# Taiwan Tuna Association Pacific Albacore Tuna Longline Fishery

Fishery Improvement Project (FIP)

**Environmental Rapid Assessment Report** 

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**Overseas Fisheries Development Council** 

May 2021

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# **Executive summary**

This analysis was conducted by the Overseas Fisheries Development Council (OFDC) in accordance with the Environmental Rapid Assessment Tool. The fishery being assessed is the Pacific albacore tuna longline fishery of Taiwan Tuna Association, which targets albacore tuna (*Thunnus alalunga*). The concerned pelagic longline vessels are flagged to Taiwan and Vanuatu and operate on the high seas in the Pacific. The fishery is managed regionally by the Western and Central Pacific Fisheries Commission (WCPFC) in the Western and Central Pacific Ocean (WCPO) and by the Inter American Tropical Tuna Commission (IATTC) in the Eastern Pacific Ocean (EPO). The aim of the document is to evaluate the gap between the current fishery and well-recognized sustainable fisheries standards and pursue an improved fishery based on relevant criteria.

This pre-assessment obtained the information and data from the tabletop research including publicly available studies, the information on the website of the WCPFC and IATTC and onsite information from the interviewees. Additional information was also obtained from existing fishery assessments of Marine Stewardship Council (MSC).

The conclusions made by the assessment team are as follows. At the current stage, the Pacific albacore tuna longline fishery of Taiwan Tuna Association has not met with the sustainable fisheries standards required by the Environmental Rapid Assessment Tool. Further measures, such as a Fishery Improvement Project (FIP), are needed to make this fishery to be more sustainable.

According to the pre-assessment, the major issue of the Pacific albacore tuna longline fishery of Taiwan Tuna Association is the lack of endangered, threatened, and protected (ETP) species information (PI 2.3.3) and outcomes (PI 2.3.1), which scores all below 60. Other concerns include: lack of harvest strategy (PI 1.2.1) in South Pacific albacore; lack of harvest control rules (PI 1.2.2) in both South and North Pacific albacore; the lack of Other species outcome (PI 2.2.1); the lack of ETP species management (PI 2.3.2); and lack of management performance evaluation (PI 3.2.4) in Vanuatu.

# Abbreviations

Acronym	Definition
ALC	Automatic Location Communicator
B <sub>MSY</sub>	Biomass that will support the maximum sustainable yield
ССМ	WCPFC Commission Members, Cooperating Non-Members, and Participating Territories
СММ	WCPFC Conservation and Management Measure
CMR	Compliance Monitoring Report
CPC	IATTC Commission Members and Cooperating Non-Members
CPUE	Catch per Unit Effort
DWF	Distant Water Fisheries
EEZ	Exclusive Economic Zone
eNGO	Environmental Non-Governmental Organization
EPO	Eastern Pacific Ocean
ЕТР	Endangered, Threatened or Protected Species
FAO	Food and Agricultural Organization
FFA	Pacific Islands Forum Fisheries Agency
FIP	Fishery Improvement Project
FMAC	Fisheries Management Advisory Council
F <sub>MSY</sub>	Maximum rate of fishing mortality
GT	Gross Tonnage
HCR	Harvest Control Rule
IATTC	Inter-American Tropical Tuna Commission
IPOA	International Plan of Action
ISC	International Scientific Committee for Tuna and Tuna-like Species in the N. Pacific Ocean
IUCN	International Union for the Conservation of Nature
IUU	Illegal, Unreported and Unregulated (fishing)

Acronym	Definition
LOA	Length Overall
LRP	Limit Reference Point
MBA	Monterey Bay Aquarium
MCS	Monitoring, Control and Surveillance
MSC	Marine Stewardship Council
MSY	Maximum Sustainable Yield
NC	Northern Committee of the WCPFC
NPCI	National Plan of Control and Inspection for Fisheries
NPFC	North Pacific Fisheries Commission
NPOA	National Plan of Action
OFDC	Overseas Fisheries Development Council
PI	Performance indicator
PRI	Point of Recruitment Impairment
RFMO	Regional Fisheries Management Organization
SB	Spawning Biomass
$SB_{F=0}$	Spawning Stock Biomass when Fishing Mortality=0
$SB_{MSY}$	Spawning Biomass at Age Resulting in MSY
SBR	Spawning Biomass Ratio
SC	Scientific Committee of the WCPFC
SEPODYM	Spatial Ecosystem and Population Dynamics Model
SFW	Seafood Watch
SPC	Secretariat of the Pacific Community
SSB	Spawning Stock Biomass
TAC	Total Allowable Catch
TCC	Technical Compliance Committee of the WCPFC
TRP	Target Reference Point

Acronym	Definition
UNCLOS	United Nations Convention on the Law of the Sea
UNFSA	United Nations Fish Stocks Agreement
UoA	Unit of Assessment
VMS	Vessel Monitoring System
WCPFC	Western and Central Pacific Fisheries Commission
WCPO	Western and Central Pacific Ocean

# Methodology background

The Environmental Rapid Assessment methodology is co-developed by Ocean Outcomes, World Wildlife Fund US and the Sustainable Fisheries Partnership, which is based on their existing assessment tools and feedback from other non-profit groups. It is based on the performance indicators (PIs) of Marine Stewardship Council (MSC) and draws concepts/definitions from both the MSC and Monterey Bay Aquarium Seafood Watch (MBA SFW) standards, specifically the MSC Fisheries Standard Version 2.01 and the MBA SFW Standard for Fisheries Version 3.2. Although it relies heavily on concepts developed and tested by MSC and MBA SFW, this methodology does not replicate or replace either an MSC pre-assessment or a SFW assessment. Such assessments are designed to present key information about the fishery and identify major deficiencies in ecological sustainability, for general scoping or to facilitate movement of a fishery into an improvement project.

To maintain consistency with MSC pre-assessment protocols and scoring ranges used by FisheryProgress.org, assessors assign a scoring range to each PI by using a redyellow-green traffic light system (Table 1). 'Default priority' refers to the general importance of addressing the identified deficiency; priority levels may be adjusted depending on the specific circumstances of the fishery under assessment.

Score range	Default priority	General definition of management performance
<60	High	<ul> <li>Key aspects of management remain insufficient or ineffective, due to a lack of resources, will, and/or framework.</li> <li>There is limited information on stock status, or available information suggests that stocks are overfished.</li> <li>There is limited information on ecosystem impacts from the fishery, or available information suggests that fishing activity causes some significant impacts to the habitat and ecosystem.</li> <li>Relation to MSC assessment: this PI is likely to fail</li> </ul>
60-79	Medium	<ul> <li>Some important management aspects may be lacking, but none are sufficient to prevent a passing rating by themselves. Monitoring and enforcement are in place and believed effective.</li> <li>Information is available to estimate fishing mortality and effects on non-target and ETP species, and the fishery is</li> </ul>

		unlikely to hinder ETP recovery. Habitat and ecosystem impacts are possible, though the fishery is unlikely to cause serious or irreversible harm. Relation to MSC assessment: a condition may be needed for this PI
≥80	Low	<ul> <li>Management measures in place are expected to be effective, and precaution is accounted for.</li> <li>Stock-specific reference points are available and show that biomass is highly likely above a limit and is fluctuating around a target (normally MSY). Information is available to assess fishing mortality and impacts on non-target and ETP species. There is strong evidence that the fishery is not causing serious harm to habitats or ecosystems.</li> <li>Relation to MSC assessment: an unconditional pass for this PI appears likely</li> </ul>

# Scoring summary

Principle	Component	PI #	Performance Indicator	Scoring category	
				South Pacific albacore	North Pacific albacore
1	Outcome	1.1.1	Stock status outcome		
		1.1.2	Stock rebuilding outcome	Not applicable	Not applicable
	Management	1.2.1	Harvest Strategy		
		1.2.2	Harvest control rules		
		1.2.3	Information and monitoring		
		1.2.4	Assessment of stock status		
2	Other species	2.2.3	Other species information		
		2.2.1	Other species outcome		
		2.2.2	Other species management		

	ETP species	2.3.3	ETP species information				
		2.3.1	ETP species outcome				
		2.3.2	ETP species management				
	Habitats	2.4.3	Habitats information				
		2.4.1	Habitats outcome				
		2.4.2	Habitats management				
	Ecosystem	2.5.3	Ecosystem information				
		2.5.1	Ecosystem outcome				
		2.5.2	Ecosystem management				
				WCPO	EPO	TWN	VUT
3	Governance & policy	3.1.1	Legal and customary framework				
		3.1.2	Consultation, roles and responsibilities				
		3.1.3	Long term objectives				
	Fishery- specific management system	3.2.1	Fishery-specific objectives				
		3.2.2	Decision-making processes				
		3.2.3	Compliance and enforcement				
		3.2.4	Management performance evaluation				

# Basic fishery information

UoA	Description
Target species (common and scientific name)	Albacore tuna ( <i>Thunnus alalunga</i> )
Fishery location	Pacific Ocean
Gear type(s)	Pelagic longline
Catch quantity (weight)	North Albacore: 2,312 tons (2019)

	South Albacore: 4,787 tons (2019)
Vessel type and size	Tuna longline vessel
Number of registered vessels	24 vessels flagged to Taiwan ; 6 vessels flagged to Vanuatu.
Management authority	At the national level: Fisheries Agency of Taiwan & Fisheries Department of Vanuatu. At the regional level: WCPFC & IATTC

# Taiwan vessel list and details

Vessel Name	Owner Name	Registration Number	LOA (m)	GT
JIN HWEI SHIANG	CHUN WEI FISHERY CO., LTD.	CT6-1275	52.65	497
JIN FONG SHUUN	CHUN YO FISHERY CO., LTD.	CT6-1276	52.65	497
HOU CHUN NO.1	JINN CHUN FISHERY CO., LTD.	CT6-1292	52.65	489
HUNG FA NO.66	XIN XIANG FISHERY CO., LTD	CT7-0551	59.2	635
FONG CHUN NO.66	FONG CHUN FISHERY CO., LTD.	CT6-1332	55.9	496
LIAN HORNG NO.67	LIAN PANG FISHERY CO., LTD.	CT6-1339	55.9	496
CHUN I NO.218	SUNG WENG MARINE PRODUCTS CO., LTD.	CT7-0196	54.2	712.7
FU CHUN NO.128	FU CHUN FISHERY CO. LTD.	CT7-0329	56.65	719
CHUN I NO.206	CHUN TING FISHERY CO., LTD.	CT7-0421	56.96	707
FONG CHUN NO.136	YING CHUN FISHERY CO., LTD.	CT7-0537	55.9	526
FONG CHUN NO.166	CIA CHUN FISHERY CO., LTD	CT7-0538	55.9	526
FONG CHUN NO.36	MING CHUN FISHERY CO., LTD.	CT7-0542	55.9	531
HSIANG HSIN NO.6	HSIANG HSIN FISHERY CO., LTD	CT7-0456	55.9	531
LIAN HORNG NO.777	LIAN HORNG FISHERY CO., LTD.	CT7-0547	55.9	531
CHI FA NO.1888	HSIN JYI FA FISHERY CO., LTD.	CT6-1495	42.46	399
CHI HONG NO.899	LIN HUANG, SU-QIN	CT6-1418	35.5	209
TO YU NO.2	TO YU OCEAN ENTERPRISE CO., LTD.	CT7-0433	56.25	711
DA SHENG	LIAN CHI FISHERY CO., LTD	CT6-1307	53.15	486
CHI WIN NO.1688	LIN, HAN-TE	CT6-1471	40.2	327
CHUN I NO.11	CHUN DA FISHERY CO., LTD	CT7-0663	63.16	775
HUNG SHING NO.212	QI YU FISHERY CO.LTD.	CT7-0348	56.5	722
CHUN I NO.12	CHUN BAO FISHERY CO., LTD	CT7-0665	63.16	775
HSIEH TA	HONG YUAN FISHERY CO., LTD	CT7-0587	59.2	625
SHIN CHUN NO.8	SHIN CHUN FISHERY CO., LTD.	CT6-1356	53.15	483

Vessel Name	Owner Name	Registration Number	LOA (m)	GT
HONG AN	HONG YU FISHERY CO., LTD.	1484	45.6	470
KIN SHUN AN NO.6	LI HUNG FISHERY CO., LTD.	1366	57.06	637
YONG AN	YONG FU FISHERY CO., LTD.	1608	57.06	637
DA WANG	YONG FENG FISHERY CO., LTD.	1302	57.06	637
TO CHAN NO.2	SUN RISE FISHERY CO., LTD	1513	44.99	492
MORE RICH	SUN RISE FISHERY CO., LTD	1479	50.8	625

Vanuatu vessel list and details

Longlining is a commercial fishing technique, which is used throughout the world's oceans to capture tuna and tuna-like species. Longline gear is typically deployed by a single vessel and floats on the ocean hundreds of miles. The longline vessel uses a single main line that is periodically buoyed with floatation devices, and the thinner branch lines (with baited hooks) are then attached to the main line between the floats. Within this simple framework, a variety of configurations and operational practices can be employed to specifically target different species of fish.

The longline fishing method involves deploying the main line, with baited hooks on branch lines at regular intervals (Figure 1). Line shooters are used in conjunction with vessel speed and branch line attachment to get branch lines deeper into the water. Also, floats and float lines are attached at regular intervals. The distance between the branch lines must be greater than the length of the branch line itself to avoid entanglement. The floats suspend the main line in the water at a pre-determined depth.



*Figure 1. Typical pelagic longline gear configuration (source: https://www.findafishingboat.com/a -rticle/longlinging)* 

A single set by a vessel participating in the albacore FIP of Taiwan Tuna Association usually consists of a main line that is up to 140 to 160 kilometers in length with 20 to 36 meters long branch line attached at intervals along the length of the main line. The distance between floats is about 450 meters, with 10 to 34 hooks.

# Unit of Assessment(s)

For the purpose of this assessment, the Units of Assessments (UoAs) were identified based on the two target stocks of the pelagic longline fleets:

UoA 1	Description
Target species (common and scientific name)	Albacore tuna ( <i>Thunnus alalunga</i> )
Stock	South Pacific albacore
Geographical area	WCPO & EPO high seas
Fishing method or gear type	Pelagic longline
Fishing fleet or group of vessels, or individuals fishing operators pursuing stock	Taiwan longline vessels Vanuatu longline vessels
UoA 2	Description
UoA 2 Target species (common and scientific name)	Description Albacore tuna ( <i>Thunnus alalunga</i> )
UoA 2 Target species (common and scientific name) Stock	Description         Albacore tuna ( <i>Thunnus alalunga</i> )         North Pacific albacore
UoA 2 Target species (common and scientific name) Stock Geographical area	Description         Albacore tuna ( <i>Thunnus alalunga</i> )         North Pacific albacore         WCPO & EPO high seas
UoA 2Target species (common and scientific name)StockGeographical areaFishing method or gear type	Description         Albacore tuna ( <i>Thunnus alalunga</i> )         North Pacific albacore         WCPO & EPO high seas         Pelagic longline

# Status of target stock(s) - Principle 1

Principle 1 considers the status of the target stock(s) and whether harvest is being conducted in a manner that does not lead to overfishing or depletion of the exploited populations.

# Stock status outcome (1.1.1)

### South Pacific Albacore tuna

Scoring category >80

#### **Rationale:**

Interim (biomass or fishing mortality) reference points have been adopted for South Pacific albacore. Therefore, non-data-limited scoring categories is applied to assess its stock status.

The longline catch of albacore is distributed over a large area of the south Pacific, but concentrated in the west (Williams et al., 2017). Thus, management and assessment of South Pacific albacore is in effect conduct by the Western and Central Pacific Fisheries Commission (WCPFC), but the IATTC scientists also participated in the WCPFC Scientific Committee albacore working group. The most recent South Pacific albacore stock assessment was conducted in 2018 by the SPC, a scientific service provider of WCPFC. The spawning biomass is very likely to be above the biomass Limit Reference Point (LRP, with the median value of SB<sub>latest</sub>/SB<sub>F=0</sub>=0.52), and the probability to fall below the LRP was zero (Tremblay-Boyer et al., 2018). In the 2018 stock assessment, there was a 0% probability (0 out of 72 models) that the recent fishing mortality might exceed F<sub>MSY</sub>, which suggested that the stock is not experiencing overfishing (100%probability F < F<sub>MSY</sub>) and is not in an overfished condition (100% probability SB<sub>recent</sub>> LRP) (WCPFC 2018). According to the above reasons, this PI is scored as Green level (>80).

# North Pacific Albacore tuna

Scoring category >80

#### Rationale:

A reference point for biomass or fishing mortality has been adopted for North Pacific albacore. Therefore, the non-data-limited scoring categories is used to assess its stock status.

The North Pacific albacore stock was assessed in 2020 by using the data up to 2018. The stock is likely not overfished relative to the LRP at 20%SSB<sub>current F=0</sub> adopted by the WCPFC. The SSB<sub>2018</sub> was estimated to be 58,858 tons and was 2.3 times greater than the LRP threshold of 25,573 tons (International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC), 2020). No F-based reference points have been adopted to evaluate overfishing. Stock status was evaluated against seven potential

reference points. Current fishing intensity (F<sub>2015-2017</sub>) is likely at or below all seven reference points (see ratios in Table NPALB-1 in ISC 2020).

The North Pacific albacore stock is likely neither overfished nor subject to overfishing. The estimation of Maximum Sustainable Yield (MSY) is 113,522 tons. SSB to produce MSY (SSB<sub>MSY</sub>) was 21,431 tons. The ratio of SSB<sub>2018</sub>/SSB<sub>MSY</sub> is 2.63, indicating that the stock is not in an overfished state. The ratio of  $F_{2015-2017}/F_{MSY}$  is 0.61, indicating that fishing intensity in 2017 was below  $F_{MSY}$ , and overfishing was not occurring. Therefore, it is highly likely that SSB is at or above a level consistent with MSY. Therefore, the PI is scored as Green level (>80).

# Stock rebuilding outcome (1.1.2)

#### South Pacific Albacore tuna

Skip this indicator, due to the fact that the target species is scored as Green level for stock status outcome (1.1.1).

#### North Pacific Albacore tuna

Skip this indicator, due to the fact that the target species is scored as Green level for stock status outcome (1.1.1).

# Harvest strategy (1.2.1)

#### South Pacific Albacore tuna

Scoring category 60-79

#### Rationale:

As noted above (PI 1.1.1), although the South Pacific albacore are distributed across WCPO and EPO, owing to there is less albacore fishing in the eastern South Pacific, it is in effect managed by WCPFC only. In the Conservation and Management Measure (CMM) 2014-06, the WCPFC has agreed on a workplan with indicative timeframes to adopt or refine the harvest strategies for South Pacific albacore. In 2015, the WCPFC further adopted a roadmap to establish a harvest strategy for this species, and the CMM 2015-02 provided management objectives, stating that fishing efforts may not increase over the recent (2005) or historical (2000-2004) levels. Besides, the Commission Members, Cooperating Non-Members, and Participating Territories (CCMs) shall report annually to the Commission the annual catch levels taken by each of their fishing vessels that has caught South Pacific albacore, as well as the number of vessels actively fishing for South Pacific albacore in the Convention area south of 20°S. At the WCPFC15 in

2018, the Commission adopted an interim TRP for South Pacific albacore of 56% SB<sub>F=0</sub>, with the objective of achieving a 8% increase in catch per unit of effort (CPUE) for the southern longline fishery as compared to 2013 levels (WCPFC, 2019; para.207). Based on the above information, the harvest strategy encompasses clear sustainability objectives.

In 2018, the 14<sup>th</sup> Regular Session of the WCPFC Scientific Committee (SC14) also noted that the recent fishing mortality had a zero probability (0 out of 72 models) of exceeding  $F_{MSY}$ . Therefore, there is evidence that some components of the harvest strategy work together to meet management objectives.

However, the current harvest strategy does not complete because that the monitoring strategy is under development. For this reason, this PI is scored as Yellow level (60-79).

# North Pacific Albacore tuna

Scoring category >80

#### **Rationale:**

For the WCPFC, the first North Pacific albacore HCR was set out in CMM 2005-03 (replaced by CMM 2019-03). The management objective was to ensure that the level of fishing effort by their vessels fishing for North Pacific albacore in the WCPF Convention Area did not increase beyond the 2002-2004 annual average levels. CMM 2014-06 called for WCPFC to develop and implement a harvest strategy approach that include TRPs, HCR, and other components such as monitoring and evaluation. At the WCPFC meeting in 2015, the Commission adopted a workplan for the harvest strategy for North Pacific albacore fishery; and in December 2017, the WCPFC adopted an interim harvest strategy for this fishery, which involved an interim management objective to maintain the biomass around its current level and with a low risk of breaching the LRP, 20%SSB<sub>current F=0</sub>. If this reference point is breached, management actions will be taken to return the stock to a predetermined level.

In the IATTC, Resolution C-18-03 covers the management measures for North Pacific albacore. The Resolution C-18-03 stipulates that all CPCs shall submit any North Pacific albacore catch information in accordance with the reporting scheme and the scientific staff of IATTC will review the management strategy evaluation and work towards the development of a harvest strategy that includes a target threshold and LRP, as well as HCRs. Besides, it also stipulates that the IATTC shall continue making efforts to promote compatibility between the Resolutions and CMMs adopted by both the IATTC and the WCPFC with respect to North Pacific albacore.

Current fishing mortality rate of North Pacific albacore remains below  $F_{MSY}$ , and the stock is well above SSB<sub>MSY</sub>. Therefore, maintaining the current fishing intensity is likely to achieve stock management objectives, and there is an agreed measure that all CCMs and CPCs shall ensure not to increase fishing efforts. Therefore, this PI is scored as Green level (>80).

# Harvest control rules (1.2.2)

#### South Pacific Albacore tuna

Scoring category 60	)-79
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#### **Rationale:**

The HCRs for South Pacific albacore tuna are set out in WCPFC's CMM 2015-02, which involve a banning of increasing the vessel numbers in the fishery, and a resolution for all CCMs to participate collaboratively in research to reduce uncertainty in the stock assessment and to report catches and vessel numbers. As mentioned above, CMM 2014-06 established a process and a workplan for the WCPFC to adopt well-defined HCRs; however, for South Pacific albacore, this process is underway and not completed.

Recent average fishing mortality is estimated to be well below  $F_{MSY}$ , which is likely to maintain the stock above the LRP. The most recent assessment and projections provided evidence that the tools used (or available) to implement HCRs are appropriate and effective in controlling exploitation. But the HCRs are not likely to be robust to resolve uncertainties (such as ecological uncertainties). For this reason, this PI is scored as Yellow level (60-79).

#### North Pacific Albacore tuna

Scoring category 60-79

#### Rationale:

CMM 2014-06 called for WCPFC to develop and implement a harvest strategy approach for their main stocks (including North Pacific albacore) that includes measures on TRPs and HCRs. The WCPFC adopted an interim harvest strategy for North Pacific albacore in 2017, which set out the decision rules as follows. Based on information from ISC, if the spawning stock size decreases below the LRP at any time, the NC (Northern Committee) of WCPFC will, at its next regular session or inter-sessionally, if warranted, adopt a reasonable timeline, but no longer than 10 years, for rebuilding the spawning stock to at least the LRP and recommend a CMM that can be expected to achieve such rebuilding within that timeline. The most recent F is less than  $F_{MSY}$ , which proves that the HCRs are effective. Therefore, there is some evidence that the tools used (or available) to implement HCRs are appropriate and effective in controlling exploitation. But as the existing HCRs are unable to resolve uncertainties (such as ecological uncertainties), this PI is scored as Yellow level (60-79).

# Information and monitoring (1.2.3)

# South Pacific Albacore tuna

Scoring category >80

### Rationale:

Information of South Pacific albacore including stock structure, life history characteristics, fisheries, removal rates and abundance are available. All CCMs fleets are required to provide catch and effort data annually. The formal stock assessments take place every few years (recently in 2012, 2015, and 2018). In the formal stock assessments of the WCPFC, the SPC provides information regarding trends of fishery indicators including total catch, nominal CPUE, catch at length and at weight to assist in management. Overall, as the data on this fishery is comprehensive, this PI is scored as Green level (>80).

# North Pacific Albacore tuna

Scoring category Green

# Rationale:

Information of North Pacific albacore contains stock structure, life history characteristics, fisheries, removal rates, and abundance. The stock is monitored through robust stock assessments conducted by the ISC every 2-4 years. The stock assessment and the status quo projections are used in management decision-making. Since the fishery information is available, the PI is scored as Green level (>80).

# Assessment of stock status (1.2.4)

# South Pacific Albacore tuna

Scoring category	Green
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Rationale:

For the purpose of south Pacific albacore stock assessment a single discreet stock is assumed to exist within the domain of the WCPO model area (Harley et al.,2015). Stock assessments for south Pacific albacore tuna are conducted by SPC. The WCPFC's last stock assessment of South Pacific albacore tuna was conducted by the SPC in 2018. The assessment was conducted by using an integrated assessment model, MULTIFAN-CL, which requires the identification of individual fishery with similar operational characteristics (such as selectivity and catchability). The assessment also considered the major features relevant to the biology and the ecology of the South Pacific albacore. As the reference points have been defined by the stock assessment, it is able to estimate a range of reference points by using different methodologies.

The stock assessment is also updated progressively to adjust in accordance with the research and judgment. Alternative hypotheses and assessment approaches have been explored. For the above reasons, the PI is scored as Green level (>80).

### North Pacific Albacore tuna

Scoring category Green

#### **Rationale:**

The stock assessment of North Pacific albacore tuna was conducted in 2020 by the Albacore Working Group of the ISC by using the Stock Synthesis (SS) modeling platform. SS modeling platform is a statistical age-structured population modeling platform that is highly flexible and can incorporate multiple data types and account for a variety of biological, fishery, and environmental processes. The 2020 stock assessment model was a sex-specific, length-base, age-structured, forward-simulating, fully integrated statistical model. The model also considered spatial and temporal extent of fisheries, biology of the stock, such as growth and recruitment, natural mortality, total catch, abundance, size composition and historical fishing operations. The sensitivity analyses and the retrospective analyses were also conducted, and the results of the assessments were robust.

The result of the stock assessment was reviewed internally by the working group and then peer-reviewed by the SC of WCPFC, the ISC Plenary and the staff of IATTC. For these reasons, this PI is scored as Green level (>80).

# Ecosystem impacts - Principle 2

Principle 2 considers the impacts of the UoAs on the ecosystem, including the impacts on other species, habitats, and key ecosystem components.

# List of other species reported by the fleets of the UoAs

For this pre-assessment, the species of albacore tuna is the targeted species. Except for albacore tuna, other species caught by the fleets of the UoAs are considered as other main species and minor species, depending on the proportion of the total catch by weight, which are required to be scored.

Catch composition data and bait species data were provided by the Taiwan Tuna Association. The catch composition of the UoAs from 2017 to 2019 is given in Table 2. The targeting and other main species are highlighted in yellow, the ETP species are highlighted in blue. Other main species are those that comprise at least 5% of the total catch, or at least 2% of the total catch if the species are considered as less resilient species based on productivity analysis. Any species not considered as other main species, except ETP species, shall be considered as minor species. As the amount of minor species is quite limited, this pre-assessment does not score these minor species.

Common name	Scientific name	Catch (kg)	Catch % (by weight)	Classification
Albacore tuna	Thunnus alalunga	22,247,172	49.55%	Target
Blue shark	Prionace glauca	8,148,534	18.15%	Main other
Yellowfin tuna	Thunnus albacares	3,851,414	8.58%	Main other
Bigeye tuna	Thunnus obesus	3,635,492	8.10%	Main other
Escolar	Lepidocybium flavobrunneum	1,340,442	2.99%	Minor
Shortfin mako shark	Isurus oxyrinchus	1,182,349	2.63%	ETP
Swordfish	Xiohias gladius	949,752	2.12%	Main other
Skipjack tuna	Katsuwonus pelamis	581,846	1.30%	Minor
Striped marlin	Kajikia audax	344,675	0.77%	Minor
Rough Skin Oilfish	Ruvettus pretiosus	206,966	0.46%	Minor
Blue marlin	Makaira mazara	66,163	0.15%	Minor
Mahi mahi	Coryphaena hippurus	55,646	0.12%	Minor
Shortbill Spearfish	Tetrapturus angustirostris	37,480	0.08%	Minor
Sailfish	Istiophorus platypterus	11,143	0.02%	Minor
Black Marlin	Istiompax indica	10,039	0.02%	Minor

Table 2 The species caught by the vessels of UoAs from 2017 to 2019

Longbill spearfish	Tetrapturus pfluegeri	3,350	0.01%	Minor
Thresher shark	Alopias vulpinus	3,321	0.01%	ETP
Silky Shark	Carcharhinus falciformis	1,948	0.00%	ETP
Probeagle shark	Lamna nasus	220	0.00%	ETP
Oceanic whitetip	Carcharhinus longimanus	151	0.00%	ETP
Hammerhead sharks	Sphyrnidae	140	0.00%	ETP
Southern bluefin tuna	Thunnus maccoyii	125	0.00%	Minor
Other billfish		5,977	0.01%	Minor
Other sharks		6,678	0.02%	Minor

Table 2 shows the targeted species and other main species of the UoAs are: albacore tuna, blue shark, yellowfin tuna, bigeye tuna and swordfish. As the escolar species is not the less resilient species, this species is considered as a minor species of this fishery. However, swordfish species is belonging to one of the species of less resilient so this species will be scored. It should be noted that shortfin mako shark is classified as ETP species as the International Union for the Conservation of Nature (IUCN) defined this shark species as endangered in 2018. According to the Convention on the Conservation of Migratory Species of Wild Animal (CMS), the species of some sharks are classified as ETP species. The bait species employed by this fishery include Pacific saury, mackerel and sardine species. According to the information provided by Taiwan Tuna Association, Pacific saury is the dominant bait species of this fishery.

Table 3 indicates a supplementary data from the annual report of Taiwan and Vanuatu sent respectively to WCPFC in 2019, addressing the numbers of direct interactions with these ETP species recorded by the observers onboard the vessels.

Year	Country	Species	Number observed (hooked)	Number observed (sighted)
2017	Taiwan	Leatherback turtles	2	-
		Olive ridley turtles	33	
		Loggerhead turtles	4	
		Green turtles 10		
		Laysan albatross	2	3,072
		Black-footed albatross 2		
		Campbell albatross 1		
		Bottlenose dolphin	1	254
	Vanuatu	There were no catches of species of special interest (seabir turtles and marine mammals) observed in 2017 by observers b LL and PS vessels.		erest (seabirds, sea observers by both

Table 3 The Annual Report of Taiwan and Vanuatu sent respectively to WCPFC in 2019

2018	Taiwan	Leatherback turtles	3	-
		Olive ridley turtles	96	
		Kemp's ridley turtle	1	
		Loggerhead turtles	3	
		Green turtles	12	
		Laysan albatross	6	13,305
		Salvin's albatross	5	
		Toothed whales nei	1	44
	Vanuatu	Flatback turtle	1	-
		Green turtles	1	
Leatherback turtles		Leatherback turtles	1	
	Loggerhead turtles		1	
		Olive ridley turtles		
		Albatrosses nei	2	
		Gulls- Terns and skuas	1	
		Laysan albatross	2	
		Toothed whales nei	3	
		Indor-Pacific Bottlenose dolphin	3	
M		Melon-headed whale	1	
		Pantropical spotted dolphin	1	
		Rough-toothed dolphin	4	

# Other species outcome (2.2.1)

Scoring category Yellow

#### **Rationale:**

#### Blue shark (Prionace glauca)

Blue shark has two stocks recognized in the Pacific, one in the North and another in the South. The latest stock assessment for North Pacific blue shark was conducted in 2017 (WCPFC SC, 2017). The spawning biomass of Blue shark in 2015 (SB<sub>2015</sub>) was 69% higher than that at MSY level and estimated to be 295,774 tons. The recent annual fishing mortality (F2012-2014) was estimated to be approximately 38% of  $F_{MSY}$ , well below  $F_{MSY}$ . Relative to MSY, it is thought that the North Pacific blue shark stock is not overfished, and overfishing is not occurring (Figure 2) (WCPFC SC, 2017). The south Pacific stock assessment was last attempted in 2016 (Rice and Harley, 2013b). SC12 noted that the 2016 assessment is preliminary and is considered to be a work in progress, so it cannot be used to determine stock status and form the basis for management advice. As the observer records of condition at release the vast majority of these animals are released alive; 2018 (89% alive) and 2019 (93% alive) that are expected to ensure the fishery doesn't hinder recovery. The score is meet 60-79.



Figure 2. Kobe plot of the trends in estimates of relative fishing mortality and spawning biomass of North Pacific blue shark between 1971-2015 for the reference case stock assessment model. (Source: WCPFC SC, 2017).

#### Yellowfin tuna (Thunnus albacares)

The most recent WCPO yellowfin tuna stock was assessed in 2020. The preliminary estimate of total catch of WCPO yellowfin tuna for 2019 was 669,362 tons, a 5% decrease from 2018 and a 1% increase from the average 2014-2018 (SC16, 2020). The WCPFC adopted 20% of the unfished spawning potential (20%SBF=0) as a LRP for yellowfin. SC16 noted the results of stochastic projections from the 2020 assessment which indicated the potential stock consequences of fishing at "status quo" conditions (2016–2018 average longline and other fishery catch and 2018 purse seine effort levels) and long-term recruitment scenario using the uncertainty framework approach endorsed by SC. Projections indicate that median SB<sub>2025</sub>/SB<sub>F=0</sub> = 0.58; median SB<sub>2035</sub>/SB<sub>F=0</sub> = 0.59 and median  $SB_{2045}/SB_{F=0} = 0.58$ . The risk that  $SB_{2048}/SB_{F=0}$  is less than the Limit Reference Point is 0%. Based on the uncertainty grid adopted by SC16, the WCPO yellowfin tuna spawning biomass is above the biomass LRP and recent F is below F<sub>MSY</sub>. The stock is not experiencing overfishing (100% probability F<F<sub>MSY</sub>) and is not in an overfished condition (0% probability SB/SB<sub>F=0</sub><LRP) (Figure 3). Additionally, stochastic projections predict there to be no risk of breaching the LRP (0% probability SB<sub>2048</sub>/SB<sub>F=0</sub><LRP). So, the score is meet 80.



Figure 3. Kobe plot for the recent spawning potential (2015–2018) summarizing the results for each of the models in the structural uncertainty grid. The plots represent estimates of stock status in terms of spawning biomass depletion and fishing mortality relative to MSY quantities and marginal distributions of each are presented with the median of the structural uncertainty grid displayed as a brown triangle.

The 2018 yellowfin tuna catch in the EPO was about 239,000 tons, discard included. Based on the Resolution C 16-02, IATTC adopted an interim LRP for all tropical tunas. The LRPs for yellowfin are set at 0.28 \*S<sub>MSY</sub> and 2.42\*F<sub>MSY</sub>, which correspond to a 50% reduction in recruitment from its average unexploited level based on a conservative steepness value (h = 0.75) for the Beverton-Holt stock recruitment relationship. The latest comprehensive stock assessment of Eastern Pacific yellowfin tuna was conducted in 2019. Considering the relative weights of different models and their combined distributions for the management parameters, there is only a 12% probability that the stock is overfished (P(S<sub>cur</sub><S<sub>MSY</sub>) = 12%) and a 9% probability that overfishing is taking place (P(F<sub>cur</sub>>F<sub>MSY</sub>) = 9%). There is zero probability that both S and F limit reference points have been exceeded (P(S<sub>cur</sub><S<sub>LIMIT</sub>) = 0%; P(F<sub>cur</sub>>F<sub>LIMIT</sub>) = 0%). To be consistent with the probabilistic nature of the risk analysis and the HCR, the black dot on the Kobe plot (Figure 4) representing the combined models is based on P(S<sub>cur</sub>/S<sub>MSY</sub><x) = 0.5 (SAC 11, 2020). Therefore, the score is meet 80.



Figure 4. Kobe (phase) plot of the time series of estimates of spawning stock size (S) and fishing mortality (F) of yellowfin tuna relative to their MSY reference points. The colored panels are separated by the target reference points (SMSY and FMSY). Limit reference points (dashed lines), which correspond to a 50% reduction in recruitment from its average unexploited level, based on a conservative steepness (h) of 0.75 for the Beverton-Holt stock-recruitment relationship, are merely indicative, since they vary by model and are based on all models combined. The center point for each model indicates the current stock status, based on the average fishing mortality (F) over the last three years; The solid black circle represents all models combined; to be consistent with the probabilistic nature of the risk analysis and the HCR, it is based on P(Scur/SLIMIT<x) = 0.5 and P(Fcur/FMSY>x) = 0.5. The lines around each estimate represent its approximate 95% confidence interval.

#### Bigeye tuna (Thunnus obesus)

The most recent stock assessment for WCPO bigeye tuna was undertaken in 2020. The preliminary estimate of total catch of WCPO bigeye tuna for 2019 was 135,680 mt, a 9% decrease from 2018 and an 8% decrease from the average 2014-2018. SC16 noted the results of stochastic projections from the 2020 assessment which indicated the potential stock consequences of fishing at "status quo" conditions (2016–2018 average longline and other fishery catch and 2018 purse seine effort levels) and short-term recruitment scenario using the uncertainty framework approach endorsed by SC. Projections indicate that median SB<sub>2025</sub>/SB<sub>F=0</sub> = 0.47; median SB<sub>2035</sub>/SB<sub>F=0</sub> = 0.49 and median SB<sub>2045</sub>/SB<sub>F=0</sub> = 0.49. The risk that SB<sub>2048</sub>/SB<sub>F=0</sub> is less than the Limit Reference Point is 0%. Based on the uncertainty grid adopted by SC16, the WCPO bigeye tuna spawning biomass is above the biomass LRP and recent F is very likely below  $F_{MSY}$ . The stock is not overfished (100% probability SB/SB<sub>F=0</sub>>LRP) and likely not experiencing overfishing (87.5% probability F<F<sub>MSY</sub>) (Figure 5). Therefore, the score is meet 80.



Figure 5. Kobe plot for the recent spawning potential (2015–2018) summarizing the results for each of the models in the structural uncertainty grid. The plots represent estimates of stock status in terms of spawning biomass depletion and fishing mortality. Marginal distributions of each are presented. The median is shown in blue.

The 2018 bigeve tuna catch in the EPO was recorded to be about 103,000 tons, including discard catch. The most recent stock synthesis of Eastern Pacific bigeye tuna stock assessment was in 2016, updated in 2017, 2018 and 2019, respectively. One of the problems for determining the stock status is that, with reference points defined at low stock levels, a small status change can lead to a large change in scoring the status performance. The management goal of the IATTC is to maintain the stocks at the MSY level. To assess whether a stock is above the point where recruitment is impaired (PRI), a LRP is defined for all tuna species harvested in the EPO. The 2018 estimation from the base case assessment indicated that the bigeye stock in the EPO is not overfished  $(S>S_{MSY})$ , but overfishing is taking place  $(F>F_{MSY})$ . The current base case model indicates that the LRPs of 0.38 \*S<sub>MSY</sub> and 1.6 F<sub>MSY</sub>, which corresponds to a 50% reduction in recruitment from its average unexploited level based on a conservative steepness value (h = 0.75) for the Beverton-Holt stock recruitment relationship. The assessment in 2019 used indicators rather than the 2018 assessment model as the various uncertainties were identified in the 2018 bigeye tuna assessment. According to the assessment of bigeye tuna in 2019, the bimodal nature of the probability distributions indicates that the stock is either well below or well above the MSY levels, which means the results of risk analysis are not yet clear. Therefore, the score is between 60-79.

#### Swordfish (Xiohias gladius)

The stock structure of swordfish is fairly researched in the Pacific Ocean, and the species of swordfish is divided into two stocks, the North Pacific swordfish and the South Pacific swordfish.

In terms of WCPO, the latest stock assessment for the North Pacific swordfish was conducted in 2018 by the ISC. The result indicated that the population biomass was around 71,000 tons in the last three years (2014-2016). Compared to MSY based reference points, the spawning stock biomass in 2016 was 87% above SSB<sub>MSY</sub> and the current fishing mortality (average for ages 1 to 10 during 2013-2015) was 45% below F<sub>MSY</sub> (Figure 6) (WCPFC ISC, 2018). Overall, the base case model indicated that the WCPO swordfish stock is not likely overfished and is not likely to experience overfishing relative to MSY-based or 20% of unfished spawning biomass-based reference points.

For Southwest Pacific swordfish, the latest stock assessment was conducted in 2017. Based on the assessment, the spawning biomass is likely above the 20% SB<sub>F=0</sub> biomass LRP adopted for tunas, and the SB<sub>MSY</sub> level. It is therefore highly likely that the stock is not in an overfished condition. Recent fishing mortality is likely below  $F_{MSY}$ , and it appears that the stock is not experiencing overfishing. The stock is therefore highly likely to be above PRI. Therefore, the score is meet 80.



Figure 6. Kobe plot of the time series of estimates of relative fishing mortality (average of age 1-10) and relative spawning stock biomass of Western and Central North Pacific Ocean swordfish (Xiphias gladius) during 1975-2016. The white circle denotes the first year (1975) and the orange circle denotes the last year (2016) of the assessment time horizon.

In terms of EPO, the swordfish have two distinct stocks, the north-eastern Pacific swordfish and the south-eastern Pacific swordfish. The stock assessment of north-eastern swordfish in 2017 indicated that the biomass level has been stable and well above 50% of the unexploited levels of stock biomass. As a result, the north-eastern Pacific swordfish are not overexploited at current levels of fishing effort.

The most recent stock assessment of the south-eastern Pacific swordfish was conducted with Stock Synthesis by using data that were updated as of 22 April 2011. Key results from that assessment included: (1) the swordfish stock in the southeast Pacific Ocean is not experiencing overfishing and is not overfished; (2) the spawning biomass ratio is about 1.45, indicating that the spawning biomass is about 50% above the carrying capacity and substantially above the level which is expected to produce catch at the MSY level; (3) the recent catch levels over the past 5 years (29,293 tons in 2016) situates nearly at MSY levels(~25,000 tons); and (4) there has been a recent series of high recruitments to the swordfish stock (Figure 7). There is no indication of a significant impact on fishing this stock. Therefore, the score is meet 80.



Figure 7. Estimated annual spawning biomass ratio (SBR) during 1945-2010 and approximate 95% confidence intervals.

#### Pacific saury (Cololabis saira)

Pacific saury is the main bait species used in this fishery. Pacific saury is a highly migratory species, distributed in the water area from Korea and Japan eastward to Gulf of Alaska and southward to Mexico. Currently it is managed by the North Pacific Fisheries Commission (NPFC). The total catch amount of Pacific saury caught by the fleets of China, Japan, Korea, Russia and Taiwan showed a general increase from 1990s to 2000s, with the lowest amount in 1998 and 1999 (about 176,000 tons) and the highest in 2014 (about 630,000 tons). In 2017, catch decreased and reached the lowest point among the last 13 years (about 260,000 tons). The most recent stock assessment on

Pacific saury was conducted in 2021. According to the report of Small Scientific Committee on Pacific Saury of NPFC, the results indicated that the stock declined with an interannual variability from near carrying capacity in the mid-2000's after a period of high productivity to current levels. The results also indicated that B was below  $B_{MSY}$  (median average B/B<sub>MSY</sub> during 2017-2019 = 0.544, 80%CI=0.376-0.803) and F was above  $F_{MSY}$  (average F/F<sub>MSY</sub> during 2017- 2019 = 1.327, 80%CI= 0.845-1.841). The results further indicated that stock biomass fell to the lowest value since 1980 in 2017 (median B/B<sub>MSY</sub> = 0.434, 80%CI=0.295-0.639) and has been still at a historically low level in recent years (2017-2019). Thus, the Pacific saury is likely below the biologically based limits. For the above reasons, the score is between 60-79.

For the reasons above, this PI is scored as Yellow level (60-79).

# Other species management (2.2.2)

Scoring category Green

# Rationale:

### Blue Shark

The species of blue shark is one of species of shark family. Since the WCPFC and IATTC had adopted management measures on shark, it is considered the contents of measures adopted by WCPFC and IATTC could also be applied to the species of blue shark.

# WCPFC measures

Various conservation and management measures related to shark bycatch are implemented at regional level. In the WCPFC, CMM 2019-04 is the overarching measure for conserving sharks. The provisions include:

- 1. CCMs should implement, as appropriate, the FAO International Plan of Action for the Conservation and Management of Sharks (IPOA). For implementation of the IPOA, each CCM should, as appropriate, include its National Plan of Action for sharks in Part 2 Annual Report.
- 2. CCMs shall take measures necessary to require that all sharks retained on board their vessels are fully utilized. CCMs shall ensure that the practice of finning is prohibited.
- 3. In order to implement the obligation in preceding paragraph, in 2020, 2021 and 2022, CCMs shall require their vessels to land sharks with fins naturally attached to the carcass. However, in 2020, 2021 and 2022, CCMs may take alternative measures as listed below to ensure that individual shark carcasses and their corresponding fins can be easily identified on board the vessel at any time, such as each individual shark carcass is bound to the corresponding fins using rope or wire, each individual shark

carcass and its corresponding fins are stored in the same bag, preferably biodegradable one...etc.

- 4. CCMs shall take measures necessary to prevent their fishing vessels from retaining on board (including for crew consumption), transshipping, and landing any fins harvested in contravention of this CMM.
- 5. CCMs shall take measures necessary to ensure that both carcasses and their corresponding fins are landed or transshipped together, in a manner that allows inspectors to verify the correspondence between an individual carcass and its fins when they are landed or transshipped.
- 6. For longline fisheries targeting tuna and billfish, CCMs shall ensure that their vessels comply with at least one of the following options: (1) do not use or carry wire trace as branch lines or leaders; or (2) do not use branch lines running directly off the longline floats or drop lines, known as shark lines.
- 7. The Commission shall adopt and enhance bycatch mitigation measures and develop new or amend, if necessary, existing Shark Safe Release Guidelines1 to maximize the survival of sharks that are caught and are not to be retained. Where sharks are unwanted bycatch they should be released alive using techniques that result in minimal harm, taking into account the safety of the crew. CCMs should encourage their fishing vessels to use any Commission adopted guidelines for the safe release and handling of sharks.
- 8. CCMs shall ensure that sharks that are caught and are not to be retained, hauled alongside the vessel before being cut free in order to facilitate a species identification. This requirement shall only apply when an observer or electronic monitoring camera is present, and should only be implemented taking into consideration the safety of the crew and observer

#### IATTC measures

Within the IATTC, sharks are covered under the Resolution C-05-03 on the conservation of sharks caught in association with fisheries in the eastern Pacific Ocean, Resolution C-16-04, and Resolution C-16-05 management of shark species.

Provisions in these Resolutions include:

- 1. Each CPC should establish and implement a national plan of action for conservation and management of shark stocks, in accordance with the FAO International Plan of Action for the Conservation and Management of Sharks.
- 2. CPCs shall take the measures necessary to require that their fishers fully utilize any retained catches of sharks. Full utilization is defined as retention by the fishing vessel of all parts of the shark excepting head, guts, and skins, to the first point of landing.
- 3. CPCs shall require their vessels to have onboard fins that total no more than 5% of the weight of sharks onboard, up to the first point of landing. CPCs that currently do

not require fins and carcasses to be offloaded together at the point of first landing shall take the necessary measures to ensure compliance with the 5% ratio through certification, monitoring by an observer, or other appropriate measures.

- 4. Fishing vessels are prohibited from retaining on board, transshipping, landing or trading in any fins harvested in contravention of Resolution C-16-05.
- 5. CPCs shall, where possible, in cooperation with the IATTC scientific staff, undertake research to:
  - a < Identify ways to make fishing gears more selective, where appropriate, including research into alternative measures to prohibiting wire leaders.
  - b · Improve knowledge of key biological/ecological parameters, life-history and behavioral traits, and migration patterns of key shark species.
  - c ldentify key shark mating, pupping, and nursery areas; and
  - d Improve handling practices for live sharks to maximize post-release survival.
- 6. CPCs shall prohibit longline vessels flying their flag and targeting tuna or swordfish in the Convention Area from using 'shark lines'.
- 7. The use of gaffs, hooks, or similar instruments is prohibited for the handling of sharks. No shark may be lifted by the head, tail, gill slits, or spiracles, or by using bind wire against or inserted through the body, and no holes may be punched through the bodies of sharks (e.g., to pass a cable through for lifting the shark).

#### **Shark Finning**

#### WCPFC measures

Within the WCPFC, the prevailing measures are covered under CMM 2019-04, which requires that CCMs shall ensure the practice of finning is prohibited.

#### IATTC measures

Within the IATTC, the relative measures are covered under the Resolution C-05-03, which requires that fishing vessels are prohibited from retaining on board, transshipping, landing or trading in any fins harvested in contravention.

#### Taiwan measures

The prevailing measures taken by international fisheries management bodies on the conservation and management of shark resources include the prohibition of catching shark species with low abundance and the application of the ratio of fins to shark carcass of not over 5% at time of landing of shark catches.

To conserve and sustainably utilize shark resources, the Council of Agriculture of Taiwan amended and promulgated the Regulations for Tuna Longline or Purse Seine Fishing Vessels Proceeding to the Pacific Ocean for Fishing Operation on 24 November 2020, which includes the following requirements:

- In case of catching any shark that total length less than 100 centimeters or catching any shark in the area north of 35°N, and between 165°E to 175°E from June 1 to October 31 of each year, such catch shall be discarded and the amount of discard shall be recorded in the E-logbook.
- 2. For any tuna longline fishing vessel employing ice chilling method to preserve its shark catches, shark fins shall not be fully cut off and shall be naturally attached to the carcasses (hereinafter referred to as "fins naturally attached").
- 3. For any tuna longline or tuna purse seine fishing vessel, shark fins shall be naturally attached or tied to carcasses. The fins and carcass that are tied together shall be of the same shark. Notwithstanding such a provision, small scale longliners may alternatively process shark catches by:
  - (1) Storing shark carcass and its corresponding fins in the same bag, or
  - (2) Attaching identical numbered tags to each shark carcass and its corresponding fins and binding all the fins from the same carcass together or storing them in the same bag. Both the carcasses and fins shall be stored in the same hold.
- 4. Shark catches of any tuna longline or tuna purse seine fishing vessel being processed in accordance with the preceding paragraph shall remain the same processed status until landing.
- 5. Shark carcasses and corresponding fins shall be transshipped or landed concurrently in the same shipment.
- 6. Catching vessels shall fully utilize the shark catch, which shall not be discarded except the head, guts and skins.

#### Vanuatu measures

The policy of shark finning ban, including carcass retention, National Plan of Action on Sharks and finning controlling have been implemented by the Government of Vanuatu since 2017. The provisions of the National Plan of Action on Sharks included the following requirements:

- 1. Ban shark targeted fishing by longline vessels in all Vanuatu's fisheries waters.
- 2. Establish shark sanctuaries within territorial and archipelagic waters, including prohibitions against commercial fishing.
- 3. Fin control of 5% (the ratio of fins to carcass is 5% wet weight, such that if 100 tons of sharks are landed, the fins must weigh no more than five tons), but with fins naturally attached (CMM 2010-07).
- 4. Prohibition of retention, transshipping and storing on a fishing vessel, or landing in whole or in part, of any oceanic whitetip shark (CMM 2011-04, CMM 2013-08);
- 5. Implement elements of CMM 2010-07, CMM 2011-04, CMM 2012-04 and CMM 2013-08: discourage waste and discards, encourage live release, control finning (i.e. cutting of a shark's fins and discarding its carcass at sea).

According to the above details, various measures are taken to manage and conserve the family of shark species including the blue shark. In addition, the regulations and measures on preventing shark finning are robust. It is highly likely that shark finning is not taking place within this fishery. For the above reasons, the score is meet 80.

### Yellowfin tuna and Bigeye tuna

The harvest strategies for the species of yellowfin tuna and bigeye tuna (other main species of this fishery) can be found in WCPFC CMM 2014-06 and CMM 2020-01; IATTC Resolution C-17-02 and Resolution C-16-02. As the stocks have been above the PRI and fluctuating around the level consistent with the MSY, it is evident that these harvest strategies are successful.

The harvest strategies adopted by the WCPFC and IATTC are briefly introduced as follows:

- 1. The objective of the WCPFC CMM 2014-06 is to develop and implement a harvest strategy approach for each of the key fisheries or stocks in accordance with the process set out in CMM 2014-06.
- 2. WCPFC CMM 2020-01 includes harvest strategies and interim objectives for bigeye tuna, skipjack, and yellowfin tuna, fish-aggregating devices (FAD) set management, zone-based and high sea purse seine effort control, catch retention for purse seine fishery, the catch limit of longline fishery, capacity management for purse seine and longline vessels, as well as data provision requirements.
- 3. IATTC Resolution C-17-02 contains these measures for longline vessels:
  - (1) The measures apply to all longline vessels over 24m in length that fish for yellowfin tuna, bigeye tuna or skipjack in the Convention Area.
  - (2) Taiwan must ensure that its total annual catches of bigeye tuna by its longline fleet in 2018, 2019 and 2020 do not exceed 7,555 tons. Vanuatu must ensure its total annual catches do not exceed the greater of 500 tons.
  - (3) (3) Landing and transshipments of tuna or tuna products that have originated from
  - (4) fishing activities that contravene measures in this Resolution are prohibited.
  - (5) Each of Members and CPCs are required to submit an annual report on its updated national compliance scheme and actions taken to implement these.
  - (6) IATTC are also committed to promoting compatibility between the conservation and management measures adopted by WCPFC for tuna species to maintain and inform their conservation and management measures.

Taking into account the above measures, the score is meet 80.

### <u>Swordfish</u>

As a precautionary approach, the WCPFC has CMM 2009-03 in place for swordfish, which stated that:

- 1. CCMs shall limit the number of fishing vessels for swordfish south of 20°S to the number in any year between 2000 and 2005.
- 2. CCMs shall not shift their fishing effort because of this measure.
- 3. CCMs shall identify the maximum total catch of swordfish permitted to be fishing south of 20°S.

In 2019, the WCPFC agreed on a harvest strategy for North Pacific swordfish, following a proposal by the NC. The harvest strategy sets  $F_{MSY}$  as a LRP (or in practice a trigger reference point) and states that if F is evaluated as exceeding  $F_{MSY}$ , the NC will recommend measures to reduce fishing mortality. So, there is a management strategy in place for the UoAs.

Besides, according to the stock assessment of swordfish mentioned in PI 2.2.1, the stock is highly to be above PRI. Therefore, there is evidence that the management strategy is working, so the score is meet 80.

#### Pacific saury

The Pacific saury is managed by the NPFC. The purpose of the NPFC is to ensure the long-term conservation and sustainable use of the fisheries resources in the Convention Area while protecting the marine ecosystems of the North Pacific Ocean in which these resources occur. The NPFC has one CMM in place for Pacific saury.

The result of the stock assessment released in 2021 indicate that the Pacific saury stock declined with an interannual variability from near carrying capacity in the mid-2000's after a period of high productivity to current levels. Thus, the NPFC decided to improve the measure on Pacific saury, and adopted CMM 2021-08 to replaces CMM 2019-08.

Provisions of CMM 2021-08 include:

- 1. For 2021 and 2022, Members of the Commission agree, having regard to the advice of the Scientific Committee, that the annual catches of Pacific saury in the entire area (the Convention Area and the areas under their jurisdiction adjacent to the Convention Area) should not exceed 333,750 metric tons.
- 2. In 2021 and 2022, the annual total allowable catch (TAC) of Pacific saury in the Convention Area shall be limited to 198,000 metric tons.
- 3. As a provisional measure until the Commission decides allocation of the TAC, each Member of the Commission shall reduce the annual total catch of Pacific saury by the fishing vessels entitled to fly its flag in 2021 and 2022 by 40% from its reported catch

in 2018 so that the total catch in the Convention Area will not exceed 198,000 metric tons

4. To protect juvenile fish, Members of the Commission are encouraged to take measures for fishing vessels flying their flags to refrain from fishing for Pacific saury in the areas east of 170°E from June to July.

Given that the NPFC adopted the new CMM as a precautionary approach in time, showing that the management strategy works to respond to the stock status accordingly. The score is meet 80.

For the reasons above, this PI is scored as Green level (>80).

# Other species information (2.2.3)

Scoring category Green

#### Rationale:

Quantitative information on the targeted species and other main species is available, encompassing fishery-dependent data (logbooks) and fishery-independent data (observers), which are reviewed by research institutes and government agencies. Each of these species has a detailed stock assessment conducted based on quantitative information of total landings, stock biomass, species life history characteristics and total mortality and, in some cases, environmental parameters that affect recruitment. With a high degree of certainty and the available information, the impact of this fishery on these stocks is considered as low. Information is adequate to support a partial strategy or full strategy to manage other main species.

For the reasons above, this PI is scored as Green level (>80).

# ETP species outcome (2.3.1) Scoring category Red

#### Rationale:

#### Shortfin mako shark (Isurus oxyrinchus)

The ISC assessed the North Pacific shortfin mako shark in 2018 by using data up to 2016. The results showed that, relative to MSY, the stock in the North Pacific Ocean is likely (>50%) not in an overfished condition and overfishing is likely (>50%) not occurring. This suggests that the stock is likely to be above PRI. Furthermore, the assessment looked at future projections (over the next ten years) for the stock. It found that the spawning abundance was expected to increase gradually if fishing pressure remained stable or

decreased relative to 2013-2015 levels. However, the model's ability to project into the future is highly uncertain given the uncertainties of fishery data and key biological processes within the model (Figure 8) (WCPFC SC, 2018). Given that the estimated SA has been above MSY, the known direct effects of the UoAs are not likely to hinder the recovery of this species. The score is between 60-79.

There is no stock assessment for the South Pacific shortfin mako shark, so it is unknown if the stock is at or above a level capable of producing the MSY. Furthermore, it is unknown whether the current catches are at levels that will allow the stock to move toward the biomass and support the MSY. Due to the lack of data, especially fishery-specific data, it is difficult to estimate the direct impact of the fisheries on mako sharks. Given that there is no sufficient information to understand the effects of the UoAs, the score is under 60.



Figure 8 Kobe time series plot of shortfin mako sharks in the North Pacific Ocean indicate the ratio of spawning abundance (SA; number of mature female sharks) relative to spawning abundance at MSY ( $SA_{MSY}$ ), and the ratio of fishing intensity (1-SPR) relative to fishing intensity at MSY (1-SPR<sub>MSY</sub>) for the base case model. The Blue triangle and black circle denote the values of the start (1975) and end (2016) years, respectively. The Black lines indicate 95% confidence intervals (2016) of the end year. The Gray numbers indicate selected years.

#### Thresher shark (Alopias vulpinus)

According to the proposal from the Convention on the Conservation of Migratory Species of Wild Animals in 2014, the population status for thresher shark in eastern and central Pacific was near threatened, but the data in Indo-Western Pacific region was deficient. All species exhibit similar biological characteristics and face the same challenges for fishing mortality. Both target species and bycatch are predominantly caught by longline fishing gear. The stock status of thresher shark is unknown in the Pacific and there has been no stock assessment or analysis conducted on this species. Given that there is no sufficient information to understand the effects of the UoAs, the score is under 60.

#### Silky shark (Carcharhinus falciformis)

The most recently completed stock assessment was conducted in 2018 (Clarke and Langley, 2018). This stock assessment uses the stock assessment model and computer software known as Stock Synthesis. The conclusions of the assessment were that the stock is not considered to be overfished and there is a 78% probability that SB<sub>2016</sub> is greater than SB<sub>MSY</sub>. Furthermore, the current level of catch is substantially higher than the MSY. If catches remain at the current level, there is a high probability that the biomass will decline to below the SB<sub>MSY</sub> level in the foreseeable future (~ 5 years). Although these estimates are not considered reliable bases for management decision-making, they represent the progress since the 2013 assessment and the best available science concerning the status of silky shark in the WCPO. The SC14 concluded that, on the basis of the best available science and pending the availability of less uncertain stock status indicators, the stock is not overfished, but is subject to overfishing. Given that there is no sufficient information to understand the effects of the UoAs, the score is under 60.

#### Probeagle shark (Lamna nasus)

The first stock assessment of porbeagle shark in the southern hemisphere (includes WCPO and EPO) was conducted in November 2017. The report of WCPFC SC13 noted that although the stock status of the species is currently unknown the results of the assessment show that fishing mortality on the Southern Hemisphere stock is very low, and that it decreases eastward from the waters off South Africa to the waters off New Zealand. In the assessment area (Eastern Atlantic to Western Pacific Ocean) in the last decade (2005 to 2014), median F values ranged from 0.0008 to 0.0015 (mean 0.0010). This fishing mortality was less than 9% of the MIST based on the risk metric R in all years assessed (1992-2014) and fell to half that level in more recent years, with at most a 3% probability of exceeding the MIST based on the risk metric R in 2010-2014. For the same scenarios, fishing mortality is less than 12% of the MIST based on 0.75r and less than 18% of the MIST based on 0.5r. Therefore, the direct effects of the UoAs are likely to not hinder recovery ETP species. But the indirect effects have not considered for the UoAs, so the score is between 60-79.

#### Oceanic whitetip shark (Carcharhinus longimanus)

The most recent stock assessment (Tremblay-Boyer et al., 2019) for the oceanic whitetip shark was performed by using the SS modelling framework (Methot Jr and Wetzel, 2013). The four-fleet structure used in the previous stock assessment divided the longline fishery into bycatch and target fleets and the purse seine fishery into fleets of associated and unassociated sets. A new addition to the 2019 assessment was the discard mortality

scenarios in historical catches. The stock assessment showed that the stock of this species is overfished and overfishing is occurring based on SB/SB<sub>MSY</sub> and F/F<sub>MSY</sub> reference points. Given that there is no sufficient information to understand the effects of the UoAs, the score is under 60.

#### Hammerhead shark species (Sphyrnidae)

The stock status of hammerhead shark species is unknown but, given the life characteristics of these species, it is likely to be declining. So far there is not any stock assessment or analysis conducted for any of the hammerhead shark species in either WCPO or EPO. The report of WCPFC SC14 indicated that there is a high level of retention (about 70%) in longline fisheries in the region (Peatman et al., 2019). Given that there is no sufficient information to understand the effects of the UoAs, the score is under 60.

#### Sea turtles

At the global level, the IUCN Red List of Threatened Species evaluates six of the seven marine turtle species on the risk of extinction, and classifies each species as vulnerable, endangered, or critically endangered based on the respective stock status. However, threats on regional scales can affect different life-stages of the same populations.

Fisheries bycatch has been ranked as the most significant threat to sea turtle populations globally, followed by climate change. A comparison of impact between the three gear types (longlines, nets, and trawls) was conducted. Pelagic longline fisheries were identified as significant sources of impacts on North and South Pacific loggerheads and Eastern Pacific leatherbacks, both have seen nesting population declines of more than 80% in the past two decades (Clarke et al., 2014).

The sea turtles bycatch rate of a longline vessel targeting albacore tuna is likely to be low as the catch of albacore is primarily taken at >100 meter in cooler waters in the WCPO, and sea turtles primarily inhabit shallower coastal waters. To be specific, indirect impact on sea turtles were observed to be the surrounding disturbance around the inshore nesting areas. As albacore longliners are operating in the areas of deep water, the longliners are unlikely to negatively impact the inshore nesting areas of sea turtles.

The observers onboarded the vessels of Taiwan and Vanuatu have reported interactions with two species of sea turtles (Loggerheads and Green turtles). In accordance with the international and national regulations, when sea turtles are incidentally caught, they shall be released by cutting the branch lines. In addition, vessel owners are required to carry and employ dip nets and de-hookers to handle turtles as appropriate. Thus, known direct effects of the UoAs are likely not to hinder the recovery of sea turtle species, while the indirect effects are not clear. The score is between 60-79.

#### <u>Seabirds</u>

Given that the distribution of albatrosses and large petrels, which are key at-risk species susceptible to incidental capture by pelagic longline fisheries, occur poleward of 20° latitude in both hemispheres, it is highly likely that this longline fishery overlaps with these seabird species. Filippi et al. (2010) compared the distribution of seabirds and their likelihood of capture in relation to longline fishing effort in the WCPFC Convention Area. The study used a Productivity-Susceptibility Analysis (PSA) to identify the areas of greatest risk of occurrence and impacts of bycatch, the species of greatest concern for population impacts, and the fisheries contributed to the greatest risk. The result of the areas of likely species-level effects of fishing in the WCPFC Convention Area are shown in Figure 9. As shown on the map, the albacore fishery is located in a relatively high-risk area for seabird interactions. But according to the records, observers onboard Taiwan and Vanuatu longline vessels have observed very few interactions with seabirds (Taiwan, 2019). The direct impact of the fishery is likely not hindering the recovery of seabird species. The score is between 60-79.



Figure 9. Areas of likely species-level effects of fishing in the WCPFC Convention Area. Highest risk areas – pink; Medium-high - orange; Medium – green; Medium-low – pale blue; Low – dark blue; Negligible risk – White.

#### Marine mammals

There are two main types of interaction between cetaceans and longline vessels: depredation and capture via hooking and entanglement (Anderson, 2014). Although

longline fishing generally does not pose as much of a threat compared to other fishing gear such as gillnets, many cetacean individuals suffer mortality and serious injury due to the interactions (Gilman et al., 2006; Garrison, 2007 cited in Werner et al., 2015). Besides, both Taiwan and Vanuatu have measures and regulations to protect marine mammals. And, according to the WCPFC Annual Reports of Taiwan and Vanuatu, the interaction with ETP marine mammals is rare; therefore, it is highly likely that the UoAs do not hinder the recovery of these species. Nevertheless, due to the indirect effects (such as noise disturbance) are not clear. Thus, the score is between 60-79.

For the reasons above, this PI is scored as Red level (<60).

# ETP species management (2.3.2)

Yellow

Scoring category

# Rationale:

#### <u>Sharks</u>

WCPFC CMM-2019-04 adopted management measures related to shark bycatch. These measures include:

- 1. CCMs should implement, as appropriate, the FAO International Plan of Action for the Conservation and Management of Sharks (IPOA).
- 2. CCMs shall take measures necessary to require that all sharks retained on board their vessels are fully utilized. CCMs shall ensure that the practice of finning is prohibited.
- 3. In 2020, 2021 and 2022, CCMs shall require their vessels to land sharks with fins naturally attached to the carcass, or may take alternative measures as listed below to ensure that individual shark carcasses and their corresponding fins can be easily identified on board the vessel at any time:
  - (1) Each individual shark carcass and its corresponding fins are stored in the same bag, preferably biodegradable one.
  - (2) Each individual shark carcass is bound to the corresponding fins using rope or wire.
  - (3) Identical and uniquely numbered tags are attached to each shark carcass and its corresponding fins in a manner that inspectors can easily identify the matching of the carcass and fins at any time.
- 4. For longline fisheries targeting tuna and billfish, CCMs shall ensure that their vessels comply with at least one of the following options:
  - (1) do not use or carry wire trace as branch lines or leaders; or
  - (2) do not use branch lines running directly off the longline floats or drop lines, known as shark lines.

- 5. CCMs shall prohibit vessels flying their flag and vessels under charter arrangements to the CCM from retaining on board, transshipping, storing on a fishing vessel or landing any oceanic whitetip shark, or silky shark, in whole or in part, in the fisheries covered by the Convention.
- 6. The SC shall periodically provide advice on the stock status of key shark species for assessment and maintain a WCPFC Shark Research Plan for the assessment of the status of these stocks. If possible, this should be done in conjunction with the Inter-American Tropical Tuna Commission.
- 7. CCMs shall require all vessels release any oceanic whitetip shark or silky shark that is caught as soon as possible after the shark is brought alongside the vessel, and to do so in a manner that results in as little harm to the shark as possible, following any applicable safe release guidelines for these species.

Within the IATTC, shark management measures are covered under the Resolution C-05-03, Resolution C-16-04 and Resolution C-16-05. The species-specific Resolutions refer to oceanic whitetip shark (Resolution C-11-10) and silky sharks (Resolution C-16-06). The provisions of these Resolutions include:

- 1. CPCs shall, where possible, in cooperation with the IATTC scientific staff, undertake research to:
  - (1) Identify ways to make fishing gears more selective, where appropriate, including research into alternative measures to prohibiting wire leaders.
  - (2) Improve knowledge of key biological/ecological parameters, life-history and behavioral traits, and migration patterns of key shark species.
  - (3) Identify key shark mating, pupping, and nursery areas; and
  - (4) Improve handling practices for live sharks to maximize post-release survival.
- 2. CPCs shall prohibit longline vessels flying their flag and targeting tuna or swordfish in the Convention Area from using shark lines.
- 3. The use of gaffs, hooks, or similar instruments is prohibited for the handling of sharks. No shark may be lifted by the head, tail, gill slits, or spiracles, or by using bind wire against or inserted through the body, and no holes may be punched through the bodies of sharks (e.g., to pass a cable through for lifting the shark).
- 4. The Resolution of silky shark shall be reviewed annually at the meeting of the SAC, in order to evaluate the adequacy of the measures, notably those in paragraphs 2, 3 and 6 in that Resolution.

So, there are measures in place and are expected to be highly to achieve national and international requirement for the ETP species. And the measures are considered likely to work. Besides, there is a review of the potential effectiveness and practicality of alternative measures to minimize UoAs related mortality of sharks. But there is no clear

evidence that the strategy is being implemented successfully. Therefore, the score is between 60-79.

#### Sea turtles

The WCPFC and IATTC have both adopted management measures to address the incidental capture of sea turtles. The WCPFC CMM related to sea turtles is CMM 2018-04, which covers both longline and purse seine operations. The WCPFC has also developed several guidelines for handling sea turtles as practicable. Longline vessels must also carry and use dip-nets in accordance with these WCPFC guidelines and may only use large circle hooks or finfish as bait for longline vessels that fish in a shallow-set manner. The requirements in the IATTC Resolution C-19-04 are similar to the WCPFC CMM 2018-04. The measures are considered feasible as they are based on research regarding sea turtle interaction/bycatch in longline fisheries (Gilman and Huang, 2017). Besides, in the Resolution C-19-04 that the Commission staff be requested to report to the Bycatch Working Group every three years (beginning in 2024) on the extent of implementation. Therefore, there is a regular review of the potential effectiveness and practicality of alternative measures to minimize UoAs related mortality of sea turtles. However, there is no clear evidence that the strategy is being implemented successfully. Therefore, the score is between 60-79.

#### Seabirds

The WCPFC and IATTC have both adopted management measures that require the implementation of seabird bycatch mitigation. CMM 2018-03 (replacing CMM 2017-06) is the current seabird management measure in WCPFC, providing measures to mitigate the impact of fishing activities on seabirds. In IATTC, seabird mitigation measures are covered by Resolution C-11-02. The Resolution C-11-02 replaced the Recommendation C-10-02 and Resolution C-05-01. The requirements of these Resolutions will be subject to review and possible modification. Therefore, there is a regular review of the potential effectiveness and practicality of alternative measures to minimize UoAs related mortality of seabird species.

In addition, based on the interview with the WCPO industry stakeholders and the observer data, indicated that seabird interactions with longline vessels operating in tropical and subtropical areas of the WCPO are very rare, except in the Hawaii-based longline fisheries, (Watling, 2002). Thus, the measures appear likely to work. But there is no clear evidence that the strategy is being implemented successfully. Therefore, the score is between 60-79.

#### Marine mammals

Neither the WCPFC nor IATTC has explicit management measures in addressing the impact of longline fisheries on marine mammals. However, for WCPO longline fisheries, the protection of marine mammals is implemented through the Pacific Islands MoU to which Vanuatu is a signatory. As for Taiwanese fleets, the protection measures adopted by the Government of Taiwan are included in the provisions of Regulations for Tuna Longline or Purse Seine Fishing Vessels Proceeding to the Pacific Ocean for Fishing Operation and the Wildlife Conservation Act.

For example, Article 51 of the Regulations requires that any marine mammals incidentally caught shall be released when caught alive or discarded if dead. In Taiwan, the species of marine mammals are applicable to the Wildlife Conservation Act. And Article16 of this Act indicates that harassment, ill-treatment, hunting, slaughtering, trading, displaying, showing, holding, importing, exporting and breeding of wild animals is prohibited. Therefore, it can be considered that there are measures in place that minimize the mortality of marine mammals.

Based on observers and logbooks' data from this fishery, the catch rate of marine mammals is low, so these measures may be effective. However, evidence is not clear and sufficient to prove these measures are successful. Therefore, the score is between 60-79.

For the reasons above, this PI is scored as Yellow level (60-79).

# ETP species information (2.3.3)

Scoring category Red

#### **Rationale:**

For all scoring elements above, there will be some quantitative information from logbook entries and observer records. Both the IATTC and WCPFC require reports on interactions with seabirds, sea turtles, and marine mammals annually. The required observer coverage rate under the IATTC and WCPFC measures is 5%.

Much of the information used in scoring ETP species component stems from the studies on similar fisheries (e.g., Gilman et al., 2017) or risk assessments (e.g., Filippi et al., 2010), with the fishery-specific information provided only by a limited observer dataset. So, there are some quantitative information is adequate to assess the impact of the UoAs on ETP species and to determine whether this fishery may be a threat to the protection and recovery of the ETP species, but not all.

For the reasons above, this PI is scored as Red level (<60).

# Habitats outcome (2.4.1)

Scoring category Green

#### Rationale:

The longlines targeting albacore tuna usually set in deep oceanic waters, and the fishing gear is highly unlikely to interact with or harm bottom habitats. The conclusion in this preassessment therefore is that this fishery is highly unlikely to interact with benthic features or reduce structure and function of any bottom habitats.

For this reason, this PI is scored as Green level (>80).

# Habitats management (2.4.2)

Scoring category	Green
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### Rationale:

A habitat management strategy may not be necessary as these longline fisheries operate with minimal impact on habitats.

For this reason, this PI is scored as Green level (>80).

Green

# Habitats information (2.4.3)

Scoring category

# Rationale:

The albacore longline fishery is strictly a pelagic fishery and does not interact with benthic habitats. All UoAs' operation in WCPO and EPO are undertaken in deep oceanic waters and do not have any physically contact with substrate (seabed, seamount, corals, etc.), nor do they have any impact on any physical habitat during operations. As such, the water column is the only habitat to be considered potentially impacted. Vessels in both the WCPO and EPO fisheries would be subject to Vessel Monitoring System (VMS) under CCM 2007-02 and Resolution C-14-02, which monitor the movements of fishing vessels in the respective Convention Areas, and the VMS data can determine the extent and spatial dynamics of the fishery (CONAPESCA 2020). Based on this, level of detail of information is adequate to broadly understand the nature of the main impacts of gear use on the commonly encountered habitats, including spatial overlap of habitat with fishing gear.

For the reasons above, this PI is scored as Green level (>80).

# Ecosystem outcome (2.5.1)

Scoring category	Green
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#### Rationale:

The impacts of this fishery on retained species, bycatch, ETP species as well as habitats have all been considered and described in the above sections of this report. However, other risks still exist, and the further impacts on the fishery may consider high, particularly those risks related to ecosystem structure and functions due to the removal of pelagic species. Number of papers have described general declines of predatory fish species, and the potential/likely impacts to the ecosystem through disturbance of trophic dynamics.

In the EPO, number of ecosystem studies have been undertaken. Some studies found that tropical tunas in the EPO act as meso predators more than apex predators. The research in collaboration with the IATTC and research organizations also seek to develop amino acid compound-specific isotopic analysis as a tool to provide a rapid and unbiased evaluation of trophic position for a wide variety of marine organisms. This information can be used to validate output from trophic mass-balance ecosystem models.

In the WCPO, the SC of WCPFC continues to investigate the ecosystem and trophic impacts of these removals through various studies and ecosystem models. The WCPFC conducted the pelagic trophic dynamic study, of which the long-term objective is to develop ecosystem approaches of fisheries management through building ecosystem models to assess fishing and environmental impacts on the whole ecosystem and evaluate management options. Through these detailed studies, the WCPFC has constructed several robust and detailed biodynamic tropic Ecopath with Ecosim models.

The WCPFC and IATTC have a significant amount of comprehensive and high-quality information and monitoring available to its ecosystem. Main interactions between the fishery and these ecosystem elements including impacts of removals, large scale oceanographic events, change of variability, climate change, can be inferred from existing information and have been investigated. The major functions of the components (i.e., target species, other species, ETP species and habitats) in the ecosystem are well known. Furthermore, extensive ecosystem modeling and analysis on the impacts of the fishery on the components (especially on retained tuna and non-tuna discarded components) and elements (especially on trophic structure) are available and sufficient.

For the reasons above, this PI is scored as Green level (>80).

# Ecosystem management (2.5.2) Green

Scoring category

#### Rationale:

Article 119 of United Nations Convention on the Law of the Sea (UNCLOS) obliges Parties to implement certain aspects of the ecosystem-based management approach when establishing measures to conserve living marine resources. Article 5 of the 1995 United Nations Fish Stocks Agreement (UNFSA) also details certain features of the ecosystem approach, including the need to preserve marine biodiversity and to maintain the integrity of marine ecosystems. The management measures and resolutions of the WCPFC and IATTC apply the FAO code, stating that the fisheries management should ensure the conservation of target and bycatch species (Allain et al., 2010). Consequently, the WCPFC and IATTC have measures in place that address both target and bycatch species.

The WCPFC's application of the FAO code extends to manage the highly migratory fish species including tuna through conservation and management measures such as CMM 2014-01 on the management of albacore tuna, bigeye tuna, yellowfin tuna and skipjack, Resolution 2005-03 on non-target fish species and relevant CMMs on improvement the protection of sharks. Although these CMMs are not specifically designed to manage the impacts on the ecosystem, the range of measures in place is considered to represent a strategy that works to achieve the intended outcome.

The IATTC is an observer of both UNCLOS and UNFSA and has introduced binding Resolutions for all key tuna stocks, ETP species and key shark species taken within the EPO. The IATTC manages ecosystem impacts largely through managing the removal of target species and through collecting data on interactions with non-target and ETP species. Management measures are also in place to promote reduction in discard mortality, specifically among shark species (Resolution C-16-05). In addition, the IATTC continues to collect data and monitor work through observer coverage, logbooks, VMS and ongoing ecosystem and trophic research. Studies and reports also investigate the physical habitat of the EPO region.

The regional stock assessments indicate that current harvest strategies and management measures have been successful in maintaining target species about the BMSY level. The strategy considers the significant sources of fishery-related risks to the WCPO ecosystem, namely the removal of target species, risks associated with impacts of bycatch and discarding of a wide range of non-target species. Overall, the strategy is considered feasible.

As previously indicated, regional stock assessments show that current harvest strategies and management measures have been successful in maintaining target species at about the BMSY level. Available ecosystem modelling suggests that it is unlikely this fishery is having an irreversible impact on ecosystem functioning (SCS global services,2019).

For the reasons above, this PI is scored as Green level (>80).

# **Ecosystem information (2.5.3)**

Scoring category Green

# Rationale:

In the WCPO, several organizations have been devoted to collecting detailed data on the structure of the Pacific Ocean pelagic ecosystem. The data has been collected from observer programs, trophic analyses and mid-trophic level sampling. In addition, the SPC has been exploring the applicability of ecosystem models including Ecopath with Ecosim and Spatial Ecosystem and Population Dynamics Model (SEPODYM).

In the EPO, the IATTC has a significant amount of comprehensive and high-quality information and monitoring available to it regarding all areas of information. Major interactions between the fishery and these ecosystem elements including impacts of removals, large scale oceanographic events, change of variability and climate change, can be inferred from existing information, and have been investigated.

Information on the main functions of the components in the WCPO and EPO ecosystems are well studied, and the main impacts of this fishery on those key ecosystem elements can be inferred from existing information.

For the reasons above, this PI is scored as Green level (>80).

# Management - Principle 3

Principle 3 focuses on whether there is an institutional and operational framework appropriate to the size and scale of the UoA(s) for implementing Principles 1 and 2, capable of delivering sustainable fisheries.

# Legal and/or customary framework (3.1.1)

Scoring category Green

### **Rationale:**

This fishery is managed respectively by the Fisheries Agency of Taiwan and Fisheries Department of Vanuatu at the national level and governed by the WCPFC, IATTC and other regional bodies, including Pacific Islands Forum Fisheries Agency (FFA) with the support of SPC at the regional level.

### **WCPFC**

The WCPFC, which officially came into force in 2004, was established by the Convention for the Conservation and Management of Highly Migratory Fish Stocks in the WCPO, is aiming to manage such species in the Convention Area. The WCPFC Convention includes many provisions found in the UNFSA. Under the Convention, the governing body called the Commission, was formed. The Commission is made up of representatives from countries that have ratified the Convention.

The WCPFC improve the management of tuna and tuna-like species in the region through the adoption of CMMs. All members of the WCPFC are legally bound to apply these measures to their fisheries operating in the Convention Areas. The process of decision making also is fair and transparent, which allow CCMs and the observers to fully participate in the meetings. In addition, the WCPFC established a Compliance Monitoring Scheme to facilitate the compliance of CMMs of concerned CCMs.

The WCPFC dispute settlement mechanism is set out under Article 31 of the Convention. Annex II of the Convention establishes the authority to form a panel to review decisions made by the Commission and to settle disputes among members of the Commission. The dispute settlement mechanism allows for a transparent process to occur. To date there have not been any sanctions imposed by WCPFC. The mechanisms for dispute resolution are transparent and considered to be effective in dealing with most issue and that is appropriate to the context the UoAs. The Convention also addressed the special need or requirement for the small island developing to protect their traditional and customary rights. Therefore, the score is meet 80

# IATTC

The IATTC was established under the 1949 Convention and is responsible for the management of tuna and tuna-like species in the EPO. The Antigua Convention entered into force in 2010 to replace the 1949 Convention of the IATTC. The Antigua Convention is open to the Parties to the 1949 Convention, State not the Party to the 1949 Convention with a coastline bordering the Convention Area, State whose nationals fish for fish stocks covered by the Convention; or State that is otherwise invited to join on the basis of a decision by the Parties.

The IATTC improve the management of tuna and tuna-like species in the region through the adoption of Resolutions. All members of IATTC are legally bound to apply these measures to their fisheries operating in the Convention Areas. The system of adoption of resolutions and recommendations proposed by members of the Commission is transparent. The system of adoption of resolutions and recommendations proposed by members of the Commission is transparent. Members are fully informed of the issues under consideration and are able to participate in informed discussion. Independent observers, including NGO and IGOs, are present at such meetings and would observe any resolutions and justifications that are presented. Dispute resolution is provided for through Part VII of the Antigua Convention, which outlines how disputes between Commission members can be addressed. Furthermore, IATTC annual meetings provide a forum to discuss disputes. If needed, disputes may also be settled through either the International Court of Justice or the International Tribunal for the Law of the Sea.Legal rights of people dependent on fishing for food or livelihood are protected through national interests of Parties to the Convention. Therefore, the score is meet 80.

#### <u>Taiwan</u>

After the WCPFC officially came into force in 2004, Taiwan, as a member of Commission, participated in the meetings of WCPFC annually. After the Antigua Convention entered into force in 2010, Taiwan, as a member of Commission, also participated in the meetings of IATTC annually.

The Fisheries Act (2016) and the Distant Water Fisheries Act (2016) are the two major instruments of fisheries management for Taiwan's fleets. The latter stipulates that the competent authority should consider the precautionary principle, ecosystem-based approach, and the use of the best available scientific advice, with an aim to achieve management outcomes consistently. Annually, the Fisheries Agency includes the update WCPFC CMMs and IATTC Resolutions into the Regulations for Tuna Longline or Purse Seine Fishing Vessels Proceeding to the Pacific Ocean for Fishing Operation.

Pursuant to the Administrative Procedure Act, when formulating a legal order, the administrative authority shall cause it to be publicly announced in a government gazette or newspaper, and any person may give the designated authority his/her opinions within the specified period (Article 154). Furthermore, in Article 168 of the same Act, it stipulates that every citizen is entitled to present to competent authorities petitions with respect to proposals on administrative innovations and reforms, inquiries into administrative laws and regulations, reports on acts in breach of law or neglect of administrative duties or protection of the [people's] rights and interest in administration. Accordingly, any stakeholder can participate in the formation of the relevant law and regulations and resolve the disputes concerned by the mechanism in a transparent manner.

Therefore, the score is meet 80.

#### <u>Vanuatu</u>

The Vanuatu Government manages tuna fisheries through the Fisheries Department of the Ministry of Agriculture, Livestock, Forestry, Fisheries and Biosecurity. The Fisheries Act No.10 (2014) and the Fisheries Regulations (2009) are the two major instruments governing the management of fisheries resources in Vanuatu's EEZ. Vanuatu is one of the parties of international and regional legal instruments such as the WCPF Convention, UNCLOS and UNFSA that relate to conservation, management and development. Therefore, there is an obligation to apply the principles in those agreements, including the precautionary approach, in their EEZ. Vanuatu is also a Party of Tokelau Arrangement, which came into force in December 2014. The Tokelau Arrangement covers most South Pacific countries and provides a cooperative framework for these coastal States/territories to set management measures specifically for South Pacific albacore within their EEZs.

Under the Vanuatu legal system there is a provision under the Fisheries Act, where appeals against decisions made by the Director of Fisheries can be made by way of request to the Minister for a re-consideration of the decision. The Fisheries Act is a publicly accessible document, which therefore provides a transparent mechanism, which is considered to be effective in dealing with most disputes.

Pursuant to the Fisheries Act No.10 (2014) Part 2, Section 4, which provides for the adoption of measures ensure that levels of fishing effort do not exceed those commensurate with the sustainable use of fishery resources and take into account the interests of artisanal, subsistence fishers and local communities, maintain traditional forms of sustainable fisheries management, as well as ensure broad participation by Vanuatu nationals in activities related to the sustainable use of fisheries resources. Therefore, the score is meet 80.

For the above reasons, this PI is scored as Green level (> 80).

# Consultation, roles, and responsibilities (3.1.2)

Scoring category	Green
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#### Rationale: WCPFC

The functions, roles, and responsibilities of member countries of the WCPFC have been identified in various Articles of the Convention. The roles and responsibilities of the Commissions and Committee have also been well defined by the WCPFC. The WCPFC allows observers to attend specific meetings, and the terms for which an observer must adhere have been well defined. Therefore, the functions, roles and responsibilities are explicitly defined and well understood for key areas of responsibility and interaction

There are number of regular formal and informal consultation processes at WCPFC that regularly seek and accept information from members and cooperating non-members. Besides, the Commission is also active in assisting and facilitating the regular and timely provision of fisheries data and information for assessment by the Commission secretariat and scientific providers.

The Commission actively uses information from the fishery and its member states to inform fisheries management decisions and assist in the formulation of CMMs. The Commission also has formal cooperative relationships with other organizations. Given that all interested and affected parties are able to give input regarding decisions, the score is meet 80.

# **IATTC**

The functions, roles, and responsibilities of member countries of the IATTC have been identified in various Articles of the Convention. The roles and responsibilities of the Commissions and Committee have also been well defined by the IATTC. The IATTC allow Observers to attend some meetings and the terms of being an Observer have been well defined. The performance of the IATTC Secretariat is also well.

Roles and responsibilities are explicitly at the national level, such as providing catch and monitoring data to the Secretariat, taking part in various meetings sharing information and making decisions, meeting the requirements for conservation and other recommendations for IATTC. There are number of regular formal and informal consultation processes at IATTC that regularly seek and accept information from members and cooperating non-members.

The Commission actively uses information from the fishery and its member states to inform fisheries management decisions and assist in the formulation of Resolutions, as well as also has formal cooperative relationships with other organizations. Given that all interested and affected parties are able to give input regarding decisions, the score is meet 80.

#### <u>Taiwan</u>

At the national level, Taiwan Fisheries Agency's roles and responsibilities are well defined. The fisheries management is mainly administered by the Fisheries Agency. The Deep Sea Fisheries Division of Fisheries Agency is dealing with the issues of distant water fishing operations, including issuing fishing permits, employing VMS, e-logbook and observer program, implementing port inspections, monitoring quota or harvest limit, monitoring transshipment activities, and law enforcement, etc.

Before every annual meeting of the WCPFC and IATTC, the Fisheries Agency holds a consultation meeting with the Taiwan Tuna Association, Taiwan Tuna Purse Seiners Association, Taiwan Tuna Longline Association, Fishermen's Associations, experts from academia, and the OFDC to facilitate the discussion and consultation among the stakeholders. And all interested and affected parties have opportunity to provide the comments in the meetings, which may be regarded as a consultation approach. Therefore, the score is meet 80.

#### <u>Vanuatu</u>

The roles and responsibilities of the Ministry of Agriculture, Livestock, Forestry, Fisheries and Biosecurity are outlined in Part 3 of the Fisheries Act No.10 (2014). The Minister is responsible for providing general policy guidance on fisheries matters and delegating responsibilities and direction to the Director. The roles and responsibilities of the Director of Fisheries is to manage and coordinate monitoring and control of Vanuatu fishing vessels engaged in fishing or related activities within and beyond Vanuatu waters; and to promote and facilitate the development of Fisheries Management Plans, etc.

To facilitate the consultation among the stakeholders, a Fisheries Management Advisory Council (FMAC) consisting of members from the fishing industry, artisanal fisheries, offshore fisheries, non-governmental organizations (NGOs), and relevant governmental agencies was also established. The function of the FMAC is to provide recommendations to the Director on policy matters relating to the fisheries conservation and management. Through the FMAC and formal consultations with all relevant stakeholders the Vanuatu government has developed and implemented plans such as the Tuna Management and Development Plan 2014. Through the FMAC and formal consultations with all relevant stakeholders the Vanuatu government has developed and implemented plans such as the Tuna Management and Development Plan 2014. Within Fisheries Act No.10 (2014) Part 4, specifies that the Director in preparing fishery management plan, must consult with fishermen, local authorities or other person likely to be affected by the plan. The process outlined before certainly provides opportunity for all interested and affected parties to be involved. Therefore, the score is meet 80.

For the reasons above, this PI is scored as Green level (>80).

# Long-term objectives (3.1.3)

Scoring category Green

#### Rationale: WCPFC

The WCPFC has clear long-term objectives to guide the decision-making process, and such objectives are stated in the CMMs adopted by their Commission. Evidence is provided in various Commission reports and in CMMs, that these objectives are guiding, or are starting to guide decision-making. Therefore, this score is meet 80.

#### **IATTC**

The IATTC has clear long-term objectives to guide the decision-making process, and such objectives are stated in the Resolutions adopted by their Commission. Various Articles of the Convention require the effective long-term management of tuna and tuna-like species. Therefore, this score is meet 80.

#### <u>Taiwan</u>

Within Article 1 of the Distant Water Fisheries Act (2016) provides clear long-term objectives. The Act is "enacted to ensure the conservation of marine fisheries resources, strengthen distant water fisheries management, curb illegal, unreported and unregulated (hereinafter referred to as IUU) fishing, and improve traceability of catches and fisheries products, so as to promote the sustainable operation of distant water fisheries". Besides, the Article 5 requires the competent authority shall, taking reference with international conventions, treaties, agreements and conservation and management measures, draw up and promulgate national plans of actions with the pre-cautionary principle, ecosystem-based approach and the best available scientific advice. Therefore, this score is meet 80.

#### <u>Vanuatu</u>

Part 2 of the Fisheries Act No.10 (2014) specifies that the main objectives are to conserve, manage and develop fisheries in Vanuatu so as to ensure its long-term sustainable use

for the benefit of the people of Vanuatu and effectively discharge obligations under Scheduled Treaties and Agreements in which Vanuatu is party to. The main principles that support the objectives of the Act are ensure that such measures are based on the best scientific evidence available and are designed to maintain or restore, where appropriate, target stocks at levels capable of producing maximum sustainable yield, or other suitable reference points, as qualified by relevant environmental and economic factors, and taking into account fishing patterns, the interdependence of stocks and any generally recommended international minimum standards. Therefore, the score is meet 80.

For the reasons above, this PI is scored as Green level (>80).

# Fishery-specific objectives (3.2.1)

Scoring category Green

# Rationale: WCPFC

The long-term objectives for target stocks and the ecosystem are well-defined in WCPFC's Convention. The WCPFC also apply fishery-specific objectives through various CMMs addressing respective target species and bycatch species. The outcomes are consistent with the Principle 1 and 2. In Principle 1, by defining biomass depletion ratios against average SB/SBF=0 for pervious years as the albacore' target. Given that the objectives within the fishery are explicit. Therefore, this score is meet 80.

# IATTC

The long-term objectives for target stocks and the ecosystem are well-defined in Antigua Convention of IATTC, and by management resolutions to actualize the management. Some resolutions have clear objectives for albacore, such as Resolution C-05-02, defined the total level of fishing effort do not beyond 2005's level. For ecosystem components, there are some resolutions serve mitigate impacts of fishing. Therefore, this score is meet 80.

# <u>Taiwan</u>

As mentioned above, Article 5 of the Distant Water Fisheries Act requires the Fisheries Agency to develop arrangements based on the precautionary principle, ecosystem-based approach, and the best available scientific advice. Taiwan also follows the CMMs and Resolutions of WCPFC and IATTC that are currently in force, and annually amends the Regulations for Tuna Longline or Purse Seine Fishing Vessels Proceeding to the Pacific Ocean for Fishing Operation to ensure the compliance of its distant water fishing vessels.

For example, Article 30 of the Regulations for Tuna Longline or Purse Seine Fishing Vessels Proceeding to the Pacific Ocean for Fishing Operation specifically requires vessels to stop catching the concerned species when their catches have reached 95% of total annual catch limit. Small scale longliners are not permitted to target bigeye tuna or to target albacore when fishing in the area North of the Equator, which limits their fishing efforts to a certain extent. Therefore, the score is meet 80.

#### <u>Vanuatu</u>

The current revised Tuna Fishery Management Plan 2014 covers all Vanuatu waters, including the area of Vanuatu's EEZ around Matthew and Hunter Islands. Pursuant to the plan, the four key short-term objectives providing the guidance for the management of the tuna fisheries to ensure the exploitation of tuna resources that are found within or out of Vanuatu waters are compatible with the sustainability of the stock and that the harvest is taken in a way that maximizes long-term economic and social benefits. Therefore, the score is meet 80.

For the reasons above, this PI is scored as Green level (>80).

# Decision-making processes (3.2.2)

Scoring category	Green
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#### Rationale: WCPFC

The WCPFC has a defined and clear decision-making process. In general, the decisionmaking process within the WCPFC is by consensus. If a consensus cannot be reached, a vote can be held. The decision-making process for CMMs are open.

The Convention Article 5 (c) of WCPFC, requires the Commission to apply the precautionary approach in decision-making and Article 6 requires the application of the precautionary approach and use of a Scientific Committee to ensure that the Commission obtains the best scientific information available for its consideration and decision-making.

There is a publicly accessible website by WCPFC, the meeting minutes, reports and scientific reports from the Commission and subsidiary bodies are posted on it and are freely download. The websites provide a high level of public access and transparency, showing how scientific information is used to inform management actions, which are then monitored for effectiveness and discussed.

The WCPFC consensus decision-making process provides a mechanism to avoid legal disputes, and certainly the lack of disputes to date can offer some evidence that this proactively works. Therefore, the score is meet 80.

### **IATTC**

The IATTC has a defined and clear decision-making process within the Article IX of the Antigua Convention. The decision-making process of the IATTC is unanimous consensus. The decision-making process for Resolutions is open.

The IATTC require the use of the precautionary approach when applying the decisionmaking process. And decisions are based on scientific advice and the processes are responsive and transparent.

IATTC also has a publicly accessible website, the meeting minutes, reports and scientific reports from the Commission and other working groups, and information used for decision-making are posted on the website and are freely download. The websites provide a high level of public access and transparency, showing how scientific information is used to inform management actions, which are then monitored for effectiveness and discussed.

In IATTC, if needed, disputes may settle through either the International Court of Justice or the International Tribunal for the Law of the Sea. As the lack of use of the international court that can offer some evidence that this proactively works. Therefore, the score is meet 80.

#### <u>Taiwan</u>

The fisheries management system in Taiwan has established its decision-making process. There are general provisions consistent with the Administrative Procedure Act related to administrative planning, guidance, and petitions. For example, when new act or regulation is proposed, the Fisheries Agency must provide a pre-notice 3-4 weeks in advance for the public to provide inputs on changes, which are then considered by the Fisheries Agency. When the Fisheries Agency proposes to amend a concerned Act or Regulations, the above pre- notice shall be followed, for receiving feedback from the stakeholders, including members of fishing industries, academia sectors, and environmental non-governmental organizations (eNGOs).

As mentioned above in PIs 3.1.3 and 3.2.1, decision-making is based on the precautionary approach and using the best available information, as required by the DWF Act (2016).

As a member of the WCPFC and IATTC, Taiwan is required to submit reports to both organizations for annual reports. In addition, prior to each meeting of the WCPFC and IATTC, a consultation among the members of fishing industry, fisheries experts and scientists, the staff of the Agency will be held on a regular basis. Such consultations facilitate the consensus on developing a national position on proposed CMM or Resolution of the WCPFC and IATTC. Therefore, this system is considered to be an adequate platform that provides responses to issues in a transparent manner. Therefore, the score is meet 80. There is no evidence to suggest that the management system is disrespectful to, or defiant of local laws or legally binding agreements reached at the regional and international level. Therefore, the reasons above, this score is meet 80.

#### <u>Vanuatu</u>

The Fisheries Act No.10 (2014) outlines the procedures for decision-making. In order to assess and recommend measures for management, development and conservation, the Director must consult with appropriate stakeholders. Also, the Director must consult wherever practical with the appropriate fisheries management authorities of other States in the region and in particular with those that share the same interrelated stocks.

In Vanuatu, the Fisheries Management Advisory Council is responsible for making firm rules by decision-making to ensure decisions are subject to informed, independent critique and transparency. Part 2 Section 5 of the Fisheries Act No.10 (2014) specifically ensures the application of the precautionary approach. Part 2 Section 4 of the Fisheries Act No. 10 specifies the Principles of the Act, which include "ensure that such measures are based on the best scientific evidence available and are designed to maintain or restore, target stocks at levels capable of producing maximum sustainable yield" and "collect and share, in a timely manner, complete and accurate data concerning fishing activities on".

Vanuatu is a member of the WCPFC, so it is able to join the meetings of WCPFC, including SC, TCC and Commission meeting as well as to participate in the process of decision-making of WCPFC. The public can access information concerning the fishery's performance and management through the Fisheries Department Facebook. Information available on the Facebook of Fisheries Department shows how scientific information is used to inform management actions, which are then monitored for effectiveness. There is no evidence to suggest that the Fisheries Department is disrespectful to, or defiant of local laws or legally binding agreements reached at the regional and international level. Therefore, the score is meet 80.

For the reasons above, this PI is scored as Green level (>80).

# **Compliance and enforcement (3.2.3)**

Green

Scoring category

### Rationale: WCPFC

WCPFC applies measures such as VMS, IUU vessel listing, port state controls, observers, logbooks and transshipment monitoring to ensure compliance. These are formalized through CMMs and implemented by the CCMs. To date, there is no significant contraventions of regulations have been reported, which provides confidence that fisher comply with the management system.

Sanctions to deal with non-compliance do exist at the regional level, and this is mainly through the IUU vessel listing process under CMM 2019-07. And the list of non-compliance vessels is published on the WCPFC website that are thought to provide effective deterrence.

Like many other tuna RFMOs, the WCPFC has established the Compliance Monitoring Scheme to ensure the CMMs adopted are fully implemented by the CCMs and their fleets. The Scheme is carried out in the annual meeting of the TCC and various reports are produced for such purpose every year.

There is no evidence of systematic non-compliance. Therefore, the score is meet 80.

# <u>IATTC</u>

IATTC demonstrates a MCS system through the implementation of resolutions and monitoring of fleets through many ways, such as logbooks, the observer program, VMS, IUU vessel listing, port state controls and transshipment monitoring. The IATTC has a permanent working group on compliance that reviews and monitors compliance with IATTC management measures.

There are sanctions exist and are applied, such as IUU vessels and vessels detected as being non-compliant with resolutions. Enforcement is the responsibility of the national management bodies. There are no significant non-compliance cases occur, so sanctions are thought to act as effective deterrence.

The Committee for the Review of Implementation of Measures Adopted by the Commission is a permanent group which reviews compliance with IATTC. There are other MCS certifications and reports suggests there is some evidence to demonstrate fishers comply with the management system. Besides, there is also no evidence of systematic non-compliance. Therefore, the score is meet 80.

#### <u>Taiwan</u>

There are MCS tools in place for Taiwan, and relevant legislations also in place to implement CMMs and Resolutions adopted by the RFMOs. The provisions of Chapter 2, of the Distant Water Fisheries Act empowers the Fisheries Agency to take various MCS measures to ensure the compliance of its distant water fishing fleets including this fishery. For example, the Regulations for Tuna Longline or Purse Seine Fishing Vessels Proceeding to the Pacific Ocean for Fishing Operation clearly stipulate all the requirements on various MCS measures has been implemented and the Fisheries Agency has demonstrated the ability to enforce relevant management measures, strategies and/or rules.

The penalty for non-compliance of the Distant Water Fisheries Act and its relevant regulations is stated in Chapter 4 of the Distant Water Fisheries Act. For example, Article 36 of the Distant Water Fisheries Act states that, "In case that any distant water fisheries operator or distant water fisheries employee commits any of the serious infringements stipulated in Article 13, paragraph 1, a fine shall be imposed upon the distant water fisheries operator concerned in accordance with the following provisions, and the fishing license may be suspended for 2 years and under or be revoked...".

There is the evidence to indicate that this fishery complies with the fisheries management system of Taiwan, including the above Act and Regulations as well as management measures at regional level. The EU delisted Taiwan's fishing fleets from the yellow card system is another evidence to show the fully compliance of this fishery. There is no evidence of systematic non-compliance now. Therefore, the score is meet 80.

#### <u>Vanuatu</u>

The Fisheries Department's MCS program adheres to national management measures and regionally management measures adopted by the WCPFC. The MCS program is responsible for the management of VMS system, monitoring of catch log sheets, licensing of fishing vessels, management of the national observer program and conducting at-sea inspections with two patrol vessels. The Fisheries Act No.10 (2014) outlines the requirements and responsibilities for the maintenance of the MCS system, which demonstrates the ability to enforce relevant WCPFC CMMs.

Sanctions applied for non-compliance of regulations are provided in Part 19 of the Fisheries Act No.10 (2014) For most cases, monetary fines apply firstly, but prison terms are also applicable depending on the severity of the crime. Under Part 19, Section 122, of the Fisheries Act No.10 (2014), it states that, a person who divulges information from a vessel monitoring system, to any other person not authorized to receive the information, commits an offence punishable on conviction by a fine not exceeding 100,000,000

Vanuatu Dollars, or by a term of imprisonment of not more than 2 years, or both." In addition, property seizure is also another possible sanction for non-compliance.

The lack of violations from the fleet reported by the Fisheries Department leads to the conclusion that the sanctions are either effective and provide effective deterrence or insufficient to identify offenders.

The TCC16 reviewed the CMR report and submitted to the Commission in September 2020. The CMR identifies that non-compliance occurs, but the deficiencies are minor such as late submissions of transshipment notification reports, VMS data gap and annual transshipment activities not reported. There does not appear to be evidence of systematic non-compliance at either the regional or national level. Therefore, the score is meet 80.

For the reasons above, this PI is scored as Green level (>80).

# Monitoring and management performance evaluation (3.2.4)

Scoring category Yellow

# Rationale:

#### <u>WCPFC</u>

There is a regional annual report developed by the WCPFC Secretariat, which details compliance of members with the reporting provisions of the Commission. The WCPFC through assessing the implementation and performance of the CMMs by reports of member countries to the Commission and stock assessments to conduct the internal review. Stock assessments undertaken by SPC are also subject to peer review and external review to ensure that the scientific processes remain robust. WCPFC carried out an external performance review in 2012. Therefore, the score is meet 80.

# **IATTC**

CPCs provide annual reports to the Commissions on their compliance with the various Resolutions. The Commission meetings review progress with the management measures in terms of their success and implementation. IATTC is subject to regular internal review, as demonstrated by the various committees and working groups that meet regularly and report their findings to the Commission and which are published. IATTC carried out an external performance review in 2016. Therefore, the score is meet 80.

#### <u>Taiwan</u>

As one of the members of the WCPFC and IATTC, Taiwan must send annual reports to the Commissions on its performance of compliance with various CMMs and Resolutions

adopted by the WCPFC and IATTC. The submission of compliance reports and compliance review are regarded as a way of the regular external review on Taiwan's fleets.

There also have a National Plan of Control and Inspection for Fisheries (NPCI)) implemented in Taiwan, which indicating Taiwan has management system subject to regular internal review. According to the NPCI, the Fisheries Agency of Taiwan sets annual goals for port inspection, observer coverage and implementation rate of high seas boarding inspection, and annually reviews the result of implementation so as to facilitate the amend the contents of NPCI accordingly. Therefore, the score is meet 80.

#### <u>Vanuatu</u>

Just as the practices of Taiwan, Vanuatu also must submit annual reports to the Commission regarding its performance of compliance with various CMMs and Resolutions adopted by the WCPFC and IATTC. There is therefore a system in place to evaluate key parts of the fisheries-specific management system, which is reviewed on an annual basis.

The fisheries-specific management system of Vanuatu is subject to review on a regular basis. Up to now, the Fisheries Act has been amended for ten revisions and the Tuna Management Plan has been amended for three revisions and the Fisheries Regulations are currently under review. According to these instruments, various MCS tools and inspection plan have been implemented in Vanuatu's fishing fleet, which indicates that Vanuatu has the management system and it is subject to regular internal revie, but the result of implementation is not clear. Therefore, the score is between 60-79.

For the reasons above, this PI is scored as Yellow level (60-79).

# References

Allain V., 2010. Trophic structure of the pelagic ecosystems of the western and central Pacific Ocean. WCPFC--- SC6--2010/EB--IP--10.

Anderson, R.C., 2014. Cetaceans and Tuna Fisheries in the Western and Central Indian Ocean. IPNLF Technical Report No. 2. International Pole and Line Foundation, London.

Carolina V. Minte-Vera, Haikun Xu, Mark N. Maunder. 2018. Status of the tuna and billfish stock in 2018. Inter-American Tropical Tuna Commission. Stock report 20, 2019.

Clarke, S., Sato, M., Small, C., Sullivan, B., Inoue, Y. & Ochi, D. 2014. Bycatch in longline fisheries for tuna and tuna-like species: a global review of status and mitigation measures. FAO Fisheries and Aquaculture Technical Paper No. 588. Rome, FAO. 199 pp.

Clarke, S.C., Langley, A., Lennert-Cody, C.E., Aires-da-Silva, A., and Maunder, M. 2018. Pacificwide silky shark (Carcharhinus falciformis) stock status assessment. WCPFC-SC14-2018/SA-WP-08. Western and Central Pacific Fisheries Commission Scientific Committee Fourteenth Regular Session, Busan, Korea, 8-16 August 2018.

Dominique Filippi, Susan Waugh, Simon Nicol. 2010. Revised spatial risk indicators for seabird interactions with longline fisheries in the Western and Central Pacific. Western and Central Pacific Fisheries Commission. Scientific Committee Sixth Regular Session, Nukualofa, Tonga, 10-19 August 2010.

*Filippi, D., Waugh, S., Nicol, S., 2010. Revised spatial risk indicators for seabird interactions with longline fisheries in the western and central Pacific. Scientific Committee. WCPFC-SC6-2010/EB-IP 01. WCPFC.* 

Gilman E., Huang, H.W. 2017. Review of effects of pelagic longline hook and bait types on sea turtle catch rate, anatomical hooking position and at-vessel mortality rate. Western and Central Pacific Fisheries Commission Scientific Committee Thirteenth Regular Session. Rarotonga, Cook Islands, 9-17 August 2017. WCPFC-SC13-2017/EB-IP-01

Gilman, E., Brothers, N., McPherson, G., Dalzell, P. 2006a. A review of cetacean interactions with longline gear. Journal of Cetacean Research and Management 8(2):215–223.

ISC. 2017. Stock assessment and future projections of blue shark in the North Pacific Ocean through 2015. WCPFC-SC13-2017/ SA-WP-10.

ISC. 2017. Stock assessment of albacore in the North Pacific Ocean in 2017. WCPFC-SC13-2017/SA-WP-09.

ISC. 2018. Report of the shark working group workshop. 18th Meeting of the International Scientific Committee for Tuna and Tuna-Like Species in the North Pacific Ocean, Yeosu, Republic of Korea, July 11-16, 2018

ISC. 2018. Stock Assessment for Swordfish (Xiphias gladius) in the Western and Central North Pacific Ocean through 2016. Scientific Committee Fourteenth Regular Session, Busan, Republic of Korea, 8-16 August 2018. WCPFC-SC14-2018/SA-WP-07 Rev. 1 (11 August 2018)

ISC. 2018. Stock Assessment of Shortfin Mako Shark in the North Pacific Ocean Through 2016. Scientific Committee Fourteenth Regular Session, Busan, Republic of Korea, 8-16 August 2018. WCPFC-SC14-2018/ SA-WP-11

L. Tremblay-Boyer1, S. McKechnie, G. Pilling, J. Hampton. 2017. Stock assessment of yellowfin tuna in the western and central Pacific Ocean. WCPFC-SC13-2017/SA-WP-06 Rev1 August 4<sup>th</sup>

Laura Tremblay-Boyer, Felipe Carvalho, Philipp Neubauer and Graham Pilling. 2019. Stock assessment for oceanic whitetip shark in the Western and Central Pacific Ocean. Scientific Committee. Fifteenth Regular Session of the Scientific Committee. Pohnpei, Federated States of Micronesia, 12–20 August 2019

*M.* T. Vincent, G.M. Pilling and J. Hampton 2018. Incorporation of updated growth information within the 2017 WCPO bigeye stock assessment grid, and examination of the sensitivity of estimates to alternative model spatial structures. Scientific Committee Fourteenth Regular Session, Busan, Republic of Korea, 8-16 August 2018. WCPFC-SC14-2018/SA-WP-03

*Me Certification Ltd 2015. The SZLC, HNSFC & CFA Cook Islands EEZ south Pacific albacore longline fishery. MSC Public Certification Report, June 2015.* 

Methot Jr, R., Wetzel, C. R. 2013. Stock synthesis: A biological and statistical framework for fish stock assessment and fishery management. Fisheries Research, 142, 86–99.

SCS Global service, 2019. Solomon Islands Longline Tuna Fishery MSC Fishery Assessment Report. Public Certification Report.

NPFC. 2019. Report. North Pacific Fisheries Commission 2nd Meeting of the Technical Working Group on Chub Mackerel Stock Assessment, Yokohama, Japan, 28 February-2 March 2019.

NPFC. 2019. Report. North Pacific Fisheries Commission 4th Meeting of the Technical Working Group on Pacific Saury Stock Assessment, Yokohama, Japan, 6-9 March 2019.

Peter Williams, Icanus Tuiloma and Aurélien Panizza. 2018. Status of observer data management. Scientific Committee Fourteenth Regular Session, Busan, Republic of Korea, 8-16 August 2018. WCPFC-SC14-2018/ST IP-02 rev. 1

Shelley Clarke 2017. Southern Hemisphere porbeagle shark (Lamna nasus) stock status assessment. WCPFC-SC13-2017/SA-WP-12 (rev. 2)

T. Peatman, L. Bell, V. Allain, S. Caillot, P. Williams, I. Tuiloma, A. Panizza, L. Tremblay-Boyer, S. Fukofuka and N. Smith 2019. Summary of longline fisheries bycatch at a regional scale, 2003 – 2017. Western and Central Pacific Fisheries Commission. Scientific Committee, Thirteenth Regular Session. Busan, Republic of Korea, 8 – 16 August 2018. WCPFC-SC14-2018/ST-WP-03. Rev 3 (15th April 2019).

Tremblay-Boyer, L., Hampton, J., McKechnie, S. & Pilling, G. 2018. Stock assessment of south Pacific albacore tuna. WCPFC-SC14-2018/SA-WP-05 Rev. 2 (2 August 2018). Secretariat of the Pacific Community, Noumea, New Caledonia. 113pp.

WCPFC. 2018. Summary report. The Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean. Fourteenth Regular Session of the Scientific Committee Busan, South Korea, 8–16 August 2018.

WCPFC. 2018. Final compliance monitoring report. Fifteenth Regular Session. Honolulu, Hawaii, US, 10-14 August 2018. Western and Central Pacific Fisheries Commission. WCPFC15-2018-FinalCMR.

WCPFC SC14. 2018. Outcomes document. Fourteenth Regular Session of the Scientific Committee, Busan, South Korea 8–16 August 2018. WCPFC15-2018-SC14-01

WCPFC SC15 2019. North Pacific Blue shark (Prionace glauca) stock status and management advice. WCPFC Current Stock Status and Advice key documents/15/ North Pacific Blue shark, November 19, 2019

WCPFC SC15. 2019. Silky Shark (Carcharhinus falciformis) stock status and management advice. WCPFC Current Stock Status and Advice key documents/13/silky shark, November 19, 2019.

WCPFC SC15. 2019. South Pacific Albacore Tune (Thunnus alalunga) stock status and management advice. WCPFC Current Stock Status and Advice key documents/04/south pacific albacore tuna, November 19, 2019.

WPCFC SC15. 2019. South Pacific Blue Shark (Prionace glauca) stock status and management advice. WCPFC Current Stock Status and Advice key documents/14/south pacific blue shark, November 19, 2019.

WCPFC SC15. 2019. Southern Hemisphere Porbeagle shark (Lamna nasus) stock status and management advice. WCPFC Current Stock Status and Advice key documents/18/ Southern Hemisphere Porbeagle shark, November 19, 2019.

WCPFC SC15. 2019. Summary Report. The Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean. Fifteenth Regular Session of the Scientific Committee. Pohnpei, Federated States of Micronesia, 12–20 August 2019

WCPFC SC16. 2020. North Pacific Swordfish (Xiphias gladius) stock status and management advice. WCPFC Current Stock Status and Advice key documents/07/North Pacific Swordfish, November 19, 2020.

WCPFC SC16 2020. Bigeye tuna (Thunnus obesus) stock status and management advice. WCPFC Current Stock Status and Advice key documents/01/Bigeye tuna, February 17, 2021

WCPFC SC16 2020. Yellowfin tuna (Thunnus albacares) stock status and management advice. WCPFC Current Stock Status and Advice key documents/02/Yellowfin tuna, February 17, 2021

WCPFC SC16 2020. North Pacific Albacore tuna (Thunnus alalung) stock status and management advice. WCPFC Current Stock Status and Advice key documents/05/ North Pacific Albacore tuna, February 17, 2021

WCPFC, 2019. Summary Report 4 May 2019. Fifteenth Regular Session of the Commission Honolulu, Hawaii, USA, 10-14 December 2018.

Werner, T.B., Northridge, S., Press, McClellan, K., Young, N., 2015. Mitigating bycatch and depredation of marine mammals in longline fisheries. ICES Journal of Marine Science 72, 1576–1586.