MSC Principle 2 fisheries data analysis for the Thai Union and Liancheng Overseas Fishery (Shenzhen) Co. Pacific Ocean albacore, yellowfin, and bigeye tuna longline FIP

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1 Contents

2 Glossary

Acronym	Definition
CITES	Convention on International Trade in Endangered Species
CMM	(WCPFC) Conservation Management Measure
CMS	Convention on Migratory Species
DCR	Daily Catch Reports
EEZ	Exclusive Economic Zone
EM	Electronic Monitoring
ETP	Endangered, threatened and Protected (species)
FIP	Fishery Improvement Programme
FSM	Federated States of Micronesia
ISSF	International Seafood Sustainability Foundation
MSC	Marine Stewardship Council
mt	Metric Tonnes
RFMO	Regional Fisheries Management Organisation
RMI	Republic of the Marshall Islands
ROS	Regional Observer Scheme
SPC	Pacific Community
WCPFC	Western and Central Pacific Fisheries Commission
WCPO	Western and Central Pacific Ocean

3 Introduction

This document presents the results of an analysis of the fishery's catch and observer data for Principle 2. The aim of the document is to provide an assessment of primary, secondary, and endangered, threatened or protected (ETP) species interacting with the Liancheng Pacific Ocean longline tuna fishery improvement project (FIP) to close out Improvement Performance Goals (IPG) 2.1 and compile information on species interactions with the fishery in preparation for its full MSC assessment. The analysis has been conducted using the definition set out in the Marine Stewardship Council (MSC) Fisheries Standard for sustainable fishing (version 2.01), specifically from Annex SA3.1 – "General requirements for Principle 2".

This FIP is the Liancheng Overseas Fishery (Shenzhen) Company's Pacific Ocean longline tuna fishery. The fishery targets albacore (*Thunnus alalunga*) tuna but also catches bigeye (*T. obesus*) and yellowfin (*T. albacares*) tunas. The pelagic longline vessels are flagged to China, Taiwan, Federated States of Micronesia and Fiji, fish on the high seas (and occasionally in the national EEZs) in the western and central Pacific Ocean and are managed by the Liancheng Overseas Fishery (Shenzhen) Co. The fishery is managed regionally by the Western and Central Pacific Fisheries Commission (WCPFC). The entire FIP scope can be found in Table 1 of this report.

Table 1. FIP Scope

Species	Albacore tuna (*Thunnus alalunga*), bigeye tuna (*Thunnus obesus*), and yellowfin tuna (*Thunnus albacares*)
Stocks	North and south Pacific Ocean stocks of albacore tuna Western and central Pacific Ocean (WCPO) stocks of yellowfin and bigeye tunas
Fishing gear	Pelagic longline
Geographical area	WCPO high seas and EEZs of Federated States of Micronesia (FSM) and Republic of the Marshal Islands (RMI)
Management	Regional: WCPFC Flag states: Ministry of Agriculture and Rural Affairs of the People's Republic of China, Taiwan Fisheries Agency (TFA), National Oceanic Resource Management Authority (NORMA) in FSM, and Ministry of Fisheries in Fiji
Fleet flags	China, Taiwan, Federated States of Micronesia, and Fiji

4 Data analysis

4.1 MSC Principle 2 definition summary

This section provides a short summary of how the MSC Fisheries Standard designates components for Principle 2 to provide context of the following species' category allocations and analysis. The fishery's impact of non-target species is analysed differently if the species is from a "managed" stock or not considered ETP. These are defined as follows:

Primary species (MSC Component 2.1):

- Species in the catch that are not covered under P1.
- Species that are within scope of the MSC programme, 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):

- 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, Convention on Migratory Species (CMS), ACAP, etc.).
- Species classified as 'out-of scope' (amphibians, reptiles, birds, and mammals) that are listed in the IUCN Red List 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.

4.2 Data availability

The data presented in this report was collected via Luen Thai Fishing Ventures (LTFV) and analysed by Key Traceability Ltd, who are listed as registered technical consultants on the MSC website. Requests were formulated through written correspondence with the various ministries to which vessels are flagged or to whose waters vessels are licensed to fish. The data obtained is thought to be representative of the fishery's current operations in the Pacific Ocean and represents data from both high seas activities as well as those fishing events occurring in the waters of FSM and RMI. All flags are part of the SPC Regional Observer Programme (ROP) as mandated by WCPFC. Observer reports have been received through the various ministries via SPC. Permission to contact the ministries was first obtained from the vessel companies and formal requests on behalf of the vessels sent to the appropriate ministries requesting.

This information is collated by the client, which has been provided for this analysis. The data presented has been aggregated for all the flags between 2016 and 2019. Table 2 presents the retained client catch. This provides information on the species retained in the fishery but does not account specifically for any species which may have been discarded or which are classified as ETP species, as these must be released by a fishing vessel dead or alive. The catch data provided is for both the FAD-associated and free-school sets of the fishery.

5 Catch Composition

From the observer data analyses received, the species that will be considered under P2 for assessment are presented in Table 2. Justification for assigning each species to either 'primary' (main, minor), 'secondary' (main, minor), or 'ETP' is provided under "GSA3.1.1 – 3.1.4 including Table GSA2: Components of Principle 2, Figure GSA4: Decision's tree to assist teams in the designation of P2 species components" of the MSC Guidance to the Fisheries Standard v2.01.

The information collected by the regional observer programme provides accurate and generally verifiable information on ETP species identification, including sharks, rays, and turtles. With continued use of observer data templates and the additional reporting of the number and fate of bycatch individuals, this FIP will be able to provide the appropriate data required to show its improvements as it progresses. The use of electronic monitoring (EM) systems and analysis will further add to independent information on fishing operations and species interactions. Full implementation of those systems for all FIP vessels is expected by the end of 2022.

Please note that the evaluation was based on number of individuals. At full assessment this would be scaled up to extrapolate to 100% observer coverage against number of hooks set.

Table 2. Average catch volume and composition (%) of species caught from free-school and floating object sets from 2016 – 2019 (source observer reports from four countries).

English name	Scientific name	Category	Justification	Total number	% Total catch
Albacore	*Thunnus alalunga*	Target/Primary main when not UoA target	N/A	29263	35.36%
Yellowfin tuna	*Thunnus albacares*	Target/Primary main when not UoA target	N/A	15850	19.15%
Bigeye tuna	*Thunnus obesus*	Target/Primary main when not UoA target	N/A	13374	16.16%
Skipjack tuna	*Katsuwonus pelamis*	Primary - minor	<5% total catch	2708	3.27%
Southern bluefin tuna	*Thunnus maccoyii*	Primary - minor	Managed, <5% total catch	2	0.002%
Common dolphinfish	*Coryphaena hippurus*	Primary - minor	Managed, <5% total catch	3533	4.27%
Long snouted lancetfish	*Alepisaurus ferox*	Secondary - minor	<5% total catch	3724	4.50%
Wahoo	*Acanthocybium solandri*	Secondary - minor	<5% total catch	2839	3.43%
Pelagic stingray	*Dasyatis violacea*	Secondary - minor	<5% total catch	1965	2.37%
Escolar	*Lepidocybium flavobrunneum*	Secondary - minor	<5% total catch	1934	2.34%
Blue marlin	*Makaira nigricans*	Secondary - minor	<5% total catch	1114	1.35%
Blue shark	*Prionace glauca*	Secondary - minor	<5% total catch	1060	1.28%
Shortbill spearfish	*Tetrapturus angustirostris*	Secondary - minor	<5% total catch	496	0.60%
Striped marlin	*Kajikia audax*	Secondary - minor	<5% total catch	462	0.56%
Swordfish	*Xiphias gladius*	Secondary - minor	<5% total catch	434	0.52%
Sickle pomfret	*Taractichthys steindachneri*	Secondary - minor	<5% total catch	409	0.49%
Snake mackerel	*Gempylus serpens*	Secondary - minor	<5% total catch	306	0.37%

Black marlin	*Makaira indica*	Secondary - minor	<5% total catch	283	0.34%
Short snouted lancetfish	*Alepisaurus brevirostris*	Secondary - minor	<5% total catch	196	0.24%
Unknown	Unknown	Secondary - minor	<5% total catch	160	0.19%
Indo-Pacific sailfish	*Istiophorus platypterus*	Secondary - minor	<5% total catch	156	0.19%
Opah	*Lampris guttatus*	Secondary - minor	<5% total catch	140	0.17%
Indo-Pacific blue marlin	*Makaira mazara*	Secondary - minor	<5% total catch	138	0.17%
Marlinsucker	*Remora osteochir*	Secondary - minor	<5% total catch	132	0.16%
Pomfrets, ocean breams nei	*Brama brama*	Secondary - minor	<5% total catch	121	0.15%
Great barracuda	*Sphyraena barracuda*	Secondary - minor	<5% total catch	108	0.13%
Omosudid	*Omosudis lowii*	Secondary - minor	<5% total catch	76	0.09%
Crocodile shark	*Pseudocarcharias kamoharai*	Secondary - minor	<5% total catch	64	0.08%
Oilfish	*Ruvettus pretiosus*	Secondary - minor	<5% total catch	52	0.06%
Stingrays nei	Myliobatoidei	Secondary - minor	<5% total catch	41	0.05%
Barracudas nei	Sphyraenidae	Secondary - minor	<5% total catch	33	0.04%
Ocean sunfish	*Mola mola*	Secondary - minor	<5% total catch	32	0.04%
Dagger pomfret	*Taractes rubescens*	Secondary - minor	<5% total catch	27	0.03%
Rainbow runner	*Elagatis bipinnulata*	Secondary - minor	<5% total catch	25	0.03%
Patagonian moray cod	*Muraenolepsis orangiensis*	Secondary - minor	<5% total catch	22	0.03%
Blacktip reef shark	*Carcharhinus melanopterus*	Secondary - minor	<5% total catch	20	0.02%
Common remora	*Remora remora*	Secondary - minor	<5% total catch	10	0.01%

Slender sunfish	*Ranzania laevis*	Secondary - minor	<5% total catch	9	0.01%
Silver gemfish	*Rexea solandri*	Secondary - minor	<5% total catch	8	0.01%
Bronze whaler shark	*Carcharhinus brachyurus*	Secondary - minor	<5% total catch	6	0.01%
Anadara clams nei	*Anadara floridana*	Secondary - minor	<5% total catch	5	0.01%
Driftfish	*Cubiceps gracilis*	Secondary - minor	<5% total catch	5	0.01%
Bonefishes nei	Albulidae	Secondary - minor	<5% total catch	4	0.00%
Longbill spearfish	*Tetrapterus pfluegeri*	Secondary - minor	<5% total catch	3	0.00%
Rudderfish	Kyphosidae	Secondary - minor	<5% total catch	3	0.00%
King of herrings	*Regalecus glesne*	Secondary - minor	<5% total catch	2	0.00%
Narrow-barred Spanish mackerel	*Scomberomorus commerson*	Secondary - minor	<5% total catch	2	0.00%
Snub nose chub	*Kyphosus cinerascens*	Secondary - minor	<5% total catch	2	0.00%
Unicornfish	*Lophotus capellei*	Secondary - minor	<5% total catch	2	0.00%
Velvet dogfish	*Zameus squamulosus*	Secondary - minor	<5% total catch	2	0.00%
Cobia	*Rachycentron canadum*	Secondary - minor	<5% total catch	1	0.00%
Requin-taupe commun	*Marrajo sardinero*	Secondary - minor	<5% total catch	1	0.00%
Round escolar	*Psomethichthys prometheu*	Secondary – minor	<5% total catch	1	0.00%
Scabbardfishes	Trichiuridae	Secondary - minor	<5% total catch	1	0.00%
Sharptail mola	*Masturus lanceolatus*	Secondary - minor	<5% total catch	1	0.00%
Silky shark	*Carcharhinus falciformis*	ETP	CMM 2019-04; CMS Appendix II	389	0.47%
Shark unid.	Selachimorpha	ETP	CMS Appendix I & II	288	0.35%
Oceanic whitetip shark	*Carcharhinus longimanus*	ETP	CMM 2019-04; CMS Appendix I	251	0.30%

Pelagic thresher shark	*Alopias pelagicus*	ETP	CMS Appendix II	126	0.15%
Bigeye thresher shark	*Alopias vulpinus*	ETP	CMS Appendix II	109	0.13%
Longfin mako	*Isurus paucus*	ETP	CMS Appendix II	64	0.08%
Thresher shark	*Aliopas* spp.	ETP	CMS Appendix II	60	0.07%
Shortfin mako	*Isurus oxyrhincus*	ETP	CMS Appendix II	46	0.06%
Olive ridley turtle	*Lepidochelys coriacea*	ETP	CMM 2018-04; CMS Appendix I; CITES Appendix I	24	0.03%
Mobula rays nei	Mobulidae	ETP	CMM 2019-05; CMS Appendix I	17	0.02%
Green turtle	*Chelonia mydas*	ETP	CMM 2018-04; CMS Appendix I; CITES Appendix I	7	0.01%
Hammerhead sharks nei	*Sphyrna* spp.	ETP	CMS Appendix II	3	0.00%
Giant manta	*Manta birostris*	ETP	CMM 2019-05; CMS Appendix I	2	0.00%
Great white shark	*Carcharodon carcharias*	ETP	CMS Appendix I	2	0.00%
Devil ray	*Mobula mobular*	ETP	CMM 2019-05; CMS Appendix I	1	0.00%
Hawksbill turtle	*Eretmochelys imbricata*	ETP	CMM 2018-04; CMS Appendix I	1	0.00%
Loggerhead turtle	*Caretta caretta*	ETP	CMM 2018-04; CMS Appendix I; CITES Appendix I	1	0.00%
Spinetail mobula	*Mobula japonica*	ETP	CMM 2019-05; CMS Appendix I	1	0.00%

As can be seen from Table 2, the majority of catch is constituted of the target species. Species can only be considered one of the three species components under Principle 2 "SA3.1.2 - The team shall consider each P2 species within only one of the primary species, secondary species or ETP species components". This means that if Principle 2 data (catch and/or observer) is aggregated and not split by UoA at full assessment, the most precautionary allocation of component will be selected. For example, if fishing is occurring in a shark sanctuary, all sharks will be designated as 'ETP' for the entirety of the assessment, even when some species would not be considered as 'ETP' in other EEZs or on the high sea UoAs.

Table 2 also shows that there are likely no 'main' secondary species, meaning SG80 should be met by default for Performance Indicator (PIs) 2.2.1 (secondary species outcome). 'Main' primary species are the target species and so also likely to meet SG80 for PI 2.1.1 (primary species outcome). To aid the reader, Figure 1 shows the percentage composition of MSC components encountered.

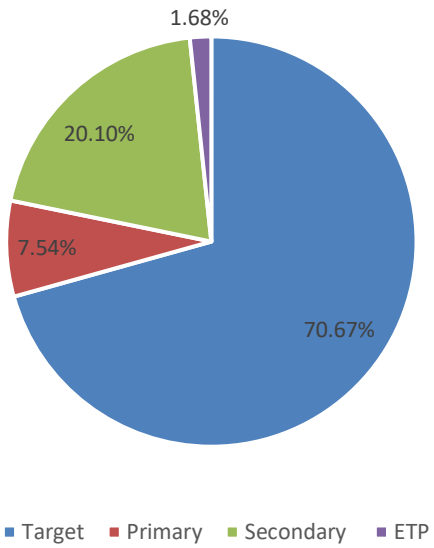

Figure 1. Percentage opposition by MSC component based on figures from

Table 2 above.

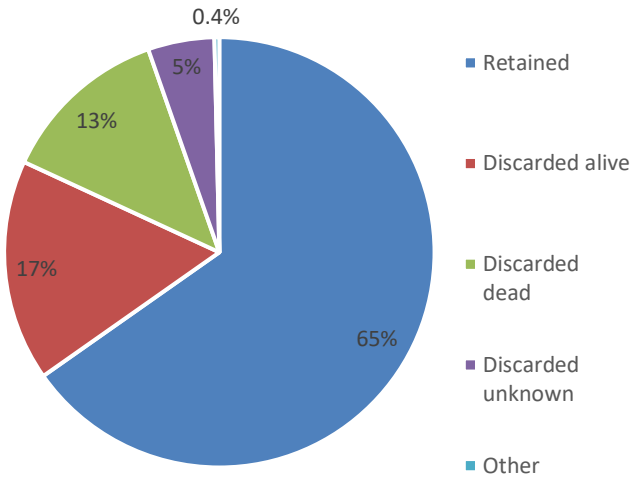

Figure 2. Fates of individuals observed based on information from

Table 2 (source observer reports collected).

In addition to Figure 1, Figure 2 provides the reader with a breakdown of the fates of the animals encountered in the fishery that were reported by human observers on trips. The majority of the catch is retained. This positively correlates with the percentage composition of catch components (Figure 1), as the majority of the catch is comprised of the three target species (70.67%).

Table 3 provides the numbers of species retained and discarded as recorded in the observer reports for the fishery. Please note that other ETP species will likely be identified at full assessment as a wider number of protective management measures will be applied by the assessment team (see Table 2 for examples of other protective instruments included by the MSC). This document focuses purely on species recognised by WCPFC as 'ETP' species have been presented in bold text in the table.

With the exception of two silky sharks, all ETP species were discarded by the vessels (Table 3) across all years and areas. The retention of silky sharks, which is prohibited under WCPFC Conservation Measure (CMM) 2019-04 can be integrated by the full assessment team. Further analysis is discussed directly in the PI scoring in Appendix.

Table 3. Numbers of animals and their general fate (regionally or internationally designated ETP species are shown in bold text).

English name	Scientific name	Retained	Discarded	Unknown
Albacore	*Thunnus alalunga*	22028	7217	18
Anadara clams nei	*Anadara floridana*	5	0	0
Barracudas nei	Sphyraenidae	3	30	0
Bigeye thresher shark	*Alopias superciliosus*	0	91	18
Bigeye tuna	*Thunnus obesus*	9907	3366	101
Black marlin	*Makaira indica*	176	105	2
Blacktip reef shark	*Carcharhinus melanopterus*	0	20	0
Blue marlin	*Makaira nigricans*	984	130	0
Blue shark	*Prionace glauca*	55	979	26
Bonefishes nei	Albulidae	2	2	0
Bronze whaler shark	*Carcharhinus brachyurus*	0	2	4
Cobia	*Rachycentron canadum*	1	0	0
Common dolphinfish	*Coryphaena hippurus*	3119	411	3
Common remora	*Remora remora*	0	10	0
Crested oarfish	*Lophotus capellei*	2	0	0
Crocodile shark	*Pseudocarcharias kamoharai*	1	58	5

Dagger pomfret	*Taractes rubescens*	15	12	0
Devil ray	***Mobula mobular***	**0**	**1**	**0**
Driftfish	*Cubiceps gracilis*	0	5	0
Escolar	*Lepidocybium flavobrunneum*	1299	631	4
Giant manta	***Mobula birostris***	**0**	**2**	**0**
Great barracuda	*Sphyraena barracuda*	64	43	1
Great white shark	*Carcharodon carcharias*	0	2	0
Green turtle	***Chelonia mydas***	**0**	**7**	**0**
Hammerhead sharks nei	*Sphyrna* spp.	0	3	0
Hammerjaw	*Omosudis lowii*	1	75	0
Hawksbill turtle	***Eretmochelys imbricata***	**0**	**1**	**0**
Indo-Pacific blue marlin	*Makaira mazara*	0	138	0
Indo-Pacific sailfish	*Istiophorus platypterus*	80	73	3
Loggerhead turtle	***Caretta caretta***	**0**	**1**	**0**
Long snouted lancetfish	*Alepisaurus ferox*	0	3724	0
Longbill spearfish	*Tetrapterus pfluegeri*	3	0	0
Longfin mako shark	*Isurus paucus*	0	64	0
Marlinsucker	*Remora osteochir*	0	132	0
Mobula ray nei.	**Mobulidae**	**0**	**17**	**0**
Narrow-barred Spanish mackerel	*Scomberomorus commerson*	0	0	2
Giant oarfish	*Regalecus glesne*	0	2	0
Ocean sunfish	*Mola mola*	1	31	0
Oceanic whitetip shark	***Carcharhinus longimanus***	**0**	**251**	**0**
Oilfish	*Ruvettus pretiosus*	30	22	0
Olive ridley turtle	***Lepidochelys coriacea***	**0**	**24**	**0**
Opah	*Lampris guttatus*	33	106	1
Patagonian moray cod	*Muraenolepis orangiensis*	0	22	0
Pelagic stingray	*Dasyatis violacea*	0	1960	5
Pelagic thresher shark	*Alopias pelagicus*	0	124	2
Porbeagle shark	*Lamna nasus*	0	1	0
Ray's bream	*Brama brama*	4	117	0

Rainbow runner	*Elagatis bipinnulata*	18	3	4
Round escolar	*Psomethichthys Prometheu*	0	1	0
Rudderfish	Kyphosidae	3	0	0
Scabbardfishes	Trichiuridae	0	1	0
Shark nei	Selachimorpha	0	288	0
Sharptail mola	*Masturus lanceolatus*	1	0	0
Short snouted lancetfish	*Alepisaurus brevirostris*	2	194	0
Shortbill spearfish	*Tetrapturus angustirostris*	255	240	1
Shortfin mako shark	*Isurus oxyrhincus*	2	44	0
Sickle pomfret	*Taractichthys steindachneri*	130	277	2
Silky shark	***Carcharhinus falciformis***	**2**	**384**	**3**
Silver gemfish	*Rexea solandri*	0	8	0
Skipjack tuna	*Katsuwonus pelamis*	2195	491	22
Slender sunfish	*Ranzania laevis*	0	9	0
Snake mackerel	*Gempylus serpens*	39	253	14
Snub nose chub	*Kyphosus cinerascens*	0	2	0
Southern bluefin tuna	*Thunnus maccoyii*	2	0	0
Spinetail mobula ray	***Mobula japonica***	**0**	**1**	**0**
Stingrays nei	Myliobatoidei	0	41	0
Striped marlin	*Kajikia audax*	382	79	1
Swordfish	*Xiphias gladius*	257	177	0
Thresher shark nei	*Alopias* spp.	0	60	0
Unknown	Unknown	4	153	3
Velvet dogfish	*Zameus squamulosus*	0	2	0
Wahoo	*Acanthocybium solandri*	2057	769	13
Yellowfin tuna	*Thunnus albacares*	10839	4967	44

Table 4. Indication of whether the Risk Based Framework is anticipated at full assessment (based on Table 2 information).

English name	Scientific name	Category	Justification
Albacore	*Thunnus alalunga*	Target/Primary main when not UoA target	No, biologically based limits are available, derived from analytical stock assessment
Yellowfin tuna	*Thunnus albacares*	Target/Primary main when not UoA target	No, biologically based limits are available, derived from analytical stock assessment
Bigeye tuna	*Thunnus obesus*	Target/Primary main when not UoA target	No, biologically based limits are available, derived from analytical stock assessment
Skipjack tuna	*Katsuwonus pelamis*	Primary - minor	No, biologically based limits are available, derived from analytical stock assessment and not 'main' species
Southern bluefin tuna	*Thunnus maccoyii*	Primary - minor	No, biologically based limits are available, derived from analytical stock assessment and not 'main' species
Common dolphinfish	*Coryphaena hippurus*	Secondary - minor	No, biologically based limits are available, derived from analytical stock assessment and not 'main' species
Long snouted lancetfish	*Alepisaurus ferox*	Secondary - minor	No, not 'main' species
Wahoo	*Acanthocybium solandri*	Secondary - minor	No, not 'main' species
Pelagic stingray	*Dasyatis violacea*	Secondary - minor	No, not 'main' species
Escolar	*Lepidocybium flavobrunneum*	Secondary - minor	No, not 'main' species
Blue marlin	*Makaira nigricans*	Secondary - minor	No, not 'main' species
Blue shark	*Prionace glauca*	Secondary - minor	No, not 'main' species
Shortbill spearfish	*Tetrapturus angustirostris*	Secondary - minor	No, not 'main' species
Striped marlin	*Kajikia audax*	Secondary - minor	No, not 'main' species
Swordfish	*Xiphias gladius*	Secondary - minor	No, not 'main' species

Sickle pomfret	*Taractichthys steindachneri*	Secondary - minor	No, not 'main' species
Snake mackerel	*Gempylus serpens*	Secondary - minor	No, not 'main' species
Black marlin	*Makaira indica*	Secondary - minor	No, not 'main' species
Short snouted lancetfish	*Alepisaurus brevirostris*	Secondary - minor	No, not 'main' species
Indo-Pacific sailfish	*Istiophorus platypterus*	Secondary - minor	No, not 'main' species
Opah	*Lampris guttatus*	Secondary - minor	No, not 'main' species
Indo-Pacific blue marlin	*Makaira mazara*	Secondary - minor	No, not 'main' species
Marlinsucker	*Remora osteochir*	Secondary - minor	No, not 'main' species
Pomfrets, ocean breams nei	*Brama brama*	Secondary - minor	No, not 'main' species
Great barracuda	*Sphyraena barracuda*	Secondary - minor	No, not 'main' species
Omosudid	*Omosudis lowii*	Secondary - minor	No, not 'main' species
Crocodile shark	*Pseudocarcharias kamoharai*	Secondary - minor	No, not 'main' species
Oilfish	*Ruvettus pretiosus*	Secondary - minor	No, not 'main' species
Stingrays nei	Myliobatoidei	Secondary - minor	No, not 'main' species
Barracudas nei	Sphyraenidae	Secondary - minor	No, not 'main' species
Ocean sunfish	*Mola mola*	Secondary - minor	No, not 'main' species
Dagger pomfret	*Taractes rubescens*	Secondary - minor	No, not 'main' species
Rainbow runner	*Elagatis bipinnulata*	Secondary - minor	No, not 'main' species
Patagonian moray cod	*Muraenolepsis orangiensis*	Secondary - minor	No, not 'main' species
Blacktip reef shark	*Carcharhinus melanopterus*	Secondary - minor	No, not 'main' species

Common remora	*Remora remora*	Secondary - minor	No, not 'main' species
Slender sunfish	*Ranzania laevis*	Secondary - minor	No, not 'main' species
Silver gemfish	*Rexea solandri*	Secondary - minor	No, not 'main' species
Bronze whaler shark	*Carcharhinus brachyurus*	Secondary - minor	No, not 'main' species
Anadara clams nei	*Anadara floridana*	Secondary - minor	No, not 'main' species
Driftfish	*Cubiceps gracilis*	Secondary - minor	No, not 'main' species
Bonefishes nei	Albulidae	Secondary - minor	No, not 'main' species
Longbill spearfish	*Tetrapterus pfluegeri*	Secondary - minor	No, not 'main' species
Rudderfish	Kyphosidae	Secondary - minor	No, not 'main' species
Giant oarfish	*Regalecus glesne*	Secondary - minor	No, not 'main' species
Narrow-barred Spanish mackerel	*Scomberomorus commerson*	Secondary - minor	No, not 'main' species
Snub nose chub	*Kyphosus cinerascens*	Secondary - minor	No, not 'main' species
Crested oarfish	*Lophotus capellei*	Secondary - minor	No, not 'main' species
Velvet dogfish	*Zameus squamulosus*	Secondary - minor	No, not 'main' species
Cobia	*Rachycentron canadum*	Secondary - minor	No, not 'main' species
Porbeagle shark	*Lamna nasus*	Secondary - minor	No, not 'main' species
Round escolar	*Psomethichthys prometheu*	Secondary – minor	No, not 'main' species
Scabbardfishes	Trichiuridae	Secondary - minor	No, not 'main' species
Sharptail mola	*Masturus lanceolatus*	Secondary - minor	No, not 'main' species

Silky shark	*Carcharhinus falciformis*	ETP	No, as observer data is available so the impact of the fishery can be analytically determined
Shark unid.	Selachimorpha	Secondary – minor/ETP (depending on UoA)	If secondary – no, as not 'main' species. If ETP – No, as observer data is available so the impact of the fishery can be analytically determined
Oceanic whitetip shark	*Carcharhinus longimanus*	ETP	No, as observer data is available so the impact of the fishery can be analytically determined
Pelagic thresher shark	*Alopias pelagicus*	Secondary – minor/ETP (depending on UoA)	If secondary – no, as not 'main' species. If ETP – No, as observer data is available so the impact of the fishery can be analytically determined
Bigeye thresher shark	*Alopias vulpinus*	Secondary – minor/ETP (depending on UoA)	If secondary – no, as not 'main' species. If ETP – No, as observer data is available so the impact of the fishery can be analytically determined
Longfin mako shark	*Isurus paucus*	Secondary – minor/ETP (depending on UoA)	If secondary – no, as not 'main' species. If ETP – No, as observer data is available so the impact of the fishery can be analytically determined
Thresher shark	*Alopias* spp.	Secondary – minor/ETP (depending on UoA)	If secondary – no, as not 'main' species. If ETP – No, as observer data is available so the impact of the fishery can be analytically determined
Shortfin mako shark	*Isurus oxyrhincus*	Secondary – minor/ETP (depending on UoA)	If secondary – no, as not 'main' species. If ETP – No, as observer data is available so the impact of the fishery can be analytically determined
Olive ridley turtle	*Lepidochelys coriacea*	ETP	No, as observer data is available so the impact of the fishery can be analytically determined
Mobula ray	Mobulidae	ETP	No, as observer data is available so the impact of the fishery can be analytically determined
Green turtle	*Chelonia mydas*	ETP	No, as observer data is available so the impact of the fishery can be analytically determined
Hammerhead sharks nei	*Sphyrna* spp.	Secondary – minor/ETP (depending on UoA)	If secondary – no, as not 'main' species.

			If ETP – No, as observer data is available so the impact of the fishery can be analytically determined
Giant manta	*Mobula birostris*	ETP	No, as observer data is available so the impact of the fishery can be analytically determined
Great white shark	*Carcharodon carcharias*	ETP	No, as observer data is available so the impact of the fishery can be analytically determined
Devil rays	*Mobula mobular*	ETP	No, as observer data is available so the impact of the fishery can be analytically determined
Hawksbill turtle	*Eretmochelys imbricata*	ETP	No, as observer data is available so the impact of the fishery can be analytically determined
Loggerhead turtle	*Caretta caretta*	ETP	No, as observer data is available so the impact of the fishery can be analytically determined
Spinetail mobula	*Mobula japonica*	ETP	No, as observer data is available so the impact of the fishery can be analytically determined

6 Conclusion

This section summarises the findings of the data and its implications for the FIP and future MSC assessment. The information collated below covers FIP vessels from all flags, covering the EEZs of FSM and RMI and also the WCPO high seas. The data is therefore considered representative of fishing operations of the vessels within the FIP. As with all longline fisheries in the WCPO, human observer coverage for this fishery is considered significantly lower than for purse seine (100% of trips observed), so the implementation of EM will seek to bolster independent monitoring and data collection of fishing activities in the near future. Please note that this is dependent on the Covid pandemic and logistical and practical implications this has had thus far in the industry.

The result of this data acquisition has led to the re-scoring of several PIs for the pre-assessment (see

Appendix). This relates to IPG 2.1 of the FIP workplan "improve P2 data by obtaining summary observer and logbook data for tuna longline fleets" and its associated tasks "engage with flag states to obtain observer data" and "update the pre-assessment with findings". The information obtained links directly to tasks and actions contained in the FIP workplan and have necessitated correspondence to government agencies requiring their cooperation and coordination to gather the information for the FIP. Through the efforts of the FIP, independent data was sourced to verify the fishery's operations and is considered representative of their activities.

As discussed in the report, over 70% of the catch is the target species. Bycatch species are very varied (73 species identified across the data) and appear in observer reports in low numbers by species. Whilst this indicates the fishing gear is not selective, it shows the fishery does not significantly impact populations on a large-scale by substantial removals of a limited number of species.

The WCPFC regional observer template includes a section to describe the condition and fate of bycatch species – a useful tool that helps to understand mortality rates from purse seine vessels. The descriptions of condition usually range from "alive and healthy", "alive, but minor injuries", "alive, but major injuries" etc. The individuals' fates were therefore described in the aggregated observer data received from SPC via the relevant ministries.

Estimated weights of all bycatch species were not available. This is not uncommon in observer data, where observers cannot individually measure every non-target species caught. There are multiple MSC assessments that have used number of animals, in contrast to weights. What will be necessary to gather is the number of hooks the trips describe in order for there to be a way to 'scale-up' the analysis to extrapolate what the species compositions may be if 100% observer coverage were in place.

Three PIs have been re-scored, PI 2.1.1 (primary species outcome), PI 2.2.1 (secondary species outcome) and PI 2.3.1 (ETP species outcome). This has resulted in score changes for all PIs from the original pre-assessment in 2019 (Table 5).

Table 5. MSC Performance Indicator (PI) score changes as a result of data obtained

Assessment	PI 2.1.1 (primary species outcome	PI 2.2.1 (secondary species outcome)	PI 2.3.1 (ETP species outcome)
Original pre-assessment (2019)	Not scored	<60	<60
This re-scoring report	80	80	75[1]

The information provided in this report is sufficient to close out tasks IPG 2.1a and 2.1b. The work completed meets the objective of the IPG 2.1 as the P2 data in the fishery has been improved with the acquisition of SPC ROS data, which were received via the flag and coastal states. The data provided

[1] It should be noted that only those species protected by WCPFC have been included. National or other international instruments were not considered here and so this scoring is precautionary given there are likely to be other ETP species independently determined by the full assessment team.

has allowed insight into high seas activities, which even in full MSC assessments is often significantly deficient (Anhalzer et al., 2021a and 2021b).

Task 2.1a is considered met as a combination of hard copy observer reports and summaries from national authorities was gathered directly by the fishery rather than using proxy information (Anhalzer et al., 2021a and 2021b). This was only obtained through the liaison of the fishery with the necessary national authorities, and of course their kind cooperation and facilitation. Task 2.1b is considered met as the pre-assessment for three PIs have been updated as a result of the information obtained. The FIP will continue to gather observer data from the vessels active in the FIP and will add to this information with the use of third-party EM systems and subsequent analysis.

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8 Appendix

The below PIs have been re-scored based on the information collected by the FIP through the SPC observer programme.

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?	**NP albacore – Yes** **SP albacore – Yes** **WCPO bigeye – Yes** **WCPO yellowfin - Yes**	**NP albacore – Yes** **SP albacore – Yes** **WCPO bigeye – Yes** **WCPO yellowfin - Yes**	**NP albacore – Yes** **SP albacore – Yes** **WCPO bigeye – Yes** **WCPO yellowfin - Yes**

Rationale: The following 'main species and stocks were identified from the observer data.

North Pacific albacore tuna: The PRI for the stock is not known. The default PRI is taken here to be the LRP agreed by WCPFC, i.e., 20%$SB_{F=0}$. The most recent stock assessment by the Albacore Working Group of ISC was in 2020. The limit reference point (LRP) is calculated as 20% of the unfished dynamic spawning biomass (LRP; 20%$SSB_{current, F=0}$) in the terminal year of the assessment, in this case 2018. The assessment states that female SSB has not fallen below the LRP since 1994. The assessment estimated SB (base case model) to be ~2.3 times above the LRP. There is therefore a high degree of certainty that the stock is above PRI. SG100 is met.

South Pacific albacore tuna: The PRI for this stock is not known. WCPFC has adopted 20%$SB_{F=0}$ as a LRP for the stock, where $SB_{F=0}$ is calculated as the average over the period 2006–2015. This LRP was used as the PRI and stock status was referenced against 20%$SB_{F=0}$ by calculating SB_{recent} /$SB_{F=0.}$ To achieve SG60 it must be likely (≥ 70th percentile), for SG80 to be highly likely (≥ 80th percentile), and for SG100 there has to be a high degree of certainty (≥ 95th percentile) that the current stock status is above PRI. According to the latest stock assessment (Tremblay-Boyer et al., 2018), the reference points and the minimum value of $SB_{recent}/SB_{F=0}$ and $SB_{latest}/SB_{F=0}$ are all above 0.20. This means there is a high degree of certainty that the stock is above the PRI.

Western and Central Pacific Ocean bigeye tuna: The latest stock assessment for bigeye tuna was conducted in 2020 (Ducharme-Barth et al., 2020). In terms of the probabilities of stock status relative to reference points, the SB is estimated to be above the limit reference point with high probability (24 out of 24 models), and F is generally estimated to be below F_{MSY}, but not for all models. The LRP is 20%$SB_{F=0}$, with SB_{recent} = 41%$SB_{F=0}$ =2.05LRP; SB_{latest} = 0.38%$SB_{F=0}$ = 1.9LRP (median of SC uncertainty grid). To achieve SG60 it must be likely (≥ 70th percentile), for SG80 to be highly likely (≥ 80th percentile), and for SG100 there has to be a high degree of certainty (≥ 95th percentile) that the current stock status is above PRI. The 10th percentile is directly calculated in Table 6 of the stock assessment. As this value is above 0.2 (0.27) SG60 and SG80 are met. The minimum value is also above 0.2 (0.21), so SG100 is also satisfied.

Western and Central Pacific Ocean yellowfin tuna: The most recent stock assessment for WCPO yellowfin tuna was in 2020 (Vincent et al.). WCPFC adopted 20% $SB_{F=0}$ as a limit reference point. The LRP is 20%$SB_{F=0}$, with SB_{recent} = 58%$SB_{F=0}$ =2.9LRP; SB_{latest} = 54%$SB_{F=0}$ = 2.7LRP (median of uncertainty grid). As with bigeye above, to achieve SG60 it must be likely (≥ 70th percentile), for SG80 to be highly likely (≥ 80th percentile), and for SG100 there has to be a high degree of certainty (≥ 95th percentile) that the current stock status is above PRI. The 10th percentile is directly calculated in Table 5 of the stock assessment and is this value is above 0.2 (0.51) SG60 and SG80 are met easily. The minimum value is also above 0.2 (0.42), so SG100 is also satisfied.

SI Score: SG80

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?			**Not scored**

Rationale: Although present in the catch according to the observer data, minor species have not been scored.

SI Score: N/A

PI score: 80

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?	**Yes**	**Yes**	**Not scored**

Rationale: According to the observer data collected between 2016 – 2019 and its subsequent analysis, it is unlikely that there are any 'main' secondary species. This PI therefore meets SG80 by default.
SI Score: SG80

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?			**Not scored**
Rationale: Although present in the catch according to the observer data, minor species have not been scored.				
SI Score: N/A				

PI score: 80

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 in this fishery are not subject to national or international limits so has not been scored. SIb is scored in lieu of SIa.

SI Score: N/A

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?	**Sharks: Yes** **Mobulids: Yes** **Turtles: Yes** **Seabirds: Yes** **Cetaceans: Yes**	**Sharks: No** **Mobulids: Yes** **Turtles: No** **Seabirds: Yes** **Cetaceans: Yes**	**Not scored**

Rationale: ETP species identified from the observer reports are as follows:

- Sharks (silky and oceanic whitetip).
- Mobulid rays (manta and mobula, spinetail).
- Turtles (green, hawksbill, loggerhead, olive ridley).

Additionally, seabirds and cetaceans, although not identified in the observer reports collected, both groups appear in other MSC longline tuna full assessments. They have therefore been considered here on a precautionary basis. As mentioned above, please note that only regionally and internationally protected scoring elements have been discussed here.

The table below provides the fate codes of those ETP species discarded in the fishery.

	Discarded fate		
	Alive	Dead	Unknown
Silky shark	237	64	83
Oceanic whitetip shark	204	31	0
Great white shark	2	0	0
Giant manta	1	1	0
Devil ray	1	0	0
Mobula nei	0	0	17
Spinetail mobula ray	1	0	0

Green turtle	4	3	0
Loggerhead turtle	1	0	0
Olive ridley turtle	9	15	0

Silky shark: The most recent stock assessment (WCPFC, 2018) estimates the most recent (2016) catches in the WCPO to be 725,400 sharks and 570,000 in the longline fishery. The 2018 model for the WCPO-only stock estimated that current biomass is likely to be above MSY P(SB_{2016} > SB_{MSY}) = 72 %) but that overfishing is occurring, where F/F_{MSY} = 1.6. The most recent silky shark catch estimate (Clarke et al. 2018) is just over 700,000 sharks. The stock assessment states, "Even with reporting requirements now in place, logbook records are expected to grossly underestimate the true number of total removals". According to Peatman et al., (2019), 80% of elasmobranchs caught in tropical shallow longline fisheries are silky sharks. CMM 2019-04 is in place for this species specifically. It requires the prohibition of retaining the shark or its products on-board. Numbers must be recorded by the fishery itself and if accidentally captured, best efforts made for their safe release. There are therefore measures in place to ensure the UoAs do not hinder the recovery of the stock. 389 silky sharks were reported across the time series. Only two were reported as retained. Of the ones released, 61% were alive on release. SG60 is at least met. As the observer data is yet to be scaled up to represent 100%, precautionarily SG80 is not met.

Oceanic whitetip shark: The most recent stock assessment (Tremblay-Boyer et al., 2019) assesses the stock as overfished and predicts population extinction in the long-term under current rates of fishing mortality. The stock is estimated to be overfished and undergoing overfishing (where $SB_{2013-2015}/SB_{MSY}$ = 0.1 and $F_{2013-2015}/F_{MSY}$ = 4.24. As with silky sharks, CMM 2019-04 has be enacted for this species. Otherwise, rationale as per silky sharks. There are therefore measures in place to ensure the UoAs do not hinder the recovery of the stock. 386 individuals were reported in the observer reports, all of which were discarded, 85% were alive on release according to the observer data. SG60 is at least met. As the observer data is yet to be scaled up to represent 100%, precautionarily SG80 is not met.

Mobulids: Interactions with mobulid rays do occur in this fishery. The observer reports show that all mobulids encountered where discarded. Peatman et al., 2019 present information that 10 – 35% of manta rays are released alive/healthy or injured. Given the relatively low proportion of these rays compared to other elasmobranchs (between 0.3% and 5.2% of sets record catches of mobulid rays according to Peatman et al., 2019) and the assumption the UoAs will adhere to the CMM of the WCPFC (and therefore attempt to release manta and mobula rays); the author considered the UoAs unlikely to hinder recovery of this species. Further to this CMM 2019-05 is in place (active since January 2021) regionally which requires fishing vessels to release mobulids alive and unharmed as soon as practicable. It further prohibits the retention, transshipment, or landing of mobulids either wholly or in part. Given the only 20 individuals were recorded (with one reported dead) across all four years of reports and reporting states, and the other measures already mentioned, it is considered highly likely that the fishery is not hindering the recovery of mobulids in the WCPO. SG80 is met.

Turtles: Six out of the seven marine sea turtle species are threatened with extinction. Fisheries bycatch has been ranked as the most significant threat to sea turtle populations globally, followed by climate change. A global comparison of calculated impact scores between three classes of gear types (longlines, nets and trawls) was conducted. Incidental catch of marine turtles in longline fisheries is one of the most serious threats to marine turtle populations (Gilman and Huang, 2017). Gilman and Huang (2017) summarised the following in the case of longline fisheries, "fish bait also reduced hard-shelled turtle deep hooking. Wider circle hooks reduced both leatherback and hard-shelled turtle catch rates relative to narrower J and tuna hooks and reduced the proportion of caught hard-shelled turtles that were deeply hooked." It is not necessarily possible

to interpret low numbers of interactions with low impact. 33 individuals were recorded across the data period. 24 of which were olive ridley turtles. All were discarded by the fishery, (three green and 15 olive ridley dead), so the majority were released alive. Turtle populations in some areas are small and localised and even minimal mortalities can have an impact either directly or indirectly (Gascoigne et al., 2015). Additionally, plastic disposal and waste management issues are increasing problems in fisheries. Clukey et al., 2017 noted 100% olive ridley, 90% green and 80% of loggerhead turtles captured as bycatch in longline operations in the Pacific had ingested plastic, which may have resulted from fisheries. Although the known direct effects of the UoAs are likely to not hinder recovery of ETP species, more information would be required to determine that this is highly likely to be the case. SG60 is met but SG80 is not met.

Seabirds: The category of ETP species is unlikely to be an issue, given the tropical nature of the fishery. Given that the distributions of albatrosses and large petrels, which are main at-risk species susceptible to capture in pelagic longline fisheries, occur poleward of 20 degrees latitude in both hemispheres, it is highly unlikely that this fishery overlaps with these species. SG80 is met.

Cetaceans: There are two main types of interaction between cetaceans and longlines: depredation and entanglement, the latter often following on from the former (Anderson, 2014). The study by Gilman et al. (2006a) found only one interaction with a toothed whale in the Palau longline fishery. On this basis, the team considered it highly likely that the UoA is not hindering recovery of cetacean species. SG80 is considered met.

SI Score: 75

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?		**Sharks: Yes** **Mobulids: Yes** **Turtles: Yes** **Seabirds: Yes** **Cetaceans: Yes**	**Not scored**

Rationale: Discard and post-release mortality is discussed above in SIa, as they are direct effects of interacting with the fishery. Possible indirect effects to be as follows:

Sharks and mobulids: None.

Turtles: Disturbance around nesting areas/inter-nesting foraging areas.

Seabirds: Disturbance around nesting/roosting areas.

Cetaceans: Noise disturbance, change in foraging behaviour.

Turtles and seabirds: Disturbance around inshore nesting, foraging or roosting areas is highly unlikely. Vessels only operate offshore, and do not even land in any of the EEZs in which they operate.

Cetaceans: Noise disturbance is likely to be minimal because the number of vessels is limited relative to the size of the fishery's operational area. It is known that marine mammals have changed their foraging behaviour in response to the availability of fish on longlines – individual fishers will try to mitigate this by avoiding setting or hauling in the presence of mammals if possible. Aside from the risk of bycatch (considered above), it has been shown in other fisheries (e.g., orcas in toothfish fisheries) that the impact on the mammals themselves is positive, as one would expect (Gilman et al., 2006).

SI Score: 80

PI score: 75