate that the risk of reducing structure and function of coral reef habitats to a point where there would be serious or irreversible harm, associated with lost and/or abandoned UoA FAD beaching events, is sufficiently low for SG80 to be met.	2.4.1

Condition number	Condition	Performance Indicator
5	By the end of Year 3, there should be an objective basis for confidence that the partial strategy in place for managing UoA impacts on VME habitats, associated with lost and/or abandoned UoA FAD beaching events, will work based on information directly about the UoA and/or habitats involved.	2.4.2
6	By the end of Year 3, information availability is adequate to allow for identification of the main impacts of the UoA on coral reef habitats, associated with the beaching of lost and/or abandoned UoA FADs, and provides reliable information on the spatial and temporal extent of UoA FAD beaching events.	2.4.3
7	By the end of Year 4, some of the main impacts of the UoA on the key ecosystem elements, and in particular in relation to the ecological trap theory, should have been investigated in detail.	2.5.3
8	By the end of Year 5, the client fishery should demonstrate that at IOTC level, decision-making processes regarding skipjack stock management respond to important issues, specifically to skipjack catches in excess of the annual catch limit corresponding to the HCR, in a transparent, timely and adaptive manner. This could be done by implementing the harvest strategy set out in Resolution 16/02 and in Condition 1, or by some other means as appropriate.	3.2.2

4.4 Recommendations

One recommendation was made by the team, in relation to non-entangling FAD designs:

From the early 2010s, 'sausage nets' have been in use in the UoA fishery to prevent accidental entanglements of turtles, sharks and other species in the netting. According to ISSF guidance (ISSF, 2019), these FAD types conform to lower-entanglement risk designs and the UoA is moving towards full adoption of non-entanglement risk designs which use rope instead of netting in its subsurface structure (Figure 3). In order to further reduce any remaining impacts on ETP and non-ETP species, the team recommends that the truly non-entangling FAD designs are adopted in full by the UoA, concomitant with the adoption of biodegradable materials.

Note: the client has adopted fully non-entangling FAD designs from 2020-2021; this will be verified at the next available opportunity (e.g. surveillance).

5 Traceability and eligibility

5.1 Eligibility date

The eligibility date is the date of certification.

5.2 Traceability within the fishery

All vessels in the Unit of Certification (UoC) complete two fishing logs: the EU electronic logbook, and the IOTC logbook in excel format. The logbooks indicate the trip date, unique trip number, vessel name and unique identifiers. For each set, the following information is recorded:

- Date, time and coordinates of fishing operation;
- Estimated catch of key target species (yellowfin, skipjack, albacore, bigeye) as well as bycatch and discards;
- Set type (free-school or associated: log, natural, artificial, supply vessel, beacon, whale shark, whale);
- Type and number of buoy (in the case of FAD); and
- The EEZ the set was made in.

All logbooks are communicated on a regular basis to the flag state (daily), to the coastal state (before entry, on exit and during fishing as per Protocols and licence conditions) and port state. All the UoA vessels are equipped with Vessel Monitoring System (VMS) and the Global Positioning System (GPS) position of each vessel is recorded on an hourly basis. There is however no risk of vessels fishing outside the UoC area as all areas fished are covered by this assessment.

The vessels in the UoC each have 14 to 18 holding tanks of 70 to 120 m^3 in which the fish are placed in refrigerated seawater prior to being frozen in brine at -16 ^oC. There is no sorting or processing at this stage. Each vessel has a document '*Plan de cuve'*, which is completed on each trip and indicates for each haul, the destination tank, the species and species quantities that were entered on which day. The information contained in the fishing log and the *plan de cuve* is verified by the onboard observer (if present) or via electronic monitoring where possible. Once placed in the hold, no handling of the fish takes place until after landing in the Seychelles (Victoria) or Mauritius (Port Louis). When returning to port, the fish can be:

- Landed directly at the factory (IOT factory in Seychelles, Princes factory in Mauritius);
- Landed and transferred directly into a container; or
- Transhipped in port, straight onto a refrigerated cargo vessel.

One vessel may offload its catch through a combination of the above options, and this is recorded onto the Final Unloading Report (*Bon de débarquement*) for the vessel and trip. All offloading activities are verified by an independent company Socomep, an ISO 9001:2015 certified and compliant company for the monitoring, storage, off-loading and weighing of fish catches who check the following: dates and times when unloading begins and ends for each holding tank, the destination of each unloaded tank (factory receipt showing species, grade, quantity; unique container identifier; cargo vessel stowage plan), the total offloaded volume, grading and sorting and drafting of Final Unloading Report. It is during offloading that the yellowfin are separated from the skipjack. In addition to Socomep, the unloading activities are supervised by a local CFTO representative, an official from the fisheries authority in Mauritius or Seychelles, and the IRD (who take their own samples for T3 validation – see Section 6.3.6.2). Where the catch is offloaded into a container, a single container cannot contain catch from multiple UoA vessels, nor from UoA and non-UoA vessels. Unless landed directly at the factory in Mauritius or the Seychelles, the catch is then transported to canneries where ownership changes. In most cases, ownership changes upon arrival at the factory, although in some cases, ownership changes prior to transport (following offloading). Note that the vast majority of offloading happens in the Seychelles; Mauritius being too far from the fishing grounds. In fact, offloading in Mauritius are rare and usually coincide with a vessel's maintenance schedule as this is also where the shipyard is based.

During transport, traceability is maintained physically in the sense that one container cannot contain multiple species or products from different vessels. Each container also has a unique identifier that is linked to a health certificate, invoice, bill of lading and the catch certificate. Final destinations include the Seychelles, Mauritius, EU, West and North Africa and Thailand.

Table 7. Traceability within the fishery

Factor	Description
Will the fishery use gear 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.	No, only purse seine gear is used aboard the UoC vessels. All set types are covered by the UoC. Minimal risk.
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.	No, all areas fished by the UoC are covered by this assessment. Minimal risk.
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 skipjack caught by the UoC would be certified. There is no risk of mixing MSC and non-MSC skipjack during any of the activities covered by the fishery certificate. Strict traceability is furthermore maintained by the Client's records, as explained above, as verified by observers and electronic monitoring (where possible) and through the independent ISO 9001:2015 certified company Socomep who checks all activities and records during the offloading process in the Seychelles, where the vast majority of offloading happen, or more rarely in Mauritius. In addition to Socomep, the unloading activities are supervised by a local CFTO representative, an official from the fisheries authority in Mauritius or Seychelles, and the IRD. Unless landed directly at the factory in Mauritius or the Seychelles, the catch is then transported to canneries where ownership changes. In most cases, ownership

Factor	Description
	changes upon arrival at the factory, although in some cases, ownership changes prior to transport (following offloading). During transport, traceability is maintained physically in the sense that one container cannot contain multiple species or products from different vessels. Each container also has a unique identifier that is linked to a health certificate, the provisional sales note, bill of lading and the catch certificate. Overall, the risk of mixing UoA and non-UoA product during any of the operations listed is minimal.
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. In-port transhipment does occur where the catch is offloaded onto a transport vessel (reefer). All offloading activities are strictly monitored as described above.
Are there any other risks of mixing or substitution between certified and non-certified fish? If Yes, please describe how any risks are mitigated.	Indian Ocean skipjack is fished by many fleets most of which are not MSC certified. The certificate will be published with a schedule of the UoC vessels.

5.3 Eligibility to enter further chains of custody

The team considered that the procedures described above, in conjunction with the IOTC Monitoring, Compliance and Surveillance (MCS) system described in Performance Indicator 3.2.3, constitute a robust traceability management system, ensuring that traceability back to the UoC can be demonstrated up to the point of first sale. However, because there are multiple scenarios of when ownership changes (either straight after landing, or upon arrival in the factory after transport), the team concludes that Chain of Custody should commence from the point of landing, i.e. when the catch is offloaded from the UoC vessels and before transport to the next step in the supply chain.

Indian Ocean skipjack caught by the vessels listed in Table 10 after the date of certification and conforming to the UoC description given in Table 3 will be eligible to enter further chains of custody from the point of offloading. **Separate CoC certification will be required from this point onwards.**

5.4 Non-eligible product

Should the fishery be certified the CAB informs the client that should they sell or label non-eligible (nonconforming) product as MSC certified, they must:

a. Notify any affected customers and the CAB of the issue within 4 days of detection.

b. Immediately cease to sell any non-conforming products in stock as MSC certified until their certified status has been verified by the CAB.

c. Cooperate with the CAB to determine the cause of the issue and to implement any corrective actions required.

5.5 Eligibility of Inseparable or Practicably Inseparable (IPI) stock(s) to enter further chains of custody

There are no IPI catches in this fishery. Not applicable.

6 Scoring

6.1 Principle Level Scores

The final scores are provided in Table 8.

Table 8. Final Principle Scores

Principle	Score
Principle 1 – Target Species	86.7
Principle 2 – Ecosystem Impacts	80.3
Principle 3 – Management System	83.5

6.2 Summary of PI Level Scores

The Performance Indicator level scores are shown in the following table.

Table 9. Performance Indicator scores

Principle	Component	Wt	Performance Indicator (PI)		Wt	Score
One	Outcome	0.33	1.1.1	Stock status	0.5	100
			1.1.2	Stock rebuilding	0.5	N/a
	Management	0.67	1.2.1	Harvest strategy	0.25	70
			1.2.2	Harvest control rules & tools	0.25	75
			1.2.3	Information & monitoring	0.25	80
			1.2.4	Assessment of stock status	0.25	95
Two	Primary species	0.2	2.1.1	Outcome	0.33	95
			2.1.2	Management strategy	0.33	85
			2.1.3	Information/Monitoring	0.33	90
	Secondary species	0.2	2.2.1	Outcome	0.33	80
			2.2.2	Management strategy	0.33	80
			2.2.3	Information/Monitoring	0.33	85
	ETP species	0.2	2.3.1	Outcome	0.33	80
			2.3.2	Management strategy	0.33	85
			2.3.3	Information strategy	0.33	70
	Habitats	0.2	2.4.1	Outcome	0.33	70
			2.4.2	Management strategy	0.33	75
			2.4.3	Information	0.33	75
	Ecosystem	0.2	2.5.1	Outcome	0.33	80
			2.5.2	Management	0.33	80

Principle	Component	Wt	Performance Indicator (PI)		Wt	Score
			2.5.3	Information	0.33	75
Three	Governance and policy	0.5	3.1.1	Legal &/or customary framework	0.33	80
			3.1.2	Consultation, roles & responsibilities	0.33	85
			3.1.3	Long term objectives	0.33	100
	Fishery specific management system	0.5	3.2.1	Fishery specific objectives	0.25	80
			3.2.2	Decision making processes	0.25	75
			3.2.3	Compliance & enforcement	0.25	80
			3.2.4	Monitoring & management performance evaluation	0.25	80

6.3 Fishery overview

6.3.1 Fishery operation

CFTO is a Parlevliet & van der Plas owned company (since 2016) and member of the Concarneau-based Producer Organisation Orthongel which represents all French tropical tuna fishing companies (besides CFTO this includes Saupiquet and Sapmer S.A.), as well as the Italian company Industria Armatoriale Tonniera. Whilst CFTO has a fleet of fourteen tuna purse seiners in the Atlantic and Indian oceans, this assessment only covers the Indian Ocean fleet, consisting of eight vessels based in Victoria, Seychelles (Table 10).

The Indian Ocean CFTO purse seine fleet is supported by a single supply vessel, the Kersaint. Support vessels, also called supply or auxiliary vessels, are vessels that are not equipped with any fishing gear but assist one or several purse seiners in the detection of tuna schools and the management of the stock of artificial fish aggregating devices (FADs) and buoys used to locate both natural floating objects (LOGs) and FADs. Support vessels also contribute to increasing the fishing time of the purse seiners they assist through the transport of persons and materials and repairing operations (Assan et al., 2015). At IOTC level, the number of support vessels is limited to two in support of not less than five purse seiners, all of the same flag State (IOTC Resolution 19/01).

Table 10. List of CFTO vessels active in the Indian Ocean skipjack tuna purse seine fishery

Vessel Name	Registration	Call sign	Length (m)	GRT	Flag
Axel Vad	CC 854 430	FNAL	67.3	1598	France
Cap Saint Vincent	CC 911 289	FIPP	67.3	1606	France
Cap Sainte Marie	CC 854 429	FNSM	67.3	1596	France
Glenan	CC 899 950	FMHD	84.1	2319	France
Talenduic	CC 911 320	FOVN	79.8	2109	France
Drennec	DI 925 755	FMJP	84.1	2319	France
Trevignon	DI 925 754	FMJQ	84.1	2319	France
Torre Italia	BARI 342	IBIO	81.9	2137	Italy

Although skipjack is the Principle 1 species, the majority of the catch from the fishery is actually yellowfin (*Thunnus albacares*), caught year-round but with a peak in catches from late autumn to late winter and especially December – January. Outside this period, the contribution of yellowfin to the overall catch drops to 5 – 10% per month. A detailed overview of the fishery's catch profile is given in Section 6.3.6.

6.3.2 Fishing zones

The fishery operates in the Western Indian Ocean (FAO areas 51 and 57). In previous years CFTO vessels have accessed the EEZs of a range of western Indian Ocean states, including the Seychelles, Mauritius, Madagascar, Comoros, France (Mayotte and French Southern and Antarctic Lands (TAAF)), Kenya and Tanzania, and the High Seas (Figure 1). At the time of assessment (2020), fishing access agreements were in place only for the Seychelles, Mauritius and until the end of 2018, the TAAF's EEZs. The scope of this full assessment is therefore limited to those EEZs and the High Seas, as shown in the Unit of Assessment (Table 2) and detailed further in Section 6.6.1.4.

The UoA vessels land in the Seychelles (Port Victoria) and occasionally in Mauritius (Port Louis). The Indian Ocean areas restricted to the UoA fishery are also shown in Figure 1; these include:

- British Indian Ocean Territory (BIOT): no take marine reserve;
- Exclusion of 12 nautical mile (nm) from all coasts;
- Exclusion of 20 nm from the coast of Madagascar and from the Leven and Castor Banks (as per Madagascar vessel nominative fishing licences);
- Exclusion of 12 nm from the coasts of the scattered islands (*Îles Éparses* – Glorioso, Juan de Nova, Bassas da India, Europa, Tromelin – marked as TAAF(FR) on Figure 1) and 10 nm from the centre of the Geyser Bank Reef (see TAAF Arrêté No. 2018-09);
- Exclusion of 24 nm from the coast of Mayotte (Regulation EC 1385/2013 following the amendment of the status of Mayotte with regard to the European Union[1]); and
- Exclusion zones of Seychelles: around Mahé Island and Seychelles Bank, Platte Island, Coetivy Island, Fortune Bank, Amirantes Islands, Alphonse Island, Province, Farquhar and St Pierre and Wizard Reef, Cosmoledo and Astove Islands, Aldabra and Assomption Islands (Annex II, 2014 Protocol to the Fisheries Agreement[2]).

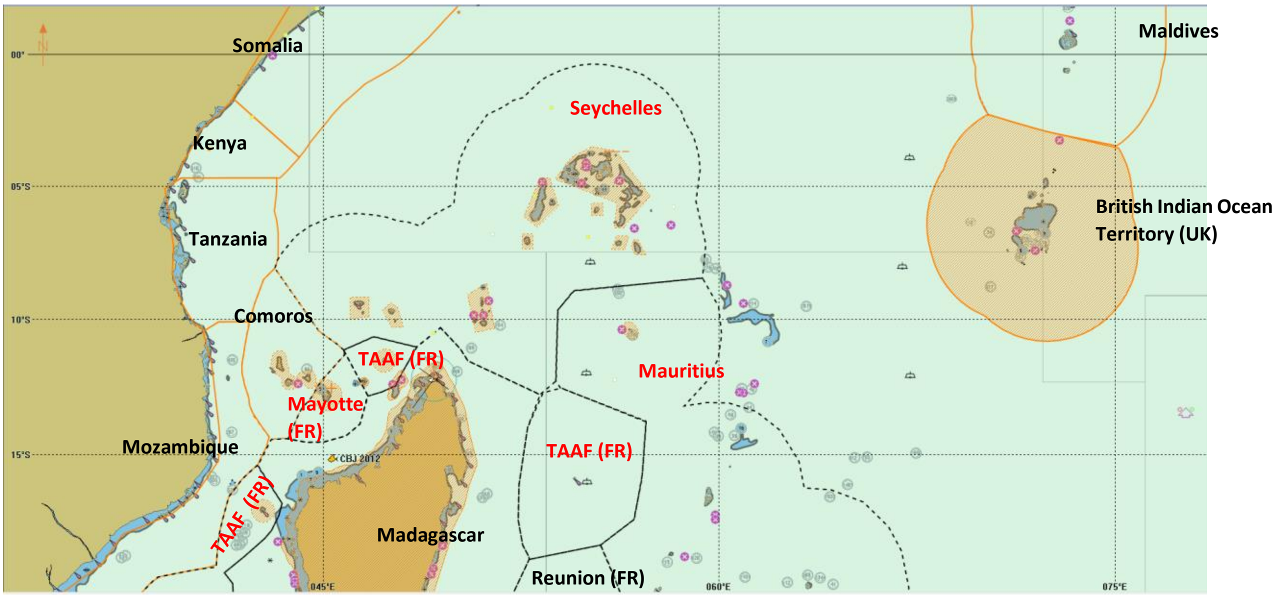

Figure 1. Map of UoA fishing area in the Indian Ocean showing EEZs fished in red. No fishing is allowed in the orange coloured areas. See Section 6.6.1.4 for more detail on coastal states.

6.3.3 Gear and FADs

The purse seines in this fishery are deployed in two ways. They are either set on free-swimming schools of fish not associated with any floating object (free schools), or around floating objects, nowadays predominantly artificial, satellite-tracked buoys known as fish aggregating devices (FADs) although these can also be natural objects such as logs or whales (although setting on the latter is prohibited in the UoA – see Section 6.5.2). The purse seines are typically *ca*. 1,500 m by 250 m, with floats along the top line and a weighted lead line. A purse cable on the bottom of the gear allows the pursing of the net around shoaling tuna. Free schools are identified through a combination of

[1] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R1385&from=en
[2] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.L_.2014.004.01.0003.01.ENG&toc=OJ:L:2014:004:TOC

oceanographic data, radar showing seabird distribution, activity on the sea surface and sonar, while FAD buoys transmit data via satellite to the vessel, including echosounder data. In general, 15-20 minutes separate net deployment from pursing. When the net volume has been sufficiently reduced, the tuna are brought onboard by a brailer, placed on the upper deck for initial sorting (this is when the large specimens of sharks and other unwanted catch are removed) and dropped down onto a conveyor for secondary sorting. There are two conveyor belts, one main belt and one belt for small bycatch. After sorting, the catch is placed in refrigerated seawater to bring down the temperature before being frozen in brine at -16 °C.

Although CFTO's fishing strategy has historically focused on targeting big yellowfin associated with free-school sets, this strategy had to be revised following the implementation of the yellowfin rebuilding plan in 2017 (IOTC Resolution 19/01) which requires a gradual reduction of yellowfin catches. For the French fleet, this is implemented through an EU Total Allowable Catch (TAC), as discussed under Principle 2. Because catch composition is more difficult to predict for free schools than for FADs, with species make-up being more homogeneous in free schools and most often consisting of yellowfin, there has been a gradual move towards FADs which are less high-risk for the fleet in terms of quota management. However, although FAD sets account for smaller proportions in yellowfin catch (between *ca*. 30 – 40%), the proportion of juvenile yellowfin catch is also greater than in free schools. The implications of this are further discussed under Principle 2. Overall, however, this helps interpreting why the majority of CFTO sets are now on FADs (also see Table 18 for trends in free-school vs FAD catches).

The FADs used by the French purse seine fleets have in the past consisted of rectangular bamboo rafts of about 4-6 m^2 covered in old pieces of purse seine nets, with plastic floats attached under the surface structure of the raft to ensure buoyancy. The subsurface structure found below FADs was composed of one or two hanging panels or 'curtain nets' (see Figure 2 A). From the early 2010s, however, 'sausage nets' (Figure 2B) were introduced to prevent accidental entanglements of turtles and sharks and other species in the netting and these are now in use by the UoA. According to ISSF guidance (ISSF, 2019), these FAD types conform to lower-entanglement risk designs and the UoA is moving towards full adoption of non-entanglement risk designs which use rope instead of netting in its subsurface structure (Figure 3). FAD buoys can also be deployed on floating objects of natural (e.g. palm trees, logs - Figure 2) or anthropogenic (e.g. ropes) origin (Imzilen et al., 2019a).

Report update: As of the start of 2021, CFTO reports that it has moved to 100% fully non-entangling FADs which use no netting; in compliance with Annex V of IOTC resolution 19/02 (this transition had already been ongoing from 2020). However, the background and analysis for P2 has not been updated to reflect this for two reasons: i) we have not been able to verify it independently; and ii) it comes after the cut-off date for adding new information to the report.

To respond to stakeholder comments (Appendix 4.2), the team has confirmed the following with CFTO:

- FADs are never deployed without acoustic buoys ('pingers') and inactive buoys are not reactivated in the water – this can only be done on board a fishing or support vessel;
- FAD pingers send a signal at a minimum once a day;
- Each FAD is marked using the unique manufacturer identifier on the buoy, which is recorded in the vessel logbook;
- If an entangling FAD is encountered, CFTO asks their crews either to remove it from the water, or to replace the entangling elements;

- In 2019, 4006 acoustic buoys were purchased. In 2020, 3102 were purchased and 4843 were deployed.

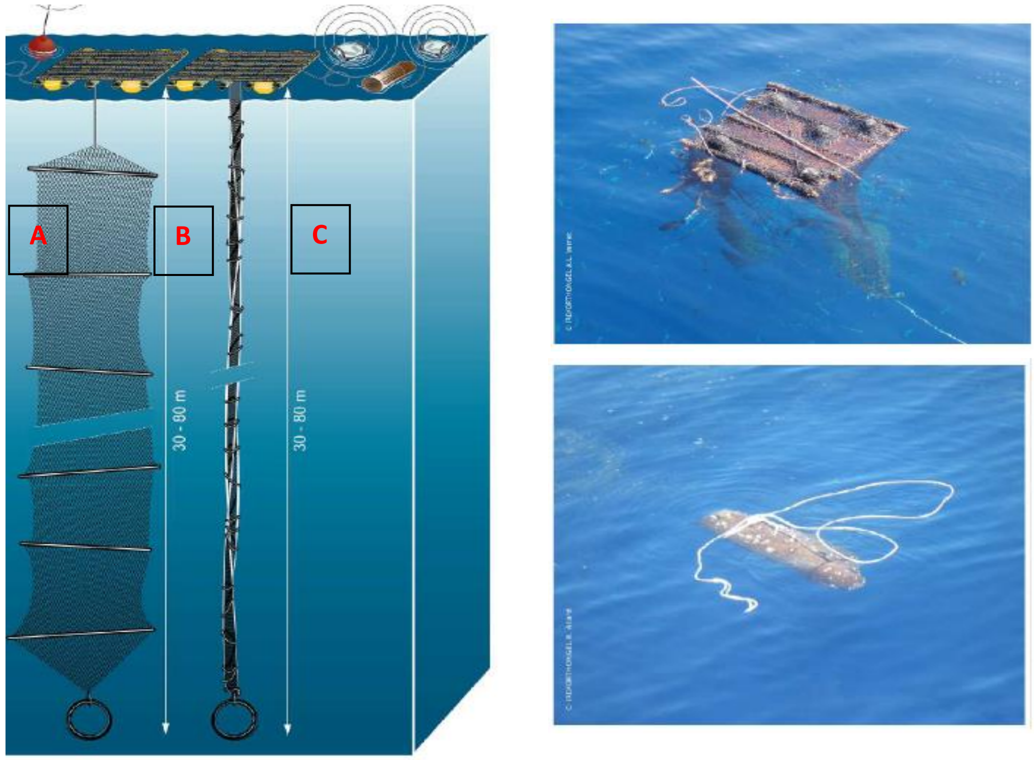

Figure 2. Description of the structure and design (in the water column) of fish aggregating devices (FADs) used in purse seine fisheries including artificial rafts with a sea anchor made of ’curtain’ nets (left A) or ’sausage’ nets (left B and top right) and natural logs (left C and bottom right). From Imzilen et al. (2019a).

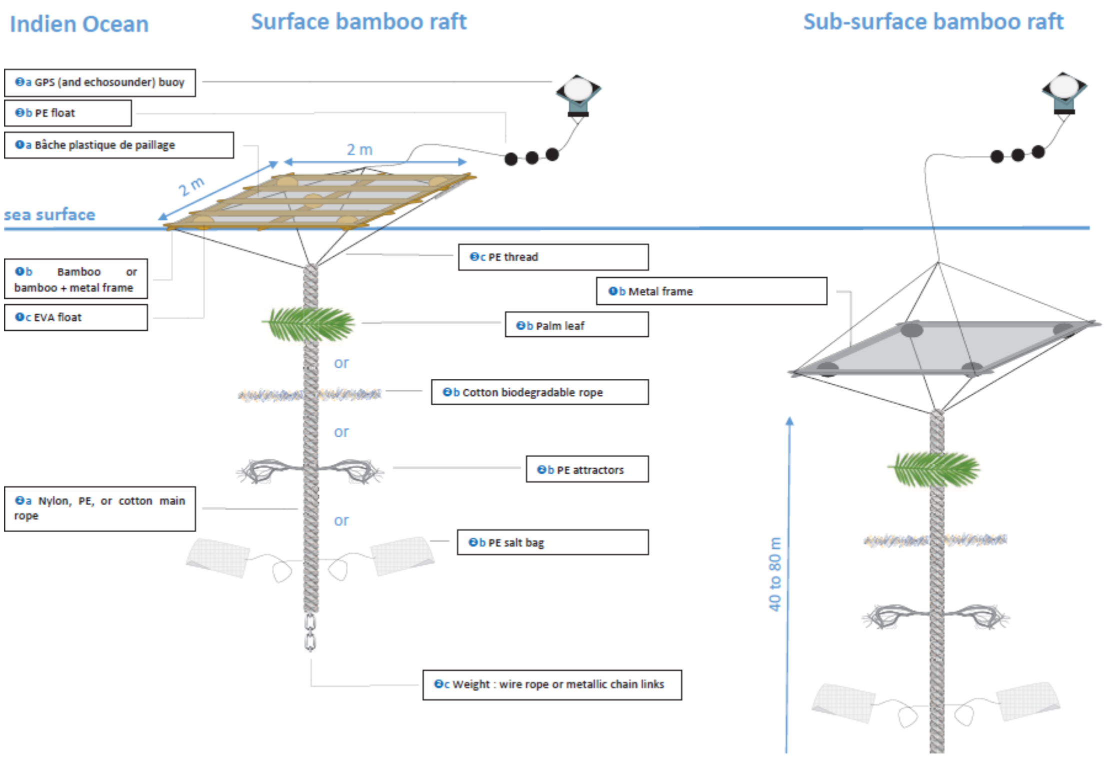

Figure 3. UoA FAD designs as provided by CFTO.

6.3.4 Client initiatives towards improved sustainability

As a member organization of Orthongel, CFTO partake in several initiatives aimed at improving the overall sustainability of the Indian Ocean tuna purse seine fleet. These initiatives are either funded and implemented through the *Contrats d'Avenir thoniers (CAT)* or through separate research partnerships. These are briefly discussed in the following sections.

6.3.4.1 Contrats d'Avenir thoniers (CAT)

The first CATs were conceived in 2009, combining Orthongel funding with co-financing by other parties including the EU, the DPMA and *France Filière Pêche* to implement research projects in partnership with organisations such as the *Institut de Recherche et de Développement* (IRD), *Oceanic Développement* and Thalos. Since their inception, several CATs have been realised as summarized in Table 11.

Table 11. Contrats d'Avenir thoniers (CAT)

CAT	Period	Aim
DCP BIO	2019-2021	Development programme for a biodegradable FAD in 5 stages: 1. Search for existing candidate biodegradable materials with little or no modification, composite materials or treated natural materials, biodegradable plastics or any other product capable of degrading under in situ conditions, without producing particles or polluting compounds; 2. In the event that the solution sought for the development of a biodegradable FAD does not yet exist on the market, search for materials in development and evaluate feasibility; 3. Tests under controlled conditions making it possible to verify the duration of potential degradation and the harmlessness of the degradation products; 4. Construction of prototypes with materials deemed relevant and tests in real conditions by the crews of ORTHONGEL member ships; 5. Assessment of production costs for materials and FAD structures deemed relevant including the costs of production of materials, assembly of biodegradable FADs or transport to the ports of Abidjan (Ivory Coast) and Mahé (Seychelles). The first phase has just been completed with a Breton service provider.
Optimisation de l'Oeil Electronique (OOE)	2015-2018	Follow-up of CAT OCUP. Achieve 100% observer coverage either by on-board observers or with CCTV if on-board placements are not feasible. Trial consists of a 6-camera surveillance system placed on 7 CFTO vessels. http://www.orthongel.fr/docs/publications/Poster_IFOMC_Vigo2018_OOE.pdf Also see Briand et al. (2018)
OCUP (Observateurs Communs Uniques et Permanents)	2013 – ongoing (CAT ended in 2014)	The OCUP Program (Observateurs Communs Uniques et Permanents) is a regional fishery monitoring programme launched in 2013 by Orthongel, and implemented by Oceanic Développement. This programme aims at taking observers onboard tropical tuna purse seiners fishing in the Indian and Atlantic Oceans, covering 100% of their activities. The program has been renewed in 2016 http://www.oceanic-dev.com/en/ocup-monitoring-program-orthongel/. Status in the Indian Ocean: - 32 observers from 4 African nations have been trained. - 180 observed trips on Orthongel member vessels

CAT	Period	Aim
		- Observer coverage French IO frozen tuna fleet increased from 10% to 84% in 2016 (including E-monitoring under OOE CAT). Also see Goujon et al. (2017). Note: the OCUP observer programme is now funded by Orthongel's member companies: CFTO, Sapmer and Saupiquet
Sélectivité	2013-2015	Follow-up of CAT « DCP éco » and « Requins ». Aims: - Provide vessels with means to increase post-release survival of sharks and rays - Workshops on construction of non-entangling FADs - System set-up for monitoring and control of development, production and usage of non-entangling FADs - Research and trials into biodegradable materials for the submerged section of FADs
Requins	2010 - 2012	Follow-up of project MADE (see next section) with aim to significantly reduce or eliminate post-release mortality of sharks, rays and turtles. Resulted in good practice guide: http://www.orthongel.fr/docs/publications/GoodpracticesGuide_LDef.pdf Also see Filmalter et al. (2012), Poisson et al. (2011) and Poisson et al. (2014)
DCP éco	2010 - 2012	Follow-up of project MADE (see next section) with aim to modify FADs of entire French purse seine tuna fleet to eliminate sea turtle and shark bycatch mortality (CAT Requins). As a result, the French fleet only deploys non-entangling FADs (décision ORTHONGEL n°11 du 23 novembre 2011)

6.3.4.2 Scientific collaboration

In parallel with the CATs, a framework agreement for scientific and technical cooperation has been in existence since 2001 between ORTHONGEL and IRD, facilitating the relations between fishing operators and scientists and the regular supply of fisheries data for research programmes. It is also within this framework that Orthongel participates in various scientific projects focused on improving the understanding of marine ecosystem functioning and identifying and where necessary mitigating ecosystem impacts by fishing.

- INNOV FAD (2018-2021): aims to propose innovative solutions to reduce the impact of FADs on ecosystems. Among other things, it provides for the development of an autonomous buoy that enables sharks and other bycatch species to be observed below the floating devices, a *Dispositifs de Concentration de Poissons* (DCP) whose trajectory would be controllable in order to avoid problems related to losses and strandings of DCPs and techniques to limit bycatch.

- BIOFAD (2018-2019): aims to test biodegradable materials for the construction of FADs to reduce the risk of pollution and degradation of ecosystems associated with lost FADs. 1,000 prototypes of biodegradable FADs will be launched in the Indian Ocean from April 2018 to April 2019 by French, Spanish, Italian, Mauritian and Seychellois purse seiners.

- CECOFAD (2014-2016): The objectives of CECOFAD were 1) a better definition of the notion of fishing effort associated with FAD fishing, 2) development of CPUE standardization methods that consider the specificities and trends in fishing practices on FADs and free-schools, and 3) improved knowledge of the impacts of FAD fishing on associated species and ecosystems. This project was continued through the CECOFAD2 project which started in 2018.

- GAP (2008-2011 and 2011-2015): The aim of the GAP project was to "bring fisheries professionals, scientists and policy makers together to work together for sustainable fisheries for the benefit of society". A first phase of the program began in 2008 with collaborative work between scientists and stakeholders of European fisheries to agree on actions to improve fisheries management. The second phase started in 2011 and covered 13 case studies, including the tropical tuna fishery and the sustainable management of FADs. Project partners were ANABAC, AZTI, IRD and ORTHONGEL.

- MADE (2010-2012): MADE (Mitigating Adverse Ecological Impacts of Open Ocean Fisheries) aimed to find solutions to help tropical longliners and tuna purse seiners reduce the negative effects of their activity on marine ecosystems. In particular, work was done in collaboration with French and ORTHONGEL armaments to avoid ghost fishing of sharks and turtles in the structure of FADs (CAT « DCP éco » and « Requins »).

6.3.4.3 SIOTI Fishery Improvement Project

The Sustainable Indian Ocean Tuna Initiative (SIOTI) is an Indian Ocean purse seine tuna Fisheries Improvement Project (FIP) for the majority of European Union (EU), Seychelles and Mauritius-flagged purse seine vessels fishing for pelagic tunas in the Western Indian Ocean using both free school and object associated sets. The FIP was jointly established in 2017 by key governments in the region, major tuna processors, producer organisations and their fishing vessels, with the support of WWF. Participants involved in this FIP include Princes Limited, Thai Union Europe, the Government of Seychelles, the Government of Mauritius, ANABAC/OPTUC, Inpesca Fishing LTD, Atunsa Inc, IOSMS, Beach Fishing LTD, Isabella Fishing LTD, CFTO, ORTHONGEL, Industria Armatoriale Tonniera, Interatun LTD, Hartswater LTD, Sapmer SA, Thunnis Overseas Group, TFC and WWF[3]. Although CFTO is undergoing MSC assessment, the company remains active in the FIP.

6.3.5 Management framework

A detailed analysis of the fishery management framework is presented in Section 6.6 (Principle 3). In brief, the management framework is made up of multiple jurisdictional layers consisting of:

1. The Indian Ocean Tuna Commission (IOTC) conservation and management measures (CMMs) concerning the management of tuna and tuna-like species under the IOTC mandate as well as the fisheries which target them;
2. EU DG MARE on behalf of EU institutions as IOTC Contracting Party, implementing the EU Common Fisheries Policy (CFP) as it applies to EU vessels operating outside EU's waters, signatories of fisheries agreements;
3. The national (French and Italian) fishing vessel licensing authorities and the Fisheries Monitoring Centre (FMC) is charge of daily monitoring, control and surveillance (MCS) and reporting to European institutions;
4. Coastal states (including Seychelles, Mauritius and TAAF) licensing authorities allowing fishing activities in their EEZ;
5. Port States implementation of Port State Measures Agreement (PSMA);
6. The EU-approved Producer Organisation (PO: Orthongel), in charge of the yellowfin quota management for all UoA vessels and all French fishing companies operating in the Indian Ocean and weekly reporting to the licensing authorities and FMCs, also voluntary measures regarding e-monitoring and scientific observation;

[3] https://www.wwf.org.uk/what-we-do/projects/indian-ocean-tuna-fishery-improvement-project and https://fisheryprogress.org/fip-profile/indian-ocean-tuna-purse-seine-sioti

7. Fishing Company (CFTO) Code of Conduct and voluntary measures, for example regarding technical specifications and numbers of FADs used.

6.3.6 Catch profiles and data availability

There are multiple sources of information available on UoA catches. A brief summary is provided below, with further detail given in the following sub-sections. The available data include:

- Vessel logbook data, as described in Section 6.3.6.1. These data are used by CFTO for the real-time management of the fishery, including yellowfin quota consumption. The data show retained catch for all species, as well as discards of the key target species, with catch species composition estimated on board;
- Validated T3 logbook data compiled by IRD (Section 6.3.6.2). T3 data are logbook data but corrected for species composition based on catch profiles by area established by IRD based on sampling from holds by observers or at landing. These data are submitted to the IOTC in an official capacity and are used in stock assessments and other analyses by the Scientific Committee, and to calculate overall catches at stock level. Until 2017, these data were also used by the French state (DPMA) for declaring yellowfin quota uptake to the EU (see Principle 2). These data estimate landed catch for the key target species (yellowfin, skipjack, bigeye and albacore).
- CFTO sales data, based on weights and sizes measured at factory level for the key target species and which inform the catch certificate. These figures are likely to be the most accurate as measurements are done per individual fish, although they are for landed fish only. From 2018 onwards, the sales data are being used by the DPMA to declare yellowfin quota uptake to the EU. It is important to note, however, that IOTC still bases its analyses on T3 data, which has led to discrepancies between catch reported by the EU and that recorded by IOTC.
- Electronic and on-board observer data providing information on *inter alia* observed retained catch and discards, as well as on ETP species encounters. The CFTO observer programme and the resulting data are shown in Sections 6.3.6.3 and 6.3.6.4, respectively.

6.3.6.1 Logbook data

Logbooks were provided to the assessment team for each vessel for each trip between the period 2014 – 2018. The logbooks are the official documents sent to the flag state daily and to the port authorities after landing and show estimated retained catch (in tonnes - estimated and based on weight and size sampling prior to entry into the tanks), discards, number of fishing days, purse seine sets, set type (free-school or type of association) and fishing location (EEZ). During the trips, these data are also submitted electronically via the ERS V3 system, which is a European requirement.

For the key target species (yellowfin, skipjack, bigeye and albacore), these data are systematically analysed, corrected for species composition and validated by the *Institut de Recherche pour le Développement* (IRD) against offloading data and are then provided to the IOTC for official purposes (Table 12). An explanation of the T3 methodology is given in Section 6.3.6.2.

However, as this validation exercise relates to target species only, the assessment team used the uncorrected logbook data which shows estimated retained catch for all species. A comparison of estimated vs adjusted total landed catch for the key target species is shown in Table 12, indicating that the proportion, of yellowfin vs. skipjack appears to be adjusted in favor of skipjack in the T3 data as compared to the raw data, with the estimated proportion of bigeye also increased in the adjustment process. The implications for this for the catch data and stock assessment process at stock level are considered under Principle 1, while the implications for the management of yellowfin and bigeye are considered under Principle 2.

Table 12. Comparison of estimated vs validated logbook data (in tonnes) for the main target species in the UoA.

Year	Data	YFT	SKJ	BET	ALB
2014	Validated	20,159	12,802	2,792	106
	Estimated	16,537	16,490	2,207	105
	Difference	**3,622**	**-3,688**	**585**	**1**
2015	Validated	20,588	12,872	3,299	199
	Estimated	18,291	15,605	2,465	201
	Difference	**2,297**	**-2,733**	**834**	**-2**
2016	Validated	18,268	18,136	1,925	141
	Estimated	15,571	21,170	860	142
	Difference	**2,697**	**-3,034**	**1,065**	**-1**
2017	Validated	20,559	21,262	3,072	129
	Estimated	16,830	25,675	1,889	128
	Difference	**3,729**	**-4,413**	**1,183**	**1**

Aggregated uncorrected UoA logbook data for the period 2013 – 2018, showing estimated retained catch by species and for all set types combined are provided in Table 13. Although some discards are also recorded in these data, and the team were not certain how reliable they are, they were included in the analysis on a precautionary basis.

Table 13. 2013 – 2018 UoA logbook data in tonnes and as % of total estimated catch. Data compiled from IRD logbook data for UoA before validation. Designation of species under Principle 2 is also shown, in accordance with procedure outlined in Section 6.5.1. Main species are marked in bold.

Species		Tonnes						% species composition						P2 species designation
		2013	2014	2015	2016	2017	2018	2013	2014	2015	2016	2017	2018	
Katsuwonus pelamis	**Skipjack tuna**	**20,416**	**16,490**	**15,605**	**21,170**	**25,675**	**34,185**	**49.60**	**46.64**	**42.64**	**56.00**	**57.59**	**58.66**	**Principle 1**
Thunnus albacares	**Yellowfin tuna**	**18,520**	**16,537**	**18,291**	**15,571**	**16,830**	**18,823**	**44.99**	**46.77**	**49.98**	**41.19**	**37.75**	**32.30**	**Primary**
Thunnus obesus	**Bigeye tuna**	**1,937**	**2,207**	**2,465**	**860**	**1,889**	**4,396**	**4.71**	**6.24**	**6.73**	**2.27**	**4.24**	**7.54**	**Primary**
Thunnus alalunga	Albacore	241	105	201	142	128	57	0.59	0.30	0.55	0.38	0.29	0.10	Primary
Thunnini	Tunas nei	11	0	14	28	15	507	0.03	0.00	0.04	0.07	0.03	0.87	N/a
Euthynnus affinis	Kawakawa	0	0	0	0	0	228	0.00	0.00	0.00	0.00	0.00	0.39	Secondary
Elagatis bipinnulata	Rainbow runner	0	0	10	14	13	46	0.00	0.00	0.03	0.04	0.03	0.08	Secondary
Thunnus tonggol	Longtail tuna	32	0	0	0	0	0	0.08	0.00	0.00	0.00	0.00	0.00	Secondary
Balistidae	Triggerfishes, durgons nei	0	0	4	13	10	4	0.00	0.00	0.01	0.03	0.02	0.01	Secondary
Auxis thazard	Frigate tuna	0	0	0	1	2	26	0.00	0.00	0.00	0.00	0.00	0.04	Secondary
Euthynnus alletteratus	Little tunny	8	5	0	0	10	0	0.02	0.01	0.00	0.00	0.02	0.00	Secondary
Coryphaenidae	Dolphinfishes nei	0	0	3	1	7	5	0.00	0.00	0.01	0.00	0.02	0.01	Secondary
Squaliformes	Dogfish sharks, etc. nei	0	0	2	1	2	0	0.00	0.00	0.01	0.00	0.00	0.00	Secondary
Carcharhinus falciformis	Silky shark	0	0	0	0	1	1	0.00	0.00	0.00	0.00	0.00	0.00	ETP
Istiophoridae	Marlins,sailfishes,etc. nei	0	0	0	0	0	2	0.00	0.00	0.00	0.00	0.00	0.00	Secondary
Carcharhinus longimanus	Oceanic whitetip shark	0	0	0	2	0	0	0.00	0.00	0.00	0.01	0.00	0.00	ETP
Other (discarded)	N/a	0	12	5	0	0	0	0.00	0.03	0.01	0.00	0.00	0.00	N/a
Grand Total		41,165	35,356	36,600	37,803	44,582	58,280	100.00	100.00	100.00	100.00	100.00	100.00	

6.3.6.2 T3 logbook validation

So-called 'T3' data are raw logbook data which have been corrected by IRD (T3 refers to the software package used). The purpose of this correction process is to improve the estimates of catch species composition. Estimating catch species composition is problematic for large-scale purse seine fisheries, because catches arrive on board in bulk as (often) a mixture of skipjack with juvenile yellowfin and bigeye. Estimating catch composition for the purposes of logbook data while on board is a specialist task and although the skipper and crew are experts, these estimates remain uncertain.

The T3 correction process applies species composition estimates from subsamples of the catch to the entire catch. These subsamples apply to a particular fishing area / time – i.e. if the logbook records that 20% of the catch came from fishing area X on date Y, the proportions from that sample will be applied to 20% of the catch. The areas used to define a given proportion are 5x5 degree squares. The subsamples are taken either by observers or in the course of unloading from specific tanks, since it is known from the logbook on what day fish were put into each tank and the associated fishing location.

There are acknowledged problems with this T3 system – notably that the areas assumed to have a homogeneous catch composition are large, and particularly at the start of a year the correction can be based on a small number of samples. The system was developed when the fishery was largely free-school and used paper logbooks and may not work so well in the current situation which is mainly FAD-based and electronic. IRD are currently working on a complete review and revision of this catch validation system.

The consensus view of stakeholders during the site visit was that these T3 data are less and less useful for the management of the CFTO fishery – e.g. in relation to tracking the consumption of yellowfin quota. However, for the purpose of inputs to the stock assessments of skipjack and yellowfin, which require an aggregate catch estimate rather than a day-by-day estimate, they are considered to be suitable since the stock assessment model operates at a coarser spatial level again. All acknowledge, however, that the ongoing revision of the system should result in significant improvements.

6.3.6.3 Observer data collection

IOTC requires 5% observer coverage for vessels operating in the IOTC convention area, as calculated by the number of operations/sets for each gear type by the fleet of each CPC (Resolution 11/04 on a Regional Observer Scheme). CFTO, through its membership of the Producer Organisation (PO) Orthongel, is making considerable efforts to improve this rate for its own fleet. With the Torre Italia being the only UoA vessel that has sufficient room to board an observer permanently, all other vessels in the UoA have been equipped with electronic observation systems since 2014 following the implementation of the OOE CAT and OCUP observer programme (see Section 6.3.4.1). The observer scheme for the UoA therefore consists of the following components:

- All UoA vessels are EU vessels and 10% observer coverage is assured under the EU Data Collection Framework (DCF). The coverage consists of human observers only (as opposed to electronic monitoring) and is financed by the EU and implemented by the TAAF or IRD, depending on the fishing location.
- OCUP is an industry initiative, set up by Orthongel, and consists of human observers and electronic monitoring (EM). Where possible, human observers are placed on board the vessels; however due to the need for protection crew, many of the boats have insufficient space for an additional observer. The EM data are analysed by the French company *Oceanic Développement* and optimized through the project CAT OOE (Section 6.3.4.1).

The improvement of the fishery's data collection programme is an ongoing activity of the SIOTI FIP (Section 6.3.4.3). Juan-Jordá (2019) note that data collected by EM would only be useful if it is collected in a consistent way, requiring the development of minimum standards for the use of EM systems onboard tropical tuna purse seiners. The following minimum standards, developed by Ruiz et al. (2017), were presented and adopted by the IOTC Scientific Committee:

- Before the trip (Installation, certification, audits):
    - Customized to vessel level; and
    - Tested (and certified) by third party.
- During the trip (Data collection):
    - Secure System: On board equipment must be adapted to sea conditions and assuring inviolability;
    - System and data security: Tamperproof and real-time information to on-land offices;
    - Cameras: Must cover all areas of interest according to the vessel and fishing maneuvers;
    - Recording frame rate must assure the detection of both catch and bycatch species;
    - Independence: The system needs to be self-governing with the exception of minimal maintenance by crew; and
    - Data storage and autonomy: On-board data storage must assure 4 months recording.
- After the trip (Data traceability and analysis):
    - Dedicated image analysis software: every EMS must offer an analysis software to allow the information review and analysis;
    - EMS data analysis and reporting: data analysis must be done by authorized entities following approved procedures;
    - Office observers' training: analysts must have passed specific training;
    - Compatible with ongoing standardized data flow and databases: compatible data output format; and
    - Hard drives chain of custody: the system must assure traceability of every hard drive and information recorded on-board.

EM strengths and weaknesses to properly monitor activities of interest under IOTC Resolutions are summarised by Ruiz et al. (2017), highlighting the need for both human observers and EM to complement each other. Weaknesses include:

- Fishing operation type: EM limited to identify sets associated to whales when the whale is not encircled, or if it escapes at the beginning of the set.
- Target species composition by set: both EM and human observers have the same difficulties. Species composition estimates, especially bigeye and yellowfin proportion, will be more accurate if it is done via port sampling.

- Bycatch estimate (sharks, rays, turtles, birds and marine mammals) and fate (sharks, rays, turtles, birds and billfish): number of cameras is limited, and bycatch handling area could change and move out from the camera views punctually. Small-sized individuals can be underestimated, mainly in those cases where they are not sorted, and are retained in wells. Species id. could be limited sometimes compared to an experienced observer.
- Discards: number of cameras is limited, and discard area could change and move out from the camera views punctually. If discards are not brailed onboard, EM is limited to estimate fish quantities in the net sack. Moreover, it would not be possible to know reasons for discarding in most of the cases.
- Size frequency: Calibration work is still needed before robust random sampling.

Through the OCUP programme, CFTO typically deploy 5 – 6 cameras per vessel. A typical configuration, as described by Briand et al. (2018), is as follows:

- One camera with wide angle in the crow's nest to cover the port side of the boat and to follow general fishing activity including setting, pursing, and brailing;
- One camera on deck to record brailing operations and discard activities on deck;
- Three other cameras with higher frequency (5 frames/second) are placed below the deck along the conveyor belt to follow the sorting operations and to determine the species composition. One of these is placed at the end of the discard belt to estimate the volume of discards;
- In some configurations, one more camera is placed on the crow's nest to enlarge the view on the starboard side, where large species are released at sea;
- Crow's nest cameras are set to record continuously whereas deck and internal cameras are triggered by vessel speed.
- The system is checked remotely on a regular basis to ensure it is operational. Image data are stored digitally with full hard disks transmitted to Oceanic Développement for analysis.
- Electronic recordings are reviewed using the Oceanlive software developed by Thalos. Fishing operations are selected using logbook indications and analysed independently and data reporting generally follows the same format as that for on-board observers.

To validate the OCUP observer protocol, the reliability of EMS data was analysed over 2015-16 for 2 Orthongel vessels (one in the Atlantic, one in the Indian Ocean) with both a human observer and EMS cameras on board (Briand et al., 2018). The study found that EMS was a suitable means for monitoring the type of fishing set, non-target catch volume and species composition, discards and best practices on board. Results on tuna discards showed that the EMS was able to reproduce on-board observer work and estimate equivalent volume of discards of all species of tunas combined and of the most common tuna species (skipjack) or group of tuna species (yellowfin or bigeye), although with less precision than on-board observation in terms of species identification, especially when discard operations take place on the deck. EMS weight estimation may also be less precise than on-board estimation because the 'on land' observer has no direct access to the fish. For individual non-target species analyses, however, the EMS was found to significantly underestimate the number of individuals, as for example larger species such as sharks or billfish or species with high commercial value, may be retrieved at several places and may not be recorded by cameras. For specimens handled above deck, the cameras may be too distant from the discard operations or be compromised by backlight, overexposure and/or splashing water for the EMS to register the individuals at the species level. Briand et al. (2018) concluded that some of these issues could be solved by adding more cameras to cover a larger portion of the activities, improving camera configuration (resolution, frame rate), cleaning the cameras and working with the crew to develop a standardized approach to handling catch that would improve the EMS ability to accurately document each event. It is also important to bear in mind that camera configurations will differ between vessels to an extent which in turn will influence data collection. Ultimately, however, it is clear that EMS may not be able to fully replace on-board observer coverage.

6.3.6.4 Observer data

The assessment team were provided with two observer datasets: human observer data (from the DCF and OCUP programmes – see Table 11) and electronic observer data (from the OCUP programme alone – see Table 11). As retained catches for the key target species are not recorded by the observers, these data were supplemented with validated logbook data. This enabled the data to be scaled up to fleet level as per the method below:

Both observer datasets were scaled up by the assessment team to fleet level based on the total landings of skipjack (SKJ) and yellowfin (YFT) (the main target species in this fishery) from the validated logbook data and the yearly retention rate for both species (i.e. landed as indicated in the observer datasets; this varied between 98.3 and 99.9%).

The scaling factor (SF) for each year was calculated separately as follows:

1. SKJ + YFT landings raised to total catch (SKJ+YFT$_{total}$):

$$SKJ + YFTtotal = \frac{logbook\ data\ (SKJ + YFT)}{\%\ SKJ + YFT\ retained}$$

2. Scaling factor (SF):

$$SF = \frac{SKJ + YFTtotal}{observed\ catch\ (SKJ + YFT)}$$

The observer data for each species were then raised as follows:

$$Species_{total} = SF\ x\ observed\ catch\ (Species)$$

This method assumed a linear relationship between the number of landed SKJ and YFT catch to the number of catch of other species. The scaled-up data are shown in Table 14 and Table 15.

Table 14. 2015 – 2018 electronic observer data (OCUP programme) for UoA as observed catch (in tonnes), scaled up to fleet level (in tonnes, using the method described above) and as % of total catch. Designation of species under Principle 2 is also shown, in accordance with procedure outlined in Section 6.5.1. Main species are marked in bold. Note that catch was initially observed in numbers and converted into weights by applying mean weight by species as provided by IRD. Scaling factors: 3.85 (2015), 1.52 (2016), 1.47 (2017), 1.94 (2018).

Species		Observed catch (tonnes)				Scaled up (tonnes)				% species composition				P2 species designation
		2015	2016	2017	2018	2015	2016	2017	2018	2015	2016	2017	2018	
Skipjack	***Katsuwonus pelamis***	**4,467**	**13,735**	**18,053**	**17,819**	**17,183**	**20,802**	**26,481**	**34,576**	**49.85**	**55.14**	**59.57**	**59.38**	**Principle 1 species**
Yellowfin	***Thunnus albacares***	**2,775**	**10,317**	**10,481**	**9,444**	**10,673**	**15,626**	**15,374**	**18,324**	**30.97**	**41.42**	**34.58**	**31.47**	**Primary**
Bigeye	***T. obesus***	**65**	**552**	**1,244**	**1,856**	**250**	**836**	**1,825**	**3,601**	**0.73**	**2.22**	**4.10**	**6.19**	**Primary**
Yellowfin/Bigeye	***T. albacares/obesus***	**1,465**	**8**	**6**	**8**	**5,637**	**12**	**8**	**15**	**16.35**	**0.03**	**0.02**	**0.03**	**Primary**
Rough triggerfish	*Canthidermis maculata*	44	52	98	85	168	79	144	164	0.49	0.21	0.32	0.28	Secondary
Frigate and bullet tunas	*Auxis thazard, A. rochei*		4	15	233	0	5	22	453	0.00	0.01	0.05	0.78	Secondary
Tunas nei	Thunnini	13	32	67	133	48	49	99	258	0.14	0.13	0.22	0.44	Secondary
Rainbow runner	*Elagatis bipinnulata*	42	40	86	70	162	61	126	137	0.47	0.16	0.28	0.23	Secondary
Albacore	*T. alalunga*	30	81	63	34	115	123	92	66	0.33	0.33	0.21	0.11	Primary
Mahi mahi	*Coryphaena hippurus*	24	16	63	63	94	25	93	122	0.27	0.07	0.21	0.21	Secondary
Silky shark	*Carcharhinus falciformis*	11	33	65	53	44	50	95	104	0.13	0.13	0.21	0.18	ETP
Little tunny	*Euthynnus alletteratus*			1	88	0	0	1	171	0.00	0.00	0.00	0.29	Secondary
Wahoo	*Acanthocybium solandri*	2	3	19	23	8	4	28	45	0.02	0.01	0.06	0.08	Secondary
Requiem sharks nei	Carcharhinidae	8	11	10	17	29	17	15	34	0.08	0.05	0.03	0.06	Secondary
Kawakawa	*Euthynnus affinis*		0.04	0.84	39	0	<1	1	77	0.00	0.00	0.00	0.13	Secondary
Mackerel scad	*Decapterus macarellus*	5	6	15	11	17	9	22	21	0.05	0.02	0.05	0.04	Secondary
Marlins,sailfishes,etc. nei	Istiophoridae	3	6	5	4	10	9	8	8	0.03	0.02	0.02	0.01	Secondary
Non identified	Non identified	0.28	1	2	11	1	2	3	22	0.00	0.01	0.01	0.04	N/a
Great barracuda	*Sphyraena barracuda*	0.37	0.94	2	4	1	1	4	7	0.00	0.00	0.01	0.01	Secondary
Oceanic whitetip shark	*Carcharhinus longimanus*	1.49	1.78	1.83	1.11	6	3	3	2	0.02	0.01	0.01	0.00	ETP
Kyphosus sea chubs nei	*Kyphosus* spp.	0.89	0.99	1.99	2.19	3	2	3	4	0.01	0.00	0.01	0.01	Secondary
Mobula nei	*Mobula* spp.	0.45	2.25	1.80	0.45	2	3	3	<1	0.01	0.01	0.01	0.00	Secondary
Carangids nei	Carangidae	0.08	0.01	2.24	2.26	<1	<1	3	4	0.00	0.00	0.01	0.01	Secondary
Tripletail	*Lobotes surinamensis*	0.39	0.55	1.24	2.07	1	<1	2	4	0.00	0.00	0.00	0.01	Secondary
Whale shark	*Rhincodon typus*		1.43	0.72	0.72	0	2	1	1	0.00	0.01	0.00	0.00	ETP
Frigate tuna	*Auxis thazard*	1.96	0.10			8	<1	0	0	0.02	0.00	0.00	0.00	Secondary
Unicorn leatherjacket filefish	*Aluterus monoceros*	0.08	0.68	0.23	0.67	<1	1	<1	1	0.00	0.00	0.00	0.00	Secondary
Blue marlin	*Makaira nigricans*	1.22		0.09		5	0	<1	0	0.01	0.00	0.00	0.00	Primary
Cottonmouth jack	*Uraspis secunda*	0.00	0.02	0.42	0.69	<1	<1	<1	1	0.00	0.00	0.00	0.00	Secondary

Species		Observed catch (tonnes)				Scaled up (tonnes)				% species composition				P2 species designation
		2015	2016	2017	2018	2015	2016	2017	2018	2015	2016	2017	2018	
Giant manta	*Manta birostris*	0.14			0.29	<1	0	0	<1	0.00	0.00	0.00	0.00	ETP
Cottonmouth jack	*Uraspis secunda*	0.01	0.08	0.10	0.20	<1	<1	<1	<1	0.00	0.00	0.00	0.00	Secondary
Mantas, devil rays nei	Mobulidae				0.36	0	0	0	<1	0.00	0.00	0.00	0.00	Secondary
Bigeye trevally	*Caranx sexfasciatus*	0.01	0.03	0.10	0.15	<1	<1	<1	<1	0.00	0.00	0.00	0.00	Secondary
Longfin yellowtail	*Seriola rivoliana*	0.01	0.03	0.11	0.14	<1	<1	<1	<1	0.00	0.00	0.00	0.00	Secondary
Marine turtles nei	Testudinata	0.08	0.04	0.08	0.08	<1	<1	<1	<1	0.00	0.00	0.00	0.00	ETP
Carangids	*Uraspis* spp.				0.24	0	0	0	<1	0.00	0.00	0.00	0.00	Secondary
Ocean sunfish	*Mola mola*		0.15		0.08	0	<1	0	<1	0.00	0.00	0.00	0.00	Secondary
Marlins,sailfishes,etc. nei	Istiophoridae			0.14	0.07	0	0	<1	<1	0.00	0.00	0.00	0.00	Secondary
Longfin batfish	*Platax teira*	0.00	0.04	0.02	0.15	<1	<1	<1	<1	0.00	0.00	0.00	0.00	Secondary
Shortfin mako	*Isurus oxyrinchus*	0.09		0.09		<1	0	<1	0	0.00	0.00	0.00	0.00	Secondary
Chilean devil ray	*Mobula tarapacana*			0.15		0	0	<1	0	0.00	0.00	0.00	0.00	ETP
Leatherback turtle	*Dermochelys coriacea*				0.11	0	0	0	<1	0.00	0.00	0.00	0.00	ETP
Flat needlefish	*Ablennes hians*	0.00	0.01	0.02	0.04	<1	<1	<1	<1	0.00	0.00	0.00	0.00	Secondary
Scribbled leatherjac. filefish	*Aluterus scriptus*		0.00	0.07	0.00	0	<1	<1	<1	0.00	0.00	0.00	0.00	Secondary
Pompano dolphinfish	*Coryphaena equiselis*	0.05				<1	0	0	0	0.00	0.00	0.00	0.00	Secondary
Pelagic stingray	*Dasyatis violacea*		0.01	0.02	0.02	0	<1	<1	<1	0.00	0.00	0.00	0.00	Secondary
Oceanic puffer	*Lagocephalus lagocephalus*	0.01	0.02	0.03		<1	<1	<1	0	0.00	0.00	0.00	0.00	Secondary
Bermuda sea chub	*Kyphosus sectatrix*			0.04		0	0	<1	0	0.00	0.00	0.00	0.00	Secondary
Batfishes	*Platax* spp.	0.02	0.00	0.02		<1	<1	<1	0	0.00	0.00	0.00	0.00	Secondary
Pilotfish	*Naucrates ductor*	0.00	0.00	0.01	0.02	<1	<1	<1	<1	0.00	0.00	0.00	0.00	Secondary
Olive ridley turtle	*Lepidochelys olivacea*	0.03				<1	0	0	0	0.00	0.00	0.00	0.00	ETP
Dolphinfishes nei	Coryphaenidae			0.03		0	0	<1	0	0.00	0.00	0.00	0.00	Secondary
Indo-Pacific sailfish	*Istiophorus platypterus*			0.02		0	0	<1	0	0.00	0.00	0.00	0.00	Primary
Stingrays, butterfly rays nei	Dasyatidae	0.00	0.01		0.00	<1	<1	0	<1	0.00	0.00	0.00	0.00	Secondary
Spectacled porpoise	*Phocaena dioptrica*		0.01			0	<1	0	0	0.00	0.00	0.00	0.00	ETP
Brassy chub	*Kyphosus vaigiensis*	0.00		0.01		<1	0	<1	0	0.00	0.00	0.00	0.00	Secondary
Blue sea chub	*Kyphosus cinerascens*	0.00		0.01		<1	0	<1	0	0.00	0.00	0.00	0.00	Secondary
Flathead catshark	*Apristurus macrorhynchus*	0.01				<1	0	0	0	0.00	0.00	0.00	0.00	Secondary
Yellowtail amberjack	*Seriola lalandi*				0.01	0	0	0	<1	0.00	0.00	0.00	0.00	Secondary

Species		Observed catch (tonnes)				Scaled up (tonnes)				% species composition				P2 species designation
		2015	2016	2017	2018	2015	2016	2017	2018	2015	2016	2017	2018	
Pomfrets, ocean breams nei	Bramidae				0.01	0	0	0	<1	0.00	0.00	0.00	0.00	Secondary
TOTAL						34,468	37,723	44,457	58,227	100.00	100.00	100.00	100.00	

Table 15. 2014 – 2018 human (on-board) observer data (OCUP programme and TAAF/IRD combined) for UoA as observed catch (in tonnes), scaled up to fleet level (in tonnes, using the method described above) and as % of total catch. Designation of species under Principle 2 is also shown, in accordance with procedure outlined in Section 6.5.1. Main species are marked in bold. Note that catch was initially observed in numbers and converted into weights based on length-weight ratios held by the IRD. Scaling factors: 19.22 (2014), 11.46 (2015), 12.62 (2016), 6.12 (2017), 6.65 (2018).

Species		Tonnes					Scaled up					% species composition					P2 species designation
		2014	2015	2016	2017	2018	2014	2015	2016	2017	2018	2014	2015	2016	2017	2018	
Skipjack	***Katsuwonus pelamis***	**767**	**2,036**	**1,577**	**3,699**	**3,192**	**14,735**	**23,331**	**19,896**	**22,658**	**21,223**	**26.30**	**59.35**	**50.69**	**48.99**	**33.89**	**Principle 1 species**
Yellowfin	***Thunnus albacares***	**953**	**892**	**1,312**	**3,145**	**4,893**	**18,306**	**10,218**	**16,551**	**19,265**	**32,528**	**32.68**	**25.99**	**42.17**	**41.66**	**51.95**	**Primary**
Bigeye	***T. obesus***	**1,089**	**391**	**142**	**599**	**1,131**	**20,936**	**4,476**	**1,788**	**3,667**	**7,520**	**37.37**	**11.39**	**4.56**	**7.93**	**12.01**	**Primary**
Mahi mahi	*Coryphaena hippurus*	32	9	21	16	18	621	103	271	96	117	1.11	0.26	0.69	0.21	0.19	Secondary
Albacore	*T. alalunga*	0	35	4	24	33	2	398	52	144	219	0.00	1.01	0.13	0.31	0.35	Primary
Rainbow runner	*Elagatis bipinnulata*	17	7	12	21	35	330	86	149	130	232	0.59	0.22	0.38	0.28	0.37	Secondary
Silky shark	*Carcharhinus falciformis*	14	11	10	11	25	261	127	122	67	165	0.47	0.32	0.31	0.15	0.26	ETP
Rough triggerfish	*Canthidermis maculata*	12	7	4	22	13	235	83	51	133	87	0.42	0.21	0.13	0.29	0.14	Secondary
Wahoo	*Acanthocybium solandri*	20	2	6	3	9	384	25	79	19	62	0.69	0.06	0.20	0.04	0.10	Secondary
Baleen whales nei	Mysticeti	0	30	0	0	0	0	344	0	0	0	0.00	0.87	0.00	0.00	0.00	ETP
Frigate and bullet tunas	*Auxis thazard, A. rochei*	0	0	0	0	30	0	0	3	0	197	0.00	0.00	0.01	0.00	0.31	Secondary
Kawakawa	*Euthynnus affinis*	0	0	0	0	14	2	<1	0	2	92	0.00	0.00	0.00	0.00	0.15	Secondary
Mackerel scad	*Decapterus macarellus*	2	1	2	3	4	29	7	24	18	26	0.05	0.02	0.06	0.04	0.04	Secondary
Oceanic whitetip shark	*Carcharhinus longimanus*	1	1	8	0	1	21	12	97	1	6	0.04	0.03	0.25	0.00	0.01	ETP
Blue marlin	*Makaira nigricans*	2	2	2	2	2	33	24	29	9	16	0.06	0.06	0.07	0.02	0.03	Primary
Great barracuda	*Sphyraena barracuda*	1	1	0	1	3	13	8	5	9	21	0.02	0.02	0.01	0.02	0.03	Secondary
Batfishes	*Platax* spp.	0	0	0	0	6	5	<1	<1	<1	40	0.01	0.00	0.00	0.00	0.06	Secondary
Black marlin	*Makaira indica*	1	0	2	1	2	21	2	26	5	10	0.04	0.01	0.07	0.01	0.02	Primary
Blue shark	*Prionace glauca*	0	0	4	0	0	0	3	54	0	0	0.00	0.01	0.14	0.00	0.00	Secondary
Frigate tuna	*Auxis thazard*	0	0	1	1	2	<1	2	8	6	11	0.00	0.00	0.02	0.01	0.02	Secondary
Striped marlin	*Tetrapturus audax*	1	1	0	0	0	19	17	4	3	<1	0.03	0.04	0.01	0.01	0.00	Primary
Brassy chub	*Kyphosus vaigiensis*	0	0	0	0	2	2	4	2	2	13	0.00	0.01	0.00	0.00	0.02	Secondary
Tripletail	*Lobotes surinamensis*	1	0	0	0	1	23	2	4	3	5	0.04	0.00	0.01	0.01	0.01	Secondary
Spinetail mobula	*Mobula japanica*	0	0	0	0	1	6	2	0	<1	7	0.01	0.00	0.00	0.00	0.01	ETP
Whale shark	*Rhincodon typus*	0	1	0	0	1	0	9	0	0	5	0.00	0.02	0.00	0.00	0.01	ETP
Blue sea chub	*Kyphosus cinerascens*	<1	<1	<1	<1	1	2	<1	5	2	4	0.00	0.00	0.01	0.00	0.01	Secondary
Cottonmouth jack	*Uraspis secunda*	<1	<1	<1	<1	<1	16	<1	<1	<1	3	0.03	0.00	0.00	0.00	0.00	Secondary
Mobula nei	*Mobula* spp.	0	<1	0	0	<1	0	14	0	0	1	0.00	0.03	0.00	0.00	0.00	Secondary
Unicorn leatherjacket filefish	*Aluterus monoceros*	<1	<1	<1	<1	<1	5	2	2	<1	2	0.01	0.00	0.00	0.00	0.00	Secondary

Species		Tonnes					Scaled up					% species composition					P2 species designation
		2014	2015	2016	2017	2018	2014	2015	2016	2017	2018	2014	2015	2016	2017	2018	
Tiger shark	*Galeocerdo cuvier*	0	0	<1	0	0	0	0	10	0	0	0.00	0.00	0.03	0.00	0.00	Secondary
Longfin batfish	*Platax teira*	<1	<1	<1	<1	<1	2	<1	<1	<1	3	0.00	0.00	0.00	0.00	0.00	Secondary
Marlins,sailfishes,etc. nei	Istiophoridae	<1	<1	<1	<1	<1	2	<1	2	<1	1	0.00	0.00	0.01	0.00	0.00	Secondary
Giant manta	*Manta birostris*	<1	<1	0	<1	<1	3	4	0	<1	0	0.01	0.01	0.00	0.00	0.00	ETP
Scribbled leatherjack. filefish	*Aluterus scriptus*	<1	<1	<1	<1	<1	<1	<1	5	<1	<1	0.00	0.00	0.01	0.00	0.00	Secondary
Bigeye trevally	*Caranx sexfasciatus*	<1	<1	<1	<1	<1	<1	<1	2	<1	<1	0.00	0.00	0.01	0.00	0.00	Secondary
Longfin yellowtail	*Seriola rivoliana*	<1	<1	<1	<1	<1	2	<1	<1	<1	<1	0.00	0.00	0.00	0.00	0.00	Secondary
Kyphosus sea chubs nei	*Kyphosus* spp.	<1	<1	<1	<1	0	<1	1	1	<1	0	0.00	0.00	0.00	0.00	0.00	Secondary
Sharptail mola	*Masturus lanceolatus*	0	0	<1	1	0	0	0	<1	1	0	0.00	0.00	0.00	0.00	0.00	Secondary
Hammerhead sharks, etc. nei	Sphyrnidae	0	0	<1	0	0	0	0	3	0	0	0.00	0.00	0.01	0.00	0.00	ETP
Requiem sharks nei	Carcharhinidae	0	<1	0	0	0	0	2	0	0	0	0.00	0.01	0.00	0.00	0.00	Secondary
Marine fishes nei	Osteichthyes	0	<1	0	0	0	0	2	0	0	0	0.00	0.01	0.00	0.00	0.00	Secondary
Green turtle	*Chelonia mydas*	0	<1	<1	<1	<1	0	<1	<1	<1	<1	0.00	0.00	0.00	0.00	0.00	ETP
Pompano dolphinfish	*Coryphaena equiselis*	<1	0	0	<1	<1	2	0	0	<1	<1	0.00	0.00	0.00	0.00	0.00	Secondary
Shortfin mako	*Isurus oxyrinchus*	<1	0	0	0	0	3	0	0	0	0	0.00	0.00	0.00	0.00	0.00	Secondary
Chub mackerel	*Scomber japonicus*	0	0	0	<1	<1	0	0	0	<1	<1	0.00	0.00	0.00	0.00	0.00	Secondary
Carangids nei	Carangidae	0	<1	0	<1	<1	0	<1	0	<1	<1	0.00	0.00	0.00	0.00	0.00	Secondary
Marine fishes nei	Osteichthyes	0	<1	0	0	0	0	<1	0	0	0	0.00	0.00	0.00	0.00	0.00	Secondary
Pelagic stingray	*Dasyatis violacea*	0	<1	<1	<1	<1	0	<1	<1	<1	<1	0.00	0.00	0.00	0.00	0.00	Secondary
Flat needlefish	*Ablennes hians*	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	0.00	0.00	0.00	0.00	0.00	Secondary
Marine turtles nei	Testudinata	0	0	0	0	<1	0	0	0	0	<1	0.00	0.00	0.00	0.00	0.00	ETP
Loggerhead turtle	*Caretta caretta*	<1	0	0	0	<1	<1	0	0	0	<1	0.00	0.00	0.00	0.00	0.00	ETP
Shortbill spearfish	*Tetrapturus angustirostris*	0	0	0	<1	0	0	0	0	<1	0	0.00	0.00	0.00	0.00	0.00	Secondary
Stingrays, butterfly rays nei	Dasyatidae	0	0	0	<1	0	0	0	0	<1	0	0.00	0.00	0.00	0.00	0.00	Secondary
Bullet tuna	*Auxis rochei*	<1	<1	0	<1	0	<1	<1	0	<1	0	0.00	0.00	0.00	0.00	0.00	Secondary
Carangids	*Uraspis* spp.	0	0	<1	0	0	0	0	<1	0	0	0.00	0.00	0.00	0.00	0.00	Secondary
Hound needlefish	*Tylosurus crocodilus*	<1	<1	0	0	<1	<1	<1	0	0	<1	0.00	0.00	0.00	0.00	0.00	Secondary
Olive ridley turtle	*Lepidochelys olivacea*	0	0	0	0	<1	0	0	0	0	<1	0.00	0.00	0.00	0.00	0.00	ETP
TOTAL		2,915	3,430	3,111	7,551	9,419	56,024	39,313	39,249	46,247	62,618	100.00	100.00	100.00	100.00	100.00	

6.3.6.5 Observer coverage

Since 2015, all trips for which there are no on-board observers are covered by electronic observation. However, due to technical difficulties with camera set-up, not all footage is exploitable, resulting in a lower coverage rate.

Based on the scaling factors calculated as described previously, the following levels of observer coverage were estimated by the assessment team (Table 16):

Table 16. Levels of observer coverage as estimated by the assessment team, based on scaling factors calculated according to the method described in Section 6.3.6.2.

Year	Electronic monitoring (OCUP)		Human observers (OCUP + DCF)	
	Scaling factor	Observer Coverage (%)	Scaling factor	Observer Coverage (%)
2014	N/a	N/a	19.22	5.20
2015	3.85	26.00	11.46	8.73
2016	1.51	66.03	12.62	7.93
2017	1.47	68.18	6.12	16.33
2018	1.94	51.54	6.65	15.04

Note that these levels of coverage are not completely additive. In some instances, during 2015 and 2016, vessels were subject to both human and electronic observer coverage to validate the OCUP observer protocol, as discussed in Section 6.3.6.2.

The figures above are in keeping with the overall observer coverage estimated by CFTO for all observer programmes combined, as calculated by number of days at sea observed.

Table 17. Total CFTO observer coverage 2014 – 2018 by number of days at sea observed. Source: Client
*** electronic observation data collected and exploitable.**

Year	Number of days at sea observed				CFTO days at sea total	% Observer coverage
	IRD-DCF Programme (human only)	Programme OCUP		Total		
		Human	Electronic*			
2014	48	94	-	139	2242	6%
2015	100	140	654	894	2242	40%
2016	86	187	1507	1780	2264	79%
2017	-	351	1577	1928	2235	86%
2018	130	263	1322	1715	2228	77%

6.3.6.6 Free-school vs FAD sets

Note that virtually all of the observer data relate to FAD sets. This is because the fishery predominantly fished on FADs from 2017 onwards (free-school sets being associated with high yellowfin catches which are now subject to a rebuilding plan – Scoring table 8). The proportion of free-school versus FAD catches according to the uncorrected logbook data is shown in Table 18, with the spatial distribution of 2018 floating object and free-school sets shown in Figure 4.

Table 18. Proportion (%) of free-school versus FAD catches according to the uncorrected logbook data

Year	Free-school sets	FAD sets
2013	25	75
2014	35	65
2015	40	60
2016	26	74
2017	24	76
2018	7	93

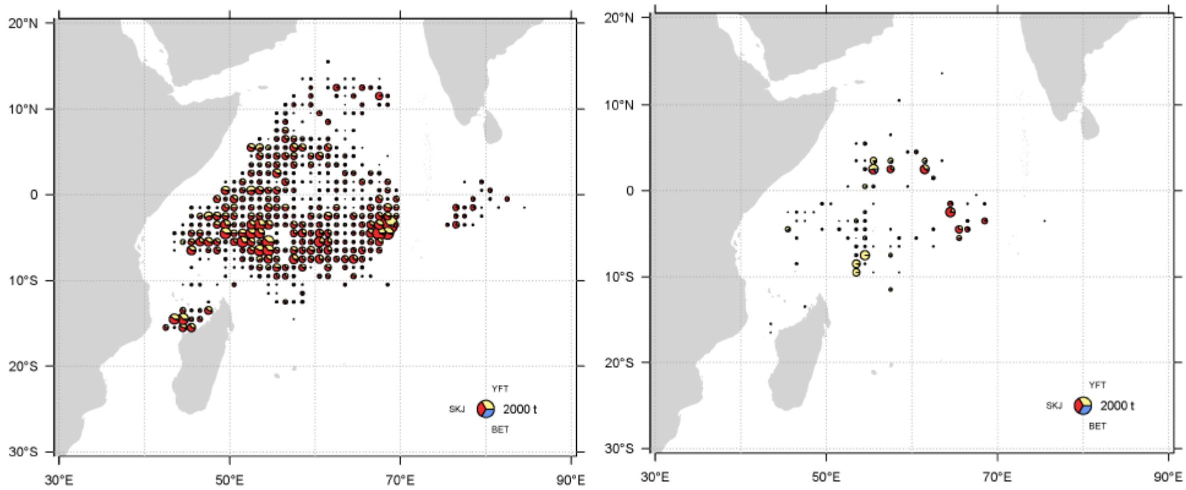

Figure 4. Spatial distribution of tuna catches of the French purse seine fishing fleet made on floating object associated schools (left) and free-swimming schools (right) in 2018. From Floch et al. (2019).

6.4 Principle 1

Note: Principle 1 background and scoring was updated in February 2021 to incorporate the outcome of the 2020 skipjack stock assessment meeting (WPTT22, 19-23 October), the 2020 Commission meeting (S24, 2-6 November) and the 2020 Scientific Committee meeting (SC23, 7-11 December).

Normally the date cut-off for incorporating new information into a stock assessment is the end of the site visit process (mid-2020 in this case). However, in responding to comments from several stakeholders, the assessment team wanted to explore revising some scores in Principle 1. Since there are other fisheries either certified or going through full assessment on this stock, harmonisation of P1 scores is required, and this cannot be done unless the analysis and scoring is up-to-date. Ultimately, scores were not changed since it did not appear justified based on the new information and analysis.

Note that only Principle 1 has been formally updated, the rest of the assessment has not, since this is not required.

6.4.1 Landings and TAC

The fishery is not managed via a Total Allowable Catch (TAC), although IOTC Res. 16/02 provides a 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 is no catch limit for 2016 and 2017. The last three years of catch data for the UoA and the fishery as a whole, as well as the catch limit from the HCR for 2018, are given in Table 19 (updated to 2019 for data relevant to the analysis of Principle 1).

Table 19. Catch data and catch limits from Res. 16/02 (in tonnes). Catch data taken from IOTC nominal catch data provided to WPTT22 (spreadsheet IOTC-2020-WPTT22(DP)-DATA03; see https://iotc.org/WPTT/22DP/Data/03-NC; IOTC (2017a, 2018a)**) and for 2019 from IOTC (2020a). UoA catch data based on validated logbook data (Table 12)**

Year	2016	2017	2018	2019
UoA catch (t)	18,136	21,262	32,239	
Total catch from the stock (estimated by IOTC) (t)	470,187	505,486	609,156	547,248
Catch limit from 16/02 (t)	-	-	470,029	470,029

6.4.2 Biology and stock

The information in this section is taken from IOTC (2017b) except where otherwise indicated.

Compared to other species of tuna, skipjack are short-lived 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.

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 (also see Section 6.5.6). 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).

6.4.3 Stock status

A target and limit reference point (TRP, LRP) has been agreed by IOTC for skipjack of 40%B_0 and 20%B_0 respectively (Res. 16/02). The most recent stock assessment, in 2020 (Fu, 2020; IOTC, 2020b), estimated that the stock was above the TRP level: median estimate from stock assessment, SB_{2019} = 45%SB_0; SB_{2019} above 40%SB_0 with 80% probability and below with 20% probability (Figure 5). The Kobe plot is shown in Figure 6.

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 (E_{targ}: below: 61%, above: 39%) (Figure 5). Catch resulting in equilibrium biomass at the target level ($C_{40\%SB0}$) 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.

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

Figure 5. Probability that the Indian Ocean skipjack stock in 2019 was above/below the biomass TRP and that the exploitation rate was above/below the equivalent level (IOTC, 2020a)**.**

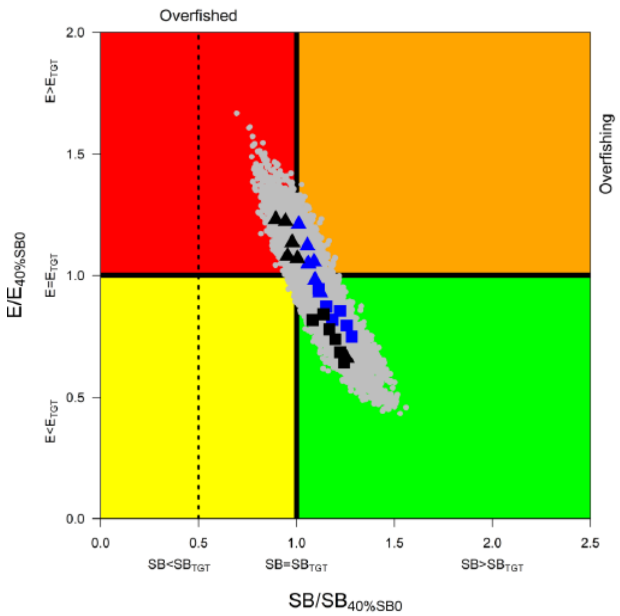

Figure 6. Kobe plot showing the results of the 2020 skipjack stock assessment across the uncertainty grid: x-axis – SB relative to the target level 40%SB$_0$); y-axis – exploitation rate relative to the target level; grey dots – values for the terminal year of the model (2019) for each individual model; blue and black symbols – median outputs from each model in the uncertainty grid (blue vs. black – different assumptions about purse seine catchability; square vs triangle – different assumptions about tagging data; details under 'stock assessment' below) (IOTC, 2020a).

6.4.4 Information

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 Figure 7. The IOTC Secretariat make estimates and assumptions to fill in critical gaps (e.g. to estimate total catch) as far as possible (IOTC, 2020c).

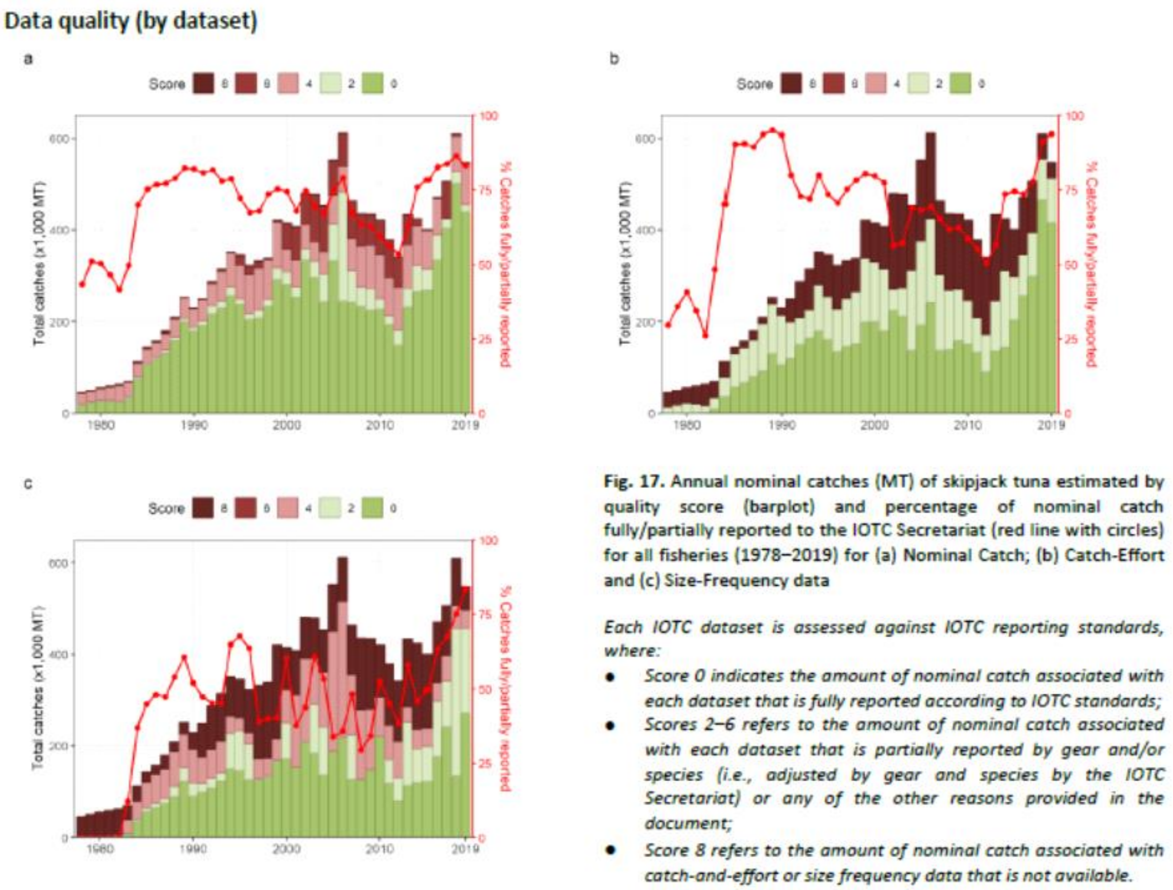

Figure 7. Skipjack data available to IOTC: barplots show data broken down by quality score (green = score zero = data provided as per requirements to brown = score 8 = not available or estimated); red line shows proportion of data reported in some form. Plot a) nominal catch; plot b) catch-effort data; plot c) size data (IOTC, 2020c).

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

<u>Nominal catch</u>: 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.

<u>Catch and effort time series</u>: 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.

<u>Echosounder buoy data</u>: 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.

6.4.5 Stock assessment

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, 2020b) 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 (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 20. 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 20. Skipjack tuna assessment model grid, as agreed by WPTT (IOTC, 2020b).

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

6.4.6 Stock management

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 B_{curr} is below B_{safety}, 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 8.

The catch limit for 2018-2020 was calculated based on the 2017 stock assessment at 470,029 t (IOTC, 2017a). IOTC estimate the catch in 2018 at 609,156 t and 2019 547,248 t – i.e. 30% and 16% above the catch limit respectively (IOTC, 2020a). Catch estimates for 2020 were not available at time of writing. 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, 2020a).

Res. 16/02 does not define any tools which can be used to implement the HCR – i.e., to limit catch to the catch limit. 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). IOTC is planning a special session of the Commission (SS4) in March 2021 specifically to discuss this issue (para. 11 of 16/02) as well as the yellowfin fishery (IOTC, 2020d).

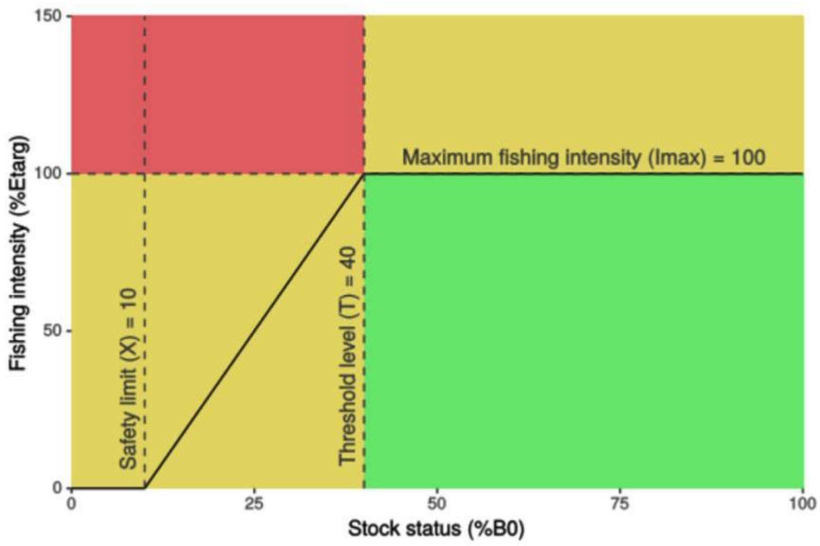

Figure 8. Relationship between exploitation rate (fishing intensity) and stock status (biomass in relation to reference points) resulting from application of the above HCR (IOTC Res. 16/02).

6.4.7 Key Low-Trophic Level (LTL) species

The trophic level of skipjack is estimated at ~ 4.4 (Fishbase). Skipjack is therefore not a key LTL species.

6.4.8 Principle 1 Performance Indicator scores and rationales

Scoring table 1. PI 1.1.1 – Stock status

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

Rationale

The PRI for this stock is unknown. The LRP for the stock is set at 20%SB_0 which is also MSC's default proxy for the PRI. The SS stock assessment model also estimates SB_{MSY} to be ~23%SB_0 although this value is not used by IOTC as a reference point.

The guidance in GSA2.2.3.1 states: *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%B_0 unless BMSY<27%B_0, in which case the default PRI should be 75%B_{MSY}.*

On this basis, 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

SB_{2019} is estimated at 45%SB_0 (median of stock assessment uncertainty grid), with the lower 10% CI estimated at 38%SB_0. This means that the lower 5% CI is most likely above 17%SB_0; i.e. there is 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%SB_0 (vertical dotted line in Kobe plot, Figure 6). 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_{2016} 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, should such an estimate be 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. Reading off the Kobe plot (Figure 6) 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. SG100 is met.

References

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

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

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

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

Overall Performance Indicator score	100
Condition number (if relevant)	N/a

Scoring table 2. 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?	N/a		N/a

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?	N/a	N/a	N/a

Rationale

Rebuilding is not required – not applicable

References

Rebuilding is not required – not applicable

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

Draft scoring range	N/a
Information gap indicator	Information sufficient to score PI

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

Overall Performance Indicator score	N/a
Condition number (if relevant)	N/a

Scoring table 3. 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 *'the combination of monitoring, stock assessment, harvest control rules and management actions, which may include an MP or an MP (implicit) and be tested by MSE'* (MSC – MSCI Vocabulary v1.20).

Monitoring and a stock assessment process are in place (see PIs 1.2.3 and 1.2.4 for details). A harvest control rule and reference points for Indian Ocean skipjack have been defined by IOTC in Res. 16/02. Discussions over catch allocations and/or other tools to restrict catch, effort or fishing capacity have been underway at IOTC for several years, but so far agreement has not been possible (e.g. see IOTC-2019-S23-PropA and PropM, presented at IOTC plenary 2019 but not accepted - IOTC (2019a)). Work to find some suitable compromise proposal continued through 2019 (see https://www.iotc.org/allocation-estimations) but in 2020 appears to have been halted owing to the Covid-19 pandemic, with the March 2020 meeting of the Technical Committee on Allocation Criteria (TCAC) postponed indefinitely (see https://www.iotc.org/meetings/6th-session-technical-committee-allocation-criteria-tcac06-please-note-meeting-has-been). However, in 2021 these discussions will restart with a Special Session of the Commission (SS4) in March 2021 (see https://iotc.org/meetings/special-session-indian-ocean-tuna-commission-ss4). The 2018 skipjack catch was estimated to be 130% of the catch limit calculated by the HCR and the 2019 catch 116% (see Section 6.4.6).

There are some tools are in place which may act to restrict skipjack catch to some extent – notably tools relating to the interim rebuilding plan for yellowfin (Res. 19/01). On the other hand, the requirement to reduce yellowfin catch under Res. 19/01 may actually have made the situation worse for skipjack. For example, this fishery has moved to a large extent from targeting free schools of larger yellowfin, towards using FADs to target skipjack mixed with juvenile yellowfin, in order to maximise catch while complying with their yellowfin quota allocation. Nevertheless, it seems logical that the limits on supply vessels and FADs will have reduced purse seine capacity to some extent (which is their aim).

The relevant tools are:

Under the Interim Rebuilding Plan for yellowfin, Res. 19/01:

- CPCs with vessels >24m or any fishing outside EEZs are required to reduce their yellowfin catch by a percentage based on the gear type (which may reduce skipjack catch if CPCs reduce fishing capacity);
- Purse seine supply vessels are limited to 2 for 5 fishing vessels from 2020, with no new supply vessels authorised since end 2017;

Under Res. 19/02 on FADs:

- 300 instrumented buoys are active at sea at any one time in relation to each of a flag state's vessels;
- 500 instrumented buoys may be acquired annually by each of a flag state's fishing vessel.

Other items:

- Large permanent closed area in the central Indian Ocean (EEZ of BIOT)

Scoring SG60: The elements of a harvest strategy, under the MSC definition, are all present: i.e. monitoring (see Section 6.4.4 and PI 1.2.3), stock assessment (see Section 6.4.5 and PI 1.2.4), HCR (Res. 16/02) and management actions (tools). The stock assessment suggests that the stock is above the target and MSY level, while the reported exploitation rate is below the target level (E_{2019}/E_{targ} 0.92; CIs 0.67-1.21) and below F_{MSY} (see PI 1.1.1 and Section 6.4.3). The stock is therefore estimated to be achieving stock management objectives as of the most recent assessment (2020: final year of the assessment 2019). On this basis, SG60 is met.

Scoring SG80: After the 2017 assessment, skipjack catch increased sharply (see Table 19) to reach the top end of the catch range estimated in 2017 to be compatible with E_{targ} (see Section 6.4.3). It appears that 2018 might have been an exceptional year for skipjack catch, since the catch in 2019 was lower and more consistent with E_{targ}, although still above the catch limit derived from the HCR (16/02). The stock assessment in 2020 paints a slightly more optimistic picture of the stock than the previous assessment, and the participants (WPTT and SC) note that it seems that the stock is in a particularly productive phase at present, most likely due to oceanographic conditions. This means that the catch limit under 16/02 estimated from the 2020 stock assessment (to apply in 2021-3) is somewhat higher than the previous limit, although still slightly below the 2019 catch (6.6%). There are some tools in place, although not aimed at skipjack directly, which can be expected to constrain catches to some extent. IOTC has struggled to react to the overshoot of the catch limit, since 2018 catch (the first year) was only known during 2019 while activities in 2020 were significantly disrupted, but there is now evidence that the issue is being treated as urgent (Special Session of the Commission in March 2021).

The 2018 and 2019 catch was estimated to have been above the catch limit derived from the HCR (16/02). The management tools in place are not directly linked to the skipjack catch, and so far have not shown that they can constrain skipjack catch sufficiently to comply with the output of the HCR; they are not working together with other elements of the harvest strategy. SG80 is not met.

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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

On the one hand, the harvest strategy is not being completely implemented, because there is no convincing means of applying the catch limit (a key element of the harvest strategy), which was overshot for the last two years for which data are available (2018 and 2019). On the other hand, the objective of the harvest strategy is taken to be the agreed TRP for skipjack – i.e. that biomass be maintained at 40%SB_0. 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 E_{targ} (probability of above/below 40%/60%). The harvest strategy objective is relatively precautionary (TRP is 1.7*SB_{msy}). 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 the team are relying 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, for the moment, so SG80 is met. Since there is concern about whether the harvest strategy will be able to constrain catches sufficiently to be 'clearly able' to meet stock-level objectives, SG100 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 Section 6.4.4 above and 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?			Not evaluated

Rationale

Not evaluated because SIa only meets 60. According to FCR 7.10.5.3, if SG80 is not met for all SIs then no SI can be scored at SG100; therefore, as SG80 for SIa is not met, SG100 is not scored.

e	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?	N/a	N/a	N/a

Rationale

The target species is not a shark; not relevant.

f	Review of alternative measures			
	Guide post	There has been a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock.	There is a regular review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock and they are implemented as appropriate.	There is a biennial review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of the target stock, and they are implemented, as appropriate.
	Met?	N/a	N/a	N/a

Rationale

Under Principle 2, unwanted catch is defined by MSC (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 it should be interpreted in the same way for Principle 1, except in relation to the target species only.

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. CFTO report that slipping of catch would only happen if a technical problem meant that the fish could not be brought on board fast enough to prevent spoilage and food safety risk; this is reportedly a rare occurrence (no incidences in 2020 so far). There is no 'unwanted catch' of skipjack in this fishery.

References

IOTC Resolutions 16/02, 19/05, 19/01, 19/02

IOTC (2019a, 2020b, 2020d), Fu (2020)

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

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

Overall Performance Indicator score	70
Condition number (if relevant)	1

Scoring table 4. 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 (see Section 6.4.6) which ensures that the exploitation rate is reduced as the LRP and B_{safety} are approached (see Figure 8). Under the HCR, E is reduced below E_{targ} as the biomass falls below the TRP, meaning that it should act to maintain the stock around the target level. 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.

(Note: This SI considered the HCR itself; the implementation of the HCR via management tools is considered below under SIc.)

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%SB_0 which is well above SB_{MSY} (see PI 1.1.1). The LRP is 20%SB_0, which is close to estimates of SB_{MSY} (slightly below; see 1.1.1) The stock assessment also takes into account 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 B_{safety} which is only 50% of the agreed LRP (10%B_0), 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 SB_{MSY}. On this basis, the HCR is likely to be robust; SG80 is met. In relation to SG100, the ecological role of the stock is not taken into account, and the team are lacking concrete evidence as to how the HCR functions in practice or via stock projections. 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 B_{MSY} within the next 5 years* (SA2.5.2a). B_{MSY} is estimated to be ~23%SB_0, while $SB_{current}$ is estimated at 45%SB_0. Biomass has never dropped to the level of SB_{MSY} in the time series, as can be seen from the Kobe plot (Figure 6; see 1.1.1). The stock assessment report provides estimates of F_{2019}/F_{MSY} for a range of model runs, estimating that F_{2019}/F_{MSY} is in the range 0.31-0.78 (median 0.55) – i.e. current (or recent) F is a long way below F_{MSY}, and hence SB is not likely to drop below SB_{MSY} in the near future. It is therefore possible in theory to conclude that tools are 'available' – even though this argument has not been used to score SIa, since a HCR is clearly 'in place'. It is unclear from the requirements and associated guidance, however, whether it is possible to make this argument for 'available' tools at SIc without the HCR also being considered 'available' at SIa. It was agreed during harmonisation discussions to score this SI based on the tools that are in place, following the logic of SIa.

There are two years for which there is both a catch limit in place and a catch estimate – 2018 and 2019. In 2018, the catch was 130% of the catch limit computed under Resolution 16/02. In 2019, the catch was 116% of the catch limit. The catch for 2020 is not yet known. For 2021-3, the catch limit (estimated using the HCR and the 2020 stock assessment) has increased somewhat, closer to the actual 2019 catch although still below it (2019 catch 107% of 2021-3 catch limit).

MSC critical guidance for this SI states: *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*. As noted above, F is well below F_{MSY}. On this basis, there is some evidence that the tools are effective in controlling exploitation. SG60 is met.

The overall exploitation rate is appropriate both for MSY and for the agreed target ($E_{2019}<E_{targ}$), but the available evidence suggests that the catch limits set out under the HCR (i.e. the main tool to implement the HCR) may not be able to control catches to the level required by the HCR. As noted above, evidence as to how these catch limits are working is limited for the moment. The issue was discussed at the 2020 Commission meeting and a Special Session (SS4) will take place in March 2021 to focus on this issue. There is an MSE process in place, based on which IOTC will presumably review the skipjack harvest strategy, although progress in 2020 has been delayed by Covid-19. SG80 is not met.

References

IOTC Resolution 16/02

IOTC (2017c, 2017d, 2019a, 2019b, 2020a, 2020d, 2020e), Fu (2020)

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

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

Overall Performance Indicator score	75
Condition number (if relevant)	2

Scoring table 5. 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 (2017b)) 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	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

			and monitored with sufficient frequency to support the harvest control rule.	[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 described in Section 6.3.6.2. 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, 2020f), 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, 2020c) 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' (paragraph 163); 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.

Note: In the Echebastar assessment, this SI scored 100; however, this was prior to the 2017 stock assessment where uncertainties in the data were raised that had not previously been considered.

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 (2020c, 2020f). 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 (2020f)) 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 7). This scoring issue is met.

References

IOTC Resolution 15/01

IOTC (2017b, 2017c, 2020b, 2020c, 2020d, 2020f)

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

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

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

Overall Performance Indicator score	80
Condition number (if relevant)	N/a

Scoring table 6. 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: it 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. Other features of fisheries, such as purse seine effort creep, are also taken into account. 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 B0 (see 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

There are various lines of argument that suggest that the assessment is sufficiently robust: there were no major conflicts between the input abundance indices and fits were good, fits to length-frequency data were good for the main fisheries with good sampling, retrospective pattern was negligible and hindcasting analysis showed that the model was fairly stable with truncated input datasets. The uncertainty grid includes some relatively precautionary assumptions (e.g. three levels of h including 0.7, considered by

WPTT to be low) and reference points are also relatively precautionary, such that stock assessment outputs are likely to be precautionary as well. Alternative approaches and hypotheses were explored as described above and in Section 6.4.5.

However, the stock assessment report (IOTC, 2017d) 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. Pew, in their stakeholder comments (Appendix 4.2.3), note concerns around assumptions about trends in catchability for key fleets. On a precautionary basis and in agreement with previous scoring, this is scored as 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.

References

IOTC (2017a, 2017b, 2017c)

Fu (2020), IOTC (2020b) and Schirripa (2020)

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

Draft scoring range	≥80
Information gap indicator	More information sought on whether the stock assessment has been externally peer reviewed

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

Overall Performance Indicator score	95
Condition number (if relevant)	N/a

6.5 Principle 2

6.5.1 Designation of species under Principle 2

Primary species (MSC Component 2.1) are defined as follows:

- Species in the catch that are not covered under P1;
- Species that are within scope of the MSC program, i.e. no amphibians, reptiles, birds or mammals;
- Species where management tools and measures are in place, intended to achieve stock management objectives reflected in either limit (LRP) or target reference points (TRP). Primary species can therefore also be referred to as 'managed species'.

Secondary species (MSC Component 2.2) are defined as follows:

- Species in the catch that are not covered under P1;
- Species that are not managed in accordance with limit or target reference points, i.e. do not meet the primary species criteria;
- Species that are out of scope of the programme, but where the definition of ETP species is not applicable (see below)

ETP (Endangered, Threatened or Protected) species (MSC Component 2.3) are assigned as follows:

- Species that are recognised by national ETP legislation
- Species listed in binding international agreements (e.g. CITES Appendix 1, Convention on Migratory Species (CMS), ACAP, etc.)
- 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).

Both primary and secondary species are defined as '**main'** if they meet the following criteria:

- The catch comprises 5% or more by weight of the total catch of all species by the UoC;
- The species is classified as 'Less resilient' and comprises 2% or more by weight of the total catch of all species by the UoC. Less resilient is defined here as having low to medium productivity, or species for which resilience has been lowered due to anthropogenic or natural changes to its life-history
- The species is out of scope but is not considered an ETP species (secondary species only)
- Exceptions to the rule may apply in the case of exceptionally large catches of bycatch species

6.5.2 Principle 2 management framework

The following sections provide an overview of relevant regulations as they relate to Principle 2.

6.5.2.1 EU

All UoA vessels are either French or Italian-flagged and must therefore abide by the provisions set out in Council Regulation (EU) 2019/124 of 30 January 2019 (and subsequent updates), to the extent that it applies to all EU fishing vessels (Article 14) and the IOTC area (Section 4). The provisions of the regulation are of particular relevance to ETP species and are in most but not all cases reflected in IOTC resolutions. This is shown in Table 22. The Regulation (EU) 2019/1241 of 20 June 2019 on the conservation of fisheries resources and the protection of marine ecosystems through technical measures also applies.

6.5.2.2 IOTC Resolutions

For brevity, only the more general IOTC Resolutions relevant to Principle 2 are listed here. Species-specific Resolutions are given as appropriate in the relevant P2 scoring tables.

- Resolution 19/02: Procedures on a **FAD management plan**, including limitation on the number of FADs, 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.

- Resolution 19/05: Resolution 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 ban applies to all catches except for fish considered unfit for human consumption and/or species which are prohibited from retention through domestic legislations and international obligations. Discards should be recorded in logbooks. 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.

- Resolution 15/01: Resolution on the **recording of catch and effort data** by fishing vessels in the IOTC area of competence.

- Resolution 11/04: Resolution on a **regional observer scheme** requiring observer coverage of at least 5% of the number of operations/sets for each gear type by the fleet of each CPC.

- Resolution 03/01: Resolution on the **limitation of fishing capacity** of contracting parties and cooperating non-contracting parties for CPCs which have more than 50 vessels on the 2003 IOTC Record of Vessels to limit the number of their fishing vessels larger than 24 meters length overall to the number of its fishing vessels registered in 2003.

An up-to-date list of active Resolutions and Recommendations is available here: http://www.iotc.org/cmms

6.5.2.3 Internal PO management

As a member of the PO Orthongel, CFTO is bound to abide by its internal policies (‘*décisions*’ - http://www.orthongel.fr/index.php?page=gouvernance/reglt). The following *décisions* are relevant for Principle 2:

- ***Décision n°12 du 23 novembre 2011 relative à la préservation des requins***: promote and enable safe handling and release practices to increase post-release survivability of sharks, collaborate with scientific tagging programmes.

- ***Décision n°11 du 23 novembre 2011 relative à l'utilisation de dispositifs de concentration de poissons***: ban on use of entangling FADs by member vessels.

- ***Décision n°10 du 23 novembre 2011 relative à l'encadrement de la pêche sur DCP***: trimestral monitoring of number of FADs used by member vessels (through instrumented buoys). Limit on active FAD buoys per vessel at any given moment and number of buoys that may be purchased per vessel per year as per FAD management plan and IOTC regulations. For 2020, there is a limit of 300 active FAD buoys per vessel and 500 FAD buoys that may be purchased per vessel per year. The use of HF buoys is prohibited from 2012 onwards.

- ***Décision n°8 du 15 janvier 1997 engageant les armements à améliorer leur sélectivité et embarquer des observateurs et interdisant le découpage des ailerons en mer avec rejet des carcasses ainsi que leur commercialisation***: ban on shark finning (Article 3), rapid return to sea of any live bycatch (note this measure goes further than IOTC Resolution 17/05 that prohibits the removal of shark fins on board fresh tuna vessels but limits freezer vessels to a 5% fin to body ratio).

- **Décision n°6 du 14 mai 1992 étendant la décision du 1er mars 1990 à l'ensemble des mammifères marins**: ban on dolphin-associated purse seine sets and prohibition of any activity that may deliberately endanger dolphins or other cetaceans.

- **Décision n°5 du 1er mars 1990 relative à l'interdiction de pêche sur dauphin** (as above)

These measures are part of the Orthongel Code of good practice in force since 2015 (http://www.orthongel.fr/index.php?page=durabilite/gbp) which also includes provisions on

- Limiting discarding and maximizing value of non-target commercial species; and
- Waste management plan and compliance with MARPOL (covering non-organic waste as well as pollutants, anti-fouling and cleaning products used in the Orthongel fleet).

6.5.2.4 Indian Ocean FAD management plan

This **FAD Management Plan** was drafted in accordance with IOTC Resolution 19/02 on Procedures on a FAD management and is applicable to all tuna seiners registered in a French port and operating in the waters of the Indian Ocean. It also applies to support vessels flying the French flag and used in the tropical tuna seine fishery. The management plan covers only drifting FADs (as opposed to anchored FADs). The plan has three objectives:

1. Improve knowledge on FAD fishing activities;
2. Limit FAD deployment; and,
3. Reduce potential ecosystem impacts of FADs.

The plan includes the following management measures:

- Identification and marking of FADs;
- Registration and tracking of instrumented buoys;
- Recording of FAD activities (deployment, maintenance, removal, fishing, loss of FAD);

- Limit on the number of traceable FADs (DCPT) to 300 per vessel per company and subject to individual IOTC vessel limits;
- Ban on the use of High Frequency beacons;
- Prohibition of the use of light to attract tunas under FADs;
- Supervision of support vessels and other FAD management support systems;
- Fight against the uncontrolled drift of FADs in sensitive areas (captains and fishing companies will continue to implement all measures to prevent or limit the loss of FADs at sea. The fishing companies agree that the positions of FAD beacons entering areas where the risk of stranding of FADs on coral reefs or of damaging interaction with other activities (e.g. seismic surveys) are communicated to the relevant organizations in order to eliminate or limit to the lowest possible level the associated risks);
- Measures to mitigate the effects of FADs on the environment (increase selectivity to minimize the taking of juveniles and non-target bycatch such as sharks and sea turtles, use of non-entangling FADs with associated workshops, develop biodegradable FADs);
- Shark conservation measures (fast and safe handling and release practices, assist in scientific tagging); and
- Limit on the number of support vessels (2 per 5 purse seiners).

6.5.2.5 TAAF regulations (Iles Eparses)

The Scattered Islands (French: *Îles Éparses*) consist of four small coral islands, an atoll, and a reef in the Indian Ocean, and constitute the 5th district of the French Southern and Antarctic Lands (*Terres Australes Antarctiques Françaises* – TAAF, also see Figure 1). Fishing activities off these islands are subject to TAAF management as laid out in *Arrêté* 2020-25 of 5 mars 2020. A synopsis of measures pertaining to purse seining is given below (please see *Arrêté* for further detail):

- All active fishing vessels must have a separate license for targeting tunas and other pelagic fishing in the *Îles Éparses* and carry an on-board TAAF observer;
- FAD fishing within territorial waters is not allowed;
- Discarding of tunas is banned and discarding of any other commercial species is strongly discouraged;
- Purse seining is not allowed within 24 nm from the baseline or within 10 nm from the centre of the lagoon at the *Banc du Geyser*;
- Any bycatch, particularly sharks, must be returned to the water as quickly as possible; shark finning is banned;
- FADs should be biodegradable and non-entangling. Any entangling FAD drifting in French TAAF waters should be removed and treated as non-biodegradable waste;
- All FADs should be traceable;
- Setting on cetaceans or whale sharks is strictly forbidden; and
- Sea turtles should be avoided and if caught, should be released as quickly as possible.

6.5.3 Primary species and secondary species

Primary and Secondary species were identified on the basis of the combined datasets presented in Sections 6.3.6.1 and 6.3.6.2. The 'main' species listed in Table 21 were identified. An explanation as to their designation under Principle 2 is also provided.

Table 21. Reason for P2 designation 'main' primary and secondary species

Species/stock	Designation	Reason
Indian Ocean yellowfin	Main primary	Stock assessment estimates stock status in relation to reference points (Fu et al., 2017); associated interim rebuilding plan (IOTC Resolution 19/01).
Indian Ocean bigeye	Main primary	Stock assessment estimates stock status in relation to reference points (Langley, 2016); stock-specific management in place as per Resolution 05/01.

Each stock is discussed further in the Primary and Secondary Species performance indicator scoring tables (Section 6.5.8).

6.5.4 ETP species

The criteria for designating ETP species are set out in Section 6.5.1. As the UoA is an EU fleet fishing in the IOTC Convention Area, the following legislation and binding agreements were considered for the designation of ETP species:

- EU: Council Regulation (EU) 2019/124 of 30 January 2019, to the extent that it applies to all EU fishing vessels (Article 14) and the IOTC area (Section 4);
- IOTC Conservation and Management Measures (Resolutions);
- CITES appendix I listing; and
- Listing under the *Arrêté n°2020-25 du 5 mars 2020 encadrant l'exercice de la pêche aux thons et aux autres poissons pélagiques dans les zones économiques exclusives des Iles Eparses* (TAAF)

The ETP species found to be interacting with the UoA according to electronic and on-board observer data (Table 14 and Table 15) are listed in Table 22. For each species, the average annual catch scaled up to fleet level according to the method described in Section 6.3.6.2 is shown in tonnes, as well as the fate upon release, set type and observer type. For rare interactions, the data were not scaled up and actual observed interactions are shown instead.

Each ETP species group is discussed further in the ETP Species Performance Indicator scoring tables (Section 6.5.8).

Table 22. ETP species interacting with the UoA according to electronic and human observer data (Table 14 and Table 15). Data shown include average annual catch scaled up to fleet level according to the method described in Section 6.3.6.2 in tonnes, fate, set type and observer type. *Not scaled up as rare event.

Species	Interaction level	Fate	Set type	Observer type	Reason for designation
Cetaceans					
Baleen whales nei (Mysticeti)	30 tonnes in 2015, 2 individuals*	Both released alive	Free-school	On-board	CITES appendix I IOTC Resolution 13/04
Spectacled porpoise (*Phocaena dioptrica*)	2 individuals between 2015 – 18*	Discarded, fate unknown	FAD	Electronic	IOTC Resolution 13/04
Elasmobranchs					
Oceanic whitetip shark (*Carcharhinus longimanus*)	2014-18 scaled up average: 27t/year	All discarded (alive or dead)	Free-school and FAD, although mostly FAD	On-board	IOTC Resolution 13/06 Council Regulation (EU) 2019/124
	2015-18 scaled up average: 3t/year			Electronic	
Spinetail mobula (*Mobula japonica*)	2014-18 scaled up average: 3t/year	Mostly discarded alive	Both set types	On-board	Council Regulation (EU) 2019/124
Chilean devil ray (*Mobula tarapacana*)	1 individual between 2015 – 18*	Discarded dead	Free-school	Electronic	Council Regulation (EU) 2019/124
Whale shark (*Rhincodon typus*)	3 individuals between 2014 – 18*	All released alive	Both set types	On-board	IOTC Resolution 13/05 Council Regulation (EU) 2019/124
	4 individuals between 2015 – 18*	3 released alive; one dead		Electronic	
Giant manta (*Manta birostris*)	6 individuals between 2014 – 18*	Mostly discarded alive	Both set types	On-board	Council Regulation (EU) 2019/124
	3 individuals between 2015 – 18*	Discarded dead		Electronic	
Silky shark	2014-18 scaled up average: 148.4t/year	Discarded (48% discarded dead)	FAD	On-board	*Arrêté 2020-25 du 5 Mars 2020* (TAAF)

Species	Interaction level	Fate	Set type	Observer type	Reason for designation
	2015-18 scaled up average: 73.25t/year	Discarded (70% discarded dead)	Mostly FAD and occasionally free school	Electronic	
Hammerhead sharks, etc. nei	2015-18 scaled up average: 0.6t/year	Discarded alive	FAD	On-board	*Arrêté 2020-25 du 5 Mars 2020* (TAAF)
Sea turtles					
Green turtle (*Chelonia mydas*)	5 individuals between 2014 – 18*	4 out of 5 discarded alive	FAD	On-board	CITES appendix I
Marine turtles nei (Testudinata)	1 individual between 2014 – 18*	Discarded alive	FAD	On-board	CITES appendix I
	7 individuals between 2015 – 18*			Electronic	
Loggerhead turtle (*Caretta caretta*)	3 individuals between 2014 – 18*	Discarded alive	FAD	On-board	CITES appendix I
Olive ridley turtle (*Lepidochelys olivacea*)	1 individual between 2014 – 18*	Discarded alive	FAD	On-board	CITES appendix I
	2 individuals between 2015 – 18*			Electronic	
Leatherback turtle (*Dermochelys coriacea*)	3 individuals between 2015 – 18*	Discarded alive	Both set types	Electronic	CITES appendix I

6.5.5 Habitats

The purse seine gear in this fishery is strictly pelagic and therefore the fishing operation itself does not impact on benthic habitats. Considering the significant cost of the gear (at over 0.5 million euros for one purse seine), the size of the operation, the make-up and configuration of the gear (with the net attached to two parts of the boat), the loss of the purse seine is considered unlikely. This was discussed with the client during the site visit who confirmed that gear loss is rare, and when it does happen, only ever concerns part of the gear when there is a net breakage. Even in those instances, however, all efforts are made to recover the gear so the net can be mended onboard.

FAD fishing forms an important component of this fishery with 93% of sets carried out on FADs in 2018 (Table 18) and impacts may result from the FADs themselves. Abandoned or lost FADs can end up stranded on coasts, with coral reefs the most impacted habitat, as the FAD's sub-surface structure becomes entangled on reef structure (Davies et al., 2017; Zudaire et al., 2018). According to the client, FADs deployed by CFTO have a typical life expectancy of one year, after which the bamboo material will have degraded to the point the FAD is no longer effective. A significant amount of FADs that are deployed also gets 'repurposed' by competitive fleets, which is a practice that also applies to CFTO vessels. It is therefore difficult to ascertain how many FADs are truly abandoned, lost or 'repurposed.

Seychelles' coral reefs (Figure 17) appear particularly exposed to FAD beaching because of their prominent position within the main fishing grounds of the purse seine fleet (Davies et al., 2017). After beaching, those FADs with netting in their submerged structure can cause ghost fishing, even if tied in bundles to prevent entanglement, because with time the netting becomes unravelled (Moreno et al., 2018). Another problem attributed to FADs is marine pollution, with more than 70% of FADs beached in the Seychelles being made of synthetic material (Zudaire et al., 2018). In the Indian Ocean, beaching events occur over a wider set of zones, with Somalia, the Seychelles, the Maldives and Sri Lanka being the most important, with deployment positions mainly located around the Seychelles, in the Mozambique Channel and off Somalia (Maufroy et al., 2015). Maufroy et al. (2015) carried out a large-scale examination of spatio-temporal patterns of drifting FADs for the French purse seine fleet between 2007 and 2011. Putative beaching events, identified by GPS buoy positions that repeat at least three times far from a port and land, occurred in *ca*. 10% of "at sea" trajectories in the dataset. A study carried out as part of the FAD Watch project in the Seychelles (Zudaire et al., 2018) provides a more optimistic outlook, however, than those of preceding studies (Maufroy et al., 2015; Davies et al., 2017). Using buoy track analysis for the OPAGAC fleet, Zudaire et al. (2018) have shown that from FADs tracked in the EEZ of the Seychelles, only 0.8% in 2016 and 0.5% in 2017 impacted the coast of the archipelago (this was further reduced to 0.1-0.2% if the number of beached FADs in the study buffer areas is considered; i.e. a total of 22 and 12 beachings in 2016 and 2017 respectively). Note that this study was the only one to combine in-zone buoy track data with actual observations of beaching events although its scope was limited geographically to the Seychelles EEZ (Zudaire et al., 2018). Davies et al. (2017) based their assessment on simulations of trajectories for a subset of 10 GPS buoy deployments, while the 10% estimate by Maufroy et al. (2015) is based on a predictive model for buoy state using 1,741,000 GPS positions from 9,289 buoys deployed in the Atlantic and Indian Oceans over a 5-year period.

Table 23. Comparison of dFAD beaching potential estimates calculated by three different studies. Adapted from Zudaire et al. (2018)

Study	Beaching potential (%)	Period	Area	Method

Maufroy et al. (2015)	9.9%	2007 – 2011	Indian and Atlantic Oceans	Model based on buoy track data (N = 9,289)
Davies et al. (2017)	32.3%	2006 – 2014	Indian Ocean	Lagrangian transport model to simulate trajectories of dFADs based on 10 buoy deployments
Zudaire et al. (2018)	0.8 and 0.5%	2016 - 2017	Seychelles EEZ	In-zone buoy track data combined with *in-situ* observations

The risk of a drifting FAD beaching event occurring is determined by the number of drifting FADs in the ocean, the deployment location, dispersal patterns, the extent of efforts to prevent beaching events from occurring and FAD design. The likelihood and severity of beaching events can be mitigated through limiting FAD deployments, simplifying FAD structure, avoiding FAD deployment areas that imply high risk of stranding, using FADs that remain in the fishing area (e.g. FADs with navigation capability, FADs that could be sunk, anchored FADs), recover FADs at sea, and recover FADs from the coast (Davies et al., 2017). In this context, the Client fishery has been taking a number of steps to reduce the likelihood and severity of beaching events:

Non-entangling FAD and biodegradable FADs:

Activities have included workshops on the construction of non-entangling FADs; system set-up for monitoring and control of development; production and usage of non-entangling FADs; research and trials into biodegradable materials for the submerged section of FADs as part of the projects listed in Section 6.3.4. The French fleet has further committed to ban entangling FADs (*décision ORTHONGEL n°11 du 23 novembre 2011*) as a result of the 2010 – 2012 Project *DCP éco* (see Section 6.3 for information on UoA FAD design).

The EU project BIOFAD was launched in August 2017. This 28-months EU project was coordinated by a Consortium comprising three European research centres: AZTI, IRD (*Institut de recherche pour le développement*) and IEO (*Instituto Español de Oceanografía*). The International Seafood Sustainability Foundation (ISSF) was also actively collaborating by providing the biodegradable materials needed to test biodegradable drifting FADs (dFADs). The main objectives of the project were: (1) to test the use of specific biodegradable materials and designs for the construction of dFADs in real fishing conditions; (2) to identify options to mitigate dFADs impacts on the ecosystem; and (3) to assess the socioeconomic viability of the use of biodegradable dFADs in the purse seine tropical tuna fishery (Zudaire et al., 2019). As part of the project, 201 biodegradable FADs and 113 non-entangling FADs were deployed by the French purse seine fleet in the IO (which includes CFTO). Thus far, results indicate that these FAD types remain experimental with issues around quick degradation of the gear having been identified (with some even degrading before deployment). The efficiency of BIOFADs and non-entangling FADs in terms of catch data, tuna presence/absence and biomass indicators given by echosounder buoys compared to those of a classic design will also be a factor in the extent these innovations will be adopted. The Client fishery is currently taking part in the Orthongel CAT (Table 11) which continues the research into biodegradable FAD designs in collaboration with a Breton company.

In parallel, the IOTC have defined procedures on a FAD management plan through Resolution 19/02, where any netting materials are eliminated for FAD construction by 1 January 2020; the reduction of the amount of synthetic marine litter is also promoted in line with Resolution 18/04, by the use of natural or biodegradable materials for drifting FADs (Annex V; IOTC, 2019). Resolution 19/02 also fixed the start of the transition to the implementation of biodegradable FADs from 1 January 2022; although it is noted that this implementation timeframe could be revised depending on the results of the BIOFAD project.

Limits on FAD deployment:

The French IO FAD management plan (Section 6.5.2.4) includes provisions for the identification and marking of FADs, registration and tracking of satellite beacons (instrumented buoys) and recording of FAD activities (deployment, maintenance, removal, fishing, loss of FAD); limits the number of traceable FADs (DCPT) to 300 per vessel per company and subject to individual IOTC vessel limits; and commits to avoid the uncontrolled drift of FADs in sensitive areas (captains and fishing companies will continue to implement all measures to prevent or limit the loss of FADs at sea. The fishing companies agree that the positions of FAD beacons entering areas where there is a risk of stranding of FADs on coral reefs or of damaging interaction with other activities (e.g. seismic surveys) are communicated to the relevant organizations in order to eliminate or limit to the lowest possible level the associated risks.

FAD recovery

The FAD Watch project is a first multi-sectoral initiative developed to prevent and mitigate FAD beaching across islands in the Seychelles, in which coastal recovery is applied as a mitigation measure. It is the result of a collaborative work among the Spanish Tuna Purse Seiner fishing representatives (OPAGAC), Island Conservation Society (ICS), Islands Development Company (IDC) and Seychelles Fishing Authority (SFA) (Zudaire et al., 2018). Since June 2019, CFTO (through the Fishery Improvement Project SIOTI) has been participating in this project. Any potential habitat impacts resulting from beaching in this high-risk area would thus be further mitigated by FAD recovery.

6.5.6 Ecosystem

The P2 Ecosystem component considers the broad ecological community and ecosystem in which the fishery operates and addresses system-wide issues, primarily impacted indirectly by the fishery, including ecosystem structure, trophic relationships and biodiversity (Blyth-Skyrme, 2016). In the context of this fishery, the assessment focused on the pelagic ecosystem of the tropical Indian Ocean, as the ecosystem under consideration.

The Indian Ocean has many unusual features, largely due to the vast Asian landmass to the north and a low latitude throughflow from the Pacific via the Indonesian Seas. Indian Ocean circulation is particularly complex and distinct from circulation in the Atlantic and Pacific Oceans because, unlike these oceans, the Indian Ocean is bounded to the north by land masses, and interactions with these land masses produce strong seasonal variability in wind forcing (Kaplan et al., 2014). The Asian monsoon winds drive a complete reversal of the currents north of 10◦ S, including the Somali Current at the western boundary and semi-annual jets along the equator (Figure 9). The strong southwest monsoon winds yield intense upwelling along the western boundary of the Arabian Sea, modulating evaporation and moisture transport toward India, and fostering intense oceanic productivity. This high productivity, together with low ventilation, leads to a subsurface depletion of oxygen that is acknowledged to be expanding with changes noted in the Arabian Sea and Bay of Bengal (see oxygen minimum zones in Figure 9 below). Deep atmospheric convection is modulated by the Madden–Julian Oscillation (MJO) and by the monsoon intraseasonal oscillation (MISO), which induce subseasonal air–sea interactions. The thermocline ridge, associated with off-equatorial upwelling of the shallow overturning circulation makes the sea surface temperature (SST) in the western tropical Indian Ocean, highly sensitive to atmospheric anomalies, which in turn impact the cyclogenesis and MJO development. At interannual time scales, the tropical Indian Ocean exhibits uniform warming during and after El Niño events, a response known as the Indian Ocean Basin Mode (IOBM). The Indian Ocean also has important interannual climate modes of its own, such as the Indian Ocean Dipole (IOD). The Indian Ocean is also home to subtropical climate modes, such as the Subtropical Indian Ocean Dipole (SIOD) which manifests as large-scale SST anomalies spanning 15–45ºS. Although climate change trends are difficult to discern from these patterns of natural variability, there is no doubt that the Indian Ocean is responding to anthropogenic climate change, with evidence of increasing SST and heat content, rising sea level, increased carbon and nitrogen uptake, and an intensified water cycle (see Hermes et al. (2019) and references therein).

Primary production in the tropical Indian Ocean from July to October originates predominantly in the area around the Horn of Africa and the Arabian Peninsula, with secondary centres of productivity being located around the tip of the Indian subcontinent and near major island chains. From March to June, productivity is uniformly weak over the entire ocean (Kaplan et al., 2014).

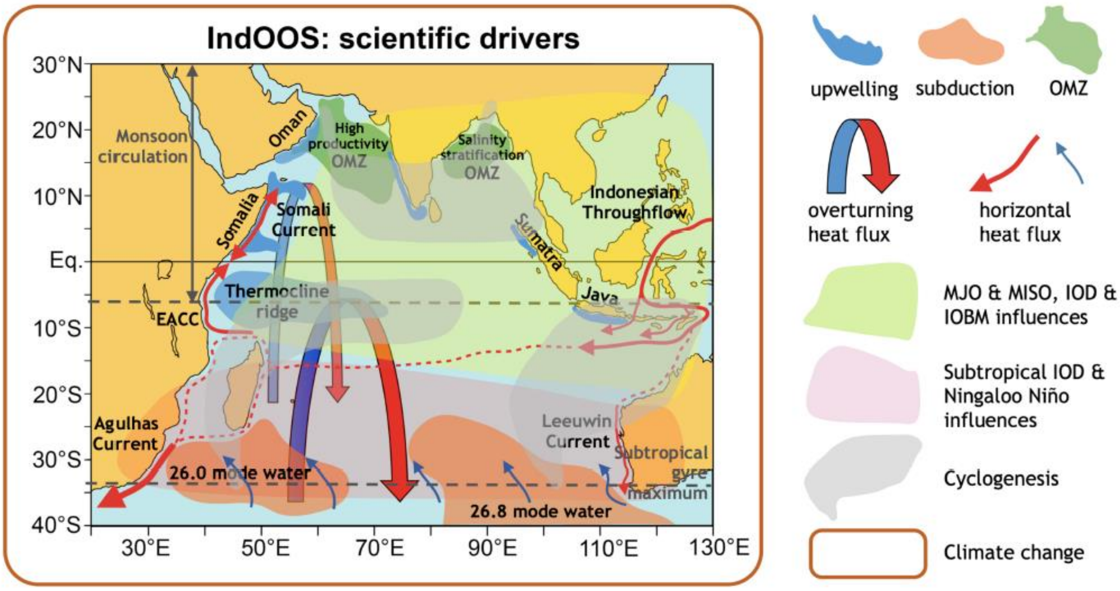

Figure 9. Schematic view of key phenomena in the Indian Ocean. OMZ: oxygen minimum zone; MJO: Madden–Julian Oscillation; MISO: monsoon intra-seasonal oscillation; IOD: Indian Ocean Dipole; IOBM: Indian Ocean Basin Mode. From Hermes et al. (2019)**.**

The assessment of the Ecosystem Component is presented in Scoring table 19 to Scoring table 21.

6.5.7 Scoring elements

Table 24. Principle 2 scoring elements

Component	Scoring elements	Designation	Data-deficient
Primary species	Yellowfin tuna Bigeye tuna	Main	No
	Albacore Blue marlin Indo-Pacific sailfish Black marlin Striped marlin	Minor	No
Secondary species	See Table 13, Table 14 and Table 15	Minor	Yes for some species; however no RBF applied (this caps the PI score at 80)
ETP species	Cetaceans Elasmobranchs Sea turtles - see Table 22 for species	N/a	No
Habitats	Water column	Commonly encountered	No
	Coral reef	VME	No

6.5.8 Principle 2 Performance Indicator scores and rationales

Scoring table 7. 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	Yellowfin – Yes Bigeye - Yes	Yellowfin – No Bigeye - No

Rationale

As explained in Sections 6.3.6 and 6.5.2, main primary species/stocks are Indian Ocean (IO) yellowfin and bigeye.

IO yellowfin

In 2018 a stock assessment was carried out for yellowfin tuna in the IOTC area of competence to update the stock status undertaken in 2016. The stock assessment was carried out using Stock Synthesis III (SS3), a fully integrated model that is currently used to provide scientific advice for the three tropical tunas stocks in the Indian Ocean (Fu et al., 2017). According to the stock assessment, current (2017) spawning biomass is estimated to be below SB_{MSY} (SB_{2017}/SB_{MSY} = 0.83) and fishing mortality is estimated to be above F_{MSY} (F_{2017}/F_{MSY} = 1.20). According the base model, SB_{2017}/SB_0 = 0.30 (also see figure below). No limit reference point has been estimated for this stock; however, the

MSC default value for the PRI at 50%B_{MSY} was applied for the purposes of scoring (see GSA2.2.3.1[4]). The assessment results were based on a grid of 24 SS3 model runs which are recognized as insufficient to explore the spectrum of uncertainties and scenarios, noting the large uncertainty associated with data quality and consideration of model statistical uncertainty. Overall, the quantified uncertainty in stock status is likely underestimating the underlying uncertainty of the assessment (IOTC, 2018b). Nevertheless, applying the default MSC PRI, as shown by the red line in Figure 10, it is clear that the lower bound of the 95% confidence interval for $SSB_{current}/SSB_0$ is above this level (50%B_{MSY} being the equivalent of 18%B_0 in this case). This suggest that the IO yellowfin stock is highly likely to be above the PRI (with at least 70% probability). SG60 and SG80 are met. Considering the fact that the stock has been fished at or above MSY for the last five years or so (see Figure 10), SG100 is not met.

The team notes the concerns raised by stakeholders (Appendix 4) in relation to the change in fishing practices as a result of implementation of the yellowfin rebuilding plan. I.e. the increased reliance of Indian Ocean purse seine fisheries on FADs, with likely increased catches of juvenile yellowfin as a result. Given that this trend has not yet been incorporated into the latest stock assessment, there was concern that stock status may be worse than assessed by Fu et al. (2017). For precautionary reasons, the team therefore explored the scenario where the first part of SG80 (i.e., main primary species are highly likely to be above the PRI) is not met, triggering the question: 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. This fishery overlaps with 2 other fisheries in the MSC programme. The table below shows the total amount of yellowfin caught by these UoAs as most recently reported in MSC reports. According to these data, the total annual yellowfin catch by MSC UoAs is estimated at 47,141 tonnes. The total Indian Ocean yellowfin catch according to the IOTC database varied from 424,988 t in 2016 to 438,583t in 2018 (https://www.iotc.org/documents/nominal-catch-species-and-gear-vessel-flag-reporting-country). The MSC UoAs combined contributions to this overall catch are in the region of *ca*. 11%. Applying SA3.4.6-d and associated guidance ("UoA catches of less than 30% of the total catch of a species may not normally be influential in hindering a recovery in a marginal sense, i.e., nothing the UoA does would be likely to change the situation"), the team concludes that the second part of SG80 is met. SG100 remains not met as explained already.

Fishery	Most recent yellowfin catch amount (t)	Reference
Echebastar Indian Ocean Skipjack Tuna Purse Seine	10,670 (FAD) + 116 (free-school) = 10,786	Year 1 surveillance report
Maldives pole & line skipjack tuna fishery	15,796	Reassessment Public Certification Report
This assessment	20,559	Table 12
Total	47,141	N/a

[4] 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 50%B_{MSY} unless B_{MSY}<27%B_0, in which case the default PRI should be 75%B_{MSY}. According to the base model, SB_{MSY}/SB_0 = 34% (Fu et al., 2017).

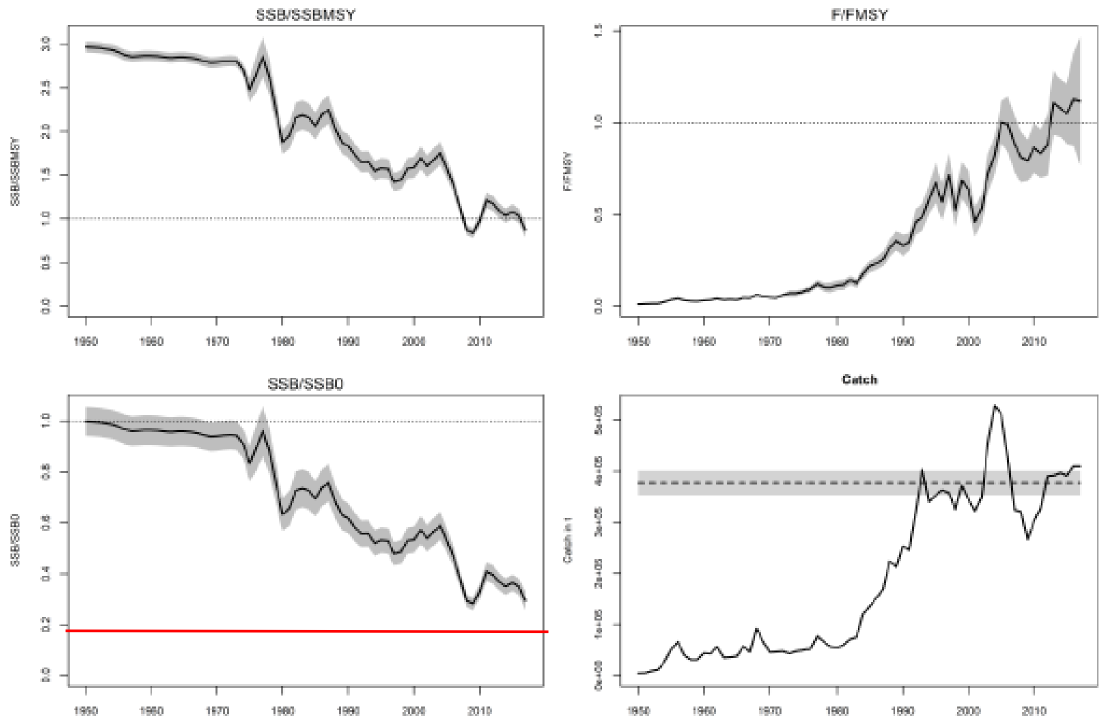

Figure 10. Stock status summary for the Indian Ocean yellowfin for base model. Thick black lines shaded areas represent 5th and 95th percentiles. In the catch plot, dotted lines represent estimate of MSY, the shaded area represents 5th and 95th percentiles. From Fu et al. (2017). Red line in bottom left graph depicts approximation of MSC default PRI (50% B_{MSY} or 18%B_0) as added by team.

<u>Indian Ocean bigeye:</u>

In 2019 a new stock assessment was carried out for bigeye tuna in the IOTC area of competence to update the stock status undertaken in 2016. Two models were applied to the bigeye stock (JABBA and Stock Synthesis (SS3)). The stock assessment selected to provide scientific advice was carried out using SS3, a fully integrated model used to provide scientific advice for the three tropical tunas stocks in the Indian Ocean (Fu, 2019; IOTC-SC, 2019). The reported stock status is 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. Combined across the model ensemble, SB_{2018} was estimated to be well above the interim limit reference point (0.5 B_{MSY}), at 1.22 SB_{MSY} (80% CI: 0.82-1.81), with F_{2018} estimated at 1.20 F_{MSY} (80% CI: 0.70-2.05) (Figure 11). Although SSB has been on a downward trajectory over *ca*. the last 5 years in the stock assessment (Figure 12), the median estimate of SB has never dropped below the SB_{MSY}. Overall, the stock is not considered to be overfished but overfishing is occurring. The assessment indicates that SB_{2018} is above SB_{MSY} with 65.4% probability and that fishing mortality is above F_{MSY} with 72.8% probability – see Figure 13. The increase in F since the last assessment is considered primarily a result of the significant increase in catches from the purse seine FAD fishery in 2018 (Fu, 2019) and the SS3 projections from the 2019 assessment show that there is a risk of breaching MSY-based reference points by 2021, and 2028 if catches are maintained at 2018 levels at the current selectivity and therefore size distribution of catch. Overall, the team concludes that there is a high degree of certainty (at 90% probability) that the stock is about the PRI (SG60, SG80 and the first part of SG100 are met). Although the stock been above SB_{MSY} throughout the time series, the stock is considered to have overfishing occurring and the increase in SKJ targeting (likely as a result of the yellowfin rebuilding measure) is contributing to that overfishing due to the high level of juvenile BET catches in purse seine FAD sets. As commented on by Pew during the PCDR stage, the latter issue is considered an important deficiency in the stock assessment model, which questions the predictive capacity of the model. Therefore, SG100 is not met.

MSY (1,000 t) (80% CI):	87 (75-108)
F_{MSY} (80% CI):	0.24 (0.18-0.36)
SB_{MSY} (1,000 t) (80% CI):	503 (370-748)
F_{2018}/F_{MSY} (80% CI):	1.20 (0.70-2.05)
SB_{2018}/SB_{MSY} (80% CI):	1.22 (0.82-1.81)
SB_{2018}/SB_0 (80% CI):	0.31 (0.21. – 0.34)

Figure 11. Estimated Status of bigeye tuna in the Indian Ocean (IOTC-SC, 2019).

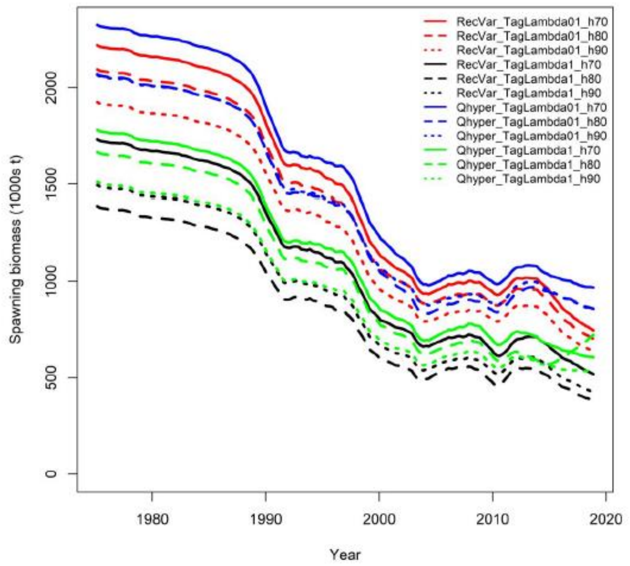

Figure 12. Spawning biomass trajectories from the final model options in Fu (2019).

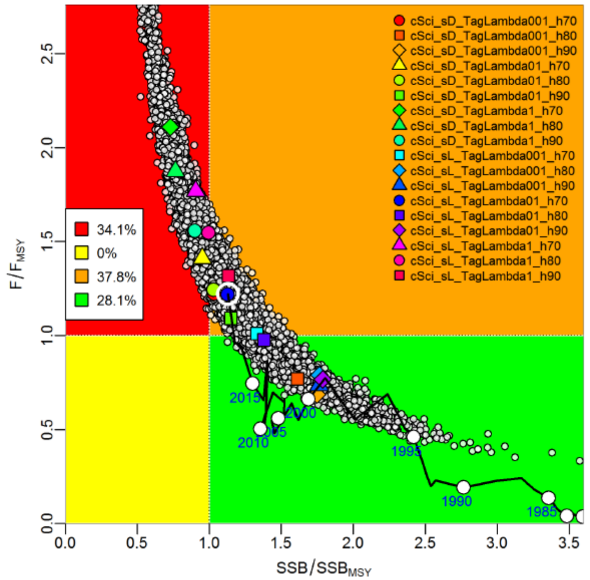

Figure 13. SS3 Aggregated Indian Ocean assessment Kobe plot for Indian Ocean bigeye. The coloured points represent stock status estimates from the 18 model options. The grey dots represent 5000 estimates of 2018 stock status from the multivariate normal approximation from the mean and variance-covariance 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 purple dot) represents the median stock status in 2018. From IOTC-SC (2019)

In relation to unobserved mortality caused by entanglement in FADs (whether they are active, lost or abandoned), the team took into account the fact that the UoA makes use of 'sausage nets', i.e. lower entanglement risk FADs, although it is moving towards full implementation of netting-free FADs with ropes, i.e. non-entangling FADs (Section 6.3). Assuming that all FADs are less entangling (worst case scenario), the team concluded that unobserved mortality through entanglement at the scale of the UoA was highly unlikely to be a significant factor in the fishery's interactions with primary species to the extent that this will have stock-level effects.

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?		Albacore – Yes Blue marlin – Yes Indo-Pacific sailfish – Yes Black marlin – Yes Striped marlin - Yes

Rationale

Minor primary species/stocks identified are Indian Ocean albacore, blue marlin, Indo-Pacific sailfish, black marlin and striped marlin (see Table 13, Table 14 and Table 15).

Indian Ocean albacore: A new stock assessment was carried out for albacore in 2019 to update the assessment undertaken in 2016. The stock assessment was carried out using Stock Synthesis III (SS3). The model used in 2019 is based on the model developed in 2016 with a series of revisions, including changes in the spatial distribution of longline catches (IOTC-SC, 2019). For the reference model option selected by Langley (2019), the spawning biomass is estimated to have remained above the SB_{MSY} level throughout the history of the fishery (1950–2017), although fishing mortality rates have generally increased over the last two decades and are estimated to have exceeded the F_{MSY} level in 2016– 2017. On this basis, the team considered that there is a high degree of certainty that the stock is above the PRI. SG100 is met.

Blue marlin: Stock status based on the Bayesian State-Space Surplus Production model JABBA applied in the 2019 updated assessment of IO blue marlin (Parker et al., 2019) suggests that there is an 87% probability that the stock in 2017 is in the red zone of the Kobe plot, indicating the stock is overfished and subject to overfishing (B_{2017}/B_{MSY}= 0.82 (0.56 - 1.15) and F_{2017}/F_{MSY}=1.47 (0.96 - 2.35)). No limit reference point is defined in the assessment; the team therefore applied the MSC's default value of $0.5B_{MSY}$ – the lower bound of the 95% confidence interval is close to but above this level ($0.56B_{MSY}$). SG100 is met.

Indo-Pacific sailfish: The stock status is determined on the basis of the 2015 assessment and other indicators presented in 2018. In 2015, data poor methods for stock assessment using Stock Reduction Analysis (SRA) techniques indicated that the stock is not yet overfished, but is subject to overfishing (B_{2014}/B_{MSY} (80% CI) = 1.13 (0.87–1.37) and F_{2014}/F_{MSY} (80% CI) = 1.05 (0.63–1.63)). The stock appears to show a continued increase catches which is a cause of concern, indicating that fishing mortality levels may be becoming too high. On the weight-of-evidence available in 2018, the stock is determined to be still not overfished but subject to overfishing (IOTC-SC, 2018a). SG100 is met.

Black marlin: Two models (ASPIC and Bayesian state space Surplus Production Model) were applied to black marlin in 2016. Both models indicated that the stock is overfished and subject to overfishing (B_{2015}/B_{MSY} (80% CI) = 0.81 (0.55 – 1.10) and F_{2015}/F_{MSY} (80% CI) = 2.42 (1.52 – 4.06)). The WPB agreed to use the results from the Bayesian state space Surplus Production Model for stock status advice. The results of the stock assessment of black marlin are based on very limited information and in particular are compromised by the uncertainty in the estimates of catches for this species, over the time series. For this reason, the status of the stock is considered to have a high degree of uncertainty (IOTC-SC, 2018b). The first part of the SG100 is therefore not met. The team considered whether there is evidence that the UoA does not hinder the recovery and rebuilding of black marlin. This species does not appear in the logbook data in significant numbers, as it is mostly consumed on-board or retained in small quantities. According to the on-board observer data 12.8 tonnes of this species are caught per year on average (based on scaled up data in Table 15). The 2015 catch estimate used in the latest stock assessment was 18,490 tonnes and the UoA contributes about 0.07% to this figure. In line with GSA3.4.6, the team concludes that this is evidence that the UoA does not hinder recovery or rebuilding of this species. SG100 is met.

Striped marlin: A new stock assessment was carried out in 2018. The key assessment results for all models were consistent in indicating that the stock has been subject to overfishing in the last two decades, and that as a result, the stock biomass is well below the B_{MSY} level. On the weight of evidence available in 2017, the stock status of striped marlin is determined to be overfished and subject to overfishing (IOTC-SC (2018c) and see table 4 in Wang (2017). In 2016 reported catches increased to 5,299 t (IOTC-SC, 2018c) while according to the on-board observer data (Table 15) the UoA catches an average estimate of 9t striped marlin per year. Applying the same reasoning as for black marlin above, the team concludes that this is evidence that the UoA does not hinder recovery or rebuilding of this species. SG100 is met.

References

Fu et al. (2017), IOTC (2018b, 2018c), Langley (2016), Fu (2019), IOTC-SC (2019)

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

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

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

Yellowfin	80
Bigeye	80
Minor species (N = 5)	100
Overall Performance Indicator score	95
Condition number (if relevant)	N/a

Scoring table 8. 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?	Yellowfin – Yes Bigeye – Yes Minor species – Yes (default)	Yellowfin – Yes Bigeye – Yes Minor species – Yes (default)	Yellowfin – Yes Bigeye – No Minor species - No

Rationale

A "**strategy**" represents 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 fishing practices in the light of the identification of unacceptable impacts.

A "**partial strategy**" represents a cohesive arrangement which may comprise one or more measures, an 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.

Main primary species/stocks are as follows: Indian Ocean yellowfin and bigeye.

IO yellowfin and bigeye are currently subject to IOTC Resolutions:

- Resolution 16/01 On an interim plan for rebuilding the Indian Ocean Yellowfin tuna stock in the IOTC Area of Competence (yellowfin only)
- Resolution 05/01 On conservation and management measures for bigeye tuna (bigeye only)

- 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 15/06 On a ban on discards of bigeye tuna, skipjack tuna, yellowfin tuna and a recommendation for non-targeted species caught by purse seine vessels in the IOTC area of competence
- Resolution 15/10 On target and limit reference points and a decision framework
- Resolution 15/11 on the implementation of a limitation of fishing capacity of Contracting Parties and Cooperating Non-Contracting Parties
- Resolution 14/02 for the conservation and management of tropical tunas 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 and access agreement information
- Resolution 10/08 concerning a record of active vessels fishing for tunas and swordfish in the IOTC area

For yellowfin, IOTC Res. 19/01 on a rebuilding plan for the stock, sets out separate catch limits (expressed as reductions from 2014 levels) for purse seine, gill net, longline and other gear fisheries. The resolution includes provisions in the case of over-catch of the catch limits by any CPC, together with a mandatory reduction in supply vessels (From 1 January 2020 to 31 December 2020: 2 supply vessels in support of not less than 5 purse seiners, all of the same flag State) and reporting of the number of FAD deployments. Note that the latter is paired with a greater restriction on the number of active FAD buoys allowed to be in use per vessel (300, reduced from 350) and allowed to be purchased per year per vessel (500, down from 700) as per Res. 19-02 (compared with the previous Res. 18-08). For the EU fleet, to which the UoA belongs, the rebuilding plan is being implemented via a catch limit of 77,698 tonnes to be shared among EU flagged purse seiners operating in the Indian Ocean, with 29,501 tonnes available to French purse seiners (Council Regulation (EU) 2020/123 of 27 January 2020). Together with routine stock assessments carried out by the Working Party on Tropical Tunas (WPTT), these measures meet the definition of a strategy and SG60, SG80 and SG100 are met.

Bigeye: Resolution 05/01 on conservation and management measures for bigeye tuna applies. The Resolution requires CPCs to limit their catch of bigeye tuna to their recent levels of catch reported by the IOTC Scientific Committee, and sets out a plan to establish, for a three year period, interim catch levels for CPC's catching more than 1000t of bigeye tuna at the 10th IOTC regular session (2006). Note, however, that the resolution was adopted at the 2005 Commission meeting and has not been updated since. Taiwan is further requested to limit its catches at 35,000t. The team considers that the combination of measures listed above and routine stock assessments (e.g. Fu (2019)) make up a partial strategy (SG60 and SG80 are met). Given that the resolution is now outdated and that it has not been revisited since its adoption, suggests the measures do not form a complete strategy. SG100 is not met.

Minor species: SG60 and SG80 apply to main species only so this is met by default for minor species.

Resolution 18/05 On Management Measures for the Conservation of the Billfishes: Striped Marlin, Black Marlin, Blue Marlin and Indo-Pacific Sailfish requires CPCs to ensure that the overall catches of these species in any given year do not exceed either the MSY level or, in its absence, the lower limit of the MSY range of central values as estimated by the

Scientific Committee. The limits referred to correspond to the following: striped marlin: 3,260 t; black marlin: 9,932 t; blue marlin: 11,930 t; and Indo Pacific sailfish: 25,000 t. If the average annual total catch of any of these species in any two consecutive years period from 2020 onward exceeds the limits, the Commission shall review the implementation and effectiveness of the measures contained in this Resolution and consider the adoption of additional conservation and management measures, as appropriate, by also taking into account the advice of the Scientific Committee. Pending advice from the SC on minimum conservation size, CPCs shall not retain on board, trans-ship, land, any specimen smaller than 60 cm Lower Jaw Fork Length (LJFL) of any of the species referred to, but shall return them immediately to the sea in a manner that maximizes post-release survival potential without compromising the safety of crew. In addition, CPCs may consider the adoption of additional fisheries management measures to limit fishing mortality such as: releasing any specimen brought alive on-board or alongside for taking on board the vessel; modify fishing practices and/or fishing gears to reduce juvenile catches; adopting spatial/temporal management measures to reduce fishing in nursery grounds; limiting days at sea and/or fishing vessels exploiting billfishes. Whilst this comes close to a strategy, the Resolution lacks the tools that enable these catch limits to be implemented (e.g. country allocations are lacking). On that basis, the team concludes that SG100 is not met for these four billfish species.

For albacore, Resolution 13/09 requests the IOTC Scientific Committee to *inter alia* compile, review, discuss and assess the quality of all available data on catches and fishing effort related to albacore fisheries in the IOTC area of competence and, through its IOTC Working Party on Temperate Tunas (WPTmT), to examine the state of albacore stock. The SC should further advise on TRPs and LRPs as well as evaluate potential management options through the Management Strategy Evaluation (MSE) process. The resolution itself does not aim at constraining catches of albacore, although an evaluation of Management Procedures (MPs) for Indian Ocean albacore tuna is being carried out which attempts to simulation-test a full MP, consisting of data collection, a specified mechanism to evaluate stock status and/or trends, and a decision rule (IOTC, 2019c). Here also, the team concludes that there is no full strategy for albacore and 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?	Yellowfin – Yes Bigeye – Yes Minor species – Yes (default)	Yellowfin – Yes Bigeye – Yes Minor species – Yes (default)	Yellowfin – No Bigeye – Yes Minor species – No

Rationale

Yellowfin: Stock projections were carried out by Fu et al. (2017) over a 10 year period (2018–2027) with five levels of catch investigated representing 100% to 60% 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 (2020), 5 years (2022) and 10 years (2027). For the base model, a 20% catch reduction relative to 2015 level would allow the stock to rebuild to be above the SB_{MSY} level at the end of the 10-year projection period with a probability greater than 50%. The reference model indicated up to 30% catch reduction is required for the stock to recover to be above the SB_{MSY} level at the end of the 10-

year projection period with a high probability. 2017 was the first year that the IOTC CPCs were required to implement the agreed catch reductions as per the Rebuilding Plan in which CPCs with catches greater than 5000 t in 2014, should reduce purse seine yellowfin catches by 15% as compared to the reference year of 2014 (in addition to the other measures detailed above). For the EU, this decision resulted in a quota of 77,698 tons of YFT to be shared among EU flagged purse seiners operating in the Indian Ocean (see Council Regulation (EU) 2020/123 of 27 January 2020). This quota is distributed between French, Italian and Spanish purse seiners with France and Italy allocated a sub-quota of 29,501 and 2,515 tonnes, respectively. The PO Orthongel, representing all French tropical tuna purse seine fishing companies operating in the Indian Ocean (as well as the one Italian vessel), was mandated by the French administration (DPMA) to distribute the quota amongst French fishing companies and to monitor the consumption of the quota in real time by the French PS fleet (Maufroy et al., 2017). Since June 2017, a YFT quota management plan has been implemented for this fleet (*Décision n° 15 du 25 juin 2019 relative à la mise en place du plan de gestion du sous-quota d'albacore en Océan Indien pour 2019*), allocating 60% of the French quota to CFTO (i.e. 17,700.6 tonnes) and setting out the means used by the PO to monitor yellowfin catches in real-time and to apply sanctions as appropriate. The distribution of EU quota (and corresponding reductions from 2014 levels are shown in Table 25). Note that prior to the rebuilding plan coming into force, the French fleet had already been in the process of restraining catches by limiting its number of active buoys to 150 (*Décision n°11 du 23 novembre 2011 relative à l'utilisation de dispositifs de concentration de poissons* which is now superseded); this is why the percentge reduction is greater for the Spanish fleet than for the French fleet[5]. Despite the rebuilding plan's relatively recent implementation (since 2017), compliance with the quota by France and Italy has been good, although the quota was overshot by 310 tonnes in 2017, which was deducted from the following year's quota, as shown in Table 26 and Figure 14. Therefore, although an analysis by Rattle (2019) highlighted concerns over inadequate implementation of the rebuilding plan, including potentially by EU vessels, the available data indicate that France, including CFTO, have implemented the measures as required under the Resolution. Furthermore, Orthongel limited the number of active buoys to 300 per vessel before this was in fact a requirement at IOTC and only one supply vessel is in operation for the entire CFTO Indian Ocean purse seine fleet. On this basis, the team concludes that at the UoA level, there is an objective basis for confidence that the strategy will work for yellowfin. SG60 and SG80 are met. Although compliance of the UoA with the yellowfin rebuilding plan has been good, neither the stock assessment, nor the projections appear to sufficiently take into account the increase in FAD fishing over recent years and the associated increase in juvenile yellowfin catches (which lead to a greater number of yellowfin being caught). It therefore cannot be said that the implications of the strategy are fully understood and that there is high confidence that it will work. SG100 is not met.

Table 25. Distribution of EU Indian Ocean yellowfin quota in tonnes (and corresponding reductions from 2014 levels). * In 2014, the purse seiner that is currently under the Italian flag was under the French flag. This allowed this vessel to be protected against piracy by French protection team. From Maufroy and Goujon (2019)**.**

EU PS fleet	Quota	% Reduction / 2014
France	29 501	- 12%
Italy	2 515	*
Spain	45 682	- 21%
Total	77 698	- 15 %

[5] However the number of permitted active buoys per vessel was subsequently increased to 300 as a result of the YFT rebuilding plan which requires fisheries to rely more on FAD catches than free-school catches as explained in Section 6.3.

Table 26. French and Italian quotas in 2017, 2018 and 2019. Quotas are adjusted to take into account the overshooting of the French quota in 2017 (payback in 2018) and transfers of quota between France and Italy. ** French and Italian PS vessels being part of the same Producer Organization, quota transfers are facilitated and can be adjusted using real-time estimates of the quota consumption. From Maufroy and Goujon (2019)

EU PS fleet	Year	Payback	Transfer	Quota
France**	2017	0	+ 150	29 651
Italy**	2017	0	- 150	2 365
France	2018	- 310	- 75	29 116
Italy	2018	0	+ 75	2 590

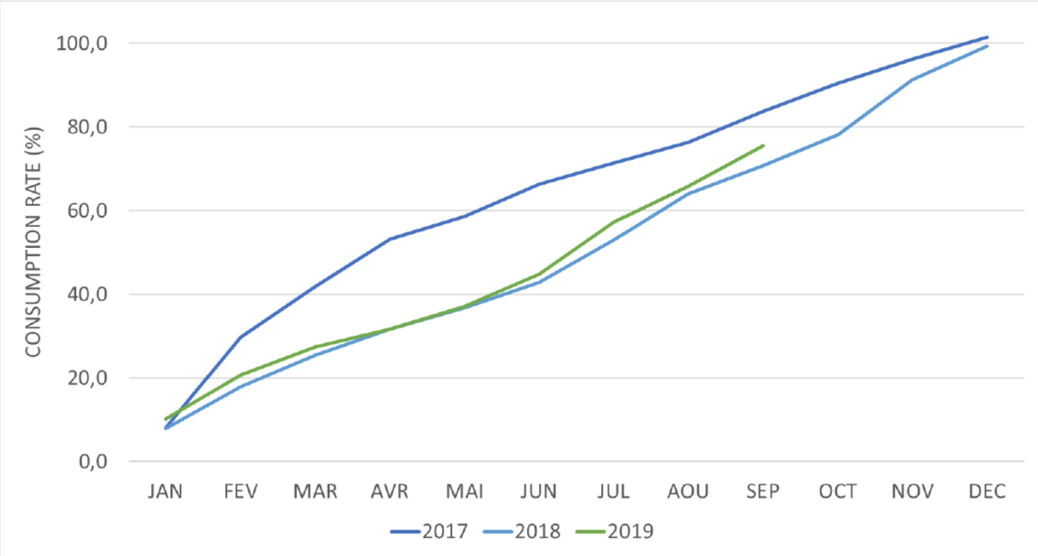

Figure 14. Consumption of the YFT quota by French and Italian purse seiners of the Indian Ocean over 2017-2019. In 2017: T3 estimates. In 2018 and 2019: cross validation of operational information. From Maufroy and Goujon (2019).

Bigeye: 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 SB_{2015} for the entire projection period. The bigeye catch for 2017 was 90,050 t (IOTC, 2018c) or 3% less than the 2015 level (Langley, 2016). On this basis, SG60, SG80 and SG100 are met.

Minor species were scored using the all or nothing approach. Note that SG60 and SG80 apply to main species only so this is met by default for the minor species. Given that a number of the minor species (black marlin, striped marlin) are likely to be overfished with overfishing occurring, there is no high degree of confidence that the partial strategies are working. SG100 is not met for the minor 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?		Yellowfin – Yes Bigeye – Yes Minor species – Yes (default)	Yellowfin – Yes Bigeye – No Minor species – No

Rationale

For yellowfin, the rationale in scoring issue b explains how there is clear evidence that the strategy is being implemented successfully at the UoA level and is achieving its overall objective as set out in scoring issue a. SG80 and SG100 are met.

For bigeye, Resolution 05/01 aims to implement a reduction in catches of bigeye across all fishing gears. As is evident from the data presented in scoring issue b, the overall catch of Indian Ocean bigeye is decreasing, providing some evidence that the strategy is being implemented successfully. SG80 is met. SG100 is not met because the Resolution has been in place since 2005 and catches have clearly not been decreasing continuously since then (Figure 4 in Langley (2016)).

Minor species were scored using the all or nothing approach. Note that SG80 applies to main species only so this is met by default for the minor species. Given that a number of the minor species (black marlin, striped marlin) are likely to be overfished with overfishing occurring, and that there are no country allocations enabling the implementation of the catch limit, there is no clear evidence that the partial strategies are working. SG100 is not met for the minor 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?	N/a	N/a	N/a

Rationale

No primary species are sharks (Table 13, Table 14 and Table 15). Not relevant.

e	Review of alternative measures			
	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 primary 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 primary 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 primary species, and they are implemented, as appropriate.
	Met?	Main species – N/a Minor species – Yes (default)	Main species – N/a Minor species – Yes (default)	Main species – N/a Minor species – No

Rationale

The vast majority of primary species are retained for sale, as evidenced by the observer data which shows that discarding rates are very low (Section 6.3.6.2). For yellowfin retention rates were between 98.3% and 99.9% of the observed catch (on-board observers and EMS combined). For bigeye this was between 99.9% (on-board observers) and 100% (EMS). Note that there is also a discard ban in place at IOTC level, with Resolution 19/05 requiring all purse seine vessels to retain on board and then land all bigeye tuna, skipjack tuna, and yellowfin tuna caught, except fish considered unfit for human consumption. There is therefore no unwanted catch of main primary species and this scoring issue is not applicable for the main species. As SG60 and SG80 apply to main species only, these are met by default for the minor species. According to the observer data, there is, however, unwanted catch of the minor primary species. In the absence of a biennial review to address these, SG100 is not met for the minor species.

References

Fu et al. (2017), IOTC (2018b, 2018c), Langley (2016), Rattle (2019), Fu (2019), Langley (2016), Maufroy et al. (2017) and Maufroy and Goujon (2019)

IOTC-SC (2019)

IOTC Resolutions 05-01; 19-01; 19-02

Council Regulation (EU) 2020/123 of 27 January 2020 fixing for 2020 the fishing opportunities for certain fish stocks and groups of fish stocks, applicable in Union waters and, for Union fishing vessels, in certain non-Union waters

Orthongel Decisions: http://orthongel.fr/index.php?page=gouvernance/reglt

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

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

Yellowfin	95
Bigeye	85
Minor species (N = 5)	80
Overall Performance Indicator score	85
Condition number (if relevant)	N/a

Scoring table 9. 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 (bigeye and yellowfin)	Yes (bigeye and yellowfin)	No

Rationale

For yellowfin and bigeye, between 98.3% and 100% of the observed catch is landed (see Section 6.3.6.2); logbook data (at 100% coverage) therefore provide quantitative information on the UoA's impact with respect to main primary species which are validated and corrected by the IRD on the basis of unloading data (see Section 6.3.6.1). The stock assessments (Langley, 2016; Fu et al., 2017; Fu, 2019) further enable the impact of the UoA with respect to status to status. SG60 and SG80 are met. However, as noted by IOTC (IOTC, 2018d), changes introduced in the statistical methodologies used by the French purse-seine fleet to estimate species composition for 2018 (this is the T3 methodology discussed in Section 6.3.6.2), resulted in figures largely contrasting with other segments of the Indian Ocean purse seine fleet: this specific issue was discussed during the 21st Session of the WPTT and – while no revision to the catch figures was officially introduced – the WPTT agreed on using revised catch levels for stock assessment and management purposes. To date, no official revision for the species composition of catches reported by the EU purse-seine fishery in 2018 was received by the IOTC Secretariat. For this reason, the team concludes that there is no high degree of certainty and 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

For the minor species, the logbook data are not validated, and these are therefore likely to suffer from estimation error (Section 6.3.6.1). Observer coverage in this fishery is good, however, at 77% in 2018 for all programmes combined (Table 17). Although there are difficulties with quantifying commercial billfishes through EM (see Section 6.3.6.5), the extrapolations of the available on-board observer data (Table 15) provide confidence in the estimated UoA impact on the stocks concerned. On that basis, 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?	Main species – Yes (bigeye and yellowfin) Minor species – Yes (default)	Main species – Yes (bigeye and yellowfin) Minor species – Yes (default)	Main species – Yes (bigeye and yellowfin) Minor species – No

Rationale

The information provided through the logbooks and observer programmes is adequate to support the strategies that are in place for both main primary species (see above and see 2.1.2). This combined with the aforementioned analyses at UoA level (see scoring issue 2.1.2b) means that it can be evaluated with a high degree of certainty that the strategies are achieving their objective. SG60, SG80 and SG100 are met for the main species. For the minor species, given that full strategies are lacking, in particular the tools that enable successful implementation of the catch limits, it cannot be evaluated with a high degree of certainty whether the strategies are achieving their objective. SG100 is not met for the minor species.

References

Fu et al. (2017) and Langley (2016)

UoA logbook data: Section 6.3.6.1

UoA observer data: Section 6.3.6.2

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

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

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

Yellowfin	90
Bigeye	90
Minor species (N = 5)	90
Overall Performance Indicator score	90
Condition number (if relevant)	N/a

Scoring table 10. 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?	N/a	N/a	N/a

Rationale

No main secondary species were identified (Section 6.3.6 and 6.5.2). This scoring issue is not relevant.

In relation to unobserved mortality caused by entanglement in FADs (whether they are active, lost or abandoned), the team took into account the fact that the UoA makes use of 'sausage nets', i.e. lower entanglement risk FADs, although it is moving towards full implementation of netting-free FADs with ropes, i.e. non-entangling FADs (Section 6.3), and concluded that unobserved mortality through entanglement at the scale of the UoA was highly unlikely to be a significant factor in the fishery's interactions with secondary species to the extent that this will have stock-level effects.

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

Rationale

There is a long list of minor secondary species (see Table 13, Table 14 and Table 15) and they have not been evaluated individually. Using an all or nothing approach, this scoring issue is therefore not met.

References

UoA logbook data: Section 6.3.6.1

UoA observer data: Section 6.3.6.2

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

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

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

Overall Performance Indicator score	80
Condition number (if relevant)	N/a

Scoring table 11. 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 (default)	Yes (default)	No

Rationale

In the absence of main secondary species, SG60 and SG80 are met by default. The majority of secondary species identified in Table 13, Table 14 and Table 15 however are not managed. 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/species).	There is some objective basis for confidence that the measures/partial strategy will work, based on some information directly about the UoA and/or species involved.	Testing supports high confidence that the partial strategy/strategy will work, based on information directly about the UoA and/or species involved.
	Met?	Yes (default)	Yes (default)	No

Rationale

As above, SG60 and SG80 are met by default. The majority of secondary species have no management associated with them, which can therefore also not have been tested. 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 (default)	No

Rationale

For the same reasoning given in scoring issue b, SG80 are met by default, 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	No

Rationale

Shark finning is not permitted under either EU legislation (Regulation (EU) No 605/2013) or company policy (*Décision n°8 du 15 janvier 1997 engageant les armements à améliorer leur sélectivité et embarquer des observateurs et interdisant le découpage des ailerons en mer avec rejet des carcasses ainsi que leur commercialisation*), although a 5% fin to body ratio is permitted under IOTC regulations (Resolution 17/05). Although the fleet reached 77% observer coverage in 2018, this was through a combination of on-board observers and EMS. As EMS is not a formal part of the monitoring, control and surveillance system, the team did not take this coverage rate into account in the scoring of this issue. On-board observer coverage was 15% in 2018. This is not a random sample since all the trips were on the Torre Giulia, but it seems reasonable to assume that all the vessels operate in a similar way. This, combined with the lack of UoA infractions in relation to shark finning, the fact that no shark finning incidences were recorded by either on-board observers or EMS, the management policies in place and the Orthongel and ISSF training programmes, together with the UoA vessels' listing on the ISSF

ProActive Vessel Register[6], makes it highly likely that shark finning is not taking place. SG60 and SG80 are met. The on-board observer coverage is, however, not sufficiently comprehensive to provide a high degree of certainty. SG100 is not 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 (default)	Yes (default)	No

Rationale

In the absence of main secondary species, SG60 and SG80 are met by default. Not all minor secondary species are desirable, and as far as the team are aware there is no biennial review of alternative measures to minimise these catches. SG100 is not met.

References

UoA logbook data: Section 6.3.6.1

UoA observer data: Section 6.3.6.2

Regulation (EU) No 605/2013 of the European Parliament and of the Council of 12 June 2013 amending Council Regulation (EC) No 1185/2003 on the removal of fins of sharks on board vessels.

Resolution 17/05 On the conservation of sharks caught in association with fisheries managed by IOTC

[6] The ISSF PVR (https://iss-foundation.org/glossary/proactive-vessel-register/) is a third-party audited scheme which verifies individual vessels' compliance with ISSF policies including on shark finning, i.e. there needs to be an established and published company policy prohibiting shark finning AND no known recent shark finning incidences.

https://iss-foundation.org/glossary/proactive-vessel-register/

Orthongel Décision n°8 du 15 janvier 1997 engageant les armements à améliorer leur sélectivité et embarquer des observateurs et interdisant le découpage des ailerons en mer avec rejet des carcasses ainsi que leur commercialisation

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

Draft scoring range	< 60 (scoring not complete)
Information gap indicator	Information not sufficient to score PI: site visit interviews to be carried out to inform on likelihood of shark finning.

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

Overall Performance Indicator score	80
Condition number (if relevant)	N/a

Scoring table 12. 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

For the secondary species, the logbook data are not validated, and these are therefore likely to suffer from estimation error (Section 6.3.6.1). Observer coverage in this fishery is good, however, at 77% in 2018 for all programmes combined (Table 17), providing confidence in the estimated UoA impact on the stocks concerned, despite the fact that most secondary species do not have stock assessments. In terms of the risk of entanglement to ETP species, the risk posed by deteriorating sausage nets at the scale of the UoA remains sufficiently low so that it remains highly likely that the UoA does not have stock-level effects on secondary species. Murua et al. (2014) state that '*This kind of tied-netting design was initially envisaged by scientists as an intermediate step towards non-entangling FADs that greatly reduces entanglement, with a low incidence of ghost fishing reported only if the bundles become untied*'. As no main secondary species were identified, 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

Although catches of secondary species are recorded in logbook and observer data (see PI 2.1.3 and Sections 6.3.6.1 and 6.3.6.2), the majority of the secondary species identified have no stock assessments. The UoAs impacts on those species/stocks with respect to status can therefore not be estimated. 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 (default)	Yes (default)	No

Rationale

In the absence of main secondary species, SG60 and SG80 are met by default. In the absence of a strategy to manage all secondary species, SG100 is not met.

References

UoA logbook data: Section 6.3.6.1

UoA observer data: Section 6.3.6.2

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

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

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

Overall Performance Indicator score	85
Condition number (if relevant)	N/a

Scoring table 13. 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?	N/a	N/a	N/a

Rationale

ETP species are discussed in Section 6.5.4 and include the following:

- Elasmobranchs: 7 species
- Sea turtles: 4 species
- Cetaceans: 2 species

Formal 'limits' (national or international) which trigger management action are not in place for any of these species groups. This scoring issue was therefore not scored.

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?	Yes	Yes	No

Rationale

Elasmobranchs

Within the elasmobranch group, catches of oceanic whitetip shark and silky shark dominated the bycatch of other elasmobranch species which consists of rays (*Mobula* spp. and giant manta ray), hammerhead sharks and whale shark.

Oceanic whitetip: The average annual scaled up catch according to 2014 – 2018 observer data amounts to 27 tonnes / year for the human observers. Electronic monitoring (EMS) recorded significantly fewer interactions at 3 tonnes per year; however Briand et al. (2018) stated that EMS underestimated the occurrence and volume of shark bycatch compared to regular observers. Only the higher value was therefore taken into consideration. There is no quantitative stock assessment and limited basic fishery indicators currently available for oceanic whitetip sharks in the Indian Ocean. The ecological risk assessment (ERA) conducted for the Indian Ocean by the WPEB and SC in 2012 (Murua et al., 2012) estimated this species as being the most vulnerable shark species to purse seine gear, as it was characterised as having a relatively low productive rate, and high susceptibility to the gear. In an updated assessment, however, this species was ranked at a lower level of vulnerability because of its lower post-capture mortality (PCM) after the implementation of safe release best practices in the purse seine fleet in 2014 (Murua et al., 2018). Average reported IOTC catch for 2013-2017 was 230t although this is likely to be an underestimate (i.e. total estimated catches may be approximately 20 times higher than that declared in the IOTC database) and most of the catches are made with gillnets and longlines (IOTC, 2018e). Based on the scaled-up observer data, the UoA accounts for *ca*. 12% of the 230t IOTC annual estimate. However, this assumes 100% PCM which is also likely to be an overestimate for the UoA - Murua et al. (2018) applied 30% PCM for this species in their ERA, based on implementation of best practices release techniques by the EU purse seine fleet. Furthermore, as part of the POREMO project (see discussion under 2.3.2e), post-release survival of this species has been estimated at 91.7%, based on data from 12 tags deployed on French and Spanish purse seiners (Bach et al., 2019). The actual UoA impact compared to other fisheries in the region is therefore likely to be significantly lower. Overall, the team considered that the direct effects of the UoA are highly likely to not hinder recovery of oceanic whitetip shark. SG60 and SG80 are met. In the absence of population estimates for this species, there is no high degree of certainty and SG100 is not met.

Silky shark: The average annual scaled up catch according to 2014-2018 observer data amounts to 148 tonnes / year (for the on-board observers). Electronic monitoring (EMS) recorded fewer interactions at 73 t/year; however the same argument applies as for oceanic whitetip above, in that EMS is likely to underestimate the occurrence and volume of shark bycatch compared to regular observers. Only the higher value was therefore taken into consideration. Although this species remains amongst those most at risk to purse seine fisheries (due to a higher susceptibility to the gear), Murua et al. (2018) also reduced the silky shark's vulnerability rating because of likely lower PCM (estimated at 55%) due to implementation of best practices. Using data from the French and Spanish tropical tuna purse seine fishery, Diallo et al. (2019) derived an abundance trend for this species, based on its associative behaviour with floating objects. Two models were used, describing the dynamics of sharks associated to floating objects (FOBs) in a social and in a non-social case. The relative abundance indices were derived for the Seychelles area and the Mozambique Channel. For both areas, 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. The authors suggest that these increases could be a result of a combination of factors that took place as from 2010 (e.g. introduction of non-entangling FADs, Chagos MPA, shift of fishing effort due to piracy, Maldivian shark fishing ban), but stress that this abundance index is not a population estimate, which means that the observed upward trends should not be interpreted as an indication of a healthy population (Diallo et al., 2019). The average 2013-2017 reported IOTC catch of silky shark is 2,967 tonnes, which is likely to be an underestimate and total estimated catches may be approximately 10 times higher than declared in the IOTC database (IOTC, 2018f).

Based on human observer data, the UoA is estimated to contribute *ca*. 5% of this 2,967t estimate. Note that this estimate assumes 100% PCM, which, according to Murua et al. (2018) is unlikely to be the case for EU purse seine fisheries which employ best practice handling and release practices. Even taking into account these more precautionary estimates, the team concludes that the direct effects of the UoA are highly likely to not hinder recovery of silky sharks. SG60 and SG80 are met. In the absence of population estimates for this species, there is no high degree of certainty and SG100 is not met.

Hammerhead sharks: Only one individual hammerhead was recorded in the human observer data (discarded alive), leading to a scaled up annual estimate of 0.6 t/year. Murua et al. (2018) considered this group of species to have low susceptibility to purse seine gear. Overall, taking into account the low observed catches of this species by the UoA, the team concludes that the direct effects of the UoA are highly likely to not hinder recovery of hammerhead sharks. SG60 and SG80 are met. In the absence of species-specific catch records or population estimates, or more comprehensive and reliable observer coverage, there is no high degree of certainty and SG100 is not met.

Rays: Only observed catches of spinetail mobula (*Mobula japonica*) were scaled up as interactions with the other two species (Chilean devil ray - *Mobula tarapacana*, and giant manta - *Manta birostris*) were considered too sporadic to be scaled up. The scaled-up estimate for *M. japonica* amounted to 3t / year, again assuming 100% PCM. Garcia and Herrera (2018) estimated the overall catch for mantas and devil rays across all IOTC fisheries at 10,480 tonnes. On this basis, the direct effects of the UoA are highly likely to not hinder recovery of these ETP species. SG60 and SG80 are met. In the absence of population estimates for any of these species, there is no high degree of certainty and SG100 is not met.

Whale shark: In total, 7 encounters were observed between 2014 - 2018 with EMS and by human observers. All but one was released alive. A tagging study of 5 whale sharks by Escalle et al. (2014) showed that PCM in purse seine fisheries may be low, with 4 individuals surviving for at least 21 days after being encircled. While this study was clearly very limited in scale, impacts on this species are further limited by IOTC Res. 13-05 which prohibits vessels from intentionally setting a purse seine net around a whale shark, if it is sighted prior to the commencement of the set, and that safe release practices should be adhered to in the case a whale shark is unintentionally captured. Overall, the team concluded that the rate of encounters with this species was sufficiently low so that direct effects of the UoA are highly likely to not hinder recovery of whale sharks. SG60 and SG80 are met. In the absence of population estimates for this species, there is no high degree of certainty and SG100 is not met.

<u>Sea turtles</u>

22 sea turtles (across all species) were recorded in the UoA observer data over the 2014 – 18 period. The team were cautious in scaling up the data (given that encounters are infrequent) but did so on a precautionary basis and to estimate the magnitude of UoA impact on the species concerned. The scaling up exercise is summarised in Table 27. Each dataset (stemming from electronic and human observer coverage) was scaled up to 100% coverage separately, so the results are not cumulative across both observer datasets – the impact assessment for each species is instead based on the worst case scenario (i.e. either based on electronic or human observer data). All but one of the individuals encountered were released alive. A sea turtle drowning in purse seine gear is rare but occurs if an animal is entangled for a prolonged period of time and/or is unable to reach the surface to breathe. It is possible that a turtle lifted out of the water while entangled can fall and be injured or could be killed by passing through the power block. More often, a turtle found alive in purse seine gear can be gently released over the side of a vessel (Zollett and Swimmer, 2019), with best practice handling and release practices, as employed by the UoA, further increasing the chances of survival.

An Ecological Risk Assessment of sea turtles overlapping with fisheries in the IOTC region estimated that ~3,500 and ~250 marine turtles are caught annually by longline and purse seine vessels, respectively, with an estimated 75% of turtles released alive (Nel et al., 2013). The same study suggests (with caution) that 1,000 – 2,500 hard-shelled turtles, and < 1,000 leatherback turtles are caught per annum in the IOTC region (Nel et al., 2013).

The fishery under assessment overlaps with the five Regional Management Units (RMUs) (Wallace et al., 2010) listed in Table 28 (for the latest map, see this link: http://seamap.env.duke.edu/swot). According to Nel et al. (2013), species with small RMUs (e.g. the loggerhead and leatherback RMUs below) are among the most vulnerable to fishing pressures (Nel et al., 2013). All species have nesting sites in proximity of the UoA area which suggests that interactions with adult nesting females may occur which would have a more severe impact at RMU level than interactions with juveniles or males. However, applying the more precautionary estimates by Nel et al. (2013) to the average annual scaled up data in Table 27, the team estimates that the UoA fishery may contribute to *ca*. 2% of hard-shelled turtle bycatch and 0.1% of leatherback bycatch in the IOTC area. These estimates remain low even when compared to the more localised nesting population data reported by Shanker (2004) (Table 28), which, although not up to date, provides some context to the likely locations and orders of magnitude of nesting populations. Overall, it is therefore highly likely that the direct effects of the UoA do not hinder recovery of sea turtle species concerned. SG60 and SG80 are met. In the absence of accurate population estimates for any of these species, and given the relatively small population size estimates, there is no high degree of certainty and SG100 is not met.

Table 27. UoA sea turtle encounters scaled up at fleet level based on human or on-board and electronic observer coverage separately (see Table 14 and Table 15 for source data).

Species	Observed encounters 2014-2018 (# ind.)	Scaled up estimate 2014-2018 (# ind.)	Average annual scaled estimate (# ind.)
Leatherback	Electronic: 3	Electronic: 6	Electronic: 1
Green turtle	Human: 5	Human: 51	Human: 10
Loggerhead	Human: 3	Human: 34	Human: 7
Olive ridley	Human: 1 Electronic: 2	Human: 7 Electronic: 8	Human: 2 Electronic: 2
Unidentified	Human: 1 Electronic: 7	Human: 7 Electronic: 16	Human: 2 Electronic: 3

Table 28. Sea turtle Regional Management Units (RMUs) and known nesting sites that overlap with the fishery under assessment (from Wallace et al. (2010) **and http://seamap.env.duke.edu/swot). A summary of Indian Ocean nesting data from** Shanker (2004) **is also provided.**

Species	Common name	Overlapping RMU	Known nesting sites in proximity of UoA area (from SWOT website)	Indian Ocean nesting summary from Shanker (2004)
Caretta caretta	Loggerhead	Southwest Indian Ocean (RMU28)	Southern Madagascar, Southern Mozambique, Northern South Africa	The largest nesting population in the Indian Ocean occurs in Oman with 30 000 nests a year, believed to be the largest aggregation of this

Species	Common name	Overlapping RMU	Known nesting sites in proximity of UoA area (from SWOT website)	Indian Ocean nesting summary from Shanker (2004)
				species in the world. Smaller nesting aggregations with 100 to 1 000 nesting females annually occur in Tongaland (South Africa), Mozambique, Madagascar, the Arabian Sea coast (Oman) and the Halaniyat Islands (Oman) (Ross, 1982). A small population of loggerheads also nests in Sri Lanka.
Chelonia mydas	Green turtle	Southwest Indian Ocean (RMU44)	Islands and coastlines throughout UoA area	Most widely distributed species, with regionally important populations occurring in Indonesia (10 000–20 000 clutches per year), Malaysia (up to 10 000 nests per year), Peninsular Malaysia (2 000–3 000 nests/ year), the Tawi-Tawi Turtle Islands, Philippines (10 000–20 000 nests/year), Myanmar (~ 500 nests per year), Thailand (200–300 clutches/year) and possibly a similar number on the Andaman sea coast (Chantrapornsyl, 1993). Green turtles also nest in Pakistan (~ 1 000 nests a year) Gujarat, India, Lakshadweep (< 1 000 nests/year) and the Andaman and Nicobar Islands (>1 000 nests/year), Sri Lanka and the Maldives. In Viet Nam, the total nesting population is likely to be around 250 females/year. There are extensive green turtle populations in Madagascar and in the oceanic islands including Seychelles, Mauritius and other small islands, potentially numbering 5 000 nesting females. Large nesting grounds are also located at Ras Al Hadd (Oman) (7 000 females a year) and Makulla (Yemen) (10 000 females a year), and several small nesting grounds are found in the region.
Dermochelys coriacea	Leatherback	Southwest Indian Ocean (RMU54)	Southern Mozambique, Northern South Africa	Major nesting IO nesting sites are in Indonesia (~7000 clutches per year), Andaman and Nicobar Islands and Godavaya, Sri Lanka (~300 clutches per year). A small leatherback population (about 100 females/year) also nests in Natal, South Africa.
Eretmochelys imbricata	Hawksbill	Southwest Indian Ocean (RMU18)	Islands and coastlines to the north of UoA area	In Malaysia, 400–600 hawksbill nests are deposited each year in the Sabah Turtle Islands, and 200–300 nests are produced every year in Melaka (Peninsula Malaysia). Nesting in Indonesia is higher, with a total of 1 000–2 000 nests per year. In the Indian subcontinent, hawksbill nesting is restricted to Lakshadweep and the Andaman and Nicobar Islands. Seychelles has the largest population of nesting hawksbills in the western Indian Ocean with about 1 000–2 000 nesting females annually. The Chagos Archipelago has about 300–700 nesting females, while 600–800 nest annually in the Sultanate of

Species	Common name	Overlapping RMU	Known nesting sites in proximity of UoA area (from SWOT website)	Indian Ocean nesting summary from Shanker (2004)
				Oman, 100–500 in Saudi Arabia, the former People's Democratic Republic of Yemen and Sudan and up to 1 000 in Iran.
Lepidochelys olivacea	Olive Ridley	Western Indian Ocean (RMU08)	Mozambique	Olive ridleys nest in Pakistan, the east and west coasts of mainland India and Sri Lanka, Bangladesh, Myanmar and Andaman and Nicobar Islands, and small populations are found in Viet Nam, Malaysia and Australia. Important sporadic nesting occurs in Tamil Nadu, with around 4 000 nests a year), Andhra Pradesh, with up to 10 000 nests a year and Andaman and Nicobar Islands with over 1 000 nests a year. The single most important breeding area is Orissa on the east coast of India, which has three mass nesting beaches where more than 100 000 turtles nest during arribadas at Gahirmatha and tens of thousands nest at the other sites during single mass nesting events over the course of five to seven days. This species is mostly absent in Southeast Asia. Myanmar and Brunei record activity exceeding 300 nests a year and Indonesia, Malaysia, Vietnam and Thailand have fewer than 50 nests a year. In the Western Indian Ocean, olive ridleys nest on the east coast of Africa, particularly Mozambique and in Oman.

Cetaceans

According to the available data, only four individuals were observed to interact with the UoA between 2014 and 2018. Here also, the data were not scaled up. The interactions concerned 2 individuals of baleen whales (both released alive) and two spectacled porpoises (discarded in unknown condition). A rough estimation by Anderson (2014) suggests that in excess of 60,000 small cetaceans might be taken as bycatch each year by Western Indian Ocean fisheries. In purse seine fisheries, most cetaceans do not regularly associate with FADs and the major potential cetacean interactions are with free-school sets. Overall, the team considered that the levels of interactions reported for the UoA, even considered at fleet level, are highly likely to not hinder recovery of these ETP species. SG60 and SG80 are met. The level of observer coverage is insufficient however, and particularly so for the free-school sets, to determine this with a high degree of certainty. SG100 is not met.

All ETP species

The team also considered the risk of entanglement of ETP species in FAD netting, whether the FADs are active, lost or abandoned. The risk of entanglement of in particular sharks and turtles is well documented for FADs using open curtain nets – for example Filmalter et al. (2013) estimated that entanglement mortality of silky sharks in the Indian Ocean was 5–10 times that of the known bycatch of this species from the region's purse-seine fleet. As a result of this and other studies, IOTC has from 2014 required the gradual implementation of non-entangling FADs, which is now required in full through Resolution 19/02 (Annex V):

1. The surface structure of the FAD shall not be covered, or only covered with non-meshed material

2. If a sub-surface component is used, it shall not be made from netting but from non-meshed materials such as ropes or canvas sheets.

In their FAD management plan, France have prohibited fishing and support vessels to launch a FAD that is not designed to reduce to zero the risk of turtle and shark entanglement (IOTC, 2019d). The implications of this were seen in data collected under the FAD Watch programme in the Seychelles, where none of the FADs that used curtain nets (the most likely to cause entanglement) were identified as belonging to French flagged vessels or companies (Balderson and Martin, 2015). Orthongel also have a PO-wide policy to ban entangling FADs (see *Décision n°11 du 23 novembre 2011 relative à l'utilisation de dispositifs de concentration de poissons*). The use of rolled up fishing nets (sausage nets) was previously considered to be best practice as they significantly reduced the rate of entanglement of sharks and turtles, and this FAD design was consequently adopted by CFTO. The risk remains, however, that these sausage nets may unravel over time, especially when FADs are lost or abandoned and subsequently get caught on coral reef, severing the ropes that keep the sausage net rolled up. When this happens the FAD is no longer a 'non-entangling' device (Balderson and Martin, 2015). As a result, ISSF have issued guidelines that call for the removal of all netting from FAD design, with FADs that use sausage nets considered 'lower entanglement risk FADs' (ISSF, 2019). In response, CFTO is moving towards full implementation of of netting-free FADs with ropes, i.e. non-entangling FADs (Section 6.3). For the moment, however, the team's analysis is based on the assumption that FADs in this fishery are of the 'less-entangling' sausage net type.

In terms of the risk of entanglement to ETP species, the team concludes that the risk posed by deteriorating sausage nets at the scale of the UoA remains sufficiently low so that it remains highly likely that the UoA does not hinder recovery of ETP species. Murua et al. (2014) state that '*This kind of tied-netting design was initially envisaged by scientists as an intermediate step towards non-entangling FADs that greatly reduces entanglement, with a low incidence of ghost fishing reported only if the bundles become untied'*. The team's conclusion is further supported by the UoA's ongoing efforts to use biodegradable materials in its FAD designs (both through the EU project BIOFAD and privately, through the CAT DCP BIO - Table 11) and its adoption of non-entangling FAD designs as explained in Section 6.3. The UoA is further limited in its fishing effort in terms of the number of active FAD buoys (300 per vessel, in line with Orthongel policy and IOTC Resolution 19-02), yellowfin quota (see PI 2.1.2) and use of a single supply vessel for its entire fleet. All of this contributes to restraining the UoA's impact overall, so that it is highly likely that the direct effects of the fishery do not hinder recovery of ETP species. SG60 and SG80 are met. SG100 is not met because truly non-entangling FADs have yet to be fully implemented in the fishery.

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?		Yes	No

Rationale

Potential indirect effects for the ETP species considered above may include reduced availability of prey items due to their removal by the UoA; disturbance of nesting / roosting behaviour. ETP species habitat modification induced by the UoA may be relevant to FAD sets and is further discussion under the Habitat Component (2.4).

Removal of prey:

Sharks are opportunistic feeders with a varied diet consisting a range of teleosts including barracuda, jacks, dolphinfish, tuna, skipjack and other scombrids, white marlin, and squid, and occasionally stingrays, seabirds, turtles, marine gastropods, crustaceans, carrion from marine mammals, and garbage (Compagno, 1984 in Bonfil et al. (2008)). Although they are apex predators, the diversity of prey items makes it highly unlikely that the UoA fishery, through its exploitation of mainly skipjack, yellowfin and bigeye, would lead to unacceptable impacts on any of the ETP shark species through competition.

Giant manta rays and whale sharks are planktivorous; *Mobula* rays feed on small fish and zooplankton; the diet of sea turtles is restricted to algae, grasses and seaweeds, invertebrates and small fish; baleen whales are planktivorous and although the spectacled porpoise does feed on fish (as well as squid), large tunas are an unlikely prey item – indirect effects from the UoA through prey removal is highly unlikely.

Disturbance of nesting / roosting behaviour:

The UoA fishery takes place far from any land masses – see Figure 1 for exclusion areas – and is therefore highly unlikely to disrupt any feeding/nesting grounds to the extent that there would be unacceptable impacts on the species involved.

Overall, indirect effects have been considered and the UoA is considered highly likely to not create unacceptable impacts on the ETP species identified. SG80 is met. There has been no dedicated research exploring likely indirect effects by the UoA and as such, SG100 is not met.

References

Anderson (2014), Bach et al. (n.d.), Bonfil et al. (2008), Garcia and Herrera (2018), IOTC (2018e), Murua et al. (2018), Murua et al. (2012), Nel et al. (2013), Wallace et al. (2010), Balderson and Martin (2015), Diallo et al. (2019), Escalle et al. (2014), Filmalter et al. (2013), IOTC (2018f, 2019d), Shanker (2004), Zollett and Swimmer (2019)

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

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

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

Overall Performance Indicator score	80
Condition number (if relevant)	N/a

Scoring table 14. 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?	Yes	Yes	No

Rationale

MSC definitions:

A "**strategy**" represents 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 fishing practices in the light of the identification of unacceptable impacts.

A "**comprehensive strategy**" (applicable only for ETP component) is a complete and tested strategy made up of linked monitoring, analyses, and management measures and responses.

An explanation of the ETP species management measures in place at IOTC and UoA level has been provided in Section 6.5.2 and these are summarized below.

The following management measures apply to **ETP species in general**:

- Prior to 2020, the FAD designs consisted of sausage nets which are considered by ISSF as 'lower entanglement risk FADs' (ISSF, 2019); however, the UoA continues to make efforts to improve FAD design through its participation in past (MADE, CECOFAD) and current projects (BIOFAD, and DCP BIO - Table 11) and has adopted non-entangling FAD designs used rope (rather than netting) as explained in Section 6.3. At the start of this assessment, both lower entanglement risk FADs and non-entangling FADs were in use by the UoA. From 2021, the client fleet has committed to only using non-entangling FAD designs;
- The UoA fishery has in place a good practice guide (http://www.orthongel.fr/index.php?page=durabilite/gbp) which is a result of the Orthongel funded CAT 'Requins' and the project 'MADE'. In relation to ETP species, the guide focuses on best practice for the safe release of sea turtles and sharks, use of non-entangling FADs, avoiding seabird bycatch, limiting impacts on dolphins and obtaining dolphin-safe certification, and a prohibition on shark finning;
- The Indian Ocean French FAD management plan (drafted in response to IOTC Resolution 18/08 – see IOTC (2019d)), includes measures to mitigate the effects of FADs on the environment by increasing selectivity to minimize the taking of juveniles and non-target bycatch such as sharks and sea turtles, and through the use of non-entangling FADs with associated workshops, and development of biodegradable FADs (as part of the ongoing project BIOFAD – see IOTC resolution 18/04 ON BIOFAD experimental project);
- Resolution 15/01 on the recording of catch and effort data by fishing vessels in the IOTC area of competence requires all UoA vessels to record all catches of (or interactions with) ETP species, including sea turtles, sharks and marine mammals. Discards of sharks should also be recorded; and,
- Resolution 15/02 on the mandatory statistical reporting requirements for IOTC CPCs which sets out the IOTC country reporting requirements for ETP and non-ETP species catches and interactions.

The Client Group further has in place a training programme for the training of captains and crews in ETP bycatch good handling practices. The programme includes:

- During 2012 – 2013 training sessions in good practices were run by the CFTO in the framework of the CAT selectivity (Section 6.3.4.1)
- Participation of captains in ISSF working groups organized regularly in Concarneau
- On-board display of good handling practices for accessory species
- The ISSF Skippers' Guidebook to Sustainable Purse Seine Fishing Practices - 3rd Edition" in on board the boats

Finally, all CFTO vessels in the Indian Ocean, with the exception of the TALENDUIC, are equipped with a discard conveyor belt which allows for the fast release of accessory species and ETP species (if not released prior to hauling).

For **sea turtles** in particular, IOTC Resolution 12/04 on the conservation of marine turtles calls on CPCs to:

- Collect (including through logbooks and observer programmes) and provide to the IOTC Secretariat, 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;

- 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;

- Report to the Commission in the annual implementation report, in accordance with Article X of the IOTC Agreement, their progress of implementation of the FAO Guidelines and this Resolution; and,

- 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.

For purse seine vessels, CPCs must:

- Ensure that operators of such vessels avoid encirclement of marine turtles, and if a marine turtle is encircled or entangled, take practicable measures to safely release the turtle in accordance with the handling guidelines in the IOTC Marine Turtle Identification Cards; 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 such vessels to adopt FAD designs that reduce the incidence of entanglement of marine turtles according to international standards; and,
- Require that operators of such vessels record all incidents involving marine turtles during fishing operations in their logbooks and report such incidents to the appropriate authorities of the CPC.

These measures constitute a strategy, albeit not a comprehensive one as per the definition above. **SG60 and SG80 are met for sea turtles but not SG100.**

For **sharks**, IOTC Resolution 17/05 on the conservation of sharks caught in association with IOTC fisheries requires *inter alia*:

- CPCs to take the necessary measures to require that their fishermen fully utilise their entire catches of sharks, with the exception of species prohibited by the IOTC. Full utilisation 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. For sharks landed as fresh, the removal of fins is forbidden. For sharks landed frozen, a 5% fin to body ratio is permitted. However, CPCs are encouraged to consider to progressively implement the ban on shark finning to all shark landings;
- In fisheries in which sharks are unwanted species, CPCs shall, to the extent possible, 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;
- CPCs shall report data for catches of sharks in accordance with Resolution 15/02, including all available historical data, estimates and life status of discards (dead or alive) and size frequencies;

- CPCs shall undertake research to a) identify ways to make fishing gears more selective, where appropriate; b) improve knowledge on key biological/ecological parameters, life-history and behavioural traits, migration patterns of key shark species; c) identify key shark mating, pupping and nursery areas; and d) improve handling practices for live sharks to maximise post-release survival; and,
- Finally, IOTC Resolution 13/06 on a scientific and management framework on the conservation of shark species caught in association with IOTC managed fisheries, prohibits retention onboard, transhipping, landing or storing any part or whole carcass of oceanic whitetip sharks.

Species-specific non-retention regulations, as they apply to the UoA, are further in place for oceanic whitetip shark (IOTC Res. 13-06), silky shark (TAAF Arrete 2020-25 of 5 Mars 2020), hammerhead sharks (TAAF Arrete 2020-25 of 5 Mars 2020) and whale sharks (IOTC Res. 13-05).

At UoA level, there is also the *Décision n°12 du 23 novembre 2011 relative à la préservation des requins*, which promotes and enables safe handling and release practices to increase post-release survivability of sharks, and collaboration with scientific tagging programmes; the *Décision n°8 du 15 janvier 1997 engageant les armements à améliorer leur sélectivité et embarquer des observateurs et interdisant le découpage des ailerons en mer avec rejet des carcasses ainsi que leur commercialisation* prohibits shark finning. With regards to sharks, the Orthongel good practice guide was developed following the '*Requins*' and '*Sélectivité*' CAT projects (Table 11, Section 6.3.4.1) in collaboration with research institutes IRD and IFREMER (amongst others).

Overall these measures comprise a strategy to manage shark bycatch in the Indian Ocean and SG60 and SG80 are met. As for sea turtles, this strategy is not comprehensive, in that it is not a complete and tested strategy made up of linked monitoring, analyses, and management measures and responses. SG100 is not met.

Although there are no IOTC measures in place for rays and mantas, these species are all on the EU list of prohibited species as per Council Regulation (EU) 2019/124 of 30 January 2019, to the extent that it applies to all EU fishing vessels (Article 14) and the IOTC area (Section 4). The regulation prohibits the landing of all listed species for conservation purposes and, combined with the application of the ISSF and Orthongel good practice guides, this constitutes a strategy to minimise the UoA impact on rays and mantas. SG60 and SG80 are met. For the same reasons given for the other species groups, SG100 is not met.

Finally, for cetaceans, IOTC Resolution 13/04 prohibits CPC flagged 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 the event that a cetacean is unintentionally encircled in a purse seine net, the master of the vessels shall a) 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 and b) report the incident to the relevant authority of the flag State. The Resolution also requires the use of non-entangling FADs. At UoA level there are also the Décisions Orthongel n°5 (1990) and n°6 (1992) which prohibit the setting of purse seine on either dolphins or cetaceans in general. Overall these measures constitute a strategy to minimise the UoA impact on cetaceans. SG60 and SG80 are met. For the same reasons given for the other species groups, SG100 is not met.

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?	N/a	N/a	N/a

Rationale

There are requirements for the protection and rebuilding of the ETP species concerned, so this scoring issue is not relevant (see FCRv2.0 SA3.11.2).

c	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 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	No

Rationale

According to the UoA observer programme, of which coverage is increasing over time (see Table 17), interaction levels remain within acceptable bounds as explained in 2.3.1. This provides an objective basis for confidence that the various measures at EU, IOTC and PO level, combined with the implementation of best practice release techniques and use of lower-entanglement risk FADs (see scoring issue a), are working. SG60 and SG80 are met. Although there are data on interaction levels and the fate of species upon release, the observer coverage in the fishery, particularly EMS, is not considered optimal for the detected of ETP species encounters (Briand et al., 2018) and data on the different risk levels of lower-entanglements risk FADs and non-entangling FADs are lacking. SG100 is not met.

d	Management strategy implementation			
	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

The same rationale as for scoring issue c above applies. Non-compliance with any of the measures listed above is also not thought to be a problem (see PI 3.2.3). This, combined with ad hoc observations such as by Balderson and Martin (2015) in the context of FAD design, provides some evidence that the strategy is being implemented successfully. Note that these vessels are also listed as fully compliant on the ISSF Proactive Vessel Register which verifies compliance with sustainable practices (including on FAD design) by third-party auditors. SG80 is met. In the absence of more comprehensive observer coverage however, SG100 is not met.

e	Review of alternative measures to minimize 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

Through their Orthongel membership, the Client fishery participates in a range of scientific projects (Table 29) that evaluate the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of ETP species and measures are implemented as appropriate. These initiatives are ongoing and can be considered to be biennial across the range of ETP species in this assessment. SG60, SG80 and SG100 are met.

Table 29. Overview of research projects that evaluate the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of ETP species

Project	Time period	Summary	ETP species affected
DCP BIO	2019 – 2021	Development programme for a biodegradable FAD in 5 stages: 1. Search for existing candidate biodegradable materials with little or no modification, composite materials or treated natural materials, biodegradable plastics or any other product capable of degrading under in situ conditions, without producing particles or polluting compounds; 2. In the event that the solution sought for the development of a biodegradable FAD does not yet exist on the market, search for materials in development and evaluate feasibility; 3. Tests under controlled conditions making it possible to verify the duration of potential degradation and the harmlessness of the degradation products; 4. Construction of prototypes with materials deemed relevant and tests in real conditions by the crews of ORTHONGEL member ships; 5. Assessment of production costs for materials and FAD structures deemed relevant including the costs of production of materials, assembly of biodegradable FADs or transport to the ports of Abidjan (Ivory Coast) and Mahé (Seychelles). The first phase has just been completed with a Breton service provider. http://orthongel.fr/index.php?page=durabilite/cat	All
Optimisation de l'Oeil Electronique (OOE)	2015 - 2018	Improvement of electronic observer data collection on ETP species interactions http://orthongel.fr/index.php?page=durabilite/cat/ooe	All
OCUP (Observateurs Communs Uniques et Permanents)	2013 – ongoing	Improvement of human and electronic observer data collection on ETP species interactions http://orthongel.fr/index.php?page=durabilite/cat/ocup	All
Sélectivité	2013 - 2015	Following the identification of good practices for handling sharks and rays (CAT 'Requins' - see below), models of gloves, tarpaulins and lassos were selected by a working group. Once delivered, the selected equipment was made available to 3	ETP species within

Project	Time period	Summary	ETP species affected
		tuna seiners (one ship per company) for a test phase on board in real conditions. A "Shark" kit was thus created and made available to each tuna purse seiner. This kit includes safety equipment for fishermen (rags, pair of gloves, accessories to grab a shark or ray without injuring it or taking any risk) but also tools / equipment that continue to evolve (parts of net, lifting slings, tarpaulin + slide, shark fork, ...). http://orthongel.fr/index.php?page=durabilite/cat/selectivite	elasmobranchs group
Sélectivité	2013 - 2015	Workshops on construction of non-entangling FADs; System set-up for monitoring and control of development, production and usage of non-entangling FADs; Research and trials into biodegradable materials for the submerged section of FADs http://orthongel.fr/index.php?page=durabilite/cat/selectivite	All
Requins	2010 - 2012	Phase 1: identification of tools and protocols for releasing live sharks such as: - use of a square-shaped piece of net placed near the brailer on which the crew slide the manta rays and large sharks, the net is then winched and positioned above the water to release the animal; - for the handling of small sharks by hand (on the sorting belt), the crew must first of all hold the head of the shark so as not to be bitten by grabbing it behind the gill slits or by the dorsal fin; - the sorting conveyor belt and garbage chute system should be improved to prevent sharks and rays from getting stuck at the end of the belt. Phase 2: assessment of procedures and survival of the sharks released: - estimation of the survival of sharks (markings) under normal fishing conditions: out of 136 sharks caught accidentally during these two trips (the vast majority of silky sharks), 53 were released alive (39%); out of 21 sharks tagged before being released, at least 14 were still alive after ten days (67%); - description of the different maneuvers involved in the capture of elasmobranchs: the chances of survival decreasing over time and depending on the number of manipulations, it is important to intervene as quickly as possible during the capture process while ensuring the safety of crew members; for large individuals, handling is generally carried out on deck and can take several minutes (2 to 4) involving 3 to 4 crew; for small individuals, these are generally returned to the water by the garbage chute; a technique (double pocket) also exists to release whale sharks. Phase 3: crew training and development of good practice guide: http://www.orthongel.fr/docs/publications/GoodpracticesGuide_LDef.pdf Also see Filmalter et al. (2012), Poisson et al. (2011) and Poisson et al. (2014) for publications on post-release survival of silky sharks.	ETP species within elasmobranchs group

Project	Time period	Summary	ETP species affected
		http://orthongel.fr/index.php?page=durabilite/cat/requins	
DCP éco	2010 - 2012	Follow-up of project MADE (see next section) with aim to modify FADs of entire French purse seine tuna fleet to eliminate sea turtle and shark bycatch mortality. As a result, the French fleet only deploys non-entangling FADs (décision ORTHONGEL n°11 du 23 novembre 2011) Phase 1: identity technical solutions to avoid entanglement, based on results from MADE programme Phase 2: testing of non-entangling FADs by crew Phase 3: analysis of results Phase 4: communication and validation of data through IOTC bycatch working group and ISSF (who used the data to contribute to the guide on non-entangling FAD designs) http://orthongel.fr/index.php?page=durabilite/cat/dcpeco	All
INNOV FAD	2018 - 2021	Aims to propose innovative solutions to reduce the impact of FADs on ecosystems. Among other things, it provides for the development of an autonomous buoy that enables sharks and other bycatch species to be observed below the floating devices, a Dispositifs de Concentration de Poissons (DCP) whose trajectory would be controllable in order to avoid problems related to losses and strandings of DCPs and techniques to limit bycatch http://www.umr-marbec.fr/IMG/pdf/innov-fad_fiche_projet_br.pdf	
BIOFAD	2018 - 2019	Aims to test biodegradable materials for the construction of FADs to reduce the risk of pollution and degradation of ecosystems associated with lost FADs. 1,000 prototypes of biodegradable FADs will be launched in the Indian Ocean from April 2018 to April 2019 by French, Spanish, Italian, Mauritian and Seychellois purse seiners. Zudaire et al. (2019)	All
CECOFAD	2014 - 2016	The objectives of CECOFAD were 1) a better definition of the notion of fishing effort associated with FAD fishing, 2) development of CPUE standardization methods that take into account the specificities and trends in fishing practices on FADs and free-schools, and 3) improved knowledge of the impacts of FAD fishing on associated species and ecosystems. This project was continued through the CECOFAD2 project which started in 2018.	All
GAP	2008 - 2011 and	The aim of the GAP project was to "bring fisheries professionals, scientists and policy makers together to work together for sustainable fisheries for the benefit of society". A first phase of the program began in 2008 with collaborative work between scientists and stakeholders of European fisheries to agree on actions to improve fisheries management. The second phase	All

Project	Time period	Summary	ETP species affected
	2011 - 2015	started in 2011 and covered 13 case studies, including the tropical tuna fishery and the sustainable management of FADs. Project partners were ANABAC, AZTI, IRD and ORTHONGEL.	
MADE	2010 - 2012	MADE (Mitigating Adverse Ecological Impacts of Open Ocean Fisheries) was a project covering European open ocean tropical and Mediterranean pelagic fisheries (Spain, France, Portugal, Italy, Greece). The main objective of the project was to develop measures to mitigate adverse impacts of fisheries targeting large pelagic fish in the open ocean: purse seiners using FADs and longliners. Two main categories of mitigation measures were studied: spatial management issues (e.g. closure areas) and technical solutions to reduce by-catch in these fisheries. The main concept of MADE was to follow a multi-disciplinary and comparative approach, combining biological and technological studies with economic analyses in different sites (Indian and Atlantic oceans, Mediterranean Sea), with a particular effort to closely associate fishers from the beginning of this research. High-tech technology and novel approaches were employed (electronic tagging, in situ and in vitro experiments, etc.), and a particular effort was devoted to disseminate results to fishers, tuna commissions, EU DG Fisheries, and scientists. In particular, work was done in collaboration with French and ORTHONGEL armaments to avoid ghost fishing of sharks and turtles in the structure of FADs. https://cordis.europa.eu/project/id/210496	All
POREMO	2017 - ongoing	The POREMO project specifically aims to quantify the post release mortality of the oceanic whitetip shark caught as a bycatch in the EU tuna purse seine and pelagic longline fisheries in order to assess the retention ban measure taken as conservation and management measure (CMM) for this species as specified in the IOTC resolution 13/06.	Oceanic whitetip shark

References

Décision ORTHONGEL n°11 du 23 novembre 2011

http://www.orthongel.fr/index.php?page=durabilite/gbp

IOTC Resolution 18/08, 15/01, 15/02, 12/04, 17/05, 13/06

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

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

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

Overall Performance Indicator score	85
Condition number (if relevant)	N/a

Scoring table 15. PI 2.3.3 – ETP species information

PI 2.3.3	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		
Scoring Issue	SG 60	SG 80	SG 100
a	Information adequacy for assessment of impacts		
Guide post	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.	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.	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.
Met?	Yes	No	No

Rationale

IOTC requires 5% observer coverage for vessels operating in the IOTC convention area, as calculated by the number of operations/sets for each gear type by the fleet of each CPC (Resolution 11/04 on a Regional Observer Scheme). CFTO, through its membership of the PO Orthongel, is making considerable efforts to improve this rate for its own fleet:

- All UoA vessels are EU vessels and 10% observer coverage is assured under the EU Data Collection Framework (DCF). The coverage consists of human observers only (as opposed to electronic monitoring) and is financed by the EU and implemented by the TAAF or IRD, depending on the fishing location.

- OCUP is an industry initiative, set up by Orthongel, and consists of human observers and electronic monitoring (EM). Where possible, human observers are placed on board the vessels; however due to the need for protection crew, many of the boats have insufficient space for an additional observer and this gap is then filled with electronic monitoring. The EM data are analysed by the French company Oceanic Développement and optimized through the project CAT OOE (Section 6.3.4.1).

Since 2015, all trips for which there are no human observers on board are covered by electronic observation. However, due to technical difficulties with camera set-up, not all footage is exploitable, resulting in a lower coverage. The overall observer coverage (across all set types and monitoring methods) was 77% in 2018 and 86% in 2017 (see Section 6.3.6.5 for further detail). At the ACDR stage, the team queried whether observer coverage of free-school sets was sufficient given that the majority of observer data related to FAD sets. However, this is to be expected as the fishery has predominantly fished on FADs from 2017 onwards (as discussed in Section 6.3). Furthermore, additional analysis by the team of observer data and logbook data indicates that 75% and 44% of free school sets (based on skipjack and yellowfin catch) were observed in 2017 and 2018, respectively – this was either through EMS or by on-board observers (see Table 30).

Table 30. Analysis of UoA observer coverage of free-school sets

Year	% free-school in total EMS observed catch (SKJ + YFT)	% free-school in total on-board observed catch (SKJ + YFT)	% observed catch vs uncorrected logbook catch (SKJ + YFT) for free-school sets
2015	15	56	21
2016	27	30	76
2017	19	29	75
2018	6	0	44

While the electronic monitoring provides substantial additional coverage, there remain important quality issues to sort out, as highlighted in Section 6.3.6.3 of this report: *For individual non-target species analyses, however, the EMS was found to significantly underestimate the number of individuals, as for example larger species such as sharks or billfish or species with high commercial value, may be retrieved at several places and may not be recorded by cameras. For specimens handled above deck, the cameras may be too distant from the discard operations or be compromised by backlight, overexposure and/or splashing water for the EMS to register the individuals at the species level.* In fact, for oceanic whitetip sharks and silky sharks in particular, the EM appeared to significantly underestimate UoA interaction levels, as follows (extract from Table 22):

Oceanic whitetip shark (*Carcharhinus longimanus*)	Onboard: 2014-18 scaled up average: 27t/year
	Electronic: 2015-18 scaled up average: 3t/year
Silky shark	Onboard: 2014-18 scaled up average: 148.4t/year
	Electronic: 2015-18 scaled up average: 73.25t/year

Given that the Torre Italia is the only UoA vessel that has sufficient room to board an observer permanently, the reliance of the UoA on electronic monitoring is significant. Although CFTO are already working to improve data quality through the project OCUP, the discrepancies in reported shark interactions suggest there remains room for improvement. While the human observer data enables the UoA-related mortality on ETP species to be estimated (see 2.3.1), the UoA's increased reliance on EM with its acknowledged data quality issues increases the risk for ETP interactions (particularly sharks) to be underestimated. SG80 is therefore not met.

In terms of the risk of entanglement to ETP species, the risk posed by deteriorating sausage nets at the scale of the UoA remains sufficiently low so that it remains highly likely that the UoA does not hinder recovery of ETP species. Murua et al. (2014) state that '*This kind of tied-netting design was initially envisaged by scientists as an intermediate step towards non-entangling FADs that greatly reduces entanglement, with a low incidence of ghost fishing reported only if the bundles become untied*'. For the associated set types, although the observer data provide quantitative data on UoA related observed mortality, impacts related to unobserved mortality (caused by entanglement in dFADs) are estimated based on FAD design (see 2.3.1b). While the client has committed to only using non-entangling FADs from 2020/2021 onwards, independent evidence that this is indeed happening could not be verified by the team. Therefore, although the qualitative information is adequate to estimate the UoA related mortality on ETP species (and SG60 is therefore met), quantitative data on this type of unobserved mortality are lacking. SG80 is not met.

b	Information adequacy for management strategy			
	Guide post	Information is adequate to support measures to manage the impacts on ETP species.	Information is adequate to measure trends and support a strategy to manage impacts on ETP species.	Information is adequate to support a comprehensive strategy to manage impacts, minimize mortality and injury of ETP species, and evaluate with a high degree of certainty whether a strategy is achieving its objectives.
	Met?	Yes	Yes	Yes

Rationale

The observer coverage in this fishery has increased from ~40% in 2015 to 77% in 2018 through a combination of on-board observation and EMS. The available datasets enable trends to be measured and therefore the strategy to manage ETP impacts to be managed. Furthermore, a framework agreement for scientific and technical cooperation has been in existence since 2001 between Orthongel and IRD, facilitating the relations between fishing operators and scientists and the regular supply of fisheries data for research programmes. It is also within this framework that Orthongel participates in various scientific projects focused on improving the understanding of marine ecosystem functioning, and identifying and where necessary mitigating ecosystem impacts by fishing (this is further explained in Section 6.3.4.2). The long history of CAT projects (Section 6.3.4.1), with resulting research (e.g. Filmalter et al. (2012), Filmater et al. (2012), Poisson et al. (2011) and Poisson et al. (2014)) further demonstrates the importance of Orthongel (and therefore CFTO) data availability to scientific advances in the management of ETP species impacts. SG60 and SG80 are met. Although a comprehensive strategy is not in place, the team concludes that the information is available and adequate to support one and to evaluate with a high degree of certainty whether it is achieving its objectives (through for example on-board observer coverage, EM, information on FAD design and FAD buoy monitoring data). SG100 is met.

References

IOTC Resolution 11/04 on a Regional Observer Scheme

UoA observer data (Section 6.3.6)

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

Draft scoring range	60 - 79
Information gap indicator	More information sought on observer coverage for free-school sets

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

Overall Performance Indicator score	70
Condition number (if relevant)	3

Scoring table 16. 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

The purse seine gear in this fishery is strictly pelagic, and therefore the fishing operation itself does not impact on benthic habitats. The gear impact on the water column (considered here as the commonly encountered habitat, in line with MSC interpretation https://mscportal.force.com/interpret/s/article/pelagic-habitats-and-gear-Box-GSA7-1527262009346) is considered negligible. Furthermore, fishing is not permitted within at least 12nm from all coasts (Section 6.3) and the gear is deployed over deep water (over 300m depth according to CFTO) which further reduces the likelihood of interactions with any benthic habitat types. Considering the significant cost of the gear (at over 0.5 million euros), the size of the operation, the make-up and configuration of the gear (with the net attached to two parts of the boat), the loss of the purse seine is considered unlikely. This was discussed with the client during the site visit who confirmed that gear loss is rare, and when it does happen, it only ever concerns part of the gear when there is a net breakage. Even in those instances, however, all efforts are made to recover the gear so the net can be mended onboard. On that basis, the team concludes that 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. SG60, SG80 and SG100 are met.

As discussed in Section 6.3.6.5, FAD fishing forms an important component of this fishery with 93% of sets carried out on FADs in 2018 (Table 18) and impacts may result from the FADs themselves when they become abandoned or lost. Impacts include entanglement of Primary, Secondary or ETP species through ghost fishing (as already discussed under PIs 2.1.1, 2.2.1 and 2.3.1), benthic habitat impacts as the FADs become stranded, particularly on coral reefs (Davies et al., 2017; Zudaire et al., 2018), and localized marine pollution or litter when beached FADs are made of synthetic materials (Zudaire et al., 2018). In the context of this assessment, the team considered the commonly encountered habitat to be the water column which is already assessed in relation to purse seine loss. The consequences of FAD beachings on coral reefs (with associated localised pollution) were therefore considered under VMEs below.

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	No	No

Rationale

As explained in scoring issue a, interactions between the purse seine gear and VMEs are not considered to be an issue as this is a strictly pelagic fishery taking place in deep waters at least 12 nm from any coastline. Furthermore, the nature of the operations is such that any gear loss would be highly unlikely to lead to serious or irreversible harm on VME habitats (see scoring issue a).

For the FAD component of the fishery, however, the risk of lost or abandoned drifting FADs beaching onto coastlines and causing damage to coral reefs VMEs (Habitat type: solid reef of biogenic origin – high relief – large erect biota) has been acknowledged (Maufroy et al., 2015; Davies et al., 2017; DeAlteris et al., 2018; Zudaire et al., 2018; Imzilen et al., 2019). The likelihood of beaching events has been calculated by Davies et al. (2017), Maufroy et al. (2015) and Zudaire et al. (2018) with estimates ranging from 32.3% to 0.5% depending on the estimation method employed (see Section 6.5.5 for detail). It is noted that the Zudaire et al. (2018) study was the only one to combine in-zone buoy track data with actual observations of beaching events, albeit in a limited geographical area. Davies et al. (2017) based their assessment on simulations of trajectories for a subset of 10 GPS buoy deployments only, while the 10% estimate by Maufroy et al. (2015) is based on a predictive model for buoy state using 1,741,000 GPS positions from 9,289 buoys deployed in the Atlantic and Indian Oceans over a 5-year period. Given that the Seychelles coastal zone is particularly exposed to drifting FAD beaching events because of the archipelago's prominent position within the main fishing grounds of the purse seine fleet (Davies et al., 2017), the work done by Zudaire et al. (2018) as part of the FAD Watch programme is particularly relevant. As part of the FAD Watch programme the Island Conservation Society (ICS) found that French and Italian-flagged vessels made up less than 25% of beached FADs in the Seychelles study area (Figure 15), with CFTO accounting for about 1.75 beached FADs per vessel based on the 2015 survey (Figure 16). It is clear that this only provides a small snapshot of the extent of FAD stranding and since this study, the number of FADs deployed by the French fleet has increased as a consequence of a change in fishing strategy to comply with the yellowfin rebuilding plan. Nevertheless, even when taking into account this increase, the team considers it unlikely that at the scale of the UoA, the fishery would reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm. This conclusion is further supported by the fact that 1) the impacts of FADs on coral reefs are highly localised: the top structure of a FAD is typically 2x2m according to client designs with the sausage net or rope up to 15m long but narrow in diameter. Furthermore, once stranded, they are unlikely to move. 2) Coral reefs in the Western Indian Ocean form a relatively well connected network, as demonstrated for example by Gamoyo et al. (2019) who found that reefs at Mafia-

Latham Island (Tanzania), Angoche-Nacala and Pemba-Mucufi (Mozambique), Anjouan and Ngazidja (Comoros), and Glorieuses (France) were the most significant for multigenerational connectivity. On that basis, the team concludes that the UoA is unlikely to lead to reductions in habitat structure and function of coral reef habitat in the region below 80% of the unimpacted level (i.e. 'serious or irreversible harm' as per SA3.13.4.1) and SG60 is met.

Balderson and Martin (2015) found that 37% of dFADs had corals entangled in the structure and 100% of these were using nets as the aggregator. 46% of dFADs using sausage nets (i.e. those used by the UoA) were found with corals entangled in the nets. Although considered as lower-entanglement risk FADs, the risk of entanglement and habitat damage of these FAD types increases as the sausage nets begin to unravel. ISSF (2012) also noted that the problem of drifting FADs encountering islands and coral reefs was much more significant when non-biodegradable materials such as nylon netting and rope are used in the FAD construction. Although work on developing biodegradable FAD materials is ongoing (see further on), the fact remains that nearly all FADs in use today by the UoA are made of synthetic materials.

The Client Fishery's efforts to reduce the likelihood and severity of beaching events are listed in Section 6.5.5 and include *inter alia* limiting the number of FADs deployed, using non-entangling FADs that have a reduced risk of entanglement, participation in the BIOFAD project and trialling of biodegradable FADs. The UoA also participated in the project INNOV FAD which, among other things, provides for the development of a dFAD whose trajectory would be controllable in order to avoid problems related to losses and strandings. Furthermore, the FAD-Watch Programme, for the prevention and mitigation of FAD beaching in the Seychelles is the result of a collaborative work among the Spanish Tuna Purse Seiner fishing representatives (OPAGAC), Island Conservation Society (ICS), Islands Development Company (IDC) and Seychelles Fishing Authority (SFA) (Zudaire et al., 2018). Since June 2019, CFTO (through the Fishery Improvement Project SIOTI) has been participating in this project. Any potential habitat impacts resulting from beaching in this area would be further mitigated by FAD recovery.

In relation to scoring of SG80, the team identified the following issues:

- The number of FADs deployed is currently not well monitored. Although there is a requirement for CPCs to report FAD deployments as part of Resolution 19-01, and monthly buoy declarations are submitted regularly to CFTO, Orthongel and the French administration (DPMA), there is also a wide-spread practice of 'repurposing' other companies' FADs by replacing the buoy (and either discarding or bringing to port the other company's buoy). The exact number of FADs in use by any given fishery is therefore difficult to determine, with the number of active buoys not necessarily being equal to the number of FADs used over time;

- There is no dedicated monitoring system for the tracking of lost or abandoned FADs at the UoA level, and impact studies are currently based on simulations (e.g. Davies et al. (2017), Imzilen et al. (2019b) and Maufroy et al. (2015)) or in-situ observations that are limited in scope (e.g. Balderson and Martin (2015) and Zudaire et al. (2018));

- While of great local importance, the FAD Watch Programme only covers 5 atolls within the Seychelles Archipelago and any monitoring or mitigation programmes elsewhere are at best in their infancy. Coral reefs in the Maldives for example were according to site visit interviews at greatest risk of FAD strandings. Furthermore, at-sea recovery has been trialled by CFTO who reported difficulties in pursuing this further owing to the distances involved and the effort and space required to store FADs onboard the vessels.

- Although of lower-entanglement risk, the FADs in use by the UoA do not fully eliminate the risk of entanglement and VME damage following beaching events, with the use of synthetic materials further increasing the risk of longer-term habitat damage. According to Moreno et al. (2020), until a 100% biodegradable FAD structure is found, a progressive replacement of some plastic components, such as the submerged appendage, would still be a significant step to decrease the FAD impacts on the marine habitat.

The team deduce that there is insufficient certainty to conclude 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. SG80 is not met.

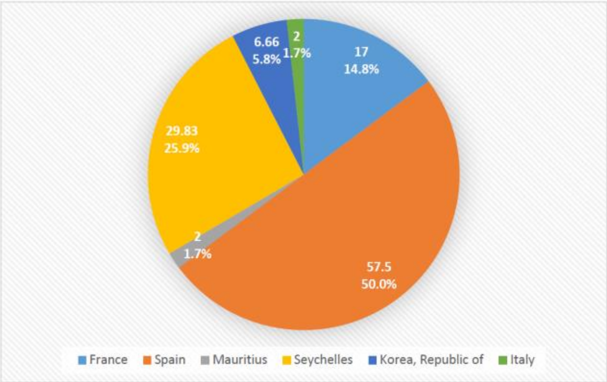

Figure 15. Number of dFADs by flag as surveyed in 2015 by the ICS across the Seychelles. From Balderson and Martin (2015)

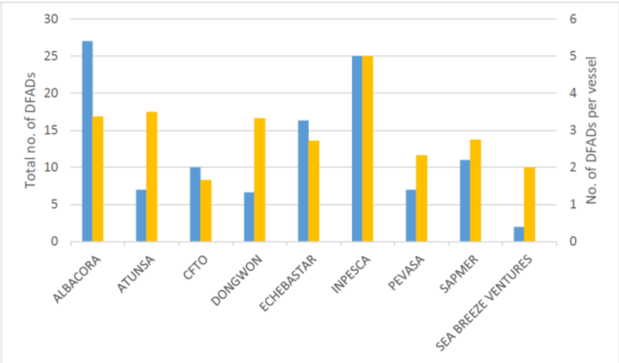

Figure 16. Number of dFADs by parent company as surveyed in 2015 by the ICS across the Seychelles. From Balderson and Martin (2015)

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

In the absence of UoA -specific data on FAD loss and beaching events, it cannot be considered that there is evidence about dFAD impacts on minor habitats. SG100 is not met.

References

Davies et al. (2017), DeAlteris et al. (2018), Imzilen et al. (2019b), Maufroy et al. (2015), Zudaire et al. (2018), Balderson and Martin (2015), Gamoyo et al. (2019), ISSF (2012) and Murua et al. (2014)

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

Draft scoring range	60-79
Information gap indicator	More information sought on trends in the number of FAD deployments over the years, FAD losses, FAD recoveries and any other relevant information pertinent to determining the likelihood and severity of dFAD beaching events with respect to VMEs (coral reefs)

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

Overall Performance Indicator score	70
Condition number (if relevant)	4

Scoring table 17. 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?	Yes	Yes	No

Rationale

The Client fishery's efforts to reduce the likelihood and severity of beaching events are listed in Section 6.5.5 and include:

At IOTC level:

- Resolution 19/02: Procedures on a FAD management plan, including limitation on the number of FAD buoys, FAD markings, specifications of catch reporting from FAD sets, use of non-entangling FAD design, and requirement to annually submit the number of operational buoys followed by vessel, lost and transferred by 1° by 1° grid area and month strata and dFAD type;

- Resolution 11/04: Resolution on a regional observer scheme requiring observer coverage of at least 5% of the number of operations/sets for each gear type by the fleet of each CPC. Through this observer scheme, compliance with the types of FADs deployed is monitored.

- Resolution 03/01: Resolution on the limitation of fishing capacity of contracting parties and cooperating non-contracting parties for CPCs which have more than 50 vessels on the 2003 IOTC Record of Vessels to limit the number of their fishing vessels larger than 24 meters length overall to the number of its fishing vessels registered in 2003.

At French level, the French FAD Management Plan (IOTC, 2019e) includes measures on identification and marking of FADs; registration and tracking of instrumented buoys; recording of FAD activities (deployment, maintenance, removal, fishing, loss of FAD); limit on the number of traceable FADs to 300 per vessel per company and subject to individual IOTC vessel limits; fight against the uncontrolled drift of FADs in sensitive areas (captains and fishing companies will continue to implement all measures to prevent or limit the loss of FADs at sea. The fishing companies agree that the positions of FAD beacons entering areas where the risk of stranding of FADs on coral reefs or of damaging interaction with other activities (e.g. seismic surveys) are communicated to the relevant organizations in order to eliminate or limit to the lowest possible level the associated risks); measures to mitigate the effects of FADs on the environment (increase selectivity to minimize the taking of juveniles and non-target bycatch such as sharks and sea turtles, use of non-entangling FADs with associated workshops, develop biodegradable FADs; limit on the number of support vessels (2 per 5 purse seiners).

At UoA level:

- FAD fishing effort is limited in accordance with the above regulations by employing only one supply vessel for CFTO's entire Indian Ocean purse seine fleet and by limiting the number of dFADs deployed to 300 active FAD buoys per vessel at any given moment. An average of 500 buoys may be purchased per vessel per year (average calculated per company) from 2020. Compliance with this buoy limit is monitored by Orthongel and controlled by DPMA, with the number of buoy deployments reported to IOTC annually (as per IOTC Res. 19-02);
- The UoA has committed to using non-entangling FADs that have a reduced risk of entanglement, as per the French FAD management plan (IOTC, 2019e);
- The UoA participated in the BIOFAD project with trialling of biodegradable FADs and is involved in the CAT DCP BIO (Table 11) to further pursue the development of biodegradable materials for its FAD designs;
- The UoA participates in the project INNOV FAD which, among other things, provides for the development of a dFAD whose trajectory would be controllable in order to avoid problems related to losses and strandings.
- The FAD Watch Programme, for the prevention and mitigation of FAD beachings in the Seychelles is the result of a collaborative work among the Spanish Tuna Purse Seiner fishing representatives (OPAGAC), Island Conservation Society (ICS), Islands Development Company (IDC) and Seychelles Fishing Authority (SFA) (Zudaire et al., 2018). Since June 2019, CFTO (through the Fishery Improvement Project SIOTI) has been participating in this project. Any potential habitat impacts resulting from beaching in this high-risk area would thus be further mitigated by FAD recovery.

According to MSC, *a partial strategy represents a cohesive arrangement which may comprise one or more measures, an 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.* The team considered that combined, these policies and activities constitute a partial strategy which aims to ensure that lost or abandoned dFADs are highly unlikely to cause serious or irreversible harm to commonly encountered habitats or to VMEs. On that basis, SG60 and SG80 are met. It is, however, not a full strategy in the sense that it is not 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*. SG100 is not met.

Note on scoring: SA3.14.2.2 requires that in scoring issue (a) at the SG80 level, the "partial strategy" for a UoA that encounters VMEs shall include, at least, the following points: a. Requirements to comply with management measures to protect VMEs (e.g., designation of closed areas), or b. Implementation by the UoA of precautionary measures to avoid encounters with VMEs, such as scientifically based, gear- and habitat-specific move-on rules or local area closures to avoid potential serious or irreversible harm on VMEs. The team argues that neither move-on rules nor closed areas apply to the issue of lost or abandoned FADs which passively drift with ocean currents and are not under the control of any fishing operators. The risk of a drifting FAD beaching event occurring is determined by the number of drifting FADs in the ocean, the deployment location, dispersal patterns, the extent of efforts to prevent beaching events from occurring and FAD design. The likelihood and severity of beaching events can be mitigated through limiting FAD deployments, simplifying FAD structure, avoiding FAD deployment areas that imply high risk of stranding, using FADs that remain in the fishing area (e.g. FADs with navigation capability, FADs that could be sunk, anchored FADs), recover FADs at sea, and recover FADs from the coast (Davies et al., 2017).

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	No	No

Rationale

As already mentioned, the risk of a drifting FAD beaching event occurring is determined by the number of drifting FADs in the ocean, the deployment location, dispersal patterns, the extent of efforts to prevent beaching events from occurring and FAD design. The likelihood and severity of beaching events can be mitigated through limiting FAD deployments, simplifying FAD structure, avoiding FAD deployment areas that imply high risk of stranding, using FADs that remain in the fishing area (e.g. FADs with navigation capability, FADs that could be sunk, anchored FADs), recover FADs at sea, and recover FADs from the coast (Davies et al., 2017). As has already been explained in scoring issue a and in Section 6.5.5, the Client fishery is implementing or striving towards implementation of a number of these measures as part of their partial strategy, including limiting FAD deployment, changing FAD design towards biodegradable and non-entangling FADs and experimenting with FAD navigation. This, together with existing initiatives aimed at drifting or beached FAD recovery (FAD Watch) provides plausible argument that the partial strategy will work. SG60 is met. It is not clear, however, that the current limits on buoy numbers (300 as per IOTC resolution 19/02) and buoy and FAD deployment monitoring strategies go far enough to ensure an SG80 outcome score for VMEs. Furthermore, the UoA fishery has historically employed lower-entanglement risk FADs rather than fully non-entangling FADs (although it is increasingly using the latter). The development of biodegradable FADs is also encouraged rather than required. Any recovery programmes are also limited in scope and scale (e.g. the FAD Watch programme). The team therefore concludes that an objective basis for confidence that the partial strategy will work is lacking. SG80 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

The use of lower-entanglement risk FADs is monitored via the Client fishery's independent observer programme. Adherence to the 300 FAD buoys per vessel limit is also controlled. Many 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)), providing some quantitative evidence that the partial strategy is being implemented successfully. SG80 is met. However, clear evidence that these are reaching the objective of reduced dFAD beaching likelihood and severity is currently lacking. 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	Yes

Rationale

There are several protected areas in the western Indian Ocean some of which have been designated for the protection of coral reef habitat. Purse seine fishing is excluded from these areas, as shown in Figure 1. Compliance with these marine protected areas (MPAs) is verified on a continual basis by the authorities involved via VMS data. As discussed under Principle 3, UoA compliance with regulations, including spatial restrictions is good, providing 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. SG60, SG80 and SG100 are met.

References

Davies et al. (2017), DeAlteris et al. (2018), Zudaire et al. (2019) and Zudaire et al. (2018)

BIOFAD (https://www.iotc.org/documents/biofad-project)

INNOV FAD (http://www.umr-marbec.fr/IMG/pdf/innov-fad_fiche_projet_br.pdf)

IOTC (2019e)

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

Draft scoring range	60-79
Information gap indicator	More information sought on compliance with coral reef MPAs

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

Overall Performance Indicator score	75
Condition number (if relevant)	5

Scoring table 18. PI 2.4.3 – Habitats information

PI 2.4.3		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		
Scoring Issue		SG 60	SG 80	SG 100
a	Information quality			
	Guide post	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.	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.	The distribution of all habitats is known over their range, with particular attention to the occurrence of vulnerable habitats.
	Met?	Yes	Yes	No

Rationale

Coral reefs in the western Indian Ocean are extensively studied and monitored. The Global Coral Reef Monitoring Network (GCRMN) in particular contributed to the Coral reef status reports for the Western Indian Ocean, the most recent of which was published in 2017 (Obura et al., 2017). The report documents quantitative trends for Western Indian Ocean reef corals, fleshy algae and fishes based on data from 822 reef locations from 1992 to 2016, covering 9 countries of the Western Indian Ocean. These studies are also being supplemented with remote sensing techniques, e.g., via the Millennium Coral Reef Mapping Project which contributed to the map shown in Figure 17. The team therefore concludes that the nature, distribution and vulnerability of coral reefs in the UoA area are known at a level of detail sufficient to the scale and intensity of the UoA. SG80 is met. At the scale of the Western Indian Ocean, however, it is difficult to ascertain that the distribution of all habitats is known. SG100 is not met.

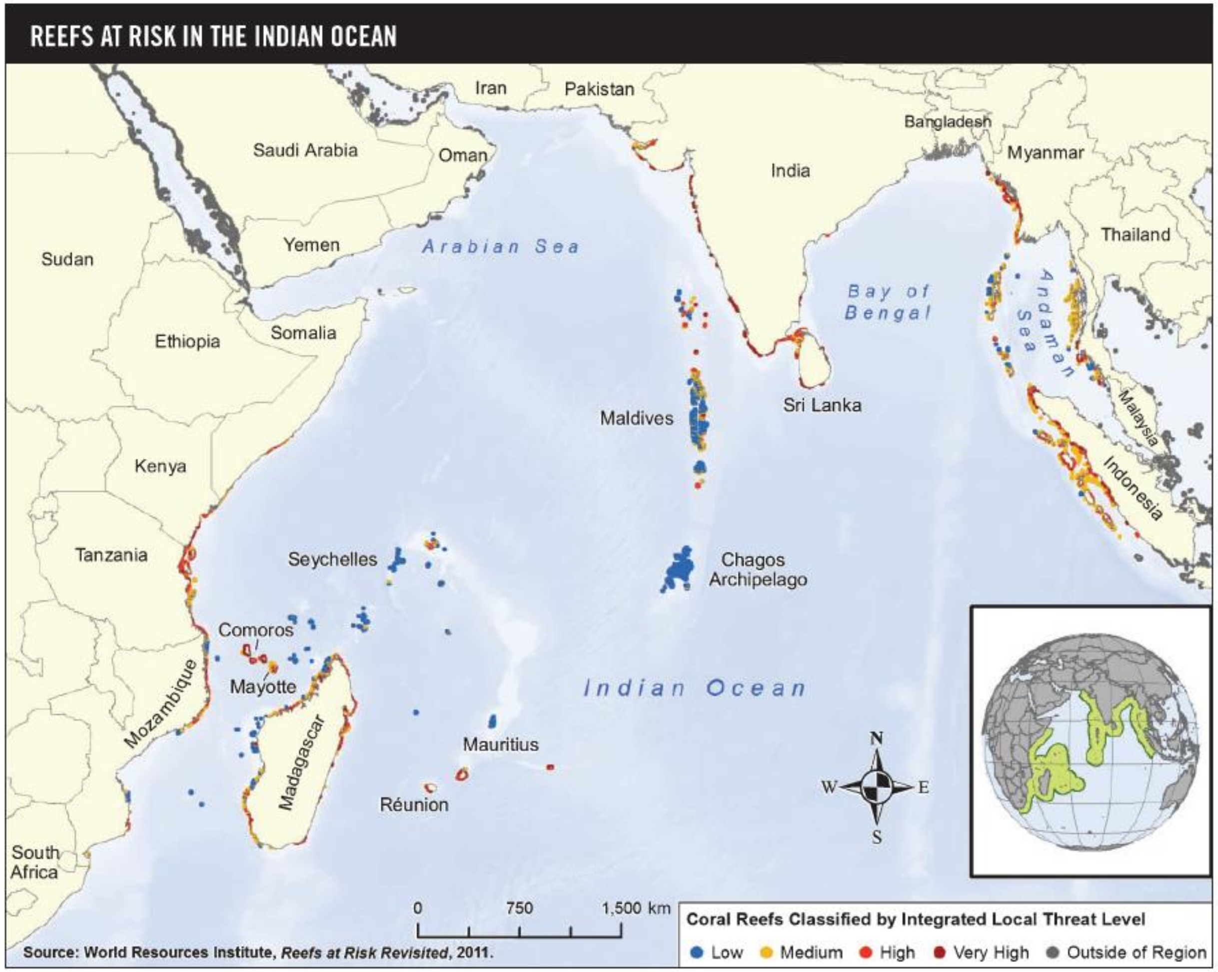

Figure 17. Distribution of coral reefs in the Indian Ocean, with level of local threats indicated. Created by Burke et al. (2011) in Wilson and Kirkendale (2016)**.**

b	Information adequacy for assessment of impacts

	Guide post	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.	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 and spatial attributes of the main habitats.	The physical impacts of the gear on all habitats have been quantified fully.
	Met?	Yes	No	No

Rationale

Modelling, simulations and in-situ observations of drifting FAD beaching events in the Western Indian Ocean provide a broad understanding of the most likely coastal zones to be impacted and how these beaching events may affect coral reef habitat (e.g. Davies et al. (2017), Imzilen et al. (2019b), Maufroy et al. (2015) and Zudaire et al. (2018)). SG60 is met. There is, however, a lack of understanding about the exact scale of the problem for the UoA (i.e. how many FADs are lost, how many of those beach and in turn how many of those impact on coral reef habitat and in which areas). SG80 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?		Yes	No

Rationale

The status of coral reef habitat in the western Indian Ocean is monitored over time (see Obura et al. (2017)). For the UoA, any increased risk of FAD beaching would be most likely related to an increase in fishing effort (i.e., increased deployment of FADs) which is closely monitored by the Client fishery with all buoy data transmitted to IRD as well as Orthongel and the French administration (DPMA). Overall, this information is considered adequate to detect any increase in risk to the main habitats affected (i.e. coral reefs). SG80 is met. However, changes in distribution and status are not measured for all habitats. SG100 is not met.

References

Davies et al. (2017), Imzilen et al. (2019b), Maufroy et al. (2015), Obura et al. (2017), Wilson and Kirkendale (2016) and Zudaire et al. (2018)

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

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

Overall Performance Indicator score	75
Condition number (if relevant)	6

Scoring table 19. 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

To score this PI, the assessment team considered the ecosystem-level impacts of the tuna fishery itself; i.e., any ecosystem impacts caused by the removal by the UoA of skipjack, yellowfin and bigeye (the main target species), and ecosystem-level impacts associated with the use of FADs which are dominant in the Client fishery (at 93% of sets in 2018 - Table 18). These are the ecosystem elements for this component.

Ecosystem effect of removals

Skipjack, yellowfin and bigeye, the main target species in this fishery are high-trophic level species and considered second-tier apex predators below sharks, swordfish, marlin and billfish. Tunas are perceived as very effective generalists as they are opportunistic carnivores with high degrees of trophic interaction and diet overlap (Kitchell et al., 1999). There is, however, a growing body of evidence that exploitation by tuna fisheries creates substantial and sustained changes in both the target populations and a diversity of other species in the affected ecosystems (Botsford et al. 1997, Fogarty and Murawski 1998, Jennings et al. 1999, Stevens et al. 2000, Jackson et al. 2001 - all cited in Schindler et al. (2002)). Amongst these changes, trophic cascades are among the best-known examples, involving strong predator effects propagating downwards through food webs resulting in inverse patterns in abundance across two or more trophic links and potential simplification of oceanic systems through the removal of functional groups (Baum and Worm, 2009). Harvesting will also almost inevitably lead to changes in the age and size structure of populations, with a large change in the size structure of top predators also potentially having ecosystem ramifications since diet and size range of prey may vary with size (Polacheck, 2006). Trophic structure, together with top predator size structure, were therefore considered as the key ecosystem elements in this assessment (as per SA3.16.3). However, at least for bigeye and yellowfin, estimates of the size distribution of the catch taken by the longline fisheries in the Indian Ocean exist since the beginning of these fisheries. While there are uncertainties in these estimates which are difficult to quantify (particularly for the early years), the estimates do not suggest that there has been a substantial change in the size distribution of the catches reflecting major impacts on functional trophic relationships (Polacheck, 2006). Any fishing activity will potentially have ecosystem effects and the magnitude of the ecosystem effects will depend both on the functional role of the fish being harvested and the magnitude of the removals from the system (Polacheck, 2006). In this context it is important to consider that none of the main target species in this fishery are currently below (or near) the PRI, as discussed in Principle 1 and the Primary species component. Current total removals for the Indian Ocean are in excess of 800,000 mt, with the UoA itself accounting for *ca*. 5% of the total estimated removals of skipjack and yellowfin; for bigeye this is *ca*. 3%. At the scale of the UoA, it is therefore highly unlikely that the fishery under assessment would disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm.

Ecosystem effects associated with use of FADs

When an animal settles preferentially in a habitat within which it does poorly relative to other available habitats, it is said to have been caught in an "ecological trap" (Robertson and Hutto, 2006). Because tropical tunas are known to aggregate around floating objects, it has been suggested that the large number dFADs deployed by purse seiners could act as an 'ecological trap'. This hypothesis states that these networks of drifting FADs could take fish to areas where they would not normally go or retain them in places that they would otherwise leave (Dagorn et al., 2010). If FADs drive the associated fauna to biologically poor areas (a change in their migration routes), this could have detrimental effects on their biology. This hypothesis is mainly based on the idea that FADs occupy areas where natural FADs such as logs are not found (Dagorn et al., 2013). In this context it is important to consider that the deployment of FADs could modify the oceanic environment in two ways. First, FADs can be deployed in or drift into areas where there previously were no logs (i.e. naturally occurring floating objects that were already part of the habitat). In this way FADs can create new areas with floating objects. Second, FAD deployment can increase the number of floating objects in areas that already had logs (Dagorn et al., 2013) with fish aggregations already occurring naturally. In this latter scenario, there would likely be limited changes to natural migration patterns which goes against the ecological trap hypothesis. Dagorn et al. (2013) carried out a comparison of the distributions and numbers of logs and FADs in the Indian Ocean. The authors found that at a spatial scale larger than quadrats of 2° by 2°, there were no areas occupied by FADs but free of logs, whereas the study did find that FADs increased the number of floating objects in any given area. Therefore, should FADs indeed drive tunas to less suitable environments, this would occur at scales smaller than 2° by 2. Tunas are known to travel long distances and their habitat largely exceeds 2° by 2° areas. Therefore, one could consider that the ecological consequences of tunas being driven to areas where they would not have been, at the scale of 2° by 2°, are minor (Dagorn et al., 2013). While research into this topic is clearly still ongoing, it is also important to consider any potential impacts at the scale of the UoA. The UoA has clear measures in place to limit the number of FAD deployments which are more precautionary than IOTC requirements (at 300 vs 350 FAD active buoys per vessel; see IOTC Res. 18-01 and 18-08). The relatively small scale of the CFTO fleet (eight purse seiners with one supply vessel, out of a total of 239 purse seiners operating in the Indian Ocean[7]) further limits the scale of UoA impacts. On this basis, the team concludes that at UoA level, irreversible ecosystem impacts related to the redistribution of tunas to biologically less favourable areas are highly unlikely.

Overall, SG80 is met. However, because there is no clear evidence on ecosystem-level impacts caused by fish removals or FAD deployments, SG100 is not met.

[7] According to IOTC database https://www.iotc.org/vessels/current (last accessed 18 May 2020).

References

Dagorn et al. (2013), Dagorn et al. (2010), Kitchell et al. (1999), Baum and Worm (2009), Polacheck (2006), Robertson and Hutto (2006) and Schindler et al. (2002)

https://www.iotc.org/vessels/current

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

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

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

Overall Performance Indicator score	80
Condition number (if relevant)	N/a

Scoring table 20. 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

The geographical area of the UoA fishery is widespread with multiple levels of management, all of which contribute to ecosystem-based management in the Indian Ocean and to some extent to restraining the impact of the UoA on the ecosystem. Management measures are presented in more detail in Section 6.5.2 but the most pertinent ones are summarized here:

At IOTC level

Procedures on a FAD management plan are set out in IOTC Resolution 18/08, requiring a limitation on the number of FADs, 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. In accordance with this resolution, a FAD Management Plan was drafted and is applicable to all tuna seiners registered in a French port and operating in the waters of the Indian Ocean. It also applies to support vessels flying the French flag and used in the tropical tuna seine fishery. The management plan covers only drifting FADs (as opposed to anchored FADs). The plan has three objectives:

- Improve knowledge on FAD fishing activities;
- Limit FAD deployment; and
- Reduce potential ecosystem impacts of FADs.

A ban on discards of bigeye tuna, skipjack tuna and yellowfin tuna caught by purse seine vessels in the IOTC area of competence is in effect (Resolution 17/05). 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.

Requirements for the recording of catch and effort data by fishing vessels in the IOTC area of competence are set out in Resolution 15/01.

IOTC Resolution 11/04 on a regional observer scheme requires observer coverage of at least 5 % of the number of operations/sets for each gear type by the fleet of each CPC. Note that the Client fishery goes above and beyond this requirement through its own initiatives as a member of Orthongel (OCUP) as well as through collaborations with the EU, the TAAF and IRD (see Section 6.3.6.2 for detail).

IOTC Resolution 03/01 on the limitation of fishing capacity requires CPCs which have more than 50 vessels on the 2003 IOTC Record of Vessels to limit the number of their fishing vessels larger than 24 meters length overall to the number of its fishing vessels registered in 2003.

At company level, by abiding with the Orthongel ‘Decisions’, CFTO has committed to

- Promote and enable safe handling and release practices to increase post-release survivability of sharks, collaborate with scientific tagging programmes;
- Implement a ban on the use of entangling FADs;
- Carry out trimestral monitoring of the number of FADs used with limits on the number of active FADs used and purchased as per the FAD management plan. Note that since 2007, CFTO transmits all buoy data (positions and echosounder data) to the IRD to allow the use of these data for scientific purposes;
- implement a ban on shark finning and rapid return to sea of any live bycatch (note this measure goes further than IOTC Resolution 17/05 which prohibits the removal of shark fins on board fresh tuna vessels but limits freezer vessels to a 5% fin to body ratio); and
- Implement a ban on dolphin-associated purse seine sets and prohibition of any activity that may deliberately endanger dolphins or other cetaceans.

These measures are all part of the Orthongel Code of good practice in force since 2015 (http://www.orthongel.fr/index.php?page=durabilite/gbp) which also includes provisions on

- Limiting discarding and maximizing value of non-target commercial species; and
- Waste management plan and compliance with MARPOL (covering non-organic waste as well as pollutants, anti-fouling and cleaning products used in the Orthongel fleet)

CFTO also participates in ongoing initiatives to explore innovative ways to further reduce ecosystem impacts, for example through participation in BIOFAD (development of non-entangling, biodegradable FADs) and INNOV FAD (development of FADs with navigational ability), as well as through its regular participation in ISSF workshops.

At transboundary, non-RFMO level:

The Global Environment Facility (GEF) and its Implementing Agencies[8] have supported a suite of projects within the Western Indian Ocean region in order to develop an effective management and governance strategy for the Western Indian Ocean Large Marine Ecosystems. These include:

- Addressing Land-Based Activities in the Western Indian Ocean (WIO-LaB), implemented by the United Nations Environment Programme. This Project aims at addressing the impacts and related issues from land-based activities on the Western Indian Ocean Large Marine Ecosystems;

- The Southwest Indian Ocean Fisheries Project (SWIOFP), implemented by the World Bank. This Project is dealing with the offshore and nearshore commercial fisheries issues related to the South Western Indian Ocean Large Marine Ecosystems;

- The Agulhas and Somali Current Large Marine Ecosystems Project (ASCLME), implemented by the United Nations Development Programme. This Project is addressing all other coastal and oceanic activities including offshore ecosystem assessment, coastal livelihoods and community engagement, coastal artisanal and subsistence fisheries, larval transport, marine pollution and marine invasive species.

- The SAPPHIRE project (2017 – 2023) builds on the above projects with an overall objective to achieve effective long-term ecosystem management in the Western Indian Ocean LMEs through five components:

- Component 1: Supporting Policy Harmonization and Management Reforms towards improved ocean governance.
- Component 2: Stress Reduction through Community Engagement and Empowerment in Sustainable Resources Management.
- Component 3: Stress Reduction through Private Sector/Industry Commitment to transformations in their operations and management practices
- Component 4: Delivering best practices and lessons through innovative ocean governance demonstration
- Component 5: Capacity Development to Realize improved ocean governance in the WIO region

At national level

The UoA fishery takes place in the EU, Seychelles, Mauritius, TAAF EEZs as well as the High Seas. Each of these EEZs have some form of ecosystem-based management integrated within their national policies – for example at EU level, this is through the EU Common Fisheries Policy. In June 2013, The *Maurice Ile Durable* (MID) Policy and Strategy Action Plan was formulated with an aim to steer the sustainable development in Mauritius. The plan outlines four priority programmes within the country, namely energy conservation and renewables; cleaner, greener and pollution free Mauritius; green economy; and ocean economy. In relation to the latter, the Mauritian Government

[8] https://www.thegef.org/partners/gef-agencies

has recognised the importance of formulating a national policy on the sustainable management and use of ocean and marine resources, as well as of adopting an ecosystem-based approach to fisheries. In line with its MID vision, Mauritius has made the "Blue Economy" a pillar of its economic development strategy, creating an Oceans Economy Roadmap, which aims to sustainably coordinate the use of resources. Mauritius has also been advancing marine spatial planning (MSP) in key maritime sectors including fisheries and has set up an MSP Coordinating Committee, bringing together all the relevant stakeholders to support the development of a holistic plan including for conservation of the marine ecosystem (aligned with the implementation of the Sustainable Development Goals (SDGs)). The Seychelles have followed a similar trajectory, with its Blue Economy Roadmap approved by the Government of Seychelles in 2018, and the Seychelles Marine Spatial Plan Initiative which began in 2014 and focused on planning for and management of the sustainable and long-term use and health of the Seychelles EEZ. The MSP is led by government in collaboration with The Nature Conservancy (TNC). Finally, in TAAF waters, *Arrêté* 2020-25 of 5 mars 2020 sets out a series of measures for fisheries all of which contribute to sustainable exploitation of marine resources in the TAAF EEZ (see Section 6.5.2.5)

Finally, there are several spatial restrictions to the purse seine fishery in the Western Indian Ocean which are implemented through various national jurisdictions (see Figure 1), including:

- British Indian Ocean Territory (BIOT): no take marine reserve;
- Exclusion of 12 nm from all coasts;
- Exclusion of 20 nm from the coast of Madagascar and the Boating and Castor Banks;
- Exclusion of 12 nm from the coasts of the scattered islands (Îles Éparses – Glorioso, Juan de Nova, Bassas da India, Europa, Tromelin) and 10 nm from the center of the Geyser Reef lagoon;
- Exclusion of 24 nm from the coast of Mayotte;
- Exclusion zones of Seychelles: Mahé Island and Seychelles, Platte, Coetivy, Fortune, Amirantes, Alphonse, Province, Farquhar and St Pierre and the sorcerer Reef, Cosmoledo and Astove, Aldabra and the islands of the Assumption;
- Somali piracy has enormously modified fishing in the Western IO since ~2007 (Kaplan et al., 2014), with the EEZ acting as a *de facto* closed area to the UoA; and
- The IOTC instituted a large, 1-month annual closure east of Somalia from 2010.

Overall, the team considered that these measures constitute a partial strategy aimed at constraining the impact of the UoA on the ecosystem. SG60 and SG80 are met. In the absence of a plan which contains measures to address all main impacts of the UoA on the ecosystem, 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/ ecosystems).	There is some objective basis for confidence that the measures/ partial strategy will work, based on some information directly about the UoA and/or the ecosystem involved.	Testing supports high confidence that the partial strategy/ strategy will work, based on information directly about the UoA and/or ecosystem involved.
	Met?	Yes	Yes	No

Rationale

Many of the measures implemented at IOTC and UoA level are science-based, i.e. stemming from stock assessments, scientific working groups and associated analyses or more industry-driven initiatives such as those listed in Section 6.3.4 with the support of government bodies or independent research providers such as the IRD, resulting in peer reviewed literature (Table 11). This provides some objective basis for confidence that they will work. SG60 and SG80 are met. They have not all been necessarily tested however so SG100 is likely 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

Compliance with IOTC measures is monitored via the Client fishery's independent observer programme which also verifies compliance with the best practice guide mentioned in scoring issue a (IOTC Compliance Committee report and associated documents). Compliance with other IOTC measures (such as FAD limits etc) is reported on in annual reports (IOTC-CoC, 2019). 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 implementation of GEF projects is also subject to regular review and evaluation by independent experts. Overall, there is some evidence that the partial strategy is being implemented successfully. SG80 is met. However, clear evidence that the partial strategy is reaching its objective of limiting ecosystem-level impacts is currently lacking. SG100 is not met.

References

IOTC Resolution 18/08, 19/05, 15/01, 11/04, 03/01

Orthongel ‘Décisions’

Orthongel Code of good practice (http://www.orthongel.fr/index.php?page=durabilite/gbp)

BIOFAD (https://www.iotc.org/documents/biofad-project)

INNOV FAD (http://www.umr-marbec.fr/IMG/pdf/innov-fad_fiche_projet_br.pdf)

IOTC-CoC, 2019 (https://www.iotc.org/meetings/16th-session-compliance-committee)

The Western Indian Ocean Large Marine Ecosystems SAPPHIRE: https://nairobiconvention.org/CHM%20Documents/SAPPHIRE/Project%20Info/Revised_SAPPHIRE_ProDoc_English.pdf

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

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

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

Overall Performance Indicator score	80
Condition number (if relevant)	N/a

Scoring table 21. 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

The information available to the ecosystem component at Indian Ocean level is discussed annually at the IOTC Working Party on Ecosystems and Bycatch (WPEB), the most recent of which convened in September 2019. Relevant discussion points and papers presented included:

- The WPEB Program of Work (2019-2023) which includes a reporting framework to monitor the full range of interactions between IOTC fisheries and the different components of the pelagic ecosystem. The workplan also includes the development of an indicator-based ecosystem report card for the IOTC region. The main purpose of the IOTC ecosystem report card is to provide stronger links between ecosystem science and fisheries management to support the implementation of ecosystem-based fisheries management (EBFM) in the IOTC region. Ultimately the ecosystem report card aims to report on the relevant pressures affecting the state of the pelagic ecosystem, and report on the ecological state of the pelagic ecosystem interacting with IOTC fisheries (Shahifar et al., 2019a).

- Andonegi et al. (2019) addressed the “food web/trophic relationships” ecosystem component, focusing on the development of three ecological indicators to examine the potential ecological effects of the EU and Seychelles’ purse seine fishery targeting tropical tunas in the western Indian Ocean. To do so, the authors estimated the total biomass removed by this fishery in terms of weight, trophic level and replacement time of the species removed and compared these indicators among the different sampling areas and by purse seine fishing strategy (sets on floating objects-FOBs and sets on free schools-FSCs). The functional groups included the three main targeted tuna species (skipjack, yellowfin and bigeye), billfishes, sharks, rays, small tunas and mackerels, and other bony fish groups containing a variety of species with similar ecological characteristics. Given the lack of food web and/or ecosystem modelling approaches in the IOTC at present, functional groups were defined based on the information provided by a food web model developed in the Atlantic Tropical Area by Forrestal (2016) (in Andonegi et al. (2019)) and other information derived from IOTC and observer databases.

- Bodin et al. (2018) developed the IndianEcoTuna dataset which provides a panel of ecological tracers measured in four soft tissues (white muscle, red muscle, liver, gonads) from 1,364 individuals representing a wide range of body sizes of albacore, bigeye, skipjack and yellowfin, collected throughout the western Indian Ocean from 2009 to 2015.

For each record, the type of fishing gear, the conservation mode, as well as the fishing date and catch location are provided. The intent of the dataset is to assist in the investigation of global and regional research on marine trophic ecology and food web analysis, as well as on the impacts of anthropogenic changes on Indian Ocean marine ecosystems (Bodin et al., 2018)

Overall, through the work identified above, as well as through ongoing data collection, in accordance with IOTC Resolution 15/02 Mandatory statistical reporting requirements, which now covers the period 1950–2017, sufficient information is available to broadly understand the key elements of the ecosystem. SG60 and SG80 are 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	No	No

Rationale

The impact of the UoA on the ecosystem caused by the removal of skipjack, yellowfin and bigeye (the main target species), and ecosystem-level impacts associated with the use of FADs can be inferred from the available UoA logbook and observer data, IOTC stock assessments and several studies contributing to the understanding of the potential ecological effects of the Indian Ocean purse seine fishery on the structure and functioning of the ecosystem in the western Indian Ocean (e.g. Andonegi et al. (2019), Juan-Jordá et al. (2019a and b) and Shahifar et al. (2019b)) as well as the ecological trap theory (e.g. Dagorn et al. (2013)). At the scale of the UoA, the team concludes that the main impacts of the Client fishery on key ecosystem elements can be inferred from existing information. SG60 is met. However, for the Echebastar fishery, DeAlteris et al. (2018) concluded that *the effects of FADs used in the fishery on tuna behaviour, migration patterns and feeding are the subject of numerous ongoing investigations. Dagorn et al (2012) conclude that there is no unequivocal empirical evidence that FADs represent an 'ecological trap' that inherently disrupts tuna biology, although further research should focus on this issue.* The team therefore harmonised scoring with the Echebastar fishery and concludes that SG80 is not met as the main impacts of the UoA, in relation to the ecological trap theory in particular, have not been investigated in detail. This is particularly relevant considering the increase in FADs deployed by CFTO since the implementation of the yellowfin rebuilding plan (IOTC resolution 2019/02) when the number of active FAD buoys permitted per vessel increased from 150 to 300.

c	Understanding of component functions			
	Guide		The main functions of the components (i.e., P1 target species, primary, secondary and	The impacts of the UoA on P1 target species, primary, secondary and ETP species and Habitats

	post		ETP species and Habitats) in the ecosystem are known.	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 free-school set types. Sufficient information is available to identify the range of species that are impacted, based on observer and logbook data. Although no ecosystem model exists currently for the Indian Ocean, sufficient information can be inferred from similar pelagic ecosystems so that the components' respective roles are known. Although data gaps do exist, these are the focus of the IOTC Working Party on Ecosystems and Bycatch (WPEB) which aims to review and analyse matters relevant to bycatch, by-product and non-target species which are affected by IOTC fisheries for tuna and tuna-like species. Overall, the main functions of the components are known and SG80 is met. SG100 is not met as the interaction between the UoA and some components is not yet well understood (i.e. ghost fishing and habitat damage related to lost or abandoned FADs).

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

The impacts of the UoA on the respective components have already been discussed under 2.1 (Primary species), 2.2. (Secondary species), 2.3 (ETP species), 2.4 (Habitats) and are not repeated here. In relation to the FAD sets, the knowledge of FAD design and associated impacts (moving from lower-entanglement risk FADs to non-entangling FADs), limitation on and monitoring of FAD buoy deployments and high level of observer coverage at UoA level all mean that 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. For free schools sets, the level of observer coverage at UoA level was considered by the team sufficient to also infer the main consequences for the ecosystem in relation to these components. On that basis, SG80 is met. Because of the uncertainties in relation to the FAD fishery and the ecological trap theory in particular (see scoring issue b), 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

Information on target and non-target species (bycatch and ETP species) is gathered by the IOTC through logbook data and its regional observer programme. The Client fishery supplements this information with its industry-led observer programme which consists of human observer coverage and electronic monitoring. At IOTC level the Working Party on Ecosystems and Bycatch (WPEB) aims to review and analyse matters relevant to bycatch, by-product and non-target species which are affected by IOTC fisheries for tuna and tuna-like species (i.e. sharks, marine turtles, seabirds, marine mammals and other fishes), as well as the ecosystems in which they operate; and to develop mechanisms which can be used to better integrate ecosystem considerations into the scientific advice provided by the Scientific Committee to the Commission. Although significant data gaps remain across all fisheries in the Indian Ocean, particularly on non-target bycatch, the data collection at UoA level is sufficient to detect any increase in risk level. SG80 is met. In the absence of a strategy, SG100 is not met.

References

IOTC Working Party on Ecosystems and Bycatch (WPEB): https://www.iotc.org/meetings/15th-working-party-ecosystems-and-bycatch-wpeb15

Andonegi et al. (2019), Dagorn et al. (2013), Juan-Jordá, Andonegi, et al. (2019), Juan-Jordá, Murua, et al. (2019) and Shahifar et al. (2019b)

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

Draft scoring range	60-79
Information gap indicator	More information sought, particularly on ecosystem-level impacts of ghost fishing and habitat impacts caused by abandoned or lost FADs

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

Overall Performance Indicator score	75
Condition number (if relevant)	7

6.6 Principle 3

Note: In response to stakeholder comments regarding IOTC decision-making processes, the background section of Principle 3 was updated in February 2021, to take account of the 2020 skipjack stock assessment meeting (WPTT22, 19-23 October), the 2020 Commission meeting (S24, 2-6 November) and the 2020 Scientific Committee meeting (SC23, 7-11 December) outcomes discussed under the updated Principle 1 background Section 6.4. PI3.2.2 has also been rescored (see Section 6.6.7 below).

6.6.1 Legal and customary framework

The fishery targets the highly migratory, shared straddling stock of skipjack tuna (*Katsuwonus pelamis*, SKJ) in the Indian Ocean and associated species, as they migrate across national jurisdictions and the High Seas. Cooperation between coastal and fishing nations for the sustainable management of these stocks and the fishery's effects on the ecosystem is enabled through the regional fisheries management organisation (RFMO), the Indian Ocean Tuna Commission (IOTC).

As already noted in Section 6.3.5, the UoA vessels are registered in EU member states (flag states), they operate in the Western Indian Ocean across several national jurisdictions (coastal states) and on the High Seas, and land in several of the region's islands states (port states).

The fishery is therefore managed at several levels: the international, EU, coastal state and EU member states' national levels. Jurisdiction-specific conservation management regimes and measures are briefly described in the following sections.

6.6.1.1 IOTC - RFMO

The IOTC was established by an Agreement drawn up in Rome under Article XIV of the FAO Constitution in 1993 that entered into force on 27 March 1996. Article XIV provides for autonomous treaty regimes, therefore the parties can commit themselves to agree to binding conservation and management measures[9]. The IOTC is mandated to manage tuna, tuna-like and associated species in the Indian Ocean and adjacent seas, promote cooperation among its Members with a view to ensuring, through appropriate management, the conservation and optimum utilization of stocks and encouraging sustainable development of fisheries based on such stocks. Article XII regarding subsidiary bodies ("shall provide a forum for consultation and cooperation"), art. XV on cooperation with other organizations and institutions, and art. XXIII on the interpretation and settlement of disputes set out the RFMO's ground rules[10]. The European Union (EU) is a contracting party (CP) on behalf of its Distant fishing fleet (French and Italian in the UoA). France is also a coastal state contracting Party through its overseas territories (OT) of La Réunion, Mayotte and of its uninhabited territories administered by TAAF (*Terres Australes et Antarctiques Françaises*).

The most important regulatory frameworks (Table 31) are closely integrated. All relevant IOTC binding conservation and management measures adopted as Resolutions are translated into European legislation updated annually as necessary (EU, 2019a). The same applies to national fishing vessel licensing authorities, and to EU-registered Producer Organisations (PO) for any EU quota allocation sharing. All vessels in the UoA are managed by the same fishing company, the *Compagnie Française*

[9] As opposed to advisory bodies established under Article VI FAO Constitution, such as the Southwest Indian Ocean Fisheries Commission (SWIOFC), which deals with the management of non-migratory fisheries resources

[10] https://iotc.org/sites/default/files/documents/2012/5/25/IOTC%20Agreement.pdf

du Thon Océanique (CFTO[11]) and are members of the same PO, Orthongel[12]. Both Orthongel and CFTO have additional fisheries conservation measures provisions, which are binding on their members.

Table 31. Jurisdictions in the fishery's management system

Jurisdictions	Institutions and legal framework
Indian Ocean tuna RFMO	IOTC: Agreement for the protection of tuna, tuna-like and associated species
European Union	DG MARE, EU Parliament and Council, Long-Distance Advisory Council (LDAC): Common Fisheries Policy (CFP), Bilateral Sustainable Fisheries Partnership Agreements (SFPA)
France (and Overseas Territories - OT)	*Ministère de l'Agriculture et de l'Alimentation* – DPMA (licensing authority): Code Rural; Code de l'Environnement; National Fisheries Monitoring Centre (CROSS Étel)
TAAF	*Territoires Australes et Antarctiques Français* (Iles éparses) - TAAF
Italy	*Ministero delle politiche agricole alimentari, forestali e del turismo*
Coastal States	Seychelles, Mauritius and TAAF: licensing authorities allowing individual fishing vessels activities in their EEZ including specific requirements, entry-exit and catch reporting obligations
Port States	Seychelles, Mauritius, Madagascar: Port State Measures, prior notice to arrival, reporting obligations and landing inspections
Producer Organisation (PO)	Orthongel: EU-approved, in charge of the YFT quota management for all UoA vessels and all French fishing companies operating in the Indian Ocean and weekly reporting to the licensing authorities and fisheries monitoring centres (FMCs), also voluntary measures regarding e-monitoring and scientific observation;
Fishing Company	CFTO: Code of Conduct and voluntary measures, for example regarding technical specifications and numbers of FADs used.

The IOTC manages the highly migratory / straddling / shared stocks of tuna, tuna-like and associated species in the Indian Ocean on the basis of catch and scientific data provided by its commission Contracting Parties (CPC) and on the basis of advice provided by its Scientific Committee, Compliance Committee and analyses of specific working parties (WP). The WPs most relevant to the fishery are:

- WP on Data Collection and Statistics (WPDCS)
- WP on Methods (WPM)
- WP on Tropical Tunas (WPTT)
- WP on Ecosystems and Bycatch (WPEB).

Indian Ocean Tuna Commission (IOTC) Resolutions, such as to fix annual catch limits (ACLs) for yellowfin tuna, to reduce numbers of FADs and supply vessels or shark conservation measures, are

[11] https://www.cfto.fr/index.php

[12] http://orthongel.fr/index.php

transcribed into EU Law, annually as needed, through the Council Regulation that fixes fishing opportunities in non-Union waters[13] (e.g. EU (2019a)).

Fishing opportunities are presently apportioned between CPCs according to historical catches. The IOTC has set up a Technical Committee on Allocation Criteria (TCAC) and agreed a programme of work for the allocation of fishing opportunities for 2018 and 2019. Two proposals are currently examined, one from 10 IOTC developing coastal states and small island states (SIDS), and another from the EU[14]. Both proposals recognise the special requirements of developing States as per the UN Convention on the Law of the Sea (UNCLOS) and the needs of subsistence, small-scale and artisanal fishers, who are mainly dependent on fishing as per the UN Fish Stocks agreement (UNFSA).

6.6.1.2 European Common Fisheries Policy (EU-CFP)

The European Common Fisheries Policy (CFP) prevails across EU member states (France and Italy for the fishery) for which its regulations are binding. The European Union (EU) reports as a single CPC to the IOTC since 1995[15].

Activities of European fishing vessels outside EU waters have been framed by Council Regulation (EC) No 1006/2008 of 29 September 2008 (or 'FAR'), which established a fishing activities registry and clearly set out the responsibilities of the EU and EU member states. The FAR was repealed by Regulation (EU) 2017/2403 of the European Parliament and the Council of 12 December 2017 on the sustainable management of external fishing fleets in waters 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. Key elements of EU legislation that apply to this fishery are listed in Table 32.

Key features are as follows:

- The core principle of the Regulation is that 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 (paragraph #14).
- In the absence of MS 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 (#6).
- 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

[13] http://data.europa.eu/eli/reg/2019/124/oj

[14] https://www.iotc.org/allocation-estimations

[15] The Union acceded by Council Decision 95/399/EC of 18 September 1995 on the accession of the Community to the Agreement for the establishment of the Indian Ocean Tuna Commission (OJ L 236, 5.10.1995, p. 24).

necessary to take them into account in the authorisation and reporting processes set out in this Regulation (#16).

- In third-country waters, Union 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 (#18).
- 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 (19)
- 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 (#22).
- The exchange of data in electronic form between Member States and the Commission, as provided for by the Control Regulation (Council Regulation (EC) No 1224/2009), 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 in order to coordinate those data collection activities (#27) ».

In addition, the EU Council of Ministers has just strengthened its support to IOTC in 2019, pledging that the Union shall, where appropriate, endeavour to support[16]:

a) Conservation and management measures for fisheries resources in the IOTC Agreement area based on the best scientific advice available, including Total Allowable Catches (TACs) and quotas or effort regulation for living marine biological resources regulated by the IOTC, which would bring or maintain the achievement of the maximum sustainable yield exploitation rate at the latest by 2020. Where necessary, specific measures for stocks, which suffer from overfishing shall be considered in order to keep the fishing effort in line with available fishing opportunities;

b) Measures to prevent, deter and eliminate illegal, unreported and unregulated (IUU) fishing activities in the IOTC Agreement area, including IUU vessel listing;

c) Measures to reinforce fisheries' scientific data collection and promote better cooperation between the industry and scientists;

d) Monitoring, control and surveillance measures in the IOTC Agreement area in order to ensure efficiency of control and compliance with measures adopted within the IOTC;

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[16] 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 https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019D0860&qid=1573667468444&from=EN

e) Measures to minimise the negative impact of fishing activities on marine biodiversity and marine ecosystems and their habitats, including measures to reduce marine pollution and prevent the discharge of plastics at sea and reduce the impact on marine biodiversity and ecosystems of plastics present at sea, protective measures for sensitive marine ecosystems in the IOTC Agreement area in line with the UNGA Resolutions, and measures to avoid and reduce as far as possible unwanted catches, including in particular vulnerable marine species, and to gradually eliminate discards;

f) Measures to manage the use of FADs notably to improve collection of data, to accurately quantify, track and monitor FADs use, to reduce impact on vulnerable tuna stocks, to mitigate their potential effects on target and non-target species, as well as on the ecosystem;

g) Measures to reduce the impact of Abandoned, Lost or Otherwise Discarded Fishing Gear (ALDFG) in the ocean and to facilitate the identification and recovery of such gear, and to reduce the contribution to marine debris;

h) Measures aimed at 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;

i) Recommendations, where appropriate and to the extent permitted under the relevant constituent documents, encouraging the implementation of the Work in Fishing Convention of the International Labour Organisation (ILO); and

j) Additional technical measures based on advice from the bodies and working groups of the IOTC.

Table 32. References of EU fisheries management legislation applying to the UoA

Reference	**Title**
Council Regulation (EC) No 1005/2008 of 29 September 2008	Establishing a Community system to prevent, deter and eliminate illegal, unreported and unregulated fishing (**IUU Regulation**)
Commission Regulation (EC) No 1010/2009 of 22 October 2009	Laying down detailed rules for the implementation of Council Regulation (EC) No 1005/2008 establishing a Community system to prevent, deter and eliminate illegal, unreported and unregulated fishing (**Implementation Regulation)**
Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013	On the Common Fisheries Policy (**CFP**)
Council Regulation (EC) 1224/2009 of 20 November 2009	Establishing a Union control system for ensuring compliance with the rules of the common fisheries policy (**Control Regulation**)
Decision (EU) 2018/1986 of 13 December 2018	Establishing specific control and inspection programmes for certain fisheries (**Compliance Regulation**)
Regulation (EU) 2017/2403 of the European Parliament and of the Council of 12 December 2017	On the sustainable management of external fishing fleets (**External fishing fleet Regulation)**
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 Decision**)
Regulation (EU) 2019/1241 of the European Parliament and of the Council of 20 June 2019	On the conservation of fisheries resources and the protection of marine ecosystems through technical measures

6.6.1.3 Flag states: France and Italy

EU fisheries legislation is incorporated or directly prevails in the French and Italian legal orders. EU Member states are in charge of monitoring, control and surveillance (MCS) of their vessels activities through their national fishing vessel registration and licensing authorities and their Fisheries Monitoring Centres (FMCs).

The French islands of La Réunion and Mayotte are ultra-peripheral territories part of the EU. Their waters may therefore be fished by EU vessels without further formalities. The French (OT) TAAF are not part of the EU and therefore a separate licence is needed to fish their EEZs (see section below).

For French vessels operating outside EU waters, the licensing authority is the Ministerial *Direction des Pêches Maritime et de l'Aquaculture* (DPMA), which delivers AEP (*autorisations européennes de pêche et d'appui*[17]) that may be requested by the PO, and implements the French marine fisheries policy. The *Centre national de surveillance des pêches* (CNSP) is the national Fisheries Monitoring Centre (FMC), in charge of the satellite surveillance of French vessels. The CNSP reports to the DPMA and locally to the region's Préfet, the *Direction de la mer sud de l'Océan Indien* (DMSOI), which also oversees the Réunion-based *Centre Régional Opérationnel de Surveillance et de Sauvetage* (CROSS-RU) in charge of fisheries surveillance in the French and TAAF EEZs. The CROSS-Étel in Brittany hosts the FMC in charge of satellite surveillance (VMS and e-logbooks) of all French-registered fishing vessels, in close collaboration with other EU Member State FMCs and (for EU waters) the European Fisheries Control Agency (EFCA). The CNSP monitors the activities of all French and TAAF-registered fishing vessels based in the Indian Ocean wherever they are, and of vessels, whatever their nationalities, present in the Indian Ocean French and TAAF EEZs or High Seas in the vicinity. The CROSS-RU coordinates fisheries and maritime traffic MCS and sea-rescue operations in the region.

An on-board scientific observation programme for all French and French (OT) registered purse seiners started in 2005, aiming to cover at least 10% of all fishing trips. The programme was stopped mid-2009 because of piracy risks and resumed in 2011 as part of the EU Data Collection Framework (DCF) obligations (see Annex 1 IOTC-2018-SC21-NR05_Rev1 European Union - National Report 2018) covering 13.8% of all fishing operations. In addition, the PO Orthongel runs a permanent observation programme called OCUP since 2013, complemented by an on-board camera monitoring system in collaboration with the French research institute IRD and the scientific consultancy Océanic Développement, providing additional coverage (see Section 6.3.6 for more detail). Some port sampling also takes place as part of the EU DCF programme for all European (France, Italy and Spain) purse seiners registered in the EU or a third country, organised in close collaboration with the IRD (France), the SFA (Seychelles) and USTA (Madagascar). In 2017, 238 samples were collected from landings of French purse seiners in Victoria (Seychelles).

One vessel in the UoC, the Torre Italia, is registered in Bari, Italy. The vessel was registered in Concarneau in France (see https://www.iotc.org/vessels/history/88800/345) at some stage, when piracy was high, making it possible to take French military personnel on board. It is owned by a CFTO subsidiary and is also member of the Orthongel PO under the same rules as the French-registered vessels. The vessel operates within the CFP, the EU SFPAs obligations and the voluntary CFTO rules just as the French-registered vessels. For this vessel, the Italian Central Government *Ministro delle politiche agricole alimentari, forestali e del turismo* (MIPAAFT), specifically its Sea fisheries and aquaculture Directorate (*Direzione generale della Pesca marittima e dell'Acquacoltura* - PEMAC) is the licensing authority. It is also the monitoring, control and surveillance (MCS) competent authority. The

[17] https://www.legifrance.gouv.fr/affichTexte.do?cidTexte=LEGITEXT000038532841&dateTexte=20190723

Italian Coast Guards have delegated responsibility for fisheries control at sea and on land, and work with the local, national and the European Fisheries control Agency, EFCA, to devise and implement appropriate risk-based fisheries surveillance activities. MCS information for Italian-registered distant fishing vessels is collated and checked by the National Fishery Control Centre (*Centro Controllo Nazionale Pesca* - CCNP) in Rome.

French and Italian (thus EU) registered vessels in the UoA gain access to the Indian Ocean EEZs of non-EU countries through EU-led bilateral agreements, the Sustainable Fisheries Partnership Agreements (SFPA). Vessel participation is conditional on the vessels obtaining a European authorisation (*Autorisation européenne de pêche* - AEP) from their licensing authority. Fishing rights in terms of stock quota shares are apportioned between fishing companies according to historical catches through the Eu-mandated PO (Orthongel).

6.6.1.4 Coastal States

Being registered in EU members states, the UoA vessels may either fish in the waters of coastal states that have active Fisheries Agreement protocols with the EU (Seychelles, Mauritius) or through private licensing arrangements (e.g. TAAF). In recent years, the EU had active fisheries access agreements with all coastal continental and island states in the Western Indian Ocean, Comoros (COM), Kenya (KEN), Tanzania (TZA), Seychelles (SYC), Mozambique (MOZ), Madagascar (MDG) and Mauritius (MUS) who are all IOTC CPCs. Not being part of the EU, the French (OT) TAAF (*Iles Eparses*) is a separate IOTC CPC, while the waters of Mayotte are considered as French/EU (FR/EU). Independently of available fishing opportunities, catches have been overwhelmingly from the High Seas and Seychelles waters (Table 33).

Table 33. Five-year average UoA catch tonnage (t) and percentages between 2014 and 2018, per species and discards (DSC) and by Coastal/ Island states EEZs (from IRD T3 validated logbook data 2014-2018). Comoros (COM), Kenya (KEN), Tanzania (TZA), Seychelles (SYC), Mozambique (MOZ), Madagascar (MDG), Mauritius (MUS), Somalia (SOM), Maldives (MDV)

2014-2018	High Seas	SYC	MDG	MUS	FR /EU	MDV	KEN	TAAF	MOZ	TZA	SOM	KEN	Avg (t)
YFT	55%	39%	2%	1%	1%	1%	0%	0%	0%	0%	0%	0%	19,457
SKJ	61%	31%	3%	1%	1%	1%	0%	0%	0%	0%	0%	0%	18,666
BET	63%	30%	2%	2%	1%	1%	0%	0%	0%	0%	0%	0%	2,774
ALB	49%	38%	3%	8%	1%	0%	0%	0%	0%	0%	0%	0%	126
DSC	57%	35%	2%	1%	1%	1%	0%	0%	0%	0%	0%	0%	1,378
Total	58%	34%	2%	1%	1%	1%	0%	0%	0%	0%	0%	0%	
Avg (t)	24,767	14,574	1,056	555	439	382	305	178	84	23	20	18	42,401

Presently, two tuna-specific SFPA protocols are active in the Indian Ocean, with the Seychelles[18] and with Mauritius[19]. In recent years, the UoA vessels have obtained licences from several other coastal

[18] https://ec.europa.eu/fisheries/cfp/international/agreements/seychelles

[19] https://ec.europa.eu/fisheries/cfp/international/agreements/mauritius

states: from Kenya and Tanzania through direct authorisations, and from Comoros, Madagascar and Mozambique through SFPAs (see Table 34).

Access conditions agreed through SFPAs are stipulated in each agreement's Protocol[20] and cover the following elements:

- Vessels authorisation, technical measures and fishing opportunities agreed through a joint Committee
- Annual fishing vessel authorisation on payment of a flat-rate advance fee to the coastal state, and possible excess per tonne caught additional fee
- Logbook submission and catch reporting
- EEZ in and out notifications, operational VMS
- Scientific on-board observers
- At-sea and in-port inspections; infringements, penalties and legal proceedings
- Vessel support in the fight against IUU
- On-board crewing by third country nationals.

Table 34. Active fishing authorisation of the UoA vessels in the Indian Ocean or through SFPAs[21]

EEZ fished	Date of last licence	SFPA
Seychelles	17/01/2020	Exp. 17/01/2020, new 6 year-SFPA agreed 22 Oct. 2019
Mauritius	31/12/2019	Protocol until 07/12/2021
I_Eparses (TAAF – France)	31/12/2018	Annual individual vessel licences
Mayotte (France - EU)	EU waters	*De facto* access
Kenya	14/06/2017	None
Tanzania	30/06/2016	None
Comoros	31/12/2016	Protocol expired on 31/12/2016 Agreement denounced
Madagascar	31/12/2018	Protocol expired on 31/12/2018
Mozambique	31/12/2012	Protocol expired on 31/01/2015

TAAF's fishing vessel register does not include vessels authorized to fish for IOTC species since 2014, when vessels previously listed on the IOTC Record under the France (OT) flag (for Mayotte) and the relevant capacity plans were transferred to the flag of France as part of the European Union.

The TAAF administration delivers licences to French and foreign purse seiners and longliners that grant access to the Iles Eparses (Juan de Nova, Bassas Da India and Europa) EEZs excluding the Iles Glorieuses EEZ MPA (since 2012), and administers a mandatory onboard scientific observer programme for all licensees (OBSPEC, see IOTC-2018-SC21-NR06 France (OT) - National Report 2018). Annual licences

[20] https://ec.europa.eu/fisheries/cfp/international/agreements_en

[21] Up-to-date list from DG MARE https://ec.europa.eu/fisheries/cfp/international/agreements

delivered by TAAF include all IOTC prescriptions in force such as the discard ban and maximum number of FAD buoys. Other, TAAF-specific licence conditions regulating tuna and other pelagic species fisheries in the EEZs of the Iles Eparses apply, as summarised in Section 6.5.2.5 under Principle 2.

6.6.1.5 Port states

Tuna canneries in the Western Indian Ocean are mostly supplied by the European purse seine fleet although the CFTO UoA fleet does not have direct links with a specific cannery. The UoA vessels use the bunkering, landing and in-port transhipping facilities of Victoria (Seychelles) to export frozen tuna around the world, and occasionally lands in Port Louis (Mauritius) on their way to the shipyard for maintenance visits. Both are also IOTC CPCs and as such regularly communicate to the IOTC their activities in terms of landings inspections and controls. They are also parties to the FAO Agreement on Port State Measures (PSMA) to prevent, deter and eliminate IUU fishing[22].

All vessels in the UoA are registered in the EU. Therefore, landings and in-port transhipments in the Seychelles (or Mauritius occasionally) are all treated as exports, for which catch certificates need to be established. The coastal state's competent authorities that check landing 'imports' are usually the Fisheries MCS, Customs and Port Authorities. Between 2014 and 2018 included, CFTO exported tuna to the following countries: Cape Verde, Ecuador, Ghana, Italy (EU), Mauritius, Senegal, Seychelles, Spain (EU), Thailand and Turkey, who are parties to the PSMA, and Ivory Coast, Morocco and Tunisia, who are not.

6.6.1.6 CFTO and Orthongel

A number of Best Practice initiatives have been developed and implemented by the UoA vessels fishing company CFTO including on-board whole crew three-hour seminars, supported by the PO Orthongel, in collaboration with scientists since at least 2010[23]. They aim to reduce environmental impacts of purse seiners on sharks and rays, ETP species and on habitats from FAD beachings (IRD-coordinated EU CECOFAD2 project). These have been shared and supported by environmental NGOs notably through the industry-led International Seafood Sustainability Foundation (ISSF), which publishes guidebooks and species identification guides (e.g. ISSF (2016, 2019)), and organises regular purse seiners skippers workshops.

PO Decisions are taken unanimously and are binding on all PO members concerned, from the date set in the "Décision" document. Some key decisions and CFTO Instructions to vessel captains are listed in

Table 35.

In particular, as per IOTC Res. 19/02, Orthongel has devised an Indian Ocean FAD management Plan for the fleet of French tuna purse seiners, in effect since 2018. The measures under the FAD management plan are summarised in Section 6.5.2.4 under Principle 2. The voluntary conservation measures implemented by CFTO and Orthongel are briefly summarised in Table 35 below. More detail on this is provided in Section 6.3.4 (Client initiatives towards improved sustainability) and Section 6.5.2 (Principle 2 management framework).

Finally, Orthongel and CFTO are partners in the Sustainable Indian Ocean Tuna Initiative (SIOTI), a large-scale Fisheries Improvement Project (FIP) of tuna purse seine fisheries (SIOTI, 2019).

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[22] http://www.fao.org/fileadmin/user_upload/legal/docs/037s-e.pdf
[23] http://orthongel.fr/index.php?page=durabilite/cat

Table 35. CFTO and Orthongel Voluntary Indian Ocean purse seiners conservation measures

Document type and 1st publication and revision years	Aims
Orthongel decision 5/1990 Orthongel decision 6/1992	Banning sets on dolphins Banning sets on any marine mammals
Orthongel decision 10/2011	Maximum of active DCP buoys and prohibiting use of HF buoys from 30 June 2012 (as per FAD management plan)
Orthongel decision 11/2011 CFTO Instructions to captains 023 ARMT- 01/06/2011 Rev 4 (3/17)	Non-entangling FADs to reduce impacts on turtles and shark, locally made in Seychelles only, policy posted on the CFTO website (www.cfto.fr) and available to the public upon request, and visible on board every tuna fishing vessel in the CFTO fleet. Removal of any entangling FAD encountered at sea.
Orthongel decision 12/2011 CFTO Instructions to captains 021 ARMT-06/06/2011, Rev. 3 2014	Shark finning ban; sharing of good handling practice, research and tagging
Since 2013 OCUP (Common Permanent Unique Observer) voluntary program on French tropical purse seiners.	In collaboration with IRD French research institute, Electronic monitoring system (EMS) implemented on all French tropical purse seiners since 2015 (Goujon et al., 2017), resulting in 45.3% observed fishing operations in 2017 (EU report to the Scientific Committee, France national report IOTC-2018-sc21-NR05).
Orthongel decision 14/2018 in response to EU Regulation on YFT TAC and quota shares, and DPMA Arrêté du 8 mars 2018	Management plan for French YFT Indian Ocean sub-quota 1) including transmission of catch data to PO weekly per species, per vessel, and authorised access to VMS data, 2) fishing company measures to ensure quota is not overshot, and 3) PO administrative and pecuniary sanctions in case of quota overshoot
Orthongel 1st January 2018	FAD (DCP) Management Plan

6.6.2 Consultation, roles and responsibilities

6.6.2.1 IOTC

IOTC provides a consultation and conciliation forum between its CPCs[24]. Stakeholders such as international environmental NGOs, who may not be participating through national delegations may obtain observer status. They may contribute information and analyses but do not take part in discussions; however, two eNGOs were represented on the panel for the IOTC 2nd Performance Review (IOTC, 2016). Meetings of the Commission and of all its subsidiary bodies are open to Observers. The list of current, pre-approved observers is public and kept up to date on the IOTC Observers page[25].

Roles and responsibilities are clearly defined for all key areas and IOTC parties[26] although possibly not for all areas of responsibility and interaction between CPCs. Organisations and individuals involved in the management process at IOTC level have been identified. The Commission, its subsidiary bodies including the Scientific and the Compliance Committees, and its Working Parties on Tropical Tunas (WPTT), on Ecosystem and Bycatch (WPEBB) and on Data Collection and Statistics (WPDCS) in

[24] https://www.iotc.org/about-iotc/structure-commission

[25] www.iotc.org/node/6378

[26] IOTC Rules of Procedures https://www.iotc.org/node/5065

particular for this fishery, regularly seek and accept relevant information to be incorporated into the management system.

The IOTC process of consensus reaching may be illustrated by the ongoing discussions to devise an allocation system for fishing opportunities, which seeks to ensure transparency at all stages and consideration of all points of view and explains how the information is used or not used[27]. Resolutions are binding on the Commission Members, unless there is a specific objection on the part of a Member, and require a two-thirds majority of members present and voting. Therefore, cooperation may be organised and effective, but it may not be binding on all parties.

6.6.2.2 Europe, France and Italy

The European Union, as an IOTC CPC, is the level of interaction for the fishing companies in the fishery. The European Commission (DG Maritime Affairs and fisheries) holds regular consultations, open to all citizens and publishes the initial and final texts and collected responses[28]. Fisheries regulations drafted by the Commission, which take direct effect in European member states legislation, are also co-decided by the European Parliament (elected members) and the European Council of fisheries ministers. The EU Long-distance fleet Advisory Council for fleets operating in non-EU waters (LDAC) is the EU fisheries body bringing together stakeholders of the fishing sector (including catching, processing and marketing sectors, and trade unions), scientists, managers and other interest groups (environmental NGOs, consumers and civil society). The LDAC mission is to provide advice to the European Institutions (Commission, Council and Parliament) and EU Member States on matters related to Fisheries Agreements with Third Countries, relations with Regional Fisheries Organizations (RFOs) in which the EU is a signing party, or with international organizations in whose waters the Community Fleet is operating, as well as on business relations and the international market for fishing products[29]. Roles and responsibilities are known and well understood, and as a mixed forum, the LDAC is still able to contribute to the EU-wide adoption of best practices, for examples with FAD-specific measures adopted in May 2019.

At national level, the fishing company (CFTO) represents the French and Italian vessels in their discussion with European authorities, and so does the PO (Orthongel) for quota-related matters. They are both members of national and EU-wide organisations and actively participate in research and fisheries management discussions.

6.6.3 Long-term and fishery-specific objectives

The objective of the IOTC is " to maintain stocks in perpetuity and with high probability, at levels not less than those capable of producing their maximum sustainable yield as qualified by relevant environmental and economic factors including the special requirements of developing States in the IOTC area of competence". In addition, IOTC Resolution 12-01 on the implementation of the precautionary approach states that "In the determination of appropriate reference points and harvest control rules, consideration must be given to major uncertainties, including the uncertainty about the status of the stocks relative to the reference points, uncertainty about biological, environmental and socio- economic events and the effects of fishing activities on non-target and associated or dependent species".

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[27] https://www.iotc.org/allocation-estimations

[28] see https://ec.europa.eu/info/consultations/fishing-opportunities-2021-under-common-fisheries-policy_en

[29] https://ldac.eu/en/about-us

The European Union committed itself at the United Nations Summit on Sustainable Development on 25 September 2015 to implementing the resolution containing the outcome document entitled 'Transforming our world: the 2030 Agenda for Sustainable Development', including Sustainable Development Goal 14 which is to 'conserve and sustainably use the oceans, seas and marine resources for sustainable development', as well as Sustainable Development Goal 12 which is to 'ensure sustainable consumption and production patterns' and their targets. The objective of the CFP, is "to ensure that fishing activities are environmentally, economically and socially sustainable and are managed consistently with the objectives of achieving economic, social and employment benefits, and of restoring and maintaining fish stocks above levels which can produce maximum sustainable yield and that they are contributing to the availability of food supplies" (EU, 2013).

Long-term objectives consistent with the MSC standard Principles 1, 2 and 3 and the precautionary approach are also clearly stated by the PO for all purse seiners in the fishery. They have underpinned the development of:

- A Code of Conduct and associated training for captain and crew;
- A comprehensive research programme cooperation with the French research institute IRD, leading to specific research findings regarding the biology of target and non-target species, an improved understanding of FAD drift in the Indian Ocean, movement towards 100% scientific observer coverage (through EM and human observers), and to allow for confidential real-time data transmission in order to improve scientific understanding and advice; and
- An active participation in the FIP « SIOTI »(2018-2022) with a detailed action plan that provides well-defined and measurable long-term and short-term explicit objectives for the management system of the Indian Ocean tropical purse seine fishery (SIOTI, 2019).

6.6.3.1 Principle 1

IOTC's long-term and short-term objectives are given in Resolution 16/02 on HCRs for skipjack tuna:

- « 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). » (see Principle 1 Section 6.4.6).

These objectives are fully endorsed by the EU as an IOTC CPC, and are aligned with the CFP (EU, 2013) objectives that prevail in the policies of EU Member states. They require: (i) sustainable exploitation of marine resources based on the precautionary approach taking into account available scientific data; (ii) the protection of the marine environment; (iii) the sustainable management of all commercially exploited species; and (iv) the achievement of good environmental status by 2020. EU fishing activities in external waters are based on the same principles and standards as those applicable under the CFP.

6.6.3.2 Principle 2

In addition to the long-term objectives related to Principle 2 stated in IOTC Resolution 16/02 and in the CFP Regulation mentioned above, a number of IOTC Conservation Management Measures (CMM) provide explicit long and short-term objectives, and in particular:

- An Interim Plan for Rebuilding the Indian Ocean Yellowfin Tuna Stock (Resolution 19/01) which has resulted in the EU setting a quota for YFT, although the IOTC does not specifically require it;
- A ban on discards of Bigeye tuna, skipjack tuna, yellowfin tuna and non-targeted species caught by purse seine vessels (Res. 19/05) to ensure the achievement of IOTC objectives to conserve and manage bigeye tuna, skipjack tuna and yellowfin tuna;
- Resolution 19/02 Procedures on a fish aggregating devices (FADs) management plan, including a limitation on the number of FADs, more detailed specifications of catch reporting from FAD sets, and the development of improved FAD design to reduce the incidence of entanglement of non-target species;
- To develop improved FAD designs to improve management procedures to monitor the number, type and use of such devices and to mitigate possible negative effects on the ecosystem, including on juveniles and the incidental bycatch of non-target species, particularly sharks and marine turtles (Resolution 18/04 On bioFAD experimental project), and to reduce the incidence of entanglement of marine turtles, including the use of biodegradable materials (Resolution 12/04);
- The use of instrumented buoy on all dFAD (Resolution by 19/02) 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;
- On the conservation of cetaceans (Resolution 13/04);
- On the conservation and mitigation measures for marine turtles (Resolution 12/04); and
- On the conservation of sharks caught in the IOTC fisheries (Resolution 17/05); on the conservation of mobulid rays (Resolution 19/03); on management measures for the conservation of blue shark caught in association with IOTC fisheries (Resolution 18/02).

6.6.4 Decision making processes, stakeholders and disputes

IOTC has a clear mandate to adopt Conservation and Management Measures (CMM, see Section 6.6.1.1 and art.V.2(c) of the Agreement[30]) concerning the management of tuna and tuna-like species under its mandate and the fisheries that target them. Decisions are made by the Commission during its annual or special sessions; those in the form of Resolutions are binding on Commission Members that have not objected. Of direct relevance to this fishery, Resolution 16/02 defined a harvest control rule and reference points for Indian Ocean skipjack.

Resolution 16/02 relies on a model-based stock assessment for skipjack to be undertaken every three years from 2017, from which a catch limit was derived for the period 2018 to 2020. The Resolution was adopted at the Twentieth Session of the IOTC in May 2016. The calculation of a catch limit of 470,029 tonnes for the period 2018-2020 by the Scientific Committee was issued in November 2017,

[30] See https://www.iotc.org/about-iotc/basic-texts

which was then used by the Secretariat to notify CPCs of the recommended catch limit for skipjack tuna for 2018 on 15 December 2017 (IOTC Circular 2017-094). For 2018, the skipjack total catch was estimated to be 30% above the catch limit calculated from the HCR, and for the 2019 catch 16% above (see Section 6.4.6).

In 2020, the IOTC Scientific Committee recommended a higher catch applying the HCR specified in Resolution 16/02 of 513,572t for the period 2021 -2023, based on the new stock assessment, which estimated a higher stock productivity and a higher stock level relative to the target reference point, possibly due to skipjack life history characteristics and favourable environmental conditions, concluding that the recent catches that exceeded the (previously-set) limits established for the period 2018-2020, could have been sustained by favourable environmental conditions; and that "the Commission needs to ensure that catches of skipjack tuna during this period (2021 – 2023) do not exceed the agreed limit" (IOTC, 2020e).

In other words, the IOTC is presently lacking a responsiveness to the important issue of the new catch limit implementation, which would potentially become a very serious issue if the stock biomass becomes depleted.

A wide variety of stakeholders are represented at all key jurisdictional levels. Numerous international, national, intergovernmental and non-governmental organisation have active IOTC Observer status, which allows presence and submissions of information to the meetings of all of the subsidiary bodies of the Commission[31]. Representation is also explicitly defined and well understood for all areas, including the EU fisheries management institutions, with the EU Commission through the LDAC (see section 6.6.1.2) and also through the EU Parliamentary Fisheries Committee who has co-decision powers for most CFP aspects important to this fishery, such as its international dimension and the SFPAs.

At EU, PO (Orthongel) and at IOTC levels, reports are publicly accessible and describe how management considers the relevant information arising from research, monitoring and evaluation.

Disputes are ordinarily solved with IOTC subsidiary bodies (Section 6.6.1.1), 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 (art. XXIII), although this has not been tested (Medley et al., 2019).

6.6.5 Compliance and enforcement

There are several levels to the fishery's MCS system, with contributions from each jurisdiction. Historically, the IOTC and the vessel's flag states (France and Italy) provided the key elements. With the improved fight against IUU and adoption of the Port State Measures Agreement (PSMA), port states play a more central role through improved catch certification and traceability.

- The regional level is coordinated through IOTC and various projects including the EU-funded Regional Surveillance activities based at the Indian Ocean Commission (IOC) in Mauritius together with the World Bank funded regional component of the SWIOFISH2

[31] https://www.iotc.org/node/6378

project to assist eligible CPCs to strengthen their compliance with IOTC Resolutions and build MCS capacity (IOTC Circular 2016-093) and World Bank support to the IOTC[32];

- UoA vessels must comply with the EU and PO management arrangements through the EU SFPA protocols, which play an active part in the fight against IUU by collecting unmarked FADs, reporting on unknown vessels encountered at sea, and through the catch documentation scheme (CDC) and Port State Control measures that tally VMS, e-logbooks, reported catch and landings.

The IOTC publishes a detailed analysis of CPCs national compliance every year. The report for the European Union includes the UoA French and Italian covers all obligations, including mandatory reporting and data submissions; see IOTC (2019f). France has been exemplary in submitting information. The vessels (French and Italian) in the fishery have been actively engaged in sustainable management initiatives (see 6.6.1.3), with the support of French and European funds.

The information system for the UoA vessels is updated in real time from electronic logbooks (since 2012-13) into a centralised system called *Système d'Information Halieutique* (SIH) in France, where VMS position and catch data can be checked, validated and coded into IOTC statistical rectangles by MCS authorities and the Fisheries Administration. Scientific observer information, sampling and measurements of landed products and other analyses are connected through the responsibilities of IRD, with specific data sharing provisions with the PO Orthongel. Information is submitted to IOTC through the French Ministry (DPMA) and through the EU Data facilities.

There has been no at-sea inspection of the UoA seiners and supply vessels in recent years, but all vessels are systematically inspected when they come into port to land, tranship, bunker and change crew. An analysis of inspection reports communicated to the team (mostly from Seychelles, also Mauritius) shows no evidence of systematic non-compliance could be found.

Finally, there is still a low level of compliance with IOTC Resolutions by some CPCs active in IOTC tropical tuna fisheries, including poor bycatch reporting. This lack of compliance considerably reduces the effectiveness and scope of management actions taken by the IOTC. Partners in the FIP SIOTI commissioned a study, which recommended that IOTC strengthens its compliance system by presenting more detailed compliance reporting focusing on instances of non-compliance, action planning remedial actions, regular audits and by introducing a system of sanctions (Hosch, 2018). To date IOTC still lacks a strategy for strengthening compliance. Many coastal state CPCs do not favour adoption of penalties for non-compliance, noting that there is already a clear improving trend in compliance without strong penalties. However, proposals for improving compliance made in 2018 were deferred to the newly formed Compliance Committee (CoC) and revisited in 2019 (SIOTI, 2019). As a result, the 2019 Compliance Committee report included a summary analysis of % CPC compliance by CMM and presented trends (2010-2018) in compliance rates for specific obligations, such as vessel authorisations (Resolution 15/04), active vessels (Resolution 10/08), catch documentation (Resolution 01/06) or mandatory statistics reporting (Resolution 15/02), which showed that only 51% of CPCs were fully compliant. Similarly, only 37% of all CPCs' fleets were compliant with the regional observer scheme achieving the minimum level of 5% of operations or sets[33]. These first results do not correspond to systematic non-compliance, but rather point to difficulties that some CPCs may have with specific CMMs.

[32] https://www.iotc.org/compliance/port-state-measures

[33] IOTC-2019-CoC16-03 [E]- Summary Report on the level of Compliance.pdf

6.6.6 Management performance evaluation

The IOTC has had two formal independent performance evaluations, in 2009 and 2014. Since then, the Commission and its subsidiary bodies review progress made in implementing each of the recommendations arising from the Performance Review, and the latest updates are included as an appendix to each Commission annual report. In its latest report on the Implementation of the Performance Review Recommendations, the IOTC Secretariat noted that of the 63 actions required, 30 were ongoing and 29 completed, including all High and Medium priority actions (IOTC, 2019g).

IOTC management performance, in terms of stock health and ecosystem impacts are monitored and analyses are published in peer-reviewed scientific papers, discussed at annual meetings especially of the Working Party on Tropical Tunas (WPTT) and the Compliance Committee (CoC).

There is close monitoring of the tropical purse seine fisheries activities and performance by all key stakeholders, including through the Indian Ocean FIP SIOTI and annual surveillance audits of the two fisheries on the Indian Ocean skipjack stock that are already MSC certified. Resolutions and results (or lack thereof) are commented upon throughout the year by Environmental NGOs with observer status[34] who provide external reviews and press for changes, most recently in an organised fashion through the SIOTI Action Plan.

Areas of particular importance for this fishery at the IOTC 23rd Commission meeting in 2019 concerned the increase in yellowfin catch and lack of functional harvest strategy for all species, especially of Harvest Control Rules; the need for more transparent compliance monitoring and reporting mechanisms and an effective FAD management Plan (IOTC, 2019h; WWF, 2019). This was also picked up by a recent paper (Juan-Jordá et al., 2016) on the use of ecosystem-based fisheries management (EBFM) by tuna RFMOs (tRFMOs), and a meeting on the subject was held at FAO headquarters in December 2016, where the IOTC pledged detailed measures to develop its EBFM (FAO, 2017).

At EU level, regular internal reviews are done before submission of the annual report to IOTC, and external reviews are provided at IOTC, and by the Joint Committees that meet annually to monitor the Seychelles and Mauritius SFPAs (although their reports are not public). The SFPAs are further monitored and evaluated before each Protocol renewal; see Goulding et al. (2019). The LDAC has had its first performance review in 2018, which focused on its internal functioning[35]. The Producer Organisation Orthongel, similar to all European POs, submits an annual Production and Marketing Plan report, which is not publicly available, but which is formally reviewed by the French DPMA and by the EU Commission to ensure compliance with the CFP (in particular with the IUU (EC, 2008) and Control (EC, 2009) Regulations.

The Indian Ocean skipjack fishery does not have a formal management plan. Its management system performance is monitored and evaluated for its key parts, including scientific advice, management measures, fleet capacity, stakeholder involvement through the IOTC Performance reviews and for its costs to the EU taxpayer and its local value added for coastal states through the SFPA.

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[34] see http://iotc.org/about-iotc/observers-iotc-meetings

[35] https://ldac.eu/images/LDAC_web-compressed_Performance_Review.pdf

6.6.7 Principle 3 Performance Indicator scores and rationales

Scoring table 22. 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 with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2	There is an effective national legal system and organised and effective cooperation with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2.	There is an effective national legal system and binding procedures governing cooperation with other parties which delivers management outcomes consistent with MSC Principles 1 and 2.
	Met?	Yes	Yes	No

Rationale

The jurisdictions of relevance for the fishery's management system are 1) the IOTC RFMO at regional level (IOTC, 2012), 2) the EU (through the EU Common Fisheries Policy and the SFPA with coastal states of Seychelles and Mauritius), 3) France-TAAF (OT) as policy makers, France and Italy as flag states, 4) Western Indian Ocean coastal states in whose EEZ the vessels have a licence to fish: Seychelles and Mauritius, and 5) the Seychelles and Mauritius as port states. IOTC, to which all jurisdictions mentioned are CPCs, provides an organised and effective international cooperation framework regarding scientific data collection and sharing, stock assessment and the development of scientific advice and well as monitoring and control. SG60 is met. IOTC resolutions are incorporated into EU legislation (Council Decision (EU) 2019/860 of 14 May 2019), which through the CFP has direct effect in the French and Italian national legislations. IOTC conservation measures adopted as resolutions to deliver management outcomes consistent with Principles 1 and 2 are therefore binding at national (EU (France, Italy) and France (OT)) and regional (IOTC) levels, SG80 is met. However, a European NGOs-led meeting held in November 2019 (Birdlife et al., 2020) recommended in particular that SFPAs with coastal states be based on improved transparency to determine more precisely how much surplus production was available to EU vessels. In addition, the EU legal system of SFPAs does not impose the same reporting standards to its registered vessels if they are operating in third country waters. For example, some technical barriers to effective data sharing remain to be resolved regarding the implementation of the electronic reporting (ERS) and timely validation of scientific data derived from catch records from certain purse seiners (Goulding et al., 2019). Finally, cooperation of all other parties within the IOTC is not mandatory. It is therefore possible for an individual IOTC CPC to object to an otherwise binding IOTC resolution that is key to the fishery's management, such as Australia regarding Res 16/02 on Harvest Control Rules for Skipjack tuna in the IOTC area of competence (IOTC, 2018g), and more recently when India objected to Resolution 19/01 on an Interim Plan for rebuilding the Indian Ocean Yellowfin tuna (IOTC, 2019i) therefore SG100 is not 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

Dispute resolution mechanisms exist at all jurisdictional levels (IOTC, EU, French and Italian), SG60 is met. The IOTC annual meetings provide a basis to avoid disputes and deal with major issues at regional level (art. 23 in IOTC (2012)). The EU Long Distance Advisory Council (LDAC) and the Producer Organisation (PO: Orthongel) do the same regarding issues that the client company (CFTO) may have at EU and French/Italian levels. Mechanisms are transparent and considered to be effective. SG80 is met. However, at this time, an absence of legal disputes at regional level means that the system has not been tested. 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 regional level, the IOTC agreement (IOTC, 2012) was drawn from the United Nations Convention on the Law of the Sea (UNCLOS) and one of the key function of its Commission is “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.” In this regard, the skipjack HCRs state that "If B_{curr} is below B_{safety}, the catch limit is zero except for subsistence fisheries" (CMM 16-02 - IOTC (2019c)), which recognises 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 arrangement between the fishing company and the coastal state. Historical involvement recognised at EU and French/Italian levels through the PO is also recognised and used by IOTC to define “fishing anteriorities”, such as over the period 2007-2014 for yellowfin tuna. Therefore, there are mechanisms to observe legal rights created by customs for key target and non-target species and by gear type. Within coastal states waters, legal rights of people dependent on fishing for food or livelihood are taken into account by IOTC, to the extent that coastal states collect and report catch data - SG60 is met. The mechanisms are consistent with the objectives of Principles 1 and 2, SG80 is met. Work is on-going through the IOTC Technical Committee on Allocation Criteria (IOTC, 2019i), but presently there is no definitive overall IOTC agreement on access rights and allocations between distant fleet and coastal states, SG100 is not met.

References

IOTC (2012, 2018g, 2019c, 2019i); EU (2019b); Birdlife et al. (2020); Goulding et al. (2019)

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

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

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

Overall Performance Indicator score	80
Condition number (if relevant)	N/a

Scoring table 23. 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	No

Rationale

At all essential jurisdictional levels - IOTC, EU, France and Italy - organisations and individuals party to the fishery's management system are identified and their roles are understood. SG60 is met. For key areas of responsibility and interaction, the EU defines the conditions and obligations of member states vessels fishing in the IOTC area explicitly. Any new or changed obligations are discussed in preparation meetings prior to the IOTC Commission, Committees and scientific Working Parties meetings through the EU Advisory Council (LDAC, 2019) and the French Producer Organisation (PO see http://orthongel.fr/index.php?page=orthongel/op), professional representation at regular meetings with the Fisheries Ministry (DPMA) and scientific research institutes. SG80 is met. At IOTC level, not all obligations may be defined explicitly in the national management system of all CPCs. SG100 is not met.

b Consultation processes			
Guide post	The management system includes consultation processes that obtain relevant information from the main affected parties, including local knowledge, to inform the management system.	The management system includes consultation processes that regularly seek and accept relevant information, including local knowledge.	The management system includes consultation processes that regularly seek and accept relevant information, including local knowledge. The management system demonstrates consideration of the

			The management system demonstrates consideration of the information obtained.	information and explains how it is used or not used.
	Met?	Yes	Yes	Yes

Rationale

The IOTC management system is open to stakeholders who may take part through national delegations or as observers. The IOTC has also signed a number Memorandum of understanding (MoU) to facilitate cooperation and information sharing through its subsidiary bodies, especially the Working Party on Ecosystems and Bycatch and the Scientific Committee, regarding the protection of marine turtles (IOSEA https://www.cms.int/iosea-turtles/) and seabirds (ACAP https://www.acap.aq), SG60 is met.

European and national fishery managers and scientists responsible for broad policy development, associated research and scientific advice are involved in the IOTC process as key stakeholders. At European level, the Advisory Councils, here the Long-Distance fleet (LDAC) were set up to facilitate participation, information sharing including local knowledge and validation of data collected by scientists and by fishing crew (Working Group 1). The data are submitted to IOTC, analysed and discussed by the Scientific Committee and scientific working parties, where the fishing industry is also represented (IOTC, 2018d). Information submitted by the CPCs is logged and considered by IOTC (IOTC, 2017e) and forms the basis of its management advice; SG80 is met.

Meeting reports provide evidence that the management system considers the information obtained and include explanations about how and why some could be used or not; see for example the latest Compliance Committee report (IOTC, 2019f). The same applies to LDAC meetings in preparation of IOTC. All meeting reports are publicly available on the IOTC and LDAC websites. SG100 is met.

c	Participation			
	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	No

Rationale

The IOTC structure and processes offer numerous opportunities for all interested and affected parties to be involved. The first one is by opening all its Commission and subsidiary bodies meetings to registered observers (see https://www.iotc.org/about-iotc/structure-commission). Observers do not take part in discussions but may submit evidence in advance of the meetings, SG80 is met. Two initiatives are run by IOTC to facilitate the participation of interested and affected parties from developing countries, a Meeting Participation Fund (MPF) to support scientists and representatives from IOTC developing States CPCs, and a special fund for capacity building in order to ensure compliance with CMMs (https://www.iotc.org/about-iotc/capacity-building). However, a meeting led by European NGOs together with partners from around the Indian Ocean (Coalition nationale de plaidoyer Environmental à Madagascar (CNPE) and the Federation of Artisanal Fishermen of Indian Ocean (FPAOI)) held in November 2019 found that engagement was not yet strong and effective, and recommended that the coastal States and the EU should make sure that all relevant stakeholders at local, national and regional levels are systematically and transparently consulted prior to negotiations and during the implementation period of the SFPA Protocol (Birdlife et al., 2020). SG100 is not met.

References

IOTC (2017e, 2018d, 2019f), LDAC (2019), Birdlife et al. (2020)

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

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

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

Overall Performance Indicator score	85
Condition number (if relevant)	N/a

Scoring table 24. 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

The jurisdictions of relevance to the management policy and long-term objective setting are those "*broader than the specific UoA" (SA4.5.1),* the IOTC RFMO at regional level regarding the skipjack stock (Principle 1) and the Western Indian Ocean ecosystem (Principle), and the EU (through the EU Common Fisheries Policy and the SFPA with coastal states of Seychelles and Mauritius) and France-TAAF (OT) as policy makers (see Principle 2 regarding MPAs and ETP species strategies). The overarching objectives of the reformed CFP prevail in both French (hence France (OT)) and Italian fisheries policies. The IOTC establishment agreement in 1993 clearly stated that its objective is "to promote cooperation among its Members with a view to ensuring, through appropriate management, the conservation and optimum utilisation of stocks covered by this Agreement and encouraging sustainable development of fisheries based on such stocks (art.5)" SG60 is met. Since then, Resolution 12-01 on the implementation of the precautionary approach requires that IOTC to "apply the precautionary approach, in accordance with relevant internationally agreed standards" SG80 is met.

In addition, until the IOTC Agreement is re-drafted, Resolution 12-01 explicitly requires that clear long-term objectives are set "in applying the precautionary approach, the Commission shall adopt, after due consideration of the advice supplied by the IOTC Scientific Committee, stock-specific reference points ... and associated harvest control rules ..." (see Resolution 16/02). The long-term objectives are required in the formulation of each management measure, as presently demonstrated in the preamble of Resolution 19/01 on an Interim Plan for Rebuilding the Indian Ocean Yellowfin Tuna Stock. SG100 is met for the IOTC.

The European Common Fisheries Policy (CFP) regulation sets out clear objectives (EU, 2013 Article 2) "1. To ensure that fishing and aquaculture activities are environmentally sustainable in the long term and are managed in a way that is consistent with the objectives of achieving economic, social and employment benefits, and contributing to the availability of food supplies; 2. To apply the precautionary approach to fisheries management, and aim to ensure that exploitation of living marine biological resources restores and maintains populations of harvested species above levels, which can produce the maximum sustainable yield. In order to reach the objective of progressively restoring and maintaining populations of fish stocks above biomass levels capable of producing maximum sustainable yield, the maximum sustainable yield exploitation rate shall be achieved by 2015 where possible and, on a progressive, incremental basis at the latest by 2020 for all stocks; and 3. To implement the ecosystem-based approach to fisheries management so as to ensure that negative impacts of fishing activities on the marine ecosystem are minimised, and shall endeavour to ensure that aquaculture and fisheries activities avoid the degradation of the marine environment." The overarching objectives of the reformed CFP are stipulated in the preamble of each Regulation, which have direct effect and prevail in both French and Italian fisheries policies. They are required at EU and national levels. SG100 is met.

References

EU (2013) and IOTC (2019c)

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

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

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

Overall Performance Indicator score	100
Condition number (if relevant)	N/a

Scoring table 25. 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	No

Rationale

The fishery-specific objectives are set by the IOTC and the EU for the flag states. The IOTC Agreement objective, to "ensure, through appropriate management, the conservation and optimum utilisation of stocks covered by the mentioned Agreement and encouraging sustainable development of fisheries based on such stocks and minimising the level of bycatch" applies to the skipjack purse seine fishery. There are several components to the fishery-specific management system that are relevant to achieving the outcomes expressed by MSC's Principles 1 and 2.

For the target species (Principle 1): the IOTC stock management objective is to achieve MSY, SG60 is met. Resolution 16/02 defines explicit harvest control rules (HCR) when MSY-based reference points cannot be robustly estimated, which is presently the case for Indian Ocean skipjack as follows: 1) the biomass limit reference point is set at 20% of unfished levels ($B_{lim} = 0.2B_0$) and 2) the biomass target reference point, B_{targ}, at 40% of unfished spawning biomass (i.e. $0.4B_0$), SG80 is met. In addition, Resolution 19/05 bans discards of tuna species, including skipjack and of non-targeted species in order to ensure the achievement of its management and conservation objectives.

Short-term objectives are explicit within IOTC Resolution 16/02 including a total annual catch limit, maximum change in annual catch limit, and provision to review the HCR in "case that the estimated spawning biomass falls below the limit reference point" (IOTC, 2019c). Objectives are well-defined and measurable, and entirely transposed in the EU CFP regulation (EU, 2013). However, in 2018 the IOTC recommended catch limit for skipjack was overshot; therefore, at IOTC level, the objectives may not be demonstrably consistent with achieving the projected outcome, SG100 is not met.

Regarding Principle 2 outcomes, IOTC Resolution 12/01 requires application of the precautionary approach to adopt stock-specific Reference Points and associated HCRs. For other impacts on tropical tuna, other species and the ecosystem, Res 19/01, Res 19/05, Res 18/08, Res 18/04, Res 12/04, Res. 19/02, Res 13/04, Res 17/05, 19/03 and 18/02 are further examples of the long-term objectives with a precautionary approach that apply to this fishery (see section 6.6.3). SG80 is met.

At EU level, the CFP (EU, 2013 - Reg. (EC) 1380/13) long-term objectives of the fishery's management system apply for EU-registered vessels active on the High Seas and within coastal states EEZ's through the SFPAs. They require (in addition to IOTC fishery-specific objectives) that (i) sustainable exploitation of marine resources based on the precautionary approach taking into account available scientific data; (ii) the protection of the marine environment; (iii) the sustainable management of all commercially exploited species; and (iv) the achievement of good environmental status by 2020. EU fishing activities in external waters are based on the same principles and standards as those applicable under the CFP, which also prevail in the policy and legislation of all EU member states. SG80 is met for Principle 2 as well.

Some key short-term and long-term objectives are not well-defined and measurable. For example, catch and effort limits are not well-defined for skipjack (see Principle 1) or bigeye (Principle 2), SG100 is not met.

References

EU (2013) and IOTC (2019c)

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

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

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

Overall Performance Indicator score	80
Condition number (if relevant)	N/a

Scoring table 26. 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

The IOTC Agreement signed in 1993 put in place some decision-making processes. Resolutions are to be based on scientific evidence and may be drafted by sub-commissions and subsidiary bodies and at the initiative of a CPC. The EU, its members states and the coastal and island states are represented in the decision-making process at the IOTC level as CPC. SG60 is met.

The IOTC Rules of Procedures adopted in 1997 and updated in 2004 (https://www.iotc.org/node/5065) established clear decision-making processes within IOTC that are well-established by now. They lead to the formulation of binding Resolutions that detail strategies and measures to achieve the fishery-specific objectives. For example, IOTC Resolution 16/02 on the HCRs for skipjack tuna (IOTC, 2019c) is based on a recommendation of the Scientific Committee to the Commission. Similarly, Resolution 19/02 on Procedures on a FAD Management Plan makes reference to the relevant CMMs already in place and notes the pertinent elements of advice from the Scientific Committee. For EU member states, the IOTC decision-making process is integrated in the international policy parts of the CFP and the SFPA decision-making processes, informed by stakeholder input through the LDAC and other EU institutions. SG80 is met.

b	Responsiveness of decision-making processes			
	Guide	Decision-making processes respond to serious issues identified in relevant research, monitoring,	Decision-making processes respond to serious and other important issues identified in relevant	Decision-making processes respond to all issues identified in relevant research,

	post	evaluation and consultation, in a transparent, timely and adaptive manner and take some account of the wider implications of decisions.	research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions.	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

The IOTC decision-making process is transparent and responsive. The process is adaptive through the Working Parties meeting agenda setting and with the possibility for the Commission to establish a Technical Committee when a need for action is identified (see Resolution 16/09). The wider implications of decisions are examined by IOTC's subsidiary bodies, CPCs (including the EU) and meetings observers, who inform or are informed of the issues ahead of time, and are able to contribute and inform decisions on all serious issues. The EU transposes IOTC Resolutions systematically as legal obligations for EU member states, SG60 is met.

Besides serious issues, other important issues are also brought up and discussed through the same channels that have demonstrated their effectiveness from the bottom up. For the fishery, voluntary measures on biodegradable FADs and on active FAD buoy tracking arising from consultation and research have led to best practice being developed at the fishing company level to be shared and later become compulsory for PO members across French fishing companies, being presented at the EU LDAC, then at the IOTC and being incorporated into an IOTC Resolution (18/04 and 15/09) by the time the important issues of excessive FAD numbers developed into a serious one.

An important example for the fishery has been the timely introduction of a total catch limit for skipjack derived from the HCR (Res. 16/02, see Scoring table 3. PI 1.2.1 – Harvest strategy) fixed according to the recommendation of the Scientific Committee (SC) and communicated to all CPCs in December 2017 for the year 2018. However, the catch limit was exceeded by 30% in 2018, and by 16% in 2019. In 2020, the new skipjack stock assessment found the stock biomass in a good state, and the Scientific Committee noted that "the recent catches that exceeded the (previously-set) limits established for the period 2018-2020, could have been sustained by favourable environmental conditions". Therefore, the team considers the catch overages to be an important rather than a serious issue. However, the SC concluded that "the Commission needs to ensure that catches of skipjack tuna during this period (2021 – 2023) do not exceed the agreed limit" (IOTC, 2020e). Until this is done, for example through the implementation of a CPC catch allocation key, the IOTC decision-making processes do not respond to this other important issue, SG80 is not met for IOTC.

Furthermore, the annual calendar of meetings is crowded (see https://www.iotc.org/meetings), with inter-sessional meetings of various scientific, compliance and technical sub-committees, so decision-making could become unclear. This may be an issue particularly for developing countries, whose capacity to attend and participate in meetings of technical committees is likely to be limited (Medley et al., 2019). Therefore, the decision-making process may not allow to respond to all issues in a timely manner. SG100 is also 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

Decision-making processes within the IOTC, the EU and EU member states explicitly refer to the precautionary approach. The IOTC Resolution 16/02 on skipjack tuna and reports of the WPTT provide evidence that the precautionary approach and best available information are used for the management of the skipjack fishery. SG80 is met.

d	Accountability and transparency of management system and decision-making process			
	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	No

Rationale

The IOTC website provides information on current and forthcoming Resolutions and their information bases from research (Scientific Committee, WPTT), monitoring, evaluation (Compliance Committee), and performance reviews (annual monitoring reports) are published formally; SG60 and SG80 are met. Meeting agendas and reports of the Working Parties and Commission plenary sessions of meetings are published formally and are publicly available. "This formal reporting represents best practice, it is difficult to see how the current system could be improved in this respect" (Medley et al., 2019). SG 100 is met for IOTC fisheries.

The EU and member states are only implementing management decisions, but the EU fisheries management system, including for EU vessels operating outside EU waters in the Indian Ocean, is also well documented; SG60 and SG80 are met. The fishing company CFTO and the PO Orthongel websites provide detailed information on fleet management best practice and recommendation emerging from research collaborations (section 6.5.1.6). Proposals from the LDAC (LDAC, 2019) and discussions at the EU level on the SFPAs are publicly available (see Birdlife et al. (2020)), together with formal reporting on the fishery's performance includes ex-post and ex-ante evaluation of the SFPA (Goulding et al., 2019). However, we could not find how the EU part of the management system responded to the evaluation report, therefore SG100 is not met.

e	Approach to disputes			
	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	Yes

Rationale

There are no reports to suggest that the IOTC CPCs or EU member states with vessels in the UoA and the purse seine skipjack fishery in the Indian Ocean have been repeatedly violating the same law or resolutions active to ensure the sustainability for the skipjack fishery. IOTC resolves most disputes by consensus during its annual meetings. Although an objection exists for Resolution 16/02 on HCR for skipjack tuna from Australia who is therefore opting out (IOTC, 2018g), it does not appear to have resulted in deleterious consequences for the fishery. Wide observer participation and scrutiny, together with extensive reporting, ensure transparency, SG60 is met.

Within IOTC, a mechanism exists to support CPCs developing States, with the costs involved in any proceedings for the settlement of disputes that result from actions pursuant to Resolution 16/11 on Port State Measures to prevent, deter and eliminate IUU fishing. The team have found no evidence of court challenges to the skipjack fishery's management system, from IOTC CPCs including the EU. SG80 is met.

The range of consultation and the Resolution opt-out clause within the IOTC indicate a strong proactive approach to avoid legal disputes. This is demonstrated by the quinquennial performance review and systematic follow-up of the recommendations of the second review panel (Resolution 16/03, see section 6.6.6). SG100 is met.

References

Goulding et al. (2019), IOTC (2018g, 2019c, 2019e), Medley et al. (2019), Birdlife et al. (2020) and LDAC (2019)

IOTC Rules of Procedures (updated 2004) https://www.iotc.org/node/5065

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

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

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

Overall Performance Indicator score	75
Condition number (if relevant)	8

Scoring table 27. 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

In support of the IOTC compliance committee (CoC) and CPCs, mechanisms have been introduced and supported at international level (EU-Smartfish, World Bank Swiofish projects) to develop IOTC MCS capacity and the fishery's MCS system, including vessel licensing and registration, VMS, electronic logbooks, on-board observer and camera coverage and the monitoring of landings. Vessels found to be non-compliant in the IOTC or other tuna-RFMO areas are now listed on a shared IUU vessel register. For the vessels in the UoA, there is a reasonable expectation that vessels will comply with requirements. SG60 is met.

The Indian Ocean-wide implementation of the Port State Measures Agreement, with associated training supported by the IOTC and by the European Fisheries Control Agency (EFCA), together with the various MCS mechanisms including monitoring by scientific observers, constitute a system. IOTC requirements have been reinforced, for example regarding FAD buoys, which are systematically incorporated into EU legislation. The vessels in the UoA are EU-flagged and subject to all EU requirements. They are all equipped with VMS and followed in real time by the flag states national fisheries surveillance centres. VMS data are also available to EFCA and the coastal states with which the EU has an agreement (Seychelles and Mauritius). The IUU Regulation (EC, 2008) requires submission of daily VMS and eLogbook reporting, entry and exit and landings reports. The Control Regulation (EC, 2009) requires that all catch landed or transhipped (always in port) from the tuna vessels have a catch certificate delivered by the national competent authority on the basis of a reconciliation between VMS and e-logbooks. This reconciliation is also used to determine the vessel licence due to coastal states with which the EU has an agreement (Seychelles and Mauritius), and to validate the catch reports submitted by the EU to IOTC, including now for the YFT quota. In port, all landed and transhipped catch is also independently checked by a quantity surveyor (Socomep) in order to establish trade statistics (by species, size category and destination, by landed "cuve" or container). Finally, the processor buying the catch also establishes a final tally, by species and size category, which is checked against the catch certificate.

Port authorities check on board quantities against logbooks records per species and areas fished. The reports communicated to the team (29 for Seychelles and 3 for Mauritius in 2018) show conformity, and stakeholders interviewed during the site visit (Seychelles, PO) report no compliance issues with vessels in the UoA, which demonstrates the system's ability to enforce measures, SG80 is met.

However, weaknesses remain in the IOTC system's ability to obtain and analyse daily VMS and other information (see section 6.6.5), and MCS capacity of coastal/ island states CPCs need reinforcement to obtain a comprehensive system. 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

The jurisdictions of relevance for the fishery's management system are 1) the IOTC RFMO at regional level, 2) the EU (through the EU Common Fisheries Policy and the SFPA with coastal states of Seychelles and Mauritius), 3) France-TAAF (OT) as policy makers, France and Italy as flag states, 4) Western Indian Ocean coastal states in whose EEZ the vessels have a licence to fish: Seychelles and Mauritius, and 5) the Seychelles and Mauritius as port states. There are no IOTC sanctions for non-compliance, apart from blacklisting on the IUU vessel register. The responsibility for sanctions lies with each CPC, here the EU, and the flag states and with the PO (Orthongel). In the EU system, detailed and comprehensive sanctions exist for all EU Member States-flagged vessels operating outside EU waters, including on the High Seas (EC, 2009), SG60 is met. Sanctions have recently been applied by the EU to Spain and through the POs to purse seiner vessels for overshooting the quota on yellowfin in 2017, in the form of a reduction of the Spanish national quota in 2018 and 2019 (EU, 2019c). Administrative sanctions are defined as part of the licence conditions for the waters of the Seychelles, Mauritius and TAAF (TAAF, 2019), which mostly consist of temporary or permanent vessel licence suspension and possible penal sanctions such as the catch or a vessel being seized. These would be applied as part of the PSMA measures in the fight against IUU fishing activities; both Seychelles and Mauritius are signatories. Evidence exists that sanctions are consistently applied across EU member states, and between vessels at PO level, although there have not been any reported in recent years. Therefore, existing sanctions are assumed to provide effective deterrence for the UoA vessels, SG80 is met. A lack of convictions in recent years means that there is no demonstration of consistency, SG100 is not met.

c	Compliance

	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

The jurisdictions of relevance to ensure compliance with the fishery's management system are 1) the IOTC RFMO at regional level, 2) the EU (through the EU Common Fisheries Policy and the SFPA with coastal states of Seychelles and Mauritius), 3) France-TAAF (OT) as policy makers, France and Italy as flag states. The vessels' compliance when they are fishing on the High Seas are covered by these jurisdictions and by 4) the Western Indian Ocean coastal states in whose EEZ the vessels have a licence to fish: Seychelles and Mauritius, and 5) the Seychelles and Mauritius as port states through the MCS system of daily reporting of VMS and e-logbook information, the EEZs the entry/exit reports and port entry declaration as well as landings controls.

The new summary format added to IOTC annual Compliance Committee reports will make detailed analyses easier across IOTC CPCs and for all CMMs that are of importance to the skipjack fishery. A first analysis demonstrates that fishers in the UoA comply with the management requirements (IOTC, 2019f). From evidence provided by the fishing company CFTO and the PO Orthongel confirmed by the Seychelles Fish Authority and numerous IOTC reports, the vessels regularly provides key information (on Principle 1 and Principle 2 aspects as well as on potential IUU vessel sightings) that contribute to the effective management of the fishery, SG60 and SG80 are met.

However, in the absence of Western Indian Ocean regional fisheries surveillance programme or sea-going patrols in recent years, there cannot be a high degree of confidence. SG100 is not met.

d	Systematic non-compliance			
	Guide post		There is no evidence of systematic non-compliance.	
	Met?		Yes	

Rationale

Analysis of recent IOTC Compliance reports (IOTC, 2019f) show no evidence of systematic non-compliance in the fishery. The recently published summary of national compliance reports by CPCs (section 6.6.5) sheds a new light on the difficulties that some CPCs may experience with specific CMMs, but there is no evidence of systematic non-compliance, SG80 is met.

References

EC (2008, 2009), EU (2019b), IOTC (2019f), TAAF (2019), site visit consultations

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

Draft scoring range	≥80
Information gap indicator	Information to be supported with site visit interviews

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

Overall Performance Indicator score	80
Condition number (if relevant)	N/a

Scoring table 28. 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

The jurisdictions of relevance for the fishery-specific management system are essentially the IOTC RFMO at regional level regarding the stock management and the EU (through the EU Common Fisheries Policy and the SFPA with coastal states of Seychelles and Mauritius) and France-TAAF (OT) regarding the management of the UoA vessel activities in the Indian Ocean. Monitoring and evaluation mechanisms are in place at multiple levels of the IOTC and EU management systems, SG60 is met. The 2nd IOTC Performance Review concerned all parts of the IOTC system (IOTC, 2016), and will take place every 5 years. At EU level, the CFP is reviewed every 10 years, the SFPA protocols are usually in force for 5 years and an evaluation ex-post and ex-ante is conducted prior to any renewal (Goulding et al., 2019), see Section 6.6.6). SG80 is met. There are mechanisms to evaluate most possibly all) parts of the management system for this fishery at EU level, but the French system does not incorporate systematic evaluations of all management system parts. 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

The fishery-specific management system is reviewed occasionally (SG60 is met) and regularly internally at IOTC and EU levels. This includes internal reviews from the IOTC WP and by all stakeholders in preparation and during annual Commission meetings. For the skipjack CMM specifically, the Scientific Committee (SC) was tasked to "undertake and report to the Commission a model-based skipjack tuna stock assessment every three years, commencing with the next stock assessment in 2017" (see section 6.3.1), to review the HCRs" through further Management Strategy Evaluation (MSE), but no later than 2021 (i.e. five years from its implementation)". Initially, the Commission was to "review this measure (Resolution 16/02) at its annual session in 2019, or before if there is reason and/or evidence to suggest that the skipjack tuna stock is at risk of breaching the LRP". In its 2019 report, the Working Party on Methods notes that the SC recommended that a workplan and budget should be developed to undertake review and possible revision of the skipjack tuna harvest control rule under Resolution 16/02 (IOTC, 2019b).

Key parts of the fishery-specific management system (IOTC, the EU-SFPAs, the LDAC) are subject to occasional external reviews, SG80 is met. External reviews are regular for IOTC (IOTC, 2019g), the CFP, LDAC (LDAC, 2020) and the EU SFPA access agreements (Seychelles - Goulding et al. (2019) - and Mauritius - COFREPECHE et al. (2016)), but the French management system components are only occasionally reviewed externally, SG100 is not met.

References

Goulding et al. (2019) and IOTC (2016, 2019b)

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

Draft scoring range	≥80
Information gap indicator	Information to be supported with site visit interviews

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

Overall Performance Indicator score	80
Condition number (if relevant)	N/a

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8 Appendices

Appendix 1 Assessment information

Appendix 1.1 Small-scale fisheries

To help identify small-scale fisheries in the MSC program, the CAB should complete the table below for each Unit of Assessment (UoA). For situations where it is difficult to determine exact percentages, the CAB may use approximations e.g. to the nearest 10%.

Percentage of vessels with length <15m	Percentage of fishing activity completed within 12 nautical miles of shore
0%	0%

Appendix 2 Evaluation processes and techniques

Appendix 2.1 Site visit and stakeholder participation

The site visit was initially scheduled to take place in the Seychelles on the 2nd to 4th of March 2020. However, because of the Covid-19 pandemic, the site visit was cancelled and remote meetings were held instead, between the 23rd April and 7th May 2020, as permitted under the MSC Coronavirus Derogation (https://fisheries.msc.org/en/fisheries/cfto-indian-ocean-purse-seine-skipjack-fishery/@@assessments). Note, however, that meetings with Pew and WWF took place outside this period (see Appendix 4 for further information). The individuals met during the remote meetings and their roles in the fishery are listed in Table 36. Stakeholders were notified about the assessment via notifications posted on the MSC website, as well as via direct email contact. The following notifications were made:

- Fishery announcement: 12 December 2019
- Stakeholder Announcement: Site Visit - delayed by 1 week: 21 January 2020
- Stakeholder input received following publication of ACDR: 14 February 2020
- Stakeholder Announcement: Site visit cancellation due to Coronavirus: 3 March 2020
- Stakeholder Announcement: Remote audit date and New Timeline: 16 April 2020
- Proposed peer reviewers: 16 June 2020

The audit was carried out in accordance with the MSC Fisheries Certification Procedure v2.1 for procedure and the MSC Standard v2.01 for scoring.

Formal submissions were made by ISSF, WWF and Pew in response to the ACDR and PCDR publications. These are further detailed in Appendix 4.

Table 36. List of attendees at the remote meetings.

Name	Position	Type of consultation
Rob Banning	Parlevliet & van der Plas	Provision of information
Pierre-Alain Carré	Compagnie Française du Thon Océanique	Provision of information
Antoine Bonnieux	Compagnie Française du Thon Océanique	Provision of information
Glen Holmes	Pew – International Fisheries Officer	Submission of comments on ACDR and during site visit (Appendix 4).
Emmanuel Chassot	Seychelles Fishing Authority	Provision of information
Philippe Michaud	Statehouse Seychelles	Provision of information
Michel Goujon	Orthongel	Provision of information
Umair Shahid	WWF - Indian Ocean Tuna Manager	Submission of comments on ACDR and during site visit (Appendix 4).

Karin Bilo	WWF - Senior Manager Global Seafood Certification Standards	Submission of comments on ACDR and during site visit (Appendix 4).
Nick Pfeiffer	ASI	Observer
Jo Gascoigne	Control Union	Assessor
Sophie des Clers	Control Union	Assessor
Chrissie Sieben	Control Union	Assessor, team leader

Appendix 2.3 Evaluation techniques

No public announcements were made, other than through the MSC website and MSC update emails, as well as through Control Union's fishery notifications (published on the MSC website) and emails to individual stakeholders.

The assessment was based on a review of publicly available data and documentation, and data, information and documentation provided by stakeholders prior to and during the site visit. Where data analyses were carried out by the assessment team, this is indicated in the report. Data sources are explained in detail in Section 6.3.6 of this report.

Scoring was agreed by the team via email correspondence and at a scoring meeting held on the 21st May 2020. Consensus was reached for all scores.

The scores were decided as follows:

How many scoring issues met?	SG60	SG80	SG100
All	60	80	100
Half	FAIL	70	90
Less than half	FAIL	65	85
More than half	FAIL	75	95

Note that where there is only one scoring issue in the SG, the issue can be partially scored – in this case the team used their judgement to determine what proportion of it was met, e.g. at the 100 level, a small part met = 85, about half met = 90, nearly all met = 95.

The decision rule for MSC certification is as follows:

- No PIs scores below 60;
- The aggregate score for each Principle, rounded to the nearest whole number, is 80 or above.

The aggregate score for each Principle is the sum of the weighted score of each Performance Indicator within that Principle.

The Risk-Based Framework was not used.

Appendix 3 Peer review reports

Appendix 3.1 Peer reviewer 1

General comments

Question	Yes/No	Peer Reviewer Justification (as given at initial Peer Review stage). Peer Reviewers should provide brief explanations for their 'Yes' or 'No' answers in this table, summarising the detailed comments made in the PI and RBF tables.	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)
Is the scoring of the fishery consistent with the MSC standard, and clearly based on the evidence presented in the assessment report?	Yes	Broadly, I agreed with the scoring and I do agree that they have correctly scored it based on the information presented. However there were a few PIs where additional information should be added or issues more fully scrutinised/discussed, and the scoring then should be reviewed in light of that additional information.	Thank you, please see our responses to your individual comments.
Are the condition(s) raised appropriately written to achieve the SG80 outcome within the specified timeframe? [Reference: FCP v2.1, 7.18.1 and sub-clauses]	Yes	Yes. Although note that the timeframe on condition 2 seems overly generous.	It is not clear, whether the peer reviewers believe more or less time should be needed. Conditions must typically be lifted within the 5 -year certification cycle of the fishery (pending the successful outcome of this fishery), unless exceptional circumstances are identified that require the condition to be carried over into the next certification cycle. No exceptional circumstances have - yet - been identified, and this condition was therefore fully harmonised with the overlapping fisheries (Echebastar and Maldives).
Is the client action plan clear and sufficient to close the conditions raised? [Reference FCR v2.0, 7.11.2-7.11.3 and sub-clauses]		N/a	
Enhanced fisheries only: Does the report clearly evaluate any		N/a	

Question	Yes/No	Peer Reviewer Justification (as given at initial Peer Review stage). Peer Reviewers should provide brief explanations for their 'Yes' or 'No' answers in this table, summarising the detailed comments made in the PI and RBF tables.	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)
additional impacts that might arise from enhancement activities?			
Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary)		Well written report with inclusion of a large amount of information and relevant references. A number of specific comments are made against the PIs. However, one general area that was underdone throughout was discussion of the implications of the recent increased use of FADs (as a proportion vs free-school sets) on by-product / bycatch and ETP species.	Thank you, please see our responses to your individual comments.

Performance indicator comments

PI	PI Information	PI Scoring	PI Condition	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)	CAB Response Code
1.1.1	Yes	Yes	NA	Scoring agreed.	No comment required.	
1.1.2	Yes	Yes	NA	Agree this PI is not applicable.	No comment required.	
1.2.1	Yes	Yes	Yes	Agree scoring. Also agree with the intent of the condition. However, the term of the condition (end of Year 4) needs further justification. The effectiveness of the HCR in achieving objectives will be evident by the end of Year 1, assuming that the next stock assessment is done in 2020. There is a high risk (given overcatch in 2018) that the stock is no longer around the TRP. I assume that the 4 year term is to allow the IOTC to implement any necessary changes in response to the	The reviewer's analysis of the timeframe is correct. We agree that it seems at least possible that the 2020 stock assessment will show that the harvest strategy is not being effective (bearing in mind that the harvest strategy includes the management tools as well as the HCR). Bearing this in mind, the condition timeframe needs enough time to make changes to the	Not accepted (no score change)

PI	PI Information	PI Scoring	PI Condition	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)	CAB Response Code
				2020 stock assessment, and then for the 2023 stock assessment to verify whether this has been effective. Without this rationale, the 4 year timeframe seems generous, given new evidence will be available within 1 year.	harvest strategy, should this be the case. For a RFMO, as we are all aware, improving harvest strategies is not a quick and straightforward process. Except under 'exceptional circumstances', conditions are required to be closed within a certification cycle, and end Year 4 is when the re-assessment would normally start - this is the logic for the timeframe. Note that this condition, including the timeline, is harmonised with the certified fisheries on this stock.	
1.2.2	Yes	Yes	Yes	Agree scoring, and agree with condition. However consider that 4 years is too generous for the term of this condition. If the 2020 stock assessment shows that the tools have not been effective in achieving the exploitation levels required under the HCR, then the current condition allows another 3 years for tools to be implemented. If high catches from 2018 continue, this could allow for 5 years of overcatch before effective tools are implemented that constrain catches within the exploitation levels required under the HCR. This is too generous, and I am of the view that the term of condition 2 should be no longer than "by the end of Year 3".	The point is taken about years of overcatch, but we are required to set condition timeframes that are realistic and achievable, and IOTC has been trying to put in place tools to implement the TAC (catch allocations) for several years already without much progress, so on that basis it seemed that as long a timeframe as possible was required. Note that if in intermediate years stock assessments show a change in stock status, then other parts of P1 will be rescored accordingly, so the fishery does not get a free pass for the duration of the condition timeframe.	Not accepted (no score change)
1.2.3	Yes	Yes	NA	Scoring agreed.	No comment required.	
1.2.4	Yes	Yes	NA	Scoring agreed.	No comment required.	

PI	PI Information	PI Scoring	PI Condition	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)	CAB Response Code
2.1.1	Yes	Yes	NA	Scoring agreed. Scoring Issue a: Important typo in paragraph 2 on page 81: "The total Indian Ocean yellowfin catch according to the IOTC database varied from ~~2~~**4**42,988 t in 2016 …" The base case scenario figures quoted for yellowfin are not consistent with the figures quoted on the IOTC Yellowfin Status Summary (at https://www.iotc.org/science/status-summary-species-tuna-and-tuna-species-under-iotc-mandate-well-other-species-impacted-iotc) and the most recent SC Yellowfin summary (https://www.iotc.org/documents/SC/22/ES04E). The PRDR states SB_{2017}/SB_0 = 0.29, while the IOTC summary uses 0.30. SB_{2017}/SB_{MSY} figures also differ between the PRDR and the IOTC docs. Perhaps the two documents are using different reference cases, however this should be clarified.	Important typo indeed, thank you very much for spotting. Yes the values are slightly different (as they were for bigeye - in which case we used the IOTC summary values). We have amended them. This does not affect the scoring.	Accepted (no score change)
2.1.1	Yes	Yes	NA	Scoring Issue b: The text under striped marlin states that "a new stock assessment was carried out in 2017". The IOTC stock status advises that the latest stock assessment for striped marlin was undertaken in 2018. Please correct.	Corrected	Accepted (no score change)
2.1.2	No (scoring implications unknown)	No (scoring implications unknown)	NA	Please clarify if the testing referred to explicitly considered the impact of the recent increased use of FADs on YFT. The increased use of FADs is likely to persist, and given the smaller size of YFT typically taken while FAD fishing, it will mean that a larger number of YFT are caught. The implications of this for the stock (a stock that is currently under a rebuilding plan) should be further discussed here. If this increase in FAD use was	The peer reviewer is right. This effect is unlikely to have been fully considered in the projections (according to Fu et al., the model tends to underestimate the proportion of fish in the smaller length mode from purse-seine FAD fisheries). We amended the scoring which now states that SG100 is no longer met for YFT. Note,	Accepted (non-material score reduction)

PI	PI Information	PI Scoring	PI Condition	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)	CAB Response Code
				not considered in testing, it cannot be said that the "testing supports high confidence that the strategy will work based on information drectly about the UoA" in accordance with SIb SG100.	however that this does not change the overall score for the PI.	
2.1.3	Yes	Yes	NA	Scoring agreed.	No comment required.	
2.2.1	Yes	Yes	NA	Scoring agreed.	No comment required.	
2.2.2	No (no score change expected)	Yes	NA	Scoring agreed. Information should include discussion about the implication of the increased use of FADs on secondary species. FADs are associated with greater amounts of by-product/bycatch and therefore it is likely that there will be increased catches of some secondary species as the fleet increases their reliance on FAD fishing. As such, the potential impacts of this shift on secondary species should be discussed.	Any effects on bycatch resulting from an increase in FAD use would have been captured by the four-year dataset for electronic monitoring and the five-year dataset for on-board observers. The fact remains that no main secondary species were identified for any of those years, and the fishery has been scored on that basis. The rationale was not amended.	Not accepted (no score change)
2.2.3	No (scoring implications unknown)	No (non-material score reduction expected)	NA	SIa: Given that there are no main secondary species, Scoring Issue should not be scored (or scored N/A) rather than SG100 being met (which artificially inflates the score). This is consistent with the approach taken in 2.2.1 Sia, and the guidance provided 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 (noting that this is not specifically guidance for 2.2.3, but is directly relevant to this example)	This has been a matter for some debate and the peer reviewer's approach had indeed been used by the P2 assessor in the past as well. However, the inverse is true as well. If UoA data are inadequate and no main species are identified, not scoring SIa would unfairly lead to higher scoring by defaulting to SG80 under SIc. The fact that the fishery has high levels of observer coverage and that there are no main secondary species supports the SG100 score for SIa. The rationale was not amended. (the P2 assessor in fact submitted the query to MSC that the PR refers to - this query and the response were very much in relation to the outcome	Not accepted (no score change)

PI	PI Information	PI Scoring	PI Condition	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)	CAB Response Code
					PIs, as is clear from the title. Also note SA3.3.1: If a team determines that the UoA has no impact on a particular component and has therefore scored 100 under the Outcome PI, the Information PI shall still be scored.)	
2.2.3	No (scoring implications unknown)	No (scoring implications unknown)	NA	The FCR GSA 3.6.3 requires that to score the adequacy of the information, CABs are required to assess the range of different information available. Very little information and analysis of the adequacy of information is provided against the Scoring Issues here. Additional information should be included analysing the adequacy of the information on minor secondary species - for example is there reasonable consistency between the logbook data and observer data on secondary species, or are there large differences in amounts and identification between the two data sources. Also, is there information sufficient to tell the different catch compositions (and therefore effect on secondary species) of FAD vs free-school fishing?	It is unclear whether the peer reviewer has read the section "Catch profiles and data availability" in detail? This section explores the consistency of the logbook data against the validated logbook data (granted, for the key target species only, which are the only main species in this assessment). Furthermore, logbook data should be treated with caution (as this is essentially self-reporting) and bias should therefore be expected. The logbook data were therefore considered on a precautionary basis (for example in cases where species were listed in the logbooks, but not the observer data, they would have been considered in scoring). In any event, minor species intervene at SG100 only and none of the data requirements are met at that level. Finally, FAD and free-school sets are assessed as a single UoA (i.e. considered as part of the same fishery) as per FCP2.2. requirements (which this fishery aimed to meet ahead of time). There is therefore no procedural requirement to compare FAD catches with free-school catches. In any case, given the dominance of FAD catches,	Not accepted (no score change)

PI	PI Information	PI Scoring	PI Condition	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)	CAB Response Code
					it is reasonable to assume that the catch profile is likely to be more representative of the FAD component. Precedent from other MSC certified free-school fisheries would indicate that this leads to a more precautionary assessment (free-school sets generally performing better in MSC assessments). The rationale has not been amended.	
2.3.1	No (scoring implications unknown)	No (scoring implications unknown)	NA	SIb: Assessment against this SI should discuss the implications of the increased use of FADs in the UoA on different ETP species. Some species are undoubtedly going to be more prone to capture, and potentially mortality, when FADs are used, therefore there is likely to be an increased impact upon them resulting from the increasing reliance on FAD fishing. Also request that the date by which the UoA will have fully implemented non-entangling FAD designs (consistent with IOTC required design) is clarified ("working towards implementation" is often referred to, with no clear implementation date).	Any effects on ETP bycatch resulting from an increase in FAD use would have been captured by the four-year dataset for electronic monitoring and the five-year dataset for on-board observers. The team considers that the increased FAD use has therefore already been taken into account in scoring. Note that catch composition is also something that will be examined on a yearly basis during surveillance audits (should this assessment be successful). The rationale was not amended. Please note that a recommendation has now been added in relation to full adoption of non-entangling FAD designs.	Not accepted (no score change)
2.3.2	Yes	Yes	NA	Scoring agreed.	No comment required.	
2.3.3	No (scoring implications unknown)	No (scoring implications unknown)	NA	As per GSA3.6 (which also applies to ETP as per GSA3.12), this PI should include a discussion of the accuracy of qualitative and quantitative information emerging from the various sources, in particular the accuracy of logbook reports of ETP interactions. Analysis	Logbooks should not be considered an adequate source of information for ETP interactions as they are likely to suffer from significant bias, due to intentional or unintentional misreporting and under-	Not accepted (no score change)

PI	PI Information	PI Scoring	PI Condition	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)	CAB Response Code
				of how the different data sources compare (or "triangulation" in the language of the FCR) is important to get an understanding of the adequacy of any or all sources of ETP catch and mortality data.	reporting of ETP species encounters. As the reviewer will note, two separate datasets have been presented, stemming from on-board observers and EM, respectively. To account for the acknowledged bias in the data, the worst-case scenario (i.e., highest scaled up encounter levels) were taken into consideration for the scoring of each ETP species scoring element. The rationale has not been amended.	
2.4.1	Yes	Yes	Yes	Scoring agreed.	No comment required.	
2.4.2	No (scoring implications unknown)	No (scoring implications unknown)	Yes	SIc: The 300 FAD limit may not actually lead to a decrease in the number of FADs deployed, as many vessels currently have less than 300, FADs are aggregated/shared across vessels in a fleet, and loop-holes associated with FADs being "operational" (indeed text under 2.5.3 b actually suggests deployments have gone up). As such, unless there are quantitative figures on the amount of FADs currently being used by CFTO and retrieval/deployment/losses, it cannot be proven whether this strategy is being implemented successfully, or whether this strategy will reduce dFAD numbers (and therefore beaching events). Suggest the scoring of this PI is reviewed based on any quantitative evidence available on actual FAD numbers.	We do not disagree with the peer reviewer, but argue that all these points are addressed under SIb, where it is acknowledged that an objective basis for confidence that the strategy is working, is lacking. The strategy, in terms of FAD buoy deployments, is to limit these at 300 which the UoA is compliant with (through regular reporting to IOTC). Therefore, they are implementing the strategy successfully. However, it is clear that the number of buoys deployed is not the same as the number of FADs deployed, and therefore, it is not clear that this strategy (although in place and implemented by the UoA) will reach the objective of reducing FAD beachings. Therefore, SG80 is not met for SIb, but it is for SIc. We noted a small typo in the text which said that "Adherence to the 300 FADs per vessel limit is also	Accepted (no score change)

PI	PI Information	PI Scoring	PI Condition	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)	CAB Response Code
					controlled". This should be "300 FAD buoys" per vessel and has been corrected.	
2.4.3	Yes	Yes	Yes	Scoring agreed.	No comment required.	
2.5.1	Yes	Yes	NA	Scoring agreed.	No comment required.	
2.5.2	Yes	Yes	NA	Scoring agreed.	No comment required.	
2.5.3	Yes	Yes	Yes	Scoring agreed.	No comment required.	
3.1.1	No (scoring implications unknown)	No (scoring implications unknown)	NA	With regards to scoring issues a and c, the discussion does not provide a sufficiently thorough critique of the SFPAs and the performance of the EU with regards to respecting coastal State rights. The EU has been critical of coastal State actions to implement more active, coordinated and improved EEZ management of DWF vessels (particularly evident in EU issues with the PNA VDS in the Pacific). They have consistently argued against greater recognition of coastal State rights and developing State rights in allocation processes at IOTC, ICCAT and WCPFC. The EU has also argued against the implementation of a coordinated IOTC VMS system (in various forms) which would (1) enhance developing coastal States ability to implement effective MCS in their EEZs, and (2) would allow for independent oversight and verification of the data and information being provided by the EU (and other DWFN) to coastal States and the IOTC on their activities. There is also substantive published criticism of the EU SFPAs, with regards to underpaying and overfishing in African coastal States (e.g. see link), and with regards to the transparency of EU activities in coastal States where access is enabled under SFPAs.	Elements and recent references added to the scoring rationale of SIa that correspond to the PR's points: 1) to indicate that a European NGOs-led meeting held in November 2019 (Birdlife et al., 2020) recommended in particular that SFPAs with coastal states be based on improved transparency to determine more precisely how much surplus production was available to EU vessels. 2) the EU legal system of SFPAs does not impose the same reporting standards to its registered vessels if they are operating in third country waters. For example, some technical barriers to effective data sharing remain to be resolved regarding the implementation of the electronic reporting (ERS) and timely validation of scientific data derived from catch records from certain purse seiners (Goulding et al., 2019)	Accepted (no score change)
3.1.2	Yes	Yes	NA	Scoring agreed.	No comment required.	

PI	PI Information	PI Scoring	PI Condition	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)	CAB Response Code
3.1.3	Yes	Yes	NA	Scoring agreed.	No comment required.	
3.2.1	Yes	Yes	NA	Scoring agreed.	No comment required.	
3.2.2	No (scoring implications unknown)	No (non-material score reduction expected)	NA	Scoring of Scoring Issue d is not agreed, the transparency and accountability of EU DWF vessels activities in the high seas and EEZs of non-EU coastal States cannot be said to meet 100. See above with regards to criticism regarding the transparency of the EU SFPAs and the EUs distant water fishing (and transhipping) activities. Is there evidence that the EU shares comprehensive operational catch data with the relevant coastal States in a timely manner? Is VMS data transmitted to relevant coastal States in near real-time to ensure that coastal States MCS activities are informed? It is not clear whether consultation has involved discussions with national authorities of the non-EU coastal States in which the UoA operates. These would be important stakeholders to interview for the purposes of understanding the performance of the UoA and flag-State with regards to their obligations and transparency.	The fishery's vessels land and tranship in Seychelles and we had confirmation during the (remotely held) site visit from the authorities that entry-exit and transhipment reports of the UoC vessels were submitted timely and verified. The national authorities communicated that they did not have concerns regarding the UoC, The shortcomings of the current arrangements were not fully discussed as the new SFPA Protocol was in the final stages of negotiation, and we could not obtain a copy in order to assess changes from the evaluation by Goulding et al (2019). We agree that the present arrangements result in a lower reporting standard than for vessels in EU waters (see PI 3.1.1 above), and that Tuna SFPA do not publish annual monitoring reports or explain how the evaluation findings are incorporating into new Protocol provisions. Some elements of clarification were added and the score for SId was reduced to SG80.	Accepted (non-material score reduction)
3.2.3	Yes	Yes	NA	Scoring agreed.	No comment required.	
3.2.4	Yes	Yes	NA	Scoring agreed.	No comment required.	

Appendix 3.2 Peer reviewer 2

General comments

Question	Yes/No	Peer Reviewer Justification (as given at initial Peer Review stage). Peer Reviewers should provide brief explanations for their 'Yes' or 'No' answers in this table, summarising the detailed comments made in the PI and RBF tables.	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)
Is the scoring of the fishery consistent with the MSC standard, and clearly based on the evidence presented in the assessment report?	Yes	Good reference is made to the requirements of the standard throughout. Scoring is appropriate and reasonable.	Thank you.
Are the condition(s) raised appropriately written to achieve the SG80 outcome within the specified timeframe? [Reference: FCP v2.1, 7.18.1 and sub-clauses]	Yes		
Is the client action plan clear and sufficient to close the conditions raised? [Reference FCR v2.0, 7.11.2-7.11.3 and sub-clauses]	N/a		
Enhanced fisheries only: Does the report clearly evaluate any additional impacts that might arise from enhancement activities?	Yes	It appears that the team have concluded that the FAD element of the fishery means that it is an enhanced fishery. I agree with this conclusion, in spite of this being a different conclusion to some other MSC assessments. The team have reasonably concluded that no change to the default assessment tree is required and the team have given propoer consideration to the impacts of this enhanced element - entanglement, ecosystem trap, and impact of lost FADs.	No comment required.

Question	Yes/No	Peer Reviewer Justification (as given at initial Peer Review stage). Peer Reviewers should provide brief explanations for their 'Yes' or 'No' answers in this table, summarising the detailed comments made in the PI and RBF tables.	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)
Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary)		Overall a very thorough and well presented report.	Thank you.
Optional: General Comments on the Peer Review Draft Report (including comments on the adequacy of the background information if necessary)		The issue in relation to FADs (entanglement, ecosystem and habitat impacts of lost FADs) were properly addressed. However, in terms of meeting SG80 'best practice' it would have been preferable if all of the client fisheries stated aims in relation to FADs (that they be all fully non-entangling and boiodegradable) had been fully implemented, prior to awarding a score of SG80 in relation to P2 management.	Please see our responses to your individual comments; a recommendation has been added.

Performance indicator comments

PI	PI Information	PI Scoring	PI Condition	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)	CAB Response Code
1.1.1	Yes	Yes	NA	Agreed	No comment required.	
1.1.2	Yes	Yes	NA	Agreed	No comment required.	
1.2.1	Yes	Yes	Yes	Agreed	No comment required.	
1.2.2	Yes	Yes	Yes	Agreed	No comment required.	
1.2.3	Yes	Yes	NA	Agreed	No comment required.	
1.2.4	Yes	Yes	NA	Agreed	No comment required.	

PI	PI Information	PI Scoring	PI Condition	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)	CAB Response Code
2.1.1	Yes	Yes	NA	Comprehensive and clear.	No comment required.	
2.1.2	Yes	Yes	NA	Comprehensive.	No comment required.	
2.1.3	Yes	Yes	NA	Agreed	No comment required.	
2.2.1	Yes	Yes	NA	Some more specifics about what the evidence is available in relation to entanglement would be benefitial, in particular in relation to out of scope species, some of which might be classified as main secondary. I did wonder if seabird bycatch might occur and not be reflected in the catch composition data, but note that Gilman 2011 notes that Seabird bycatch is not an issue in purse seine tuna fisheries: see link.	Please note that any out-of-scope species are likely to be captured in the ETP species component of this assessment, which also considers the risk of entanglement. Seabirds are indeed not considered at risk from purse seine fisheries and were therefore not considered as a scoring element. The rationale was not amended.	Not accepted (no score change)
2.2.2	Yes	Yes	NA	It's clear that SI a & e meet a default 80 if there are no main secondary species. But it is less clear (in the MSC requirements) that the lack of main species mean that SIb and c also achieve a default score of 80 (noting that SA3.8.1 states the team shall score this PI even if UoA has no impact on component). The initiatives to use less entangling FADs would seem applicable management in this area, which could be referred to, including progress in adopting non-entangling FADs.	Although 'main' is not explicitly stated in those SIs, the intent is that it applies here as well. Also see: GSA3.4.1 Approach to the assessment of main and minor species: The MSC requirements in P2 apply particularly to those species that are defined as 'main' species, according to their importance in the fishery, or by virtue of their low resilience. Requirements are specified for such 'main' species at each of the 60, 80 and 100 SG levels. Additional separate requirements are specified for the remaining 'minor' species, but only at the 100 level. Similar arrangements are specified both for primary and secondary species and for habitats, and for the Outcome, Management and Information PIs for each component. No such distinction is made for the ETP component,	Not accepted (no score change)

PI	PI Information	PI Scoring	PI Condition	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)	CAB Response Code
					where all species are scored at 60, 80 and 100. The rationale was not amended.	
2.2.3	No (non-material score reduction expected)	No (non-material score reduction expected)	NA	The lack of main species should not elevate the information score. If there are no main species SIa is N/A. This would reduce the PI score to 80. This interpretation (see link) relates to the outcome status PI, but the logic is made clear in the MSC response and is applicable here: 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	The other peer reviewer made the same comment. The same response is given here: This has been a matter for some debate and the peer reviewer's approach had indeed been used by the P2 assessor in the past as well. However, the inverse is true as well. If UoA data are inadequate and no main species are identified, not scoring SIa would unfairly lead to higher scoring by defaulting to SG80 under SIc. The fact that the fishery has high levels of observer coverage and that there are no main secondary species supports the SG100 score for SIa. The rationale was not amended. (the P2 assessor in fact submitted the query to MSC that the PR refers to - this query and the response were very much in relation to the outcome PIs, as is clear from the title. Also note SA3.3.1: If a team determines that the UoA has no impact on a particular component and has therefore scored 100 under the Outcome PI, the Information PI shall still be scored.)	Not accepted (no score change)
2.2.3	No (scoring implications unknown)	No (scoring implications unknown)	NA	Information about the level of mortality through FAD entanglement should be included. See link.	This information has been added. The scoring has not changed.	Accepted (no score change)

PI	PI Information	PI Scoring	PI Condition	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)	CAB Response Code
2.3.1	Yes	Yes	NA	Very thorough rationale. This PI clearly examines only the effect of the UoA and, in this case, the UoA is relatively tightly defined. As such it is the total impact of these vessels rather than the impact of all vessels fishing in this way (purse seine on FADs) that is being scored. Therefore the scoring conclusion is probably reasonable, given the positive steps that the UoA appears to have taken. That said, it would have been preferable if the CFTO had completed it's move towards full implementation of netting-free FADs with ropes, i.e. non-entangling FADs. This would have allowed a greater degree of confidence in the scoring of mortality due to entanglement. A condition might have been a way to achieve this.	Although the peer reviewer makes a valid point, the team cannot raise a condition for the sake of raising a condition; i.e. the risk of entanglement in UoA FADs is considered sufficiently low to the extent that it is highly unlikely the UoA will cause unacceptable impacts on ETP species at the population/stock level. However, it is true that this could do with highlighting more and we have therefore added it as a recommendation.	Accepted (no score change)
2.3.2	Yes	No (material score reduction expected to <80)	NA	Rationale states that "The French fleet only deploys non-entangling FADs", whereas 2.3.1 suggests that this is yet to be fully implemented. This should be made clear. Given this is a key element of the strategy, if it is not yet implemented then there is a reasonable argument to say SG80 is not met.	This has been clarified; however, the use of lower-risk entangling FADs (which is what the CFTO strategy is based on) is sufficient in itself to reduce ETP species impacts to a point where it is highly unlikely the UoA will cause unacceptable impacts on ETP species at the population/stock level (as argued in the preceding PI). As noted above, a recommendation has been added but the scoring has not changed.	Accepted (no score change)
2.3.3	Yes	Yes	NA	Agreed	No comment required.	
2.4.1	Yes	Yes	Yes	Excellent to see proper consideration of the fate of lost FADs.	Thank you - no comment required.	
2.4.2	Yes	Yes	Yes	Excellent to see proper consideration of the fate of lost FADs. Condition will encourage on-going move to biodegradable FADs.	Thank you - no comment required.	

PI	PI Information	PI Scoring	PI Condition	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)	CAB Response Code
2.4.3	Yes	Yes	Yes	The gap in knowledge about UoA FAD loss is correctly identified as an issue warranting a condition.	No comment required.	
2.5.1	Yes	Yes	NA	Agreed	No comment required.	
2.5.2	Yes	Yes	NA	Agreed	No comment required.	
2.5.3	Yes	Yes	Yes	Pretty rare to see conditions on ecosystem, but ecosystem trap theory is one of the issues about FADs that has been highlighted in the past so correct that it should be subject to further research - harmonised with other MSC fisheries.	No comment required.	
3.1.1	No (no score change expected)	Yes	NA	Justification is a bit too brief for some SIs. And sometimes concluding statements are made without pointing to the specific audit evidence. It would be helpful to make specific reference to the AGREEMENT FOR THE ESTABLISHMENT OF THE INDIAN OCEAN TUNA COMMISSION (see link). Some parts of this are directly relevant - such as Article XXIII. INTERPRETATION AND SETTLEMENT OF DISPUTES and Article XV. COOPERATION WITH OTHER ORGANIZATIONS AND INSTITUTIONS	We have added more detail to the rationale although the overall scoring has not changed.	Accepted (no score change)
3.1.1	No (no score change expected)	Yes	NA	SIc: Although not fishery specific - worth mentioning that the HCR states that "If B_{curr} is below B_{safety}, the catch limit is zero except for subsistence fisheries". I.e. the fishery would not be closed to subsistence fishers.	We have added this to the rationale – the scoring has not changed.	Accepted (no score change)
3.1.2	No (non-material score reduction expected)	No (non-material score reduction expected)	NA	The mechanisms described are to allow registered organisations and NGOs to quietly observe meetings. Capacity Building focusses on building government and institutional capacity (likewise the Meeting Participation Fund) . These are welcome and positive, but are not quite the same as full and open stakeholder consultation. It would enhance the justification if	We have added references and elements to the report text and scoring tables in line with the peer reviewer comments. The score for SIc was reduced from SG100 to SG80.	Accepted (non-material score reduction)

PI	PI Information	PI Scoring	PI Condition	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)	CAB Response Code
				particular examples of consultations or consultation processes were given. For example EU DGMARE publish a number of consultations - including on annual fishing opportunities (see link). I have not been able to able to see any form of open or public consultation at the IOTC level. Note the suggestion in the recent joint position paper of a number of EU NGOs to "Increase the engagement of civil society in SFPA negotiations and implementation discussions for fair and sustainable Agreements". See link.		
3.1.3	Yes	No (non-material score reduction expected)	NA	SG100 is about the requirement to set objectives - not what the objectives themselves require (which is subject of SG80). A clear list of explicit objectives (as presented here) is sufficient to support scoring at SG80 level. To score at SG100, it must be shown how these are "required by management policy".	For SG100 to be met, long-term objectives have to be explicit and required by policy, yes. We take the wording quoted for both IOTC and the CFP policy statements "considered" in management measures preambles as requirements, and not as options. We have added clarification to the rationale but the scoring has not changed.	Not accepted (no score change)
3.2.1	Yes	Yes	NA	Reg. (EC) 1380/13 is non-fisheries specific, so probably belongs in 3.1.3.	We have left this in because the CFP objectives hold for all EU-registered vessels, wherever they fish. Some clarification has been added to the rationale.	Not accepted (no score change)
3.2.2	Yes	Yes	NA	Medley 2019, was a pre-assessment and therefore not, in itself, appropriate audit evidence.	We have left this in because the scientific report, which aims to encourage a benchmark of best practice among Tuna RFMOs, is published and widely available.	Not accepted (no score change)
3.2.3	Yes	Yes	NA	Agreed	No comment required.	

PI	PI Information	PI Scoring	PI Condition	Peer Reviewer Justification (as given at initial Peer Review stage)	CAB Response to Peer Reviewer's comments (as included in the Public Comment Draft Report - PCDR)	CAB Response Code
3.2.4	No (no score change expected)	No (no score change expected)	NA	SIa focuses on the "parts" of the system, whereas SIb focuses on the "fishery specific management system". SIb therefore requires clear reference to review(s) of the IOTC Skipjack management. Resolution 16/02 On harvest control rules for skipjack tuna in the IOTC area of competence (see link) states "The Commission shall review this measure at its annual session in 2019, or before if there is reason and/or evidence to suggest that the Skipjack tuna stock is at risk of breaching the LRP". I have not been able to find this review. If this has not happened then it it worth noting.	We have made clarifications to the rationale, thank you. The scoring has not changed.	Accepted (no score change)

Appendix 3.3 Peer reviewer follow-up

Question	Peer Reviewer comments at Public Comment Draft Report stage Insert additional rows for each clearly distinct issue raised.	CAB response to Peer Reviewer's Public Comment Draft Report stage comments (as included in Final Draft Report)
List here any issues not covered in the Performance Indicators or Conditions table (following sheet) that you feel haven't been adequately addressed in the CAB response and would make a material difference to the scoring of the fishery.	I just have a single follow-up comment (PI2.3.2). In all other cases the CAB response to my PR comments is adequate.	Please see our response below.

PI	PR Comm-ent Code	Peer Reviewer Justification (as given at Public Comment Draft Report (PCDR) stage)	CAB response to Peer Reviewer's comments (as included in the Final Draft Report)	CAB Response Code
2.3.2	No (material score reduction expected to <80)	The statement has been amended from "The French fleet only deploys non-entangling FADs" to "The French fleet only deploys in their terms non-entangling FADs". The use of the phrase "in their terms" is confusing. What exactly does this mean from an audit point of view? It would be helpful if the description of deployed FADs could be more tightly defined throughout. There remain instances where the report states "non entangling FADs" when in fact referring to the earlier generation sausage net, which are elsewhere defined as "Lower entagling FADs". It would appear that the continued use of the "sausage net", which appears to be included in the "in their terms" definition above, is in contravention of RESOLUTION 19/02PROCEDURES ON A FISH AGGREGATING DEVICES (FADS)MANAGEMENT PLAN. This states that "CPCs shall require their flagged vessels to use non-entangling designs and materials in the construction of FADs as outlined in Annex V". Annex V states "If a sub-surface component is used, it shall not be made from netting but from non-meshed materials such as	In line with resolution 19/02 the client fishery has committed to only deploying fully non-entangling FADs from 2021 and this is now reflected in the report. However the assessment overlaps with the period when lesser entangling FADs were also in use. Because we have no data on unobserved mortality of ETP species due to entanglement in these FAD types, a new condition has been raised in relation to 2.3.3 which is also in line with other FAD fisheries in the MSC programme.	Accepted (no score change)

		ropes or canvas sheets". This definition does not allow for the continued use of the "sausage net / lower entangling" FAD. Given that, a score of 80, backed by a recommendation seems insufficient. A condition would require full compliance with the resolution above.		

Appendix 4 Stakeholder input

Appendix 4.1 Stakeholder input prior to PCDR

Following publication of the ACDR, comments were submitted by ISSF, WWF and Pew. All parties were given the opportunity to discuss the comments with the assessment team, either in-person or remotely. Remote meetings were held with WWF and Pew representatives as detailed in the following sections.

Appendix 4.1.1 ISSF Comments

The following comments were submitted by ISSF on the 7th February 2020.

Performance Indicator (PI)	Input summary	Input detail	Evidence or references	Suggested score change	CAB response code
1.1.1 - Stock status	The independent report by Medley et al. (2019) indicates that the fishery would not meet SG100 for SI 1.1.1.b	According to the independent report Medley et al (2019), there is not a “high degree of certainty” that the stock has been above the MSY reference points in recent years: “The new [2017] stock assessment estimates mark a significant change from the previous assessment, and it may take a few years further research to establish a more robust assessment which is widely accepted. A number of alternative models indicated lower stock status. So, although on balance the stock was determined to be at the MSY level, this conclusion is not highly certain, so SG100 is not met.” Furthermore, according to IOTC Scientific Committee 2019 meeting report, total catches in 2018 (607,701 t) were 29% larger than the catch limit generated by the Harvest Control Rule (470,029 t) which applies to the years 2018–2020, and there has been an increasing trend in catches over the past 3 years, reducing the degree of certainty that the true stock status is fluctuating around MSY levels.	' - P.A.H. Medley, J. Gascoigne and J. Akroyd. 2019. An Evaluation of the Sustainability of Global Tuna Stocks Relative to Marine Stewardship Council Criteria (Version 6). ISSF Technical Report 2019-02. International Seafood Sustainability Foundation, Washington, D.C., USA - IOTC 2019. Report of the 22nd Session of the IOTC Scientific Committee. Karachi, Pakistan, 2-6 December 2019. IOTC–2019–SC22–R[E]	80	Not accepted (no score change)
CAB response to stakeholder input		The TRP and B_{MSY} are not the same for this stock. The TRP has been set by IOTC at 40%SB_0, and the stock is estimated to be at this level (equal probability of being above vs below). However, SB_{MSY} is estimated to be in the range 20-28%SB_0; hence the stock is estimated to be at 1.4-2X SB_{MSY}. 40%SB_0 is MSC’s default proxy for SB_{MSY} (hence the argument that the stock is at the MSY level) but MSC guidance (quoted in the rationale for 1.1.1a) states that if SB_{MSY} is estimated directly, then this value should be used instead of the proxy, and this procedure has been agreed between CABs for scoring tuna fisheries, as part of a harmonisation discussion. Using this lower reference point results in a higher score.			
Principle 2 - Minimising environmental impacts	Species classification	ISSF noticed that the classification of Principle 2 species in this assessment differs in some cases from the classification in the Echebastar Indian Ocean Purse Seine Skipjack fishery MSC assessment (e.g. silky shark, oceanic whitetip shark, shortfin mako). While it is noted in the ACDR that all P2 scores and the classification of some species are preliminary and will be reviewed after the site	'DeAlteris et al. (2018). Echebastar Indian Ocean Skipjack Tuna Purse Seine Fishery. Public Certification Report. November, 2018.	N/a	Not accepted (no score change)

Performance Indicator (PI)	Input summary	Input detail	Evidence or references	Suggested score change	CAB response code
		visit takes place, ISSF suggests that if differences in species classification exist with the Echebastar assessment, the CAB provides a detailed explanation on the criterion followed and how and why it differs from the one used for the Echebastar fishery assessment.			
CAB response to stakeholder input		Silky shark and oceanic whitetip shark are both considered ETP in both assessments. Mako sharks are not ETP as they do not meet the ETP designation criteria given in Section 6.5.1, i.e. there is no IOTC Resolution requiring the protection of mako sharks. Although shortfin mako is listed on the CMS Memorandum of Understanding on the Conservation of Migratory Sharks, this is not a legally binding document and as such does not meet the MSC criteria for ETP species. Note that the Echebastar report states: "MSC CR v.2 specifically notes in GSA 3.1.5.2 that species listed by the CMS are to be considered as ETP for an MSC assessment". This is incorrect as per the following requirements: SA3.1.5: The team shall assign ETP (endangered, threatened or protected) species as follows: (…) SA3.1.5.2: Species listed in the binding international agreements given below (…) b. Binding agreements concluded under the Convention on Migratory Species (CMS). The MoU as amended by the Signatories at their 3rd Meeting, Monaco, December 2018 (https://www.cms.int/sharks/en/page/sharks-mou-text) is explicitly non-binding and therefore does not meet this requirement . We add that IUCN status is not relevant for ETP species designation (unless it is an out of scope species, which is not the case here SA3.1.5.3). Finally, scaled up encounter estimates of shortfin mako sharks are less than 1 tonne annually (Section 6.3.6.4). Whether this species is considered as a secondary or ETP species is unlikely to affect the outcome of the assessment.			
3.1.2 - Consultation, roles and responsibilities	The independent report by Medley et al. (2019)	According to the independent report Medley et al (2019): "(…) Roles and responsibilities are not well defined and/or well understood in many areas, however. Recent (2015, 2016, 2017) resolutions defining data requirements still need clearer definition. But IOTC has had problems with flag states that have not applied appropriate	'P.A.H. Medley, J. Gascoigne and J. Akroyd. 2019. An Evaluation of the Sustainability of Global Tuna Stocks Relative to Marine Stewardship Council Criteria (Version 6). ISSF Technical	65	Not accepted (no score change)

Performance Indicator (PI)	Input summary	Input detail	Evidence or references	Suggested score change	CAB response code
	indicates that the fishery would not meet SG80 for SI 3.1.2.a	controls to their vessels, not submitting timely data, etc. Additionally, the broader roles of constituents of CPCs and sometimes the CPCs themselves are not always well understood. While these problems are not all in key areas in the sense that they do not prevent IOTC from completing many of its tasks, they nevertheless undermine its overall effectiveness and increase risks for fishery sustainability. Hence the fisheries do not meet SG80 and SG100."	Report 2019-02. International Seafood Sustainability Foundation, Washington, D.C., USA		
CAB response to stakeholder input		The global focus of the Medley et al (2019) report for IOTC relates to all CPCs and to all IOTC-managed fisheries. For this fishery specifically, the focus of Principle 3 indicator scores is put on the management bodies that are directly involved in the fishery's management, the IOTC, the EU and France (OT) and well as French and Italian institutions and stakeholders. Regarding IOTC, we do not evaluate "the performance of other fisheries management bodies where they are also subject to international cooperation… to the extent that they do not impact directly on P3 outcomes" (SA4.1.3). Regarding SI3.1.2a, the focus for IOTC regarding this fishery is on the SKJ stock management and fisheries, for which there are six main fleets (IOTC 2018 update, average catches 2013–17): European Union ≈20% (EU-Spain: ≈15%; EU-France: ≈5%); Indonesia ≈19%; ≈Maldives 16%; Sri Lanka ≈12%; Seychelles ≈10%; ≈I.R. Iran 9%. For these CPCs, Organisations and individuals involved in the management process at IOTC level are identified, and judging by their report submission and exchanges (e.g. Compliance Committee report (IOTC, 2019f), functions, roles and responsibilities are explicitly defined and well understood for key areas of responsibility and interaction, therefore SG80 is met for SIa (see scoring table). Regarding SI3.1.2b, the management system for the fishery consists of IOTC together with the EU and French institutions. At all levels consultation processes are required and well documented and demonstrate consideration of the information provided by stakeholders and explain how it is used or not used particularly through the PO Orthongel, which collaborates actively with ISSF, so that SG80 and SG100 are met (see scoring table).			
General comments					
Client Action Plan -- HS/HCR Advocacy actions ISSF supports the CAB's intention to set conditions that will speed up IOTC's work towards a more robust Harvest Strategy and Harvest Control Rules & Tools for Indian Ocean skipjack tuna. As regards			N/a	N/a	N/a

Performance Indicator (PI)	Input summary	Input detail	Evidence or references	Suggested score change	CAB response code
the future Client Action Plan to meet these conditions, ISSF would like to suggest a series of specific actions for the Client to consider: 1) Sign onto future NGO Tuna Forum global RFMO appeals 2) Continue to advocate for accelerated progress on the implementation of a robust Harvest Strategy and Harvest Control Rules & tools for skipjack tuna through the IOTC, such as through continued direct engagement with national delegations to the Commissions, or through alliances with other fisheries that are MSC-certified with conditions or under assessment; and 3) Publicly support ISSF Position Statements that contain detailed asks on Harvest Strategies and Harvest Control Rules to future IOTC Regular Sessions of the Commission and document that support (e.g. by submitting a letter or some other communication citing the Position Statement).					
CAB response to stakeholder input	The CAB cannot instruct the client to include these elements in the Client Action Plan but they are included in this report and therefore available to the client for consideration.				
Client Action Plan -- PI 2.3.3. ETP species information There are currently a number of Indian Ocean purse seine and longline tuna fisheries involved in Fishery Improvement Projects (FIPs), some of them with prospects to proceed to a full MSC assessment in the near future. Although the MSC standard only requires cumulative effects to be evaluated and managed for MSC-certified fisheries (including those in evaluation) under overlapping UoAs (i.e. Echebastar), we believe these should be carefully assessed (for ETP species, as well as other P2 components such as habitats) and managed for all these tuna fisheries with MSC aspirations. All currently-certified and prospective MSC tuna fisheries should conduct a joint assessment for cumulative impacts on ETP species in the Indian Ocean and prepare a joint management strategy. CFTO could coordinate with the already certified Echebastar PS fishery, as its certification includes a condition on this PI, and also seek support on this task from other Indian Ocean FIPs such as SIOTI PS FIP, OPAGAC PS FIP, Mozambique and Mauritius LL FIP, Thai Union Indian Ocean LL, Indonesian Indian Ocean and WCPO LL, Bumble Bee/FCF Indian Ocean albacore LL, and Sri Lanka tuna LL.			N/a	N/a	N/a
CAB response to stakeholder input	There are no conditions on ETP species and cumulative impacts are not triggered as per the MSC requirements. Any action on the client's side regarding this comment would be voluntary.				
Client Action Plan -- PIs 2.4.1, 2.4.2 and 2.4.3 Habitats outcome, management strategy and information and PI 2.5.3 Ecosystem information			' - Restrepo, V., H. Koehler, G. Moreno and H. Murua (2019). Recommended		N/a

Performance Indicator (PI)	Input summary	Input detail	Evidence or references	Suggested score change	CAB response code
		Same comments as for PI 2.3.3 apply in regard to cumulative impacts on habitats in relation to purse seine FAD fisheries (Echebastar MSC-certified fishery, SIOTI PS FIP and OPAGAC PS FIP). In addition, ISSF is concerned by the lack of knowledge of the number of FADs that are being considered lost and beached by purse seine fisheries in the Indian Ocean and thus potential habitat impacts, not only in Vulnerable Marine Ecosystems (VMEs) but also in commonly encountered habitats (shore, sea bottom). ISSF recommends that the Client Action Plan implements a consistent FAD management strategy, including data collection and analysis, to address FAD habitat impacts, including cumulative effects with other tuna fisheries in the Indian Ocean (see previous comment). Such FAD Management Strategy could be informed by ISSF´s Technical Report 2019-11 on Recommended Best Practices For FAD Management In Tropical Tuna Purse Seine Fisheries for guidance when addressing Conditions on PIs 2.4.1, 2.4.2, 2.4.3 and 2.5.3. Moreover, CFTO's FAD management plan could be further developed to comply with all best practices identified in the ISSF Technical Report 2019-11 and recommendations from ISSF Technical Report 2018-19A Workshop for the Reduction of the Impact of Fish Aggregating Devices' Structure on the Ecosystem. Although CFTO's FAD Management Plan (understood as the combination of the French IO FAD management plan, Orthongel décisions, TAAF regulations, etc.) follows ISSF best practices Technical Report high-level summary sections, not all best practices within these sections are covered. Below are ISSF comments with regard to CFTO's actions under these best practice elements: a) Comply with flag state and RFMO reporting requirements for fisheries statistics by set type; ISSF Comment: Provision of routine FAD activity and number of active FADs (including those deactivated and lost) to IOTC is essential to address the conditions of the certification. ISSF suggests that deactivated and lost FAD numbers as well as information on 100% observers are provided to flag States and IOTC. b) Voluntarily report additional FAD buoy data for use by RFMO science bodies; ISSF Comment: In order to meet ISSF´s best practices for this aspect, it is recommended to provide information on position and acoustic record for the whole track or, alternatively, one position and echosounder record per day as a minimum. It is also important that fishing companies maintain buoys active to allow buoys to report at least once per day while they are in the water. c) Support science-based limits on the overall number of FADs used per vessel and/or FAD sets made;	Best Practices for FAD management in Tropical Tuna Purse Seine Fisheries. ISSF Technical Report 2019-11. International Seafood Sustainability Foundation, Washington, D.C., USA - Moreno, G., J. Murua, L. Dagorn, M. Hall, E. Altamirano, N. Cuevas, M. Grande, I. Moniz, I. Sancristobal, J. Santiago, I. Uriarte, I. Zudaire, and V. Restrepo. 2018. Workshop for the reduction of the impact of Fish Aggregating Devices´ structure on the ecosystem. ISSF Technical Report 2018-19A. International Seafood Sustainability Foundation, Washington, D.C., USA.		

Performance Indicator (PI)	Input summary	Input detail	Evidence or references	Suggested score change	CAB response code
ISSF Comment: Recognizing the efforts by CFTO in reducing the FAD numbers, in order to meet ISSF´s best practices for limiting the number of FADs ISSF recommends committing to actions such as (i) not activating remotely the buoys of inactive FADs in the water (i.e. dormant FADs), (ii) allowing buoys to report at least once per day while they are in the water, and (iii) adopting alternative measures such as FAD closures to reduce their impact. d) Use only non-entangling FADs to reduce ghost fishing; ISSF Comment: As noted by the CAB, a new ISSF non-entangling and biodegradable FADs guide was published in 2019 and, thus, ISSF encourages CFTO to commit to the new definition of fully non-entangling FAD. This will allow following the best practice of Technical Paper 2019-11 to commit to using only non-entangling FADs (without any netting). ISSF Comment: The Scattered Islands (TAAF) regulation includes a measure that "…Any entangling FAD drifting in French TAAF waters should be removed and treated as non-biodegradable waste". ISSF encourages that the client develops a plan with specific actions for reducing and removing entangling FADs from the water, not limited to TAAF territory. e) Mitigate other environmental impacts due to FAD loss including through the use of biodegradable FADs and FAD recovery policies; ISSF Comment: in relation to addressing the impact of FAD losses, ISSF encourages CFTO to further develop good practices to reduce the loss and abandonment of FADs as described in Technical Paper 2019-11 and Technical Paper 2018-19A. For example, keep providing FAD track data to identify areas of high incidence of stranding events and positional data on beached FADs to enable targeted recovery. f) For silky sharks (the main bycatch issue in FAD sets) implement further mitigation efforts. ISSF Comment: ISSF supports the adoption of the measures to reduce shark bycatch and suggests CFTO further development of measures to ensure that silky shark mortality is mitigated. Other ISSF comments on CFTO´s FAD management plan: CFTO plan states (Décision n°10 du 23 novembre 2011 relative à l'encadrement de la pêche sur DCP): "For 2020, there is a limit of 300 active FAD buoys per vessel and 500 FAD buoys that may be purchased per vessel per year." ISSF Comment: ISSF notes that the 500 buoys limit not only refers to the purchase annual limit but also to the maximum number of FAD buoys in stock at any time "IOTC Res. 19/02 (paragraph 4) No					

Performance Indicator (PI)	Input summary	Input detail	Evidence or references	Suggested score change	CAB response code
purse seine vessel shall have available more than 500 instrumented buoys (buoy in stock and operational buoy) at any time". Thus, ISSF suggests CFTO to modify their statement to include this issue which is mandatory following IOTC Res. 19/02.					
CAB response to stakeholder input	The CAB has transmitted ISSF's comments to the client who considered them in the drafting of the client action plan.				
Letters of support The ACDR states that the CAB will likely set conditions for Indian Ocean skipjack regarding PI 1.2.1 (Harvest strategy) and 1.2.2 (Harvest control rules & tools). Taking into account that the national fisheries agency (through the European Union) will probably have a relevant role in the action plan for these conditions, ISSF is concerned that, without a letter of support from them, there is no clear expectation that the Client Action Plan will achieve its objectives. For your reference, please consult formal letters included in PCDRs or Final Reports for other tuna fisheries that have obtained MSC certification in recent years. These are formal letters from the corresponding national fisheries agency or ministry of fisheries, in which they state their conformity and commitment to the milestones and actions described in the Client's Action Plan (see for example the PCDR of the SZLC, HNSFC & CFA Cook Islands EEZ south Pacific albacore longline fishery (Appendix 8, p.247), or the Final Report of the Solomon Islands Skipjack and Yellowfin Tuna Purse Seine Anchored FAD, Purse Seine Unassociated, and Pole and Line (Appendix 7, p.314)).			' - PCDR of the SZLC, HNSFC & CFA Cook Islands EEZ south Pacific albacore longline fishery (Appendix 8, p.247) - Final Report of the Solomon Islands Skipjack and Yellowfin Tuna Purse Seine Anchored FAD, Purse Seine Unassociated, and Pole and Line (Appendix 7, p.314))		
CAB response to stakeholder input	The CAB has transmitted ISSF's comments to the client who considered them in the drafting of the client action plan. (note a letter of support was provided after publication of the PCDR – See Appendix 9.				

Appendix 4.1.2 WWF Comments

General comments (received on 7th February 2020):

Introduction: WWF is actively engaged in the management of tropical tunas in the Indian Ocean and has dedicated staff and teams deployed to network and coordinate with the Indian Ocean Tuna Commission. WWF has always actively responded to fisheries management issues arising in the Indian Ocean and has engaged with relevant stakeholders of the IOTC, its member states, fishery industry, companies, tuna processors and seafood markets and retailers. WWF has in the past engaged with the above mentioned key stakeholders for the adoption of the harvest strategy for the Indian Ocean skipjack tuna fishery in 2016. WWF aims to provide critical comments as well as share relevant for this MSC full-assessment for the CFTO Purse Seine Skipjack fishery, its stock status, current management systems and catch scenario, including highlighting challenges for primary species, secondary, ETP, habitats and ecosystem identified in Principle 2, followed by an indication of issues arising in principle 3. WWF is concerned on the management of tropical tunas in the Indian Ocean, with Skipjack tuna's TAC being over shot by 29% as reported by the IOTC, in addition to dealing with yellowfin and big eye tuna stocks who are determined to be in the red and orange zone by the K2SM.

Past Engagement of WWF: Moreover, WWF has been concerned with the application of the MSC standards, and objected to the Indian Ocean Pole and Line Skipjack fishery in the Maldives as well as the Purse Seine Skipjack Fishery run by Spanish fleets under Echebastar. WWF's objection led to, a) for Maldives, a condition applied for adoption of a harvest strategy for skipjack, among others, and b) for Echebastar, being premature to opt for certification, when fisheries remained to be in a poor state. The previous MSC full assessments were undertaken on the basis of the 2017 stock assessment for skipjack tuna, and no new stock assessment has taken place so far, which puts into question the state of the target species tuna stocks in 2020. The 2017 stock assessment model results differ significantly from previous (2014 and 2011) assessments. The main reasons for these are, a) the correction of an error in specifying selectivity for small fish in previous assessment, b) the addition of tag-release mortality in the model, and c) assuming creep of 1% per year since 1995 for the standardized European PS CPUE. In addition, median value of catch at the target fishing mortality (CSB40%) from the model runs is investigated is 510,090 t with a range between 455,920 and 618,760t. current spawning stock biomass relative to unexploited levels is estimated at 40%. Catch in 2018 (≈607,401 t) is in the upper range of the estimated range of CSB40%. The total catches in 2018 were 29% larger than the resulting catch limit from the skipjack HCR for the period 2018-2020. It should be noted that the skipjack catches for most gears have increased from 2017 to 2018 (+43% for PS (log-associated), +13% for gillnets and +13% for bait boats). In particular, due to Resolution 19/01, an increase in fishing operations on FADs by purse seine fleets has been increased with the associate increase in skipjack catch. CPUE fluctuations coincide with environmental signals at inter-annual timescale (e.g. Indian Ocean Dipole). Although the environmental indicators are not closely monitored, it is essential to do so to inform on the potential increase/decrease of stock productivity.

EXTRACT OF THE Full ASSESSMENT (Evaluation of the fishery): The current assessment identifies several obstacles to be addressed before proceeding and requires additional source of information that needs to be verified through on-site visits and consultations to move towards MSC certification. One of the critical obstacles raised in the assessment is IOTC having many problems obtaining accurate and precise data for stock assessments, because of the relatively higher proportion catches in the Indian Ocean taken by artisanal fisheries, compared to other Oceans. In 2016 the proportion of nominal catches fully reported (according to the mandatory data requirements of Resolution 15/02) was just below 80%; while for catch/effort data just below 70% of data were fully reported, and for size data approximately 65%. The assessment also acknowledges that although skipjack is proposed as P1 species, the fishery's primary focus is actually Indian Ocean yellowfin tuna, caught year-round. The current assessment identifies several obstacles to be addressed before proceeding and requires additional source of information that needs to be verified through on-site visits and consultations to move towards MSC certification. One of the critical obstacles raised in the assessment is IOTC having many problems 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 other Oceans. For nominal catch data, the proportion fully reported in 2016 was just below 80%, for catch/effort data just below 70% and for size data approximately 65%. The SC acknowledged that the estimation of ROS coverage for the purse seine fleets is adversely impacted by the lack of uniformity in reporting effort data to the IOTC secretariat, and agreed that this information which is particularly useful to assess the performance of the Resolution 11/04, should be further standardized. As such, the SC recommended that all purse seine fleets reporting effort as fishing hours or fishing days begin to submit this information as 'number of sets', instead, in particular when fulfilling the reporting requirements of Resolution 15/02. In addition, the assessment also underlines other key areas of concern, for instance the management of skipjack which it agrees is currently inadequate to manage the fishery, since there is no specific resolution in place for skipjack, except for having Resolution 16/02 on harvest control rules, and 15/10 on a decision framework, which basically provides a guideline, no such comprehensive measures have been adopted such as the Resolution 19/01 which provides a plan for all gear types, including best practices for gillnets and FAD measures. Moreover, the assessment also recognizes TAC is not a management tool, yet it has been breached on in 2018. Furthermore, the assessment mentions that there are some tools in place via other resolutions, notably the Interim Rebuilding Plan for yellowfin (Res. 19/01) and the FAD limits (Res. 19/02) which may act to restrict skipjack catch somewhat, although apparently not enough. However, with resolution 16/01, 17/01 and 19/01 on interim plan for yellowfin tuna, the PS fleet changed their strategy including the assessed fleet (97% of catches as shown in Table 15 of the assessement), to target FAD schools and increased the catch by more than 43% compared to previous year. Thus illustrating that neither 19/01 or 19/02 provides any management framework to limit the increasing catches, but only provides an incentive for overfishing of the stock. The management advice from IOTC in 2019, is based on the results of the stock assessment of skipjack tuna in 2017, the Commission, following Resolution 16/02, adopted an annual catch limit of 470,029 tonnes for the years 2018-2020. Total catches in 2018 (607, 701t) were 29% larger than the catch limit generated by the Harvest Control Rules (470,029t) which applies to the years 2018-2020, and there has been an increasing trend in catches over the past three years. The Commission needs to ensure the future catches of skipjack do not exceed the agreed limit for the period 2018-2020. The Scientific Committee concluded in its programme of work further development of Management Strategy Evaluation (MSE) for the IOTC skipjack tuna fishery including, but not limited: refinement of operating model(s) used, specifications for the assessment and data to be used, and alternative management procedures. The aim of this programme of work is to develop the fully specified management procedure (harvest strategy) for Skipjack including the revision of the HCR may be required. This indicates that the current harvest strategy and harvest control rules are not suitable for managing the skipjack tuna in the Indian Ocean.

Principle 1: There are 4 PIs, 1.1.1 Stock status, 1.2.2 HCRs, 1.2.3 Information and monitoring and 1.2.4 Assessment of stock status, where the 80 level is not likely to be met, which may likely lead the overall Principle 1 score to be less than 80, therefore meaning the fishery may fail to meet the MSC Standard. The Indian Ocean Skipjack tuna stocks have had an increase of catch in the past three years and HCRs have been triggered, the catches have been exceeding the TAC and the MSY levels. There is no rebuilding plan, the HCRs are weak and ineffective, the stock status will be updated in 2020, in addition, the information and monitoring is not robust and does not provide accurate information with possible issues with reporting at the landing sites observed in recent years, while the stock status still suggests skipjack is in green zone, it does not require a rebuilding, however, the assessment of stock under 1.2.4 needs to take into consideration the timeline of the data preparatory meeting planned in May 2020, which is well before the PCDR period. No management plan has been put in place as of yet by the IOTC to ensure that TAC is maintained or catches are reduced effectively to allow stocks to remain in green and not overfished and neither overfished. There are defined HCR in place, which ensures that the exploitation rate is reduced as the LRP and B_{safety} are approached, E is reduced below E_{targ} as the biomass falls below the TRP, meaning that is should act to maintain the stock around the target level. However, HCR have only been place for two years (2018 and 2019), there is very little information (such as stock projections) and in the wake of the new stock assessment and over catch scenario, it could greatly impact the current management regime, and thus, we have strong evidence to believe that the stock status and the assessment remains uncertain. Furthermore, in scoring P1.2.1 the assessment mentions in page 46 that the rationale for scoring 80 was to refer to the stock assessment in 2017. However, it has to be noted that the stock assessment was done based on 2016 data and in 2017 and in 2018 the HCR limit was passed. IOTC did not take any measures in 2019 commission meeting despite the Scientific Committees recommendation to take adequate measures to bring down the catch levels (Refer to SC 2018 report page 129). Moreover, yellowfin tuna in the Indian Ocean has been overfished since 2015 and even with an interim plan (Resolution 16/01, 17/01, 18/01, 19/01), the catches of yellowfin continued to increase. Thus, there is no indication in the past that despite an HCR or TAC that it could be fully enforced. Thus the assessments scoring of the P1.2.1 does not meet the threshold of S60. Moreover, while information seems to be available related to stock structure, or biology, which feeds into stock assessment and/or stock productivity, fleet composition, fleet reporting of the data, methodology and change in fishing patterns and fishing areas seem to influence stock abundance greatly. While, no direct conservation and management measures are in place for the Indian Ocean skipjack stocks, as skipjack is not overfished nor subject to overfishing, there are other supporting instruments, such as Resolution 14/02 which calls for the implementation of an action plan to establish an allocation system (quota) for the main target species. Currently, these measures have not been adopted, moreover, Resolution 19/05 has been adopted 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. This resolution also seeks to enable good monitoring control and surveillance, so the observer coverage is set, and requires additional electronic monitoring. Moreover, the tagging information although available, has been used for support decisions, but do not cover wider area in the Indian Ocean and does not give a good overall representation of the stock structure. Similarly, as mentioned above, the 2018 data is highly variable and prone to change with the ongoing re-estimations and assessments from the purse seine fleets operating in the Indian Ocean. While, the data is largely from Spanish fleets, there is very little monitoring observed to have taken place at ports for other fleets operating out of Seychelles. Cumulatively, with notable problems with catch and effort data from significant fisheries in the Indian Ocean (e.g. gillnet and handline fisheries from India, Iran, Oman, Yemen, and parts of East Africa), the scenario remains complex and ambiguous.

Principle 2 – Primary Species (Yellowfin and Big eye tuna): There are 6 PIs, 2.1.1 outcome, 2.1.2 management strategy, 2.1.3 Information and monitoring for primary species and similarly for ETP species 2.3.1, 2.3.2, and 2.3.3 including habitats and ecosystem issues, as the assessment gives mixed scores, however, we believe that 80 level is not likely to be met, and which may likely lead the overall Principle 2 score to less than 80, therefore, meaning the fishery is premature and may fail to meet the MSC standard. Under P2, primary species is considered as Indian Ocean Yellowfin tuna and Bigeye tuna, based on the information produced in the assessment, the likely inclusion of silky sharks within secondary species seems ambiguous, and even with high catches the score 80 is not justified, moreover, since silky sharks are CITES listed species, based on the criteria proposed in the assessment, silky sharks are better treated as ETP species. Having said that, still the score under this PI should not meet the 80 score. The Indian Ocean Yellowfin tuna is a red listed species, while no new stock assessment were carried out in 2019, its status is determined on the basis of the 2018 assessment and other indicators presented in 2019. The 2018 stock assessment was carried out using stock synthesis III (SS3), a fully integrated model that is currently used to provide scientific advice for the three tropical tunas stocks in the Indian Ocean. The model used in 2018 is based on the model developed in 2016 with a series of revisions that were noted during the IOTC – WPTT meetings. The model uses four types of data, catch, size, frequency, tagging and joint longline and CPUE indices. The 2018 assessment results were based on a grid of 24 SS3 model runs which are recognized as insufficient to explore the spectrums of uncertainties and scenarios, noting the large uncertainty associated with data quality (e.g. spatial representativeness of CPUE coverage, estimation of catch and inconsistency in length-composition) and lack of considering model statistical uncertainty. Some of these uncertainties have were explored in 2019 following the work plan the Scientific Committee adopted in 2018. However, due to the complexity of the work, lack of agreement on key model aspects and time constraints, no new management advice is provided in 2019. According to the 2018 stock assessment, spawning stock biomass in 2017 was estimated to be 30% of the unfished levels. According to the information available in 2019, the total catch has remained relatively stable at levels around the estimated MSY since 2012 (i.e. between 390,000t and 436,000 t) with the 2018 catch being the largest since 2010 (437,422t) and exceeding the MSY range considering the best catch estimate by the scientific committee. The 2018 stock assessment estimates SB2017/SBMSY at 0.83 (0.74-0.97) and F2017/FMSY at 1.20 (1.00 -1.71). However, it is noted that the quantified uncertainty in stock status is likely underestimating the underlying uncertainty of the assessment. On the weight- of-evidence available in 2018 and 2019, the yellowfin tuna stock is determined to remain overfished and subject to overfishing. The increase in catches in recent years has substantially increased the pressure on the Indian Ocean stock, resulting in fishing mortality exceeding the MSY-related levels. There is a high risk of continuing to violate the MSY-based reference points if catches remain at 2017 levels (≈409,000 t in 2017). However, the projections that have been provided in the assessment based on the K2SM results do not adequately reflect known sources of uncertainty due to a series of issues with data and model performance, and the IOTC cautioned its use for management purposes. The decline in stock status to below MSY reference level is not well understood due to various uncertainties. As a precautionary measure, it has been noted that the Commission should ensure that catches are reduced to end overfishing and allow the SSB to recover to SSBMSY levels. In 2019, no revised specific catch limits are recommended. In the 2018 Scientific Committee a Workplan was developed to address the issues identified in the assessment review, aimed at increasing the Committee's ability to provide more concrete and robust advice by the 2019 meeting of the Scientific Committee. The workplan started in January 2019 which aimed at addressing the issues identified by the IOTC - WPTT and the external reviewer in 2018. Despite the progress made to reduce the uncertainties inherent to this fishery, the WPTT agreed that no new advice could be provided in 2019. The Commission has an interim plan for the rebuilding the yellowfin stock, with catch limitations based on 2014/2015 levels (Resolution 19/01, which superseded 17/01 and 18/01). Some of the fisheries subject to catch reductions had fully achieved a decrease in catches in 2018 in accordance with the levels of reductions specified in the Resolution; however, these reductions were offset by increases in the catches from CPCs exempt and some CPCs subject to limitations on their catches of yellowfin tuna, this has not clearly been captured in the current assessment. Thus, the total catches of yellowfin in 2018 increased by around 9% from 2014/2015 levels. This shows the seriousness of the issue, and in light of the current management regime, it seems highly unlikely to even give a conditional pass, yet alone a score of 80 or above with the current management measures failing to address the rebuilding and effectively addressing the problem. For P2, primary or main species, Bigeye tuna, in brief, in 2019, a new stock assessment was carried out. The reported stock status is based on the SS3 model formulation in the assessment, 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. Due to concerns on the reported catch data for 2018, the stock status is based on SS3 model formulations using the best catch estimate by the SC. The spawning stock biomass in 2018 was estimated to be at 31% of the unfished levels in 2018 and 122% (82%-181%) of the level that can support MSY. The assessment outcome is qualitatively different to the stock assessment conducted in 2016 due to the increase of catch of small size, changes in modelling assumptions about longline selectivity, and the abundance index developed in 2019. Considering the characterized uncertainty, the assessment indicates that SB2018 is above SBMSY with high probability (65.4%) and that fishing mortality is above FMSY also with high probability (72.8%). The median value of MSY from the model runs presented with SS3 was 87,000 t with a range between 75,000 and 108,000 t (a median level 16% lower than the estimate in 2016). Catches in 2018 (≈81,413 t) remain lower than the estimated median MSY values from the stock assessment conducted in 2019 but within the range of estimated MSY. The average catch over the previous five years (2014–18; ≈89,717 t) is just above the estimated median MSY and within the range of estimated values. Thus, on the weight-of-evidence available in 2019, the bigeye tuna stock is determined to be not overfished but subject to overfishing. The scientific committee in 2019, noted that the bigeye tuna assessment (using stock synthesis) concluded that stock is not overfished but is subject to overfishing, furthering noting that a continued decline of the CPUE from the main longline fleets and the recent increase in fishing pressure on the juvenile component of the population by the purse seine fleets have resulted in more pessimistic estimates of stock status compared to previous assessments. The stock status determination changed qualitatively in 2019 to not overfished but subject to overfishing. If catches remain at current levels there is a risk of breaching MSY reference points with 58.9% and 60.8% probability in 2021 and 2028. Reduced catches of at least 10% from current levels will likely reduce the probabilities of breaching reference levels to 49.1% in 2028. Continued monitoring and improvement in data collection, reporting and analyses is required to reduce the uncertainty in assessments. It is argued that a number of management measures currently exist, but these are majorly superseded or the CMM 05/01 on bigeye tuna requests for voluntary commitments and reductions, which we have observed are not currently favourable and the robust management regime, considering the none of the voluntary reductions have been met. The resolution has been adopted since 2005 and the catches have not decreased resulting in the overfished state. Both the tropical tunas, yellowfin and big eye tunas caught in the IOTC area of competence based on the evidence produced in the assessment have a significant proportion of the total catch. In fact, the report indicates that a good portion of yellowfin tuna caught is from free-schools. The assessment underlines this several times, that the fishery which is attempting to obtain a free-school and FAD set fishery certified, have been primarily been fishing with FADs since 2017 and have no data or association to provide enough data from free-schools. There is no observer coverage for this fishery. Having said all above, identifying issues and challenges, in addition to existing implementation and compliance to Resolution 19/01, reduction targets have not been met, yet the 2018 data is a mystery box, which is highly unreliable. The stock status is loomed with uncertainty and progress is slow and poor, and while its driven by high catches of juvenile yellowfin tuna, WWF does not see it likely even scoring 60. For Albacore, a new stock assessment was carried out in 2019 to update the assessment undertaken in 2016. The stock assessment was carried out using stock synthesis III (SS3), a fully integrated model that is currently also used to provide scientific advice for the three tropical tuna stocks in the Indian Ocean. There are some noticeable changes in spatial distribution of LL catches compared to previous assessment data set, with historical catch shifted to equatorial regions (LL1 and LL2) from southern fisheries (LL3 and LL4). Catches have also increased substantially since 2007 for some fleets (i.e., Indonesian and Taiwan, China longline fisheries), although there is substantial uncertainty regarding the reliability of the catch estimates. Catches in 2017 were marginally above the MSY level of the SS3 model. Fishing mortality represented as F2017/FMSY is 1.346 (0.588–2.171). Biomass is estimated to be above the SBMSY level (1.281 (0.574–2.071)) from the SS3 model. These changes in stock status since the previous assessment are possibly due to decreases in the CPUE in recent years, while catches have remained relatively stable. Also, there has been a large redistribution of catch to the southern regions which impacts on small fish (and therefore influences the computation of FMSY). In addition, the latest assessment uses a revised growth curve which also impacts FMSY. Thus, the stock status in relation to the Commission's BMSY and FMSY target reference points indicates that the stock is not overfished but is subject to overfishing. Maintaining or increasing effort in the core albacore fishing grounds is likely to result in further decline in the albacore tuna biomass, productivity and CPUE. The impacts of piracy in the western Indian Ocean resulted in the displacement of a substantial portion of longline fishing effort into the traditional albacore fishing areas in the southern and eastern Indian Ocean. However, in recent years the effort distribution in the Indian Ocean has been rather dynamic. Projections indicate that under current catch assumptions, the biomass will continue to decline as recent recruitment levels are estimated to be low. The recruitment in the terminal years of the assessment model are estimated to be well below average levels and this is projected to cause the stock to decline considerably over the short term. However, these recruitment estimates are poorly determined. Therefore it is cautioned that the short term projections are more influenced by the recent low recruitment levels, whereas the long term projections are more determined by the assumptions of average recruitment levels over the longer term period. Although considerable uncertainty remains in the SS3 assessment conducted in 2019, particularly due to the conflicts in key data inputs, a precautionary approach to the management of albacore tuna should be applied. The K2SM indicates that catch reductions are required in order to prevent the biomass from declining to below MSY levels in the short term, due to the low recent recruitment levels. Although there is considerable uncertainty in the projections, current catches are exceeding the estimated MSY level (35,700 t;).

<u>Principle 2 Secondary Species:</u> The assessment considers secondary species as those species that are not covered under P1, not managed in accordance with limit or target reference points, are out of scope of the programme, but where the definition of ETP species is not applicable. The assessment in tables 14 outlines a number of secondary species, however, in the P! 2.2.1 does not consider any secondary species. All of the secondary species listed in table 14 do not have a harvest strategy, they are largely data deficient and do not have indices of abundance nor indicators to suggest or incorporate secondary species outcome, yet the PI score meets 80. The assessment also refers to a major and minor secondary species, which remains confusing, as none of the tables nor the sections clearly define the difference of a major and minor secondary species – whether this difference is on basis of overall weight composition to target species or other criteria. In addition, the silky sharks which are a CITES listed species has been added in the secondary species category, considering that silky sharks are now part of the CITES appendix II listings, there seems to be corrected or else justified. Moreover, none of these species have qualitative information available. In scoring PI 2.2.3, the rationale is weakly provided, where the secondary species information verified via logbook data is mentioned to be not validated, and therefore likely to suffer from estimation error, whereas, the observer coverage in this fishery is good, but still no major impacts on secondary species being assessed leads to higher score, whereas, the unreliable information leading to no stock assessment scores lower.

<u>Principle 2 ETP Species, FADs and Habitats:</u> With ETP species, and secondary species, the assessment, tried to push the score to 80, if secondary species are retained and consumed, the bycatch of silky sharks may be justified. There are no current stock assessment for silky sharks, they have been listed under CITES as well, however, still seem to have been put in secondary species. Moreover, no robust information is available, and largely the ETP species identified within the assessment are subject to estimation. Even with underreporting as identified in the assessment or extrapolating figures are deemed to be unreliable, and to that effect it is proposed that recovery of these species would not be hindered. For oceanic whitetip, there remains considerable uncertainty about the relationship between abundance, standardized CPUE series and total catches over the past decade. The ecological risk assessment (ERA) conducted for the Indian Ocean tuna commission by the Working Party on Ecosystem and Bycatch and scientific committee in 2018 consisted of a semi-qualitative risk assessment analysis to evaluate the resilience of shark species to the impact of a given fishery, by combining the biological productivity of the species and its susceptibility to each fishing gear type. Oceanic white tip shark was estimated as being the 11th most vulnerable shark species to purse seine gear, as it was characterized to having a relatively low productive rate. The current IUCN threat status of 'vulnerable' applies to oceanic white tip sharks globally. Moreover, there are no management strategy adopted for the ETP species and is likely that these species remain poorly managed. The IOTC indicated that there is a paucity of information available on these species and the situation is not expected to improve in the short to medium term. In addition, based on circumstantial evidence it is likely that the FAD-associated sets have a negative impact on the populations of vulnerable and endangered species such as pelagic sharks and rays, predominantly silky shark, oceanic white tip shark, and manta and mobulid rays. Their stock status in the Indian Ocean is highly uncertain. Due to a lack of data the impact of FAD purse seine fisheries on sea turtles cannot be fully evaluated. All species of sea turtles are listed under IUCN and on CITES appendix I. The purse seine fishery is characterized by the use of two different fishing modes, the fishery on floating objects (FADs) catches large numbers of small yellowfin tuna in association with skipjack and juvenile big eye tuna, compared to the fishery on frees swimming schools, which catches larger yellowfin tuna on multi-specific or mono-specific sets. A negative impact of the FAD associated purse seine fishery is assumed as the bycatch which has largely been stated above. In addition, the assessment indicates the likeliness of reducing the use of such FADs, the issue largely is with the uptake of the biodegradable FADs and even within its definition. It is also not clear what does the term 'active' FAD buoys per vessel refer to, as once FADs are deployed active or inactive, they shall continue to aggregate fish biomass. The activeness here, seems redundant and its impacts in terms of numbers remain questionable. The assessment mentions about the on-going BIOFAD project and trialling of biodegradable FADs. The UoA also participates in the project INNOV FAD which among other things, provides for the development of a dFAD whose trajectory would be controllable in order to avoid problems related to losses and strandings. Furthermore, the FAD watch programme, for the prevention and mitigation of FAD beachings in the Seychelles is the result of a collaborative work among the Spanish Tuna purse seiner fishing representatives (OPAGAC), Island Conservation Society (ICS), among others. The fishery itself has joined this project quite recently, and considerable information is still lacking, no such reports, have been shared thus far, and the impacts on the coral reefs are just envisioned or anticipated to take place. Moreover, with majority of fishing operations taking place far away from Seychelles, and in the North Mozambique Channel as the assessment indicates in several sections, there is not much scientific evidence to prove whether the impact has been mitigated or not. In addition, the BIOFAD project is also in its early stage, and the area of operation or pilot is limited as the objective of the study was to look at beaching impact on the MPA around Seychelles, and was not wide spread. There are no gear markings, or indications of FADs where they origin from, there is growing amount of reports from the NIO region, specifically from the Maldives, where FADs have ended up impacting the

marine megafauna. Having considered this pilot has not even fully taken off, the consideration of having a partial strategy in place is uncalled for. The IOTC itself has in its programme of work, identified the need to develop improved FAD designs to reduce the incidence of entanglement of marine turtles, including the use of biodegradable materials. This has not been fully completed, not endorsed or adopted by the IOTC, thus indicating that a dearth of information still needs to be collected. Moreover, bioFAD testing and implementing in the Indian Ocean purse seine fleet is still part of the programme of work not completed which would help reduce the environmental footprint of the gear.

Principle 3: A management system is in place: This fishery is under the auspice of the Indian Ocean Tuna Commission (IOTC). The Indian Ocean Tuna Commission (IOTC) was established under Article XIV of the FAO constitution and is mandated to manage tuna and tuna-like species in the Indian Ocean and adjacent seas. The IOTC began its work in 1996, following preliminary work of the Indo-Pacific Tuna Development and Management Programme. Its objective is “to promote cooperation among its Members with a view to ensuring, through appropriate management, the conservation and optimum utilisation of stocks and encouraging sustainable development of fisheries based on such stocks. ”The IOTC is an intergovernmental organization mandated to manage tuna and tuna-like species in the Indian Ocean and adjacent seas. The objective of the Commission is to promote cooperation among its members with a view to ensuring, through appropriate management, the conservation and optima utilization of stocks covered by this Agreement and encouraging sustainable development of fisheries based on such stocks. The Scientific Committee was formally created at the First Session of the Commission. This body will advise the Commission and sub-commissions on research and data collection, on the status of stocks and on management issues. The meetings of the Scientific Committee are held conjointly with those of the Commission. IOTC 2017h:“Objectives of the Commission: To promote cooperation among the Contracting Parties (Members) and Cooperating Non-Contracting Parties of the IOTC with a view to ensuring, through appropriate management, the conservation and optimum utilisation of stocks covered by the organisation’s establishing Agreement and encouraging sustainable development of fisheries based on such stocks. ”IOTC 2017i: IOTC is mandated to manage tuna and tuna-like species. The IOTC Agreement specifies 16 tuna, billfish and neritic tuna species, of which the major commercial stocks are: yellowfin tuna, skipjack tuna, bigeye tuna, albacore tuna, and swordfish. IOTC 2016j: There are currently 31 members of IOTC, namely Australia, China, Comoros, Eritrea, European Union, France, Guinea, India, Indonesia, Iran, Japan, Kenya, Korea, Madagascar, Malaysia, Maldives, Mauritius, Mozambique, Oman, Pakistan, Philippines, Seychelles, Sierra Leone, Somalia, Sri Lanka, South Afrika, Sudan, Tanzania, Thailand, United Kingdom, and Yemen. In addition, there are 3 cooperating non-contracting parties: Bangladesh, Liberia, and Senegal. Sharma 2013: "The IOTC is one of five global RFMOs that manages tuna. It was established in 1997 and follows in large part the principles UNFSA. However, the precautionary approach was not part of the original convention because IOTC was formed before the formulation of the precautionary approach. Thus, the commission discussed two resolutions in 2012 that would include the Precautionary Approach to management in the mandate of the Commission. One of these passed a binding Resolution (Res. 12/01) that involved setting up principles of Precautionary Approach (launching an MSE process). The second resolution, involving the setting up of interim reference points was turned into a non-binding recommendation."

IOTC, 2016: Report of the 2nd IOTC Performance Review. Mahé, Seychelles, 2–6 February & 14–18 December 2015. IOTC-2016-PRIOTC02-R. 86 pp, http://www.iotc.org/documents/report-2nd-iotc-performance-review IOTC 2017h: Indian Ocean Tuna Commission > Home > The Commission: http://iotc.org/about-iotc IOTC 2017i: Indian Ocean Tuna Commission > Home > Competence: Area & Species: http://iotc.org/about-iotc/competence IOTC 2017j: Indian Ocean Tuna Commission > Home > Structure of the Commission: http://iotc.org/about-iotc/structure-commission Sharma, R., 2013:

Indian Ocean Tuna Commission - Its past, present and future. Where we are with respect to reference points, and where do we go from here. Presentation at the 2013 ISSF Stock Assessment Workshop: Harvest control rules and reference points for tuna RFMOs. ISSF Technical Report 2013--03. p. 20-21. International Seafood Sustainability Foundation, Washington, D.C., USA, https://iss-foundation.org/downloads/11183/

<u>Management of this fishery is marginally effective</u>. NB: IOTC Decisions that are binding to the Commission Members are called Resolutions, whereas Recommendations are not binding and rely on voluntary implementation (IOTC 2016f). ETP-species: Despite the existence of the several resolutions, the bycatch of endangered species, especially CITES listed shark species, remains one of the prevailing problems in the Indian Ocean fisheries industrial tuna fisheries. IOTC has to ensure that all sharks are sustainably caught or properly protected by adopting catch limits and retention prohibitions for certain species, such as silky shark, hammerhead sharks and shortfin mako sharks. The existing measures are only marginally effective. A set of resolutions and recommendations are in force to reduce unwanted bycatch: Resolution 17/05 and 13/06 on sharks Resolution 17/04 on a ban on discards of target tuna species Resolution 15/05 on billfishes (striped marlin, black marlin and blue marlin), Resolution 15/08 encourages the use of non-entangling FADs, starting in 2014, to minimize the risk to sea turtles, sharks and other marine life. Resolution 13/05 on whale sharks Resolution 13/04 on cetaceans Resolution 12/09 on thresher sharks Resolution 12/04 on marine turtles. Discard: There are indications that the tuna discard ban is effective (Chan et al. 2014). Information is however conflicting as the amount of target tuna discarded at sea remains unknown to the IOTC, which is primarily due to low observer coverage. The IOTC has recently expanded its discard ban for the purse seine fleet from solely target tunas to target tunas and non-targeted species. Resolution 17/04 of the IOTC calls for the full retention of all target tunas from purse seine fisheries, except fish considered unfit for human consumption, and of the following non-targeted species or species group; other tunas, rainbow runner, dolphinfish, triggerfish, billfish, wahoo, and barracuda, except fish considered unfit for human consumption and/or species which are prohibited from retention (IOTC 2017d). IOTC 2017b (WPTT19 Report): "The total amount of tropical tunas discarded at sea remains unknown for most fisheries and time periods. Discards of tropical tunas are thought to be significant during some periods of industrial purse seine fisheries using fish aggregating devices (FADs) and may also be high due to depredation of catches of longline fisheries, by sharks or marine mammals, in tropical areas. Update: No change from WPTT-18. The IOTC Secretariat is actively working with CPCs to develop the Regional Observer Scheme, which will lead to improvements in the estimates of discards of tropical tunas. However, for the moment, estimates of discards remain highly uncertain. "Chan et al. 2014:"Before the catch retention requirement went into effect (2006–2009), discard rates for tuna averaged ~2% of landed weight, and after the catch retention requirement went in effect in 2010, discard rates for the three tuna species declined to 0.4%."Unwanted Bycatch: Besides ETP species (covered above), bycatch of juvenile tunas should be addressed by IOTC by, e.g. mesh size regulations. No such measures are known. It should be noted however that some authors consider that catching juvenile tuna does not necessarily result in overfishing of the stocks (e.g. Dagorn et al. 2012). Ecosystem effect: No specific measures are implemented to mitigate ecosystem effects of the large-scale industrial tuna fisheries. A general lack of data hampers progress on the estimation of bycatch and ecosystem effects, and despite the Scientific Committee issues recommendations each year to improve the situation, progress is only very slow. Results of the 2012 Ecological Risk Assessment (ERA) (Murua et al. 2012) demonstrate the vulnerability of certain shark species to longline and/or purse seine fisheries. These results do however not trigger the definition and strict implementation of stricter protection measures. Murura et al. 2012: "The species more susceptible for the purse seine fishing fleets are the oceanic white-tip and silky shark followed by shortfin mako. The rest of species are ranked in much

lower levels of susceptibility. […] In the purse seiner fleet, the vulnerability is in a large extent defined by the susceptibility of the species to the gear rather than for the productivity of the species. ”A multitude of smaller marine protected areas (MPAs) is implemented in the Indian Ocean for the protection of the marine environment and the ecosystem (WIOMSA 2017). Major focus of many of these is on the protection of coral reefs (Francis et al. 2002, Sheppard et al. 2012). Monitoring/Data Availability: IOTC`s reports and stock assessments are publicly available via the internet. However, the scientific assessment of the skipjack stocks has major uncertainties. This is mainly due to the poor quality of data and especially the still ongoing underreporting by some member and non-member countries fishing in the area. There are a number of uncertainties of catches, e.g. there is uncertainty about the catches from some important fleets including the Sri Lankan coastal fisheries, and the coastal fisheries of Comoros and Madagascar (IOTC 2016b). However, the data reporting requirements for the purse seine fleets set by IOTC are being met pretty well. Information on the status of non-target species is relatively poor and even though some stock assessments for non-target species (billfish, small tunas, sharks) have been undertaken, the stock status of the majority remains uncertain. As a consequence, uncertainties remain in relation to many of these species, most notably sharks. No centralized regional database has been established (Gilman et al. 2012). WWF 2016: For many IOTC stocks the IOTC Secretariat is required to estimate the level of catches, which increases the uncertainty of the stock assessment results. Hence it is crucial to improve data gathering for all species caught in IOTC fisheries notably through the implementation of the IOTC Regional. Observer Scheme: The effective management of IOTC’s valuable stocks relies on the accurate monitoring and timely reporting of Catch Statistics to feed into stock assessments and the development of effective management options by the IOTC Scientific Committee. Of significant concern, is the quality of data collection and levels of reporting with regard to Coastal and/or Artisanal Tuna Fisheries, which is generally low throughout the region. ”However, progress has been made compared to the Gilman et al. (2012) report, when "Observer coverage rates", "Data quality" and "Open Access to discard data" was rated by 0%. For the purse seine fisheries, there is some level of observer coverage (see also "compliance") and they do estimate the number of sharks. Davies et al. 2014:"IOTC has recently revised and improved its reporting requirements for FADs under Resolution 10/02, which were previously considered ambiguous and insufficient to comprehensively record the practise of FAD fishing. These new and more detailed requirements include reporting the unique identifier, position, type and construction of the FAD fished on. The use of supply vessels, including the number of associated catcher vessels and number of days at sea, must also be reported. In addition, in 2012 IOTC adopted a entirely new resolution (Resolution12/08, superseded by Res. 13/08) setting out the requirement for fleets to develop and submit FAD Management Plans by late 2013.n This resolution (...) represents an important step towards regulating the practice." In 2013 IOTC took steps to require an International Maritime Organization (IMO) number as unique vessel identifier (UVI) for their vessels This will strengthen the ability of RFMOs to monitor fishing capacity and to combat IUU. IOTC requires that all vessels larger than 24m must have an IMO number by 2015 to be on the Vessel Record. In addition. Res. 15/08 requires the use of an FAD logbook and other measures on FAD management. This measure will enhance the available database of FAD associated purse seine fisheries. Mixed fishery: Most tuna fleets operating in the Indian Ocean do not target or catch a single stock or species. The multi-species nature of the fishery, both industrial and artisanal, implies that management measures directed towards a single stock are very likely to have effect on other stocks as well. The direction and magnitude of these secondary effects cannot always be directly inferred given the adaptability of the various fleets. Skipjack, bigeye and albacore tuna in the Indian Ocean are considered healthy, but yellowfin is overfished, and overfishing is occurring. There is also considerable uncertainty in the assessments (IOTC 2016a, 2017b). There are no direct measures (e.g. separate quotas for all retained species, closure of fishery if quota of one species is taken, multi-species stock assessments) to address mixed fisheries issues in the Indian Ocean. IUU/Misreporting: The amount of illegal fishing in the period 2000-2003 was estimated to be 32% of the total catches for the Eastern Indian Ocean and 18% for the Western Indian Ocean (Agnew et al. 2009). The IOTC agreement lacks a reference to a commitment to halt IUU fishing, although this has been the key area of focus for the Commission (Aranda et al. 2010). Although there are lists of authorized and IUU fishing vessels, IUU fishing is widespread and transhipments from IUU long liners to “authorized” tuna reefers are a common practice. The pursuit of the IUU fishing activities is left to the means of each member country; given the chronic lack of funding suffered by the fishing authorities in most member countries, this effectively means that only a negligible proportion of IUU activities are detected and prosecuted. Despite the existence of several Resolutions and Recommendations, and despite IUU being fairly well monitored for the purse seine fleet, large uncertainties prevail. A set of resolutions and recommendations are in force to reduce IUU fishing: Resolution 17/06 on a transhipment programme Resolution 17/03 on an IUU vessel list Resolution 16/05 on vessels without nationality Resolution 16/11 on port state measures to prevent IUU fishing Resolution 15/03 on the VMS programme Resolution 15/04 on a record of authorized fishing vessels Resolution 14/05 on a record of licensed foreign fishing vessels Resolution 11/04 on a regional observer scheme Resolution 10/08 on a record of active vessels Resolution 07/01 on compliance with IOTC CMMs Recommendation 05/07 on a management standard for tuna fishing vessels Resolution 01/03 on scheme to promote compliance by non-contracting parties Resolution 99/01 on flag of convenience longline vessels. Compliance/Enforcement: The estimated observer coverage rate for purse seine vessels increased from 0% in 2010 to about 4-5% from 2011 to 2013, 8% in 2014 and 24% in 2015 and 2016 (IOTC 2017g). However: Amandé et al. 2012: “A minimum of 90% sampling coverage would be required to estimate 50% of the bycatch species with a relative error less than 20%.” IOTC 2016: “The Commission, through its Compliance Committee, needs to strengthen its compliance monitoring in relation to the timeliness and accuracy of data submissions. To that end, the PRIOTC02 RECOMMENDED that: a) the Commission review its compliance monitoring program conducted by the Compliance Committee, including identification of priority obligations (e.g. timely and accurate data reporting, catch and effort limits, accuracy of the supplied registered fishing vessel information, etc.). […] In relation to non-target species, the PRIOTC01 recommended to expand the list of shark species to be recorded by fishing vessels, which has partly been incorporated in the relevant measure (Resolution 15/01). Additional duties apply in relation to seabird bycatch (Resolution 10/06), marine turtle bycatch (Resolution 12/04) and shark bycatch (Resolutions 13/05 and 13/06 together with the existing Resolution 05/05). Overall the PRIOTC02 noted the ongoing non-compliance by CPCs regarding the submission of accurate and timely bycatch data despite it being required in a range of Resolutions. […] Overall, the PRIOTC02 noted that the Commission has not given effect to the advice of its Scientific Committee and the associated Working Parties. There are inadequate management measures implemented for most species and the ongoing paucity of scientific data continues to hamper the ability to make informed management decisions. Finally, the PRIOTC02 noted that the Commission continues to use the data paucity as a reason not to implement the advice of the Scientific Committee despite their adoption of the precautionary approach (Resolution 12/01).” IOTC`s VMS programme currently doesn`t meet global standards. Koehler (2016) highlights a number of areas in which the current IOTC VMS provisions fall short of global best practices: Koehler 2016: “The [VMS] programs in CCSBT, IOTC and IATTC and ICCAT also exhibit many of the best practices outlined in Section II, but have room to improve in the coverage of the program (e.g., in ICCAT many of the more progressive elements apply only to the bluefin fishery), the use and availability of VMS data to the Secretariat, scientists or for compliance purposes (IATTC, IOTC, and CCSBT), and the establishment of procedures and standards, such as in the event of an ALC breakdown (IATTC and IOTC).Transparency/Participation: The major tuna fishing countries are members of the IOTC (Yemen joined in 2012and Somalia in 2014). Taiwan is not a member, but they participate actively in the SC (this has to be done informally because IOTC is created under a UN charter, and China does not allow Taiwan to participate as not part of China). They also allow observers in their meetings.

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IOTC (2016): Report of the 2nd IOTC Performance Review. Mahé, Seychelles, 2–6 February & 14–18 December 2015. IOTC-2016-PRIOTC02-R. 86 pp, http://www.iotc.org/documents/report-2nd-iotc-performance-review

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As has been recognized among others by IOTC's Performance Review Panel in 2016, no coherent steps have been taken to implement an EBM for the Indian Ocean and there are still major challenges to overcome throughout the available single species management measures. For such a wide ranging highly migratory species, EBM is a significant challenge. The IOTC Working Party on Ecosystems and Bycatch (WPEB), created in 2005, recognized the severe shortcomings in bycatch and discards data and recommended better cooperation among the nations to collect data through onboard observers. The WPEB has committed itself to direct greater effort toward collecting bycatch information and evaluating bycatch effects on sharks, seabirds and turtle, and attempts to reduce bycatch and discard by encouraging, coordinating, and reviewing research to modify fishing gear, recommending conservation measures accordingly and transferring the technology and knowledge to the industry. In August 2012, the IOTC formally adopted the Precautionary Approach through a Resolution. The IOTC also decided on the definition of stock-specific Reference Points (Lmit and Target) and corresponding Harvest Control Rules (see QA6). Furthermore, the Commission requires data for non-target species that are caught in Indian Ocean tuna fisheries and several Resolutions and Recommendations have been adopted aiming at reducing the bycatch of non-target species (see Q13). However, the IOTC Convention makes no explicit mention about the Precautionary Approach or Ecosystem Considerations. The 2nd IOTC Performance Review Committee Panel recommends that the Commission establish an ad-hoc Working Party on the Modernisation of the IOTC Agreement: IOTC 2016:"The PRIOTC02 AGREED that the IOTC Agreement needs to be amended or replaced in order to incorporate modern fisheries management principles, such as the precautionary approach, ecosystem based approaches, inclusion of highly-migratory species caught in IOTC fisheries, protection of marine biodiversity, reducing the harmful impacts of fishing on marine environment and to allow the full participation of all fishing players. The weaknesses and gaps are, or have a potential to be, major impediments to the effective and efficient functioning of the Commission and its ability to adopt and implement measures aimed at long-term conservation and sustainable exploitation of stocks, according to model fisheries management instruments. More fundamentally, these deficiencies are likely to prevent the Commission from achieving its basic objectives. [...] The PRIOTC02 RECOMMENDED that [...] the Commission fully implements Resolution 12/01 On the implementation of the precautionary approach, so as to apply the precautionary approach, in accordance with relevant internationally agreed standards, in particular with the guidelines set forth in the UNFSA, and to ensure the sustainable utilisation of fisheries resources as set forth in Article V of the IOTC Agreement, including ensuring that a lack of information or increased uncertainty in datasets/stock assessment, is not used as a justification to delay taking management actions to ensure the sustainability of IOTC species and those impacted by IOTC fisheries." In 3 RFMO performance reviews, IOTC scored in the middle to lower range (Cullis-Suzuki & Pauly 2010, Gilman et al. 2012, Juan-Jord et al 2016): • Cullis-Suzuki & Pauly (2010) rated RFMOS according to a two-tiered approach, concentrating first on their performance "on paper" (P-score) and secondly in practice (Q-score). IOTC received a final P-score of 58% (best result achieved: 74%) and a Q-score of 77.8% (best result achieved: 100%). Gilman et al. 2012conducted a performance assessment of governance of bycatch, including discards, by 13 RFMOs. Performance in governing bycatch was assessed against a suite of five broad criteria. IOTC received an overall score of 17% (best result achieved: 58%), which was still below the mean score of 25% for all RFMOs investigated. In a comparative review of progress (Juan-Jorda et al. 2016), IOTC worst of the tuna-RFMOs with 7 criteria rated green (=moderate to full progress by the Commission), 11 rated yellow (=slight progress) and 16 criteria rated red (=no to moderate progress by the Scientific Committee).FAO 2016: Report of the Joint Meeting of tuna RFMOs on the implementation of the

Ecosystem Approach to Fisheries Management. 12 – 14 December 2016, FAO Headquarters, Rome, Italy. 51 pp, http://www.fao.org/fileadmin/user_upload/common_oceans/docs/JointTunaRFMO_EBFM_Meeting.pdf

Cullis-Suzuki, S.& Pauly, D. (2010): Failing the high seas: A global evaluation of regional fisheries management organizations. Marine Policy 34: 1036–1042. FAO 2016: Report of the Joint Meeting of tuna RFMOs on the implementation of the Ecosystem Approach to Fisheries Management. 12 – 14 December 2016, FAO Headquarters, Rome, Italy. 51 pp, http://www.fao.org/fileadmin/user_upload/common_oceans/docs/JointTunaRFMO_EBFM_Meeting.pdf .

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Juan-Jordá MJ, Murua H, Arrizabalaga H, Dulvy NK, Restrepo V. 2016. Progress of tuna regional fisheries management organizations in applying ecosystem-based fisheries management. IOTC IOTC-2016WPEB12-14. http://www.iotc.org/sites/default/files/documents/2016/08/IOTC-2016-WPEB12-14_-_tRFMOs.pdf

Team response: Following receipt of the above comments, the team requested a meeting with the relevant WWF representatives to discuss these matters in more detail. The meeting was held on the 26th March 2020. The minutes (as distributed to all attendants following the call) are shown below. Given that the scoring has changed following the site visit, we invite WWF to review the team's revised scoring and submit comments on a PI-specific basis following publication of the Public Comment Draft Report (PCDR).

Meeting attendants:

- Umair Shahid (WWF)
- Karin Bilo (WWF)
- Sophie des Clers (Control Union)
- Jo Gascoigne (Control Union)
- Chrissie Sieben (Control Union)

Notes :

- Comment on UoA structure: FAD and free-school sets are combined (as per the newly released FCP2.2); however there is concern that if this fishery is certified, this now removes the market incentive to move towards free school sets. The CFTO fishery mainly sets on FADs (93% in 2018) which have a higher proportion of juvenile YFT than free schools and puts more pressure on stocks overall. It is not clear to WWF that the combination of these two set types leads to a more precautionary assessment and whether the team are making any recommendation for the fishery to move more towards free schools. The team stressed that the scope of an MSC assessment is not to provide recommendations to the fishery on how to improve its sustainability. Its only aim is to evaluate the fishery's performance against the MSC standard. The UoA structure was based on the likelihood that MSC would be requiring this type of structure in the near future (as is clear from the FCP2.2. in force from Sept 2020) and was deemed by the team to provide for a more precautionary assessment.

- The tendency to move towards FADs across IOTC fisheries may be a result of the YFT rebuilding plan (as free schools have higher catches of YFT overall). This is a relatively recent development and will not yet have been considered in the latest stock assessment for YFT. So there is concern that the scoring of 2.1 (primary species) does not take this issue sufficiently into account. Assessment team have said they will explore this matter further (please see Primary Species scoring for further detail).
- The harvest strategy for skipjack is not working. There is a catch limit; however there has been a significant overshoot and feeling is that this hasn't been considered adequately in the scoring of 1.2.2. There was also some debate to what extent the catch limit should be considered a management tool rather than a rule. Team agrees that lack of implementation of catch limit is a key point in the scoring of P1. Harmonisation discussions took place with the overlapping MSC fisheries for this stock (Echebastar and Maldives) which led to the rationale presented in the ACDR. As a result, the other fisheries now have conditions on 1.2.1 and 1.2.2. The team stressed that the ACDR rationales were draft at the time of publication and will need updating with the latest available information.
- Primary species: YFT, see above – will be revisited by team to take into account issues with increased pressure on FADs and juvenile catches. Important to bear in mind however, that bar for P2 is lower than for P1. 2.1.1 asks how likely the stock is to be above the point of recruitment impairment and to what extent the fishery itself (the UoA) could be hindering recovery of that stock. Scoring needs to be seen in that context.
- Primary species: BET – new stock assessment has been released so team are planning on updating the scoring.
- Secondary species: why such a high score if no management in place for these? This is because the SG80 level in 2.2.2 refers to 'main' secondary species. If there are no main species, then this score 'defaults' to 80. However, a 100 score is not achieved because there is no management for the minor species.
- ETP: in contrast with the ACDR, silky shark will be considered as ETP on the basis of being listed as a protected species in TAAF legislation (which is included in the UoA) *Arrêté n° 2018-09 du 6 février 2018 encadrant l'exercice de la pêche aux thons et autres poissons pélagiques dans les zones économiques exclusives des Iles Eparses (Glorieuses, Juan de Nova, Bassas da India, Europa, Tromelin* . WWF made clear they would like to see this species assessed as ETP.
- To what extent do we need to harmonise with the other fisheries on P2? Because P2 focuses on the UoA impact on the components concerned, the level of harmonization is less than in other fisheries, although you would still expect to see similar outcomes for example primary or secondary species. Habitats and ecosystem were also harmonized to a degree.
- Team suggests that because many stakeholder interviews still need to take place, WWF wait until the release of the PCDR which is likely to contain revised scores, before submitting detailed comments. This is of course, entirely at the discretion of WWF.

Appendix 4.1.3 Pew Comments

Pew comments were received on the 7th February 2020 and are shown below.

Performance Indicator (PI)	Input summary	Input detail	Evidence or references	Suggested score change	CAB response code
1.2.1 - Harvest strategy (b) Harvest Strategy evaluation	Based on direct evidence of fishing activity in previous years and specifically the past year, the harvest strategy is NOT likely to work	For this SI to receive a score of SG60, "The harvest strategy is likely to work based on prior experience or plausible argument." Recent experience shows that the harvest strategy is NOT likely to work. As noted in the report, the 2018 skipjack catch was 129% of the limit set under the HCR, which continues an increasing trend of catch from both the UoA (15,605 mt in 2015 to 34,185 mt in 2018) and of the overall IOTC fleet (446,723 mt in 2016 to 607,701 mt in 2018). Therefore the harvest strategy, which now primarily relies on a catch limit, has been shown, with direct evidence, to neither be able to restrict the overall IOTC catch to the level set by the HCR (470,029 in 2018) or to the level that corresponds to the ETRP (approximately 527,000 mt) Increases in catch in 2017 and 2018 have also likely pushed the stock below the TRP, based on the fact that they were at or exceeded the ETRP, and that there was already a 51/49 chance the stock was below the TRP in 2016. Alternative tools cited in the report are unlikely to effectively work to restrict skipjack catch. - Yellowfin catch reductions will actually drive an increase in skipjack catch -The number of supply vessels with not have a direct effect on skipjack catch -The number of active buoys does not restrict the number of overall FADs that can be placed in the water each year or the number of sets that can be made, and therefore has no direct effect on the skipjack catch	Report of the 21st Working Party on Tropical Tunas and datasets of WPTT21 https://www.iotc.org/meetings/21st-working-party-tropical-tuna-wptt21	<60	Not accepted (no scoring change)

Performance Indicator (PI)	Input summary	Input detail	Evidence or references	Suggested score change	CAB response code
CAB response to stakeholder input		Please see below for minutes of remote meeting			

Team response: Following receipt of the above comments, the team requested a meeting with the relevant Pew representatives to discuss these matters in more detail. The meeting was held on the 11th March 2020. The minutes (as distributed to all attendants following the call) are shown below. Given that the scoring has changed following the site visit, we invite Pew to review the team's revised scoring and submit comments following publication of the Public Comment Draft Report (PCDR).

Meeting attendants:

- Glen Holmes
- Sophie des Clers (Control Union)
- Jo Gascoigne (Control Union)

Notes :

1. Pew's key concerns are around 1.2.1 and 1.2.2 (these concerns already raised previously with Echebastar). HCR is on paper only until there is some agreement on catch allocations; recent data show that catch is well above the required level with still no means of implementing the HCR which is therefore not effective. (Recent meeting of TCAC postponed due to corona - concern that it will be impossible to find a new date; also risk the IOTC plenary being cancelled - i.e. no progress likely this year.) On this basis, the scoring in 1.2.1 and 1.2.2 is optimistic at best.

Jo Gascoigne noted that these are valid concerns; but harmonisation is an important issue because until the recent audits, neither Echebastar or Maldives even had a condition on 1.2.2c. If there is no agreement the lowest score stands, but when it comes to failing / suspending fisheries it is better to go through a process to try and find agreement than for a CAB to act unilaterally. But at the next iteration of the report the catch data and 1.2.2c analysis should be updated.

Sophie des Clers noted that this might also be an issue to consider under P3 (3.2.2 - decision-making processes).

2. Pew also noted that there is a new skj stock assessment underway, which (even if IOTC meetings are cancelled) should be published by around September. It may change perception of the stock? Ms Gascoigne noted that normally new information stops at the PCDR, but Sophie raised the point that this was potentially substantive and critical to the assessment; the team agreed to bear it in mind in relation to the project timetable.

3. Pew noted that the objective of the harvest strategy is the agreed TRP, not Bmsy, and therefore 1.2.1 and 1.2.2 should be scored in relation to their ability to achieving the TRP, not Bmsy. Ms Gascoigne noted that MSC require consideration of MSY because 1.1.1b stipulates 'consistent with MSY' which then feeds into 1.2.1a - but agrees that the rationales in 1.2.1 and 1.2.2 should consider both.

4. Pew noted that there is a comment in the report about how the measures for yft might also help skj, and explained that the reverse seems to be the case; i.e. that the French and Spanish fisheries have shifted almost entirely to FADs because the free-school catches tended to be yft, but this has increased skj catch as we as shift the catch profile of yft (and bet) towards juveniles. He suggested looking for information in the TTWP report from Nov 2019 and/or associated working documents; the team agreed to do that and revise accordingly.

5. There was a discussion about FADs with a few points raised as follows: i) the French fleet deploys fewer FADs but this is because they 'parasitise' Spanish FADs to a large extent (this does not make them more moral i.e.); ii) possibility of releasing tracked and untracked FADs at the same point? iii) biodegradable FADs are a good idea but it only mitigates the long-term impacts; the short-term impacts (e.g. if it beaches) will be similar to non-bio; iv) questions scoring approach of adding up area

of reef impact across entire Indian Ocean - local impacts might be more significant and a fisher from Seychelles can't up and go to Mauritius to get a reef fish (but this might be a function of how it's done within MSC); v) Pew and PNA have just completed a study on FAD beaching impacts in the Pacific with potentially useful info - not yet available but will be soon (this was sent to the team on the 8th June).

Follow-up comment from Glen Holmes in response to meeting minutes:

The only clarification I want to make is around the HCR and allocation. It is only my suspicion that the lack of clear allocation is the driver behind the failure of the HCR to limit catch.

Para 11b of 16/02 states:

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.

So, there is a mechanism that CPC's are supposed to follow (except Australia) but it hasn't happened and my gut feeling is that if the allocation discussions had been concluded then there may have been more compliance with the HCR.

Appendix 4.2 Stakeholder input following PCDR

Following publication of the PCDR, comments were submitted by ISSF, WWF and Pew. Technical Oversight comments were also submitted by MSC.

Appendix 4.2.1 ISSF Comments

General comments

Input detail	Evidence or references	Suggested score change	CAB response code
Joint assessment of cumulative impacts on ETP species and Habitat management with MSC-certified, MSC prospective and FIP fisheries. Although some fisheries do not meet the MSC guidance requirements that trigger the evaluation of cumulative impacts, this does not mean that existing cumulative impacts are not significant. This is especially evident in terms of ETP species, as current guidance considers that the combined impact needs to be evaluated "only in cases where either national and/or international requirements set catch limits for ETP species". However, we consider that cumulative impacts to ETP species mortality should be assessed in reference to the species' biological limits, stock assessment results, and management advice, regardless of whether catch limits are in place or not (e.g. when management advice requests to reduce catches but catch limits are not agreed). Additionally, there are currently a number of Indian Ocean purse seine and longline tuna fisheries involved in Fishery Improvement Projects (FIPs), some of them with prospects to proceed to a full MSC assessment in the near future. Although the MSC standard only requires cumulative effects to be evaluated and managed for MSC-certified fisheries (including those in evaluation) under overlapping UoAs, we believe these should be carefully assessed (for ETP species, as well as other P2 components such as habitats) and managed for all tuna fisheries with MSC aspirations. All currently certified and prospective MSC tuna fisheries should conduct a joint assessment for cumulative impacts on ETP species in the Indian Ocean and prepare a joint management strategy. The fishery client could coordinate with already certified fisheries, fisheries under assessment, and also seek support on this task from Indian Ocean FIPs. The fishery client should take advantage of their participation in the SIOTI FIP by cooperating with other members of the FIP as a first step to develop this task.	N/a	N/a	Not accepted (no score change)

<table>
<tr><th colspan="2">Input detail</th><th>Evidence or references</th><th>Suggested score change</th><th>CAB response code</th></tr>
<tr><td>CAB response</td><td colspan="4">We only evaluate the client fishery relative to the SGs, MSC requirements and guidance and current overlapping certified fisheries. Cumulative impacts were considered as per MSC procedure and were not triggered for this assessment. For ETP species, cumulative impacts are only assessed under 2.3.1a where there are limits in place, which is not the case here. Please see this interpretation for further information on what constitutes a limit in MSC terms. For habitats, cumulative impacts intervene at SG100 under 2.4.2 only, which is not considered met for this fishery. While we do not disagree with the points raised by ISSF, it would be more useful to address these to MSC directly so that this can be considered in their policy and standard reviews. There is also nothing to prevent ISSF from supporting such an overarching analysis; please feel free to engage with the client directly.</td></tr>
<tr><td colspan="2">Fishery description and dFAD management

ISSF suggests the client provides complete background information in the assessment report covering the following:

GENERAL FISHERY DESCRIPTION

A complete dFAD fishery description section must include information on all fishery's operations, including the use of FADs. For example, information required to correctly evaluate impacts would include: number of FADs deployed annually, design and materials of FADs, FAD marking system used (if any), number of FAD tracking buoys purchased annually and/or average number of buoys active.

Please see our revised background section for the fishery description (section 6.3.3).

FAD MANAGEMENT STRATEGY

ISSF recommends that the FDR includes a description of the fishery's FAD management strategy. A comprehensive FAD management plan would comprise data collection and analysis to address FAD impacts on habitat and P2 species, including cumulative effects with other tuna fisheries in the Indian Ocean (see comment on cumulative impacts). Such FAD management plan could be informed by, and developed to comply with all best practices identified in, ISSF´s Technical Report 2019-11 on Recommended Best Practices For FAD Management In Tropical Tuna Purse Seine Fisheries. Moreover, the fishery's FAD management plan could be further informed by ISSF Technical Report 2018-19A Workshop for the Reduction of the Impact of Fish Aggregating Devices' Structure on the Ecosystem.

Please see below the six elements of FAD management that ISSF considers to be of utmost importance, as well as some practical examples the fishery could adopt to implement them. For further examples and recommendations, please see ISSF Technical reports 2019-11 and 2020-11.</td><td>- ISSF non- entangling and biodegradable FADs guide

https://iss-foundation.org/knowledge-tools/guides-best-practices/non-entangling-fads/download-info/non-entangling-and-biodegradable-fads-guide-english/

- ISSF Technical Report 2019-11

https://iss-foundation.org/knowledge-tools/technical-and-meeting-reports/download-info/issf-2019-11-recommended-best-practices-for-fad-management-in-tropical-tuna-purse-seine-fisheries/

- ISSF Technical Report 2018-19

https://iss-foundation.org/knowledge-tools/technical-and-meeting-reports/download-info/issf-2018-19a-workshop-for-the-reduction-of-the-impact-of-fish-aggregating-devices-structure-on-the-ecosystem/

- ISSF Technical Report 2020-11

https://iss-foundation.org/knowledge-tools/technical-and-meeting-reports/download-info/issf-2020-11-recommended-best-practices-for-tropical-tuna-purse-seine-fisheries-in-</td><td>N/a</td><td>Accepted (no score change)</td></tr>
</table>

Input detail	Evidence or references	Suggested score change	CAB response code
Although we recognize that CFTO's FAD Management Plan (understood as the combination of the French IO FAD management plan, Orthongel décisions, TAAF regulations, etc.) follows ISSF best practices Technical Report high-level summary sections, not all best practices within these sections are covered. [See response to each individual point below] Moreover, ISSF recommends that the client fishery develops a public FAD Management Plan in the line of what is required by ISSF Conservation Measure 3.7 Transactions with Vessels or Companies with Vessel-Based FAD Management Policies (effective June 2021). This is a sound recommendation but we cannot require the client to do more than what is required under the MSC standard and SG80 guideposts. However, the client has informed the CAB that CFTO will publish its FAD management plan before June (as requested by ISSF conservation measure 3.7). (1) Comply with flag state and RFMO reporting requirements for fisheries statistics by set type Provision to IOTC of routine FAD fishery statistics (e.g. activity on FADs, number of active FADs, etc.) as per IOTC Resolutions (Res. 15/01, 15/02, 19/02, 19/01) requirements is essential to assess and manage the impacts of FAD fisheries. ISSF suggests that information on FAD fishery statistics as well as information on observer data (100 % coverage) as per IOTC requirements are provided to flag States, IOTC and the Scientific Committee. The French FAD management plan includes all IOTC requirements on data provision up to and including 19/02. (2) Voluntarily report additional FAD buoy data for use by RFMO science bodies In order to meet ISSF´s best practices on this aspect, ISSF recommends the client fishery provides information on position and acoustic record for the whole track or, alternatively, at least one position and echosounder record per day to scientific research institutes or to IOTC and the Scientific Committee. CFTO has provided daily buoy information to IOTC as per requirements (see most recently IOTC-2020-WPDCS16-17_Rev1). They were also one of the first fisheries to provide the acoustic data on fish below the FAD – in this case to IRD: Since 2007, CFTO has provided daily buoy positions to IRD. Since 2010, CFTO is also providing acoustic records to IRD. The team is not qualified to make judgements on the technical settings of these buoys, as long as the fleet is compliant according to IOTC ; again we suggest that ISSF engage directly with CFTO for this information. (3) Support science-based limits on the overall number of FADs used per vessel and/or FAD sets made	transition-to-msc-certification-with-an-emphasis-on-fads/ - CM 3.7 https://iss-foundation.org/what-we-do/verification/conservation-measures-commitments/bycatch-mitigation-3-7-transactions-with-vessels-or-companies-with-vessel-based-fad-management-policies/		

Input detail	Evidence or references	Suggested score change	CAB response code
In order to meet IOTC's Recommendations and ISSF´s best practices for limiting the number of FADs and to strengthen the effectiveness of these FAD measures, ISSF recommends committing to actions such as (i) deploying only FADs with satellite tracking buoys , (ii) not activating remotely the buoys of inactive FADs in the water (i.e. dormant FADs), (iii) allowing buoys to report at least once per day while they are in the water, and (iv) adopting alternative possible measures such as FAD closures to reduce their impact. We checked back with the client for this information: i) only FADs with buoys are deployed; ii) inactive buoys may not be reactivated except on board a fishing or carrier vessel; and iii) buoys report a minimum of once a day. See information in revised background section 6.3.3 and please refer to the Orthongel management plan available on the Orthongel website (article 13 and 14 - http://orthongel.fr/docs/reglt/fr/PlanGestionDCP-2020ind.pdf) (4) Use only non-entangling FADs to reduce ghost fishing o A new ISSF non- entangling and biodegradable FADs guide was published in August 2019 and, thus, ISSF encourages fisheries to commit to the new definition of fully non-entangling FAD (without any netting). This will allow following the best practice of Technical Paper 2019-11 to commit to using only non-entangling FADs. As of 1 January 2021, CFTO was using 100% non-entangling FADs (no net anywhere) as required by 19/02. An update note has been included in Section 6.3.3. (note, technically as per the management plan this was being implemented from 2020; however at the time of the site visit, it was not clear that this had been fully implemented in the fishery and this could also not be verified by the team – for this reason we have scored the fishery on a precautionary basis). o ISSF encourages incorporating in the FAD management plan actions to reduce and remove entangling FADs from the water, including encountered FADs not owned by the fishery client. CFTO report that they ask their crews either to remove them or to replace the entangling elements, although we do not have independent confirmation about whether this is actually done. (5) Mitigate other environmental impacts due to FAD loss including through the use of biodegradable FADs and FAD recovery policies ISSF recommends the FAD management plan incorporates specific actions to address the impact of FAD losses. For example, ISSF suggests the fishery under assessment works towards an early adoption of biodegradable FADs in the Indian Ocean and the construction and deployment of simpler, smaller biodegradable FADs.			

Input detail		Evidence or references	Suggested score change	CAB response code
CFTO is participating in several projects towards these objectives – detailed in the P2 background section 6.3.4. Moreover, ISSF encourages FAD fisheries to further develop good practices to reduce the loss and abandonment of FADs as described in Technical Paper 2019-11 and Technical Paper 2018-19. For example, by (i) providing FAD track data till the end of their lifetime to identify areas of high incidence of stranding events, (ii) providing positional data on beached FADs to enable targeted recovery, and (iii) participating in cooperative efforts to recover FAD from the water and remove stranded FADs. The assessment report should include a detailed description of the number of FADs recovered by the fishery and the recovery strategy/plan in place and technology used. CFTO is a participant in the FADWatch project, as detailed in the report. However, the UoA does not have a dedicated system for monitoring FADs and FAD beaching; this is one of the key reasons why a condition was imposed on PI 2.4.1 (SIb – VMEs), as explained in the rationale. (6) For silky sharks (the main bycatch issue in FAD sets), implement further mitigation efforts ISSF supports the adoption by the fishery under assessment of measures to reduce shark bycatch (e.g. developing and implementing a Code of Good Practices for bycatch) and suggests the fishery further develops measures to ensure that silky shark mortality is reduced (e.g. directing more effort to school sets and decrease FAD sets, avoiding small sets or with high bycatch/tuna ratio, releasing sharks from the net when safe and practical, implementing live and safe release of sharks (and rays) from the deck). ISSF encourages FAD fisheries to further test and develop shark and rays release techniques from the deck (with a special focus on big individuals) and to identify the tools/tactics used to the safe release of sharks (hoppers, stretchers, release ramps, etc.). The likely impact of the UoA on silky sharks is evaluated in the rationale for PI2.3.1 and the management measures in place to mitigate impacts are evaluated in the rationale for PI2.3.2 – they include FAD design, a good practice guide (as per the code of good practice requested by ISSF), training on handling and the use of handling equipment etc. These were evaluated by the team to meet the SG80 requirements.				
CAB response	Please see our responses in red above.			
Fully NEFADs		- ISSF (2012) NE FAD guide - ISSF (2016) NE FAD guide	N/a	Accepted (no score change)

Input detail		Evidence or references	Suggested score change	CAB response code
ISSF would like to clarify a point made in the scoring table for SI 2.3.1.b. where the risk of entanglement in FAD netting of 'All ETP species' is discussed. The following sentence is in included in that section: However, the definition of 'non-entangling' FADs has changed over time. The use of rolled up fishing nets (sausage nets) was promoted by ISSF as being 'non-entangling' as they significantly reduced the rate of entanglement of sharks and turtles, and this FAD design was consequently adopted by CFTO. However, previous versions of the ISSF NEFAD guide (ISSF 2012, 2016) did not describe FADs with rolled-up/ 'sausage' nets as being 'non-entangling'. In fact, FADs with this type of submerged components have always been defined by ISSF as "lower entanglement risk" FADs. Our apologies – this misunderstanding has been corrected. Additionally, as noted in that same section (p.113), the use of fully NEFADs is since January 1st, 2020 an IOTC requirement (Annex V, Res. 19/02). If the fishery client is not using only fully NEFADs (without netting), they are in direct contravention with Res. 19/02. The wording of the Fishery overview section of the report (p.23) is inaccurate, the fishery is not in compliance with Res. 19/02. "...the UoA is moving towards full adoption of non-entanglement risk designs which use rope instead of netting in its subsurface structure (Figure 3). This is also in compliance with Annex V of IOTC resolution 19/02". The fishery should immediately implement 100% fully NEFADs (without netting) as per the IOTC requirement. The CAB should take this issue into consideration, revise their Principle 2 scoring accordingly, and assess any implications this may also have in Principle 3 scores. CFTO confirms that as of 1 January 2021 they are 100% NEFAD, as per 19/02 and also the rules set by Orthongel. (note, technically as per the management plan this was being implemented from 2020; however at the time of the site visit, it was not clear that this had been fully implemented in the fishery and this could also not be verified by the team – for this reason we have scored the fishery on a precautionary basis).		- IOTC Res. 19/02		
CAB response	Please see our responses in red above.			

<table>
<tr><th>Input detail</th><th>Evidence or references</th><th>Suggested score change</th><th>CAB response code</th></tr>
<tr><td colspan="1">Letters of support

ISSF acknowledges the client's efforts to work collaboratively with other fisheries and stakeholders towards meeting the conditions set by the CAB, and the letters that support this approach attached as Appendix 9 of the PCDR. However, ISSF's concern remains that, without a letter of support from the parties directly involved in the process of adoption of a Harvest Strategy (national fisheries agency/ European Union) there is no clear expectation that the Client will achieve the objectives set out in the CAP for Principle 1 conditions.

For your reference, please consult formal letters included in PCDRs or Final Reports for other tuna fisheries that have obtained MSC certification in recent years. These are formal letters from the corresponding national fisheries agency or ministry of fisheries, in which they state their conformity and commitment to the milestones and actions described in the Client's Action Plan (see for example the PCDR of the SZLC, HNSFC & CFA Cook Islands EEZ south Pacific albacore longline fishery (Appendix 8, p.247), or the Final Report of the Solomon Islands Skipjack and Yellowfin Tuna Purse Seine Anchored FAD, Purse Seine Unassociated, and Pole and Line (Appendix 7, p.314)).</td><td>' - PCDR of the SZLC, HNSFC & CFA Cook Islands EEZ south Pacific albacore longline fishery (Appendix 8, p.247)

- Final Report of the Solomon Islands Skipjack and Yellowfin Tuna Purse Seine Anchored FAD, Purse Seine Unassociated, and Pole and Line (Appendix 7, p.314))</td><td></td><td>Accepted (no score change)</td></tr>
<tr><td>CAB response</td><td colspan="3">A letter of support is not a specific requirement, but we must be able to show evidence of commitment in the case where management authorities need to change their work or spending plans to cover meeting conditions. In this case, we can show the EU commitment to the P1 conditions (MSE → management procedure and tools) by demonstrating that the EU has provided extensive funding for this process (~$1 million to date), as set out in Appendix 34 of IOTC-SC (2019), bottom of p. 159 'skipjack MSE' : “The Secretariat is in the advanced stages of contracting an expert to develop the skipjack tuna MP using funds from an EU Grant.”

Note that a letter of support was also submitted by the French Direction des Pêches Maritimes et de l'Aquaculture for this certification, following PCDR publication (see Appendix 9.4).</td></tr>
</table>

Principle 3

3.1.2 - Consultation, roles and responsibilities (IOTC)

Input summary	Input detail	Evidence or references	Suggested score change	CAB response code
The independent report by Medley et al. (2020) indicates that the fishery would not meet SG80 for SI 3.1.2.a at the regional level (IOTC)	According to the independent report Medley et al (2020): "(…) Roles and responsibilities are not well defined and/or well understood in many areas, however. Recent (2015-2019) resolutions defining data requirements still need clearer definition. But IOTC has had problems with flag states that have not applied appropriate controls to their vessels, not submitting timely data etc. Additionally, the broader roles of constituents of CPCs and sometimes the CPCs themselves are not always well understood. While these problems are not all in key areas in the sense that they do not prevent IOTC from completing many of its tasks, they nevertheless undermine its overall effectiveness and increase risks for fishery sustainability. Hence the fisheries do not meet SG80 and SG100."	'Medley et al. (2020)	75	Not accepted (no score change)
CAB response	The global focus of the Medley et al (2020) report for IOTC relates to all CPCs and to all IOTC-managed fisheries. For this fishery specifically, the focus of Principle 3 indicator scores is put on the management bodies that are directly involved in the fishery's management, the IOTC, the EU and France (OT) and well as French and Italian institutions and stakeholders. Regarding IOTC, we do not evaluate "the performance of other fisheries management bodies where they are also subject to international cooperation… to the extent that they do not impact directly on P3 outcomes" (SA4.1.3). As indicated in our response to this stakeholder's comment on the ACDR (see Appendix 4), the focus for IOTC regarding this fishery is on the SKJ stock management and fisheries. The organisations and individuals of the main fleets involved in this management process at IOTC level are identified, and functions, roles and responsibilities are explicitly defined and well understood for key areas of responsibility and interaction, therefore SG80 is met for SIa (see scoring table).			

Appendix 4.2.2 WWF Comments

General comments

Input detail	Evidence or references	Suggested score change	CAB response code
Introduction: WWF is actively engaged in the management of tropical tunas in the Indian Ocean and has dedicated staff and teams deployed to network and coordinate with the Indian Ocean Tuna Commission. WWF has always actively responded to fisheries management issues arising in the Indian Ocean and has engaged with relevant stakeholders of the IOTC, its member states, fishery industry, companies, tuna processors and seafood markets and retailers. WWF has in the past engaged with the above mentioned key stakeholders for the adoption of the harvest strategy for the Indian Ocean skipjack tuna fishery in 2016. WWF aims to provide critical comments as well as share relevant for this MSC full-assessment for the CFTO Purse Seine Skipjack fishery, its stock status, current management systems and catch scenario, including highlighting challenges for primary species, secondary, ETP, habitats and ecosystem identified in Principle 2, followed by an indication of issues arising in principle 3. WWF is concerned on the management of tropical tunas in the Indian Ocean, with Skipjack tuna's TAC being over shot by 29% as reported by the IOTC, in addition to dealing with yellowfin and big eye tuna stocks who are determined to be in the red and orange zone by the K2SM.		N/a	N/a
CAB response	Thank you for your comments, please see our responses below		
Past Engagement of WWF: Moreover, WWF has been concerned with the application of the MSC standards, and objected to the Indian Ocean Pole and Line Skipjack fishery in the Maldives as well as the Purse Seine Skipjack Fishery run by Spanish fleets under Echebastar. WWF's objection led to, a) for Maldives, a condition applied for adoption of a harvest strategy for skipjack, among others, and b) for Echebastar, being premature to opt for certification, when fisheries remained to be in a poor state. The previous MSC full assessments were undertaken on the basis of the 2017 stock assessment for skipjack tuna, and no new stock assessment has taken place so far, which puts into question the state of the target species tuna stocks in 2020. The 2017 stock assessment model results differ significantly from previous (2014 and 2011) assessments. The main reasons for these are, a) the correction of an error in specifying selectivity for small fish in previous assessment, b) the addition of tag-release mortality in the model, and c) assuming creep of 1% per year since 1995 for the standardized European PS CPUE. In addition, median value of catch at the target fishing mortality (CSB40%) from the model runs is investigated is 510,090 t with a range between 455,920 and 618,760t. current spawning stock biomass relative to unexploited		N/a	N/a

Input detail		Evidence or references	Suggested score change	CAB response code
levels is estimated at 40%. Catch in 2018 (≈607,401 t) is in the upper range of the estimated range of CSB40%. The total catches in 2018 were 29% larger than the resulting catch limit from the skipjack HCR for the period 2018-2020. It should be noted that the skipjack catches for most gears have increased from 2017 to 2018 (+43% for PS (log-associated), +13% for gillnets and +13% for baitboats). In particular, due to Resolution 19/01, an increase in fishing operations on FADs by purse seine fleets has been increased with the associate increase in skipjack catch. CPUE fluctuations coincide with environmental signals at inter-annual timescale (e.g. Indian Ocean Dipole). Although the environmental indicators are not closely monitored, it is essential to do so to inform on the potential increase/decrease of stock productivity.				
CAB response	Where WWF has provided comments on specific PIs, we have responded (see below).			
EXTRACT OF THE Full ASSESSMENT (Evaluation of the fishery): The current assessment identifies several obstacles to be addressed before proceeding and requires additional source of information that needs to be verified through on-site visits and consultations to move towards MSC certification. One of the critical obstacles raised in the assessment is IOTC having many problems obtaining accurate and precise data for stock assessments, because of the relatively higher proportion catches in the Indian Ocean taken by artisanal fisheries, compared to other Oceans. In 2016 the proportion of nominal catches fully reported (according to the mandatory data requirements of Resolution 15/02) was just below 80%; while for catch/effort data just below 70% of data were fully reported, and for size data approximately 65%. Data availability for stock assessment is considered in PI 1.2.3. WWF did not provide any specific comments relating to this PI, so we have not made any changes as a result of this comment, which appears to be provided as background information. The assessment also acknowledges that although skipjack is proposed as P1 species, the fishery's primary focus is actually Indian Ocean yellowfin tuna, caught year-round. MSC allows for this situation. The current assessment identifies several obstacles to be addressed before proceeding and requires additional source of information that needs to be verified through on-site visits and consultations to move towards MSC certification. One of the critical obstacles raised in the assessment is IOTC having many problems 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 other Oceans. For nominal catch data, the proportion fully reported in 2016 was just below 80%, for catch/effort data just below 70% and for size data approximately 65%. The SC acknowledged that the estimation of ROS coverage for the purse seine fleets is adversely impacted by the lack of uniformity in reporting effort data to the IOTC secretariat,			N/a	N/a

Input detail	Evidence or references	Suggested score change	CAB response code
and agreed that this information which is particularly useful to assess the performance of the Resolution 11/04, should be further standardized. As such, the SC recommended that all purse seine fleets reporting effort as fishing hours or fishing days begin to submit this information as 'number of sets', instead, in particular when fulfilling the reporting requirements of Resolution 15/02. We have reviewed CFTO logbooks and can confirm that this is done. In addition, the assessment also underlines other key areas of concern, for instance the management of skipjack which it agrees is currently inadequate to manage the fishery, since there is no specific resolution in place for skipjack, except for having Resolution 16/02 on harvest control rules, and 15/10 on a decision framework, which basically provides a guideline, no such comprehensive measures have been adopted such as the Resolution 19/01 which provides a plan for all gear types, including best practices for gillnets and FAD measures. 19/01 is a rebuilding plan for yellowfin, but skipjack does not require rebuilding. Moreover, the assessment also recognizes TAC is not a management tool, yet it has been breached on in 2018. The failure to apply the catch limit in 2018 (and 2019) is reflected in the scoring of 1.2.1a and 1.2.2c. Furthermore, the assessment mentions that there are some tools in place via other resolutions, notably the Interim Rebuilding Plan for yellowfin (Res. 18/01) and the FAD limits (Res. 18/08 now superseded by 19/02) which may act to restrict skipjack catch somewhat, although apparently not enough. However, with resolution 16/01, 17/01 and 19/01 on interim plan for yellowfin tuna, the PS fleet changed their strategy including the assessed fleet (97% of catches as shown in Table 15 of the assessement), to target FAD schools and increased the catch by more than 43% compared to previous year. Thus illustrating that neither 18/01, 19/01 or 18/08 (now superseded by 19/02) provides any management framework to limit the increasing catches, but only provides an incentive for overfishing of the stock. Initially we thought that the requirement to reduce effort on yellowfin might also act to reduce effort on skipjack, but the client was of the same opinion as WWF that the situation was likely to be if anything the reverse, and the report also reflects this view (see rationale for 1.2.1a). The management advice from IOTC in 2019, is based on the results of the stock assessment of skipjack tuna in 2017, the Commission, following Resolution 16/02, adopted an annual catch limit of 470,029 tonnes for the years 2018-2020. Total catches in 2018 (607, 701t) were 29% larger than the catch limit generated by the Harvest Control Rules (470,029t) which applies to the years 2018-2020, and there has			

Input detail		Evidence or references	Suggested score change	CAB response code
been an increasing trend in catches over the past three years. The Commission needs to ensure the future catches of skipjack do not exceed the agreed limit for the period 2018-2020. Indeed, and a robust method of achieving that is currently lacking ; this is reflected in the scoring of 1.2.1 and 1.2.2. The Scientific Committee concluded in its programme of work further development of Management Strategy Evaluation (MSE) for the IOTC skipjack tuna fishery including, but not limited: refinement of operating model(s) used, specifications for the assessment and data to be used, and alternative management procedures. The aim of this programme of work is to develop the fully specified management procedure (harvest strategy) for Skipjack including the revision of the HCR may be required. This indicates that the current harvest strategy and harvest control rules are not suitable for managing the skipjack tuna in the Indian Ocean. They are not adequate at present, we agree (hence scores for 1.2.1 and 1.2.2) – but note also that MSC does not require a formal MSE-driven management procedure to score 80 for these PIs.				
CAB response	Please see our responses in red above.			
Principle 1: There are 4 PIs, 1.1.1 Stock status, 1.2.2 HCRs, 1.2.3 Information and monitoring and 1.2.4 Assessment of stock status, where the 80 level is not likely to be met, which may likely lead the overall Principle 1 score to be less than 80, therefore meaning the fishery may fail to meet the MSC Standard. Where WWF has provided comments on specific PIs, we have responded (see below). The Indian Ocean Skipjack tuna stocks have had an increase of catch in the past three years and HCRs have been triggered, the catches have been exceeding the TAC and the MSY levels. The catch exceeded the median estimate of MSY in 2018 but only by a trivial amount (1.3%), and dropped below in 2019 (91% of MSY as estimated by the 2020 stock assessment) ; 2018 is the only year when the estimate of MSY has been exceeded. The overshoot of the TAC in 2018 is extensively discussed – it was also overshot in 2019 but by less (catch 1.16*TAC) . Figures are conveniently summarised here: https://iotc.org/sites/default/files/Skipjack.pdf There is no rebuilding plan, the HCRs are weak and ineffective, the stock status will be updated in 2020, in addition, the information and monitoring is not robust and does not provide accurate information with possible issues with reporting at the landing sites observed in recent years, while the stock status still			N/a	N/a

Input detail	Evidence or references	Suggested score change	CAB response code
suggests skipjack is in green zone, it does not require a rebuilding, however, the assessment of stock under 1.2.4 needs to take into consideration the timeline of the data preparatory meeting planned in May 2020, which is well before the PCDR period. We have updated the background, scoring and rationales of P1 because of the extensive comments received – it now covers the 2020 stock assessment as well as WPTT, SC and Commission meetings. No management plan has been put in place as of yet by the IOTC to ensure that TAC is maintained or catches are reduced effectively to allow stocks to remain in green and not overfished and neither overfished. There are defined HCR in place, which ensures that the exploitation rate is reduced as the LRP and Bsafety are approached, E is reduced below Etarg as the biomass falls below the TRP, meaning that is should act to maintain the stock around the target level. However, HCR have only been place for two years (2018 and 2019), there is very little information (such as stock projections) and in the wake of the new stock assessment and over catch scenario, it could greatly impact the current management regime, and thus, we have strong evidence to believe that the stock status and the assessment remains uncertain. There are certainly uncertainties in the assessment, but the outcome of the 2020 assessment seems robust enough to conclude that the stock status is good, despite the failings in the harvest strategy. Furthermore, in scoring P1.2.1 the assessment mentions in page 46 that the rationale for scoring 80 was to refer to the stock assessment in 2017. However, it has to be noted that the stock assessment was done based on 2016 data and in 2017 and in 2018 the HCR limit was passed. IOTC did not take any measures in 2019 commission meeting despite the Scientific Committees recommendation to take adequate measures to bring down the catch levels (Refer to SC 2018 report page 129). It has now been updated to reflect the 2020 stock assessment. Moreover, yellowfin tuna in the Indian Ocean has been overfished since 2015 and even with an interim plan (Resolution 16/01, 17/01, 18/01, 19/01), the catches of yellowfin continued to increase. Thus, there is no indication in the past that despite an HCR or TAC that it could be fully enforced. Thus the assessments scoring of the P1.2.1 does not meet the threshold of S60. We thought hard about the scoring of 1.2.1, and in particular 1.2.1b – in fact, this is why we updated the analysis of P1 : in case harmonisation would be required. Please see our response to the comments on 1.2.1 from Pew for a detailed explanation of our thought process here.			

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<tr><th colspan="2">Input detail</th><th>Evidence or references</th><th>Suggested score change</th><th>CAB response code</th></tr>
<tr><td colspan="2">Moreover, while information seems to be available related to stock structure, or biology, which feeds into stock assessment and/or stock productivity, fleet composition, fleet reporting of the data, methodology and change in fishing patterns and fishing areas seem to influence stock abundance greatly.

Yes, there is an interesting discussion in WPTT22 about this, in relation to the stock assessment.

While, no direct conservation and management measures are in place for the Indian Ocean skipjack stocks, as skipjack is not overfished nor subject to overfishing, there are other supporting instruments, such as Resolution 14/02 which calls for the implementation of an action plan to establish an allocation system (quota) for the main target species. Currently, these measures have not been adopted, moreover, Resolution 19/05 has been adopted 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. This resolution also seeks to enable good monitoring control and surveillance, so the observer coverage is set, and requires additional electronic monitoring.

Full details of human observer and EM coverage are given in the report, in the general background section (Under catch profiles and data availability).

Moreover, the tagging information although available, has been used for support decisions, but do not cover wider area in the Indian Ocean and does not give a good overall representation of the stock structure.

See recent report Davies et al. 2020 (in ref. list) in relation to stock structure. It is notable that two of the 5 key sensitivities in the 2020 stock assessment relate to how tagging data are treated, and a third relates to stock structure.

Similarly, as mentioned above, the 2018 data is highly variable and prone to change with the ongoing re-estimations and assessments from the purse seine fleets operating in the Indian Ocean. While, the data is largely from Spanish fleets, there is very little monitoring observed to have taken place at ports for other fleets operating out of Seychelles. Cumulatively, with notable problems with catch and effort data from significant fisheries in the Indian Ocean (e.g. gillnet and handline fisheries from India, Iran, Oman, Yemen, and parts of East Africa), the scenario remains complex and ambiguous.

This is true.</td><td></td><td></td><td></td></tr>
<tr><td>CAB response</td><td colspan="4">Please see our responses in red above.</td></tr>
</table>

Input detail	Evidence or references	Suggested score change	CAB response code
Principle 2 – Primary Species (Yellowfin and Big eye tuna): There are 6 PIs, 2.1.1 outcome, 2.1.2 management strategy, 2.1.3 Information and monitoring for primary species and similarly for ETP species 2.3.1, 2.3.2, and 2.3.3 including habitats and ecosystem issues, as the assessment gives mixed scores, however, we believe that 80 level is not likely to be met, and which may likely lead the overall Principle 2 score to less than 80, therefore, meaning the fishery is premature and may fail to meet the MSC standard. Please see our response to comments on specific PIs. Under P2, primary species is considered as Indian Ocean Yellowfin tuna and Bigeye tuna, based on the information produced in the assessment, the likely inclusion of silky sharks within secondary species seems ambiguous, and even with high catches the score 80 is not justified, moreover, since silky sharks are CITES listed species, based on the criteria proposed in the assessment, silky sharks are better treated as ETP species. Silky sharks were treated as ETP species in the PCDR – this changed from the ACDR. Having said that, still the score under this PI should not meet the 80 score. The Indian Ocean Yellowfin tuna is a red listed species, while no new stock assessment were carried out in 2019, its status is determined on the basis of the 2018 assessment and other indicators presented in 2019. The 2018 stock assessment was carried out using stock synthesis III (SS3), a fully integrated model that is currently used to provide scientific advice for the three tropical tunas stocks in the Indian Ocean. The model used in 2018 is based on the model developed in 2016 with a series of revisions that were noted during the IOTC – WPTT meetings. The model uses four types of data, catch, size, frequency, tagging and joint longline and CPUE indices. The 2018 assessment results were based on a grid of 24 SS3 model runs which are recognized as insufficient to explore the spectrums of uncertainties and scenarios, noting the large uncertainty associated with data quality (e.g. spatial representativeness of CPUE coverage, estimation of catch and inconsistency in length-composition) and lack of considering model statistical uncertainty. Some of these uncertainties have were explored in 2019 following the work plan the Scientific Committee adopted in 2018. However, due to the complexity of the work, lack of agreement on key model aspects and time constraints, no new management advice is provided in 2019. According to the 2018 stock assessment, spawning stock biomass in 2017 was estimated to be 30% of the unfished levels. According to the information available in 2019, the total catch has remained relatively stable at levels around the estimated MSY since 2012 (i.e. between 390,000t and 436,000 t) with the 2018 catch being the largest since 2010 (437,422t) and exceeding the MSY range considering the best catch estimate by the scientific committee. The 2018 stock assessment estimates SB2017/SBMSY at 0.83 (0.74-0.97) and F2017/FMSY at 1.20 (1.00 -1.71). However, it is noted that the quantified uncertainty in stock status is likely underestimating the underlying uncertainty of the assessment. On the weight- of-evidence available in		N/a	N/a

Input detail	Evidence or references	Suggested score change	CAB response code
2018 and 2019, the yellowfin tuna stock is determined to remain overfished and subject to overfishing. The increase in catches in recent years has substantially increased the pressure on the Indian Ocean stock, resulting in fishing mortality exceeding the MSY-related levels. There is a high risk of continuing to violate the MSY-based reference points if catches remain at 2017 levels (≈409,000 t in 2017). However, the projections that have been provided in the assessment based on the K2SM results do not adequately reflect known sources of uncertainty due to a series of issues with data and model performance, and the IOTC cautioned its use for management purposes. The decline in stock status to below MSY reference level is not well understood due to various uncertainties. As a precautionary measure, it has been noted that the Commission should ensure that catches are reduced to end overfishing and allow the SSB to recover to SSBMSY levels. In 2019, no revised specific catch limits are recommended. In the 2018 Scientific Committee a Workplan was developed to address the issues identified in the assessment review, aimed at increasing the Committee's ability to provide more concrete and robust advice by the 2019 meeting of the Scientific Committee. The workplan started in January 2019 which aimed at addressing the issues identified by the IOTC - WPTT and the external reviewer in 2018. Despite the progress made to reduce the uncertainties inherent to this fishery, the WPTT agreed that no new advice could be provided in 2019. The Commission has an interim plan for the rebuilding the yellowfin stock, with catch limitations based on 2014/2015 levels (Resolution 19/01, which superseded 17/01 and 18/01). Some of the fisheries subject to catch reductions had fully achieved a decrease in catches in 2018 in accordance with the levels of reductions specified in the Resolution; however, these reductions were offset by increases in the catches from CPCs exempt and some CPCs subject to limitations on their catches of yellowfin tuna, this has not clearly been captured in the current assessment. Thus, the total catches of yellowfin in 2018 increased by around 9% from 2014/2015 levels. This shows the seriousness of the issue, and in light of the current management regime, it seems highly unlikely to even give a conditional pass, yet alone a score of 80 or above with the current management measures failing to address the rebuilding and effectively addressing the problem. We assume that this comment relates to PI 2.1.1. There is a specific comment on this PI below, but here a lot of detail is provided so we will respond here as well. It is important to note that the SG80 requirement here is a much lower bar than for Principle 1 : SG80 : Main primary species are highly likely to be above the PRI. MSC provide a default proxy for the PRI at 50%Bmsy (assuming Bmsy>27%B0, which is the case here), and the stock is above this level with high probability, according to the stock assessment. For P2, primary or main species, Bigeye tuna, in brief, in 2019, a new stock assessment was carried out. The reported stock status is based on the SS3 model formulation in the assessment, 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. Due to concerns on the repoted catch data for			

Input detail	Evidence or references	Suggested score change	CAB response code
2018, the stock status is based on SS3 model formulations using the best catch estimate by the SC. The spawning stock biomass in 2018 was estimated to be at 31% of the unfished levels in 2018 and 122% (82%-181%) of the level that can support MSY. The assessment outcome is qualitatively different to the stock assessment conducted in 2016 due to the increase of catch of small size, changes in modelling assumptions about longline selectivity, and the abundance index developed in 2019. Considering the characterized uncertainty, the assessment indicates that SB2018 is above SBMSY with high probability (65.4%) and that fishing mortality is above FMSY also with high probability (72.8%). The median value of MSY from the model runs presented with SS3 was 87,000 t with a range between 75,000 and 108,000 t (a median level 16% lower than the estimate in 2016). Catches in 2018 (≈81,413 t) remain lower than the estimated median MSY values from the stock assessment conducted in 2019 but within the range of estimated MSY. The average catch over the previous five years (2014–18; ≈89,717 t) is just above the estimated median MSY and within the range of estimated values. Thus, on the weight-of-evidence available in 2019, the bigeye tuna stock is determined to be not overfished but subject to overfishing. The scientific committee in 2019, noted that the bigeye tuna assessment (using stock synthesis) concluded that stock is not overfished but is subject to overfishing, furthering noting that a continued decline of the CPUE from the main longline fleets and the recent increase in fishing pressure on the juvenile component of the population by the purse seine fleets have resulted in more pessimistic estimates of stock status compared to previous assessments. The stock status determination changed qualitatively in 2019 to not overfished but subject to overfishing. If catches remain at current levels there is a risk of breaching MSY reference points with 58.9% and 60.8% probability in 2021 and 2028. Reduced catches of at least 10% from current levels will likely reduce the probabilities of breaching reference levels to 49.1% in 2028. Please see our response in relation to yellowfin, above – the situation is the same for bigeye. Continued monitoring and improvement in data collection, reporting and analyses is required to reduce the uncertainty in assessments. It is argued that a number of management measures currently exist, but these are majorly superseded or the CMM 05/01 on bigeye tuna requests for voluntary commitments and reductions, which we have observed are not currently favourable and the robust management regime, considering the none of the voluntary reductions have been met. The resolution has been adopted since 2005 and the catches have not decreased resulting in the overfished state. Regarding PI 2.1.2, again the bar is lower than for P1 ; a partial strategy (which is what is required for SG80 to be met) is defined at the start of the rationale for 2.1.2a and does not need to include all the elements required by a harvest strategy under P1, nor be specifically directed at the species in question. Both the tropical tunas, yellowfin and big eye tunas caught in the IOTC area of competence based on the evidence produced in the assessment have a significant proportion of the total catch. In fact, the report			

Input detail	Evidence or references	Suggested score change	CAB response code
indicates that a good portion of yellowfin tuna caught is from free-schools. The assessment underlines this several times, that the fishery which is attempting to obtain a free-school and FAD set fishery certified, have been primarily been fishing with FADs since 2017 and have no data or association to provide enough data from free-schools. The fishery previously had the objective of minimising FAD use, and primarily targeted free schools, yielding a significant catch of large yellowfin. However, now that there are strict quotas in place for yellowfin for this fleet (under EU management rules) the fishery has had to try and reduce yellowfin catch by moving towards using FADs which takes a higher proportion of skipjack ; the downside of this is that the yellowfin which is taken is smaller. As noted in the report, CFTO provided catch data for the period 2014-2018. During that period, the proportion (%) of free-school versus FAD catches according to the uncorrected logbook data was as follows (Table 18 of the report): Year / Free-school sets / FAD sets: 2013 / 25 / 75 2014 / 35 / 65 2015 / 40 / 60 2016 / 26 / 74 2017 / 24 / 76 2018 / 7 / 93 There is no observer coverage for this fishery. Yes there is. See background section on Catch profiles and data availability. Having said all above, identifying issues and challenges, in addition to existing implementation and compliance to Resolution 19/01, reduction targets have not been met, yet the 2018 data is a mystery box, which is highly unreliable. The stock status is loomed with uncertainty and progress is slow and poor, and while its driven by high catches of juvenile yellowfin tuna, WWF does not see it likely even scoring 60.			

Input detail	Evidence or references	Suggested score change	CAB response code
Regarding yellowfin, please see comment above and response to specific PI comments below. For Albacore, a new stock assessment was carried out in 2019 to update the assessment undertaken in 2016. The stock assessment was carried out using stock synthesis III (SS3), a fully integrated model that is currently also used to provide scientific advice for the three tropical tuna stocks in the Indian Ocean. There are some noticeable changes in spatial distribution of LL catches compared to previous assessment data set, with historical catch shifted to equatorial regions (LL1 and LL2) from southern fisheries (LL3 and LL4). Catches have also increased substantially since 2007 for some fleets (i.e., Indonesian and Taiwan, China longline fisheries), although there is substantial uncertainty regarding the reliability of the catch estimates. Catches in 2017 were marginally above the MSY level of the SS3 model. Fishing mortality represented as F2017/FMSY is 1.346 (0.588–2.171). Biomass is estimated to be above the SBMSY level (1.281 (0.574–2.071)) from the SS3 model. These changes in stock status since the previous assessment are possibly due to decreases in the CPUE in recent years, while catches have remained relatively stable. Also, there has been a large redistribution of catch to the southern regions which impacts on small fish (and therefore influences the computation of FMSY). In addition, the latest assessment uses a revised growth curve which also impacts FMSY. Thus, the stock status in relation to the Commission's BMSY and FMSY target reference points indicates that the stock is not overfished but is subject to overfishing. Maintaining or increasing effort in the core albacore fishing grounds is likely to result in further decline in the albacore tuna biomass, productivity and CPUE. The impacts of piracy in the western Indian Ocean resulted in the displacement of a substantial portion of longline fishing effort into the traditional albacore fishing areas in the southern and eastern Indian Ocean. However, in recent years the effort distribution in the Indian Ocean has been rather dynamic. Projections indicate that under current catch assumptions, the biomass will continue to decline as recent recruitment levels are estimated to be low. The recruitment in the terminal years of the assessment model are estimated to be well below average levels and this is projected to cause the stock to decline considerably over the short term. However, these recruitment estimates are poorly determined. Therefore it is cautioned that the short term projections are more influenced by the recent low recruitment levels, whereas the long term projections are more determined by the assumptions of average recruitment levels over the longer term period. Although considerable uncertainty remains in the SS3 assessment conducted in 2019, particularly due to the conflicts in key data inputs, a precautionary approach to the management of albacore tuna should be applied. The K2SM indicates that catch reductions are required in order to prevent the biomass from declining to below MSY levels in the short term, due to the low recent recruitment levels. Although there is considerable uncertainty in the projections, current catches are exceeding the estimated MSY level (35,700 t;). Albacore is above the PRI with high probability, which is all that is required for 2.1.1b 100 to be met for this stock.			

Input detail		Evidence or references	Suggested score change	CAB response code
CAB response	Please see our responses in red above.			
Principle 2 Secondary Species: The assessment considers secondary species as those species that are not covered under P1, not managed in accordance with limit or target reference points, are out of scope of the programme, but where the definition of ETP species is not applicable. Correct The assessment in tables 14 outlines a number of secondary species, however, in the P! 2.2.1 does not consider any secondary species. There are no main secondary species (defined by MSC as those making up >=5% of the catch, or >=2% if vulnerable). Minor secondary species are considered under 2.2.1b. All of the secondary species listed in table 14 do not have a harvest strategy, they are largely data deficient and do not have indices of abundance nor indicators to suggest or incorporate secondary species outcome, yet the PI score meets 80. Because there are no main species, as per MSC procedure. FCP2.1: G7.17.10.a - For 'minor' species and habitats, SGs only exist at the SG100 level in some PIs (2.1.1-2.2.3; 2.4.1; 2.4.3). When scoring such minor species or habitats as scoring elements, the team should assume that the SG80 level is met by default, such that the scores are simply based on how many of the scoring issues that apply to minor (or all) species/habitats are met at the SG100 level. The assessment also refers to a major and minor secondary species, which remains confusing, as none of the tables nor the sections clearly define the difference of a major and minor secondary species – whether this difference is on basis of overall weight composition to target species or other criteria. See definition above. The definition is provided at the very start of the P2 background section (designation of P2 species, Section 6.5.1). In addition, the silky sharks which are a CITES listed species has been added in the secondary species category, considering that silky sharks are now part of the CITES appendix II listings, there seems to be corrected or else justified. As previously mentioned, silky sharks were assessed as ETP. Moreover, none of these species have qualitative information available. In scoring PI 2.2.3, the rationale is weakly provided, where the secondary species information verified via logbook data is mentioned to be			N/a	N/a

Input detail	Evidence or references	Suggested score change	CAB response code
not validated, and therefore likely to suffer from estimation error, whereas, the observer coverage in this fishery is good, but still no major impacts on secondary species being assessed leads to higher score, whereas, the unreliable information leading to no stock assessment scores lower. Qualitative and quantitative information is available as explained in Section 6.3.6 of the report, as well as in the scoring rationale for secondary species. The team agreed that because stock assessments are lacking for most secondary species, SG100 is not met for minor species (given that no main species were identified). This is in line with MSC procedure.			
CAB response	Please see our responses in red above.		
Principle 2 ETP Species, FADs and Habitats: With ETP species, and secondary species, the assessment, tried to push the score to 80, if secondary species are retained and consumed, the bycatch of silky sharks may be justified. There are no current stock assessment for silky sharks, they have been listed under CITES as well, however, still seem to have been put in secondary species. Silky sharks were assessed as ETP. Moreover, no robust information is available, and largely the ETP species identified within the assessment are subject to estimation. The analysis comes from observers and it is always difficult to extrapolate from rare events; this fishery is no different to any other in that regard. Note a new condition has been raised on 2.3.3. Even with underreporting as identified in the assessment We did not mean to say that the observers are underreporting through any intent, but it seems that the EM might not record all the sharks ; hence that part of the analysis is based on human observer data only, which depicts the worst-case scenario. or extrapolating figures are deemed to be unreliable, and to that effect it is proposed that recovery of these species would not be hindered. For oceanic whitetip, there remains considerable uncertainty about the relationship between abundance, standardized CPUE series and total catches over the past decade. The ecological risk assessment (ERA) conducted for the Indian Ocean tuna commission by the Working Party on Ecosystem and Bycatch and scientific committee in 2018 consisted of a semi-qualitative risk assessment analysis to evaluate the resilience of shark species to the impact of a given fishery, by combining the biological productivity of the species and its susceptibility to each fishing gear type. Oceanic white tip shark was estimated as being the 11th most vulnerable shark species to purse seine gear, as it		N/a	N/a

Input detail	Evidence or references	Suggested score change	CAB response code
was characterized to having a relatively low productive rate. The current IUCN threat status of 'vulnerable' applies to oceanic white tip sharks globally. Moreover, there are no management strategy adopted for the ETP species and is likely that these species remain poorly managed. The IOTC indicated that there is a paucity of information available on these species and the situation is not expected to improve in the short to medium term. In addition, based on circumstantial evidence it is likely that the FAD-associated sets have a negative impact on the populations of vulnerable and endangered species such as pelagic sharks and rays, predominantly silky shark, oceanic white tip shark, and manta and mobulid rays. Their stock status in the Indian Ocean is highly uncertain. Note that under P2 we are evaluating the impact of the UoA (the CFTO fishery) on these stocks, rather than (as P1) their status regardless of the impact of the UoA. Stock status is therefore only part of the analysis. Due to a lack of data the impact of FAD purse seine fisheries on sea turtles cannot be fully evaluated. All species of sea turtles are listed under IUCN and on CITES appendix I. Which is why they are included as ETP species. Note there is a new condition in relation to ETP species information. The purse seine fishery is characterized by the use of two different fishing modes, the fishery on floating objects (FADs) catches large numbers of small yellowfin tuna in association with skipjack and juvenile big eye tuna, compared to the fishery on frees swimming schools, which catches larger yellowfin tuna on multi-specific or mono-specific sets. A negative impact of the FAD associated purse seine fishery is assumed as the bycatch which has largely been stated above. In addition, the assessment indicates the likeliness of reducing the use of such FADs, the issue largely is with the uptake of the biodegradable FADs and even within its definition. It is also not clear what does the term 'active' FAD buoys per vessel refer to, as once FADs are deployed active or inactive, they shall continue to aggregate fish biomass. The activeness here, seems redundant and its impacts in terms of numbers remain questionable. 'Active' means the ones being tracked. IOTC requirements are expressed in terms of numbers of active FADs. The assessment mentions about the on going BIOFAD project and trialling of biodegradable FADs. The UoA also participates in the project INNOV FAD which among other things, provides for the development of a dFAD whose trajectory would be controllable in order to avoid problems related to losses and strandings. Furthermore, the FAD watch programme, for the preventation and mitigation of FAD beachings in the Seychelles is the result of a collaborative work among the Spanish Tuna purse seiner fishing representatives (OPAGAC), Island Conservation Society (ICS), among others. The fishery itself has			

Input detail		Evidence or references	Suggested score change	CAB response code
joined this project quite recently, and considerable information is still lacking, no such reports, have been shared thus far, and the impacts on the coral reefs are just envisioned or anticpated to take place. Moreover, with majority of fishing operations taking place far away from Seychelles, and in the North Mozambique Channel as the assessment indicates in several sections, there is not much scientific evidence to prove whether the impact has been mitigated or not. In addition, the BIOFAD project is also in its early stage, and the area of operation or pilot is limited as the objective of the study was to look at beaching impact on the MPA around Seychelles, and was not wide spread. There are no gear markings, or inidcations of FADs where they origin from, there is growing amount of reports from the NIO region, specifically from the Maldives, where FADs have ended up impacting the marine megafauna. Having considered this pilot has not even fully taken off, the consideration of having a partial strategy in place is uncalled for. The IOTC itself has in its programme of work, identified the need to develop improved FAD designs to reduce the indicence of entanglement of mafrine turtles, including the use of biodegradable materials. This has not been fully completed, not endorsed or adopted by the IOTC, thus indicating that a dearth of information still needs to be collected. Moreover, bioFAD testing and implementing in the Indian Ocean purse seine fleet is still part of the programme of work not completed which would help reduce the environmental footprint of the gear. In the context of ETP species, the critical element of the partial strategy is the use of non-entangling FADs (note that as of Jan 2021, CFTO uses 100% non-entangling, as required by 19/02. Technically as per the management plan this was being implemented from 2020; however at the time of the site visit, it was not clear that this had been fully implemented in the fishery and this could also not be verified by the team – for this reason we have scored the fishery on a precautionary basis). We are aware that no successful solution to the problem of biodegradable FADs has yet been reached ; BIOFAD is one of the main projects working on this, however, and as far as we are aware, tests and pilots are ongoing with various fleets. CFTO FADs are marked on the acoustic buoys which all have individual reference numbers – the deployment of FADs without a buoy is forbidden (please refer to the Orthongel FAD management plan – article 7 - http://orthongel.fr/docs/reglt/fr/PlanGestionDCP-2020ind.pdf). In relation to habitats, we agree that the FADWatch project is a start but that measures are not sufficient; hence the conditions on 2.4.1, 2.4.2 and 2.4.3.				
CAB response	Please see our responses in red above.			
Management of this fishery is marginally effective. NB: IOTC Decisions that are binding to the Commission Members are called Resolutions, whereas Recommendations are not binding and rely on		Agnew, D.J., Pearce, J., Pramod, G., Peatman, T., Watson, R., Beddington, J.R. & Pitcher, T.J. (2009):	N/a	N/a

Input detail	Evidence or references	Suggested score change	CAB response code
voluntary implementation (IOTC 2016f). ETP-species: Despite the existence of the several resolutions, the bycatch of endangered species, especially CITES listed shark species, remains one of the prevailing problems in the Indian Ocean fisheries industrial tuna fisheries. Longline and gillnet fisheries are by far the main threat to Indian Ocean sharks ; the impact of the purse seine fleet is trivial by comparison, particularly now that entangling FADs are being eliminated. IOTC has to ensure that all sharks are sustainably caught or properly protected by adopting catch limits and retention prohibitions for certain species, such as silky shark, hammerhead sharks and shortfin mako sharks. The existing measures are only marginally effective. A set of resolutions and recommendations are in force to reduce unwanted bycatch: Resolution 17/05 and 13/06 on sharks Resolution 17/04 on a ban on discards of target tuna species Resolution 15/05 on billfishes (striped marlin, black marlin and blue marlin), Resolution 15/08 encourages the use of non-entangling FADs, starting in 2014, to minimize the risk to sea turtles, sharks and other marine life. Resolution 13/05 on whale sharks Resolution 13/04 on cetaceans Resolution 12/09 on thresher sharks Resolution 12/04 on marine turtles. No response required. Discard: There are indications that the tuna discard ban is effective (Chan et al. 2014). Information is however conflicting as the amount of target tuna discarded at sea remains unknown to the IOTC, which is primarily due to low observer coverage. The IOTC has recently expanded its discard ban for the purse seine fleet from solely target tunas to target tunas and non-targeted species. Resolution 17/04 of the IOTC calls for the full retention of all target tunas from purse seine fisheries, except fish considered unfit for human consumption, and of the following non-targeted species or species group; other tunas, rainbow runner, dolphinfish, triggerfish, billfish, wahoo, and barracuda, except fish considered unfit for human consumption and/or species which are prohibited from retention (IOTC 2017d). IOTC 2017b (WPTT19 Report): "The total amount of tropical tunas discarded at sea remains unknown for most fisheries and time periods. Discards of tropical tunas are thought to be significant during some periods of industrial purse seine fisheries using fish aggregating devices (FADs) and may also be high due to depredation of catches of longline fisheries, by sharks or marine mammals, in tropical areas. This is not the case for this fleet, according to observer information Update: No change from WPTT-18. The IOTC Secretariat is actively working with CPCs to develop the Regional Observer Scheme, which will lead to improvements in the estimates of discards of tropical tunas. However, for the moment, estimates of discards remain highly uncertain."Chan et al. 2014:"Before the catch retention requirement went into effect (2006–2009), discard rates for tuna averaged ~2% of landed	Estimating the Worldwide Extent of Illegal Fishing. ONE 4(2): e4570. doi:10.1371/journal.pone.0004570 Ardill, D., Itano, D. & Gillett, R. (2012): A Review of Bycatch and Discard Issues in Indian Ocean Tuna Fisheries. IOTC-2012_WBEB08_INF20. Link Aranda M., de Bruyn P.& Murua H. (2010): A report review of the tuna RFMOs: CCSBT, IATTC, IOTC, ICCAT and WCPFC. EU FP7 project nº212188 TXOTX, Deliverable 2.2, 171 pp. Chan, V., Clarke, R. & Squires, D. (2014): Full retention in tuna fisheries: Benefits, costs and unintended consequences. Marine Policy 45: 2013-221. Link Davies. T.K., Mees, C. & Milner-Gulland, E.J. (2014): The past, present and future use of drifting fish aggregating devices (FADs) in the Indian Ocean. Marine Policy 45:163–170. Francis, J., Nilsson, A. & Waruinge, D. (2002): Marine Protected Areas in the Eastern African Region: How Successful Are They? Link Gilman, E., Passfield, K., Nakamura, K. (2012): Performance Assessment of Bycatch and Discards Governance by Regional Fisheries Management Organizations. IUCN, Gland, Switzerland, ix + 484 pp. Link IOTC (2016): Report of the 2nd IOTC Performance Review. Mahé, Seychelles, 2–6 February & 14–18 December 2015. IOTC-2016-PRIOTC02-R. 86 pp, Link IOTC (2017g): Update on the Implementation of the IOTC Regional Observer Scheme. IOTC-2017WPEB13-08. August 2017. 11 pp, Link		

Input detail	Evidence or references	Suggested score change	CAB response code
weight, and after the catch retention requirement went in effect in 2010, discard rates for the three tuna species declined to 0.4%. No response required. ”Unwanted Bycatch: Besides ETP species (covered above), bycatch of juvenile tunas should be addressed by IOTC by, e.g. mesh size regulations. Mesh size regulation is not effective for purse seines. No such measures are known. It should be noted however that some authors consider that catching juvenile tuna does not necessarily result in overfishing of the stocks (e.g. Dagorn et al. 2012). However, it does make it more likely in that MSY is smaller for a given stock when a higher proportion of juveniles are caught. Ecosystem effect: No specific measures are implemented to mitigate ecosystem effects of the large scale industrial tuna fisheries. It is hard to imagine a ‘measure’ to mitigate ecosystem impacts – these impacts are mitigated by a whole suite of measures tackling specific components of the ecosystem (e.g. maintaining target and bycatch stocks at a healthy level, limiting pollution). There is no evidence in tropical tuna fisheries for ecosystem impacts directly arising from exploiting tunas (such as might be seen in forage fisheries). A general lack of data hampers progress on the estimation of bycatch and ecosystem effects, and despite the Scientific Committee issues recommendations each year to improve the situation, progress is only very slow. We do not disagree, but for the purse seine fleet the estimation of bycatch is documented to some extent (IOTC-2018-WPEB14-15). Results of the 2012 Ecological Risk Assessment (ERA) (Murua et al. 2012) demonstrate the vulnerability of certain shark species to longline and/or purse seine fisheries. These results do however not trigger the definition and strict implementation of stricter protection measures. Murura et al. 2012:“The species more susceptible for the purse seine fishing fleets are the oceanig white-tip and silky shark followed by shortfin mako. The rest of species are ranked in much lower levels of susceptibility. […] In the purse seiner fleet, the vulnerability is in a large extent defined by the susceptibility of the species to the gear rather than for the productivity of the species.	Koehler, H. (2016): A Survey of RFMO Vessel Monitoring Systems and Set of Best Practices. ISSF Technical Report 2016-02. 24 pp, Link Murua, H., R. Coelho, M. N. Santos, H. Arrizabalaga, K. Yokawa, E. Romanov, J. F. Zhu, Z. G. Kim, P. Bach, P. Chavance, A. Delgado de Molina & J. Ruiz (2012): Preliminary Ecological Risk Assessment (ERA) for shark species caught in fisheries managed by the Indian Ocean Tuna Commission (IOTC). IOTC–2012–SC15–INF10 Rev_1, Link Sheppard et al. (2012): Reefs and islands of the Chagos Archipelago, Indian Ocean: why it is the world's largest no-take marine protected area. Aquatic Conservation: Marine and Freshwater Ecosystems 22(2): 232–261. WIOMSA, Western Indian Ocean Marine Science Association (2017): Managing Marine Protected Areas. A Toolkit for the Western Indian Ocean. Link WWF 2016: Smart Fishing Initiative May 2016. WWF Position: 20TH Session of the Indian Ocean Tuna Commission (IOTC). La Reunion, FRANCE 23 - 27 May 2016. 6 pp, Link		

Input detail	Evidence or references	Suggested score change	CAB response code
But although these species are the most vulnerable to the purse seine fishery, it is all relative. They are nevertheless much more vulnerable to the longline fishery, and FAD design has changed a lot since 2012. "A multitude of smaller marine protected areas (MPAs) is implemented in the Indian Ocean for the protection of the marine environment and the ecosystem (WIOMSA 2017). Major focus of many of these is on the protection of coral reefs (Francis et al. 2002, Sheppard et al. 2012). No response required. Monitoring/Data Availability: IOTC`s reports and stock assessments are publically available via the internet. However, the scientific assessment of the skipjack stocks has major uncertainties. This is mainly due to the poor quality of data and especially the still ongoing underreporting by some member and non-member countries fishing in the area. There are a number of uncertainties of catches, e.g. there is uncertainty about the catches from some important fleets including the Sri Lankan coastal fisheries, and the coastal fisheries of Comoros and Madagascar (IOTC 2016b). However, the data reporting requirements for the purse seine fleets set by IOTC are being met pretty well. Data and data quality for skipjack is considered in detail in Section 6.4.4 (see new Figure 7). Information on the status of non-target species is relatively poor and even though some stock assessments for non-target species (billfish, small tunas, sharks) have been undertaken, the stock status of the majority remains uncertain. As a consequence, uncertainties remain in relation to many of these species, most notably sharks. No centralized regional database has been established (Gilman et al. 2012). WWF 2016: For many IOTC stocks the IOTC Secretariat is required to estimate the level of catches, which increases the uncertainty of the stock assessment results. Hence it is crucial to improve data gathering for all species caught in IOTC fisheries notably through the implementation of the IOTC Regional. Observer Scheme: The effective management of IOTC's valuable stocks relies on the accurate monitoring and timely reporting of Catch Statistics to feed into stock assessments and the development of effective management options by the IOTC Scientific Committee. Of significant concern, is the quality of data collection and levels of reporting with regard to Coastal and/or Artisanal Tuna Fisheries, which is generally low throughout the region."However, progress has been made compared to the Gilman et al. (2012) report, when "Observer coverage rates", "Data quality" and "Open Access to discard data" was rated by 0%. For the purse seine fisheries, there is some level of observer coverage (see also "compliance") and they do estimate the number of sharks. Davies et al. 2014:"IOTC has recently revised and improved its reporting requirements for FADs under Resolution 10/02, which were previously considered ambiguous and insufficient to comprehensively record the practise of FAD fishing. These new and more detailed requirements include reporting the unique identifier, position, type and construction of the FAD fished on.The use of supply			

Input detail	Evidence or references	Suggested score change	CAB response code
vessels, including the number of associated catcher vessels and number of days at sea, must also be reported. In addition, in 2012 IOTC adopted a entirely new resolution (Resolution12/08, superseded by Res. 13/08) setting out the requirement for fleets to develop and submit FAD Management Plans by late 2013.n This resolution (...) represents an important step towards regulating the practice." In 2013 IOTC took steps to require an International Maritime Organization (IMO) number as unique vessel identifier (UVI) for their vessels This will strengthen the ability of RFMOs to monitor fishing capacity and to combat IUU. IOTC requires that all vessels larger than 24m must have an IMO number by 2015 to be on the Vessel Record. In addition. Res. 15/08 requires the use of an FAD logbook and other measures on FAD management. This measure will enhance the available database of FAD associated purse seine fisheries. No response required. Mixed fishery: Most tuna fleets operating in the Indian Ocean do not target or catch a single stock or species. The multi-species nature of the fishery, both industrial and artisanal, implies that management measures directed towards a single stock are very likely to have effect on other stocks as well. The direction and magnitude of these secondary effects cannot always be directly inferred given the adaptability of the various fleets. Yes, we agree; the impact of 19/01 (yellowfin measure) on the other stocks has not always been what we would have expected, particularly since it has pushed purse seine fleets further in the direction of using FADs. Skipjack, bigeye and albacore tuna in the Indian Ocean are considered healthy, but yellowfin is overfished and overfishing is occurring. There is also considerable uncertainty in the assessments (IOTC 2016a, 2017b). There are no direct measures (e.g. separate quotas for all retained species, closure of fishery if quota of one species is taken, multi-species stock assessments) to address mixed fisheries issues in the Indian Ocean. A quasi-universal problem in fisheries. IUU/Misreporting: The amount of illegal fishing in the period 2000-2003 was estimated to be 32% of the total catches for the Eastern Indian Ocean and 18% for the Western Indian Ocean (Agnew et al. 2009). That was 10-20 years ago. The IOTC agreement lacks a reference to a commitment to halt IUU fishing, although this has been the key area of focus for the Commission (Aranda et al. 2010). Although there are lists of authorized and IUU fishing vessels, IUU fishing is widespread and transshipments from IUU longliners to "authorized" tuna reefers are a common practice. The pursuit of the IUU fishing activities is left to the means of each			

Input detail	Evidence or references	Suggested score change	CAB response code
member country; given the chronic lack of funding suffered by the fishing authorities in most member countries, this effectively means that only a negligible proportion of IUU activities are detected and prosecuted. Despite the existence of several Resolutions and Recommendations, and despite IUU being fairly well monitored for the purse seine fleet, large uncertainties prevail. A set of resolutions and recommendations are in force to reduce IUU fishing: Resolution 17/06 on a transshipment programme Resolution 17/03 on an IUU vessel list Resolution 16/05 on vessels without nationality Resolution 16/11 on port state measures to prevent IUU fishing Resolution 15/03 on the VMS programme Resolution 15/04 on a record of authorized fishing vessels Resolution 14/05 on a record of licensed foreign fishing vessels Resolution 11/04 on a regional observer scheme Resolution 10/08 on a record of active vessels Resolution 07/01 on compliance with IOTC CMMs Recommendation 05/07 on a management standard for tuna fishing vessels Resolution 01/03 on scheme to promote compliance by non-contracting parties Resolution 99/01 on flag of convenience longline vessels. This is a problem, we agree. But the MSC standard requires us to evaluate control, surveillance and compliance for the purse seine fishery, not for Indian Ocean fisheries in general (PI 3.2.3 in the 'fishery-specific management system' section). The EU has more resources in this regard than many other IOTC CPCs. Compliance/Enforcement: The estimated observer coverage rate for purse seine vessels increased from 0% in 2010 to about 4-5% from 2011 to 2013, 8% in 2014 and 24% in 2015 and 2016 (IOTC 2017g). However: Amandé et al. 2012: "A minimum of 90% sampling coverage would be required to estimate 50% of the bycatch species with a relative error less than 20%." Please see Section 6.3.6.4 for details on observer coverage (human and electronic) in this fleet. IOTC 2016: "The Commission, through its Compliance Committee, needs to strengthen its compliance monitoring in relation to the timeliness and accuracy of data submissions. To that end, the PRIOTC02 RECOMMENDED that: a) the Commission review its compliance monitoring program conducted by the Compliance Committee, including identification of priority obligations (e.g. timely and accurate data reporting, catch and effort limits, accuracy of the supplied registered fishing vessel information, etc.). […] In relation to non-target species, the PRIOTC01 recommended to expand the list of shark species to be recorded by fishing vessels, which has partly been incorporated in the relevant measure (Resolution 15/01). Additional duties apply in relation to seabird bycatch (Resolution 10/06), marine turtle bycatch (Resolution 12/04) and shark bycatch (Resolutions 13/05 and 13/06 together with the existing Resolution 05/05). Overall the PRIOTC02 noted the ongoing non-compliance by CPCs regarding the submission of accurate and timely bycatch data despite it being required in a range of Resolutions. […] Overall, the PRIOTC02 noted that the Commission has not given effect to the advice of its Scientific Committee and			

Input detail		Evidence or references	Suggested score change	CAB response code
the associated Working Parties. There are inadequate management measures implemented for most species and the ongoing paucity of scientific data continues to hamper the ability to make informed management decisions. Finally, the PRIOTC02 noted that the Commission continues to use the data paucity as a reason not to implement the advice of the Scientific Committee despite their adoption of the precautionary approach (Resolution 12/01).” IOTC`s VMS programme currently doesn`t meet global standards. Koehler (2016) highlights a number of areas in which the current IOTC VMS provisions fall short of global best practices: Koehler 2016: “The [VMS] programs in CCSBT, IOTC and IATTC and ICCAT also exhibit many of the best practices outlined in Section II, but have room to improve in the coverage of the program (e.g., in ICCAT many of the more progressive elements apply only to the bluefin fishery), the use and availability of VMS data to the Secretariat, scientists or for compliance purposes (IATTC, IOTC, and CCSBT), and the establishment of procedures and standards, such as in the event of an ALC breakdown (IATTC and IOTC).Transparency/Participation: The major tuna fishing countries are members of the IOTC (Yemen joined in 2012and Somalia in 2014). Taiwan is not a member, but they participate actively in the SC (this has to be done informally because IOTC is created under a UN charter, and China does not allow Taiwan to participate as not part of China). They also allow observers in their meetings. Agreed, the IOTC would need to strengthen its MCS capacities, in particular for sea-going patrols (see rationale for PI 3.2.3a). However, for this fishery, the IOC MCS system does not operate in isolation. MCS capacity is also ensured by the EU and the French and Italian authorities and by the Producer Organisation who monitor the vessels’ VMS signals on a continuous basis and the catch and bycatch reports through elogbooks and observer reports, as well as quota uptake.				
CAB response	Please see our responses in red above.			
Principle 3: A management system is in place: This fishery is under the auspice of the Indian Ocean Tuna Commission (IOTC). The Indian Ocean Tuna Commission (IOTC) was established under Article XIV of the FAO constitution and is mandated to manage tuna and tuna-like species in the Indian Ocean and adjacent seas. The IOTC began its work in 1996, following preliminary work of the Indo-Pacific Tuna Development and Management Programme. Its objective is “to promote cooperation among its Members with a view to ensuring, through appropriate management, the conservation and optimum utilisation of stocks and encouraging sustainable development of fisheries based on such stocks. ”The IOTC is an intergovernmental organization mandated to manage tuna and tuna-like species in the Indian Ocean and adjacent seas. The objective of the Commission is to promote cooperation among its members with a view to ensuring, through appropriate management, the conservation and optima utilization of stocks covered by this Agreement and encouraging sustainable development of fisheries based on such stocks.The Scientific Committee was formally created at the First Session of the Commission. This body		IOTC, 2016: Report of the 2nd IOTC Performance Review. Mahé, Seychelles, 2–6 February & 14–18 December 2015. IOTC-2016-PRIOTC02-R. 86 pp, Link IOTC 2017h: Indian Ocean Tuna Commission > Home > The Commission: Link IOTC 2017i: Indian Ocean Tuna Commission > Home > Competence: Area & Species: http://iotc.org/about-iotc/competence IOTC		

Input detail	Evidence or references	Suggested score change	CAB response code
will advise the Commission and sub-commissions on research and data collection, on the status of stocks and on management issues. The meetings of the Scientific Committee are held conjointly with those of the Commission.IOTC 2017h:"Objectives of the Commission: To promote cooperation among the Contracting Parties (Members) and Cooperating Non-Contracting Parties of the IOTC with a view to ensuring, through appropriate management, the conservation and optimum utilisation of stocks covered by the organisation's establishing Agreement and encouraging sustainable development of fisheries based on such stocks."IOTC 2017i: IOTC is mandated to manage tuna and tuna-like species. The IOTC Agreement specifies 16 tuna, billfish and neritic tuna species, of which the major commercial stocks are: yellowfin tuna, skipjack tuna, bigeye tuna, albacore tuna, and swordfish. IOTC 2016j: There are currently 31 members of IOTC, namely Australia, China, Comoros, Eritrea, European Union, France, Guinea, India, Indonesia, Iran, Japan, Kenya, Korea, Madagascar, Malaysia, Maldives, Mauritius, Mozambique, Oman, Pakistan, Philippines, Seychelles, Sierra Leone, Somalia, Sri Lanka, South Afrika, Sudan, Tanzania, Thailan, United Kingdom, and Yemen.In addition, there are 3 cooperating non-contracting parties: Bangladesh, Liberia, and Senegal. Sharma 2013: "The IOTC is one of five global RFMOs that manages tuna. It was established in 1997 and follows in large part the principles UNFSA. However, the precautionary approach was not part of the original convention because IOTC was formed before the formulation of the precautionary approach. Thus, The commission discussed two resolutions in 2012 that would include the Precautionary Approach to management in the mandate of the Commission. One of these passed a binding Resolution (Res. 12/01) that involved setting up principles of Precautionary Approach (launching an MSE process). The second resolution, involving the setting up of interim reference points was turned into a non-binding recommendation."	2017j: Indian Ocean Tuna Commission > Home > Structure of the Commission: Link Sharma, R., 2013: Indian Ocean Tuna Commission - Its past, present and future. Where we are with respect to reference points, and where do we go from here. Presentation at the 2013 ISSF Stock Assessment Workshop: Harvest control rules and reference points for tuna RFMOs. ISSF Technical Report 2013--03. p. 20-21. International Seafood Sustainability Foundation, Washington, D.C., USA, Link		
CAB response	Thank you for this information, which has already been considered in the report.		
As has been recognized among others by IOTC's Performance Review Panel in 2016, no coherent steps have been taken to implement an EBM for the Indian Ocean and there are still major challenges to overcome throughout the available single species management measures. For such a wide ranging highly migratory species, EBM is a significant challenge. The IOTC Working Party on Ecosystems and Bycatch (WPEB), created in 2005, recognized the severe shortcomings in bycatch and discards data and recommended better cooperation among the nations to collect data through onboard observers. The WPEB has committed itself to direct greater effort toward collecting bycatch information and evaluating bycatch effects on sharks, seabirds and turtle, and attempts to reduce bycatch and discard by encouraging, coordinating, and reviewing research to modify fishing gear, recommending conservation measures accordingly and transferring the technology and knowledge to the industry. In August 2012, the IOTC formally adopted the Precautionary Approach through a Resolution. The IOTC also decided on the	Cullis-Suzuki, S.& Pauly, D. (2010): Failing the high seas: A global evaluation of regional fisheries management organizations. Marine Policy 34: 1036–1042. FAO 2016: Report of the Joint Meeting of tuna RFMOs on the implementation of the Ecosystem Approach to Fisheries Management. 12 – 14 December 2016, FAO Headquarters, Rome, Italy. 51 pp, Link Gilman, E., Passfield, K., & Nakamura, K. (2012): Performance Assessment of Bycatch and Discards Governance by Regional Fisheries Management		

Input detail	Evidence or references	Suggested score change	CAB response code
definition of stock-specific Reference Points (Lmit and Target) and corresponding Harvest Control Rules (see QA6). Furthermore, the Commission requires data for non-target species that are caught in Indian Ocean tuna fisheries and several Resolutions and Recommendations have been adopted aiming at reducing the bycatch of non-target species (see Q13). However, the IOTC Convention makes no explicit mention about the Precautionary Approach or Ecosystem Considerations. The 2nd IOTC Performance Review Committee Panel recommends that the Commission establish an ad-hoc Working Party on the Modernisation of the IOTC Agreement: IOTC 2016:"The PRIOTC02 AGREED that the IOTC Agreement needs to be amended or replaced in order to incorporate modern fisheries management principles, such as the precautionary approach, ecosystem based approaches, inclusion of highly-migratory species caught in IOTC fisheries, protection of marine biodiversity, reducing the harmful impacts of fishing on marine environment and to allow the full participation of all fishing players. The weaknesses and gaps are, or have a potential to be, major impediments to the effective and efficient functioning of the Commission and its ability to adopt and implement measures aimed at long-term conservation and sustainable exploitation of stocks, according to model fisheries management instruments. More fundamentally, these deficiencies are likely to prevent the Commission from achieving its basic objectives. [...] The PRIOTC02 RECOMMENDED that [...] the Commission fully implements Resolution 12/01 On the implementation of the precautionary approach, so as to apply the precautionary approach, in accordance with relevant internationally agreed standards, in particular with the guidelines set forth in the UNFSA, and to ensure the sustainable utilisation of fisheries resources as set forth in Article V of the IOTC Agreement, including ensuring that a lack of information or increased uncertainty in datasets/stock assessment, is not used as a justification to delay taking management actions to ensure the sustainability of IOTC species and those impacted by IOTC fisheries." In 3 RFMO performance reviews, IOTC scored in the middle to lower range (Cullis-Suzuki & Pauly 2010, Gilman et al. 2012, Juan-Jord et al 2016): • Cullis-Suzuki & Pauly (2010) rated RFMOS according to a two-tiered approach, concentrating first on their performance “on paper” (P-score) and secondly in practice (Q-score). IOTC received a final P-score of 58% (best result achieved: 74%) and a Q-score of 77.8% (best result achieved: 100%). Gilman et al. 2012conducted a performance assessment of governance of bycatch, including discards, by 13 RFMOs. Performance in governing bycatch was assessed against a suite of five broad criteria. IOTC received an overall score of 17% (best result achieved: 58%), which was still below the mean score of 25% for all RFMOs investigated.In a comparative review of progress (Juan-Jorda et al. 2016), IOTC worst of the tuna-RFMOs with 7 criteria rated green (=moderate to full progress by the Commission), 11 rated yellow (=slight progress) and 16 criteria rated red (=no to moderate progress by the Scientific Committee).FAO 2016: Report of the Joint Meeting of tuna RFMOs on the implementation of the Ecosystem Approach to Fisheries Management. 12 – 14 December 2016, FAO Headquarters, Rome, Italy. 51 pp, http://www.fao.org/fileadmin/user_upload/common_oceans/docs/JointTunaRFMO_EBFM_Meeting.pdf	Organizations. IUCN, Gland, Switzerland, 484 pp, Link Gilman, E., Passfield, K. & Nakomara, K. (2013): Performance review of regional fisheries management organizations: ecosystem-based governance of bycatch and discards. Fish & FisheriesDOI: 10.1111/faf.12021, Link IOTC (2016): Report of the 2nd IOTC Performance Review. Mahé, Seychelles, 2–6 February & 14–18 December 2015. IOTC-2016-PRIOTC02-R. 86 pp, Link Juan-Jordá MJ, Murua H, Arrizabalaga H, Dulvy NK, Restrepo V. 2016. Progress of tuna regional fisheries management organizations in applying ecosystem-based fisheries management. IOTC IOTC-2016WPEB12-14. Link		

Input detail		Evidence or references	Suggested score change	CAB response code
CAB response	Thank you for this information, which has already been considered in the report.			

Principle 1

PI 1.1.1 – Stock status

Input summary	Input detail	Evidence or references	Suggested score change	CAB response code
High uncertainty in deermining stock status	1.1.1a: the PCDR scores this at 100, indicating a high degree of confidence in the data used to assess stock status. 50% of the catch is unaccouted for in the Indian Ocean, which is from small-scale fsheries. There are obvious sources of mortality not taken into account as there is no robust index of abundance from Gillnet fisheries, so taking into account this high level of data deficiency scores should be revised.	Catch data taken from IOTC nominal catch data provided to WPTT22 (spreadsheet IOTC-2020-WPTT22(DP)-DATA03; see Link	Not given	Not accepted (no score change)
CAB response	This is not the impression we get from IOTC – please see new Figure 7 taken from the IOTC Secretariat review of data and statistics from 2020 (IOTC, 2020d). This score of 100 at 1.1.1a does not necessarily indicate a high degree of confidence in the data and stock assessment - this is scored directly in 1.2.3 and 1.2.4. An assessment with wide confidence intervals can still provide a high degree of confidence in the outcome as long as the reference point remains outside the confidence intervals. Obviously, the more uncertain is the assessment the higher the stock needs to be above the PRI for there to be high confidence; but the PRI is a low bar for skipjack which is a very productive species.			

1.2.2 - Harvest control rules and tools

Input summary	Input detail	Evidence or references	Suggested score change	CAB response code
Ineffective HCRs	SG60 at PI 1.2.2c is not met. “There is some evidence that tools used or available to implement HCRs are appropriate and effective in controlling exploitation.” Catch limits set out under the HCR are NOT able to control catches to the level required by the HCR. The same holds for the Echebastar and Maldives certification. Negotiating scores is not appropriate, fishery either meets SG60 or doesn’t, shouldn’t be the result of a negotiated solution.	IOTC-2020-SC23-R_draft (awaiting adoption)		Not accepted (no score change)
CAB response	P1 scores between fisheries on the same stock need to be harmonised - that is an MSC requirement. It is not a 'negotiation' - the experts agree what is the correct score according to the information available at the time of scoring and the MSC requirements. As a consequence of this and other comments on P1, we have updated the P1 background, scoring and rationales to take into account all data through 2020 – i.e. the 2020 stock assessment and WPTT22, SC23 and S24. The scoring of this SI is difficult, but MSC guidance is clear i.e. : Evidence that current F is equal to or less than FMSY should usually be taken as evidence that the HCR is effective. Another stakeholder argued that we should consider the target exploitation rate rather than FMSY (i.e. Etarg) but according to the 2020 stock assessment this too is being met (i.e. E<Etarg). So we have not changed the scoring.			

1.2.3 - Information and monitoring

Input summary	Input detail	Evidence or references	Suggested score change	CAB response code
Condition needed to monitor impacts of changing in fishing strategies on Skipjack and associated stocks	while information seems to be available related to stock structure, or biology, which feeds into stock assessment and/or stock productivity, fleet composition, fleet reporting of the data, methodology and change in fishing patterns and fishing areas seem to influence stock abundance greatly. While, no direct conservation and management measures are in place for the Indian Ocean skipjack stocks, as skipjack is not overfished nor subject to overfishing, there are other supporting instruments, such as Resolution 14/02 which calls for the implementation of an action plan to establish an allocation system (quota) for the main target species. Currently, these measures have not been adopted, moreover, Resolution 19/05 has been adopted 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. This resolution also seeks to enable good monitoring control and surveillance, so the observer coverage is set, and requires additional electronic monitoring. Moreover, the tagging information although available, has been used for support decisions, but do not cover wider area in the Indian Ocean and does not give a good overall representation of the stock structure. Similarly, as mentioned above, the 2018 data is highly variable and prone to change with the ongoing re-estimations and assessments from the purse seine fleets operating in the Indian Ocean. While, the data is largely from Spanish fleets, there is very little monitoring observed to have taken place at ports for other fleets operating out of Seychelles. Cumulatively, with notable problems with catch and effort data from significant	IOTC-2018-SC21-R[E]_Rev1	None made	None required

Input summary	Input detail	Evidence or references	Suggested score change	CAB response code
	fisheries in the Indian Ocean (e.g. gillnet and handline fisheries from India, Iran, Oman, Yemen, and parts of East Africa), the scenario remains complex and ambiguous. Total catches in 2017 were 12% larger than the resulting catch limit from the skipjack HCR for the period 2018-2020. It should be noted that skipjack catches for most gears have increased from 2016 to 2017 (+10% for purse seine, +16% for gillnet and +17% for baitboats). In particular, due to Resolution 18/01, an increase in fishing operations on FADs by purse seine fleets has been observed. CPUE fluctuations coincide with environmental signals at inter-annual timescale (e.g., Indian Ocean Dipole). Due to its specific life traits, skipjack can respond quickly to ambient foraging conditions driven by ocean productivity. Environmental indicators should be closely monitored to inform on the potential increase/decrease of stock productivity.			
CAB response	This is useful background information which is already for the most part presented in the report in the Principle 1 background section.			

Principle 2

2.1.1 - Primary species outcome

Input summary	Input detail	Evidence or references	Suggested score change	CAB response code
Not given	Continued concern with yellowfin being assessed as P2 primary species while it constitutes the/a main target of the fishery. Echebastar similarly had a majority catch of a non P1 species. Now we have another MSC fishery getting certified for skipjack with a majority catch of YFT and WWF questions whether this is making a mockery of the P2 thresholds for assessing cumulative impacts as well as the MSC theory of change.			Not accepted (no score change)
CAB response	MSC allows for the situation where there are other target species in the fishery than the target species of the assessment (i.e. the P1 species). Other target species are evaluated under P2 and would not be permitted to be sold as 'MSC'. Cumulative impacts only apply under 2.1.1 where the species cannot be shown to be above the PRI, which is not the case here – so you are correct that they do not apply.			

2.3.3 - ETP species information

Input summary	Input detail	Evidence or references	Suggested score change	CAB response code
The inability to detect ETP species given low/poor coverage	Information provided in relation to 2.3.1a indicates that there are significant discrepancies in the ability for EM to accurately detect rare species such as ETPs, relative to human observers. Furthermore, not only can species be easil identified but also have poor handling, with no mitigation techniques being adopted. Currently IOTC is develping its minimum sandards for EM system use. It is not entirely certain what level of data collectin is possible or not. PCDR p. 33 and Ruiz et al. 2017 "Poor ability for EM to detect non-target spp, particularly rare ones (Ruiz et al. 2017): Bycatch estimate (sharks, rays, turtles, birds and marine mammals) and fate (sharks, rays, turtles, birds and billfish): number of cameras is limited, and bycatch handling area could change and move out from the camera views punctually. Small-sized individuals can be underestimated, mainly in those cases where they are not sorted, and are retained in wells. Species id. could be limited sometimes compared to an experienced observer.			Accepted (material score reduction to <80)

Input summary	Input detail	Evidence or references	Suggested score change	CAB response code
	OWT: Human observers 27m/yrt, EMS 3mt/yr Silky Sharks: Human observers 148mt/yr, EMS 73mt/yr			
CAB response	Yes – sharks specifically appear to be under-estimated by EM, hence we have used the human observer data to depict the worst case scenario for the fishery and carry out the impact assessment. However, review of the information following submissions on this by WWF and Pew has led to a new condition under 2.3.3. In terms of handling, CFTO has a good practice guide and provides training in handling to its crew members.			

2.4.1 - Habitats outcome

Input summary	Input detail	Evidence or references	Suggested score change	CAB response code
None given	"CUP has combined purse seine free school sets and FAD sets under a single unit of assessment. This was the MSC intent in the changes to the FCP2.2 that removed 'fishing practice' from the definition of the UoA. This change to the FCP was directed at tuna fisheries seeking to remove the ability to compartmentalise a UoA such that certified and non-certified practices on the same vessel during the same trip. However, if the fishery is certified, the certification of the FAD sets takes away the incentive to switch to free school. Also stakeholders cannot review scores assigned to the two gear types separately and assess how the the lower (FAD) score influences the PI score. The proportion of FAD catches is increasing quickly and it is unclear how increasing FAD fishing effort and the associated increasing impact of the fishery is being assessed. CABs should be required to assess and score the different set-types based in part on the following (non-critical) guidance: G7.5.2.b Defining gear type(s) used in the UoAs/UoCs. The UoA/UoC must include all activities undertaken for the specified gear. For example, in a UoA where the gear type is purse seine it may be used in multiple ways such as setting on a FAD or on a free-school of fish. Where there are multiple set-types employed by the UoA, all set-types must be included in the UoA assessment of each gear type. This might be best done by separating the two set types into 'scoring elements' as is done frequently under P2 for different species."			Not accepted (no score change)
CAB response	This assessment was done in accordance with the FCP2.1 and is therefore not required to follow the above guidance. However, as explained in the report, the set types were combined as a single UoA to conform with the latest anticipated requirements (which were not yet released when this assessment was started) and provide a more			

Input summary	Input detail	Evidence or references	Suggested score change	CAB response code
	precautionary assessment. The P2 impact assessment discusses impacts for both set types; however scoring is based on the cumulative impacts between the set types (in the case of ETP species), or the worst-case impact (in the case of habitats for FAD sets). The fundamental issue, i.e. how the combination of FAD and free-school sets in a single UoA, affects MSC's theory of change is not one for the assessment to address. We propose that this is discussed further with the standard setter, MSC.			

Appendix 4.2.3 Pew Comments

General comments

Input detail	Evidence or references	Suggested score change	CAB response code
Tables 13 and 14 not clearly legible due to font.			N/a
CAB response	We would suggest you use the zoom function if this is not legible. The font is the same as all other tables in the report. A larger font will mean the tables cannot fit on the page. If this remains difficult to read we will be happy to provide you with the data tables separately.		
There is an apparent disconnect between the scope of current UoA and historical fishing upon which catch + non-target species landing data are based. The current UoA doesn't include the coastal waters of Kenya and Tanzania, but p. 21 states that up until recently, the fleet fished here. Are catch volumes used for scoring purposes predicated on a geographic fishing area not currently in scope? If so, these catches should be removed from the dataset as they may contain species that are not representative of the more oceanic/island locations the fleet is currently fishing.			N/a
CAB response	Table 32 makes clear exactly what licences have been held when: the date of the most recent licences for Kenya (June 2017) and Tanzania (June 2016) is given. We do not have the information to break down the data in Tables 13 and 14 by fishing zone, but this problem is dealt with by evaluating the percentages year by year in the right-hand columns of the table - if there were a difference in the allocation of 'main' bycatch species according to fishing zone it would be apparent. Although there are some differences between years there are no examples of species where the designation varies by year. In terms of ETP species, all the applicable species in the list are considered, and if this includes some species which are now not impacted because of the change in fishing zones, this is precautionary rather than the reverse.		

Input detail		Evidence or references	Suggested score change	CAB response code
We are requesting to participate as a stakeholder in any P1/P3 harmonization discussions held in relation to PCDR comments, in keeping with precedent set at Hong Kong 2016 WCPFPC harmonization meeting, which allowed stakeholder attendance.				N/a
CAB response	The Hong Kong harmonization meeting was a pilot for a procedure which has since been discontinued. All harmonsiation for this fishery must be conducted in accordance with the FCPv 2.1 (Annex PB) and requires CAB/team input only. Of course, stakeholder comments are taken into account as we have done in relation to your comment on 3.2.2 which triggered inter-CAB harmonization discussions.			
While we did not include a PI-related comment to this effect, we do note that it is curious that human and EMS coverage seemed relatively analogous for turtles, but differed significantly for sharks. Further investigation or explanatory rationale related to camera set-ups could be useful in the Final Report.				N/a
CAB response	The report notes that EMS appears to underestimate shark bycatch and takes account of this in scoring by using human observer data only. However, we do not have specific information in terms of camera set ups as to why this is. This recent report might be enlightening: https://iss-foundation.org/electronic-monitoring-in-indian-ocean-tuna-fisheries/. Please note a new condition has been raised in relation to your comment on 2.3.3.			
The PCDR should be updated to reflect 2020 IOTC meeting outputs released prior to the PCDR.				N/a
CAB response	P1 was updated to include the new stock assessment, WPTT22, SC23 and S24, in case harmonisation was required, based on Pew's comments in relation to 1.2.1. Please note that as per 7.20.3 of the FCP, the team is procedurally not required to take into account the outcomes of the 2020 commission meeting which took place well after the site visit.			

PI Follow-up comments

1.2.1 - Harvest Strategy

Stakeholder input code	Previous input stage	Input detail	Evidence or references
No (score reduction	SIb - For this SI to receive a score of SG60, "The harvest strategy is likely to work based on prior experience or	SIb - In the PDCR, the CAB response code to Pew's ACDR/onsite comments was the code "Accepted, no change	Report of the 21st Working Party on Tropical Tunas and datasets of

Stakeholder input code	Previous input stage	Input detail	Evidence or references
expected to <60, PI fails)	plausible argument." Recent experience shows that the harvest strategy is NOT likely to work. As noted in the report, the 2018 skipjack catch was 129% of the limit set under the HCR, which continues an increasing trend of catch from both the UoA (15,605 mt in 2015 to 34,185 mt in 2018) and of the overall IOTC fleet (446,723 mt in 2016 to 607,701 mt in 2018). Therefore the harvest strategy, which now primarily relies on a catch limit, has been shown, with direct evidence, to neither be able to restrict the overall IOTC catch to the level set by the HCR (470,029 in 2018) or to the level that corresponds to the ETRP (approximately 527,000 mt) Increases in catch in 2017 and 2018 have also likely pushed the stock below the TRP, based on the fact that they were at or exceeded the ETRP, and that there was already a 51/49 chance the stock was below the TRP in 2016. Alternative tools cited in the report are unlikely to effectively work to restrict skipjack catch. - Yellowfin catch reductions will actually drive an increase in skipjack catch -The number of supply vessels with not have a direct effect on skipjack catch -The number of active buoys does not restrict the number of overall FADs that can be placed in the water each year or the number of sets that can be made, and therefore has no direct effect on the skipjack catch	of score". In the PCDR on p. 248, the CAB responded with the rationale: "Please see below for minutes of remote meeting". In these minutes it states: "Pew's key concerns are around 1.2.1 and 1.2.2 (these concerns already raised previously with Echebastar). HCR is on paper only until there is some agreement on catch allocations; recent data show that catch is well above the required level with still no means of implementing the HCR which is therefore not effective. (Recent meeting of TCAC postponed due to corona - concern that it will be impossible to find a new date; also risk the IOTC plenary being cancelled - i.e. no progress likely this year.) On this basis, the scoring in 1.2.1 and 1.2.2 is optimistic at best. Jo Gascoigne noted that these are valid concerns; but harmonisation is an important issue because until the recent audits, neither Echebastar or Maldives even had a condition on 1.2.2c. If there is no agreement the lowest score stands, but when it comes to failing / suspending fisheries it is better to go through a process to try and find agreement than for a CAB to act unilaterally. But at the next iteration of the report the catch data and 1.2.2c analysis should be updated." In the PCDR, the core rationale is predicated on the CAB's reasoning that: "The objective of the harvest strategy is taken to be expressed in the agreed TRP for skipjack – i.e. that biomass be maintained at 40%SB0." Reasoning then does not discuss fulfillment of the SG60, but moves immediately to reasoning around "testing" at the SG 80 level. In order to score at the SG80, the CAB is first obliged to assure that the PISG 60 is met in all of its elements. The PISG 60 reads: "The harvest strategy is likely to work based on prior experience or plausible argument". The rationale provided by the CAB does not meet this standard of proof: first, it does not demonstrate how the fishery is compliant	WPTT21 https://www.iotc.org/meetings/21st-working-party-tropical-tuna-wptt21 Report of the 22nd Working Party on Tropical Tunas and datasets of WPTT22 https://www.iotc.org/meetings/22nd-working-party-tropical-tuna-wptt22-stock-assessment-meeting IOTC Resolution 16/02 https://iotc.org/cmm/resolution-1602-harvest-control-rules-skipjack-tuna-iotc-area-competence Report of the 11th Session of the IOTC Working Party on Methods https://iotc.org/meetings/11th-working-party-methods-wpm11 IOTC Resolution 15/02 https://www.iotc.org/cmm/resolution-1502-mandatory-statistical-reporting-requirements-iotc-contracting-parties-and

Stakeholder input code	Previous input stage	Input detail	Evidence or references
		with all elements of an MSC defined harvest strategy, and second, it does not demonstrate through evidence, why there is prior experience (evidence) that all elements of the harvest strategy have been met. Evidence provided at the ACDR stage by Pew, in fact, provided evidence based on prior experience in the system, that at present, the HCR, as a key aspect of the harvest strategy, is demonstrably not working. A harvest strategy under the MSC definition has four elements and - not just stock management - per the existing rationale. Please also note that SIb does not refer to stock management objectives, which is only language relevant to 1.2.1.a.. SIb refers simply to the overall harvest strategy which demands conformity in the rationale with the full MSC definition in all of its elements. A harvest strategy is defined by MSC as: "The combination of monitoring, stock assessment, harvest control rules and management actions, which may include an MP or an MP (implicit) and be tested by MSE". This definition is consistent with the IOTC's own definition of a harvest strategy which reads: "- Some combination of monitoring, assessment, harvest control rule and management action designed to meet the stated objectives of a fishery. Sometimes referred to as a Management Strategy (see below). A fully specified harvest strategy that has been simulation tested for performance and adequate robustness to uncertainties is often referred to as a Management Procedure." In the IOTC, key portions of the harvest strategy for SKJ are articulated via Resolution 16-02, in relation to reference points (stock assessment), HCR, precautionary approach & MSE. This resolution notes that the HCR is enacted via catch limits. There is more than plausible argument and in fact direct evidence based on prior experience, that the main output control (management action) associated with the HCR in the fishery is not working (please see rationale	

Stakeholder input code	Previous input stage	Input detail	Evidence or references
		provided at ACDR at left) as catch limits have been substantially exceeded. Furthermore, alternative tools are also unlikely to work to restrict skipjack catch and in fact there is evidence that other measures currently in place may be driving increases in SKJ catch. Therefore, while the stock assessment aspect of the harvest strategy is likely to work, there are questions as to whether monitoring/data inputs are likely to work (see 1.2.3 comments) , given the relatively large unmonitored artisanal catches in the IOTC *. The other two element - the HCR, and key management actions - are demonstrably not being enacted, which meets, to the contrary, the standard of proof of prior experience and exceeds the standard of proof of a plausible argument, necessary at the SG60. Therefore the SG 60 is not met. * In 2016 the proportion of nominal catches fully reported (according to the mandatory data requirements of Resolution 15/02) was just below 80%; while for catch/effort data just below 70% of data were fully reported, and for size data approximately 65%.	
CAB response	Note that the CAB response is based on the updated version of P1 using the 2020 stock assessment. If we have understood correctly, what Pew is arguing is for a different definition of what constitutes the harvest strategy working, than the one we have used. We have based our analysis on whether or not the harvest strategy is achieving its stated objective: i.e. 40%B_0 – which it is. Pew is arguing that the harvest strategy can only be considered to be working if all the different elements of it are working, and in this case the catch limits are not working (since they are being exceeded). We understand Pew's logic here, but do not believe that the PI can be interpreted this way. For one thing, under SIa, the elements of the harvest strategy are only mentioned at SG80, opening the possibility of a harvest strategy lacking some elements which could still meet SG60 (if nevertheless expected to achieve stock management objectives). In fact, this is the case in many certified fisheries which do not have a formal HCR (e.g. WCPO tuna fisheries, small-scale fisheries) and which were certified with a condition on these elements. Furthermore, the wording of SG80b strongly implies that the definition of whether or not the harvest strategy is working relates to whether or not it is achieving its objectives (SG60: 'likely to work', SG80 'evidence exists that it is achieving its objectives').		

Stakeholder input code	Previous input stage	Input detail	Evidence or references
	MSC guidance under 1.2.2 states: Evidence that current F is equal to or less than F_{MSY} should usually be taken as evidence that the HCR is effective. Although this relates to a different (related) PI, it also suggests that what MSC is concerned about primarily is outcome rather than process. Therefore, we suggest that the team's interpretation of how to score 1.2.1b SG60 is the correct one: i.e. the harvest strategy is working if it is meeting its stated objective (consistent with 1.1.1b SG80). SG60 requires that the harvest strategy is working based on 'prior experience or plausible argument' – which is demonstrated by the fact that the stock biomass is at the level taken to be the harvest strategy objective. SG80 requires that there be evidence of this, which is demonstrated likewise. (There should have been a statement: SG60 is met at the end of paragraph 1 of the rationale which probably would have made the argument around SG60 more clear. It has now been added.) Regarding the * comment at the end: For the 2019 assessment this seems to have improved? According to the IOTC Secretariat report in 2020, 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 we concur that the quality is not always very good. CAB response code: Not accepted (no change)		

1.2.2 - Harvest control rules and tools

Stakeholder input code	Previous input stage	Input detail	Evidence or references
No (score reduction expected to <60, PI fails)	SI c - To determine if the HCR is effective in controlling exploitation, catch should be compared to the ETRP, not to EMSY, as the goal of the harvest strategy and HCR is to maintain the stock at the TRP and catch below the ETRP. (Paragraph 5 of Res 16/02 states "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", where the TRP is 0.4B0 and the LRP=0.2B0.) Using this more appropriate measuring stick, it is clear the HCR has been unable to limit the catch in the most recent year to the ETRP or to the catch limit set for 2018. Therefore this SI does not meet the SG60	SIc - A key part of the CABs rationale for the SG60 being met is that the catch limit was only implemented midway through 2018, effectively allowing only a half year for catches to come into compliance. Both the WPTT 22 meeting and the 2020 stock assessment for SKJ indicated that the limit was established in 2017 and also shows that the catch limit has been definitively exceeded: "the large catches recorded in the period 2018-2019, which exceeded the catch limits established in 2017 for this period (p.8 WPTT-22, p.3 2020 Stock Assessment). In its Oct 2020 meeting, the WPTT also noted that: "the total catches exceeded the HCR recommendation in the past 3 years, during which CPUE also increased. The WPTT noted that skipjack CPUE trends and abundance	IOTC Resolution 16/02 https://iotc.org/cmm/resolution-1602-harvest-control-rules-skipjack-tuna-iotc-area-competence Report of the 22nd Working Party on Tropical Tunas and datasets of WPTT22 https://www.iotc.org/meetings/22nd-working-party-tropical-tuna-wptt22-stock-assessment-meeting Preliminary Indian Ocean Skipjack Tuna Stock Assessment 1950-2019 (Stock Synthesis) https://www.iotc.org/documents/WPTT/2202/10

Stakeholder input code	Previous input stage	Input detail	Evidence or references
	requirement that the "HCRs are..effective in controlling exploitation."	estimates show large multi-year oscillations that appear to correlate with environmental conditions, notably chlorophyll-a in the western equatorial Indian Ocean. The WPTT further noted that recent high catches may not be sustainable if oceanographic conditions revert to average, or low productivity conditions." Therefore, the following represents the current evidence from the system: 1. Systematic and demonstrated inability to responsively implement tools to allocate catch reductions in 2019, per requirements in 16-02. 2. The limit was exceeded by 1.3X in 2018, and also exceeded in 2019. 3. Catches also exceeded the 2017-established limit in the past 3 years (2017-2019), which are the strongest available proxies for ongoing fishing effort 4. CPUE is increasing 5. Recruitment may well diminish under average ocean conditions, relative to the strong recent conditions, placing further demands on constraining current catches to limits. Therefore, there is substantial evidence that indicates that the tools available to implement the HCR are not effective at controlling exploitation/removals. (In the MSC system, "some" is understood via usage such as in FCP Table PF18 to mean approximately half.). In this case, by far the majority of the evidence indicates that the SG 60 is not met. The CAB itself appears to be in agreement, and stated in responses to reviewers that "We agree that it seems at least possible that the 2020 stock assessment will show that the harvest strategy is not being effective (bearing in mind that the harvest strategy includes the management tools as well as the HCR" (PCDR p.207). On the basis that the majority of evidence in the system does	

Stakeholder input code	Previous input stage	Input detail	Evidence or references
		not show evidence of HCR implementation or responsiveness, the SG 60 is not met.	
CAB response	We have updated the rationale to incorporate the 2020 stock assessment and associated new catch limits and the 2020 Commission meeting. It turns out the team were wrong about the outcome of the 2020 stock assessment: it estimated a better stock status in 2019 than in 2016. Scoring this SI was not straightforward and required detailed harmonisation discussions between the relevant assessment teams for the different certified / in assessment fisheries on the stock (i.e. this fishery, Maldives and Echebastar; AGAC is now also in assessment but was not at that point). Little of what Pew states above is in dispute: the catch limits have been exceeded since 2018, and although the improved stock assessment has resulted in a higher catch limit for 2021-3, it is still slightly (7%) below the 2019 catch (the most recent year for which we have information). The scoring comes down to the MSC critical guidance quoted in the rationale: 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. MSC's critical guidance, unlike regular guidance, is auditable, and therefore for the CABs is in practice no different to the requirements. The wording here ('usually') does allow a CAB to take a different approach if it can be justified, but MSC provide no guidance as to the circumstances under which this guidance might not apply. In this case, there was not a strong argument for doing anything other than following the critical guidance, which is fairly clearly stated. CAB response code: Not accepted (no change)		

PI input – New at PCDR stage

1.1.1 - Stock status

Input summary	Input detail	Evidence or references	Stakeholder input code	CAB response code
Scoring should be revised due to uncertainty in artisanal catch data	SIa - The PCDR scores this at 100, indicating a high degree of confidence in the data used to assess stock status. However, given that on average ~45% of the catch is from the artisanal sector in recent years, where catch information is significantly less reliable than the industrial sector, this score is overly optimistic. On this basis, the stock status cannot be determined "with a high degree of certainty" and therefore this SI should be revised down to 80.	Catch data taken from IOTC nominal catch data provided to WPTT22 (spreadsheet IOTC-2020-WPTT22(DP)-	No (minor score reduction expected)	Not accepted (no change)

Input summary	Input detail	Evidence or references	Stakeholder input code	CAB response code
		DATA03; see link		
CAB response	Response: Pew is incorrect that a score of 100 here means that there is a high degree of certainty about all the data used in the stock assessment. The 'high degree of certainty' at SG100 is in relation to the stock status with respect to the PRI and B_{MSY}, not with respect to the various datasets in the stock assessment. With less certain data, the conclusions of the stock assessment will have wider error bars, and therefore the stock status estimate has to be higher above the reference point to have achieved that reference point with a high degree of certainty. This is the case here, where the stock assessment estimates stock biomass to be double B_{MSY} and F_{2019}/F_{MSY} at 0.55 with CIs 0.31-0.78. (Note that these figures come from the revised and updated rationale for PI 1.1.1, which uses the 2020 stock assessment.)			

1.2.3 - Information and monitoring

Input summary	Input detail	Evidence or references	Stakeholder input code	CAB response code
Condition needed to address multiple sources of uncertainty in SKJ information used for stock assessment.	SIb - There are meaningful uncertainties in quantifying effort, catchability, shifts in removals of SKJ in response to the YFT rebuilding plan, as well as uncertainties in removals from portions of the industrial, and particularly, artisanal, fleets. In terms of the latter, while we concur that these values are estimated by IOTC, this PI evaluates the sufficiency of information, not estimates. The CABs own rationale details these gaps from a number of artisanal fishing nations (whose catches represent ~45% of total SKJ landings (WPTT22, Fig. A12)), including Indonesia, Madagascar, Yemen and Sri Lanka and states that: "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." We also note that uncertainties in other gear types outside of PSLS, and that poorly monitored gillnet removals in particular, must be considered under P1 as they pertain to SKJ removals. In its Oct 2020 meeting, the tropical tuna working party report also indicated some serious problems associated with current catchability information: - If one accepts the BET and YFT assessments and the analysis outlined in IOTC-2018-WPTT20-32, but assumes that standardized PSLS catchability has not changed, it implies that the LL fisheries must have become increasingly less effective over the past several decades. The WPTT and WPM have endorsed 1% per year increasing catchability trends in the LL fisheries as plausible assumptions in bigeye and yellowfin MSE Operating	PCDR Report of the 22nd Working Party on Tropical Tunas and datasets of WPTT22 https://www.iotc.org/meetings/22nd-working-party-tropical-tuna-wptt22-stock-assessment-meeting p. 60. "Gillnet fisheries: several fisheries using gillnets have reported large catches of skipjack tuna in the Indian Ocean, including the gillnet/longline fishery of Sri Lanka, driftnet fisheries of I.R. Iran and Pakistan, and gillnet fisheries of Indonesia. In recent years gillnet catches have represented about 20% of the total catches of skipjack tuna in the Indian Ocean (Table A3; Fig. A12).	No (score reduction expected to 60-80, condition raised)	Not accepted (no change)

Input summary	Input detail	Evidence or references	Stakeholder input code	CAB response code
	Models, due to factors that the standardization is not expected to be able to address. If correct, this would imply an even greater catchability trend in the PSLS fishery; - The catchability trend should have been introduced from the start of the time series (~1990), rather than 1995 as was requested from the WPTT in 2017 and repeated in 2020. On the basis of multiple sources of uncertainty in the information relevant to obtaining accurate and precise data to inform stock assessment, information status can not be evaluated as "good" as required by SG80, and therefore the score should be reduced to 60 and a conditions should be put in place.	Although it is known that vessels from I.R. Iran and Sri Lanka have been using gillnets on the high seas in recent years, reaching as far as the Mozambique Channel, the activities of these fleets are not fully understood, as vessels may use a mix of gillnet and longline fishing gears and time-area catch-and- effort series have been made available for those fleets only in recent years."		
CAB response	(We have updated the rationale and background section to cover the data inputs to the 2020 stock assessment and the Secretariat analysis of the data available in 2020.) Regarding gillnet fisheries, we believe the issue is covered by noting that there are a range of issues with catch data from some of the artisanal fleets. Trends in catchability are not datasets – they are derived from analyses of standardised catch/effort data, as described above, which are done as part of the stock assessment. Therefore this issue is better discussed under PI 1.2.4, and has been added to the rationale for 1.2.4d. We take it the last paragraph refers to SId? We agree that it could be better, but to our mind the essential point is that it is sufficient for a reasonably robust stock assessment. Were the stock status less strong, such that more precision was required (see response under 1.1.1) the data quality would be more problematic. We note also that the situation seems to be improving.			

1.2.4 - Assessment of stock status

Input summary	Input detail	Evidence or references	Stakeholder input code	CAB response code
Uncertainty associated with nominal catch is not incorporated	SIc - Uncertainty in Assessment: As noted above (1.2.3) there is considerable uncertainty in catch data from artisanal fleets. In addition, there is some (smaller) level of uncertainty in catch data from industrial fleets (e.g. the EU allows as much as a 10% variation between logbook to landed data). None of this uncertainty is incorporated into the stock assessment models (ie all nominal catch data is assumed to be perfect) although variability in nominal	EU Margin of Tolerance can be found in Council Regulation	No (minor score reduction expected)	Not accepted (no change)

Input summary	Input detail	Evidence or references	Stakeholder input code	CAB response code
into assessment of stock status	catch can be incorporated into the stock synthesis model currently used for stock assessment, and therefore SG100 is not met.	(EC) No 1224/2009		
CAB response	Regarding the EU data the discrepancies between logbook and landings data (which are inevitable given that logbook data are estimated while landings are weighed) are dealt with via the EU data processing system prior to submission to IOTC. This system has been problematic (as IOTC has previously noted) and is currently undergoing an overhaul – it is described in the rationale for 1.2.3b which considers data on UoA removals. The 2020 stock assessment uses Stock Synthesis, and error in nominal catch data can be incorporated, although in this case the model is set to fit these data, so implicitly assuming low error. Looking at the bigger picture, it is practically impossible for a stock assessment to test the impact of uncertainty in every single input parameter, singly and in combination – this would be millions of runs. So the usual process is to run a range of uncertainty analyses (Table 4 in the stock assessment report) from which a subset of runs making the most difference, and/or based on those factors judged by the scientists to be the most significant, are taken as the basis for an uncertainty grid, which then is considered to reflect the broad range of uncertainty. We agree that this process is subjective and to some extent qualitative; the probabilistic estimates of stock status in relation to reference points have to be taken within that qualitative framework. But in practice, it is impossible to fully quantify uncertainty in a stock assessment – even if uncertainty in the various datasets could be added to this quantitative framework, it still remains within a qualitative framework around which model was selected, how inputs are weighted etc. The wording of the SGs accepts this context, in as much as it states that 'the assessment takes into account uncertainty' rather than 'uncertainty is fully quantified' or similar.			

2.1.1 - Primary species outcome

Input summary	Input detail	Evidence or references	Suggested score change	CAB response code
SIa (BET) - Contribution of FAD usage to bigeye overfishing should be incorporated	SIa (BET) - At the SG 100, the PISG stipulates that "There is a high degree of certainty that main primary species are above the PRI and are fluctuating around a level consistent with MSY". While the stock is above the PRI, there is not clear evidence that BET is fluctuating around a level consistent with MSY, as the stock is considered to have overfishing occurring (fishing mortality is above FMSY with 72.8% probability). In addition, the increase in SKJ targeting (likely as a result of the yellowfin rebuilding measure) is contributing to that overfishing due to the catch of juvenile BET from the purse seine FAD fishery with fleets (including the UoA) increasing FAD sets to over 90% of all sets. The latter issue is considered an important deficiency in the stock assessment model, as noted in the discussion of the 2019 assessment (see right) which question the predictive capacity of the model. Therefore SG100 is not met.	Preliminary Indian Ocean Bigeye Tuna Stock Assessment 1950-2018 (SS3) Link "The overall stock status estimates obtained from a range of model options do not differ substantially from the previous assessment: current spawning biomass remained to be above	No (minor score reduction expected)	Accepted (minor score reduction)

Input summary	Input detail	Evidence or references	Suggested score change	CAB response code
		SSBMSY (SSB2018/SSBMSY = 1.30). However, fishing mortality is estimated to be above FMSY (F2018/FMSY = 1.55), mostly reflecting the significant increase of the catches from PSLS fishery. Current (2018) catches are higher than the estimated MSY from the final model ensemble and are likely to drive the stock to be below SSBMSY in the long term. The retrospective analysis provided some confidence on the robustness of the model with respect to recent data, yet the uncertainly on levels of recent recruitment may undermine the predictive capabilities of the model." Purse seine FAD sets: IOTC-2019-WPTT21-11_Rev1 and IOTC-2019-WPTT21-12		
CAB response	We agree with your comment and have revised the BET score downwards. However, this does not affect the overall scoring.			

2.3.3 - ETP species information

Input summary	Input detail	Evidence or references	Suggested score change	CAB response code
Condition needed on SIb to address the inability to detect trends in ETP species given the current observation methods and meaningful discrepancies between human observers and EMS.	SIb - Information provided in relation to 2.3.1a indicates that there are significant concerns about the ability for EM to accurately detect rare species such as ETPs, relative to human observers. These differences are as large as 9 fold for the species where there are sufficient numbers to accurately track differences between human observer and EM coverage. For all other species, numbers are so small that an accurate evaluation of the two systems in not possible. On this basis, the evidence presented does not support - despite all of the good work being done by Orthongel and the SIOTI research - the ability to reliably detect changes in trends of ETP species, particularly given that the majority of vessels in the UoA are covered by EM, which because its known shortcomings, may be underestimating events by nearly 90%. Therefore SG 80 is not met and a condition should be added. PCDR p. 33 and Ruiz et al. 2017 "Poor ability for EM to detect non-target spp, particularly rare ones (Ruiz et al. 2017): Bycatch estimate (sharks, rays, turtles, birds and marine mammals) and fate (sharks, rays, turtles, birds and billfish): number of cameras is limited, and bycatch handling area could change and move out from the camera views punctually. Small-sized individuals can be underestimated, mainly in those cases where they are not sorted, and are retained in wells. Species id. could be limited sometimes compared to an experienced observer. PCDR p. 109 Oceanic Whitetips: Human observers 27m/yrt, EMS 3mt/yr Silky Sharks: Human observers 148mt/yr, EMS 73mt/yr	No (score reduction expected to 60-80, condition raised)		Accepted (score reduced to 60-80, condition raised)
CAB response	We agree with this comment which was also raised by WWF. We have amended the rationale and scoring and a condition has been raised.			

3.2.2 - Decision-making processes

Input summary	Input detail	Evidence or references	Suggested score change	CAB response code
Decision-making structures were not able to implement Para 11b of	SIb - There is clear evidence that there are deficiencies in the management system's ability to implement key output controls associated with the HCR via catch limits (see comments on 1.2.1). All CPCs were informed of this catch limit by circular on 15 Dec 2017 (Circular 2017-094). Yet p.8 of WPTT-22 reports that there were " large catches recorded in the period 2018-2019, which exceeded the catch limits established in 2017 for this period." This	IOTC Resolution 16/02 Link	No (score reduction expected to 60-80, condition raised)	Accepted (score reduced to 60-80, condition raised)

Input summary	Input detail	Evidence or references	Suggested score change	CAB response code
Resolution 16/02 to keep catches within limits in 2018 or 2019.	represents clear evidence of the management system's inability to implement Para 11b of Resolution 16/02 which states: 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. For the critical issue of controlling removals associated with limits, decision-making process did not respond, in keeping with IOTC's own management resolution, in a timely or adaptive manner, as required at the SG80. Nor was the lack of compliance explained in a transparent manner. Therefore the SG80 is not met and a condition should be raised.	Report of the 22nd Working Party on Tropical Tunas and datasets of WPTT22 Link Notification of the skipjack TAC as determined via the HCR: IOTC Circular 2017-094		
CAB response	We agree with this comment. We have revised the rationale and score for SIb and added a condition (#8) which has been harmonised with overlapping fisheries in the MSC programme (Echebastar, Maldives and AGAC). The report background section for Principle 3 has been complemented, with an introductory note and revised section 6.6.4 (Decision making processes, stakeholders and disputes), which takes account of the latest (2020) IOTC information analysed for Principle 1.			

Appendix 4.2.4 MSC Technical Oversight

Page Reference	Grade	Requirement Version	Oversight Description	PI	CAB Comment
81	Major	FCP7.17.9.1 v2.1	PI 2.1.1, SI (a); PI 2.3.1 SI (b). Its unclear how the team have considered the impact of unobserved mortality from FADs on P2 components as per SA3.1.8. For example,	2.1.1, 2.3.1	2.1.1: Unobserved mortality is considered in the final paragraph of SIa. It has already been made clear in the background section that 1. there is a limit of 300 FADs / vessel and 2. all FADs are either

Page Reference	Grade	Requirement Version	Oversight Description	PI	CAB Comment
			whilst the team have considered that unobserved mortality from FADs is mitigated by the use of "sausage nets" its unclear how the team have considered contributing factors such as the number of deployed FADs of this type, the prevalence of this types of FAD use (relative to other types used by the UoA), or the fact that these types of FADs are understood to increase their entanglement risk over time (as cited on pg 114 of PCDR).		less entangling (sausage) or non entangling. We do not have a breakdown of the two types as it changes over time (with gradual elimination of lesser entangling FADs). The analysis in 2.1.1 is based on the assumption that all FADs are 'less entangling' i.e. worst case scenario - this has been clarified. 2.3.1: Unobserved mortality from FADs is considered in detail in the final section of the rationale for SIb. The requirements for non-entangling FADs, and subsequent research into how exactly these should be designed, is clearly explained. As for 2.1.1. the analysis considers a 'worst case scenario' for the fishery; i.e. less entangling – although the client has committed to only using non-entangling FAD designs from 2021 onwards (in line with Res 19/02). Note, technically as per the management plan this was being implemented from 2020; however at the time of the site visit, it was not clear that this had been fully implemented in the fishery and this could also not be verified by the team – for this reason we have scored the fishery on a precautionary basis.
103	Minor	FCP7.17.9.1 v2.1	PI 2.2.2. SI (d). The rationale cites that on-board observer coverage is "15% in 2018" (Page 102) which contributes to the score of SG80. However its unclear how the team have established that observer coverage figure for the fleet. For example the report also cites that a single vessel within the fleet (Torra Italia) is the only	2.2.2,	The process for determining observer coverage is clearly explained in Section 6.3.6.5. One of several problems common with human observer data is that it usually does not provide a random sample - in this case of the vessels; one reason which has led to extensive research on how best to implement EMS. The assumption has been made here (which appears to be reasonable based on the

Page Reference	Grade	Requirement Version	Oversight Description	PI	CAB Comment
			vessel capable of hosting on-board observers (Pg 31).		information from the site visit) that the vessels all operate in a similar way; this has been clarified.
n/a	Minor	FCP-PB1.3.3.2 v2.1	Whilst the report cites that harmonisation meetings took place, Its unclear whether the teams have harmonised P2 scoring components as per GPB1.		This is explained in Appendix 9 which has now also been updated.
17	Guidance	FCP-7.9.1.1 v2.1	Please confirm the systems in place to allow the fishery to trace back to the UoC. In section 5.2, Skipjack (UoC) as well as other tuna species (non-UoC) are identified to be handled by the fishery. Are multiple species being targeted in the same set? The report also note species sorting and segregation don't happen until offloading. What is the system in place to ensure non-certified species are segregated and not mixed with certified skipjack at offloading (prior to the start of CoC)? In the case where landed directly at the factories in Mauritius and Seychelles, are species separation happening only at the factory? How is species segregation and traceability back to UoC ensured?		As explained throughout the report, yellowfin is in fact the main target species in the fishery, although it is assessed under Principle 2. There is no processing of the catch and skipjack are easily morphologically separated from yellowfin (or bigeye which may also be caught). All offloading activities are verified by an independent company Socomep, an ISO 9001:2015 certified and compliant company for the monitoring, storage, off-loading and weighing of fish catches who check the following: dates and times when unloading begins and ends for each holding tank, the destination of each unloaded tank (factory receipt showing species, grade, quantity; unique container identifier; cargo vessel stowage plan), the total offloaded volume, grading and sorting and drafting of Final Unloading Report. It is during offloading that the yellowfin and bigeye are separated from the skipjack. In addition to Socomep, the unloading activities are supervised by a local CFTO representative, an official from the fisheries authority in Mauritius or Seychelles, and the IRD (who take their own samples for T3 validation). All this is explained in the report.

Appendix 5 Conditions and Client Action Plan

Table 37. Condition 1 – Harvest strategy skipjack

Performance Indicator	1.2.1 Harvest Strategy
Score	70
Justification	Scoring issue a (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. See Scoring table 3. PI 1.2.1 – Harvest strategy
Condition	By the end of Year 5, the client fishery should demonstrate that 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 (i.e., it is highly likely that the stock is above the PRI and is at or fluctuating around a level consistent with MSY).
Milestones	Years 1 – 4 (2022 – 2025): The client should provide evidence that, independently or jointly with industry groups, it has worked with relevant management authorities to press for IOTC action on ensuring adoption of appropriate measures consistent with scientific advice and responsive to the state of the stock such that management objectives reflected at PI1.1.1 are met. Score: 70. Year 5 (**May 2026**): The client should provide evidence that the harvest strategy for skipjack tuna in the Indian Ocean 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. Evidence will relate to stock status and PI 1.1.1 requirements and to IOTC decision-making in response to advice. Score 80. Note: condition timelines fully harmonised with Echebastar Indian Ocean purse seine skipjack tuna and Maldives pole & line skipjack tuna fisheries. As a result of the Covid-19 pandemic, MSC have issued a derogation which extends the deadlines for all existing conditions by one year (in addition to a 6 month extension issued under a previous derogation in 2020). The milestones for this condition have therefore been brought in line accordingly.
Client Action Plan	1. We note that Condition 1 reflects Condition 9 of the Echebastar certified fishery, as defined in their first annual surveillance audit. However, the relevant fishery jurisdictions differ, leading to some changes in this CAP 2. The management authorities relevant to the CFTO fishery are IOTC and EU/France and EU/Italy. 3. We recognise that acting by ourselves, CFTO would have limited opportunity to influence the IOTC process. This emphasises the need to work in full cooperation with other interested parties. 4. We will be fully active within SIOTI to define and implement a Strategy approved by SIOTI members (producers and processors) covering adoption of an appropriate harvest strategy by the IOTC and its effective implementation. 5. We will work closely with ORTHONGEL to present the SIOTI Strategy for dialogue with, and the government of France and Italy, the EU among other through the LDAC (working group 1, via Orthongel membership). 6. Through SIOTI we will engage with other fisheries including MSC certified fisheries to try to define a common strategic approach in driving IOTC policy.

	7. To the extent of possible, our representatives will attend all meetings that are related to the definition and implementation of a Harvest Strategy where we are able to participate. 8. We have reviewed ISSF comments that refer to: the NGO tuna forum, advocation, support for ISSF position papers). We consider that to ensure a cohesive response on the part of the sector, such actions should be the responsibility of SIOTI and ORTHONGEL. We will, however, ensure that the ISSF views are taken into consideration by those two organisations. 9. Prior to each MSC annual surveillance audit we will prepare a report that provides evidence of the implementation of our activities related to Condition 1. **Deliverables** Years 1 – 4: CFTO will present annual audits with evidence that we have fully implemented our client action plan, with a list of relevant meetings together with minutes, and copies of relevant reports and submissions. Year 5: CFTO will provide evidence that the harvest strategy for skipjack tuna in the Indian ocean 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. **Action Owner** • CFTO **Action Participants** • Orthongel • SIOTI
Consultation on condition	Orthongel is already a member of the LDAC which is the key forum that will ensure industry representation at EU and IOTC level. The SIOTI FIP is an additional avenue for stakeholder consultation and RFMO advocacy. No additional consultation is required. Also see letters of support from Orthongel, SIOTI and DPMA (Appendix 9). Finally, see SC report 2019 (IOTC-SC, 2019), Appendix 34, bottom of p. 159 'skipjack MSE': "*The Secretariat is in the advanced stages of contracting an expert to develop the skipjack tuna MP using funds from an EU Grant*"

Table 38. Condition 2 – Harvest control rules and tools skipjack

Performance Indicator	1.2.2 Harvest control rules and tools
Score	75
Justification	Scoring issue c (SG80): Available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the HCRs. See Scoring table 4. PI 1.2.2 – Harvest control rules and tools
Condition	By the end of Year 5, the client must demonstrate that available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the HCRs.
Milestones	Years 1 – 4 (2022 – 2025): The client should provide evidence that, independently or jointly with industry groups, it has worked with relevant management authorities to press for IOTC action on implementing measures that are effective in ensuring

	catch limits for skipjack tuna set using the HCR adopted in IOTC Res16/02 (or any subsequent amendments) are not exceeded. Score: 75. Year 5 (**May 2026**): The client should demonstrate that the available evidence indicates that the tools in use to ensure catch limits for skipjack tuna set using the HCR are appropriate and effective in achieving the exploitation levels required under the HCR set in IOTC Res 16/02 (or any subsequent amendments). Score: 80. Note: condition timelines fully harmonised with Echebastar Indian Ocean purse seine skipjack tuna and Maldives pole & line skipjack tuna fisheries. As a result of the Covid-19 pandemic, MSC have issued a derogation which extends the deadlines for all existing conditions by one year (in addition to a 6 month extension issued under a previous derogation in 2020). The milestones for this condition have therefore been brought in line accordingly.
Client Action Plan	1. We note that Condition 2 reflects Condition 10 of the Echebastar certified fishery, as defined in their first annual surveillance audit. However, the relevant fishery jurisdictions differ, leading to some changes in this CAP 2. The management authorities relevant to the CFTO fishery are IOTC and EU/France and EU/Italy. 3. Two issues are related to the HCR established by IOTC 16/02 (and subsequent modifications); firstly, CFTO compliance, and, secondly, the compliance of other fishers. 4. We will: - work with SIOTI to recommend the procedures for the setting and allocation of quotas by IOTC. - Work with ORTHONGEL to recommend (among other through Orthongel membership to LDAC – working group 1) the procedures for the setting and allocation of quotas by IOTC and the Governments of France and Italy. - work with ORTHONGEL to recommend the procedures for the allocation of quotas among its producer members and robust monitoring of catches - work with ORTHONGEL and/or SIOTI to consider independent 3rd party audits of landings and how this may be applied by all purse seine vessels - work both independently and within the ambit of SIOTI to review and comment on proposals by other fleet segments. **Deliverables** Years 1 – 4: We will present evidence that we have fully implemented our client action plan, with a list of relevant meetings together with minutes and copies of relevant reports and submissions. Year 5: We will provide evidence to demonstrate that the tools in use are appropriate and effective in achieving the exploitation levels required under the HCRs. **Action Owner** • CFTO **Action Participants** • Orthongel • SIOTI
Consultation on condition	Orthongel is already a member of the LDAC which is the key forum that will ensure industry representation at EU and IOTC level. The SIOTI FIP is an additional avenue for stakeholder consultation and RFMO advocacy. No additional consultation is

	required. Also see letters of support from Orthongel, SIOTI and DPMA (Appendix 9). Finally, see SC report 2019 (IOTC-SC, 2019), Appendix 34, bottom of p. 159 'skipjack MSE': "*The Secretariat is in the advanced stages of contracting an expert to develop the skipjack tuna MP using funds from an EU Grant*"

Table 39. Condition 3 – ETP species information

<table>
<tr><td>Performance Indicator</td><td>2.3.3 ETP species information</td></tr>
<tr><td>Score</td><td>70</td></tr>
<tr><td>Justification</td><td>
<u>Scoring issue a (SG80):</u> 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.
Extract: While the electronic monitoring provides substantial additional coverage, there remain important quality issues to sort out, as highlighted in Section 6.3.6.3 of this report: For individual non-target species analyses, however, the EMS was found to significantly underestimate the number of individuals, as for example larger species such as sharks or billfish or species with high commercial value, may be retrieved at several places and may not be recorded by cameras. For specimens handled above deck, the cameras may be too distant from the discard operations or be compromised by backlight, overexposure and/or splashing water for the EMS to register the individuals at the species level. In fact, for oceanic whitetip sharks and silky sharks in particular, the EM appeared to significantly underestimate UoA interaction levels, as follows (extract from Table 21):
<table>
<tr><td rowspan="2">Oceanic whitetip shark (Carcharhinus longimanus)</td><td>Onboard: 2014-18 scaled up average: 27t/year</td></tr>
<tr><td>Electronic: 2015-18 scaled up average: 3t/year</td></tr>
<tr><td rowspan="2">Silky shark (C. falciformis)</td><td>Onboard: 2014-18 scaled up average: 148.4t/year</td></tr>
<tr><td>Electronic: 2015-18 scaled up average: 73.25t/year</td></tr>
</table>
Given that the Torre Italia is the only UoA vessel that has sufficient room to board an observer permanently, the reliance of the UoA on electronic monitoring is significant. Although CFTO are already working to improve data quality through the project OCUP, the discrepancies in reported shark interactions suggest there remains room for improvement. While the human observer data enables the UoA-related mortality on ETP species to be estimated (see 2.3.1), the UoA's increased reliance on EM with its acknowledged data quality issues increases the risk for ETP interactions (particularly sharks) to be underestimated. SG80 is therefore not met.
In terms of the risk of entanglement to ETP species, the risk posed by deteriorating sausage nets at the scale of the UoA remains sufficiently low so that it remains highly likely that the UoA does not hinder recovery of ETP species. Murua et al. (2014) state that 'This kind of tied-netting design was initially envisaged by scientists as an intermediate step towards non-entangling FADs that greatly reduces entanglement, with a low incidence of ghost fishing reported only if the bundles become untied'. For the associated set types, although the observer data provide quantitative data on UoA related observed mortality, impacts related to unobserved mortality (caused by entanglement in dFADs) are estimated based on FAD design (see 2.3.1b). While the client has committed to only using non-entangling FADs from 2021 onwards, independent evidence that this is indeed happening could not be verified by the team. Therefore, although the qualitative information is adequate to estimate the UoA
</td></tr>
</table>

	related mortality on ETP species (and SG60 is therefore met), quantitative data on this type of unobserved mortality are lacking. SG80 is not met.
Condition	By the end of Year 4, the client must demonstrate 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 in terms of observed mortality, as gathered through human observers and electronic monitoring, and in terms of unobserved mortality as a result of entanglement in dFADs.
Milestones	Year 1: Unobserved mortality: either demonstrate on an annual basis that fully non-entangling FADs are in use by the fishery (including any repurposed FADs), or carry out review of available data sources and establish data collection plan to quantify unobserved mortality in dFADs. Observed mortality: develop plan to ensure the UoA observer data collected through electronic monitoring is of similar quality as that collected through human observers, particularly for the estimation of ETP species interactions including sharks. Score: 70 Year 2: Unobserved mortality: either demonstrate on an annual basis that fully non-entangling FADs are in use by the fishery (including any repurposed FADs), or implement data collection plan to quantify unobserved mortality in dFADs. Observed mortality: implement plan to ensure the UoA observer data collected through electronic monitoring is of similar quality as that collected through human observers, particularly for the estimation of ETP species interactions including sharks. Score: 70 Year 3: Unobserved mortality: either demonstrate on an annual basis that fully non-entangling FADs are in use by the fishery (including any repurposed FADs), or implement data collection plan to quantify unobserved mortality in dFADs and commence data analysis. Observed mortality: continued implementation of plan to ensure the UoA observer data collected through electronic monitoring is of similar quality as that collected through human observers, particularly for the estimation of ETP species interactions including sharks. Analyse initial results. Score: 70 Year 4: Unobserved mortality: either demonstrate on an annual basis that fully non-entangling FADs are in use by the fishery (including any repurposed FADs), or demonstrate 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 in terms of unobserved mortality as a result of entanglement in dFADs. Observed mortality: 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 in terms of observed mortality, as estimated through electronic monitoring and human observers. Score: 80.
Client Action Plan	As both issues on unobserved and observed mortality are linked to EMS data collection, CFTO will work primarily with members of the OCUP program, namely Orthongel, Bureau-

	Veritas Living Resources (formerly Oceanic Development) and IRD. CFTO will also work closely with its EMS provider (Thalos) to solve remaining technical issues and improve EMS performances. <u>Unobserved mortality</u> : Approach : CFTO will primarily focus on the objective to demonstrate that only fully non-entangling FADs are used by CFTO vessels. In the event that the results presented during the year 1 audit would be assessed as not sufficient, CFTO will review the action plan to implement, with the support of Orthongel, a study to assess the unobserved mortality. This study could be based on tagging data or on diving surveys. It is important to note that the information on FAD design and FAD structure (entangling or non-entangling) is collected by onboard OCUP observers since 2015, whereas this information is not yet collected by EMS. Consequently, CFTO will focus on upgrading its EMS to allow data collection on FAD structure. Year 1 : - CFTO will work with OCUP partners to define a monitoring methodology to collect data on FAD structure (entangling or non entangling) via EMS. - CFTO will conduct a pilot study on 1 vessel to test the monitoring methodology. Deliverable : progress report and 6 months data. Year 2 : - CFTO will generalize the validated monitoring methodology to the entire CFTO fleet. Depending of the results of the pilot study, CFTO may implement the necessary corrective actions to improve data collection. Deliverable : progress report and preliminary data on year 2. Year 3 : - CFTO will pursue data collection. - CFTO will implement any corrective action that might be necessary to improve the data collection. Deliverable : definitive data on year 2 and preliminary data on year 3. Year 4 : - CFTO will pursue data collection. Deliverable : definitive data on year 3 and preliminary data on year 4. <u>Observed mortality:</u> Approach : CFTO is assuming that the observed differences between onboard and electronic estimates of shark catches have 2 main explanations : - The presence of blind spots on the fishing deck and/or the well deck leading to miss some individuals - The inability to identify the species due to poor quality of some video records. To solve these two issues, CFTO will have to take in consideration the configuration of each vessels and working habits of the crews (solutions may be different from one vessel to another).

	Year 1 : CFTO with the support of OCUP partners and Thalos will first conduct a study on each vessel to identify the reasons of shark underestimation or lack of identification at the scale of the species (crew interviews, analyse of electronic observer data per vessel, blind spots mapping, …). Given the conclusions of this first study, CFTO will work with OCUP partners and Thalos to establish a detailed work plan to improve data collection on sharks. Deliverable : work plan Year 2 : CFTO with the support of OCUP partners and Thalos will implement the work plan. Deliverable : progress report Year 3 : CFTO with the support of OCUP partners and Thalos will continue to implement the work plan. CFTO will analyse observer data collected during year 2 to assess the differences on shark catches (silky sharks and oceanic whitetip) between onboard and electronic monitoring. In the event that the results of this first study are not satisfactory, CFTO with the support of OCUP partners and Thalos will review the work plan and take corrective actions. Deliverable : Progress report – analyses of year 2 data set. Year 4 : CFTO will analyse observer data collected during year 3 to assess the differences on shark catches (silky sharks and oceanic whitetip) between onboard and electronic monitoring. Déliverables : Final report – analyses of year 3 data set.
Consultation on condition	CFTO will work primarily with members of the OCUP program, namely Orthongel, Bureau-Veritas Living Resources (formerly Oceanic Development) and IRD. CFTO will also work closely with its EMS provider (Thalos) to solve remaining technical issues and improve EMS performances. A letter of support from Bureau-Veritas Living Resources, Thalos and IRD is provided in Appendix 9.

Table 40. Condition 4 – Habitats outcome

Performance Indicator	2.4.1 Habitats Outcome
Score	70
Justification	Scoring issue b (SG80): 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. Extract from scoring rationale: In relation to scoring of SG80, the team identified the following issues: - The number of FADs deployed is currently not well monitored. Although there is a requirement for CPCs to report FAD deployments as part of Resolution 19-01, and monthly buoy declarations are submitted regularly to CFTO, Orthongel and the French administration (DPMA), there is also a wide-spread practice of ‘repurposing’ other company’s FADs by replacing the buoy (and either discarding or bringing to port the other company’s buoy). The exact number of FADs in use by any given fishery is therefore

	difficult to determine, with the number of active buoys not necessarily being equal to the number of FADs used over time; - There is no dedicated monitoring system for the tracking of lost or abandoned FADs at the UoA level, and impact studies are currently based on simulations (e.g. Davies et al. (2017), Imzilen et al. (2019) and Maufroy et al. (2015)) or in-situ observations that are limited in scope (e.g. Balderson and Martin (2015) and Zudaire et al. (2018)); - While of great local importance, the FAD Watch Programme only covers 5 atolls within the Seychelles Archipelago and any monitoring or mitigation programmes elsewhere are at best in their infancy. Coral reefs in the Maldives for example were according to site visit interviews at greatest risk of FAD strandings. Furthermore, at-sea recovery has been trialled by CFTO who reported difficulties in pursuing this further owing to the distances involved and the effort and space required to store FADs onboard the vessels. - Although of lower-entanglement risk, the FADs in use by the UoA do not fully eliminate the risk of entanglement and VME damage following beaching events, with the use of synthetic materials further increasing the risk of longer-term habitat damage. According to Moreno et al. (2020), until a 100% biodegradable FAD structure is found, a progressive replacement of some plastic components, such as the submerged appendage, would still be a significant step to decrease the FAD impacts on the marine habitat. The team therefore deducts that there is insufficient certainty to conclude 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. SG80 is not met.
Condition	Within 4 years, the client fishery needs to demonstrate that the risk of reducing structure and function of coral reef habitats to a point where there would be serious or irreversible harm, associated with lost and/or abandoned UoA FAD beaching events, is sufficiently low for SG80 to be met.
Milestones	Year 1: - Carry out review of available data sources to determine risk and identify additional monitoring needs to support partial strategy. Develop monitoring programme. - Carry out review of management options to provide some objective basis for confidence that the partial strategy will work based on information directly about the UoA and/or habitats involved. Score: 70. Year 2: - Implement monitoring programme and commence data analysis. - Present partial strategy which has some objective basis for confidence that it will work based on information directly about the UoA and/or habitats involved. Score: 70. Year 3: - Monitoring programme is up and running with continued data analysis.

	- Partial strategy that has some objective basis for confidence that it will work, based on information directly about the UoA and/or habitats involved has been implemented. Year 4: It can be demonstrated that the risk of reducing structure and function of coral reef habitats to a point where there would be serious or irreversible harm, associated with lost and/or abandoned UoA FAD beaching events, is sufficiently low for SG80 to be met. Score: 80.
Client Action Plan	**<u>Approach</u>** • We note that the score we achieved is the same as that for Echebastar; however there are differences in the defined milestones. • Through the milestones, the CAB has define two lines of work: o Data collection and data analyses o FAD management plan to control the risk of reducing structure and function of coral reef habitats to a point where there would be serious or irreversible harm, associated with lost and/or abandoned UoA FAD beaching events • As the data collection and data analyses part is also developed in condition 5, please refer to this condition for further information. • Regarding FAD management plan, CFTO will mostly work with Orthongel, SIOTI and producing companies such as Echebastar. • In common with other segments of the IO purse seine fleet and working with SIOTI, we have already implemented a work programme and our activities over the next 4 years will concentrate on confirming our approach, and modifying it as required in full cooperation with SIOTI and individual producing companies such as Echebastar • CFTO is anticipating that the work program that will be implemented in cooperation with its partners will cover the following actions : - Cooperative work with Orthongel /SIOTI to continued development and practical implementation of biodegradable FADs. - Cooperative work with SIOTI / Echebastar to test the difference in the impacts of biodegradable and traditional non-entangling FADs in selected locations. - Cooperative work with SIOTI to implement the FADWATCH project in the Seychelles; - Cooperative work with SIOTI/ Echebastar to assess potential approaches to tracking lost dFADs and derelict dFADs found in coral areas in SIDS other than the Seychelles; • We will monitor the implementation of the strategy and ensure the effective completion of any sub-projects. • Our approach will be pragmatic and be modified as required on the basis of experience. • We consider that the identified activities meet the expectations of ISSF and we will fully consider incorporating ISSF recommendations into our work plan. **<u>Deliverables</u>** <u>Year 1</u> • We will confirm our partial strategy with details of the activities completed, or in-process, for its implementation, and the expectation of how these will reduce the risk to corals from interaction with our derelict dFADs. • Analysis will present the on-going work programme and the resources allocated for its implementation, together with evidence that provides a

	basis for confidence that we will meet the condition within the time frame available. • <u>Years 2 & 3</u> • We will present a report on the implementation of the strategy and highlight any adjustments that have been made, and the expectation on how these will reduce the risk to corals from interaction with our derelict dFADs. • We will present evidence to support confidence that we will meet the condition within the time frame available. <u>Year 4</u> • We will provide a report to show that the risk to coral from interaction with our derelict dFADs has been reduced and that the potential damage to coral reefs will not risk reducing the structure and function of affected coral reef habitats to a point where there would be serious or irreversible harm. **<u>Action Owner</u>** • CFTO **<u>Action Partners</u>** • ORTHONGEL • SIOTI • ECHEBASTAR
Consultation on condition	See letters of support from Orthongel, SIOTI and Echebastar (Appendix 9)

<u>Table 41. Condition 5 – Habitats management</u>

Performance Indicator	2.4.2 Habitats Management Strategy
Score	75
Justification	Scoring issue b (SG80): 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. As already mentioned, the risk of a drifting FAD beaching event occurring is determined by the number of drifting FADs in the ocean, the deployment location, dispersal patterns, the extent of efforts to prevent beaching events from occurring and FAD design. The likelihood and severity of beaching events can be mitigated through limiting FAD deployments, simplifying FAD structure, avoiding FAD deployment areas that imply high risk of stranding, using FADs that remain in the fishing area (e.g. FADs with navigation capability, FADs that could be sunk, anchored FADs), recover FADs at sea, and recover FADs from the coast (Davies et al., 2017). As has already been explained in scoring issue a and in Section 6.5.5, the Client fishery is implementing or striving towards implementation of a number of these measures as part of their partial strategy, including limiting FAD deployment, changing FAD design towards biodegradable and non-entangling FADs and experimenting with FAD navigation. This, together with existing initiatives aimed at drifting or beached FAD recovery (FAD Watch) provides plausible argument that the partial strategy will work. SG60 is met. It is not clear, however, that the current limits on buoy numbers (300 as per IOTC resolution 19/02) and buoy and FAD deployment monitoring strategies go far enough to ensure an SG80 outcome score

	for VMEs (coral reefs). Furthermore, the UoA fishery has historically employed lower-entanglement risk FADs rather than fully non-entangling FADs (although it is increasingly using the latter). The development of biodegradable FADs is also encouraged rather than required. Any recovery programmes are also limited in scope and scale (e.g. the FAD Watch programme). The team therefore concludes that an objective basis for confidence that the partial strategy will work is lacking. SG80 is not met.
Condition	By the end of Year 3, there should be an objective basis for confidence that the partial strategy in place for managing UoA impacts on VME habitats, associated with lost and/or abandoned UoA FAD beaching events, will work based on information directly about the UoA and/or habitats involved.
Milestones	Year 1: Carry out review of management options to provide some objective basis for confidence that the partial strategy will work based on information directly about the UoA and/or habitats involved. Score: 75. Year 2: Present partial strategy which has some objective basis for confidence that it will work based on information directly about the UoA and/or habitats involved. Score: 75. Year 3: Partial strategy that has some objective basis for confidence that it will work, based on information directly about the UoA and/or habitats involved has been implemented. Score: 80.
Client Action Plan	Please refer to Condition 3.
Consultation on condition	Please refer to Condition 3.

Table 42. Condition 6 – Habitats information

Performance Indicator	2.4.3 Habitats Information
Score	75
Justification	Scoring issue b (SG80): 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. Modelling, simulations and in-situ observations of drifting DAF beaching events in the Western Indian Ocean provide a broad understanding of the most likely coastal zones to be impacted and how these beaching events may affect coral reef habitat (e.g. Davies et al. (2017), Imzilen et al. (2019), Maufroy et al. (2015) and Zudaire et al. (2018)). SG60 is met. There is, however, a lack of understanding about the exact scale of the problem for the UoA (i.e. how many FADs are lost, how many of those beach and in turn how many of those impact on coral reef habitat and in which areas). SG80 is not met.
Condition	By the end of Year 3, information availability is adequate to allow for identification of the main impacts of the UoA on coral reef habitats, associated with the beaching of lost and/or abandoned UoA FADs, and provides reliable information on the spatial and temporal extent of UoA FAD beaching events.
Milestones	Year 1: Carry out review of available data sources to determine the risk of the UoA reducing structure and function of coral reef habitats to a point where there would

	be serious or irreversible harm, associated with lost and/or abandoned UoA FAD beaching events, and identify additional monitoring needs to support partial strategy. Develop monitoring programme. Score: 75. Year 2: Implement monitoring programme and commence data analysis. Score: 75. Year 3: A monitoring programme is in place with associated analyses that is adequate to allow for identification of the main impacts of the UoA on coral reef habitats, associated with lost and/or abandoned UoA FAD beaching events, and provides reliable information on the spatial and temporal extent of these types of events. Score: 80.
Client Action Plan	**Approach** • Our partial strategy will cover the approach to improve the information base. • We will present evidence that information is being collected on: - the number of dFADs activated by our vessels; the number lost, the number recovered, the number reported as derelict and the number of derelict that have been recovered. - the spatial extent and timing of dFAD interaction with corals; - the potential impact on a coral from an individual derelict dFAD and the potential change due to use of bio-degradable dFADs. • We will establish a system to provide official accounting of all dFADs deployed by the CFTO fleet. • CFTO will coordinate with Orthongel, SIOTI and Echebastar. Action year 1 - CFTO will proceed to an exhaustive review of all FAD related data available. - CFTO will identify additional monitoring needs in order to monitor the number of FADs deployed and track abandoned or lost FADs. - If needed CFTO will develop a data collection plan to collect missing data. Deliverables Year 1 • CFTO will provide data collection plan to collect data needed to monitor the number of FADs deployed and track abandoned or lost FADs. Action Year 2 • FAD data collection : • CFTO will implement FADs data collection. • CFTO will start data analyses (as soon as the dataset is significant) Deliverable year 2 : • CFTO will provide evidence that the information is being collected and analysed. Action Year 3 – CFTO will pursue data collection – CFTO will pursue FADs data analysis Deliverable year 3

	• CFTO will present a report on the monitoring program that has been put in place, with evidence to show that this provides reliable information on the main impacts of our dFADs on coral reef habitats including analysis of their spatial and temporal character. **<u>Action Owner</u>** • CFTO **<u>Action Partners</u>** • ORTHONGEL • SIOTI • ECHEBASTAR
Consultation on condition	See letters of support from Orthongel, SIOTI and Echebastar (Appendix 9)

<u>Table 43. Condition 7 – Ecosystem information</u>

Performance Indicator	2.5.3 Ecosystem information
Score	75
Justification	Scoring issue b (SG80): Main impacts of the UoA on these key ecosystem elements can be inferred from existing information, and some have been investigated in detail. The impact of the UoA on the ecosystem caused by the removal of skipjack, yellowfin and bigeye (the main target species), and ecosystem-level impacts associated with the use of FADs can be inferred from the available UoA logbook and observer data, IOTC stock assessments and several studies contributing to the understanding of the potential ecological effects of the Indian Ocean purse seine fishery on the structure and functioning of the ecosystem in the western Indian Ocean (e.g. Andonegi et al. (2019), Juan-Jordá et al. (2019a and b) and Shahifar et al. (2019b)) as well as the ecological trap theory (e.g. Dagorn et al. (2013)). At the scale of the UoA, the team concludes that the main impacts of the Client fishery on key ecosystem elements can be inferred from existing information. SG60 is met. However, for the Echebastar fishery, DeAlteris et al. (2018) concluded that *the effects of FADs used in the fishery on tuna behaviour, migration patterns and feeding are the subject of numerous ongoing investigations. Dagorn et al (2012) conclude that there is no unequivocal empirical evidence that FADs represent an 'ecological trap' that inherently disrupts tuna biology, although further research should focus on this issue.* The team therefore harmonised scoring with the Echebastar fishery and concludes that SG80 is not met as the main impacts of the UoA, in relation to the ecological trap theory in particular, have not been investigated in detail. This is particularly relevant considering the increase in FADs deployed by CFTO since the implementation of the yellowfin rebuilding plan (IOTC resolution 2019/02) when the number of active FAD buoys permitted per vessel increased from 150 to 300.
Condition	By the end of Year 4, some of the main impacts of the UoA on the key ecosystem elements, and in particular in relation to the ecological trap theory, should have been investigated in detail.
Milestones	Year 1: Review options to investigate the potential impact of UoA FADs on the ecosystem, in particular as it relates to the ecological trap theory. Develop research plan. Score: 75. Year 2: Implement research plan. Score: 75.

	Year 3: Continue research. Preliminary results are discussed as available. Score: 75. Year 4: The client fishery demonstrates that some of the main impacts of the UoA on the key ecosystem elements, and in particular in relation to the ecological trap theory, have been investigated in detail. Score: 80.
Client Action Plan	**Approach** • We note that this condition is the same as the one defined for Echebastar. • We recognise that while the scale and intensity of our fishery would indicate that there is limited risk to the functioning of the ecosystem from our activity, nevertheless there is a need to respond to the hypothesis that dFADs impact the behavior, the migratory patterns and feeding behaviors of tuna and other species. • At the same time, we note that throughout world fisheries, there is limited understanding of ecosystem impacts. • As such, it is not feasible for us to meet this condition working by ourselves. • SIOTI has already established a work plan to address this question. • CFTO will fully cooperate to this work plan and support any activity considering and analysing the ecological trap hypothesis. • CFTO will work with SIOTI / Echebastar to identify any other required research needs on the potential impacts of dFADs on key elements of the ecosystem. **Deliverables** Year 1 • We will confirm the research plan that is being implemented by SIOTI. • We will provide copy of any completed reports. • We will present the work plan for Y2. Year 2 • We will provide copy of any completed reports. • We will present the work plan for Y3. Year 3 • We will provide copy of any completed reports. • We will present the work plan for Y4. Year 4 • We will present a report that covers: (i) the potential impact of our dFADs on the behaviour, feeding and migration of key elements of the ecosystem; and (ii) any other main consequences of the use of our FADs for the ecosystem that may be inferred. **Action Owner** • CFTO **Action Partners** • ORTHONGEL • SIOTI • ECHEBASTAR
Consultation on condition	See letters of support from Orthongel, SIOTI and Echebastar (Appendix 9)

Table 44. Condition 8 – Decision-making processes

Performance Indicator	3.2.2. Decision-making processes
Score	75
Justification	Scoring issue b (SG80): 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. Extract: An important example for the fishery has been the timely introduction of a total catch limit for skipjack derived from the HCR (Res. 16/02, see Scoring table 3. PI 1.2.1 – Harvest strategy) fixed according to the recommendation of the Scientific Committee (SC) and communicated to all CPCs in December 2017 for the year 2018. However, the catch limit was exceeded by 30% in 2018, and by 16% in 2019. In 2020, the new skipjack stock assessment found the stock biomass in a good state, and the Scientific Committee noted that “the recent catches that exceeded the (previously-set) limits established for the period 2018-2020, could have been sustained by favourable environmental conditions”. Therefore, the team considers the catch overages to be an important rather than a serious issue. However, the SC concluded that “the Commission needs to ensure that catches of skipjack tuna during this period (2021 – 2023) do not exceed the agreed limit” (IOTC, 2020e). Until this is done, for example through the implementation of a CPC catch allocation key, the IOTC decision-making processes do not respond to this other important issue, SG80 is not met for IOTC. The EU transposes IOTC Resolutions systematically as legal obligations for EU member states, therefore the condition only concerns IOTC management measures.
Condition	By the end of Year 5, the client fishery should demonstrate that at IOTC level, decision-making processes regarding skipjack stock management respond to important issues, specifically to skipjack catches in excess of the annual catch limit corresponding to the HCR, in a transparent, timely and adaptive manner. This could be done by implementing the harvest strategy set out in Resolution 16/02 and in Condition 1, or by some other means as appropriate.
Milestones	Years 1 – 4 (2022 – 2025): The client must provide evidence at that, independently or jointly with industry groups, it has worked with relevant management authorities to press for IOTC action on responding to the issue of total catches in excess of the agreed Catch Limit, by progressing with the harvest strategy (as per Conditions on PI1.2.1 and PI 1.2.2) or some other evidence (Score: 75). Year 5 (**May 2026**): The client fishery should provide evidence that regarding the skipjack stock management, IOTC decision-making processes have responded to the possibility of catches in excess of the set total annual catch by implementing the harvest strategy, or by some other suitable means. (Score: 80). Note: condition timeline harmonised with milestones for 1.2.1 and 1.2.2 conditions
Client Action Plan	As explain above, this condition is linked to the implementation of a robust harvest strategy and effective management tools that will ensure that the SKJ catch limit is not exceeded. CFTO believes that the best solution to reach this objective is the implementation of allocation criteria at the scale of IOTC. Therefore, as already developed in condition 2, CFTO will :

	– work with SIOTI to recommend the procedures for the setting and allocation of quotas by IOTC. – Work with ORTHONGEL to recommend (among other through ORTHONGEL's membership to LDAC – working group 1) procedures for the implementation and allocation of quotas by IOTC and the Governments of France and Italy. – work with ORTHONGEL to recommend procedures for the allocation of quotas among its producer members and robust monitoring of catches Deliverables Years 1 – 3 : We will present evidence that we have fully implemented our client action plan, with a list of relevant meetings together with minutes and copies of relevant reports and submissions. Year 4 : We will provide evidence to demonstrate that the tools in use are appropriate and effective in achieving the exploitation levels required under the HCRs. Action Owner • CFTO Action Participants • Orthongel • SIOTI
Consultation on condition	IOTC has announced that it will examine the matter at the forthcoming Special Session (SS4) virtual meeting to be held 08/03/2021 -12/03/2021.

Appendix 6 Surveillance

Table 45. Fishery Surveillance Programme

Surveillance Level	Year 1	Year 2	Year 3	Year 4
Level 4	On-site	Off site	On-site	Off-site

Table 46. Surveillance level rationale

Year	Surveillance activity	Number of auditors	Rationale
1	On-site	2	All information pertaining to the Principle 1 and Principle 2 conditions can be provided remotely by the stakeholders; however, the team recommends two on-site visits due to the complexity of some of the conditions. For the remote audits, remote conferencing should take place so that matters can be discussed in sufficient detail. Note: it is not proposed that the Year 4 surveillance happens at the same time as the reassessment site visit. This is because under the FCPv2.1 the drafting of the ACDR is likely to delay the site visit beyond the certificate anniversary.
2	Off site	2	
3	On-site	2	
4	Off site	2	

Table 47. Timing of surveillance audit

Year	Anniversary date of certificate	Proposed date of surveillance audit	Rationale
1	See certificate	30 days prior anniversary date of certificate	N/a
2	See certificate	30 days prior anniversary date of certificate	N/a
3	See certificate	30 days prior anniversary date of certificate	N/a
4	See certificate	30 days prior anniversary date of certificate	N/a

Appendix 7 Harmonised fishery assessments

There are currently two fisheries in the MSC programme that overlap with this assessment (Table 48). During the drafting of the ACDR, a harmonization discussion took place on the scoring of Principle 1 and consensus was reached with Dr Kevin Stokes (P1 assessor at the time for the overlapping fisheries). The agreed scoring remained unchanged in the Client and Peer Review Draft Report (CPRDR). Resulting Principle 1 conditions were first drafted as part of the Echebastar Year 1 Surveillance audit report and were fully harmonised with by the assessment team. The Maldives pole & line skipjack tuna fishery surveillance audit was ongoing when the CPRDR was drafted; however, agreement for the adoption of the new scores and conditions was reached with SAI Global on 19 June 2020.

The team has also aimed to harmonise with other overlapping fisheries on Principle 2, and most notably in relation to habitats and ecosystem-level impacts to the extent that they apply to the CFTO Unit of Assessment.

Finally, this assessment harmonised with the other fisheries in terms of Principle 3 and more precisely, in terms of the scoring of the regional governance framework (IOTC). Scoring differences arose from different fishery-specific management systems jurisdictions as indicated below.

To be completed at Public Certification Report stage

Table 48. Overlapping fisheries

Fishery name	Certification status and date	Performance Indicators to harmonise
Maldives pole & line skipjack tuna	Certified since 29 Nov 2012	P1: all P2: none - completely different fishery (pole and line versus purse seine) P3: all at IOTC level of jurisdiction
Echebastar Indian Ocean purse seine skipjack tuna	Certified since 09 Nov 2018	P1: all P2: 2.1.1a, 2.2.1a, 2.3.1a (limits), 2.4.1b (VME recognition), 2.4.2a, c (SG100) P3: all at IOTC level of jurisdiction
AGAC four oceans Integral Purse Seine Tropical Tuna Fishery	In assessment	P1: all P2: 2.1.1a, 2.2.1a, 2.3.1a (limits), 2.4.1b (VME recognition), 2.4.2a, c (SG100)P3: all at IOTC level of jurisdiction

Table 49. Harmonisation activities with overlapping fisheries

Supporting information
At the start of this assessment, only the Maldives pole & line skipjack tuna and Echebastar Indian Ocean purse seine skipjack tuna fishery overlapped with this assessment. During the drafting of the ACDR, a harmonization discussion took place on the scoring of Principle 1 and consensus was reached with Dr Kevin Stokes (P1 assessor for the overlapping fisheries). The agreed scoring remained unchanged in the subsequent versions of the report. Resulting Principle 1 conditions were first drafted as part of the Echebastar Year 1 Surveillance audit report and were fully harmonised with by the assessment team. The Maldives pole & line skipjack tuna fishery surveillance audit was ongoing when the CPRDR was drafted; however, agreement for the adoption of the new scores and conditions was reached with SAI Global on 19 June 2020. An overview of P1 scores is given in Table 50. Following publication of the PCDR, further harmonization discussions took place with

overlapping fisheries, including AGAC. Consensus was reached on scoring, condition setting and associated milestones. In parallel with the harmonization discussions on Principle 1, the team discussed the revised scoring and new condition for 3.2.2b with the overlapping fisheries. Agreement on scoring, condition setting and associated milestones was reached via email.	
Was either FCP v2.1 Annex PB1.3.3.4 or PB1.3.4.5 applied when harmonising?	No
Date of harmonisation meeting	30th October 2019 January – March 2021
If applicable, describe the meeting outcome	
Consensus reached.	

For Principle 2, the team applied the following table in its harmonisation activities (from Table GPB1, FCP2.1):

PI 2.1.1a	Partially	For stocks that are 'main' in both UoAs, harmonise status relative to PRI (at SG60,80 and 100), and if below PRI, harmonise cumulative impacts at SG80 (not at SG60).
PI 2.2.1a	Partially	For stocks that are 'main' in both UoAs, harmonise status relative to Biologically Based Limits (at SG60, 80, and 100), and if below Biologically Based Limits, harmonise cumulative impacts at SG80 (not at SG60).
PI 2.3.1a	Partially	Harmonise recognition of any limits applicable to both UoAs (at SG60, 80 and 100), and cumulative effects of the UoAs at SG80 and SG100 (not at SG60).
PI 2.4.1b	Partially	Harmonise recognition of VMEs where both UoAs operate in the same 'managed area/s' (see Guidance to the MSC Fisheries Standard).
PI 2.4.2 a, c	Partially	Harmonise scoring at SG100 since all fishery impacts are considered (not at SG60 or 80).
All P2 PIs	Situation dependent	If 2 UoAs are identical in scope, even if the UoCs are different (e.g. separate clients), harmonisation is required.

Table 50. Overview of PI scores for overlapping fisheries with explanation for those PIs where there are material differences in outcome. *Not harmonised for P2 as completely different fishery (pole and line versus purse seine)

Performance Indicators (PIs)	Maldives	Echebastar	AGAC	This assessment	Rationale for scoring differences
1.1.1	100	100	100	100	N/a
1.1.2	N/a	N/a	N/a	N/a	N/a
1.2.1	70	70	75*	70	*Slight difference as SIf (unwanted catch) scored for AGAC fishery
1.2.2	75	75	80*	75	*Difference in score will be addressed by AGAC team at next reporting stage.
1.2.3	90	90	80	80	Non-material difference; however, the Echebastar
1.2.4	85	85	100	95	

Performance Indicators (PIs)	Maldives	Echebastar	AGAC	This assessment	Rationale for scoring differences
					and Maldives assessments were carried out prior to the 2017 stock assessment where uncertainties in the data were raised that had not previously been considered.
2.1.1	*	90	>80	90	N/a
2.1.2	No harmonisation required.				
2.1.3	No harmonisation required.				
2.2.1	*	80	>80	80	N/a
2.2.2	No harmonisation required.				
2.2.3	No harmonisation required.				
2.3.1	None of the assessments have limits; cumulative impacts not triggered.				
2.3.2	No harmonisation required.				
2.3.3	No harmonisation required.				
2.4.1	Coral reefs as VMEs recognised among all fisheries that have dFAD components.				
2.4.2	Harmonisation of scoring at SG100 not triggered (SG100 not met).				
2.4.3	No harmonisation required.				
2.5.1	No harmonisation required.				
2.5.2	No harmonisation required.				
2.5.3	No harmonisation required.				
3.1.1	90	80	>80	80	Maldives-specific difference.
3.1.2	95	75	>80	85	Echebastar condition on SIb. Consultation processes lacking in the management of the Seychelles tuna fisheries for Seychelles-registered vessels.
3.1.3	80	100	>80	100	Maldives-specific difference not clear in the rationale that implies SG100 is met.
3.2.1	80	75	>80	80	Echebastar condition on SIa. Short and long-term objectives lacking for the Seychelles skipjack tuna fishery for Seychelles-registered vessels.
3.2.2	95*	75	>80*	75	*New lower score will be incorporated at next reporting stage.

Performance Indicators (PIs)	**Maldives**	**Echebastar**	**AGAC**	**This assessment**	**Rationale for scoring differences**
3.2.3	75	85	>80	80	Maldives-specific condition on SId because of systematic non-compliance on artisanal vessels logbook completion. SIc score lower for this fishery than for Echebastar because of recent lack of SWIO regionally organised sea patrols (EU-funded PRSP and Smartfish).
3.2.4	80	80	>80	80	N/a

Appendix 8 Objection Procedure

No objections were received.

Appendix 9 Letter of support for Client Action Plan

Appendix 9.1 SIOTI

Sustainable Indian Ocean Tuna Initiative
A Fishery Improvement Project for the Indian Ocean Purse Seine Tuna Fishery
104 avenue du Président Kennedy, 75016 Paris, France
https://fisheryprogress.org/fip-profile/indian-ocean-tuna-purse-seine-sioti

Compagnie Française du Thon Océanique
Mr Pierre-Alain CARRE
11 rue des sardiniers
29900 CONCARNEAU - FRANCE
+33 2 98 60 52 52

Dear Mr. Carre

The Sustainable Indian Ocean Tuna Initiative (SIOTI) is a Fishery Improvement Program (FIP) that was jointly established in 2017 by key governments in the region, major tuna processors, producer organisations and their fishing vessels, with the support of WWF. The FIP is a multi-stakeholder effort and the goal is to support improvements in the management of tuna fisheries in the Indian Ocean so that in the future, consumers can be assured that the purse-seine tuna they purchase has been harvested sustainably. The ultimate aim is for the fishery to meet the highest standards of sustainable fishing, such as the Marine Stewardship Council (MSC) standard.

Since the beginning of SIOTI, CFTO has been an active member of the FIP through support from its boat owners and its producer organisation Orthongel. CFTO entered into the MSC certification process for Indian Ocean skipjack in 2019. As expected, the conditions raised during the initial assessment of CFTO match the Improvement Performance Goals (IPG1) addressed by SIOTI in its workplan (as described here https://fisheryprogress.org/node/4711/actions-progress#). As CFTO and SIOTI share the same objectives, SIOTI welcomes the continuing proactive engagement of and collaboration by CFTO to address the shortfalls in management of the fishery, habitat impacts and ecosystem health.

Regards,

Anthony Lazazzara

SIOTI President

Appendix 9.2 Orthongel

ORGANISATION DES PRODUCTEURS DE THON CONGELÉ ET SURGELÉ
ORTHONGEL
ASSOCIATION LOI 1901

5, rue des Sardiniers – 29900 CONCARNEAU – France
Tél. +33 (0)2 98 97 19 57 – email : orthongel@orthongel.fr

Réf. OR/20.155

Objet : **Lettre de soutien**

Concarneau, le 26 octobre 2020

Madame, Monsieur,

L'organisation française des producteurs de thon congelé et surgelé (Orthongel) regroupe tous les armements français à la pêche thonière tropicale, dont la Compagnie Française du Thon Océanique (CFTO). Dans l'Océan Indien, la flottille gérée par les armements adhérents d'Orthongel compte actuellement 13 thoniers senneurs. En tant qu'Organisation de producteur les principales missions d'Orthongel sont :

- d'encourager les méthodes de pêche qui favorisent une pêche durable et responsable,
- de contribuer à la gestion des quotas de capture et de l'effort de pêche,
- de représenter, défendre et promouvoir les intérêts généraux des armateurs de thoniers congélateurs et surgélateurs tropicaux (notamment auprès des pouvoirs publics français et communautaires, des organisations régionales de gestion de la pêche et des organisations interprofessionnelles, nationales ou internationales).

Orthongel se félicite que son adhérent CFTO ai entamé le processus de certification MSC pour le listao de l'Océan Indien. Orthongel confirme que le plan d'action proposé par CFTO est en accord avec les objectifs d'amélioration de la pêcherie définis par l'OP. En tant qu'OP à laquelle adhère CFTO, Orthongel continuera à accompagner CFTO et mener des actions communes pour :

- contribuer à l'adoption par la CTOI d'une stratégie de capture robuste et d'outils permettant d'atteindre les niveaux d'exploitation requis par les HCR ;
- mettre en œuvre des mesures pour limiter l'impact des DCP sur les habitats vulnérables ;
- mettre à la disposition des scientifiques toutes les données disponibles pour l'étude de l'impact des DCP sur l'écosystème (en particulier sur les comportements migratoires et alimentaires des thons).

Ces actions seront menées directement par Orthongel ou à travers le FIP SIOTI dont CFTO est un membre actif, représenté par Orthongel.

Michel Goujon, Directeur

Organisation des Producteurs de Thon Congelé
ORTHONGEL
5, rue des Sardiniers
29900 CONCARNEAU
Tél. : +33 (0)2 98 97 19 57 - Fax : +33 (0)2 98 50 80 32

Appendix 9.3 Echebastar

echebastar

Compagnie Française du Thon Océanique
Mr Pierre-Alain CARRE
11 rue des sardiniers
29900 CONCARNEAU - FRANCE
0033 2 98 60 52 52

Objet : support to fishery improvement action plan of CFTO for MSC certification.

As a fishing company operating purse seiners in the Indian ocean, Echebastar has a long term relationship with CFTO, based on a shared vision of sustainable fishing.

Echebastar is MSC certified for its Indian ocean skipjack since 2018 and the 6 conditions adressed by CFTO in its Client Action Plan are shared by Echebastar. Echebastar reaffirmes his commitment to continue and enhance his cooperation with CFTO for the improvement of the fishery. To achieve the milestones describe in the fisherie improvement action plan, Echebastar and CFTO will work directly together but also through the SIOTI FIP which they are both members.

Regards,

echebastar fleet, s.l.u.

Kepa Echevarria

CEO

Echebastar

Bermeo, 21st October 2020

(N.I.F. B-95-337432) Muelle Erroxape, s/n - Apdo. 39 - 48370 Bermeo - Bizkaia - Tel. 94 618 65 00 - Fax. 94 618 60 40

Appendix 9.4 DPMA

MINISTÈRE
DE LA MER
Liberté
Égalité
Fraternité

Direction des pêches maritimes
et de l'aquaculture

La Défense, le 20 JAN. 2021

Sous-direction des ressources halieutiques
Bureau des affaires européennes et internationales

Réf. : 016462

Affaire suivie par : Anaïs Mélard
Tél. : 01 40 81 95 31
Courriel : anais.melard@agriculture.gouv.fr

Monsieur le Directeur,

Par courriel du 16 octobre 2020, la Compagnie française du Thon océanique (CFTO) a informé la Direction des pêches maritimes et de l'aquaculture (DPMA) de son engagement dans le processus de certification MSC pour le thon listao (*Katsuwonus pelamis*) de l'Océan Indien. La DPMA a pris connaissance des deux conditions à l'aboutissement du processus de certification[1].

La DPMA confirme que la CFTO est mobilisée, à titre individuel et à travers l'organisation de producteurs Orthongel à laquelle elle adhère, pour l'adoption d'une stratégie de capture et la mise en place des outils permettant d'atteindre les niveaux d'exploitation requis par les règles de contrôles de l'exploitation (HCR). CFTO participe activement, à titre individuel ou en étant représentée par l'organisation de producteurs Orthongel, aux instances nationales, européennes et internationales de consultation et en particulier : le Comité national des pêches maritimes et des élevages marins, le Conseil consultatif de pêche lointaine, les réunions de coordination avec les Etats membres de l'Union européenne et la Commission européenne lorsque les parties prenantes y sont associées, les groupes de travail de la CTOI et la réunion annuelle de la CTOI.

Je vous prie d'agréer, Monsieur le Directeur, l'expression de mes respectueuses salutations.

Le Directeur des pêches maritimes
et de l'aquaculture

Eric BANEL

Monsieur Pierre-Alain CARRÉ
Directeur d'armement
Compagnie Française du Thon Océanique
11 rue des sardiniers
29900 CONCARNEAU

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[1] -*Condition 1 : By the end of Year 4, the client fishery should demonstrate that 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 (i.e., it is highly likely that the stock is above the PRI and is at or fluctuating around a level consistent with MSY).*
-*Condition 2 : By the end of Year 4, the client must demonstrate that available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the HCRs*

Direction des pêches maritimes et de l'aquaculture
La Grande Arche – Paroi Sud – 92055 LA DEFENSE Cedex
Tél : 33(0)1 40 81 21 22

www.mer.gouv.fr

Appendix 9.5 Bureau-Veritas Living Resources

A Cesson-Sévigné, le 19/04/2021

Objet : lettre de soutien au plan d'action MSC de la CFTO

Madame, Monsieur,

Bureau Veritas Living Resources (anciennement Oceanic Développement) est en charge de la mise en œuvre et de la coordination du programme d'observateur OCUP (Observateurs Communs Uniques et Permanents) lancé par l'organisation de producteurs Orthongel en 2014. L'objectif de ce programme est d'assurer une couverture de 100 % par le déploiement d'observateurs sur les senneurs français opérant dans l'Océan Atlantique comme dans l'Océan Indien.

En 2015, une composante œil électronique (OE) a été adjointe au programme OCUP afin de palier à l'impossibilité d'embarquer systématiquement des observateurs sur certains thoniers et notamment les navires de la CFTO de l'Océan Indien. C'est dans ce cadre que Bureau Veritas Living resources réalise l'analyse des images pour la collecte des informations scientifiques suivant un protocole développé en collaboration avec les partenaires du programme.

Par la présente Bureau Veritas Living Resources confirme être informé du processus de certification MSC de la CFTO pour le listao de l'Océan Indien et avoir pris connaissance du plan d'action proposé par la CFTO en réponse à la condition portant sur le PI 2.3.3 (information sur les espèces ETP).

Bureau Veritas Living Resources est mobilisé aux côtés de la CFTO pour contribuer avec les partenaires du programme OCUP (Orthongel, Thalos et l'IRD) à une meilleure estimation de la mortalité directe et indirecte par l'observation électronique.

Etienne Jarry
Chef de projet du programme OCUP

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Appendix 9.6 Thalos

THALOS
ADVANCED MARITIME SOLUTIONS

Ploemeur, le 29 avril 2021

Objet : Lettre de soutien au plan d'action MSC de la CFTO

Madame, Monsieur,

Spécialisée dans le développement de solutions de télécommunications et de Systèmes d'Informations Géographiques pour le secteur maritime, la société THALOS est un partenaire historique de l'armement CFTO.

En 2014, THALOS a développé une solution d'observation électronique EMS adaptée à la pêche thonière. Cette solution, appelée OceanLive, qui comporte notamment la supervision par Caméras IP des opérations de pêche, a été déployée en 2015 sur 10 thoniers de la CFTO. Depuis cette date, THALOS a régulièrement fait évoluer le système Oceanlive dans l'objectif d'optimiser la collecte d'informations scientifiques suivant le protocole développé par les partenaires de la composante œil électronique du programme OCUP (Orthongel, Bureau Veritas - Living Resources, IRD).

THALOS se félicite que la CFTO ait entamé le processus de certification MSC pour une pêche durable du listao dans l'océan Indien. THALOS soutient la CFTO dans sa démarche et confirme que la société travaillera en étroite collaboration avec la CFTO et les partenaires de la composante Œil électronique du programme OCUP pour contribuer à une meilleure estimation de la mortalité directe et indirecte par l'observation électronique suivant le plan d'action présenté par la CFTO.

Nous vous prions de croire, Madame, Monsieur, en l'assurance de nos sincères salutations.

Pierre MONFORT
Directeur Général

- THALOS SAS -
Parc technologique de Soye – 8, rue Galilée 56270 PLOEMEUR France
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Appendix 9.7 IRD

www.umr-marbec.fr

Laurent Dagorn
Directeur de l'UMR MARBEC (IRD, Ifremer, Université de Montpellier, CNRS)

A qui de droit

A Sète, le 28 avril 2021

Objet : lettre de soutien au plan d'action MSC de la CFTO

L'IRD, au titre de l'Observatoire des écosystèmes pélagiques tropicaux exploités (Ob7) au sein de l'UMR MARBEC, est le partenaire scientifique du programme OCUP (Observateurs Communs Uniques et Permanents) lancé par Orthongel en 2014. L'objectif de ce programme est d'assurer 100% de couverture observateur sur les thoniers senneurs français.

En 2015, la composante œil électronique du programme OCUP a été développée pour palier à l'impossibilité de la CFTO d'embarquer systématiquement des observateurs sur certains de ses thoniers de l'océan Indien. Depuis 2015, nous collaborons avec les partenaires de la composante œil électronique du programme dans l'objectif d'optimiser la collecte de données scientifiques à l'aide de l'observation électronique.

En tant que directeur de l'UMR MARBEC, je certifie que nous sommes informés du processus de certification MSC de la CFTO pour le listao de l'océan Indien et avons pris connaissance du plan d'action proposé par CFTO en réponse à la condition portant sur le PI 2.3.3 (information sur les espèces ETP). Nous développons des recherches sur les plans d'échantillonnage des vidéos issues de l'œil électronique et pourrons participer à l'élaboration d'une méthodologie scientifique permettant l'optimisation du suivi des prises d'espèces ETP afin d'améliorer l'estimation de leur mortalité.

Laurent Dagorn
Directeur de recherche à l'IRD
Directeur de l'UMR MARBEC

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