# Marine Stewardship Council (MSC) Announcement Comment Draft Report

# Fukuichi Western and Central Pacific Ocean longline bigeye, yellowfin and albacore tuna fishery

**On Behalf of**

**Fukuichi Fishery Co., Ltd**

**Prepared by**

**Control Union (UK) Limited**

**May 2022**

| | |
|---|---|
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# QA

## ACDR

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| Originator: | H Ernst | 21st December 2021 |
| Reviewer: | B O'Kane | 21st January 2022 |
| Approver: | T Tsuzaki | 7th April 2022 |

## PCDR

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## Executive Summary

This report is the Announcement Comment Draft Report for the MSC Full assessment of the Fukuichi Western and Central Pacific Ocean longline bigeye, yellowfin and albacore tuna fishery. The CU UK assessment team consists of Henry Ernst (Team Leader), Dr. Jo Gascoigne (Principle 1), Dr. Timothy Emery (Principle 2), Yoko Tamura (Principle 3), and Dr. Charles Daxboeck (Principle 3).

At the time of writing, it is not yet clear if the full assessment meetings will be held on site in Japan, or remotely, due to the ever-evolving COVID-19 pandemic and shifting national travel and entry legislation. If the team is unable to travel due to entry restrictions or health concerns, the site visit meetings will be held remotely. Otherwise, members of the team (priority given to the team leader, principle 2 expert, and local principle 3 expert) will be present onsite at a location to be agreed with the client. Site visit timing will depend on the client's decision to proceed, client availability, and stakeholder availability.

The assessment is being undertaken in accordance with the MSC Fisheries Certification Procedure (FCP) v2.2 and the MSC Standard 2.01 using the default assessment tree, in combination with the Risk-Based Framework for certain elements of Principle 2 (bait species).

The fishery under assessment is the Fukuichi Western and Central Pacific Ocean longline bigeye (*Thunnus obesus*), yellowfin (*Thunnus albacares*) and albacore (*Thunnus alalunga*) tuna fishery taking place in Papua New Guinea waters and in the High Seas of the Western and Central Pacific Ocean. Fishing activities are carried out by 10 vessels selling to Fukuichi Co. All vessels operate pelagic longline systems set at depth to target the aforementioned tuna species. The product under assessment is landed in the Yaizu fishing port.

All stocks considered under Principle 1 are thought to be healthy, with most stock assessments considered to be robust and fed with a strong information base. This represents a key strength of this fishery against the MSC Standard. While a formal framework is in place for the development of a harvest strategy for the stocks under assessment, the ongoing delays in implementation of this framework will most likely result in harmonised conditions for PIs 1.2.1, and 1.2.2. For the albacore UoAs, there is the added question of unwanted catch, and the potential review of alternative measures to mitigate the unwanted catch of albacore (evidenced by the significant discards of this species in the logbook and observer data). Due to the lack of information on the review of alternative measures for the UoAs, the team has had to award a precautionary score of <60 for the North Pacific and South Pacific albacore stocks at PI 1.2.1. This information gap will be a key point to discuss at the site visit.

For Principle 2, the relative paucity of data for the UoA vessels has resulted in precautionary scoring across the entire principle. The issue of the review of alternative measures for the albacore stocks is also noted in Principle 2, with a score of <60 for PI 2.1.2, while more information is needed to ascertain UoA compliance with WCPFC CMMs and the Papua New Guinea National Plan of Action in relation to shark finning. The current information gap on this matter results in a precautionary score of <60 for PI 2.2.2. These will be important areas of discussion leading up to and during the site visit. Another issue in Principle 2 is the quality and quantity of data on the UoAs, and the representativeness of the UoA fleet's activity. Some quality issues such as identification of ETP species down to species level will need to be clarified, as interactions with "Seabirds" will need to be further clarified down to species level for the purpose of this MSC assessment. The team will also seek to understand what measures are put in place by the UoA to manage ETP-species interactions.

A key information gap identified at the ACDR stage is the observer coverage, as there is currently no indication of observer coverage in terms of % hooks observed. Key strengths in Principle 2 for this fishery are on the habitats and ecosystem components, with longline gears being considered very low impact on the habitats, and the detailed knowledge of the WCPO ecosystem allows the team to ascertain that the UoA is likely to have a limited impact on the ecosystem as a whole.

The strengths of these UoAs against Principle 3 lie in the strong national and international management framework, which includes the long term objectives set out by these management structures, and the monitoring and management performance evaluation established within these. Currently the team would seek more information on the consultation processes in place in Japan, and their acceptance of information from a range of stakeholders outside industry and management entities. Further information is also needed on the fishery specific objectives, and how these are set out for the UoA fleet. For PI 3.2.2, more information is needed on how the fishery's performance against management objectives is shared with stakeholders. Finally, there are several significant questions regarding the status of conformity of the UoAs against national and international requirements, including ETP reporting requirements, and PI 3.2.3 will be an important topic of discussion for the team internally, and with the client wider stakeholders.

The precautionary scoring based on a limited set of information would indicate that the UoAs are currently not in conformity with the MSC Standard, though this is due to precautionary scoring, and the information gaps on specific issues across all three principles. It is expected that the scoring will change with new information being presented to the team.

**Draft determination to be completed at Public Comment Draft Report stage**

# 1 Report Details

## 1.1 Authorship and Peer Reviewers

**Henry Ernst (Team Leader, Traceability)** obtained a MSci in marine biology from the University of Southampton. He has a broad background in marine research including inshore fisheries, functional marine ecology and aquaculture research. Prior to joining CU UK he was engaged in benthic invertebrate identification and biomass work with the National Oceanographic Centre, Southampton, United Kingdom. Henry has passed his team leader training course, undertaken multiple MSC surveillance audits as a team member and is a qualified ISO lead auditor. He has participated in the reassessment of the SARPC toothfish fishery, surveillance audits of the Compagnie des Pêches Saint Malo and Euronor cod and haddock and Scapeche, Euronor and Compagnie des Pêches de St Malo saithe. He has passed the traceability module of the online training, allowing him to meet competency criterion 6 in Table PC3.
He therefore meets the team leader qualifications. Henry has completed the required Fishery Team Leader MSC training modules for the new V2.2 Fisheries Certification Process. Henry has no conflict of interest for this assessment.

**Dr Jo Gascoigne (Principle 1)** is a former research lecturer in marine biology at Bangor University, Wales with over 25 years' experience working in the fisheries sector. Dr Gascoigne has a PhD from the Virginia Institute of Marine Science in the USA, which was completed on the Allee effects of the queen conch, Strombus gigas. Jo is an expert on fisheries science and management, with nearly 15 years' experience as a consultant, working mainly on MSC pre-assessments and full assessments, as well as FIP scoping, planning and implementation.
Jo has more than 5 years MSC experience with tuna fisheries which includes the SZLC, HNSFC & CFA Cook Islands EEZ south Pacific albacore longline fishery, the Walker Seafood's Australian Eastern tuna and billfish tuna fishery, and the French Polynesia albacore and yellowfin longline fishery. She was also invited to participate in the MSC Hong Kong harmonisation meeting in 2016. Jo has a current Variation Request with MSC to operate as a Principle 1 expert on tuna stocks.
Jo has completed the required Fishery Team member MSC training modules for the V2.2 Fisheries Certification Process. Based on the above experience CU UK is confident that Dr Gascoigne meets the competency requirement for P1 - Table PC 3 competency criteria 1 and 2. Jo has no conflict of interest for this assessment.

**Dr Tim Emery (Principle 2, RBF)** has a Masters in Fisheries Policy from the University of Wollongong and a PhD in Fisheries Science from the University of Tasmania in Australia. He has over ten year's experience working in both domestic and international fisheries management, policy and science. During his PhD he investigated some of the untested assumptions behind individual transferable quota (ITQ) management and commercial fisher behaviour using experimental economics and discrete-choice modelling. Prior to commencing his PhD, Tim worked as a fisheries management officer for the Australian Fisheries Management Authority (AFMA). At AFMA, Tim gained a detailed understanding of fisheries governance and management frameworks through developing and implementing fisheries regulations and providing advice to stakeholders. Tim is currently employed as fisheries scientist, where he is responsible for undertaking ecological risk assessments, analysing electronic monitoring and logbook data, developing bycatch assessment reports and providing scientific advice to policy-makers. Tim has authored and co-authored over 20 peer-reviewed scientific publications on aspects of fisheries management, policy and science since commencing his PhD. Tim has successfully completed the MSC online training on the FCP v2.2, the Risk Based Framework and Traceability modules and meets the MSC Team Member competency requirements for Principle 2. He has worked on several MSC pre-assessments and full assessments to date, including the Walker Seafood's Australian eastern tuna and billfish tuna fishery and the Korean Pan Pacific yellowfin, bigeye and albacore longline fishery. He is also a peer reviewer for the MSC Peer Review College and has reviewed several MSC full assessments. For this project Tim is the Principle 2 expert. Tim has no conflict of interest in relation to this assessment.

**Ms Yoko Tamura (Principle 3 – Japan expert)** is an independent consultant who worked recently with the Sustainable Fisheries Partnership to promote Fishery Improvement Projects and buyer engagement in Japan. With a MA in Marine Affairs from the University of Washington and a BSc. in Marine Resource Management from the Tokyo University of Marine Science and Technology, she has worked on coastal resources management, fisheries, and sustainable development and has significant current knowledge of the country, language and local fishery context. Previously, she was a technical expert for Japan International Cooperation Agency and a project coordinator at Conservation International Japan. She also contributed to the production of a seafood pocket guide in Japan to raise awareness of seafood sustainability issues. Yoko's previous MSC experience includes, among others, the MSC assessment of the Kyoto Danish Seine Fishery Federation flathead flounder fishery, Usufuku Honten Northeast Atlantic longline bluefin tuna and a number of other MSC full and pre-assessments in Japan.

It is proposed that Yoko will bring her extensive experience of the Japanese fisheries sector to the process as Local Co-Ordinator, with responsibility for the assessment of Principle 3 – Japanese national jurisdiction.

Yoko has completed the required Fishery Team member MSC training modules for the V2.2 Fisheries Certification Process, including the Traceability module and meets the criteria for Principle 3 'Fishery management and operations' and 'Current knowledge of the country, language and local fishery context' through her extensive list of work summarised above. She has no conflict of interest in relation to this assessment.

**Dr. Charles Daxboeck (Principle 3 international)** obtained a Ph.D. in comparative respiratory physiology from the University of British Columbia, Vancouver and has been a legal resident of French Polynesia for the past 27 years, following twelve years in Hawaii. Aside from his scientific and consulting activities, Charles has been a member of the US delegation to the 19th Annual Consultation on Multilateral Treaty on Fisheries between Governments of certain Pacific Island States and the US Government (the Tuna Treaty) and to the Fourth Regular Session of the Scientific Committee of the Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean. He has also been a member of French Polynesian delegations to numerous pre-WCPFC ratification meetings (MHLC4, 5, 6 and 7, PrepCon I, PrepCon 7), then WCPFC1, WCPFC6 and WCPFC17 from 1999 to 2020). Charles has also been a member of the American Samoa delegation to WCPFC7 (2010) and of the CNMI delegation to WCPFC13 (2016). His experience also includes being Scientific and Executive Director of the Pacific Ocean Research Foundation (focus on marlin and tuna), Kailua-Kona, Hawaii (P.O.R.F.), and then as a Member of its Board of Governors and Scientific Advisory Committee for six years. He was also a member of the Scientific and Statistical Committee for thirty-three years (SSC Chairman from 2011 to 2016), Western Pacific Regional Fishery Management Council (Department of Commerce, NOAA Fisheries). Charles' other experience in tuna fisheries include MSC assessments of the French Polynesia EEZ albacore and yellowfin longline fishery, Pan Pacific yellowfin, bigeye and albacore tuna longline fishery on behalf of Dongwon Industries, Tropical Pacific yellowfin and skipjack tuna free-school purse seine fishery on behalf of Dongwon Industries, as well as the Y2, Y3, Y4 surveillance audits and the re-assessment of the SZLC, CSFC & CFA Cook Islands EEZ South Pacific albacore and yellowfin longline fishery. Dr. Daxboeck has joined The Nature Conservancy's Large Pelagics Fisheries Program as a contract consultant member. Charles meets all Fishery Team Member Qualification and Competency Criteria (Table PC2) and the Table PC 3 competency criteria: 4 Fishery management and operations. Charles has successfully completed the MSC online team member training on FCP v2.2 and has no conflict of interest in relation to this assessment.

**Peer Reviewers:**

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

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

A summary of their experience and qualifications is available via this link: **Enter link**

## 1.2 Version details

**Table 1. Fisheries programme documents versions**

| Document | Version number |
|---|---|
| MSC Fisheries Certification Process | Version 2.2 |
| MSC Fisheries Standard | Version 2.01 |
| MSC General Certification Requirements | Version 2.4.1 |
| MSC Reporting Template | Version 1.2 |

# 2 Unit(s) of Assessment and Certification

## 2.1 Unit(s) of Assessment (UoA)

### To be drafted at Announcement Comment Draft Report stage

CU UK confirms that the fishery under assessment is within the scope of the MSC Fisheries Standard (7.4 and 7.5 of the MSC Fisheries Certification Process v2.2):

- The target species is not an amphibian, reptile, bird or mammal (FCP v2.2. 7.4.2.1);
- The fishery does not use poisons or explosives (FCP v2.2 7.4.2.2);
- The fishery is not conducted under a controversial unilateral exemption to an international agreement (FCP v2.2 7.4.2.3);
- The client or client group does not include an entity that has been convicted for a forced or child labour violation in the last 2 years (FCP v2.2. 7.4.2.4);
- Has the client or client group been convicted for shark finning in the last 2 years (FCP v2.2 7.4.2.10);
- The fishery has in place a mechanism for resolving disputes, and disputes do not overwhelm the fishery (FCP v2.2 7.4.2.11 and 7.4.2.11iii);
- The fishery is not an enhanced fishery (MSC FCP v2.2 7.4.2.12); and
- The fishery is not an introduced species-based fishery (ISBF) (MSC FCP v2.2 7.4.2.13).

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

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

**Table 2. Unit of Assessment (UoA) 1**

| | |
|---|---|
| **Species** | Yellowfin tuna (Thunnus albacares) |
| **Stock** | WCPO yellowfin tuna |
| **Geographical range of fishery** | WCPO High Seas (FAO 71) |
| **Fishing Gear Type and, if relevant, vessel type(s)** | Longline |
| **Client group** | Fukuichi Fishery Co., Ltd. |
| **Other eligible fishers** | None |

**Table 3. Unit of Assessment (UoA) 2**

| | |
|---|---|
| **Species** | Yellowfin tuna (*Thunnus albacares*) |
| **Stock** | WCPO yellowfin tuna |

| | |
|---|---|
| **Geographical range of fishery** | Papua New Guinea EEZ (FAO 71) |
| **Fishing Gear Type and, if relevant, vessel type(s)** | Longline |
| **Client group** | Fukuichi Fishery Co., Ltd. |
| **Other eligible fishers** | None |

**Table 4. Unit of Assessment (UoA) 3**

| | |
|---|---|
| **Species** | Bigeye (*Thunnus obesus*) |
| **Stock** | WCPO bigeye tuna |
| **Geographical range of fishery** | WCPO High Seas (FAO 71) |
| **Fishing Gear Type and, if relevant, vessel type(s)** | Longline |
| **Client group** | Fukuichi Fishery Co., Ltd. |
| **Other eligible fishers** | None |

**Table 5. Unit of Assessment (UoA) 4**

| | |
|---|---|
| **Species** | Bigeye (Thunnus obesus) |
| **Stock** | WCPO bigeye tuna |
| **Geographical range of fishery** | Papua New Guinea EEZ (FAO 71) |
| **Fishing Gear Type and, if relevant, vessel type(s)** | Longline |
| **Client group** | Fukuichi Fishery Co., Ltd. |
| **Other eligible fishers** | None |

**Table 6. Unit of Assessment (UoA) 5**

| | |
|---|---|
| **Species** | Albacore tuna (*Thunnus alalunga*) |
| **Stock** | North Pacific albacore tuna |
| **Geographical range of fishery** | WCPO High Seas (FAO 71) |
| **Fishing Gear Type and, if** | Longline |

| | |
|---|---|
| **relevant, vessel type(s)** | |
| **Client group** | Fukuichi Fishery Co., Ltd. |
| **Other eligible fishers** | None |

**Table 7. Unit of Assessment (UoA) 6**

| | |
|---|---|
| **Species** | Albacore tuna (*Thunnus alalunga*) |
| **Stock** | North Pacific albacore tuna |
| **Geographical range of fishery** | Papua New Guinea EEZ (FAO 71) |
| **Fishing Gear Type and, if relevant, vessel type(s)** | Longline |
| **Client group** | Fukuichi Fishery Co., Ltd. |
| **Other eligible fishers** | None |

**Table 8. Unit of Assessment (UoA) 7**

| | |
|---|---|
| **Species** | Albacore tuna (*Thunnus alalunga*) |
| **Stock** | South Pacific albacore tuna |
| **Geographical range of fishery** | WCPO High Seas (FAO 71) |
| **Fishing Gear Type and, if relevant, vessel type(s)** | Longline |
| **Client group** | Fukuichi Fishery Co., Ltd. |
| **Other eligible fishers** | None |

**Table 9. Unit of Assessment (UoA) 8**

| | |
|---|---|
| **Species** | Albacore tuna (*Thunnus alalunga*) |
| **Stock** | South Pacific albacore tuna |
| **Geographical range of fishery** | Papua New Guinea EEZ (FAO 71) |
| **Fishing Gear Type and, if relevant, vessel type(s)** | Longline |
| **Client group** | Fukuichi Fishery Co., Ltd. |

| | |
|---|---|
| **Other eligible fishers** | None |

## 2.2 Draft Unit(s) of Certification (UoC)

**Table 10. Draft Unit of Certification (UoC) 1**

| | |
|---|---|
| **Species** | Yellowfin tuna (Thunnus albacares) |
| **Stock** | WCPO yellowfin tuna |
| **Geographical range of fishery** | WCPO High Seas (FAO 71) |
| **Fishing Gear Type and, if relevant, vessel type(s)** | Longline |
| **Client group** | Fukuichi Fishery Co., Ltd. |
| **Other eligible fishers** | None |

**Table 11. Draft Unit of Certification (UoC) 2**

| | |
|---|---|
| **Species** | Yellowfin tuna (*Thunnus albacares*) |
| **Stock** | WCPO yellowfin tuna |
| **Geographical range of fishery** | Papua New Guinea EEZ (FAO 71) |
| **Fishing Gear Type and, if relevant, vessel type(s)** | Longline |
| **Client group** | Fukuichi Fishery Co., Ltd. |
| **Other eligible fishers** | None |

**Table 12. Draft Unit of Certification (UoC) 3**

| | |
|---|---|
| **Species** | Bigeye (*Thunnus obesus*) |
| **Stock** | WCPO bigeye tuna |
| **Geographical range of fishery** | WCPO High Seas (FAO 71) |
| **Fishing Gear Type and, if relevant, vessel type(s)** | Longline |
| **Client group** | Fukuichi Fishery Co., Ltd. |
| **Other eligible fishers** | None |

Table 13. Draft Unit of Certification (UoC) 4

| | |
|---|---|
| **Species** | Bigeye (Thunnus obesus) |
| **Stock** | WCPO bigeye tuna |
| **Geographical range of fishery** | Papua New Guinea EEZ (FAO 71) |
| **Fishing Gear Type and, if relevant, vessel type(s)** | Longline |
| **Client group** | Fukuichi Fishery Co., Ltd. |
| **Other eligible fishers** | None |

Table 14. Draft Unit of Certification (UoC) 5

| | |
|---|---|
| **Species** | Albacore tuna (*Thunnus alalunga*) |
| **Stock** | North Pacific albacore tuna |
| **Geographical range of fishery** | WCPO High Seas (FAO 71) |
| **Fishing Gear Type and, if relevant, vessel type(s)** | Longline |
| **Client group** | Fukuichi Fishery Co., Ltd. |
| **Other eligible fishers** | None |

Table 15. Draft Unit of Certification (UoC) 6

| | |
|---|---|
| **Species** | Albacore tuna (*Thunnus alalunga*) |
| **Stock** | North Pacific albacore tuna |
| **Geographical range of fishery** | Papua New Guinea EEZ (FAO 71) |
| **Fishing Gear Type and, if relevant, vessel type(s)** | Longline |
| **Client group** | Fukuichi Fishery Co., Ltd. |
| **Other eligible fishers** | None |

**Table 16. Draft Unit of Certification (UoC) 7**

| | |
|---|---|
| **Species** | Albacore tuna (*Thunnus alalunga*) |
| **Stock** | South Pacific albacore tuna |
| **Geographical range of fishery** | WCPO High Seas (FAO 71) |
| **Fishing Gear Type and, if relevant, vessel type(s)** | Longline |
| **Client group** | Fukuichi Fishery Co., Ltd. |
| **Other eligible fishers** | None |

**Table 17. Draft Unit of Certification (UoC) 8**

| | |
|---|---|
| **Species** | Albacore tuna (*Thunnus alalunga*) |
| **Stock** | South Pacific albacore tuna |
| **Geographical range of fishery** | Papua New Guinea EEZ (FAO 71) |
| **Fishing Gear Type and, if relevant, vessel type(s)** | Longline |
| **Client group** | Fukuichi Fishery Co., Ltd. |

# 3 Assessment results overview

## 3.1 Determination, formal conclusion and agreement

**To be drafted at Public Comment Draft Report stage**

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

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

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

## 3.2 Principle level scores

**To be drafted at Client and Peer Review Draft Report**

The report shall include scores for each of the three MSC principles in the table below.

Reference(s): FCP v2.2 Section 7.17

**Table 18. Principle level scores**

| Principle | Score |
|---|---|
| Principle 1 – Target Species | |
| Principle 2 – Ecosystem Impacts | |
| Principle 3 – Management System | |

## 3.3 Summary of conditions

**To be drafted at Client and Peer Review Draft Report stage**

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

Reference(s): FCP v2.2 Section 7.18

**Table 19. Summary of conditions**

| Condition number | Condition | Performance Indicator (PI) | Deadline | Exceptional Circumstances? | Carried over from Pervious Certificate? | Related to previous condition? |
|---|---|---|---|---|---|---|
| | | | | Yes/No | Yes / No / NA | Yes / No / NA |

| **Condition number** | **Condition** | **Performance Indicator (PI)** | **Deadline** | **Exceptional Circumstances?** | **Carried over from Pervious Certificate?** | **Related to previous condition?** |
|---|---|---|---|---|---|---|
| | | | | Yes/No | Yes / No / NA | Yes / No / NA |
| | | | | Yes/No | Yes / No / NA | Yes / No / NA |

## 3.4 Recommendations

**To be drafted at Client and Peer Review Draft Report stage**

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

# 4 Scoring

## 4.1 Summary of Performance Indicator level scores

The following scores are preliminary scores derived from the information made available prior to the site visit. In accordance with MSC FCPv2.2 G7.10.2.e, where limited information was available to provide a draft scoring range for a Performance Indicator, a more precautionary score was awarded, in some cases resulting in a score of < 60. It is expected that, with the provision of information during the site visit, some scores will change.

**Table 20. Performance Indicator scores**

| Principle | Component | Wt | Performance Indicator (PI) | | Wt | UoA1 Yft | UoA 2 Yft | UoA 3 Bet | UoA 4 Bet | UoA 5 Np alb | UoA 6 NP alb | UoA 7 Sp alb | UoA 8 sp alb |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| One | Outcome | 0.33 | 1.1.1 | Stock status | 0.5 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 |
| | | | 1.1.2 | Stock rebuilding | 0.5 | NA | NA | NA | NA | NA | NA | NA | NA |
| | Management | 0.67 | 1.2.1 | Harvest strategy | 0.25 | 60-79 | 60-79 | 60-79 | 60-79 | <60 | <60 | <60 | <60 |
| | | | 1.2.2 | Harvest control rules & tools | 0.25 | 60-79 | 60-79 | 60-79 | 60-79 | 60-79 | 60-79 | 60-79 | 60-79 |
| | | | 1.2.3 | Information & monitoring | 0.25 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 |
| | | | 1.2.4 | Assessment of stock status | 0.25 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 |
| Two | Primary species | 0.2 | 2.1.1 | Outcome | 0.33 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 |
| | | | 2.1.2 | Management strategy | 0.33 | <60 | <60 | <60 | <60 | <60 | <60 | <60 | <60 |
| | | | 2.1.3 | Information/Monitoring | 0.33 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 |
| | Secondary species | 0.2 | 2.2.1 | Outcome | 0.33 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 |
| | | | 2.2.2 | Management strategy | 0.33 | <60 | <60 | <60 | <60 | <60 | <60 | <60 | <60 |
| | | | 2.2.3 | Information/Monitoring | 0.33 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 |

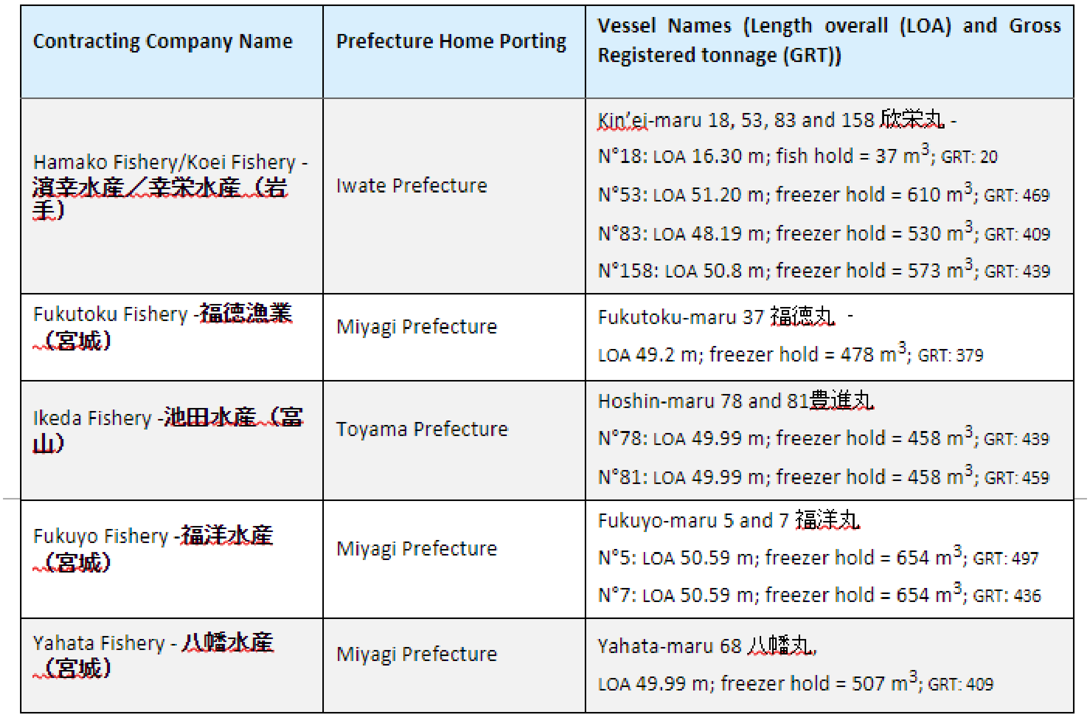
| Principle | Component | Wt | Performance Indicator (PI) | | Wt | UoA1 Yft | UoA 2 Yft | UoA 3 Bet | UoA 4 Bet | UoA 5 Np alb | UoA 6 NP alb | UoA 7 Sp alb | UoA 8 sp alb |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | ETP species | 0.2 | 2.3.1 | Outcome | 0.33 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 |
| | | | 2.3.2 | Management strategy | 0.33 | 60-79 | 60-79 | 60-79 | 60-79 | 60-79 | 60-79 | 60-79 | 60-79 |
| | | | 2.3.3 | Information strategy | 0.33 | 60-79 | 60-79 | 60-79 | 60-79 | 60-79 | 60-79 | 60-79 | 60-79 |
| | Habitats | 0.2 | 2.4.1 | Outcome | 0.33 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 |
| | | | 2.4.2 | Management strategy | 0.33 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 |
| | | | 2.4.3 | Information | 0.33 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 |
| | Ecosystem | 0.2 | 2.5.1 | Outcome | 0.33 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 |
| | | | 2.5.2 | Management | 0.33 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 |
| | | | 2.5.3 | Information | 0.33 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 |
| Three | Governance and policy | 0.5 | 3.1.1 | Legal &/or customary framework | 0.33 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 |
| | | | 3.1.2 | Consultation, roles & responsibilities | 0.33 | 60-79 | 60-79 | 60-79 | 60-79 | 60-79 | 60-79 | 60-79 | 60-79 |
| | | | 3.1.3 | Long term objectives | 0.33 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 |
| | Fishery specific management system | 0.5 | 3.2.1 | Fishery specific objectives | 0.25 | 60-79 | 60-79 | 60-79 | 60-79 | 60-79 | 60-79 | 60-79 | 60-79 |
| | | | 3.2.2 | Decision making processes | 0.25 | 60-79 | 60-79 | 60-79 | 60-79 | 60-79 | 60-79 | 60-79 | 60-79 |
| | | | 3.2.3 | Compliance & enforcement | 0.25 | 60-79 | 60-79 | 60-79 | 60-79 | 60-79 | 60-79 | 60-79 | 60-79 |
| | | | 3.2.4 | Monitoring & management performance evaluation | 0.25 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 | ≥80 |

## 4.2 Fishery overview

### 4.2.1 The Client fishery

Fukuichi Fishery Co. Ltd. is reportedly one of Japan's top three sashimi tuna traders (Campling et al. 2017). It sources widely, and longline tuna constituting around 80% of its total sales (bigeye, yellowfin, albacore and Pacific bluefin, including some "farmed" southern bluefin from Australia, and Atlantic bluefin from the Mediterranean). This assessment covers the offshore and high seas longline fishery prosecuted by the contracted vessels listed in Table 21, targeting Western and Central Pacific Ocean bigeye, yellowfin and albacore tuna in FAO 71 only. All Japanese longline vessels were constructed in Japanese shipyards. Vessels are constructed from steel, the average size is around 400 GRT (by international standards), and with hold capacities ranging from 300-400 mt. Annual average catch per vessel (all species) is around 250-300 mt for vessels targeting bigeye and yellowfin (around 1-1.5 mt/day), whereas catch volumes are lower (around 0.5 mt/day) for vessels seasonally targeting higher value southern bluefin which are also constrained by strict quota limits. Some of these vessels also have bilateral access agreements which allow them to fish within the EEZ of Papua New Guinea (PNG). The client company therefore, does not own any longline vessels, but it does own 5 Ultra Low Temperature (ULT) purse seiners with wells at -45 to -50° C, capable of also supplying some sashimi-grade tuna products from amongst their catches (can be as much as 30% of yellowfin catch). While the bulk of tuna sales come from longline vessels, the remaining 20% of total sales comes from purse seine vessels usually targeting skipjack (some of which goes to katsuobushi - simmered, smoked and fermented skipjack tuna or bonito flakes) and yellowfin tuna. Fukuichi also has two large (-60°C) ULT cold storage facilities (Fukuichi Nishijima Cold Storage (FNC) at 6,402 mt and Fukuichi Oigawa Cold Storage (FOC) at 12,700 mt capacity) as well as an ISO- and HACCP-certified frozen tuna processing plant in Yaizu (information at https://fukuichi-world.jp). Fukuichi markets mostly in Japan, selling processed fish products to supermarkets, restaurants, and hotels. It owns three fresh fish retail outlets (2 in Yaizu, 1 in Shizuoka), where many buyers are restaurant owners and around 50% of sales are tuna products. It also owns fine dining sushi restaurants (called "Fukuichimaru"), 2 in Shizuoka City and one in Singapore ("Fukuichi Japanese"). However, Fukuichi has diversified by selling frozen tuna and tuna products, primarily yellowfin and albacore loins and saku (sashimi-ready) blocks to the USA, almost exclusively to Osamu Corp. in Los Angeles (information obtained from https://www.importgenius.com/suppliers/fukuichi-fishery-co-ltd).

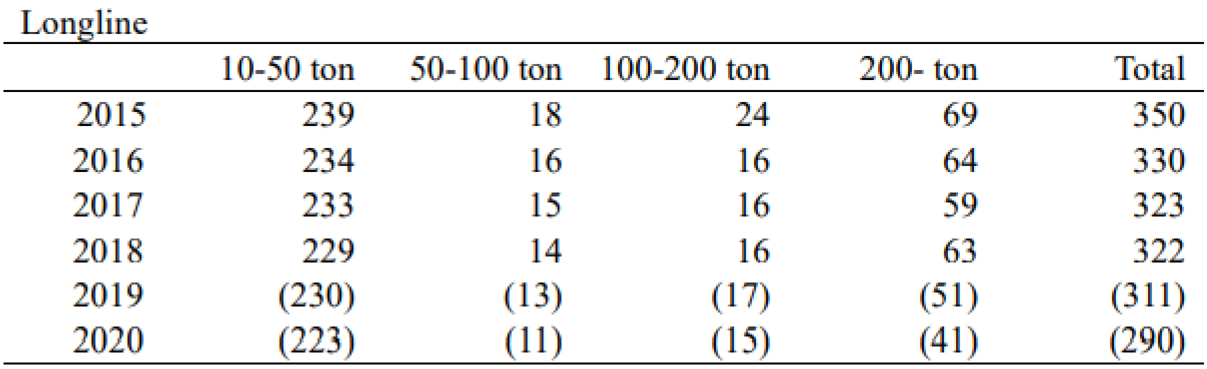
**Table 21. UoA list of longline vessels at ACDR drafting**



| Contracting Company Name | Prefecture Home Porting | Vessel Names (Length overall (LOA) and Gross Registered tonnage (GRT)) |
|---|---|---|
| Hamako Fishery/Koei Fishery - 濱幸水産／幸栄水産（岩手） | Iwate Prefecture | Kin’ei-maru 18, 53, 83 and 158 欣栄丸 -<br>N°18: LOA 16.30 m; fish hold = 37 m$^3$; GRT: 20<br>N°53: LOA 51.20 m; freezer hold = 610 m$^3$; GRT: 469<br>N°83: LOA 48.19 m; freezer hold = 530 m$^3$; GRT: 409<br>N°158: LOA 50.8 m; freezer hold = 573 m$^3$; GRT: 439 |
| Fukutoku Fishery -福徳漁業（宮城） | Miyagi Prefecture | Fukutoku-maru 37 福徳丸 -<br>LOA 49.2 m; freezer hold = 478 m$^3$; GRT: 379 |
| Ikeda Fishery -池田水産（富山） | Toyama Prefecture | Hoshin-maru 78 and 81豊進丸<br>N°78: LOA 49.99 m; freezer hold = 458 m$^3$; GRT: 439<br>N°81: LOA 49.99 m; freezer hold = 458 m$^3$; GRT: 459 |
| Fukuyo Fishery -福洋水産（宮城） | Miyagi Prefecture | Fukuyo-maru 5 and 7 福洋丸<br>N°5: LOA 50.59 m; freezer hold = 654 m$^3$; GRT: 497<br>N°7: LOA 50.59 m; freezer hold = 654 m$^3$; GRT: 436 |
| Yahata Fishery - 八幡水産（宮城） | Miyagi Prefecture | Yahata-maru 68 八幡丸<br>LOA 49.99 m; freezer hold = 507 m$^3$; GRT: 409 |

Japanese longline vessels are classified into three categories as coastal, offshore and distant water longline fisheries, according to the operational area and vessel size. Coastal longliners, whose size is 1-20 GRT, are only allowed to fish in Japan’s EEZ. Offshore longline vessels are further divided into two categories, small offshore ones at 10-20 GRT, and offshore ones, 10-120 GRT, both of which are able to go beyond Japan’s EEZ in the Pacific Ocean with some restricted areas in the eastern Pacific Ocean (Table 8). Although the vessel size of two offshore categories is duplicated in the range of 10-20 GRT, most vessels of the latter category are larger than 50 GRT. The truly distant water longliners are all over 120 GRT and can basically fish in all oceans, but still must follow various domestic regulations obligating them to adhere to the management measures imposed by the applicable tuna RFMOs. All of the client vessel above are fully registered on the WCPFC vessel list for 2021.

**Table 22. Number of Japanese longline vessels engaged in tuna fisheries in the WCPFC Convention Area by size of vessel. Figures in parentheses indicate provisional data. Coastal longliner and training/research vessels are not included in the totals. Source: WCPFC 2021-WCPFC-SC17-AR/CCM-10 (Rev.01).**



Longline

|  | 10-50 ton | 50-100 ton | 100-200 ton | 200- ton | Total |
|---|---|---|---|---|---|
| 2015 | 239 | 18 | 24 | 69 | 350 |
| 2016 | 234 | 16 | 16 | 64 | 330 |
| 2017 | 233 | 15 | 16 | 59 | 323 |
| 2018 | 229 | 14 | 16 | 63 | 322 |
| 2019 | (230) | (13) | (17) | (51) | (311) |
| 2020 | (223) | (11) | (15) | (41) | (290) |

From Table 22 it can be seen that 9 of the total of 41 (or 22%) of the 200+ GRT Japanese longline vessels are contracted to fish for the Client, Fukuichi Fishery Co. Ltd. and only one vessel is among the 223 total for the 10-50 GRT class. The number of active longline vessels fishing in the WCPFC-CA (from Japan Annual Report to WCPFC - Part 1) for 2021 is given as 290 - 87 offshore/DW and 223 small offshore, as above. The distant water (DW) longline vessels utilize ultra-low temperature (ULT) freezers for catch storage, and mostly target bigeye (and to a lesser extent yellowfin and bluefin, seasonally).

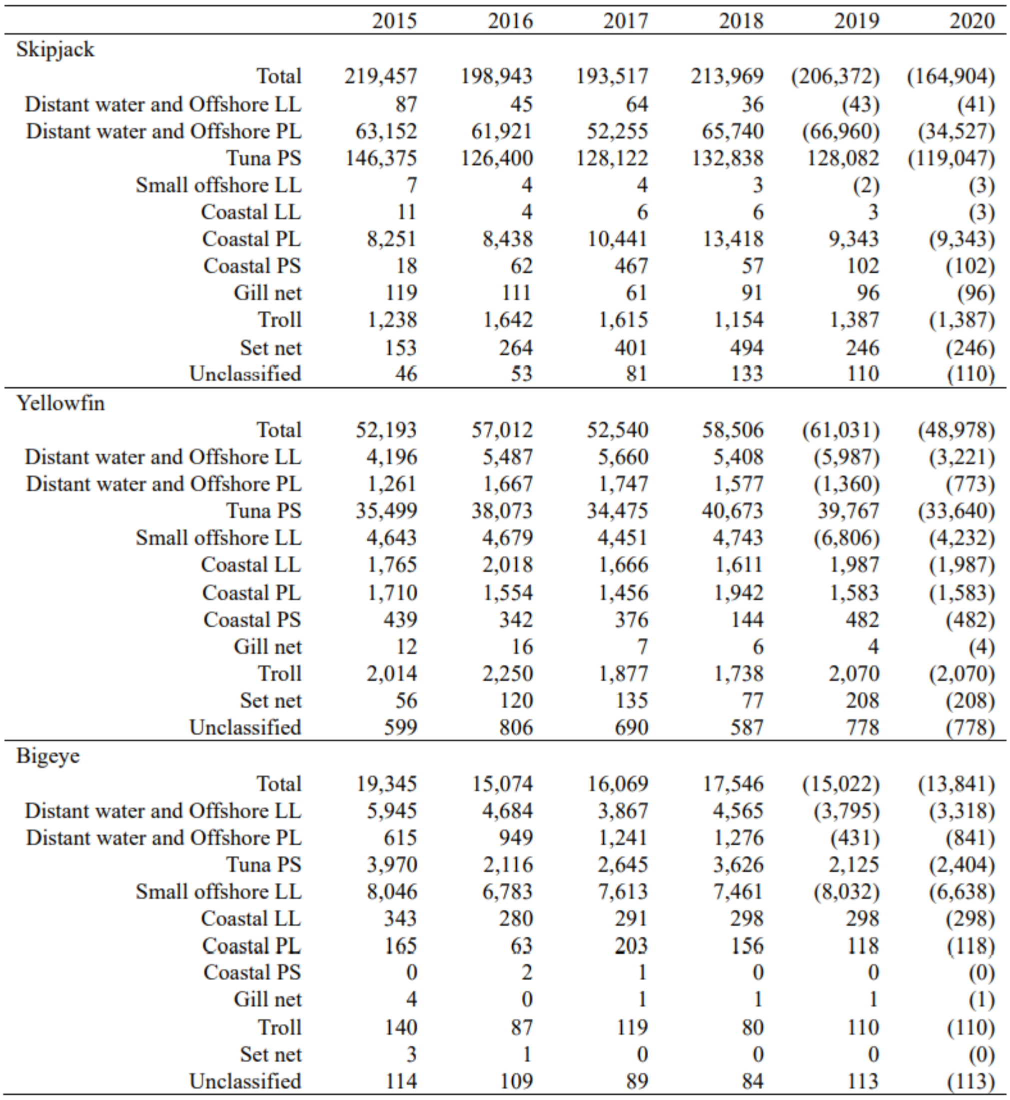
### 4.2.2 History of the fishery and its management

Horizontal longline fishing for pelagic species evolved in Japan during the nineteenth and early twentieth centuries. Wooden sailboats equipped with hemp longlines would go as far as 30 nm offshore searching for tuna and billfish. By 1912 there were over 100 registered sailboat tuna longliners in Japan. The first diesel powered steel longline vessels did not appear until the early 1920's. The longlines were hauled by hand until 1929 when the first mechanical line hauler was developed. Longline fishing was introduced to the rest of the Pacific Ocean in the 1930's by Japanese fishermen. By 1939 there were about 70 Japanese longline boats of between 60 and 270 gross registered tons (GRT) operating in the western and central Pacific Ocean from bases in Palau, Chuuk, and the Northern Marianas. These Micronesian locations became Japanese "possessions", gifted to Japan after a League of Nations decision following the signature of the Treaty of Versailles (1919), ending WWI and the occupation of these lands by German forces (South Pacific Mandate – wiki2.org/en/South_Pacific_Mandate).

Today, Japanese fisheries in general are divided also into three main types: 1) distant-water fisheries, 2) offshore, and 3) coastal, of which the longline component is represented in both the distant-water and offshore categories. It is also important to note that these three fisheries categories are quite different both in terms of resource management and obviously fishing techniques used.

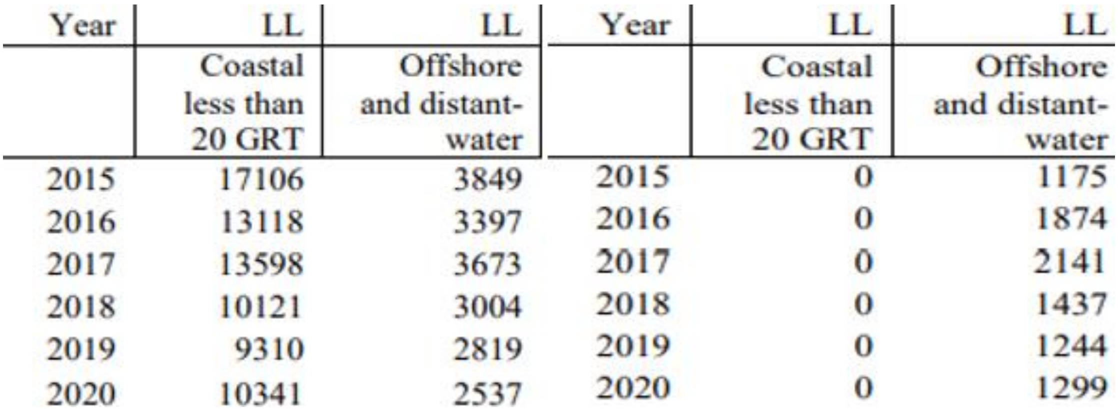
Primary species for the longline catch are historically yellowfin and bigeye, with very minor catches of skipjack, which are targeted by purse seine and pole-and-line fisheries (Table 23). Among the species caught, yellowfin catch was around 60,000 mt at a peak during the late 1970's and the early 1980's and has since declined continuously to about 10,000 mt or less in the recent years (Figure 1). Bigeye catch which had been relatively stable during the 1970's and 1980's ranging between 30,000 and 50,000 mt, and then decreased to between 20,000 and 30,000 mt during the mid-1990's to early 2000's. Further, bigeye catch continued to decrease less than 20,000 mt after 2005, was less than 10,000 mt after 2009. The yellowfin catch continued to decrease since the end of 1970's. The bigeye catch shows a declining trend in the recent years. The bigeye catch was 3,318 mt in 2020 which is 73% of that in the average of the previous 5 years (2015-2019). The yellowfin catch increased from 4,196 mt in 2015 to 5,987 mt in 2019 but dropped to 3,211 mt in 2020. The yellowfin catch in 2020 is 60% of that in the average of previous 5 years. (Table 23). Albacore tuna, while historically a small portion of the catch, has become almost as important as the yellowfin in the north Pacific WCPFC catch area over the last 5 years (Table 24).

**Table 23. Japanese catches (mt) for tropical tuna species by gear in the WCPFC Convention Area. Figures in parentheses indicate provisional data. LL: longline, PL: pole-and-line, PS: purse seine. Source: WCPFC 2021-WCPFC-SC17-AR/CCM-10 (Rev.01).**



| | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 |
|---|---|---|---|---|---|---|
| Skipjack | | | | | | |
| Total | 219,457 | 198,943 | 193,517 | 213,969 | (206,372) | (164,904) |
| Distant water and Offshore LL | 87 | 45 | 64 | 36 | (43) | (41) |
| Distant water and Offshore PL | 63,152 | 61,921 | 52,255 | 65,740 | (66,960) | (34,527) |
| Tuna PS | 146,375 | 126,400 | 128,122 | 132,838 | 128,082 | (119,047) |
| Small offshore LL | 7 | 4 | 4 | 3 | (2) | (3) |
| Coastal LL | 11 | 4 | 6 | 6 | 3 | (3) |
| Coastal PL | 8,251 | 8,438 | 10,441 | 13,418 | 9,343 | (9,343) |
| Coastal PS | 18 | 62 | 467 | 57 | 102 | (102) |
| Gill net | 119 | 111 | 61 | 91 | 96 | (96) |
| Troll | 1,238 | 1,642 | 1,615 | 1,154 | 1,387 | (1,387) |
| Set net | 153 | 264 | 401 | 494 | 246 | (246) |
| Unclassified | 46 | 53 | 81 | 133 | 110 | (110) |
| Yellowfin | | | | | | |
| Total | 52,193 | 57,012 | 52,540 | 58,506 | (61,031) | (48,978) |
| Distant water and Offshore LL | 4,196 | 5,487 | 5,660 | 5,408 | (5,987) | (3,221) |
| Distant water and Offshore PL | 1,261 | 1,667 | 1,747 | 1,577 | (1,360) | (773) |
| Tuna PS | 35,499 | 38,073 | 34,475 | 40,673 | 39,767 | (33,640) |
| Small offshore LL | 4,643 | 4,679 | 4,451 | 4,743 | (6,806) | (4,232) |
| Coastal LL | 1,765 | 2,018 | 1,666 | 1,611 | 1,987 | (1,987) |
| Coastal PL | 1,710 | 1,554 | 1,456 | 1,942 | 1,583 | (1,583) |
| Coastal PS | 439 | 342 | 376 | 144 | 482 | (482) |
| Gill net | 12 | 16 | 7 | 6 | 4 | (4) |
| Troll | 2,014 | 2,250 | 1,877 | 1,738 | 2,070 | (2,070) |
| Set net | 56 | 120 | 135 | 77 | 208 | (208) |
| Unclassified | 599 | 806 | 690 | 587 | 778 | (778) |
| Bigeye | | | | | | |
| Total | 19,345 | 15,074 | 16,069 | 17,546 | (15,022) | (13,841) |
| Distant water and Offshore LL | 5,945 | 4,684 | 3,867 | 4,565 | (3,795) | (3,318) |
| Distant water and Offshore PL | 615 | 949 | 1,241 | 1,276 | (431) | (841) |
| Tuna PS | 3,970 | 2,116 | 2,645 | 3,626 | 2,125 | (2,404) |
| Small offshore LL | 8,046 | 6,783 | 7,613 | 7,461 | (8,032) | (6,638) |
| Coastal LL | 343 | 280 | 291 | 298 | 298 | (298) |
| Coastal PL | 165 | 63 | 203 | 156 | 118 | (118) |
| Coastal PS | 0 | 2 | 1 | 0 | 0 | (0) |
| Gill net | 4 | 0 | 1 | 1 | 1 | (1) |
| Troll | 140 | 87 | 119 | 80 | 110 | (110) |
| Set net | 3 | 1 | 0 | 0 | 0 | (0) |
| Unclassified | 114 | 109 | 89 | 84 | 113 | (113) |

**Table 24. Albacore catch in the WCPFC statistical area north of (left) and south of (right) of the Equator. Source: WCPFC 2021-WCPFC-SC17-AR/CCM-10 (Rev.01).**



| Year | LL | LL | Year | LL | LL |
|---|---|---|---|---|---|
| | Coastal less than 20 GRT | Offshore and distant-water | | Coastal less than 20 GRT | Offshore and distant-water |
| 2015 | 17106 | 3849 | 2015 | 0 | 1175 |
| 2016 | 13118 | 3397 | 2016 | 0 | 1874 |
| 2017 | 13598 | 3673 | 2017 | 0 | 2141 |
| 2018 | 10121 | 3004 | 2018 | 0 | 1437 |
| 2019 | 9310 | 2819 | 2019 | 0 | 1244 |
| 2020 | 10341 | 2537 | 2020 | 0 | 1299 |

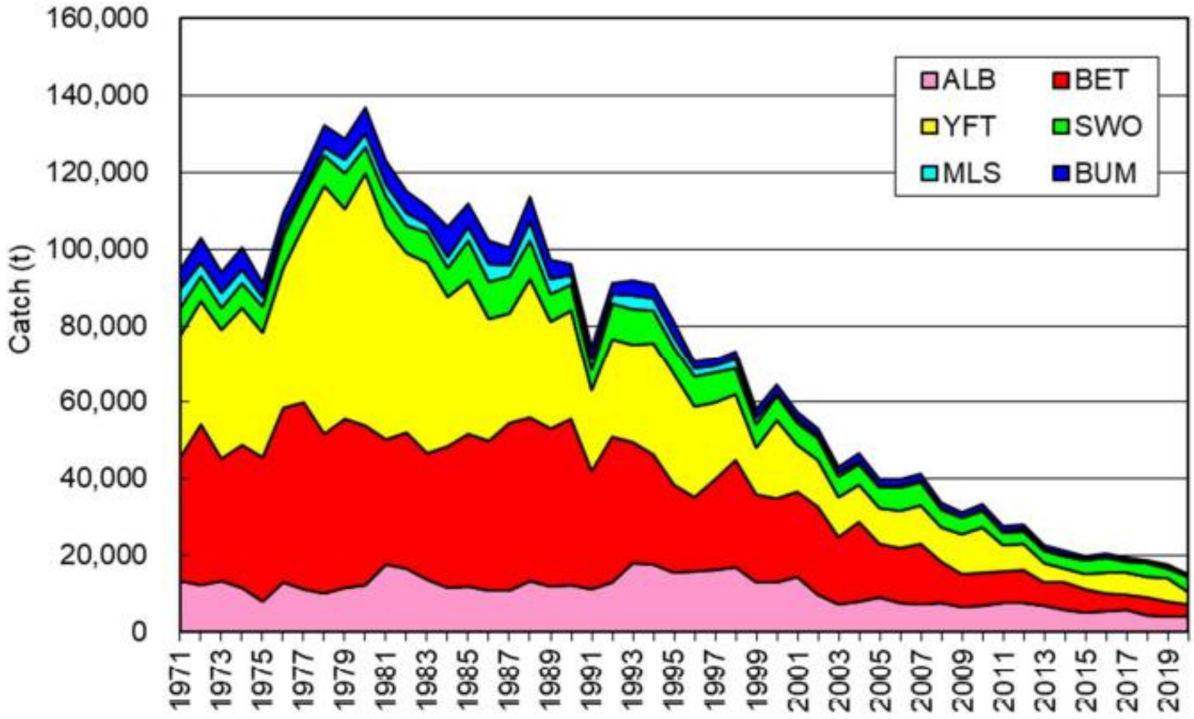


**Figure 1. Historical change in catches for major species by the Japanese distant water and offshore longline fishery (not including small offshore < 20 GRT) in the WCPFC Convention Area. ALB: albacore, BET: bigeye, YFT: yellowfin, SWO: swordfish, MLS: striped marlin, BUM: blue marlin. Values in 2019 and 2020 are provisional. Source: WCPFC 2021-WCPFC-SC17-AR/CCM-10 (Rev.01).**

To understand the current fisheries resources management scheme in Japan, one needs to really examine fishing as an integral part of Japan's culture and national history. During the Feudal Era (1743 to 1867) there was only coastal fishing (with or without use of boats), but with its continued expansion, rulers began to appreciate a real need for control of marine resources through laws and enforcement structures. For simplicity, all villages along the coast were classified as either fishing or farming villages, and only fishing villages could extract marine resources, farming villages being restricted to taking seaweed, for fertilizer (Yamamoto, 1995). Therefore, a simple law granted fishing rights to villages which paid taxes to fish, which continued until the collapse of the Feudal Era. Now, without any fishing laws, fisherman were forced to settle disputes and manage the ocean in whatever ways they could until 1901, when new fishing regulations were established under the Meiji Fishery Law (Yamamoto, 1995; Makino, 2017). These regulations gave fishing villages with an organized "Fishery Society" (village fishermen's group once again paying taxes and adhering to the central government's regulations) exclusive coastal fishing rights, imparting the impression of ocean resources ownership and with it inspiring the need to protect them for continued use (Yamamoto, 1995). With improving fishing methods and use of mechanized boats making offshore fishing more accessible, a more restricted fishing license system was added to the legal framework. Certain fishery methods started to have closed areas established and as such, regulatory enforcement needs led to central and prefecture governments' deployment of patrol boats and inspectors. And because Japanese fishers use many different types of gear to target diverse species in the coastal habitats, competition for resources forced promulgation of further regulations to restrict access and fishing licenses. These regulations set by the "Old Law" further reinforced, even on an individual level, the concept of exclusive resources ownership and responsibility for them.

Expansion of fisheries laws and regulations continued until WWII, when activities were obviously severely curtailed. But beginning in 1949, new fishing regulatory approaches were strongly influenced by the 1945-1952 post-war occupation of Japan by Allied Forces. This occupation reformed Japan's administration, and for fisheries, changed all Fishing Societies into Fisheries Cooperative Associations (FCAs) (Yamamoto, 1995). Since fishermen were invested in resources as their own, within a community-based coastal fisheries management system, this system became democratic. These FACs are still collections of fishermen from the designated area who oversee the licensing and resource management and assume all the responsibility for long-term sustainability of resources. Therefore, this would be considered an area-based "property rights" system. Although it does not provide an exclusive right *per se* over sea areas, a right to engage in fisheries is provided under limited conditions with regard to the fishing season, species and fishing methods.

From a fisheries participation management point of view, but not a fisheries resources management aspect, the Fisheries Cooperation Association Law (MAFF 1948, revised in 1962) provides a framework for these Fisheries Cooperation Associations (FCAs) which work under the Ministry of Agriculture, Forestry and Fisheries of Japan (MAFF) (Popescu and Ogushi, 2013). The Fisheries Resources Conservation Law (1951, revised in 2007) provides the framework for conserving resources in the coastal waters of Japan. The Law Concerning Preservation and Management of Living Marine Resources (MAFF, 1996, revised in 2001) introduced a Total Allowable Catch (TAC) system and a Total Allowable Effort (TAE) for several main species within the EEZ in Japan. In April 2008, the Fisheries Agency requested the Japan Fisheries Research Agency (FRA) to conduct comprehensive research on the management design for the future Japanese fisheries sector and policy framework (MAFF, 2009). This research took into account not only the output control through catch quota management measures such as TACs, IQs (Individual Quotas), or ITQs (Individual Transferable Quotas), but also the various qualitative and technical control measures such as seasonal/spatial regulations, size/sex restrictions, gear limitations, etc. So, total allowable effort can restrict the number of vessels in a particular area, proscribe catch quotas for an area, or the type of fishing equipment and amount used for catching. The TAE system may also set an upper limit on the number of fishing days for vessels operating in a specific area within the EEZ. It was established in addition to the TAC since TAE can be introduced even without detailed scientific data necessary to calculate the TAC, thus more suitable for the management of species whose abundance is declining or fluctuating conspicuously, due to whatever underlying factors there may be (environmental, overexploitation etc.).

So, historically, Japanese fishery management methods were based on input regulations such as:

- the creation of entry limitation to fishery operations,
- the establishment of closed areas and closed seasons,

- prohibition on specific gear use (including mesh size restrictions), and
- restriction on size or horsepower of fishing vessels.

Input control was therefore the underlying assumption for the Japanese licensing system for both offshore and pelagic fisheries, while a rights-based management scheme was more appropriate for coastal fisheries (Makino, 2011). In the past, these input controls were the only practicable options since no systematic scientific research on stock conditions was available. However, recent scientific progress allows higher levels of accuracy in resource management thanks to clearer comprehension and understanding fish stocks status, while technological advances have provided more efficient fishery operations, thus in many cases nullifying the effectiveness of input controls.

Japan’s Fishing Boat Law (MAFF 1950) and other shipping related laws set the regulations on the construction, registration and inspection of fishing boats. The Fisheries Law stipulates the basic system concerning fishery operation. It provides rules and regulations for fisheries by establishing:

- a national licensing system,
- the prefecture governor’s licensing system, and
- a rights-based management system.

Only registered vessels under this system can be used as fishing vessels and the information required is that which is also required and sent to the WCPFC registry. And the fishery licensing system directly controls fishing capacity for major fishery operations. The number of licenses are strictly limited and closely controlled by the government. The license specifies the name of the receiving fishing entity and one fishing vessel. Consequently, one fishing license corresponds to one fishing vessel. The license specifies detailed terms and conditions for the operations, including limitations on fishing areas, fishing seasons, base port, gear use, and fishing methods. A national fishery license is required for fisheries to be operated on a nation-wide scale or in international waters under two categories:

1. Designated Fisheries (“Shitei-gyogyo”) which includes the distant-water tuna fishery using vessels over 120 gross tons, and the offshore tuna fishery using vessels of 10-120 gross tons.
2. Permitted Fisheries (“Shonin-gyogyo”) but this does not include the fishery under assessment.

Offshore fisheries mainly target widely distributed fish stocks in Japan’s EEZ. They also employ multiple layers of fishery resource management schemes, including the vessel registration system, licensing system (both national and prefectural governor’s licensing), as well as catch control scheme.  Consequently, TAC and/or TAE coexist with the traditional input control that uses the right-based management or the licensing system, in addition to the vessel registration system. But Japan’s distant-water fisheries mainly target internationally distributed fish stocks outside of Japan’s EEZ. Therefore, the upper limit of the catch and other regulations of relevance to fishery operations agreed at International and Regional fishery management organizations are incorporated into the national regulations. And from the figures above, it is evident that the total catch, and total number of boats used for distant-water fisheries have been continuously declining for decades as these vessels have left traditional fishing grounds now located in foreign EEZs, and no longer have “open access”.

### 4.2.2 Gear and operation of the fishery

As already mentioned above, horizontal longline fishing for pelagic species evolved in Japan during the nineteenth and early twentieth centuries. Wooden sailboats equipped with hemp longlines would go as far as 30 nm offshore searching for tuna and billfish. By 1912 there were over 100 registered sailboat tuna longliners in Japan. The first diesel powered steel longline vessels did not appear until the early 1920's. The longlines (main and branch) were hauled by hand until 1929 when the first mechanical mainline hauler was developed (Beverly et al., 2003).

Today's high seas longline fishing uses a mainline made of nylon monofilament (or very rarely, tarred rope) to which hundreds or thousands of branchlines are attached (target species dependent), each with a single baited hook. For the client fishery, the gear is deployed from a single vessel from the stern, and this mainline can be up to/over 150 nm long, with up to 3,000 hooks. The line is suspended in the water at varying depths by buoylines attached to floats, which may have flagpoles, lights, or radio beacons and shown in Figure 2. Today's technology allows these intermediary buoys to also come already equipped with small GPS locators, at very reasonable cost, so that the entire mainline drift configuration can be precisely followed in real time using the vessels' electronics. A variety of branchline/hook configurations and operational practices can be employed to specifically target different depths and species of fish. Fishing masters use a combination of the number of hooks per "basket" (hooks between floats), line shooter setting speed, vessel steaming speed, floatline length, branchline length and configuration, mainline material, bait (usually saury (sanma), sardines or mackerel-type, some squid) and other factors to influence the depth at which most of its hooks (Figure 3) will effectively "fish" or "target".

Once deployment or "setting," at a speed between 10 to 12 knots is complete (6 – 7 hours), sets are normally left drifting for several (2 – 3) hours before they are hauled back, along with any catch. In the case of this fishery, the mainline may be stored on a single large or double drum system hydraulic-powered, or in below-deck bins and baited branchlines are quickly snapped to the mainline (interval set by audible timer) as the boat moves forward, interspersed with floats also snapped to the mainline at regular intervals (the "basket"). Once all the baskets to be used for the set are on and if the entire mainline is not deployed it is cut, marker buoys and radio beacons are attached so that the gear can be retrieved, then allowed to drift freely. In most cases, the vessel will stay on watch around the last buoy to economize on fuel but may occasionally choose to slowly steam towards the first buoy/beacon and begin haulback (from starboard side of vessel) there, the thought being that each hook on the entire mainline would be able to "fish" for about the same amount of time during the set. On most vessels, there is also mechanization of branch lines haul back, which was all done manually until the end of the 1970's.

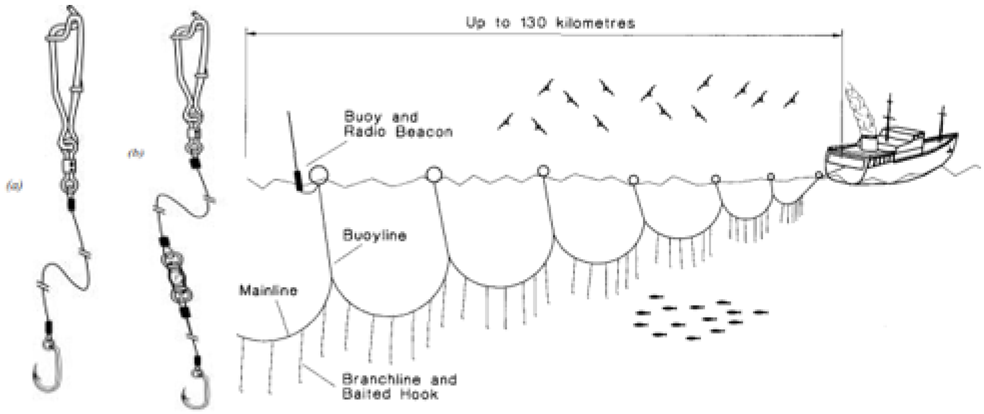


**Figure 2. Close-up of branchlines showing typical monofilament leader and snap with a) simple swivel and hook, and b) with added weighted swivel above short terminal leader and hook. Source: Beverly et al. (2003), along with a generic illustration of a longline set – not to scale. Source: Robertson (1998).**

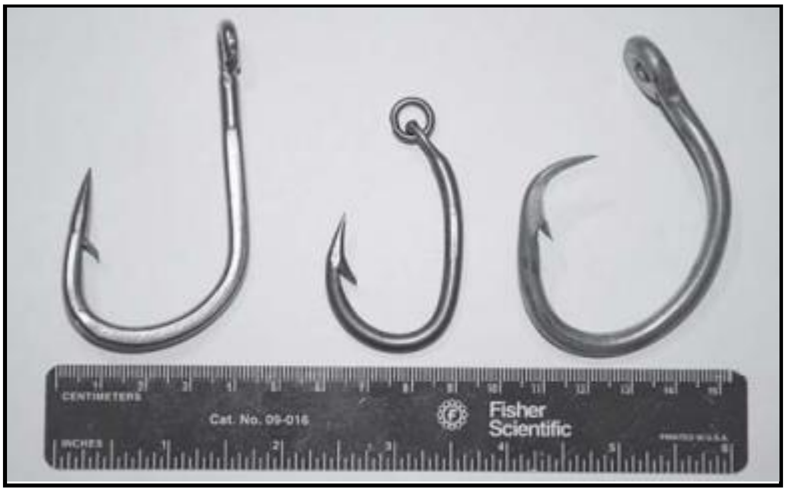


**Figure 3. Three types of hooks commonly used in pelagic longline gear configurations. From left to right, a size 9/0 J-style hook, a size 7/0 ringed tuna hook, and a size 16/0 double-strength circle hook. Source: Watson and Kerstetter (2006).**

### 4.2.3 Fishing areas and seasons

The average quarterly effort distribution of distant water and offshore longline vessels during the 2018-2020 is shown in Figure 3. The fishing grounds are located in east-west direction off Japan to Hawaii, equatorial area between 10˚S and 15˚N and off Australia. Distribution patterns of the effort do not show remarkable seasonal changes, but in the overall area, the fishing effort appeared to decrease in the second quarter than in the other quarters. Distribution of the catch by species by this fleet is shown in Figure 4. They are classified into several clear patterns, swordfish is dominant species near Japan, albacore in the middle latitudes between 15-30˚N and 25-40˚S, and tropical tuna (mostly bigeye and yellowfin) in the equatorial waters.

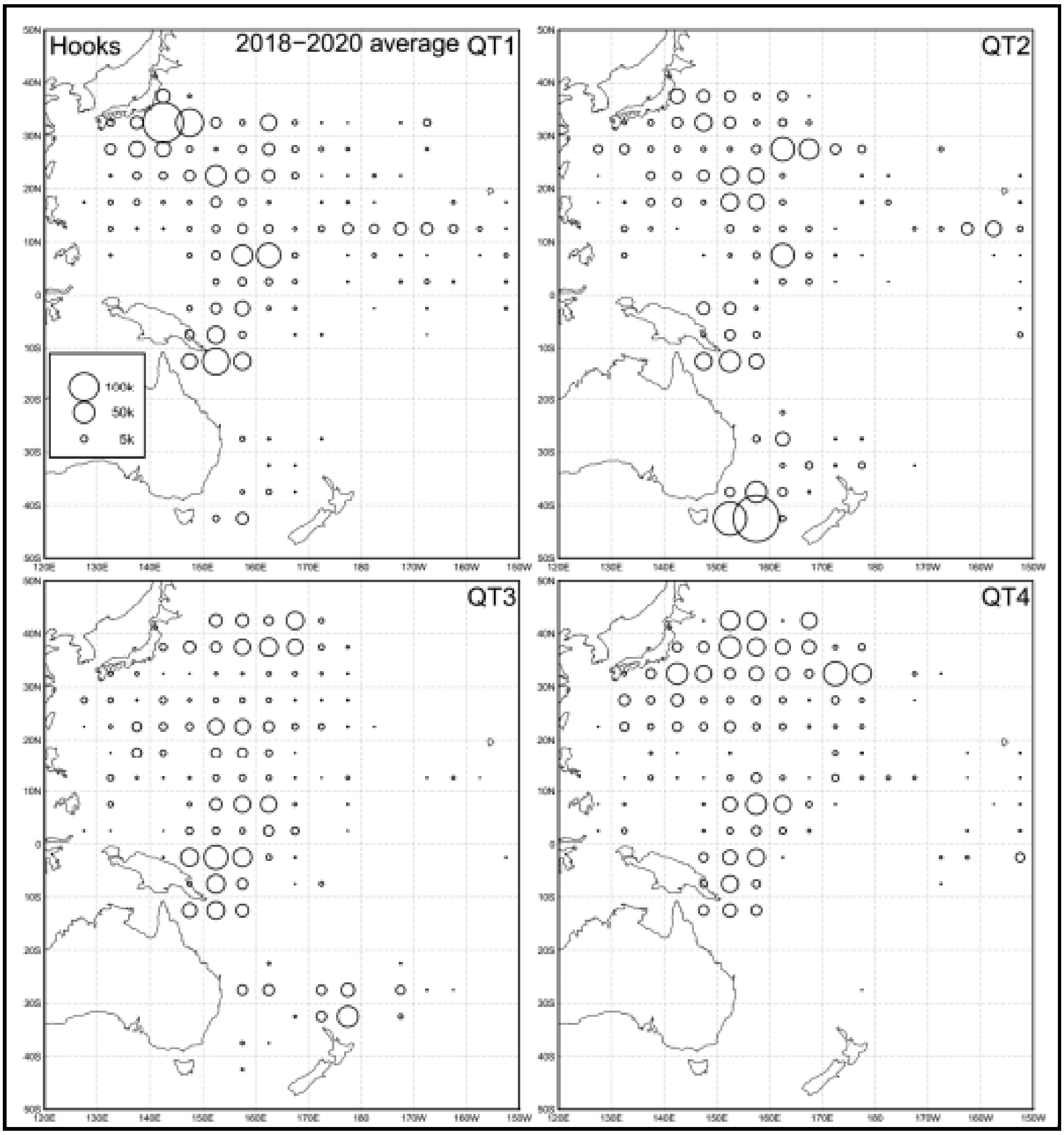


**Figure 4. Quarterly distribution of fishing effort for the Japanese offshore and distant water longline fisheries in the western and central Pacific Ocean in average of 2018-2020. Source: WCPFC 2021-WCPFC-SC17-AR/CCM-10 (Rev.01).**

The number of active longline vessels fishing in the WCPFC-CA (from Japan Annual Report to WCPFC - Part 1) for 2020 is given as 290 - 67 offshore/DW and 223 small (10-50 GRT) offshore, as above, all on the WCPFC register of vessels. Distant water (DW) longline vessels utilize ultra-low temperature (ULT) freezers for catch storage, and mostly target bigeye (and to a lesser extent yellowfin and bluefin, seasonally). Vessels are constructed from steel, the average size is around 400 GRT, with hold capacities ranging from 300-400 mt. Annual average catch per vessel (all species) is around 250-300 mt for vessels targeting bigeye and yellowfin (around 1-1.5t/day), whereas catch volumes are lower (around 0.5t/day) for vessels seasonally targeting higher value southern bluefin which are also constrained by strict quota limits (not a target of the fishery under assessment however). The total number of offshore longliners, excluding coastal longliners, has fallen steadily over the past five decades, from peaks of 1,901 offshore-distant waters vessels in 1963 and small offshore vessels from a peak of 940 in 1972, declining even further in recent years. The biggest declines have been in the medium (50-200 GRT) offshore longliners, whose numbers have dropped from 757 in 1980 to 26 in 2020 (97% decline), and small offshore vessels from 420 to 223 (47% decline). For the distant water (DW) longliners (>120 GRT) there has also been a precipitous decline over the period 1980-2020, from 943 to 56 units representing a 94% decline.

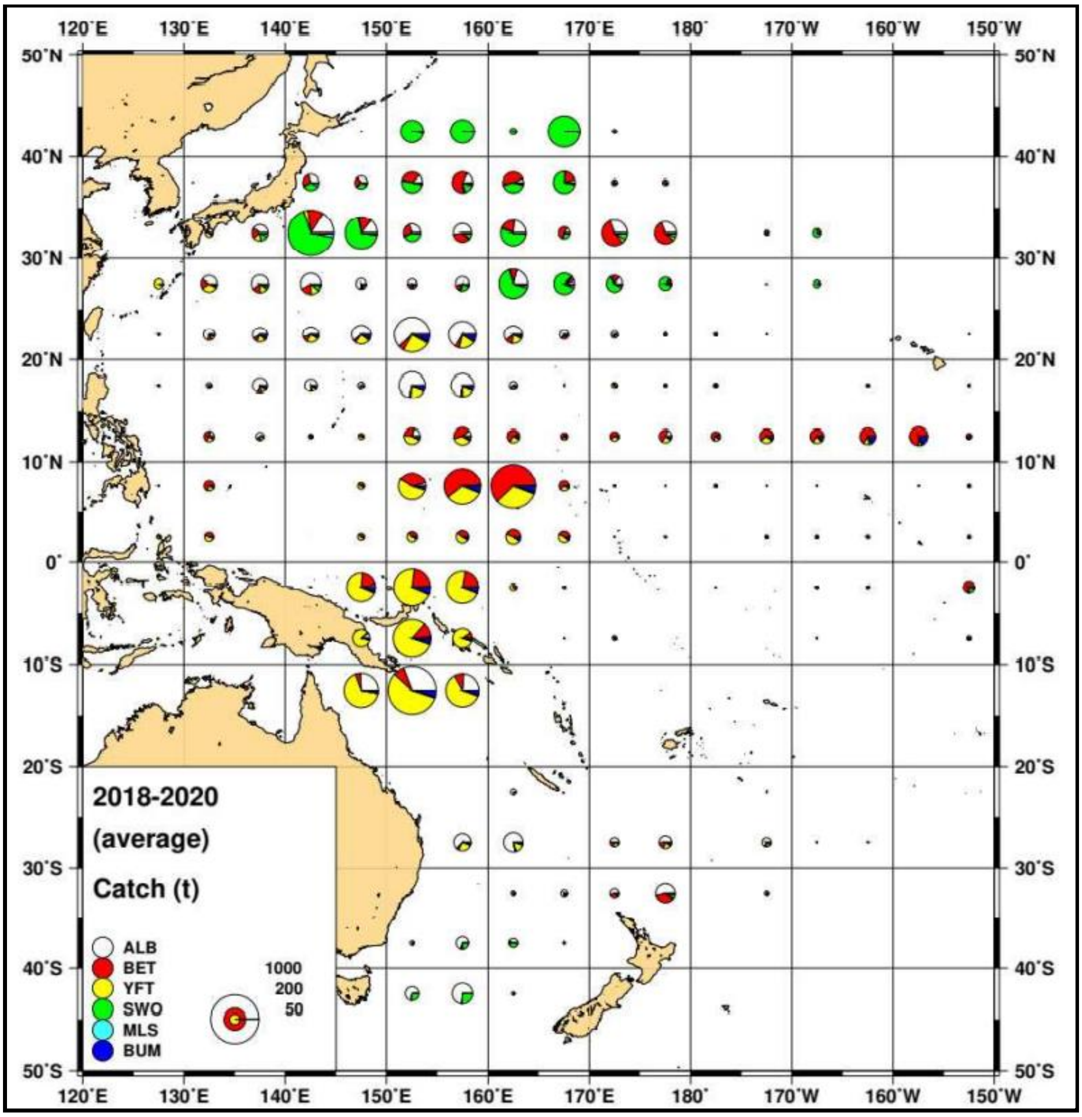


**Figure 5. Distributions of Japanese offshore and distant water longline catch (average 2018-2020 by weight) for six main species (ALB: albacore, BET: bigeye tuna, YFT: yellowfin tuna, SWO: swordfish, MLS: striped marlin and BUM: blue marlin). Source: WCPFC 2021-WCPFC-SC17-AR/CCM-10 (Rev.01).**

The total effort (in number of hooks) of distant water and offshore longline fisheries in all oceans decreased from 556 million hooks in 1981 to 495 million in 1983 and increased again to 557 million in 1988 after which it decreased steadily to less than 400 million since 1999 (Figure 5). The ratio of the fishing effort exerted in the Pacific Ocean to that of the total fishing effort was about 40-50% in the latest decade. In the WCP-CA, around 60% of the total Pacific effort has been deployed since the middle of the 1980's. The fishing effort of distant water and offshore longlines in the WCP-CA was more than 200 million hooks during the 1971-1990 period, and then decreased to less than 100 million hooks in 2005, furthermore decreased to less than 50 million hooks since 2015, and less than 40 million estimated for 2020.

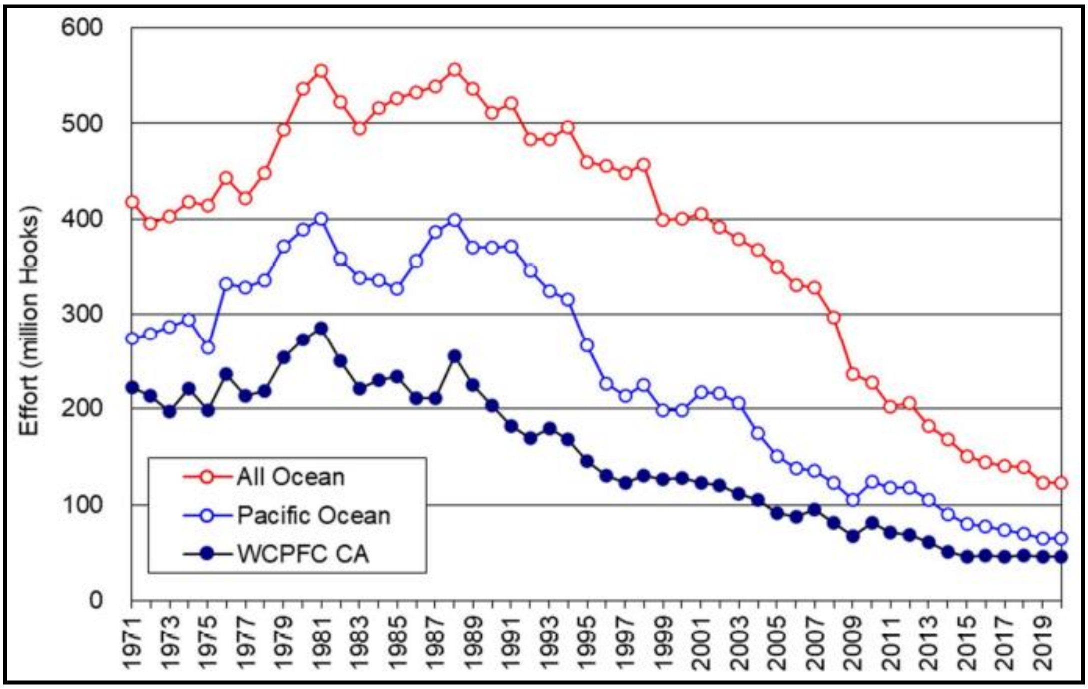


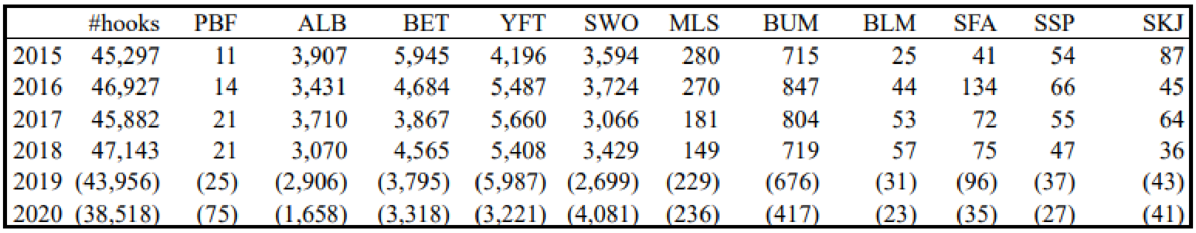
**Figure 6. Historical change in fishing effort of the Japanese distant water and offshore longline fishery (not including small offshore) in the WCPFC Convention Area. Values in 2019 and 2020 are provisional. Source: WCPFC 2021-WCPFC-SC17-AR/CCM-10 (Rev.01).**

### 4.2.4 Catch profiles and data availability

Most recent statistics available are 2020 data, though the 2019 and 2020 data are still preliminary. Catches in 3 weight of tuna species (Pacific bluefin, albacore, yellowfin, bigeye and skipjack), swordfish and billfishes (striped marlin, blue marlin, black marlin, sailfish and shortbill spearfish) caught by the Japanese distant water and offshore (not including small offshore) longliners in the WCP-CA from 2015 to 2020 are shown in Table 22. Number of Japanese longline vessels engaged in tuna fisheries in the WCPFC Convention Area by size of vessel. Figures in parentheses indicate provisional data. Coastal longliner and training/research vessels are not included in the totals. Source: WCPFC 2021-WCPFC-SC17-AR/CCM-10 (Rev.01).. Historical changes in fishing effort and catch by species for this fishery have already been illustrated above in Figure 1and Figure 2, respectively, for the years 1971-2020.

Among the species caught, yellowfin catch was around 60,000 mt at a peak during the late 1970’s and the early 1980’s and has since declined continuously to about 10,000 mt or less in the recent years (Figure 2). Bigeye catch which had been relatively stable during the 1970’s and 1980’s ranging between 30,000 and 50,000 mt, and then decreased to between 20,000 and 30,000 mt during the mid-1990’s to early 2000’s. Further, bigeye catch continued to decrease less than 20,000 mt after 2005, was less than 10,000 mt after 2009. The yellowfin catch continued to decrease since the end of 1970’s. Table 11 shows fishing effort and catch by species for the distant water and offshore longline fisheries during the 2015-2020 period. The bigeye catch shows a declining trend in the recent years. The bigeye catch was 3,318 mt in 2020 which is 73% of that in the average of the previous 5 years (2015-2019). The yellowfin catch increased from 4,196 mt in 2015 to 5,987 mt in 2019 but dropped to 3,211 mt in 2020. The yellowfin catch in 2020 is 60% of that in the average over the previous 5 years. (Table 26).

**Table 25. Fishing effort (in 1000 hooks) and catch (mt) in the WCPFC Convention Area by species for the Japanese distant water and offshore longline fisheries. Figures in the parentheses indicate provisional data. PBF: Pacific bluefin, ALB: albacore, BET: bigeye, YFT: yellowfin, SWO: swordfish, MLS: striped marlin, BUM: blue marlin, BLM: black marlin, SFA: sailfish, SSP: spearfish, SKJ: skipjack. Source: WCPFC 2021-WCPFC-SC17-AR/CCM-10 (Rev.01).**



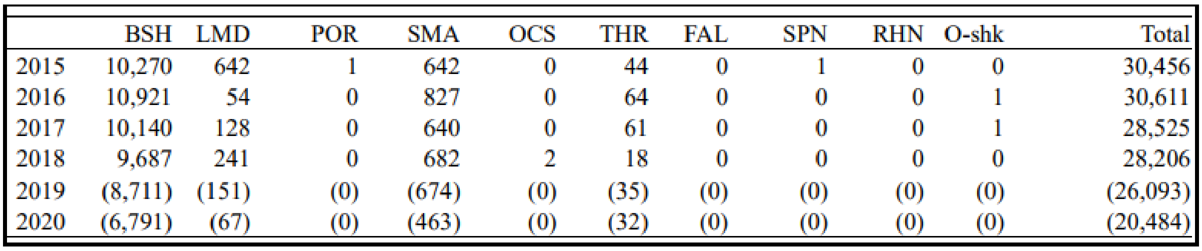
| | #hooks | PBF | ALB | BET | YFT | SWO | MLS | BUM | BLM | SFA | SSP | SKJ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2015 | 45,297 | 11 | 3,907 | 5,945 | 4,196 | 3,594 | 280 | 715 | 25 | 41 | 54 | 87 |
| 2016 | 46,927 | 14 | 3,431 | 4,684 | 5,487 | 3,724 | 270 | 847 | 44 | 134 | 66 | 45 |
| 2017 | 45,882 | 21 | 3,710 | 3,867 | 5,660 | 3,066 | 181 | 804 | 53 | 72 | 55 | 64 |
| 2018 | 47,143 | 21 | 3,070 | 4,565 | 5,408 | 3,429 | 149 | 719 | 57 | 75 | 47 | 36 |
| 2019 | (43,956) | (25) | (2,906) | (3,795) | (5,987) | (2,699) | (229) | (676) | (31) | (96) | (37) | (43) |
| 2020 | (38,518) | (75) | (1,658) | (3,318) | (3,221) | (4,081) | (236) | (417) | (23) | (35) | (27) | (41) |

**Table 26. Catch profiles as recorded for Japanese longline observer program in the western central Pacific in 2019 and 2020. Source: WCPFC SC16 and SC17 Japan Country Reports**

| **Fishery** | **Small offshore longline** | | **Distant water and offshore longline** | |
|---|---|---|---|---|
| | **2019** | **2020 (COVID year)** | **2019** | **2020 (COVID year)** |
| Number of cruises | 100 | 6 | 8 | 1 |
| Number of operations | 1,470 | 51 | 653 | 121 |
| N° catch observed | 92,088 | 91,291 | 43,483 | 338,322? |
| Catch by species | | | | |
| Albacore tuna | 18,550 | 874 | 11,276 | 6,385 |
| Yellowfin tuna | 9,929 | 151 | 5,542 | 294 |
| Southern bluefin tuna | 0 | 0 | 8,474 | 1,377 |
| Bigeye tuna | 14,898 | 413 | 4,340 | 411 |
| Pacific bluefin tuna | 14 | 0 | 4 | 0 |
| Skipjack tuna | 3,238 | 23 | 378 | 382 |
| Sailfish | 51 | 3 | 61 | 1 |
| Black marlin | 16 | 0 | 8 | 0 |
| Blue marlin | 884 | 6 | 251 | 1 |
| Shortbill spearfish | 326 | 3 | 71 | 31 |
| Striped marlin | 1,142 | 9 | 38 | 21 |
| Swordfish | 1,696 | 42 | 460 | 52 |

| | | | | |
|---|---|---|---|---|
| Lancetfishes | 5,975 | 306 | 1,640 | 211 |
| Opah | 932 | 24 | 628 | 266 |
| Pomfrets | 897 | 121 | 573 | 74 |
| Dolphinfishes | 710 | 5 | 260 | 14 |
| Escolar | 1,978 | 69 | 961 | 133 |
| Other fish | 1,589 | 44 | 1,799 | 110 |
| Thresher sharks | 328 | 47 | 144 | 8 |
| Shortfin mako | 779 | 9 | 201 | 36 |
| Blue shark | 24,228 | 201 | 3,327 | 636 |
| Other sharks | 491 | 21 | 1,318 | 159 |
| Stingray | 2,703 | 26 | 556 | 110 |
| Other rays | 22 | 0 | 4 | 0 |
| Seabirds | 521 | 30 | 1,144 | 13 |
| Sea turtles | 175 | 1 | 21 | 0 |
| Mammals | 16 | 3 | 4 | 0 |

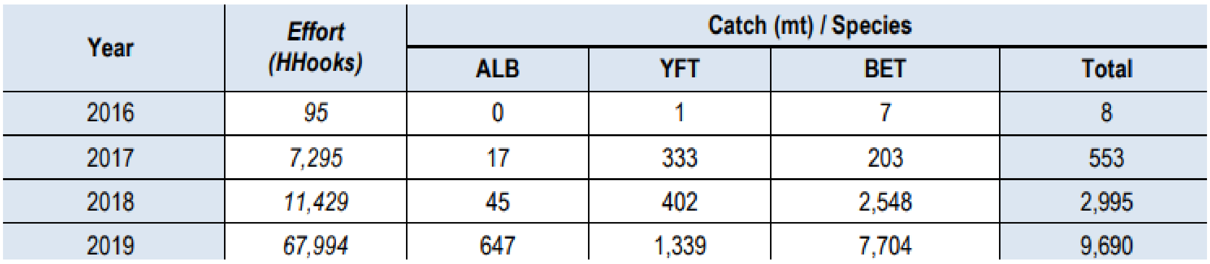
**Table 27. Catch (mt) for shark bycatch species in the WCPFC Convention Area by species for the Japanese distant and offshore longline fisheries. Figures in the parentheses indicate provisional data. The catch for salmon shark and porbeagle was counted only in south of 20° south. Since 2012, catches of silky shark, hammerhead sharks and whale shark are included in other sharks. BSH: Blue shark, LMD: Salmon shark, POR: Porbeagle shark, SMA: Shortfin mako shark, OCS: Oceanic white-chip shark, THR: Thresher sharks nei, FAL: Silky sharks, SPN: Hammerhead sharks nei, RHN: Whale shark, O-shk: other sharks. WCPFC 2021-WCPFC-SC17-AR/CCM-10 (Rev.01).**



| | BSH | LMD | POR | SMA | OCS | THR | FAL | SPN | RHN | O-shk | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 2015 | 10,270 | 642 | 1 | 642 | 0 | 44 | 0 | 1 | 0 | 0 | 30,456 |
| 2016 | 10,921 | 54 | 0 | 827 | 0 | 64 | 0 | 0 | 0 | 1 | 30,611 |
| 2017 | 10,140 | 128 | 0 | 640 | 0 | 61 | 0 | 0 | 0 | 1 | 28,525 |
| 2018 | 9,687 | 241 | 0 | 682 | 2 | 18 | 0 | 0 | 0 | 0 | 28,206 |
| 2019 | (8,711) | (151) | (0) | (674) | (0) | (35) | (0) | (0) | (0) | (0) | (26,093) |
| 2020 | (6,791) | (67) | (0) | (463) | (0) | (32) | (0) | (0) | (0) | (0) | (20,484) |

Although tuna purse seine catches in the PNG EEZ account for over 95% of the total annual catch, foreign longline vessels still do fish in PNG waters under the conditions of bilateral access agreements between PNG and their company, fishing association or home party state. And since 2015, under a trial longline fishery arrangement to determine longline catch rate, a total of 5 foreign flag ultra-low longline vessels were given access to the PNG waters. In these last five years, catches by foreign vessels fishing in PNG waters has averaged around 2,650 mt (Table 25). The bilateral arrangements were re-introduced into PNG waters in 2015 after non-access for more than two decades. The government's plan to domesticate longline fishing activities for local participation resulted in the ban in foreign bilateral longline fishing activities inside PNG waters commencing 1996. Changes to government policy in 2014 and 2015 gave rise again to limited access for ULT tuna longline vessels into PNG national waters.

**Table 28. Catch and effort estimates for foreign longline fishing in PNG waters from 2016- 2019. Source: WCPFC-SC17-AR/CCM-19** (WCPFC, 2021b)



| Year | *Effort (HHooks)* | Catch (mt) / Species | | | |
|---|---|---|---|---|---|
| | | ALB | YFT | BET | Total |
| 2016 | *95* | 0 | 1 | 7 | 8 |
| 2017 | *7,295* | 17 | 333 | 203 | 553 |
| 2018 | *11,429* | 45 | 402 | 2,548 | 2,995 |
| 2019 | *67,994* | 647 | 1,339 | 7,704 | 9,690 |

# 5 Traceability and eligibility

To be drafted at Client and Peer Review Draft Report stage

## 5.1 Eligibility date

The report shall include the eligibility date and the justification for selecting this date, including consideration of whether the traceability and segregation systems in the fishery are appropriately implemented.

Reference(s): FCP v2.2 Section 7.8

## 5.2 Traceability within the fishery

The report shall include a description of the tracking, tracing and segregation systems within the fishery and how these systems will allow any products sold as MSC certified to be traced back to the Unit of Certification.

The report shall include an evaluation of the robustness of the management systems related to traceability.

The report shall include any traceability references, including hyperlinks to publicly-available documents.

The report shall include a description of the factors that may lead to risks of non-certified seafood being mixed with certified seafood prior to entering Chain of Custody using the table below. For each risk factor, there shall be a description of whether the risk factor is relevant for the fishery and, if so, a description of the relevant mitigation measures or traceability systems in place.

Reference(s): FCP v2.2 Section 7.5.7, 7.9, 7.10, and 7.20.3

**Table 29. Traceability within the fishery**

| Factor | Description |
|---|---|
| Will the fishery use gears that are not part of the Unit of Certification (UoC)?<br>If Yes, please describe:<br>If this may occur on the same trip, on the same vessels, or during the same season;<br>How any risks are mitigated. | Please state whether this occurs within the fishery (e.g. regularly, rarely, never). If so, please describe how this potential traceability risk is addressed or mitigated.<br>If this is covered by relevant regulatory frameworks, you may link to the relevant section in Section 5 MSC Fisheries Standard – Principle 3 – Effective management. |
| Will vessels in the UoC also fish outside the UoC geographic area?<br>If Yes, please describe:<br>If this may occur on the same trip;<br>How any risks are mitigated. | Please state whether this occurs within the fishery (e.g. regularly, seasonally, never). If so, please describe how this potential traceability risk is addressed or mitigated.<br>If this is covered by relevant regulatory |

| Factor | Description |
|---|---|
| | frameworks, you may link to the relevant section in Section 5 MSC Fisheries Standard – Principle 3 – Effective management. |
| Do the fishery client members ever handle certified and non-certified products during any of the activities covered by the fishery certificate? This refers to both at-sea activities and on-land activities.<br>Transport<br>Storage<br>Processing<br>Landing<br>Auction<br>If Yes, please describe how any risks are mitigated. | Please state whether any of these activities occur within the fishery and a description of this activity including how this potential traceability risk is addressed or mitigated.<br>If this is covered by relevant regulatory frameworks, you may link to the relevant section in Section 5 MSC Fisheries Standard – Principle 3 – Effective management. |
| Does transhipment occur within the fishery?<br>If Yes, please describe:<br>If transhipment takes place at-sea, in port, or both;<br>If the transhipment vessel may handle product from outside the UoC;<br>How any risks are mitigated. | Please state whether this occurs within the fishery (e.g. regularly, rarely, never). If so, please describe how this potential traceability risk is addressed or mitigated.<br>If this is covered by relevant regulatory frameworks, you may link to the relevant section in Section 5 MSC Fisheries Standard – Principle 3 – Effective management. |
| Are there any other risks of mixing or substitution between certified and non-certified fish?<br>If Yes, please describe how any risks are mitigated. | Please state whether this occurs within the fishery. If so, please describe how this potential traceability risk is addressed or mitigated. |

## 5.3 Eligibility to enter further chains of custody

**To be drafted at Client and Peer Review Comment Draft Report stage**

The report shall include a determination of whether the seafood product will be eligible to enter certified chains of custody, and whether the seafood product is eligible to be sold as MSC certified or carry the MSC ecolabel.

The report shall include a list of parties, or category of parties, eligible to use the fishery certificate, and sell product as MSC certified.

The report shall include the point of intended change of ownership of product, a list of eligible landing points, and the point from which subsequent Chain of Custody certification is required.

If the CAB makes a negative determination under FCP v2.2 Section 7.9, the CAB shall state that fish and fish products from the fishery are not eligible to be sold as MSC certified or carry the MSC ecolabel. If the client group includes other entities such as agents, unloaders, or other parties involved with landing or sale of certified fish, this needs to be clearly stated in the report including the point from which Chain of Custody is required.

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

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

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

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

Reference(s): FCP v2.2 Section 7.9

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

NA

## 5.5 Principle 1

### 5.5.1 Yellowfin tuna

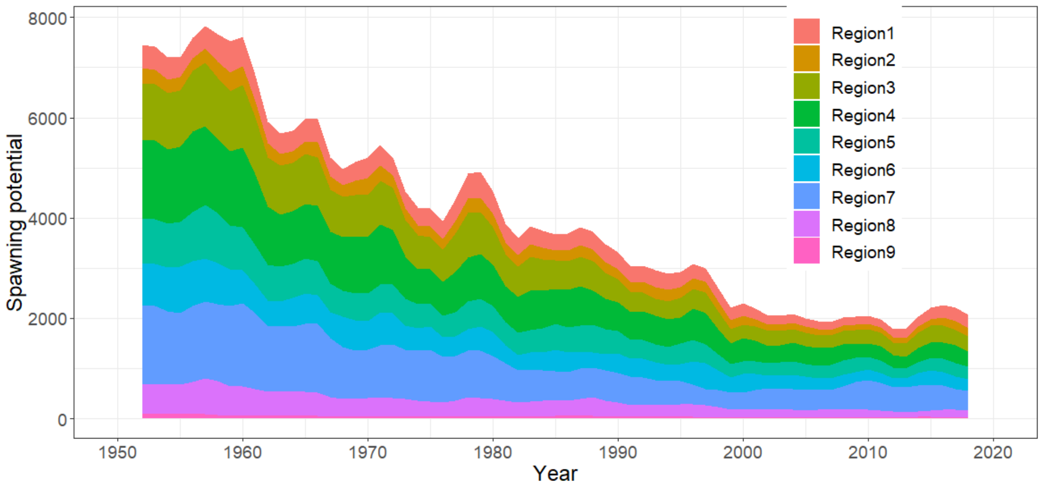


**Figure 7. Yellowfin: Trajectory of spawner potential for each of the 9 model regions from 1952, from the median of the diagnostic model. Source: Figure YFT-1 in SC16 report;** (WCPFC-SC16, 2020)**.**

The results of the stock assessment can be summarised as follows (Vincent et al., 2020):

1. Spawner biomass is estimated to have declined since the 1970s for all models and all model regions.
2. The assessment is more optimistic than the previous assessment and this is mainly due to the new growth information.
3. All models put the biomass above the LRP.
4. There is ~90% probability that the biomass is above 50%$SB_{F=0}$.
5. Depletion is estimated to be greater in tropical regions, with the model driven in these regions by declining CPUE; depletion in temperate regions is estimated to be lower and driven more by lower recent recruitment. Depletion in all regions remains above the regional reference point of 20%$SB_{F=0}$.
6. F is below $F_{MSY}$ (median 0.104) with high certainty.

#### 5.5.1.1 Yellowfin stock status projections

The projections conducted for the three tropical stocks in relation to different management scenarios are described in Section 5.5.1.10 (Analysis of management options). Projections using the new stock assessment and based on the ‘status quo’ scenario (the most optimistic) are given in Figure 8. All scenarios maintain the yellowfin stock above the LRP and below $F_{MSY}$ with high probability (see Section 5.5.1.10).

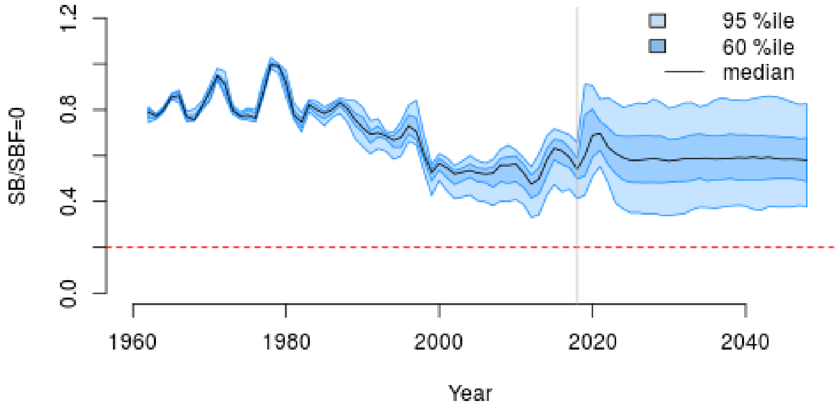


**Figure 8. Yellowfin: Time series and projection of SB/SB$_{F=0}$ to 2084 (red dashed line is LRP). Source: Figure YFT-11 in SC16 report** (WCPFC-SC16, 2020)**.**

### 5.5.1.2 Yellowfin tuna information base

The stock assessment report (Vincent et al., 2020) provides a full description of the data sources used, from which the summary in this section is taken unless otherwise indicated.

It is clear that there has been an information gap for the fishery in 2020 due to the Covid-19 pandemic, with few observer deployments and limited port sampling Pacific-wide. However, the stock assessment runs to the end of 2018, so this information gap is not yet felt in stock assessment and management advice.

Fisheries: The stock assessment defines 41 'fisheries' according to fishing gear and method (longline, purse seine (associated vs. unassociated), pole-and-line, various miscellaneous small-scale fisheries in Indonesia and the Philippines), as well as by region and by flag for Japan, Philippines, Indonesia Vietnam, Australia and the US. A difference from the previous assessment is that in addition to each individual fishery, an 'index fishery' was generated for each region based on SPC's database of longline operational data. The 'index fishery' was allocated a nominal catch of one fish per quarter. This approach is considered to optimise both the spatial coverage of the abundance indices and also improves the weighting of the size data, which is a perennial problem. It has been made possible by improved access to operational-level data from these fisheries.

The information provided from each fishery is summarised in the graphic below (Figure 9; Vincent et al. (2020)). Recent and historical (back to ~1980 at least) catch data are available from nearly all the fisheries; standardised CPUE is only evaluated for longline fisheries ('index fisheries'); size data are available as weight for the longline fisheries and length (from port sampling) for the other gear types. There is no individual size or weight data collection from this fishery at present.

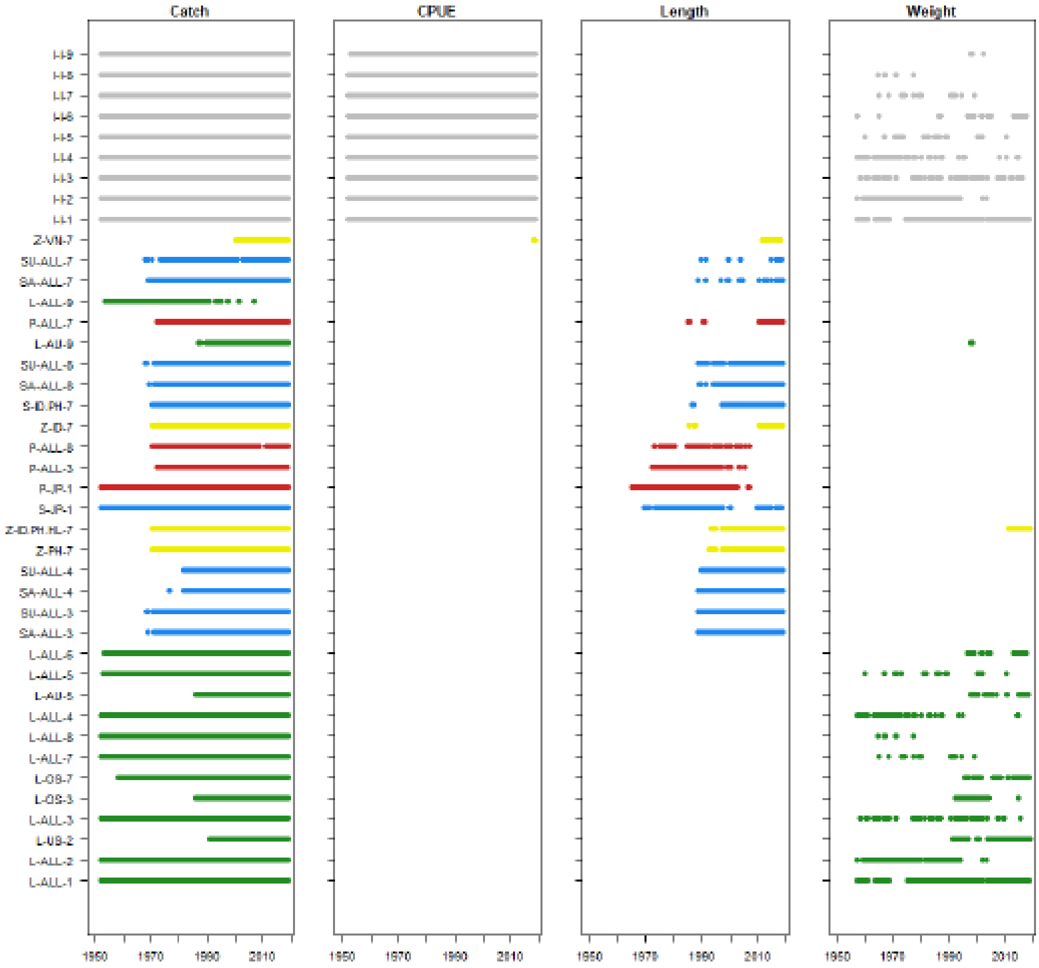


**Figure 9. Yellowfin: Graphic representing the input data to the yellowfin stock assessment from each 'fishery' (as defined as described above). Left to right: catch, CPUE, catch length sampling and catch weight sampling; top to bottom: the 41 fisheries defined by the stock assessment; x-axis of each column 1952-2018 (Figure 6 in** Vincent et al. (2020)**).**

Catches: Catch is recorded by number for longline and by weight for other gears. Discards are considered minor and are not included in the stock assessment. For the purse seine catch, a method has been defined for dividing the catch by species (this after a process of review and revision, most recently in 2019 based on the conclusions of WCPFC 'Project 60'; see references in stock assessment report).

Effort and CPUE: Effort is included in the stock assessment for the index fisheries.

Other fisheries: There has been gradual improvement in the data from Indonesia, the Philippines and Vietnam over the last decade or so. Effort for these fisheries is included as days fished where possible, but otherwise not included (this applies to three fisheries with 'miscellaneous' gears from each of the three countries).

Length/weight frequency: These data come from observers, port sampling or on-board collection by the crew and are converted to live weight. For purse seine fisheries, observer samples are corrected for grab-sample bias, and the long time-series of port sampling and observer data from Pago Pago is included and provides most of the early data. If both length and weight are available, weight is used for preference. Some length-frequency data are available from the Philippines, and for the first time there was direct size information from Indonesia and Vietnam, instead of size structure for these fisheries being extrapolated from similar fisheries in the Philippines. Project 90 is dedicated to improving length and weight data for stock assessment purposes (MacDonald et al., 2021).

Tagging data: In total 116,125 effective releases and 22,406 useable returns are incorporated into the stock assessment model. These data come from the Regional Tuna Tagging Project (1989–92), the Coral Sea Tagging Programme (1995, 1999-2001), the Pacific Tuna Tagging Programme (2006-2017) and the Japan Pacific Tagging Programme (2000-2017).

#### 5.5.1.3 WCPO Yellowfin tuna stock assessment

The most recent stock assessment for WCPO yellowfin is described in Vincent et al. (2020), from which the summary here is taken. The assessment uses data from 1952 to 2018, in quarterly timesteps. As with the assessments for all the main WCPFC stocks, the assessment model is run in Multifan-CL (MFCL), which provides a Bayesian framework. MFCL requires that 'fisheries' are defined with as near as possible constant selectivity and catchability. The details of how these fisheries are defined are given in Section 5.5.1.2 above. For each fishery, the assessment uses catch data, effort data and size data (as available; see 'information' above). The model also uses tagging data and biological information such as growth and maturity curves.

The 2020 stock assessment (Vincent et al., 2020) ending WWI and the occupation of these lands by German forces (South Pacific Mandate – www.wiki2.org/en/South_Pacific_Mandate).

Today, Japanese fisheries in general are divided also into three main types: 1) distant-water fisheries, 2) offshore, and 3) coastal, of which the longline component is represented in both the distant-water and offshore categories. It is also important to note that these three fisheries categories are quite different both in terms of resource management and obviously fishing techniques used.

Primary species for the longline catch are historically yellowfin and bigeye, with very minor catches of skipjack, which are targeted by purse seine and pole-and-line fisheries (Table 22). Among the species caught, yellowfin catch was around 60,000 mt at a peak during the late 1970's and the early 1980's and has since declined continuously to about 10,000 mt or less in the recent years (Figure 1). Bigeye catch which had been relatively stable during the 1970's and 1980's ranging between 30,000 and 50,000 mt, and then decreased to between 20,000 and 30,000 mt during the mid-1990's to early 2000's. Further, bigeye catch continued to decrease less than 20,000 mt after 2005, was less than 10,000 mt after 2009. The yellowfin catch continued to decrease since the end of 1970's. The bigeye catch shows a declining trend in the recent years. The bigeye catch was 3,318 mt in 2020 which is 73% of that in the average of the previous 5 years (2015-2019). The yellowfin catch increased from 4,196 mt in 2015 to 5,987 mt in 2019 but dropped to 3,211 mt in 2020. The yellowfin catch in 2020 is 60% of that in the average of previous 5 years. Albacore tuna, while historically a small portion of the catch, has become almost as important as the yellowfin in the north Pacific WCPFC catch area over the last 5 years.

#### 5.5.1.4 Biology and ecology

Information in this section is taken from Tremblay-Boyer et al. (2017) and Vincent et al. (2020) except where otherwise indicated.

Yellowfin tuna are fast-growing; reaching approx. 25cm FL (fork length) at 3 months, and first appearing in surface fisheries at <1 year. They reach a maximum size of *ca*. 180 cm. Maturity is reached at *ca*. 100 cm, with spawning taking place in equatorial regions, probably opportunistically. There are known to be regional differences in growth rate within the western Pacific; it is thought that growth rates are slower in Indonesia/Philippines waters than in the wider WCPO. However, this is not taken into account in the stock assessment model, which uses a single growth schedule across all regions. The growth model is a significant uncertainty in the stock assessment, and research has just been completed ('Project 82') to improve it by improving and cross-referencing otolith readings from labs across the Pacific and further afield (Farley et al., 2020).

Natural mortality (M) varies with size, being lowest for individuals that are pre-maturity (~50-80 cm) and increasing for younger and older fish. Tagging data suggest that it is commonplace for individuals to reach 4 years old, while the longest period at liberty between tag and recapture for a WCPO yellowfin is currently 6.5 years. Farley et al. (2020) estimated longevity of yellowfin tuna at least 15 years.

For assessment and management purposes, WCPO yellowfin (west of 150°W) is considered a discrete stock, although tagging data suggest that there is longitudinal movement in equatorial regions, suggesting some mixing between the western and eastern Pacific. However, Moore et al. (2018) note that the evidence for discrete stocks in the western and eastern Pacific is strong, and in fact suggest three large-scale stocks, in the western, central and eastern Pacific. Farley et al. (2020) noted faster growth rates in the central Pacific relative to both east and west. Both genetic and non-genetic data suggest that there may be stocks or sub-stocks within the western Pacific; for example, a genetic study was able to distinguish between fish from Tokelau and the Coral Sea with a high degree of accuracy (Grewe et al., 2016). The details of population structure within the WCPO, if any, and the implications for management are far from being fully worked out (Moore et al., 2018).

The WCPO yellowfin 'stock' may therefore actually be a cline or a metapopulation; but more evidence is needed to get any firm idea of what a more appropriate population structure would be, from the point of view of fisheries management. Since the current assessment allows for spatial structure, with movement rates between regions set within the model, it allows to some extent for this possibility. The regional structure of the stock assessment was adjusted in 2017 based on tagging data which showed limited movement between equatorial and more temperate waters, as well as to better reflect the distribution of the purse seine fishery (Figure 10).

For bigeye, the Scientific Committee has expressed some concern about the division of the eastern and western Pacific stocks at 150°W, but this seems to be less of a concern for yellowfin which has much lower relative catches around the 150°W line (Figure 10).

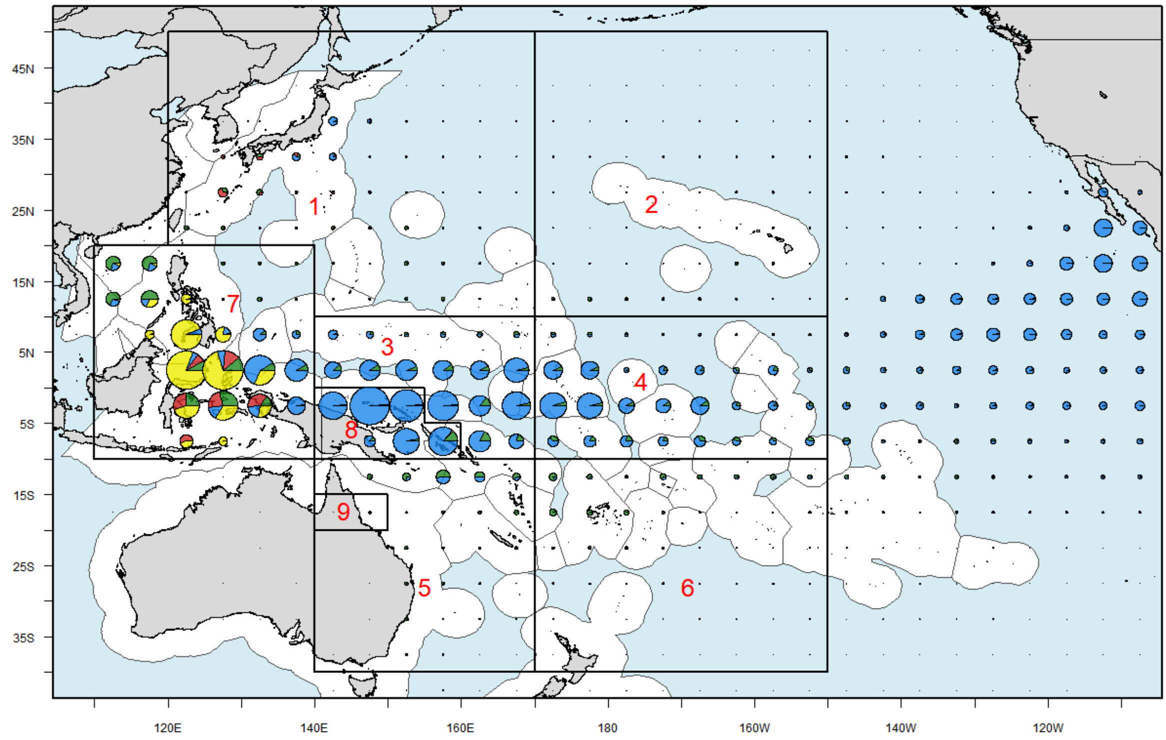


**Figure 10. Yellowfin: Geographical distribution of yellowfin catches in the Pacific Ocean 2009-18 (purse seine=blue, longline=green, pole and line=red, misc.=yellow), with the superimposed grid showing the regional structure and spatial limits of the SPC stock assessment.** (Vincent et al., 2020).

#### 5.5.1.5 Yellowfin stock status

The most recent stock assessment for WCPO yellowfin was carried out in 2020 (Vincent et al., 2020). The new assessment does not make any major changes to the assessment structure or assumptions, except for aligning the regional structure with the new regional structure for bigeye (i.e. changing the boundary between equatorial regions, Regions 3 and 4, and northern sub-tropical regions, Regions 1 and 2, from 20° N to 10° N). The three additional years of data included in the assessment, however, cover a period of strong El Niño conditions and increasing catch levels. Catch estimates for 2017 and 2018 suggest a record high catch of 695,107 t in 2017 with 690,207 t in 2018; an increase of 12% in 2017 above the 2012-16 average (WCPFC Tuna Fishery Yearbook[1]). (These high catch rates continued in 2019 and 2020 – see above).

The Pacific Community (formerly the Secretariat of the Pacific Community – SPC) recommends that the stock status be evaluated and management advice formulated, not based directly on the diagnostic model, but rather on the overall structural uncertainty grid, which incorporates the conclusions of the one-off sensitivity analyses considered to be the most important. A diagnostic model is nevertheless selected, which uses the values for each sensitivity which are considered most likely (or the middle values; further details in the stock assessment section below). The stock assessment report presents a grid of 72 models, and since the SC (meeting remotely) was not able to have a satisfactory discussion about which to retain or how to weight them, they agreed to retain

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[1] https://www.wcpfc.int/statistical-bulletins

the grid structure presented in the stock assessment by SPC (WCPFC-SC16, 2020). This grid is summarised in Table 30. Majuro plots for the full grid and key sensitivities are given in Figure 11. Figure 7 shows the trajectory of spawner potential for the nine model regions.

**Table 30. Yellowfin: Summary of stock status estimates relative to reference points, across all 72 models in the structural uncertainty grid used to characterise uncertainty; latest = 2018, recent = 2014-17; $SB_{F=0}$ = average spawning potential in the absence of fishing for 2008-17, following the definition of the LRP agreed by the SC. Source: Table 3 in** Vincent et al. (2020)**.**

| Parameter | Min. | 10% | Median | 90% | Max. |
|---|---|---|---|---|---|
| $F_{recent}$ / $F_{MSY}$ | 0.233 | 0.269 | 0.357 | 0.473 | 0.588 |
| $SB_{latest}$ / $SB_{F=0}$ | 0.404 | 0.471 | 0.542 | 0.601 | 0.664 |
| $SB_{latest}$ / $SB_{MSY}$ | 1.466 | 1.665 | 2.282 | 3.293 | 4.889 |
| $SB_{recent}$ / $SB_{F=0}$ | 0.424 | 0.507 | 0.583 | 0.641 | 0.677 |
| $SB_{recent}$ / $SB_{MSY}$ | 1.538 | 1.773 | 2.432 | 3.571 | 5.267 |
| $SB_{MSY}$ / $SB_{F=0}$ | 0.121 | 0.175 | 0.236 | 0.278 | 0.302 |

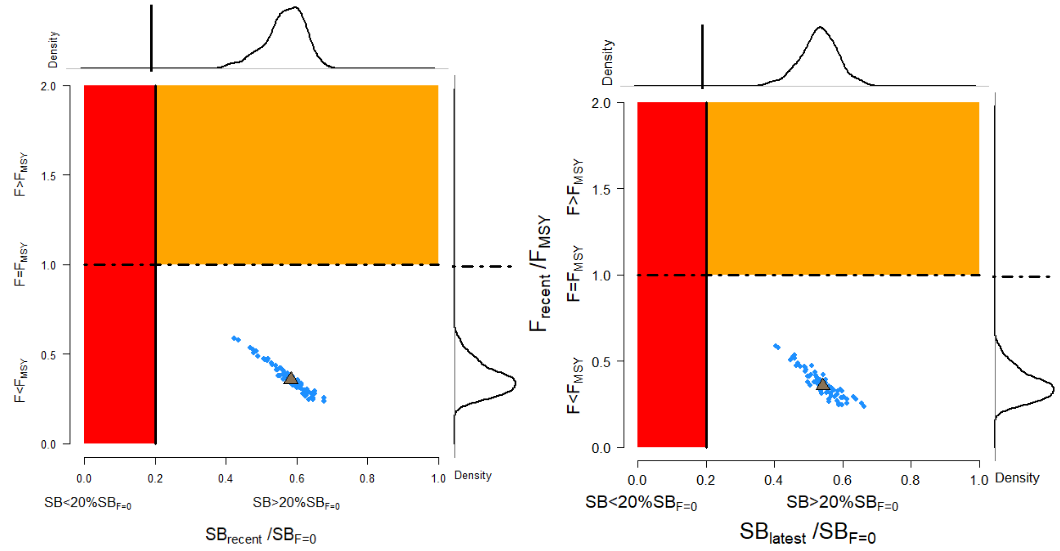

**Figure 11. Yellowfin: Majuro plots summarising the results from the structural uncertainty grid: Left: recent (2014-17); Right: latest (2018); y-axis = $F/F_{MSY}$; orange zone = $F>F_{MSY}$; x-axis = $SB/SB_{F=0}$; red zone = $SB<20\%SB_{F=0}$.. Source: Figure 55 in** Vincent et al. (2020)**.**

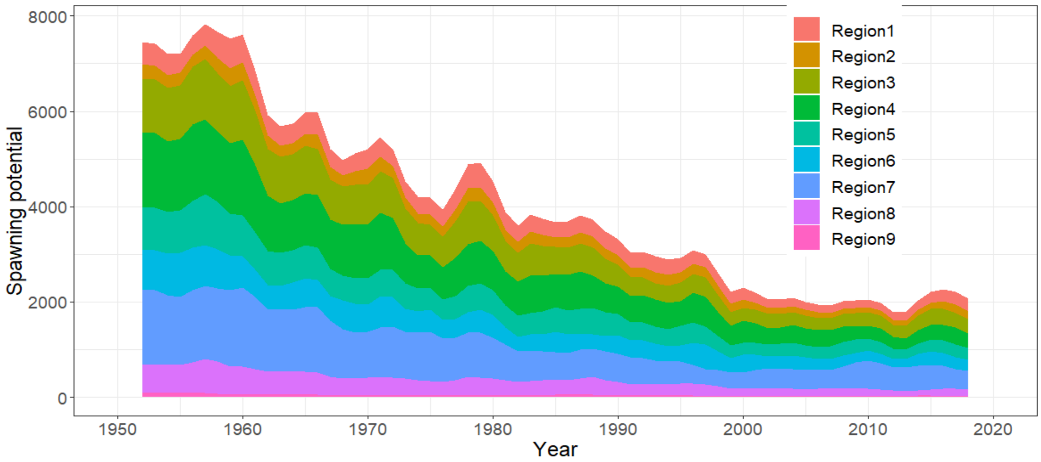

**Figure 12. Yellowfin: Trajectory of spawner potential for each of the 9 model regions from 1952, from the median of the diagnostic model. Source: Figure YFT-1 in SC16 report;** (WCPFC-SC16, 2020)**.**

The results of the stock assessment can be summarised as follows (Vincent et al., 2020):

7. Spawner biomass is estimated to have declined since the 1970s for all models and all model regions.
8. The assessment is more optimistic than the previous assessment and this is mainly due to the new growth information.
9. All models put the biomass above the LRP.
10. There is ~90% probability that the biomass is above 50%$SB_{F=0}$.
11. Depletion is estimated to be greater in tropical regions, with the model driven in these regions by declining CPUE; depletion in temperate regions is estimated to be lower and driven more by lower recent recruitment. Depletion in all regions remains above the regional reference point of 20%$SB_{F=0}$.
12. F is below $F_{MSY}$ (median 0.104) with high certainty.

### 5.5.1.6 Yellowfin stock status projections

The projections conducted for the three tropical stocks in relation to different management scenarios are described in Section 5.5.1.10 (Analysis of management options). Projections using the new stock assessment and based on the ‘status quo’ scenario (the most optimistic) are given in Figure 8. All scenarios maintain the yellowfin stock above the LRP and below $F_{MSY}$ with high probability (see Section 5.5.1.10).

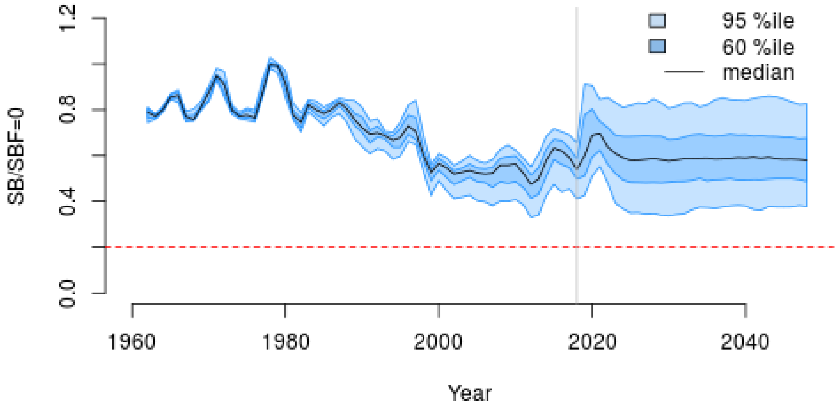

**Figure 13. Yellowfin: Time series and projection of SB/SB$_{F=0}$ to 2084 (red dashed line is LRP). Source: Figure YFT-11 in SC16 report** (WCPFC-SC16, 2020)**.**

### 5.5.1.7 Yellowfin tuna information base

The stock assessment report (Vincent et al., 2020) provides a full description of the data sources used, from which the summary in this section is taken unless otherwise indicated.

It is clear that there has been an information gap for the fishery in 2020 due to the Covid-19 pandemic, with few observer deployments and limited port sampling Pacific-wide. However, the stock assessment runs to the end of 2018, so this information gap is not yet felt in stock assessment and management advice.

Fisheries: The stock assessment defines 41 'fisheries' according to fishing gear and method (longline, purse seine (associated vs. unassociated), pole-and-line, various miscellaneous small-scale fisheries in Indonesia and the Philippines), as well as by region and by flag for Japan, Philippines, Indonesia Vietnam, Australia and the US. A difference from the previous assessment is that in addition to each individual fishery, an 'index fishery' was generated for each region based on SPC's database of longline operational data. The 'index fishery' was allocated a nominal catch of one fish per quarter. This approach is considered to optimise both the spatial coverage of the abundance indices and also improves the weighting of the size data, which is a perennial problem. It has been made possible by improved access to operational-level data from these fisheries.

The information provided from each fishery is summarised in the graphic below (Figure 9; Vincent et al. (2020)). Recent and historical (back to ~1980 at least) catch data are available from nearly all the fisheries; standardised CPUE is only evaluated for longline fisheries ('index fisheries'); size data are available as weight for the longline fisheries and length (from port sampling) for the other gear types. There is no individual size or weight data collection from this fishery at present.

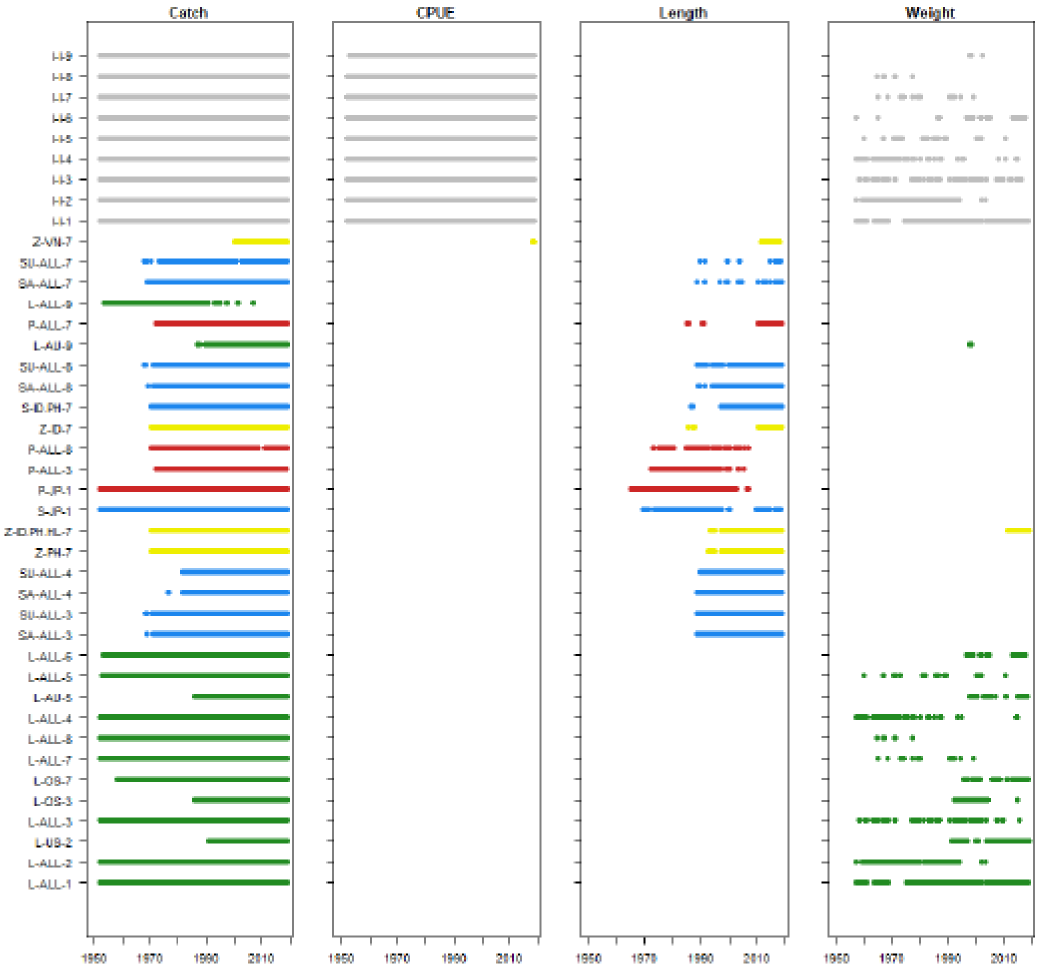

**Figure 14. Yellowfin: Graphic representing the input data to the yellowfin stock assessment from each 'fishery' (as defined as described above). Left to right: catch, CPUE, catch length sampling and catch weight sampling; top to bottom: the 41 fisheries defined by the stock assessment; x-axis of each column 1952-2018 (Figure 6 in** Vincent et al. (2020)**).**

Catches: Catch is recorded by number for longline and by weight for other gears. Discards are considered minor and are not included in the stock assessment. For the purse seine catch, a method has been defined for dividing the catch by species (this after a process of review and revision, most recently in 2019 based on the conclusions of WCPFC 'Project 60'; see references in stock assessment report).

Effort and CPUE: Effort is included in the stock assessment for the index fisheries.

Other fisheries: There has been gradual improvement in the data from Indonesia, the Philippines and Vietnam over the last decade or so. Effort for these fisheries is included as days fished where possible, but otherwise not included (this applies to three fisheries with 'miscellaneous' gears from each of the three countries).

Length/weight frequency: These data come from observers, port sampling or on-board collection by the crew and are converted to live weight. For purse seine fisheries, observer samples are corrected for grab-sample bias, and the long time-series of port sampling and observer data from Pago Pago is included and provides most of the early data. If both length and weight are available, weight is used for preference. Some length-frequency data are available from the Philippines, and for the first time there was direct size information from Indonesia and Vietnam, instead of size structure for these fisheries being extrapolated from similar fisheries in the Philippines. Project 90 is dedicated to improving length and weight data for stock assessment purposes (MacDonald et al., 2021).

Tagging data: In total 116,125 effective releases and 22,406 useable returns are incorporated into the stock assessment model. These data come from the Regional Tuna Tagging Project (1989–92), the Coral Sea Tagging Programme (1995, 1999-2001), the Pacific Tuna Tagging Programme (2006-2017) and the Japan Pacific Tagging Programme (2000-2017).

#### 5.5.1.8 WCPO Yellowfin tuna stock assessment

The most recent stock assessment for WCPO yellowfin is described in Vincent et al. (2020), from which the summary here is taken. The assessment uses data from 1952 to 2018, in quarterly timesteps. As with the assessments for all the main WCPFC stocks, the assessment model is run in Multifan-CL (MFCL), which provides a Bayesian framework. MFCL requires that 'fisheries' are defined with as near as possible constant selectivity and catchability. The details of how these fisheries are defined are given in Section 5.5.1.2 above. For each fishery, the assessment uses catch data, effort data and size data (as available; see 'information' above). The model also uses tagging data and biological information such as growth and maturity curves.

The 2020 stock assessment (Vincent et al., 2020) introduced a number of changes from the 2017 assessment (Tremblay-Boyer et al., 2017) which had a significant influence on estimates of stock status, making it more optimistic than before. The key driver of this change in perception is the new growth model (outcome of 'Project 82'; Eveson et al. (2020) and Farley et al. (2020) based on an extensive analysis of otoliths. Other significant changes were the introduction of the 'index fishery' approach (see 'information' above), improvements to how purse seine catch is estimated (grab sample bias), improvements to how tagging data are dealt with, some adjustments to gear selectivity for certain fisheries and of course updating all the data sets through 2018.

SPC in recent years have generated a grid of models to explore the interactions among selected axes of uncertainty. The grid contains all combinations of parameter settings or assumptions for each uncertainty axis. The axes are generally selected from the one-off sensitivities with the aim of providing an approximate understanding of variability in model estimates due to assumptions in model structure, not accounted for by statistical uncertainty estimated in a single model run, or over a set of one-off sensitivities. The structural uncertainty grid for the 2020 assessment was constructed from 4 axes: steepness (3 settings), growth (3 settings), tag mixing (2 settings) and size data weighting (4 settings), resulting in 72 models in the grid (3x3x2x4 = 72).

Age/spatial structure: The model is structured into 9 regions and 40 quarterly age classes (the last a plus group; an increase from 28 in the previous assessment resulting from the new growth model).

Growth: Growth was assumed to be invariant by region and sex. The stock assessment explored four methods of applying the new growth data to the assessment: i) a Richards-type growth curve estimated from otolith data external to the assessment model ('external otolith'; Farley et al. (2020); ii) age estimated by Multifan within the model based on the same dataset of age/length ('conditional length-at-age'; Farley et al. (2020); iii) a VB-type growth curve estimated from otolith plus tagging data external to the assessment model (Eveson et al., 2020)and iv) age estimated from size data modes within the model ('modal estimate'; previous method). Ultimately the approach using tagging data was not included in the uncertainty grid, while approach ii) was taken as the diagnostic case.

Steepness: Fixed at 0.8, with 0.65 and 0.95 tested as sensitivities (as all the main WCPFC tuna stocks).

Recruitment: Recruitment occurs in the model at age one, instantaneously at the beginning of each quarter. The stock-recruit relationship is considered weak (i.e. weak penalty for deviating from it); the six terminal quarterly recruitments are set at the mean of assessment period; the distribution of recruitment across regions is allowed to vary over time.

Natural mortality: M assumed to vary between males and females (because there is a larger proportion of males in the largest size classes); M is calculated externally by length and then converted to M-at-age using the growth curve; this M vector is put into the model as fixed values. In this assessment, the new growth curve resulted in changes to estimates of M, and SPC took the opportunity to review the process of estimating M and to conduct a meta-analysis (Vincent and Ducharme-Barth, 2020). This resulted in an estimate of M which was quite a bit lower than previously (in the range 0.11-0.15 as compared to 0.23 used previously). A sensitivity analysis was conducted using three values of M (0.11, 0.13 and 0.15) but not the higher previous value, for reasons which are unclear – this sensitivity run was not included in the final uncertainty grid.

Maturity: The assessment estimates ‘spawning potential’ rather than spawner biomass, with the objective of estimating directly the relevant contribution to the next generation. This is a function of sex ratio at age, female maturity at age, female spawning frequency at age and female fecundity at age. As for M, this function is calculated by length and then back-transformed to age using the growth function. The maturity ogive was reviewed and revised in this assessment based on the new growth model; however, SPC noted that there are not much data to inform this work and recommended that gonad samples be taken routinely alongside other sampling (Vincent & Ducharme-Barth, 2020).

Selectivity: Modelled using cubic spline smoothing. Fisheries can ‘share’ selectivity if their characteristics are similar, to reduce the number of model parameters.

Catchability: Constant catchability is assumed for index fisheries; because effort is not included for the other (‘extraction’) fisheries, catchability does not have to be estimated, except for the last few years of the time series, to inform projections.

Model runs: The model was run initially exactly as for 2017, and changes were made one at a time, so that the consequences of each change for the outcome of the assessment could be evaluated. In all, there were 16 steps between the 2017 diagnostic model and the 2020 diagnostic model.

Sensitivities: Several hundred sensitivity runs were done but not all were included in the structural uncertainty analysis (uncertainty grid); they focus on those which considered to represent the plausible bounds of uncertainty. Below are the sensitivities runs used to generate the structural uncertainty grid (Table 31).

**Table 31. Yellowfin: Key sensitivity runs selected to represent the range of uncertainties in the stock assessment. Table 4 in** Vincent et al. (2020)**.**

| **Sensitivity** | **Description** | **Tested values (diagnostic model in bold)** |
|---|---|---|
| Steepness (h) | Shape of stock-recruit curve (proportion of full recruitment at 20%$SB_0$) | 0.65, **0.8**, 0.95 |
| Growth | How data are used to generate the growth model within the | external otolith, **conditional** |

| Sensitivity | Description | Tested values (diagnostic model in bold) |
|---|---|---|
|  | assessment model | **length-at-age**, modal estimate |
| Size-frequency weighting | Testing the impact of different assumptions about effective sample size for the size-frequency data | effective sample size 20, **60**, 200, 500 |
| Tag mixing period | Time taken for tagged fish to mix into the general population | one quarter, **two quarters** |

SC16 expressed some concern about the 2020 stock assessment, noting that the results are very optimistic compared to previous assessments – in particular, the median estimate of MSY was 61% higher than from the 2017 assessment. The underlying drivers for this difference are not clearly understood, and because SC16 was online, the discussion around the choice of models to include in the uncertainty grid was not considered to be satisfactory. As a result of this, they have decided to commission an external peer review for the next yellowfin stock assessment (see TORs provided to SC17 by SPC; (SPC, 2021a)).

#### 5.5.1.9 Yellowfin and bigeye tuna harvest strategy

A limit reference point (LRP) has been agreed for WCPO tropical tuna stocks of 20%$SB_{F=0}$, where 'current' is defined as the most recent 10-year period for which data are available for the stock assessment. For yellowfin and bigeye, a target reference point was due to be agreed at WCPFC16 in December 2019, but the decision was postponed until 2021, and WCPFC18 postponed it again until 2022 (WCPFC, 2021a).

The objective of the harvest strategy for yellowfin and bigeye is set out in CMM 2020-01 (bigeye: paragraph 12; yellowfin: paragraph 14): *Pending agreement on a target reference point the spawning biomass depletion ratio (*$SB/SB_{F=0}$*) is to be maintained at or above the average* $SB/SB_{F=0}$ *for 2012-2015*.

CMM 2020-01 came into force in February 2021 when CMM 2018-01 expired. The two measures are identical, 2018-01 having been rolled over for an additional year by WCPFC17 without revision, to avoid WCPFC being without a tropical tuna management measure. CMMs 2018-01 and 2020-10 provide for a series of management measures aimed at constraining effort on tropical tunas, focusing particularly on the purse seine fishery which accounts for >80% of the catch of skipjack, ~60% of the catch of yellowfin and ~50% of the catch of bigeye (according to estimates in SPC (2021b). Also, the purse seine fishery has an added impact on $SB/SB_{MSY}$ because it mainly takes juvenile fish.

Measures for the purse seine fishery are as follows:

- A three-month ban on deploying, maintaining or setting on Fish Aggregating Devices (FAD)s during July-September, including the high seas and EEZs, in the area 20°N-20°S; with some exemptions for PNA vessels operating under the VDS (see below). Also a further two-month ban on FAD setting in the high seas in April-May or November-December; to be decided by the CCM; except for Kiribati and Cook Islands vessels in high seas areas adjacent to their EEZs and Philippines vessels in High Seas Pocket 1 (HSP1), for which a set of special measures are established;

- A maximum of 350 instrumented FADs to be in use, per vessel, at any one time;
- Purse seine catch or effort limits to be set for each relevant EEZ (see Table 32; remaining countries were given until the end of 2018 to set limits);
- Non-Small Island Developing States (SIDs) (except Philippines) to set high-seas effort limits for their flag vessels for the area 20°N-20°S (see Table 33 and Table 32). The CMM also notes (para. 27): CCMs shall ensure that the effectiveness of these effort limits for the purse seine fishery are not undermined by a transfer of effort in days fished into areas within the Convention Area south of 20°S. In order not to undermine the effectiveness of these effort limits, CCMs shall not transfer fishing effort in days fished in the purse seine fishery to areas within the Convention Area north of 20°N;
- Any overshoot of catch or effort limits to be deducted from the following year.

CMM 2020-01 also sets longline bigeye catch limits by flag (including charter vessels) for the distant water nations, and requires that member countries which caught less than 2,000 t in 2004 should ensure that their annual catch does not exceed 2,000 t. This may also be relevant for yellowfin in as much as it restricts longline effort in general (Table 33). The CMM was evaluated by SPC in 2020 as to its likely impact on skipjack, yellowfin and bigeye stocks under various scenarios (SPC, 2020).

**Table 32. Purse seine EEZ effort or catch limits under CMM 2020-01 (Table 1 in CMM 2020-01). Note: PNA and Tokelau manage their effort together through the VDS.**

| Coastal CCM or group of CCMs | Maximum effort in vessel days, or catch limit in tonnes |
|---|---|
| PNA | 44,033 days (see further details below) |
| Tokelau | 1,000 days |
| Cook Islands | 1,250 days |
| Fiji | 300 days |
| Niue | 200 days |
| Samoa | 150 days |
| Tonga | 250 days |
| Vanuatu | 200 days |
| Australia | 30,000 t skipjack, 600 t each of yellowfin and bigeye |
| French Polynesia (FP) | 0 (purse seine ban in FP EEZ) |
| Indonesia | not yet decided |
| Japan | 1,500 days |
| Korea | not yet decided |
| New Zealand | 40,000 t skipjack; nothing specified for other species |
| New Caledonia | 20,000 t skipjack; nothing specified for other species |
| Philippines | not yet decided |
| Taiwan | not yet decided |
| USA | 558 days |
| Wallis and Futuna | not yet decided |

**Table 33. High seas purse seine effort limits and longline catch limits for relevant fishing nations under CMM 2020-01 (Table 2 and Table 3 in CMM 2020-01)**

| CCM | Purse seine effort limit (days) | Longline bigeye catch limit (t) |
|---|---|---|
| China | 26 | 8,224 |
| EU | 403 | - |
| Japan | 121 | 18,265 |
| New Zealand | 160 | - |
| Korea | 207 | 13,942 |
| Taiwan | 95 | 10,481 |
| USA | 1270 | 3,554 |
| Indonesia | - | 5,889 * |

* provisional

Other measures in CMM 2020-01 are as follows:

- Paragraph 19: A requirement to use only less-entangling FADs (introduced in CMM 2018-01 for the first time).
- Paragraph 45: Capacity of freezer purse seiners >24m operating between 20ºN and 20ºS is limited to the level set out in 2013-01 (and subsequent iterations), except SIDS and Indonesia; likewise freezer longliners and fresh fish longliners targeting bigeye (with additional exemption for countries with a domestic quota system).
- Paragraph 46: Any replacement of purse seine vessels should not increase overall capacity.

Paragraph 51: Other fisheries (i.e. not purse seine or longline) are limited to the catch level of 2004 or the average catch 2001-4, except for those taking <2000 t who may take up to this level.

#### 5.5.1.10 Analysis of management options for yellowfin and bigeye tuna

In August 2017, a working group was convened to agree a series of management options for which SPC could evaluate the consequences for the stock status of the three tropical tuna stocks (SPC, 2017). SPC repeated this analysis in 2019, based on CMM 2018-01, concluding that there are no substantive differences between 2017-01 and 2018-01 as regards the probability of the measure achieving stated objectives for the tropical stocks. The evaluation was repeated in 2020 with updated information on recent exploitation levels and new stock assessments for both yellowfin and bigeye, and updated again in 2021 (Hamer et al., 2021).

For yellowfin, the 2020 stock assessment suggests that the stock is more abundant than previously thought, and all scenarios resulted in a negligible risk of biomass falling below the LRP and F rising above $F_{MSY}$. For bigeye, assuming the continuation of recent relatively high rates of recruitment, biomass remained above the LRP, but under the pessimistic scenario there was a 32% probability of $F>F_{MSY}$. If long-term (lower) recruitment was assumed, at the end of a 30-year projection the risk of B<LRP ranged from 5-19% and the risk of $F>F_{MSY}$ from 37-58%, depending on the fishing scenario (Hamer et al., 2021).

#### 5.5.1.11 PNA Vessel Day Scheme

The objective of the PNA purse seine VDS (from a stock management perspective) is to constrain purse seine effort to 2010 levels in the EEZs of PNA member countries (plus Tokelau), following the requirements of CMM 2016-01 and its previous iterations. The total number of days under the VDS across all the EEZs[2] for 2017-18 is 45,590, and for 2019-20 and 2020-21 is 45,033. The number of days is calculated as follows: 44,033 days are taken as baseline (2010) effort for PNA countries (from SPC); a percentage multiplier is added based on how the days are sold across different vessel length classes (for 2017-18 this increases the number of days by 1.3% relative to the baseline, for 2019-20 it is set to zero); the same calculation is carried out separately for Tokelau based on a baseline of 1,000 days – these are summed together to give a Total Allowable Effort (TAE) (PNA, 2016); see also CMM 2020-01.

Effort is allocated between PNA member countries based on a pre-agreed key but can be traded if necessary. Fishing companies apply at the beginning of the year for the number of days they think they will require from each country and pay accordingly. They may also buy more days during the year as required, as long as they remain available.

#### 5.5.1.12 Progress by WCPFC towards a formal harvest strategy for yellowfin, bigeye, and SP albacore

CMM 2014-06 commits WCPFC to putting in place a formal harvest strategy for its key stocks (WCPO skipjack, yellowfin and bigeye, and South Pacific albacore), with an associated workplan. The workplan was extensively discussed and revised at WCPFC16 (December 2019) and deadlines for all stocks were pushed back; this workplan was retained by WCPFC17 (WCPFC17, 2020); Attachment H) despite limited discussion of the issue by SC16 and WCPFC17, since SPC had reportedly made substantial progress on technical analyses. For SP albacore, the deadline for adopting a management procedure is set in this workplan for 2022. For yellowfin and bigeye, the deadline for agreeing a TRP has been pushed back to 2021, with the management procedure to be finalised sometime after 2022 (the workplan ends in 2022 without this being included).

### 5.5.2 Bigeye tuna

#### 5.5.2.1 Bigeye tuna biology and stock definition

Bigeye tuna are relatively fast-growing, with a maximum length of *ca*. 200 cm. Individuals reach maturity in the length range 80-120 cm. It appears that bigeye growth is faster in the EPO than the WCPO, for reasons unknown; maturity is reached at a similar age but at a larger size in the EPO. Growth does not seem to vary significantly by sex (changes in sex ratio after maturity are therefore presumed to be related to differential natural mortality), but growth may vary spatially in the WCPO, although more data are required to map this in detail.

Bigeye age and growth in the WCPO have been revisited and revised in recent years (‘Project 35’; (Farley et al., 2017; Farley, Eveson, et al., 2018), followed by Project 81 and Project 94; (Farley et al. (2020); Farley et al. (2018)). Initially, the authors sectioned otoliths from 1039 fish caught from 2013-16, in the age range 0.25-13.7 years, mainly from the equatorial regions, and for the 2018 update

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[2] RMI, FSM, Kiribati, Nauru, Palau, Papua New Guinea, Solomon Islands, Tuvalu, Tokelau

included a further 237 age estimates, including 188 from fish >130cm FL, to address concerns expressed at SC13 regarding the accuracy of the revised growth curve at larger sizes, as well as 11 for small fish (31-39cm), with an additional 34 from small fish added for the 2020 update. This work allowed a new growth curve for bigeye to be estimated, first used in the 2017 assessment and further adjusted for the 2020 assessment.

Bigeye are distributed throughout the tropical and sub-tropical Pacific, so the question arises as to whether it is appropriate to treat the WCPO as a stock separate from the EPO. Most genetic studies do not suggest significant population differentiation. Tagging suggests that while some individuals may move very large distances (up to 4000 nautical miles over one or more years), most were recaptured much closer to the tagging point (Figure 15). A recent review of stock structure (Moore et al., 2018) notes that the conclusions for bigeye are similar to those of yellowfin (see Section 5.5.1.10) and overall, the details of bigeye stock structure in the Pacific remain unresolved.

Nevertheless, the WCPFC Scientific Committee (SC14) have expressed some concern over the two-stock hypothesis. They note that fishing grounds around 150°W are a core area of bigeye catch (Figure 16) (unlike for yellowfin), and hence influence both stock assessments, while the recent work on growth in WCPO means that the assessments use different growth models (although there is some evidence of changes in growth across the Pacific) (WCPFC-SC14, 2018). Nevertheless, the two-stock structure is the working hypothesis for now.

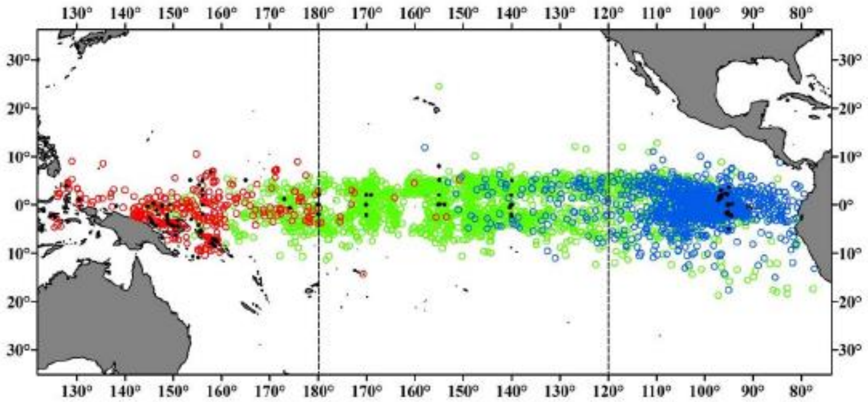


**Figure 15. Bigeye: Movements of tagged bigeye divided into three regions. Black points are release locations; red are recapture locations for fish released in the western region; green for recaptures of fish released in the central region; blue for recaptures of fish released in the eastern region. Figure taken from** McKechnie et al. (2017) **who in turn sourced it from** Schaefer et al. (2015)**.**

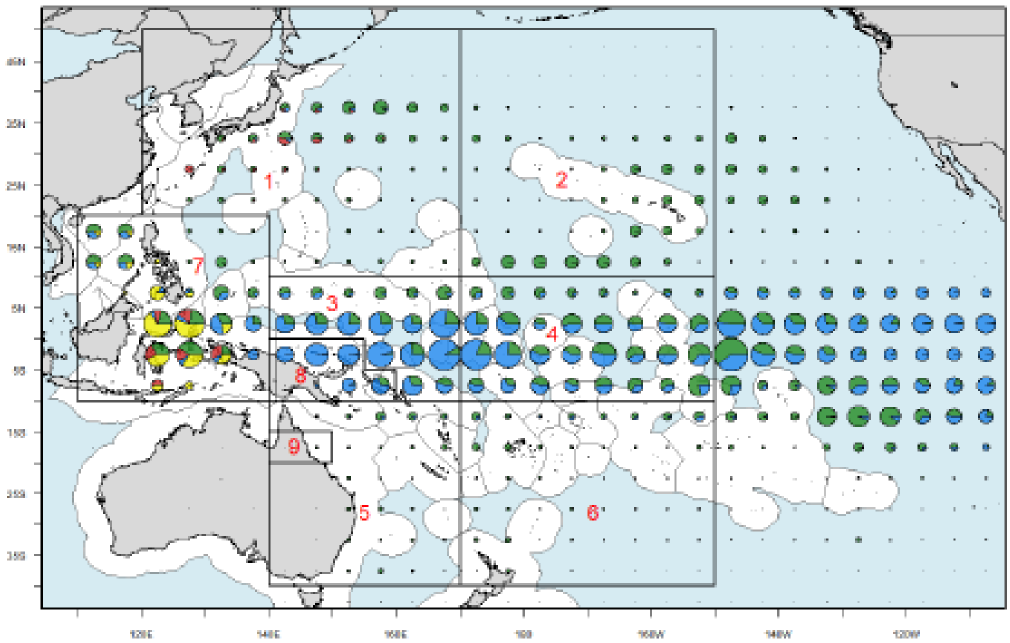


**Figure 16. Bigeye: Geographical distribution of bigeye catch in the Pacific Ocean, 2009-2018 (purse seine=blue, longline=green, pole and line=red, misc.=yellow), with the superimposed grid showing the regional structure and spatial limits of the SPC stock assessment (Figure 5 in** Ducharme-Barth et al. (2020)**).**

### 5.5.2.2 Biology stock status

The most recent full stock assessment for WCPO bigeye was in 2020 (Ducharme-Barth et al., 2020). The assessment incorporated a growth curve which has been updated by the results of the various studies on age, growth and reproduction of bigeye described above (Farley et al., 2017) (see Section 5.5.2.1 above). SPC made fewer large changes to the assessment than for the previous assessment in 2017, retaining the updated growth model and regional structure from the 2018 update, but made some important improvements to the input data (described in more detail below).

SPC does not designate a 'reference case model' as the basis for management advice, but instead provides the range of model outputs over a structural uncertainty grid made up of the key sensitivity runs. In this case, the grid was made up of 24 models over three axes of uncertainty. Normally the parameters of the uncertainty grid are set by the SC, but in this case the remote meeting format did not allow sufficient discussion, so the grid presented by SPC was retained (WCPFC-SC16, 2020).

All 24 models in the grid put SB above the LRP, but a region-by-region analysis suggests that stronger depletion in equatorial regions (regions 3, 4, 7 and 8 – see Figure 16 above) is being buffered by lower levels of depletion in the peripheral temperate regions, and depletion in the equatorial regions may be approaching the level of the LRP. The relatively high recruitment rates estimated in recent assessments, driving relatively optimistic conclusions, do not appear to have persisted in the updated data.

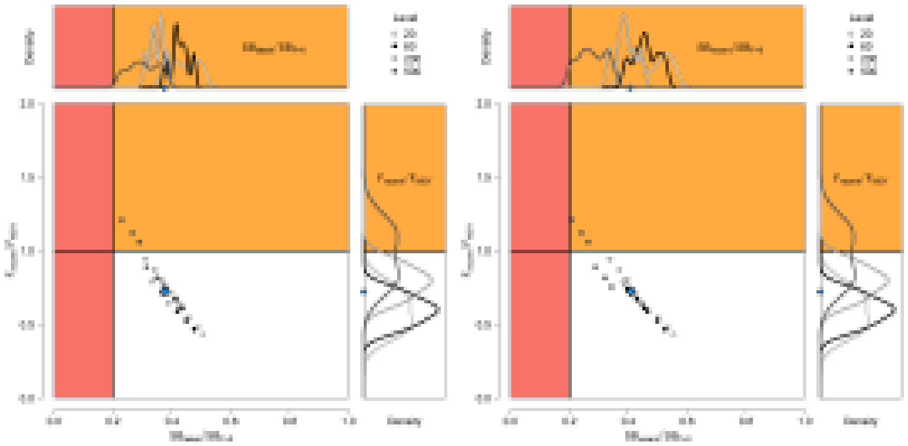
Table 34 gives the stock assessment output from the uncertainty grid and Figure 17 gives the Majuro plot for each grid axis. Figure 18 shows spawner depletion by region across all 24 models, colour coded for the sensitivity axis that had the strongest impact on the output (weighting of the size-frequency data). This clearly shows the difference in depletion between regions, as well as the uncertainty in model output and the difference in uncertainty between regions. Figure 19 shows catch over time in relation to estimated MSY, suggesting that catch has been fluctuating around MSY for the last two decades.

The basic conclusions of the stock assessment itself are summarised by the authors as follows (Ducharme-Barth et al., 2020):

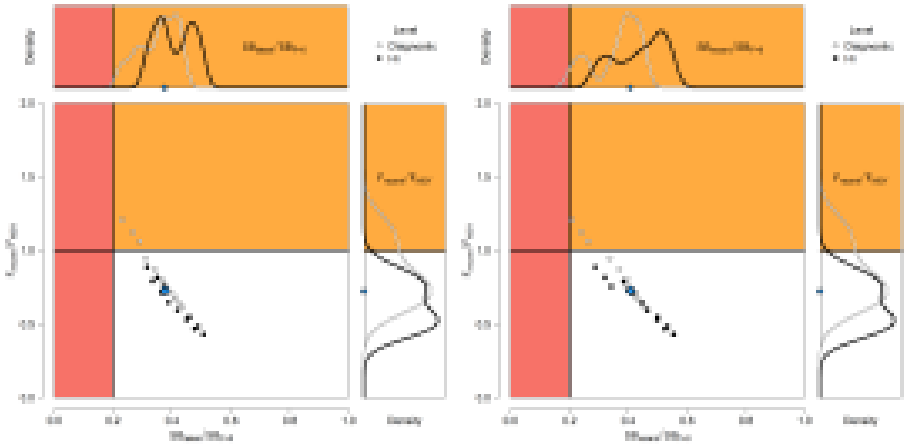
- All the models in the uncertainty grid put SB above the LRP.
- In the most optimistic models, depletion in equatorial regions is buffered by lower depletion in temperate regions, in the more pessimistic models, depletion in temperate regions is also high (high uncertainty in regions 1 and 2 in particular).
- The impacts of fishing pressure on the bigeye stock are ‘persistent and meaningful’.
- There appears to have been a downturn in stock status in recent years, driven by the end of a run of strong recruitments.

**Table 34. Bigeye: Summary of stock status in relation to reference points over the 24 models in the structural uncertainty grid. ‘Recent’ is 2014-17 for F and 2015-18 for SB; ‘latest’ is 2018** (Ducharme-Barth et al., 2020)**.**

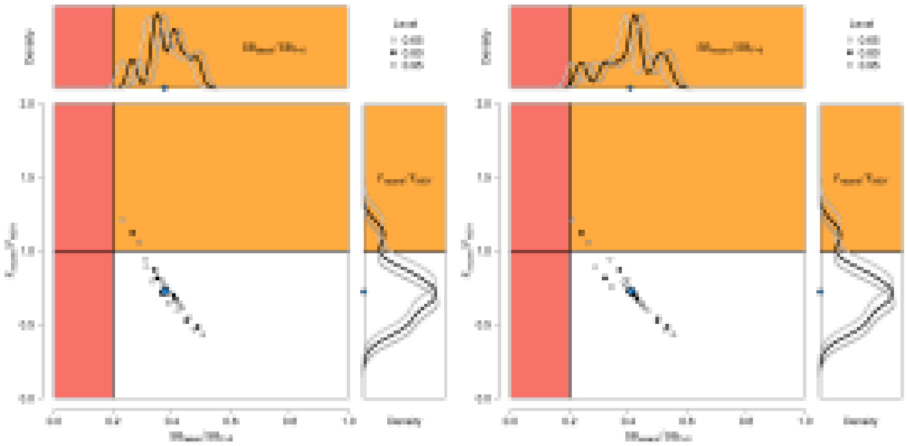
| **Parameter** | **Min** | **10%** | **Median** | **90%** | **Max** |
|---|---|---|---|---|---|
| $F_{recent}$ / $F_{MSY}$ | 0.43 | 0.49 | 0.72 | 1.02 | 1.21 |
| $SB_{latest}$ / $SB_{F=0}$ | 0.23 | 0.30 | 0.38 | 0.47 | 0.51 |
| $SB_{latest}$ / $SB_{MSY}$ | 0.95 | 1.23 | 1.67 | 2.15 | 2.60 |
| $SB_{recent}$ / $SB_{F=0}$ | 0.21 | 0.27 | 0.41 | 0.52 | 0.55 |
| $SB_{recent}$ / $SB_{MSY}$ | 0.87 | 1.18 | 1.83 | 2.32 | 2.84 |
| $SB_{MSY}$ / $SB_{F=0}$ | 0.19 | 0.2 | 0.23 | 0.26 | 0.26 |



(a) Data-weighting $SB_{latest}/SB_{F=0}$ (b) Data-weighting $SB_{recent}/SB_{F=0}$



(c) Natural mortality $SB_{latest}/SB_{F=0}$ (d) Natural mortality $SB_{recent}/SB_{F=0}$



(e) Steepness $SB_{latest}/SB_{F=0}$ (f) Steepness $SB_{recent}/SB_{F=0}$

**Figure 17. Bigeye: Majuro plot showing the outcome of each of the 24 models in the grid. Left plot=latest; right plot=recent; top to bottom: the three axes of the uncertainty grid; blue dot=median estimate of grid. The red area shows SB below the LRP, while the orange area shows F higher than $F_{MSY}$ (Figure 43 in** Ducharme-Barth et al. (2020)**.**

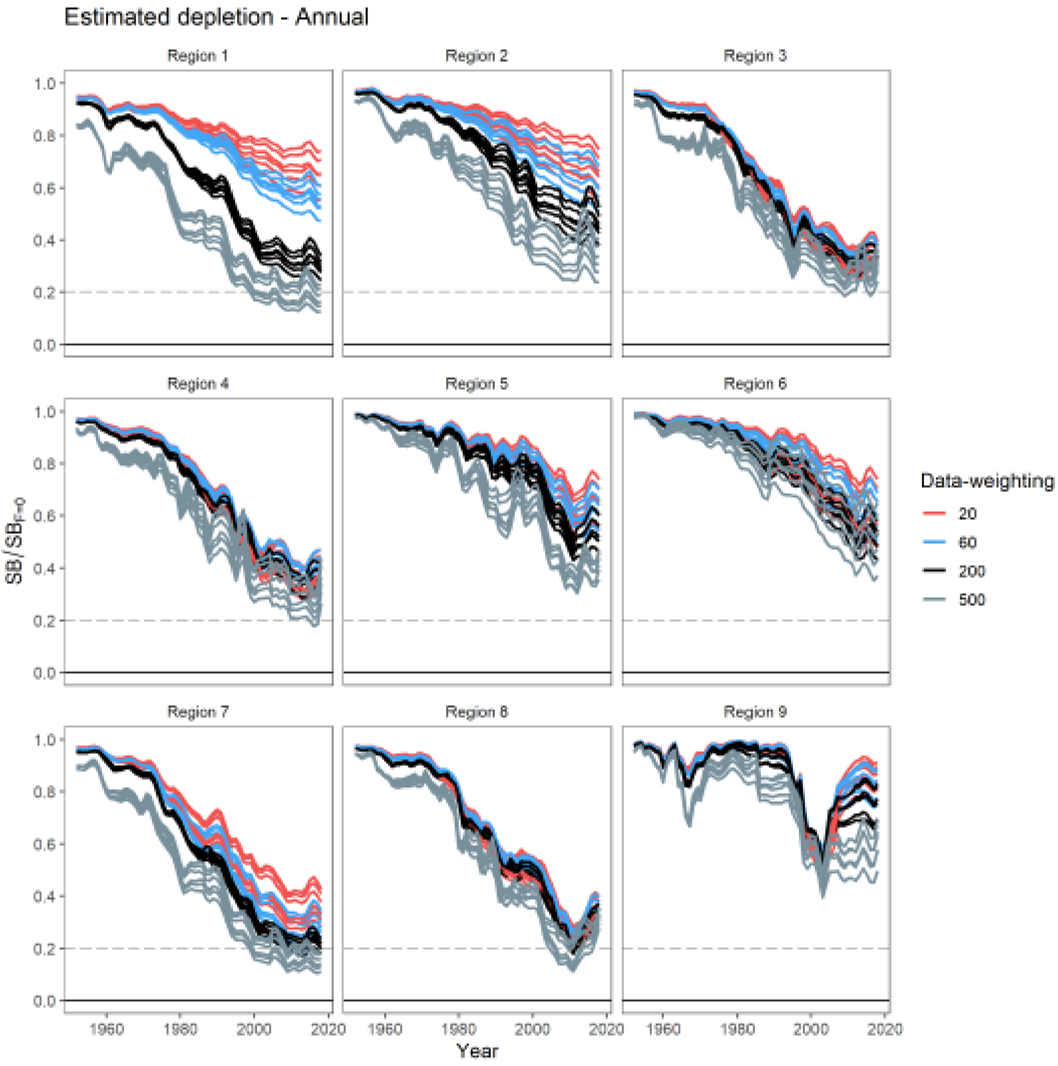


**Figure 18. Bigeye: Time series of spawner depletion by region for all the 24 models in the uncertainty grid, colour coded by the four values in the size data weighting sensitivity axis (the most influential) (Figure 37 in** Ducharme-Barth et al. (2020)**).**

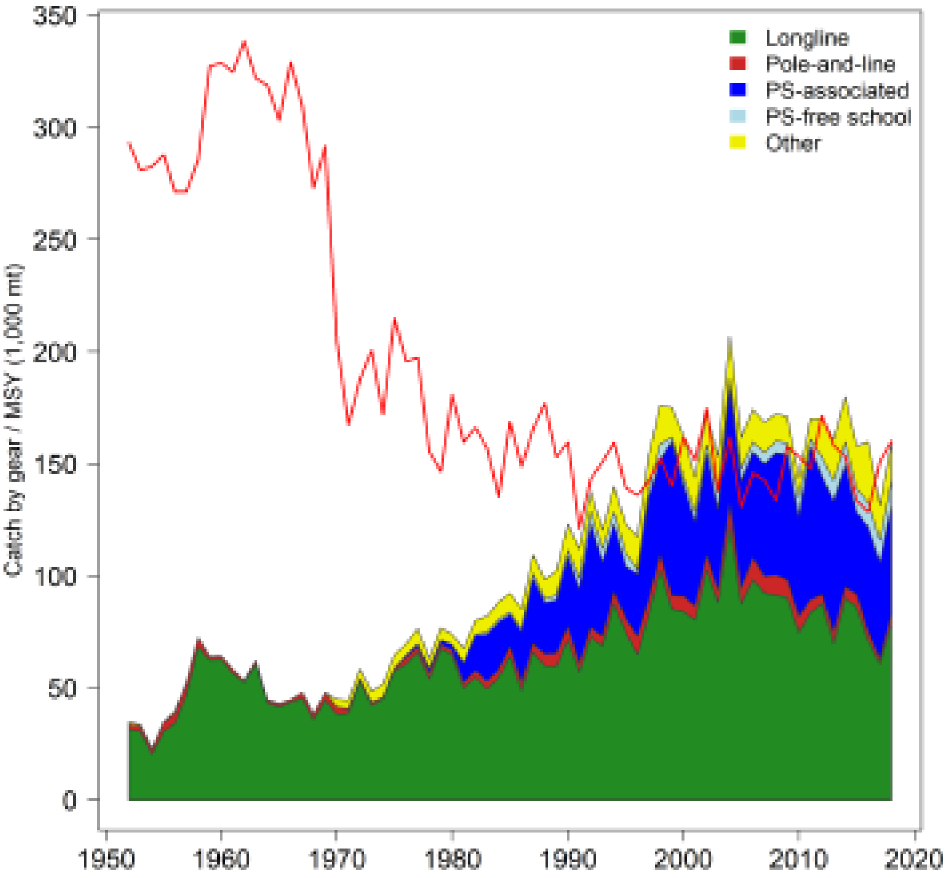


**Figure 19. Bigeye: Time series of annual catch by gear type, 1952-2018, and time series of MSY (red line) – which varies according to the size selectivity of different fisheries (MSY is reduced by the purse seine fishery and others which catch mainly small fish) (Figure 48 in** Ducharme-Barth et al. (2020)**).**

#### 5.5.2.3 Bigeye tuna stock projections

The stock assessment model was used to generate stochastic 30-year projections of spawning potential, based on either recent recruitment (higher) or average recruitment across the whole time series (lower) (Figure 20). The assumption about recruitment has a significant influence on the output and uncertainty in these projections, but in either case the risk of SB falling below the LRP remains relatively low.

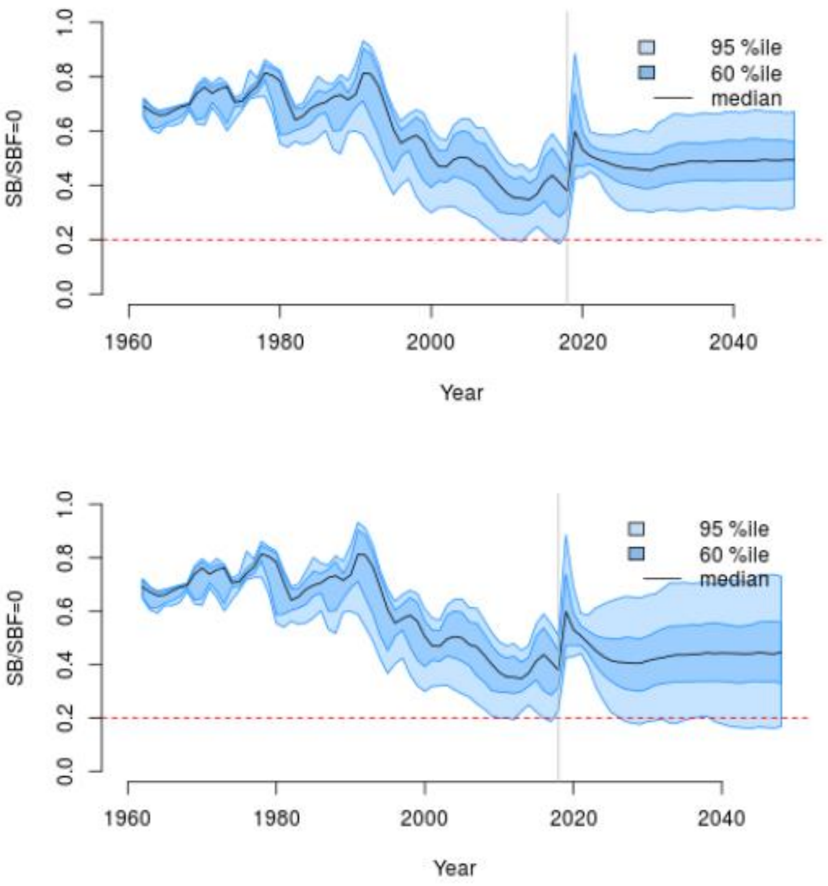


**Figure 20. Bigeye: Time series of SB/SB$_{F=0}$ from the uncertainty grid with stochastic projections 2019-2048 assuming 2016-2018 average catches for longline and other fisheries and 2018 effort for purse seine fisheries. Red dashed line is the LRP. Top: Assuming recent recruitment; Bottom: Assuming long-term recruitment. Figures BET-11 and BET-12 in SC16 report** (WCPFC-SC16, 2020)**.**

#### 5.5.2.4 Bigeye tuna information base

The 2020 stock assessment report (Ducharme-Barth et al., 2020) provides a full description of the data sources used, from which the summary in this section is taken unless otherwise indicated.

Fisheries: The stock assessment defines 41 ‘fisheries’ according to fishing gear and method (longline, purse seine by set type[3], pole-and-line, various miscellaneous small-scale fisheries in Indonesia and the Philippines), as well as by region and for those with most (Japan, Australia, US) or least (Philippines, Indonesia) data, by vessel flag or fleet. The assessment uses the same new ‘index fishery’ approach as described above for yellowfin, hence the increase in the total number of fisheries over previous assessments results from the addition of an index fishery for each region.

The information provided from each fishery is summarised in the graphic below (Figure 21). It is clear that with a few exceptions, recent and historical (back to ~1980 at least) catch data are available from all the fisheries. Size data are available as weight for the longline fisheries and length (from port sampling) for the other gear types.

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[3] unassociated, or associated with FAD, natural log, dolphin, whale, whale shark or other, or unspecified

Catch data: Catch is recorded by number for longline and by weight for other gears. Discards are considered minor and are not included in the stock assessment. For the purse seine catch, a method has been defined for dividing the catch by species (there is an ongoing process of analysis and review of this sampling methodology, as per, for example, Peatman et al. (2019)).

Effort: Contrary to previous assessments, effort is not included in the stock assessment except for the index fishery.

CPUE: The key datasets for the assessment are standardised longline CPUE time series from a range of fisheries; the historical data are mainly Japanese but in more recent years data are available from all the main distant-water fleets as well as from Pacific island domestic fleets. An improvement in the 2017 and 2020 assessments is that SPC has managed to compile an extensive database of operational (as opposed to aggregated) catch and effort data from the main distant water and Pacific island fleets.

Other fisheries: There has been gradual improvement in the data from Indonesia, the Philippines and Vietnam over the last decade or so. Effort for these fisheries is included as days fished where possible, but usually not included (five fisheries).

Illegal, Unregulated, Unreported (IUU): In the 2017 assessment, a stock assessment model run was done to evaluate the possible impact of systematic underreporting of bigeye (see (MRAG, 2016)); the outcome was slightly more positive as you might expect (i.e. same CPUE trends but a higher catch); but this was not included in the list of 'key' sensitivities (see below).

Length / weight frequency: These data come from observers, port sampling or on-board collection by the crew and are converted to live weight. For purse seine fisheries, observer samples are corrected for grab-sample bias, and the long time-series of port sampling from Pago Pago has been included since the 2014 assessment. If both length and weight are available, weight is used for preference. The data are weighted by catch or CPUE to avoid over-weighting small sample sizes in the model.

Tagging: In total 36,847 releases and 9,256 returns are incorporated into the stock assessment model. These data come from the Regional Tuna Tagging Project (1989–92), the Coral Sea Tagging Programme (1995, 1999-2001), the Pacific Tuna Tagging Programme (2006-2017) and the Japanese Tagging Programme (2000-2020), as well as a small amount of tagging from Tonga. Bigeye has the least amount of tagging data of the main stocks, but these figures are a significant improvement from the previous assessment.

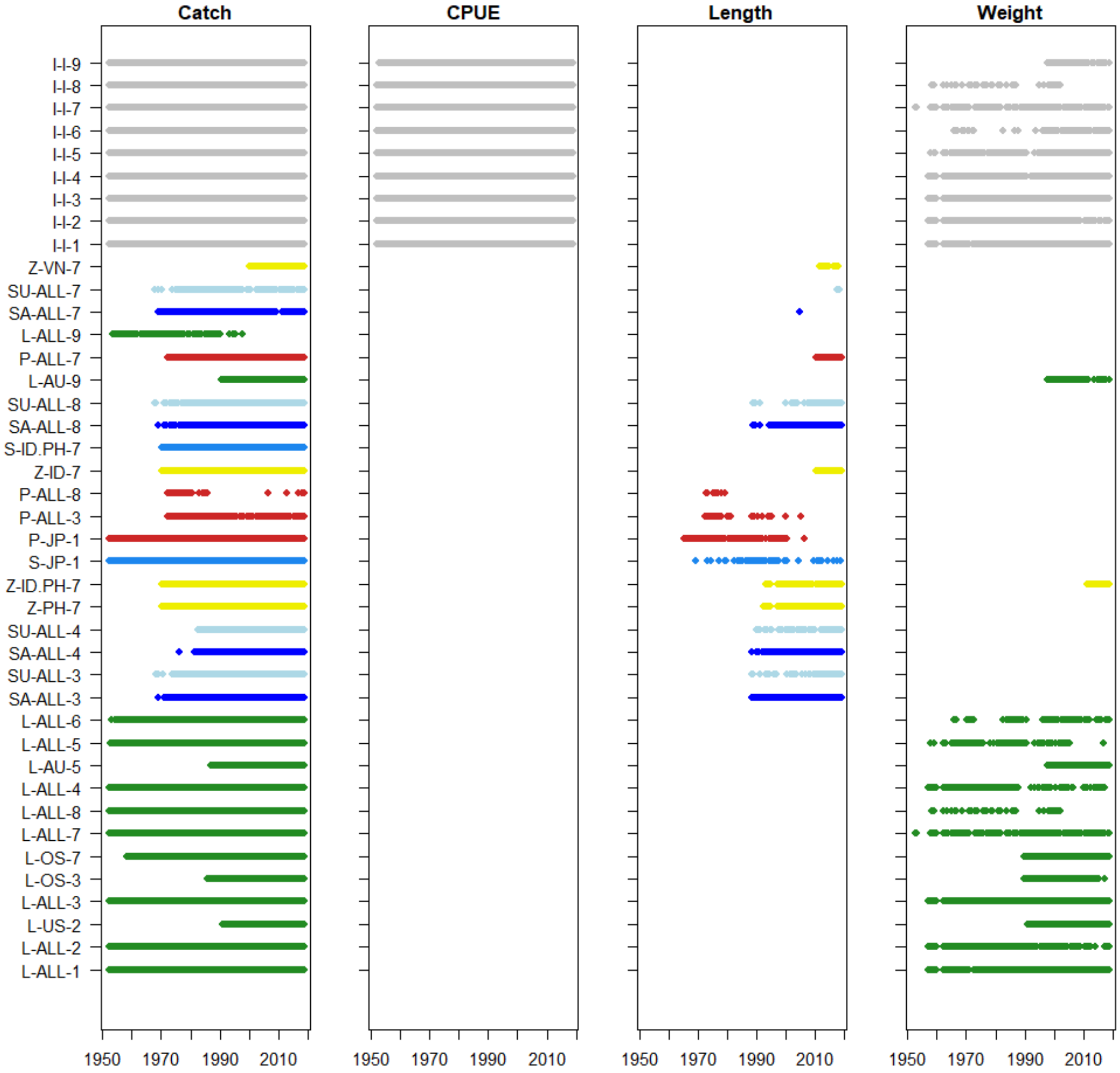


**Figure 21. Bigeye: Graphic representing the input data to the stock assessment from each 'fishery' (as defined as described above). Left to right: catch, CPUE, catch length sampling and catch weight sampling; top to bottom: the 41 fisheries defined by the stock assessment; x-axis of each column 1952-2018 (Figure 2 in** (Ducharme-Barth et al., 2020)**).**

### 5.5.2.5 Bigeye tuna stock assessment

The most recent full stock assessment for WCPO bigeye is described in Ducharme-Barth et al. (2020). The summary here is taken from this report unless otherwise indicated. The assessment uses data from 1952 to 2018, in quarterly time-steps.

As with the assessments for all the main WCPFC stocks, including those described above, the assessment model is run in Multifan-CL (MFCL). MFCL requires that 'fisheries' are defined with as near as possible constant selectivity and catchability. For each fishery, the assessment uses catch data, effort data (in some cases) and size data. The model also uses tagging data. Age and growth parameters are estimated externally and can be incorporated in a variety of ways (see below).

Temporal and spatial structure: The stock assessment model is divided into 40 quarterly age-classes and stratified by area (region), with 9 regions defined. The regions cover the WCPFC Convention area, but the assessment stops at 150°W and so excludes the IATTC overlap area. The regional structure has been the cause of some debate in previous assessments, but SPC and SC appear to have settled on a region boundary at 10° N and S. The regions are shown in Figure 22.

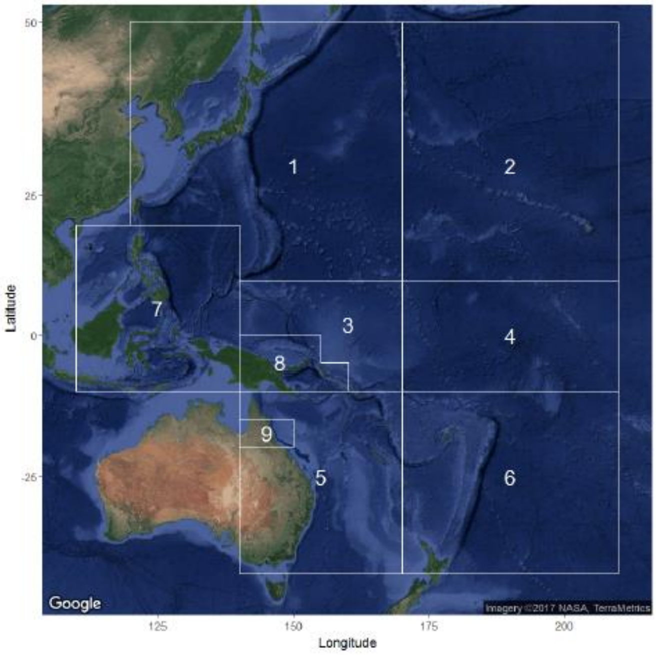


**Figure 22. Bigeye: The regions used to stratify the stock assessment model** Ducharme-Barth et al. (2020).

Growth: There has been extensive work on age and growth of bigeye (Projects 36, 81 and 94; see (Farley et al., 2020)). Three approaches to modelling growth were considered, which are new since the previous assessment which used a VB curve:

- A fixed Richards growth curve based on otoliths (Farley et al., 2020);
- A fixed Richards growth curve based on otoliths plus tagging (Eveson et al., 2020);
- Conditional age-length dataset input to MFCL which then estimates the Richards growth curve within the model.

The otolith/tagging curve was used in the diagnostic model; the other two models were run as sensitivities but not ultimately included in the uncertainty grid.

Steepness: The reference case model assumes h=0.8; 0.65 and 0.95 are tested as sensitivities (standard practice across all SPC tuna assessments).

Recruitment: The stock-recruit relationship is considered weak (i.e. weak penalty for deviating from it); the six terminal quarterly recruitments are set at the mean of assessment period; the distribution of recruitment is allowed to vary across regions.

Natural mortality: M assumed to vary between males and females (because there is a larger proportion of males in the largest size classes); M is calculated externally by length and then converted to M-at-age using the growth curve; this M vector is put into the model as fixed values. As for yellowfin, a meta-analysis was used to estimate the mean value of M, resulting in an estimated value of ~0.11. Different options for mean M were used in the sensitivity analyses and uncertainty grid.

Selectivity: Modelled using cubic spline smoothing. Fisheries can 'share' selectivity if their characteristics are similar, to reduce the number of model parameters.

Catchability: Constant catchability is assumed for the index fisheries. Since effort is not now included for the other fisheries, there was no need to estimate catchability, except in the final years to generate the projections – for this a constant catchability was assumed.

Model runs: The model was run initially exactly as for 2017, and changes were made one at a time, so that the consequences of each change for the outcome of the assessment could be evaluated. In all there were 16 steps from the 2017 diagnostic model to the 2020 diagnostic model.

Sensitivities: Several hundred sensitivity runs were done but not all are presented in the report; they focus on those which are '*considered to represent the plausible bounds of model uncertainty*'. The sensitivities presented here are those retained for the structural uncertainty grid of 24 models (Table 35).

**Table 35. Bigeye: Key sensitivity runs selected by SPC to represent the range of uncertainties in the stock assessment** (Ducharme-Barth et al., 2020)**.**

| **Sensitivity** | **Description** | **Tested values (diagnostic model in bold)** |
|---|---|---|
| Steepness (h) | Shape of stock-recruit curve (proportion of full recruitment at 20%$SB_0$) | 0.65, **0.8**, 0.95 |
| Natural mortality | Mean natural mortality | **Mean**, 95% CI of meta-analysis |
| Size-frequency weighting | Testing the impact of different assumptions about effective sample size for the size-frequency data | sample size divided by **20**, 60, 200, 500 |
| Regional structure | See above | 2017 vs. 2014 structure |

#### 5.5.2.6 Bigeye tuna harvest strategy

The bigeye harvest strategy is described alongside the yellowfin harvest strategy above.

### 5.5.3 South Pacific albacore

#### 5.5.3.1 Albacore biology and stock definition

There is good confidence that in the Pacific Ocean there are separate stocks of albacore north and south of the equator, based on their temperature preferences and low occurrence at the lowest latitudes (Figure 23), as well as genetic, ecology and (limited) tagging information (ALBWG, 2020).

Whether the South Pacific Ocean represents one fully-mixed stock, or a population cline or a set of sub-stocks is, however, less clear. As for yellowfin, otolith and genetic studies suggest that stock structure may be more complex than previously thought, but currently there is not sufficient concrete information about alternative stock structures to inform a revision of the stock assessment based on a single stock model (Castillo-Jordan et al., 2021). North Pacific albacore is likewise treated as a single, well-mixed stock (ALBWG, 2020).

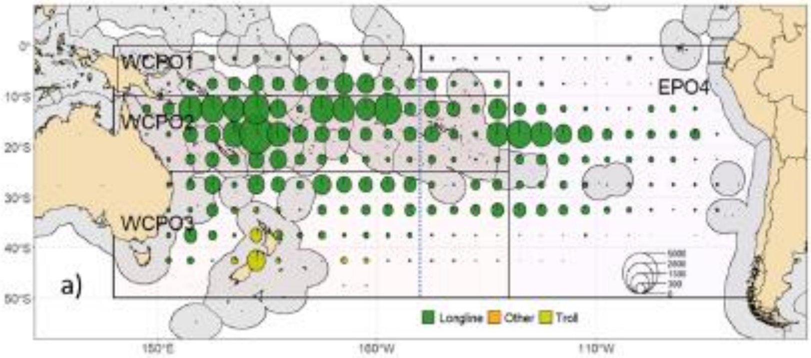


**Figure 23. SP albacore: Distribution of catch of South Pacific albacore, as well as the regions used in the stock assessment model (blue vertical line: WCPFC/IATTC CA boundary, but regions 1-3 include overlap area). Figure 4a in** (Castillo-Jordan et al., 2021).

Albacore feed in temperate waters when juvenile, migrating progressively towards the equator as they grow, and spawning in tropical areas typically between 10-30°. In warmer waters, they show diel vertical migration behaviour, moving below the thermocline during the day and coming into the mixed layer at night.

Albacore are initially fast-growing, reaching 40-50 cm after one year, although subsequently growth is slower. Maturity is reported at 85 cm FL / 4.5 years (50%) and 94cm / 7 years (100%). Growth after maturity is faster in males, and growth appears to be faster towards the eastern side of the Pacific. In 2021, a re-analysis of otoliths provided an updated growth curve for the SPA stock assessment (Farley et al., 2021).

### 5.5.3.2 SP albacore stock status

A key difference between the previous stock assessment (2018) and the new 2021 assessment is that the 2021 assessment includes for the first time the entire South Pacific, including the eastern Pacific (EPO) area under the jurisdiction of IATTC (see Figure 23 above). Although this obviously increases the absolute estimate of biomass and spawner potential, it does not noticeably alter the perception of stock status in relation to reference points, as SC17 notes (WCPFC-SC17, 2021). In order to i) provide comparability with previous assessments; ii) provide individual management advice to WCPFC and IATTC and iii) take account of uncertainty in stock structure (see Section 5.5.3.1 above), the assessment report provides estimates of stock status in relation to some reference points for each Convention Area (CA) separately and for the entire South Pacific (Castillo-Jordan et al., 2021).

For the purposes of scoring this assessment for the UoA operating in the western Pacific, we have considered where possible the values both from the WCPFC-CA and from the S. Pacific, as available from the SC17 report (which adjusted the uncertainty grid) (Castillo-Jordan et al., 2021). Stock status in relation to reference points is given in Table 36, trends from the diagnostic case model in Figure 24 and Figure 25 and Kobe and Majuro plots in Figure 26.

Regarding the stock status, SC17 comments as follows:

*The spawning stock biomass has become more depleted across the model period (1960-2019), with a notable increase in depletion in the most recent years. Based on the set of models in the SC-endorsed structural uncertainty grid, the South Pacific albacore assessment indicates the stock is not overfished, and there was zero estimated risk of the stock being below the Limit Reference Point of*

*20%$SB_{F=0}$. However, the decline in the latest estimated $SB_{latest}/SB_{F=0}$ (year 2019; median 0.40; 10th and 90th percentiles 0.27 - 0.45) is notably more pessimistic than those of $SB_{recent}/SB_{F=0}$ (years 2016-2019; median 0.52; 10th and 90th percentiles 0.41 - 0.57) indicating that there has been a substantial decline in stock status estimated over the last three years*. (SC17 report, para. 32)

**Table 36. SP albacore: Stock status in relation to reference points for the entire S. Pacific stock and for the WCPFC Convention Area (where available), based on the 72-model uncertainty grid as adjusted by WC17 (hypothesis M2 downweighted); recent = 2015-19, latest = 2019. From Tables SPA-02 and SPA-03 in SC17 report** (WCPFC-SC17, 2021)**.**

| **Ref. point** | **S. Pacific** | | | **WCPFC-CA*** | | |
|---|---|---|---|---|---|---|
| | Median | 10% CI | 90% CI | Median | 10% CI | 90% CI |
| $F_{recent}/F_{MSY}$ | 0.24 | 0.15 | 0.37 | | | |
| $SB_{recent}/SB_{F=0}$ | 0.52 | 0.41 | 0.57 | 0.52 | 0.42 | 0.58 |
| $SB_{latest}/SB_{F=0}$ | 0.40 | 0.27 | 0.45 | 0.39 | 0.28 | 0.43 |
| $SB_{recent}/SB_{MSY}$ | 3.22 | 2.24 | 5.18 | | | |
| $SB_{latest}/SB_{MSY}$ | 2.33 | 1.69 | 3.92 | | | |
| $SB_{MSY}/SB_{F=0}$ | 0.16 | 0.11 | 0.22 | | | |

*some values for the WCPFC-CA columns not given

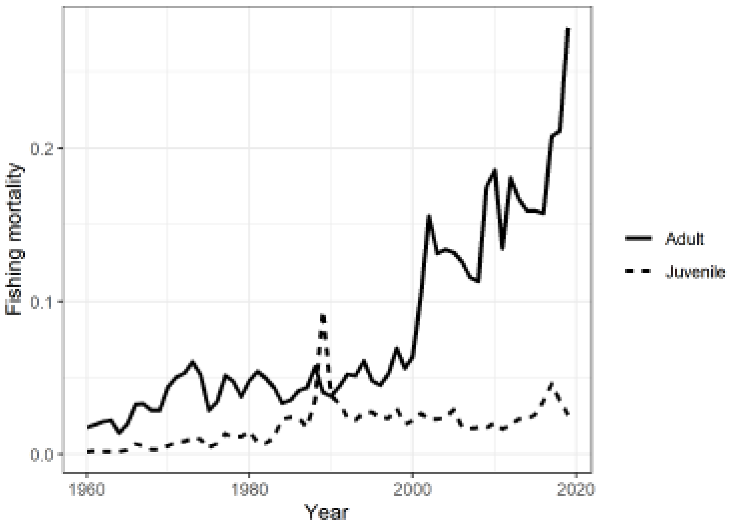


**Figure 24. SP albacore: Trends in fishing mortality for the S. Pacific from the diagnostic case model (details given below). Figure 34 in** (Castillo-Jordan et al., 2021)**.**

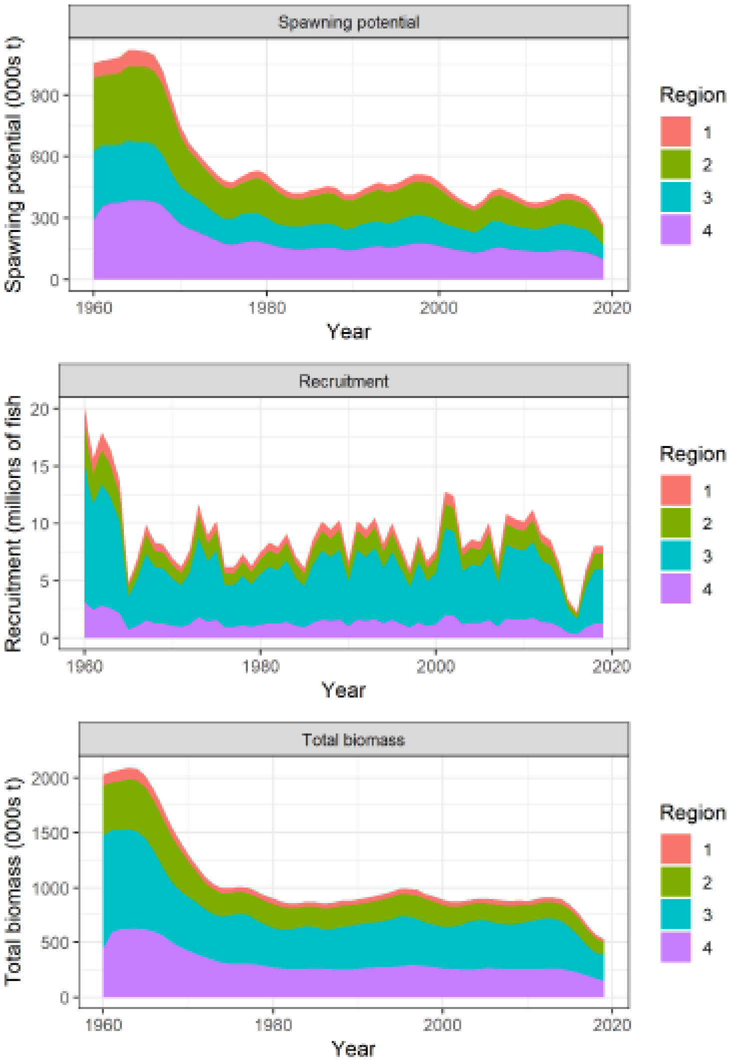


**Figure 25. SP albacore: Trends in spawning potential (top), recruitment (middle) and biomass (bottom) for the S. Pacific, from the diagnostic case model, showing also trends in each region of the model. Figure 33 in** (Castillo-Jordan et al., 2021)**.**

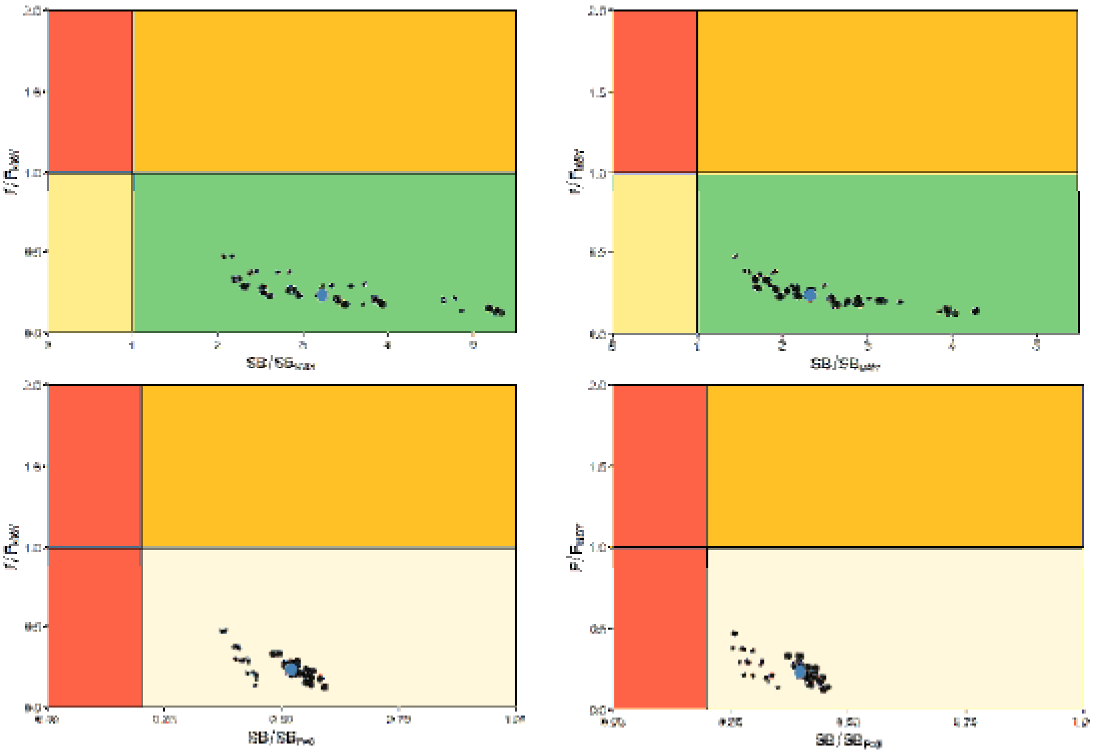


**Figure 26. SP albacore: Top: Kobe plot (SB and F in relation to MSY reference points) summarising S. Pacific results for the models in the weighted uncertainty grid. Bottom: Majuro plot from the same information ($F_{MSY}$ and limit reference point 20% $SB_{F=0}$). Left: recent (2016-19), Right: latest (2019). Blue point = grid median; black dots sized according to weighting (inclusion or not of downweighted model M2). Figures SPA-08 and SPA-09 in SC17 report** (WCPFC-SC17, 2021)**.**

### 5.5.3.3 SP albacore stock projections

The stock assessment includes projections of SB and F in relation to reference points to 2049, based on either status quo catch or effort (average 2017-19 or 2020). None of these scenarios are able to maintain the stock at the target reference point. Considering the entire S. Pacific stock area, the risk of SB falling below the limit reference point or $F<F_{MSY}$ is low, but considering only the WCPFC-CA it is higher (26-30% for $SB<B_{lim}$ and 26-27% for $F<F_{MSY}$). For the WCPFC-CA, the status quo projections have a ~0% probability of rebuilding the stock to the target reference point.

The projections are shown in Figure 27. SPC notes that 13% of the catch-based projections failed to run to completion, because (they hypothesise) of a subset of models with low productivity and low future recruitment (stochastic sampling from historical estimates) which under a fixed catch assumption run to zero within the projection period. The combined set of catch-based projections shown below therefore has a small positive bias.

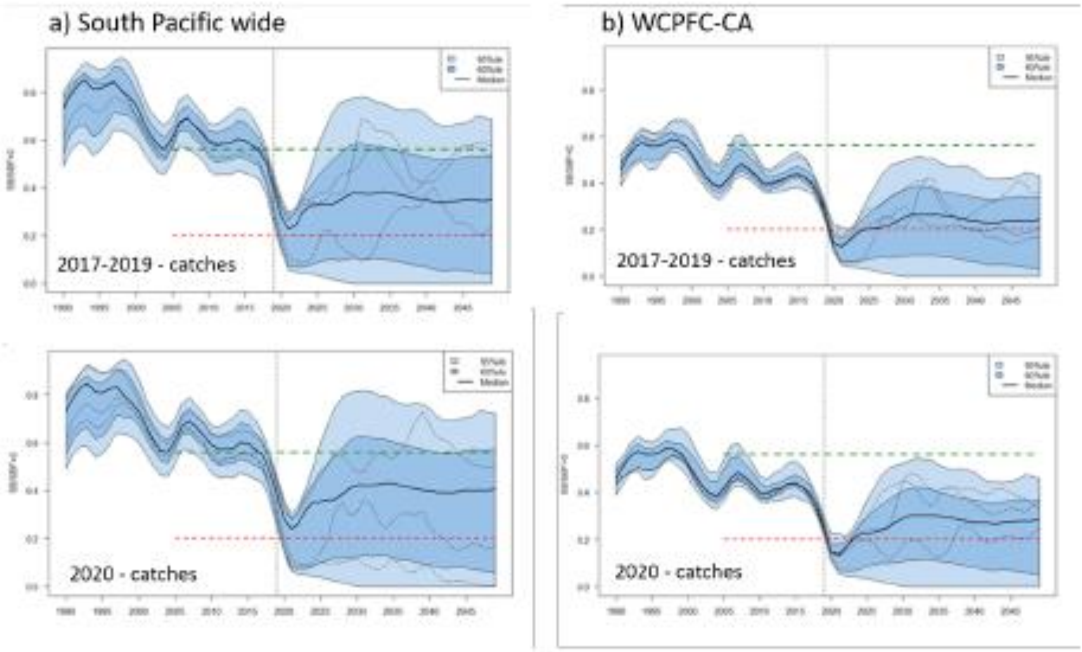


**Figure 27. SP albacore: Catch-based status quo projections for SP albacore to 2049, either South Pacific wide (left) or WCPFC-CA (right), based on 2017-19 average annual catch (top) or 2020 catch (bottom), showing spawning potential in relation to agreed target reference point (green line: 56%$SB_{F=0}$) and limit reference point (red line: 20%$SB_{F=0}$). Vertical line = final year of stock assessment; dark blue and light blue areas = 60% and 95% CIs; dotted lines=random trajectories selected from full set of 7200. (**Castillo-Jordan et al. (2021)**; Appendix 6)**

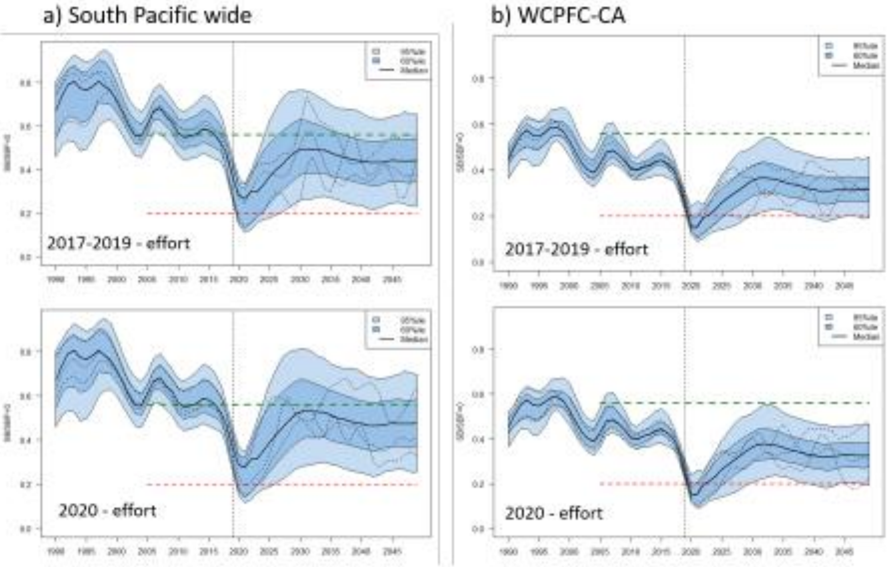


**Figure 28. SP albacore: Effort-based status quo projections for SP albacore to 2049, either South Pacific wide (left) or WCPFC-CA (right), based on 2017-19 average annual effort (top) or 2020 effort (bottom), showing spawning potential in relation to agreed target reference point (green line: 56%$SB_{F=0}$) and limit reference point (red line: 20%$SB_{F=0}$). Vertical line = final year of stock assessment; dark blue and light blue areas = 60% and 95% CIs; dotted lines=random trajectories selected from full set of 7200. (**Castillo-Jordan et al. (2021)**; Appendix 6)**

### 5.5.3.4 SP albacore information base

The 2021 stock assessment report (Castillo-Jordan et al., 2021) provides a full description of the data sources used, from which the summary in this section is taken unless otherwise indicated.

Fisheries: The stock assessment defines 25 'fisheries', in two categories: 21 extraction fisheries and 4 index fisheries. The extraction fisheries are used in the assessment to account for removals (i.e. catch) which is assumed by Multi-fan to be perfected estimated. Effort data are not included for these fisheries. The index fisheries are created from combined fleet CPUE data, and provide the four abundance indices used in the model. They are assigned a notional catch (one fish per quarter) so that removals are not counted twice. The approach is advantageous for this stock before effort and spatial coverage of individual fleets is patchy – a combined fleet index allows better coverage for each abundance index. One index fishery is defined for each of the four regions in the assessment model.

Catch data: Catch is almost all longline, except for a small amount of trolling around New Zealand, and is expressed in numbers of fish for both these gear types. Historical driftnet catches are also included.

Effort: Effort is measured in hooks set for the longline fleet, and in days fishing for the other gears. For the index fisheries, effort was standardised using a GLMM, which attempted to remove the effect of targeting (measured as relative proportion of different species in the catch) and flag, as well as time and area. Hooks between floats was also considered as a covariate, but these models did not converge – a point discussed by SC17, since it is likely to have had an influence on catchability over time.

Size data: These data come from observers and port sampling. For longline fisheries and the New Zealand fishery, there is a long time series from port sampling, for other surface fisheries there is also data albeit more sporadic (e.g. from Fiji, American Samoa and French Polynesia).

Tagging: Tagging data are limited for albacore, which appear to have high tagging mortality. Tagging data have been included in previous assessments, but for this assessment the stock assessment team found that including or excluding tagging data made no difference to the outcome, so it was excluded.

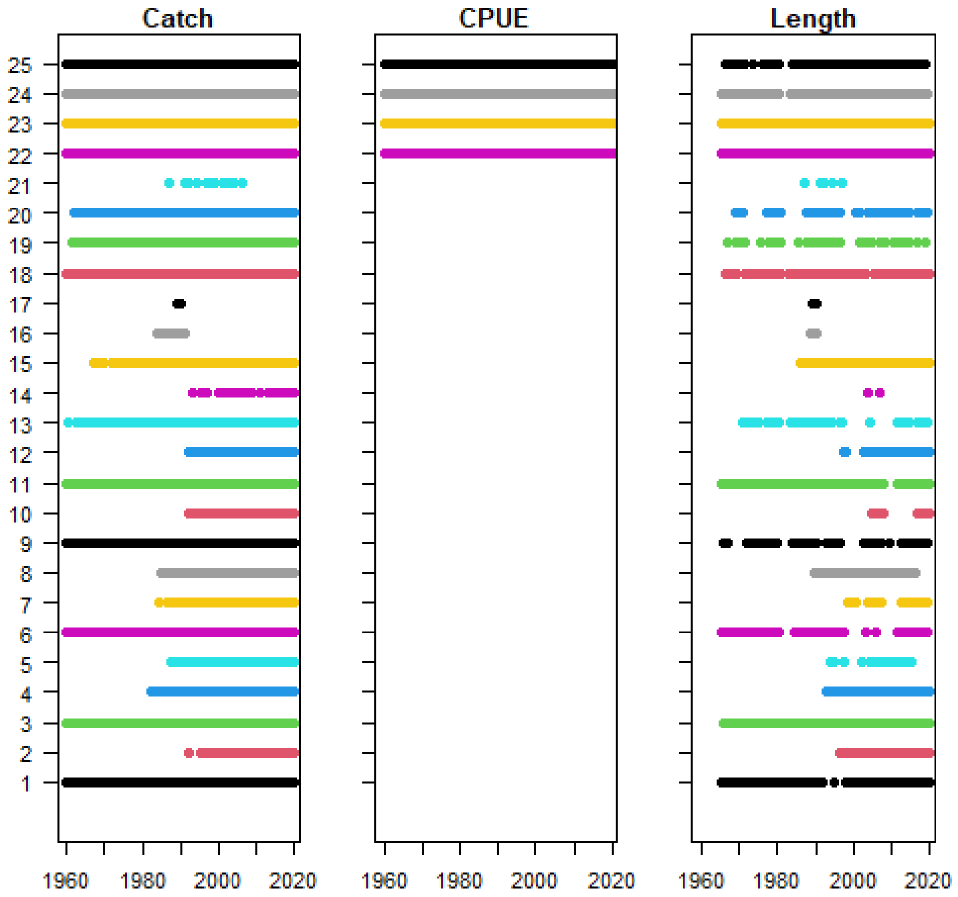


**Figure 29. SP abacore: Graphic representing the input data to the stock assessment from each 'fishery' (as defined as described above). Left to right: catch, CPUE, catch length sampling; top to bottom: the 25 fisheries defined by the stock assessment; x-axis of each column 1960-2019. Fisheries 22-25 are the combined index fisheries which provide CPUE abundance indices; the remaining fisheries are the extraction fisheries which account for removals, from which effort has been removed. Table 2 in** Castillo-Jordan et al. (2021)**.**

#### 5.5.3.5 SP albacore stock assessment

The 2021 stock assessment was conducted using Multifan-CL, as is usual for SPC. The model is spatially-structured with four regions (as per Figure 23 above). It includes 48 quarterly timesteps, the last one a plus group. The model is run from 1960-2019.

The model is a statistical model based on using multiple runs to characterise uncertainty, both from stochastically-varying inputs (notably recruitment) and from changes to the model inputs (key sensitivities). Management advice is provided based on the overall output incorporating all these uncertainties, rather than based on a diagnostic or 'most likely' set of model settings, although one subset of model settings was selected as a diagnostic model (see values in bold in Table 37). Even using the uncertainty grid, there of course remains an element of judgement in deciding which factors and values to include. In this case five factors, three with two different settings and two with three, resulted in an uncertainty grid of 72 models (Table 37).

Recruitment: Recruitment (age 1 fish) appear at the start of every quarter and was assumed to have a weak relationship with spawner potential via a Beverton-Holt function with fixed steepness (three values included in the uncertainty grid – Table 37). This is needed to allow estimate of stock status in relation to reference points, but the model put a weak penalty on recruitment deviations from the

BH curve. Two options were tried for the spatial distribution of recruitment; either assumed to come from regions 3 and 4 with the proportions estimated within the model, or fixed based on the outcome of the SEAPOPDYM (ecosystem) model (also included in the uncertainty grid; Table 37).

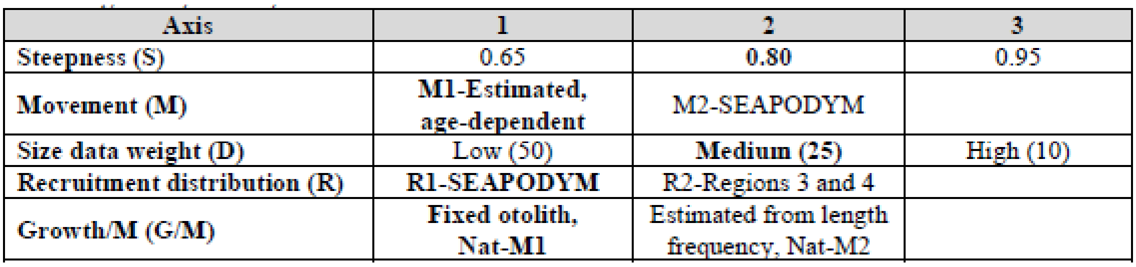
Growth: Growth was estimated externally, based on a VB growth model; either i) from otolith age estimates; or ii) from fits to the size composition data. This is also included as an uncertainty in the structural uncertainty grid (Table 37).

Movement: Movement of fish between adjacent regions is problematic in the assessment because of the lack of tagging data (described above). For the purposes of the assessment, movement was estimated two ways: either internally for each age class by Multifan, or external from the SEAPOPDYN model (included in the uncertainty grid: Table 37).

Natural mortality: Always problematic. This assessment uses a fairly sophisticated approach to estimating M at age, based on a combination of theory and life history information. The two different growth curves in the uncertainty grid are associated with two different M curves.

Reproductive potential at age: Above the age at maturity this is assumed to be length-based, which is converted to age-based within the model based on the growth curves. Maturity-at-length is estimated from data, as is sex ratio-at-length.

**Table 37. SP albacore: The structural uncertainty grid used to characterise uncertainty in the stock assessment output. Values in bold provide the diagnostic case model. Option M2 was downweighted by 50% by SC17. Table SPA-01 in SC17 report** (WCPFC-SC17, 2021)



| Axis | 1 | 2 | 3 |
|---|---|---|---|
| **Steepness (S)** | 0.65 | **0.80** | 0.95 |
| **Movement (M)** | **M1-Estimated, age-dependent** | M2-SEAPODYM | |
| **Size data weight (D)** | Low (50) | **Medium (25)** | High (10) |
| **Recruitment distribution (R)** | **R1-SEAPODYM** | R2-Regions 3 and 4 | |
| **Growth/M (G/M)** | **Fixed otolith, Nat-M1** | Estimated from length frequency, Nat-M2 | |

Uncertainties: As noted above, the assessment team conducted the usual range of analyses to evaluate uncertainty and robustness of the model. Sensitivities are described above. Figure 30 shows a retrospective analysis of the assessment output, which does not look too concerning. SC17 noted a range of qualitative concerns, notably that CPUE do not show much contrast in recent years despite a 2-3 fold increase in catch over the last 20 years, and also that hooks-between floats could not be incorporated into longline CPUE standardisation. There is clearly some concern that changes in catchability or other factors might be reducing the usefulness of the index fisheries CPUE as a reliable abundance index.

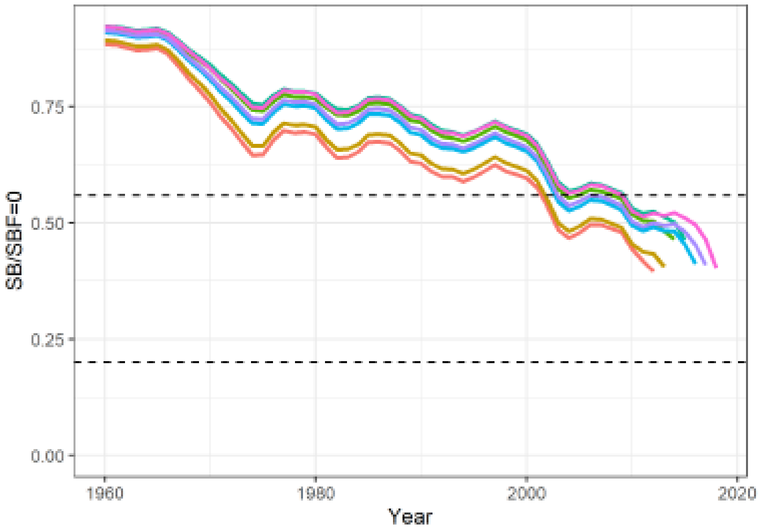


**Figure 30. SP albacore: Retrospective analysis of the stock assessment, showing assessment results (SB/SBF=0) when sequential years of data are removed from the end of the time series. Removal of the last five years of data make little difference, but years 6 and 7 push the estimate to a more depleted state. See** Castillo-Jordan et al. (2021)**, Appendix 5.**

### 5.5.3.6 SP albacore harvest strategy

Although the SP albacore stock extends into the eastern South Pacific (IATTC jurisdiction), management of the stock is via WCPFC, where the majority of the removals occur. French Polynesia, EEZ covers a large part of the EPO area, and applies WCPFC CMMs throughout its EEZ.

Progress towards a formal harvest strategy (management procedure) for SP albacore is described alongside yellowfin and bigeye in Section 5.5.1.9 above.

For the moment, SP albacore management is via CMM 2015-02, the key part of which (para. 1) states:

*Commission Members, Cooperating Non-Members, and participating Territories (CCMs) shall not increase the number of their fishing vessels actively fishing for South Pacific albacore in the Convention Area south of 20°S above 2005 levels or recent historical (2000-2004) levels*

CMM 2015-02 is due for review at WCPFC18 (see WCPFC18 Agenda; WCPFC Secretariat 2021). It was not updated at WCPFC18 but the Commission "encouraged" Contracting Parties and Cooperating Non-Contracting Parties (CPCs) to implement some additional interim controls (WCPFC, (2021a), paragraph 42):

- CCMs are encouraged to limit commercial fishing of South Pacific albacore within EEZs to domestically applied catch or effort limits in recent years.
- Each CCM is encouraged to ensure that its flagged vessels fishing for this species shall not exceed the high seas catch or effort (such as number of vessels) of South Pacific albacore by its flagged vessels in recent years.

As with WCPO yellowfin and bigeye, a biomass LRP has been set at 20%$SB_{F=0}$. A key long-term management objective for many stakeholders is to increase CPUE for Pacific Island fleets; the desired level of CPUE is 2013 +8%, which SPC estimate equates to a biomass of 56%$SB_{F=0}$, and this has been set as an interim target reference point, although since this is a dynamic reference point SC17 asked SPC to re-evaluate it. This has recently been done, and SPC arrived at a value of 68%$SB_{F=0}$ (SPC, 2021c). It remains to be seen if this will be agreed as the new target in 2022.

In 2017, WCPFC14 agreed on an inter-sessional process to develop a 'roadmap' for the effective conservation and management of SP albacore. The terms of reference of this intersessional group were to consider:

a) The elements necessary for the implementation of harvest strategy approach to the management of the stock;

b) an allocation process; and

c) monitoring and reporting priorities, and addressing of gaps, for all fisheries taking SP albacore within the WCPFC convention area.

The group met most recently in July 2021 (virtually) (Ravitu, 2021). While there was not agreement on some items, there was general agreement, i) to work on a rebuilding plan for the stock to achieve the target reference point (note this is prior to SPC's re-evaluation), with 20 years proposed as an appropriate timeframe; ii) to work on a replacement for CMM 2015-02 which should in particular cover the entire area of the stock within the WCPFC-CA and overlap area (i.e. not only the area south of $20_oS$).

WCPFC16 agreed to reinvigorate the SPALB Roadmap Intersessional Working Group in 2020, under the leadership of Fiji. The Group met virtually in November 2020, with the major agenda item being to examine progress on alternative catch pathways to achieve the interim TRP (WCPFC-SC16, 2020). Fiji provided a summary of the outcomes of the November meeting to WCPFC17, indicating that discussions are ongoing in relation to possible amendments to CMM 2015-02 or introducing a new CMM, which will be a comprehensive measure to address all occurrence of the species (in EEZs and the high seas; and including the entire area south of the equator, including the IATTC Convention Area).

### 5.5.4 North Pacific albacore

See Section 5.5.3.1 for information on albacore biology and stock definition in the Pacific Ocean.

#### 5.5.4.1 NP albacore stock status

Information in this section is summarised from Albacore Working Group (ALBWG, 2020) except where otherwise indicated.

Stock assessments for North Pacific (NP) albacore are carried out by the International Scientific Committee for Tuna and Tuna like Species in the N. Pacific Ocean (ISC), who periodically convene an Albacore Working Group (ALBWG) for stock assessments. ISC reports to the Northern Committee of WCPFC as well as to IATTC. The NP albacore stock was last assessed in July 2020 (ALBWG, 2020) using data from 1996-2018. Trends in biomass and recruitment derived from the assessment are shown in Figure 31. Estimates of stock status in relation to various reference points are given in Figure 32. The Kobe plot is shown in Figure 33.

The assessment estimates that total biomass (B) and female spawner biomass (SB; female throughout this section) have fluctuated more or less without trend since ~2000. Recruitment was estimated to be the lowest in the time series in 2014 and 2015, and since terminal recruitments are always highly uncertain, it is not clear whether recruitment has since improved. For the base case model, $SB_{2018}$ was estimated to be 2.3*LRP (20%$SB_{F=0}$), i.e. 46%$SB_{F=0}$ (1.63*LRP and 2.63*LRP for the main sensitivities), while fishing intensity (1-SPR – a proxy for F) was estimated to be ~0.5; below $F_{MSY}$ and $F_{0.1}$.

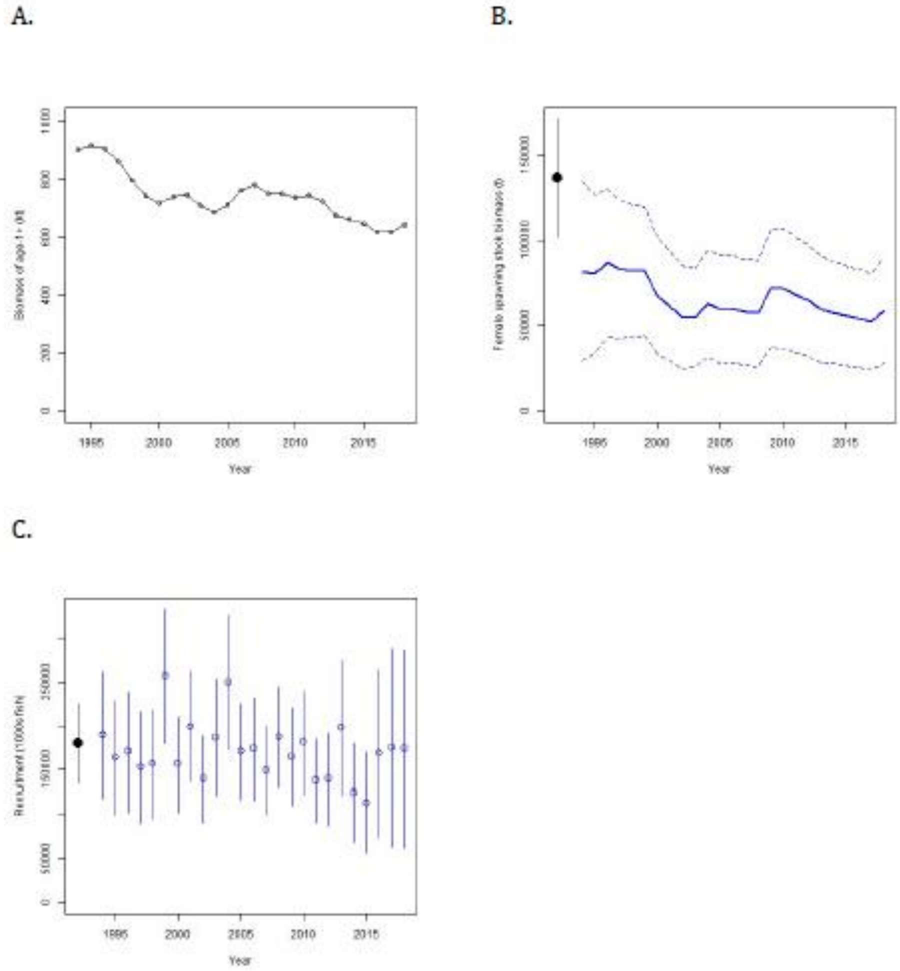
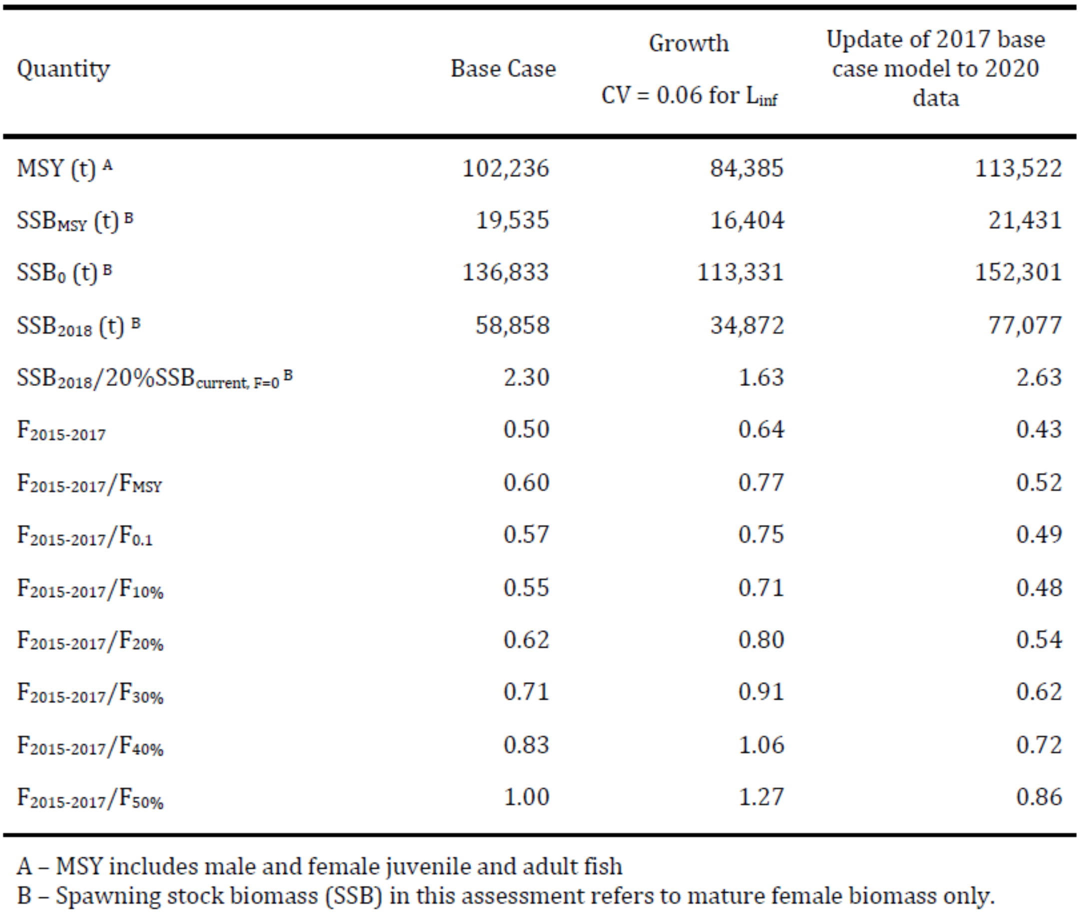


**Figure 31. NP albacore: Maximum likelihood estimates of (A) total age-1+ biomass (open circles); (B) female spawning biomass (SB) (solid blue line), and (C) age-0 recruitment (open circles). Dashed lines (B) and vertical bars (C) indicate 95% confidence intervals of the female SB and recruitment estimates respectively. The closed black circle and error bars in (B) are the maximum likelihood estimate and 95% confidence intervals of $SB_0$** (ALBWG, 2020)**.**



| Quantity | Base Case | Growth<br>CV = 0.06 for $L_{inf}$ | Update of 2017 base case model to 2020 data |
|---|---|---|---|
| MSY (t) $^{A}$ | 102,236 | 84,385 | 113,522 |
| $SSB_{MSY}$ (t) $^{B}$ | 19,535 | 16,404 | 21,431 |
| $SSB_0$ (t) $^{B}$ | 136,833 | 113,331 | 152,301 |
| $SSB_{2018}$ (t) $^{B}$ | 58,858 | 34,872 | 77,077 |
| $SSB_{2018}/20\%SSB_{current,\ F=0}$ $^{B}$ | 2.30 | 1.63 | 2.63 |
| $F_{2015-2017}$ | 0.50 | 0.64 | 0.43 |
| $F_{2015-2017}/F_{MSY}$ | 0.60 | 0.77 | 0.52 |
| $F_{2015-2017}/F_{0.1}$ | 0.57 | 0.75 | 0.49 |
| $F_{2015-2017}/F_{10\%}$ | 0.55 | 0.71 | 0.48 |
| $F_{2015-2017}/F_{20\%}$ | 0.62 | 0.80 | 0.54 |
| $F_{2015-2017}/F_{30\%}$ | 0.71 | 0.91 | 0.62 |
| $F_{2015-2017}/F_{40\%}$ | 0.83 | 1.06 | 0.72 |
| $F_{2015-2017}/F_{50\%}$ | 1.00 | 1.27 | 0.86 |

A – MSY includes male and female juvenile and adult fish
B – Spawning stock biomass (SSB) in this assessment refers to mature female biomass only.

**Figure 32. NP albacore: Estimates of stock status in relation to reference points for the base case assessment and important sensitivity analyses. The Fs in this table are not instantaneous fishing mortality, but indicators of fishing intensity (1-SPR; SPR is the equilibrium SB per recruit that would result from the current year's pattern and intensity of fishing mortality). 'Current' fishing intensity is the average 2015-2017 ($F_{2015-2017}$), while SSBcurrent,F=0 is the estimate of unfished female biomass based on observed recruitment in the model, in the terminal year of the assessment (2018). (source:** (ALBWG, 2020)**).**

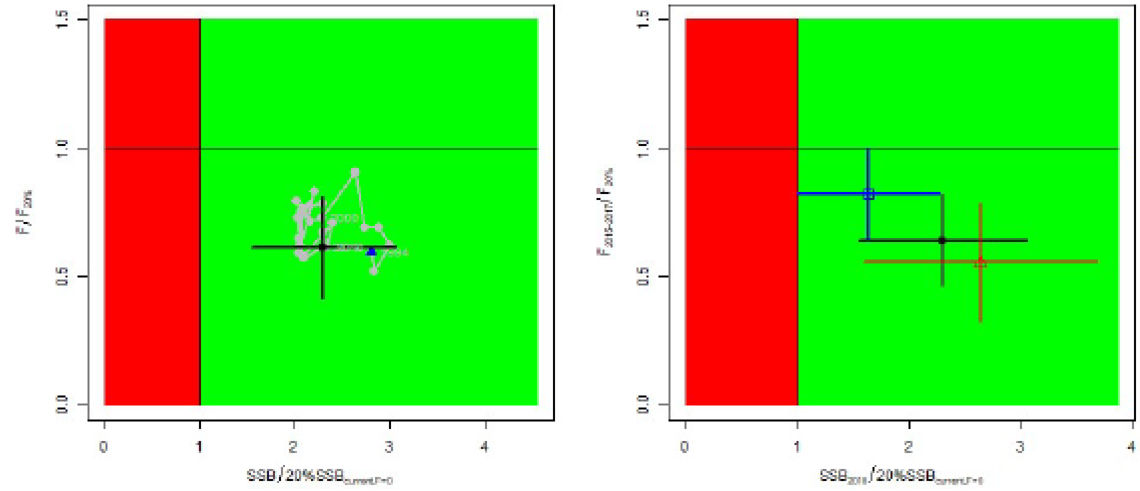


**Figure 33. NP albacore: Kobe plots showing stock status relative to the 20% biomass-based limit reference point, and equivalent fishing intensity (1-SPR$_{20\%}$) over the base case modelling period (1994-2018). Left: Blue triangle indicates the start year (1994) and black circle with 95% confidence intervals indicates the terminal year (2018). Right: Stock status and 95% confidence intervals in the terminal year (2018) of the base case model (black; closed circle) and important sensitivity runs update of 2017 base case model (red triangle), and CV = 0.06 for L$_{inf}$ in the growth model (blue square).** (ALBWG, 2020)**.**

### 5.5.4.2 NP albacore stock projections

Two ten-year projections were made (ALBWG, 2020) with constant F at the 2015-17 level and constant catch for the average 2013-17 (Figure 34). Two main sources of uncertainty were considered in the projections, namely i) uncertainty in the total biomass estimates and 2) uncertainty in the future recruitment. Projections started in 2015 and continued for ten years through 2025. The projections show that the current fishing intensity (F$_{2012-2014}$) is expected to reduce female SB, with a 0.2 and <0.01 and probability of being below the LRP by 2020 and 2025, respectively. In contrast a constant catch strategy increases the probability that SB will be below the LRP to about 3.5% / 30% in 2020 / 2025. The constant catch scenario, however, is inconsistent with current management approaches for NP albacore adopted by the IATTC and the WCPFC (see below).

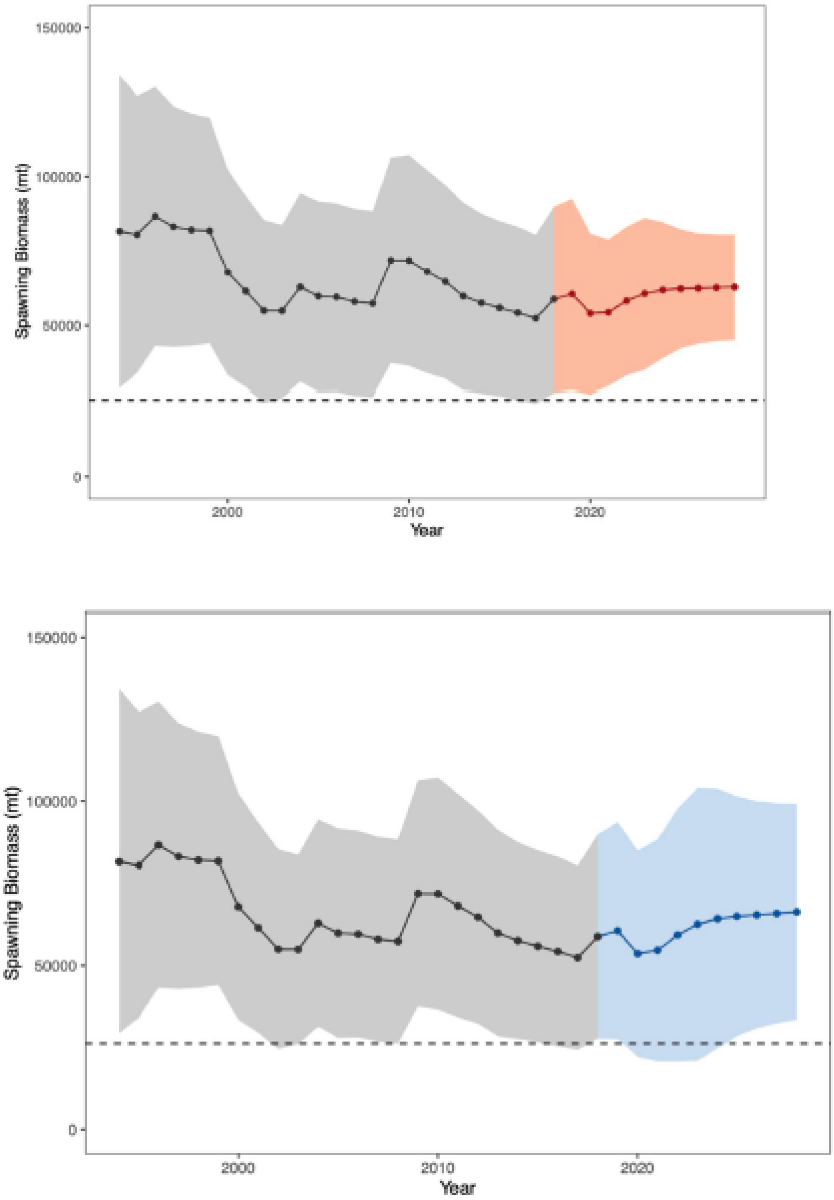


**Figure 34. NP albacore: Historical and SB trajectory and projections under different scenarios. Black line and shaded area is trajectory and CIs to 2018; red/blue line and shaded area is projected trajectory and CIs 2019-2028. Dashed line is LRP (2018 estimate). Top: Scenario of constant fishing intensity ($F_{2015-17}$). Bottom: Scenario of constant catch (average 2013-17; 69,354 t).** (ALBWG, 2020)**.**

### 5.5.4.3 NP albacore information

Information in this section comes from ALBWG (2020) and references therein.

The model inputs comprise three types of data: catch by fishery (as defined by Stock Synthesis), length-frequency data and abundance indices (standardised CPUE time series). The model also requires biological information about albacore – age and growth, natural mortality at age etc. Input data came from longline fisheries from Japan, USA, Taiwan, Korea, China and Vanuatu, the Japanese pole-and-line fisheries and other surface fisheries from the USA, Canada and Mexico.

Seven abundance indices were available from Japanese and Taiwanese longline and Japanese pole-and-line fisheries. (Stock Synthesis requires fisheries to be broken down into elements with constant selectivity (as far as possible), so a single fishery may result in several input 'fisheries' by area and season – this assessment also took advantage of this to use differences in selectivity between the same fishery in different areas as a proxy for movement of fish between areas.) The assessment finally decided to use just one index, based on the Japanese longline fishery, which the group concluded was informative on adult population trends. A second Japanese longline index was added as a sensitivity run.

Length data were available from 22 of the 35 fisheries used in the model, coming mainly from either port sampling, observers or measurements by the crew. Sex composition data were also available from Japanese research longline vessels, and Japanese and American scientists are working on a method of analysis of tissue samples by PCR which would (among other things) provide sex data – the ALBWG expressed the hope that this could be used to gather more information about catch sex ratio by fishery in the future.

In terms of biology, the model used the maximum observed age (15 years) to determine the age classes in the model (the last being 15+). It used sex-specific growth curves, based on studies of albacore age and growth which shows that it is sex-specific; these studies were also used to set the CVs for the VB growth parameters, since it was found in the preliminary model that the CV around Linf was highly influential – this also informed several sensitivity analyses (see below). Unusually, there are also data available (a meta-analysis and a study of tagging data) to inform estimates of natural mortality, which also formed part of the sensitivity analyses. Histological data were used to inform rates of maturity by size/age as well as spawning seasons and areas.

Tagging is a problem for albacore, and the lack of tagging data is a problem in defining the spatial structure of the model and movement between areas. Instead, as noted above, selectivity patterns for fisheries were used as a proxy for spatial structure, which helps to compensate for potential biases caused by the lack of explicit spatial structure in the assessment model.

#### 5.5.4.4 NP albacore stock assessment

Information in this section is summarised from ALBWG (2020) except where otherwise indicated.

The North Pacific albacore stock was most recently assessed in 2020 using the integrated stock assessment model Stock Synthesis 3 (SS3); to develop a length-based, age-, and sex-structured model. The assessment was spatially structured into five regions, covering the whole north Pacific, although movement of fish between regions was not explicitly modelled (Figure 35). Sex-specific growth curves from the 2014 and 2017 assessment were used because of evidence of sexually dimorphic growth, with adult males attaining a larger size-at-age than females after maturity (Figure 36). All fisheries were assumed to have dome-shaped length selectivity, and age-based selectivities were also estimated for surface fisheries. Maximum likelihood estimates of model parameters, outputs and uncertainties were used to evaluate stock status. As a check, the base-case model was modified into a deterministic age-structured population model, to see if the time series of catch and abundance indices were consistent with the model population trends. The group also used other analysis methods such as inspection of residuals and retrospective analysis to evaluate the robustness of model conclusions.

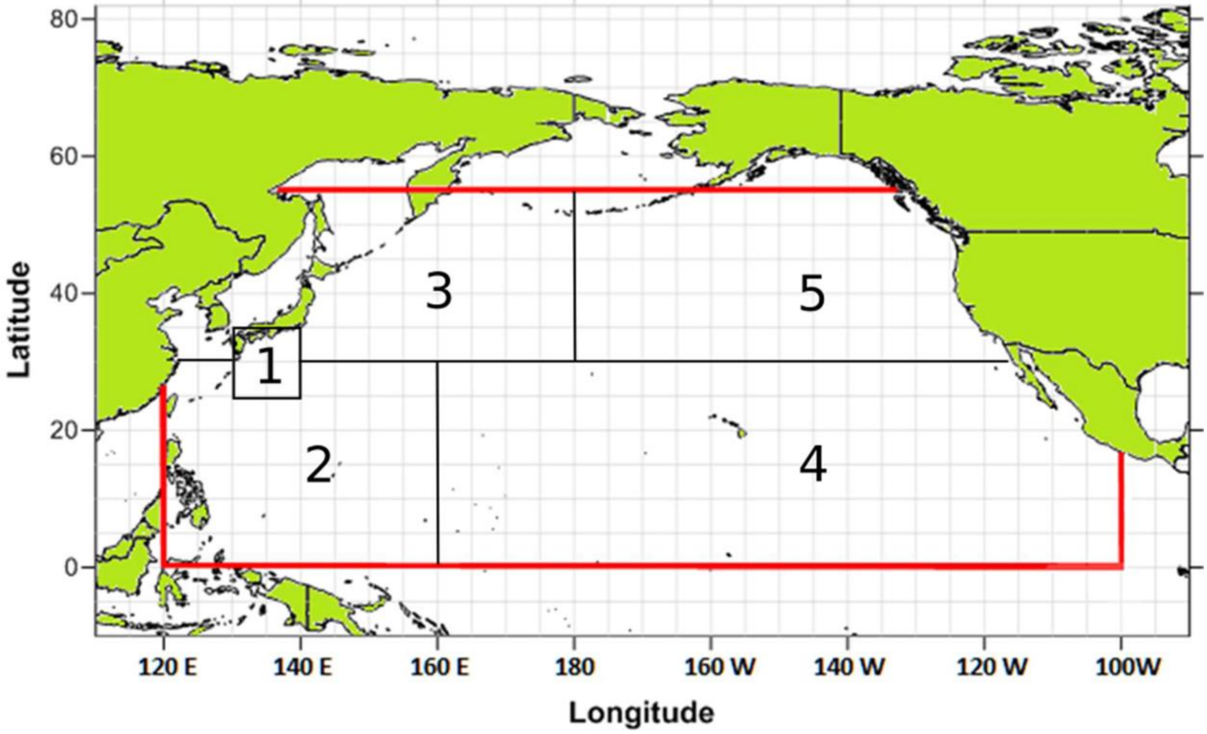


**Figure 35. NP albacore: Regional structure as used in the 2017 stock assessment. Fishery definitions were based on five fishing areas (black boxes and numbers) defined from cluster analyses of size composition data. ALBWG 2020.**

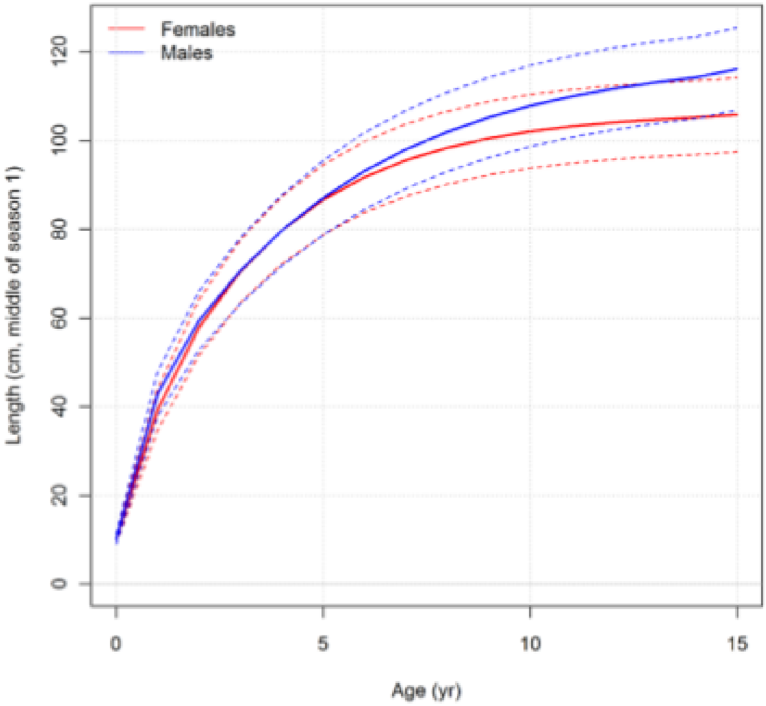


**Figure 36. NP albacore: Sex-specific growth as used in the 2017 assessment. Dashed lines indicate 95% confidence intervals. ALBWG 2017.**

There were three major changes to the base case model compared to the previous assessment in 2017:

- It was previously noted that the size composition data for the Japanese pole-and-line fisheries was highly variable, and it was unclear whether this was a function of the underlying nature of the catch, vs. insufficient sample sizes, so in previous assessments the model fit to these data was poor. Analysis since 2017 has shown that sampling is adequate, and the group concluded that the variability is a function of the fishery targeting different age classes in different locations / seasons. For the 2020 assessment, these fisheries were subdivided seasonally to reflect these variations, and selectivity was also allowed to vary annually where size data were available, resulting in a substantially improved fit to these data.
- Likewise Japanese longline fisheries were subdivided seasonally to reflect underlying patterns assumed to reflect seasonal migrations, resulting in improved fit to size-composition data.
- Improvements were made to the way that size composition data were scaled to the input sample size.

A number of sensitivity runs were performed to examine the effects of plausible alternative model assumptions on the assessment results, and to aid in the identification of the major axes of uncertainty in the assessment.

- natural mortality (significant impact on model output)
- steepness (low impact)
- growth model (CV of Linf) (significant impact)
- historical catch estimates of three fisheries (low impact)
- fitting abundance index from 1994 instead of 1996 (low impact)
- fit to additional indices (low impact)
- weighting of size composition data (medium impact)
- asymptotic selectivity for the US longline fishery (low impact)
- estimating initial conditions external to the model (failed to converge)
- model start year 1966 (poor fits; none of the outputs satisfactory)
- comparison with updated 2017 model (some differences but 2020 model considered to be more plausible)

#### 5.5.4.5 NP albacore management: current

Management of NP albacore is shared jointly between WCPFC and IATTC, which until recently had a harmonised management measure in place (WCFPC: CMM 2005-03; IATTC: Resolution C-05-02). In 2013 and 2018, IATTC supplemented C-05-02 with C-13-03 and C-18-03 which strengthen reporting requirements and require data sharing with WCPFC and review of the harvest strategy based on MSE. In December 2019 (WCPFC16), WCPFC replaced their management measure with CMM 2019-03, which includes the requirement for engagement with IATTC to ensure that management remains coherent. The management objective set in 2005-03 and C-05-02 is that F should not increase beyond ‘current levels’ (i.e. levels which were current in 2005). CMM 2019-03 has a similar but updated objective: that effort should not increase above current levels (current in 2019) and in addition should not increase above 2002-4 levels, as previously.

The most recent estimate of fishing intensity (F proxy) is roughly at the same level as in 2002-4 (Figure 37) so in practice the objective of WCPFC's new CMM 2019-03 is unchanged from the previous measure. This also means that implementation of the requirement to not exceed 2002-4 levels fishing pressure means that effort cannot increase and catch needs to decrease from current levels (as per stock projections – see Section 5.5.4.2 and Figure 34 above). Nevertheless, the figures suggest that recent catch is significantly lower than the reference period for CMM 2005-03 (2002-4), and has declined in the last 5 years (Table 38).

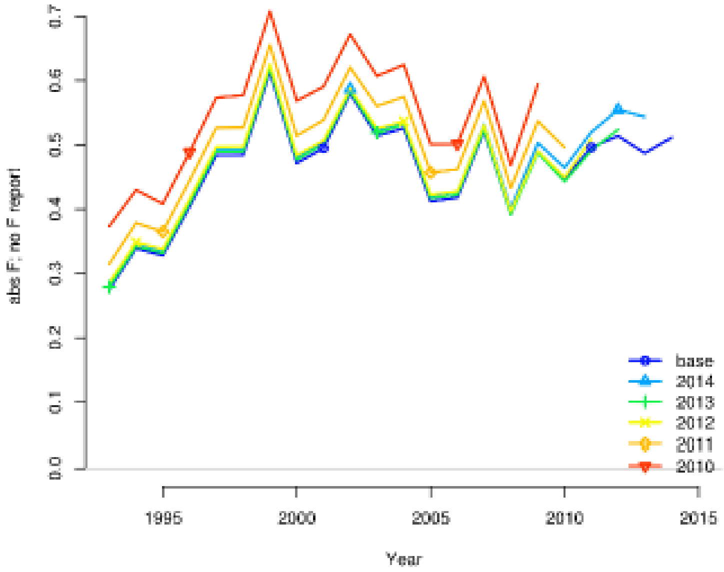


**Figure 37. NP albacore: Fishing intensity (1-SPR; proxy for F) for NP albacore as estimated by stock assessment model (base case in dark blue and retrospective analyses in other colours) (Figure 5.8 in ISC 2017).**

**Table 38. NP albacore: Landings of albacore from the North Pacific, from the WCPFC Tuna Fishery Yearbook (tonnes live weight)**

| Year | Total NPA landings (t) |
|---|---|
| 2002 | 105285 |
| 2003 | 94536 |
| 2004 | 93787 |
| average 2002-04 | **97869** |
| 2014 | 80538 |
| 2015 | 71809 |
| 2016 | 58204 |
| 2017 | 59994 |
| 2018 | 56715 |
| 2019 | 57447 |

| | |
|---|---|
| 2020 | 51731 |
| average 2016-18 | **58304** |
| average 2014-18 | **70184** |

In 2017, the WCPFC Northern Committee passed an 'interim harvest strategy' for NP albacore which was endorsed by the WCPFC plenary (WCPFC14 (summary report 2018), paragraph 206); harvest strategy included as Attachment H). This incorporates the LRP of 20%$SB_{F=0}$. It does not fix a TRP but notes that this should be determined as part of a MSE included under the Committee's future work. This was planned to be completed in 2021, and indeed has been (see below) (WCPFC-SC15, 2019).

The agreed interim harvest strategy incorporates a management objective and a decision rule relating to the LRP, as follows:

- Management objective (para. 1): *The management objective for the North Pacific albacore fishery is to maintain the biomass, with reasonable variability, around its current level in order to allow recent exploitation levels to continue and with a low risk of breaching the limit reference point.*
- Decision rule (para. 3): *In the event that, based on information from ISC, the spawning stock size decreases below the LRP at any time, NC will, at its next regular session or intersessionally 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*.

It is worth noting that the decision rule contradicts the management objective, in that the objective is to maintain the stock at a level which has a low risk of breaching the LRP, while the decision rule does not require any action until the stock has actually breached the LRP. It likewise contradicts a statement in the same section of the Northern Committee report, i.e. '*NC recommends a management strategy for the stock that ensures that the risk of the biomass decreasing below the LRP is low*' (WCPFC-NC13 2017, p. 50), as well as WCPFC's decision (WCPFC 2016) that harvest strategies should ensure that the risk of falling below the LRP is not higher than 20%.

#### 5.5.4.6 NP albacore management: progress towards a formal harvest strategy

CMM 2014-06, committing WCPFC to the development of formal harvest strategies and harvest control rules, applies to NP albacore as well as skipjack and the other tropical stocks. The work to develop the harvest strategy has, however, been delegated to the Northern Committee and NP albacore does not feature in the associated WCPFC harvest strategy workplan. The Northern Committee have, like WCPFC, agreed a harvest strategy workplan for NP albacore (see WCPFC-NC13 2017; Attachment I).

As of July 2021, the MSE part of this process is complete. NC17 reviewed the results of the MSE, and participants were sent away to digest the results, with the objective of making changes to the harvest strategy in 2022. The NC workplan, however, does not set a deadline for agreement and implementation of a revised harvest strategy based on the MSE (WCPFC-NC17 2021, Attachment H).

#### 5.5.4.7 NP albacore management – Japan

Japan is the largest contributor to catches of NP albacore, accounting for 67% of the catch in 2020 and 60% in 2019 (WCPFC Tuna Fishery Yearbook). Japan has set limits on the number of licences available for vessels to fish NP albacore. Licences must be renewed every five years, and a total number of licences is agreed by the Fisheries Agency prior to the renewal process. Vessel have to reapply for licences, and the total fishing capacity of licenced vessels is taken into account in setting the licence limit (i.e. higher capacity for some licences has to be compensated by fewer licences overall). Licences were last renewed at the end of 2021, resulting in a total of 42 licences for pole and line vessels and 213 tuna longline licences, as compared to 43 pole and line and 313 longline licences at the last licencing round in 2012. Through this system, Japan seeks to ensure that increase fishing effort should not increase above current levels.

### 5.5.5 Total Allowable Catch (TAC) and Catch Data

**Table 39. Catch Data (t live weight). Note that the stock area is the Western and Central Pacific Ocean (WCPO) for yellowfin and bigeye, the North Pacific (including the eastern North Pacific) for NP albacore and the South Pacific (including the eastern South Pacific) for SP albacore. Stock area data from https://www.wcpfc.int/doc/annual-catch-estimates-data-files**

| Stock | Total catch from stock area | | UoA catch | |
|---|---|---|---|---|
| | 2020 | 2019 | 2020 | 2019 |
| **Yellowfin** | 722042 | 689599 | | |
| **Bigeye** | 148371 | 131193 | | |
| **NP Albacore** | 51731 | 57447 | | |
| **SP Albacore** | 71949 | 86083 | | |

### 5.5.6 Principle 1 Performance Indicator scores and rationales

**Scoring table 1. PI 1.1.1 – Stock status: WCPO YFT**

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

**Rationale**

The PRI for this stock is not known. $B_{MSY}$ (see 1.1.1b below) is analytically determined in the stock assessment to be 23.6%$SB_{F=0}$ (median of grid).

The guidance in GSA2.2.3.1 states: *In the case where either $B_{MSY}$ or the PRI are analytically determined, those values should be used as the reference points for measuring stock status unless additional precaution is sought.* (…) *In the case where $B_{MSY}$ is analytically determined to be lower than 40%$B_0$ (as in some highly productive stocks), and there is no analytical determination of the PRI, the default PRI should be 20%$B_0$ unless $B_{MSY}$<27%$B_0$, in which case the default PRI should be 75%$B_{MSY}$.*

On this basis, since the PRI is not analytically determined, but $B_{MSY}$ is, and $B_{MSY}$ is estimated to be <27%$B_0$, the PRI is taken to be 75%$B_{MSY}$. Yellowfin is a productive stock so there is no reason for additional precaution. This means that the default PRI proxy is 17.7%$SB_{F=0}$ (i.e. slightly below the LRP).

To achieve SG60 it has to be likely (≥ 70th %ile); for SG80 to be highly likely (≥ 80th %ile); and for SG100 there has to be a high degree of certainty (≥ 95th %ile) that current stock status is above the PRI (PRI proxy 17.7%$SB_{F=0}$). The 10th percentile is estimated directly in the uncertainty grid, so if this is above the PRI, this would satisfy **SG60 and SG80.** For SG100 to be met, three or fewer scenarios (out of 72), or the minimum value from the grid, should fall below 17.7%$SB_{F=0}$.

In the final grid used to characterise uncertainty (72 runs; Table 30) the 10th %ile of $SB_{latest}/SB_{F=0}$ and $SB_{recent}/SB_{F=0}$ respectively was 47% and 51%, so SG60 and SG80 are met. The minimum value of the grid is 40% (latest) and 42% (recent), which is well above the default PRI of 17.7%. **SG100 is met.**

| | |
|---|---|
| **b** | Stock status in relation to achievement of Maximum Sustainable Yield (MSY) |

| | | | | |
|---|---|---|---|---|
| | Guide post | | The stock is at or fluctuating around a level consistent with MSY. | There is a **high degree of certainty** that the stock has been fluctuating around a level consistent with MSY or has been above this level over recent years. |
| | Met? | | Yes | Yes |

**Rationale**

$F_{recent}/F_{MSY}$ is estimated at $0.36F_{MSY}$ (median). The maximum estimate of $F/F_{MSY}$ from the grid was 0.59, suggesting that F is below $F_{MSY}$ with a high degree of certainty.

The median estimate of $SB/SB_{MSY}$ is 2.28/2.43 (latest/recent). The minimum estimate from the grid of $SB/SB_{MSY}$ is >1 in both cases (1.47/1.54), suggesting that SB is above $SB_{MSY}$ with a high degree of certainty (Table 30). The time series of $SB/SB_{F=0}$ (Figure 8) suggests that the lower limit of the confidence interval associated with the biomass trend has been above $SB_{MSY}$ throughout the assessment period (from 1952). **SG80 and SG100 are met.**

References

Vincent, M., Ducharme-Barth, N., Hamer, P., Hampton, J., Williams, P., & Pilling, G. (2020). Stock assessment of yellowfin tuna in the western and central Pacific Ocean. WCPFC-SC16-2020/SA-WP-04 (Rev.3).

WCPFC-SC16. (2020). Sixteenth Regular Session of the Scientific Committee: Electronic Meeting, 12–19 August 2020 (Reconvened on 10 September 2020). Summary Report, adopted on 6 November 2020.

Stock status relative to reference points

| | Type of reference point | Value of reference point | Current stock status relative to reference point |
|---|---|---|---|
| Reference point used in scoring stock relative to PRI (SIa) | PRI proxy | $75\%B_{MSY} = 17.7\% SB_{F=0}$ | Median estimate from final grid: $54\%SB_{F=0}$ ($SB_{latest}$); $58\%SB_{F=0}$ ($SB_{recent}$) |
| Reference point used in scoring stock relative to MSY (SIb) | MSY target | $SB_{MSY} = 23.6\%SB_{F=0}$ | Median estimate from final grid: $2.28SB_{MSY}$ ($SB_{latest}$); $2.43SB_{MSY}$ ($SB_{recent}$) |

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

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

**Scoring table 2. PI 1.1.2 – Stock rebuilding**

| PI 1.1.2 | | Where the stock is reduced, there is evidence of stock rebuilding within a specified timeframe | | |
|---|---|---|---|---|
| Scoring Issue | | SG 60 | SG 80 | SG 100 |
| **a** | Rebuilding timeframes | | | |
| | Guide post | A rebuilding timeframe is specified for the stock that is **the shorter of 20 years or 2 times its generation time**. For cases where 2 generations is less than 5 years, the rebuilding timeframe is up to 5 years. | | The shortest practicable rebuilding timeframe is specified which does not exceed **one generation time** for the stock. |
| | Met? | NA | | NA |

**Rationale**

Rebuilding is not required – not applicable.

| **b** | Rebuilding evaluation | | | |
|---|---|---|---|---|
| | Guide post | Monitoring is in place to determine whether the rebuilding strategies are effective in rebuilding the stock within the specified timeframe. | There is evidence that the rebuilding strategies are rebuilding stocks, **or it is likely** based on simulation modelling, exploitation rates or previous performance that they will be able to rebuild the stock within the specified timeframe. | There is **strong evidence** that the rebuilding strategies are rebuilding stocks, or it is **highly likely** based on simulation modelling, exploitation rates or previous performance that they will be able to rebuild the stock within the specified timeframe. |
| | Met? | NA | NA | NA |

**Rationale**

Rebuilding is not required – not applicable.

| References |
|---|

-

| | |
|---|---|
| Draft scoring range | NA |
| Information gap indicator | - |

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

### Scoring table 3. PI 1.2.1 – Harvest strategy WCPO YFT

| PI 1.2.1 | | There is a robust and precautionary harvest strategy in place | | |
|---|---|---|---|---|
| Scoring Issue | | SG 60 | SG 80 | SG 100 |
| **a** | Harvest strategy design | | | |
| | Guide post | The harvest strategy is **expected** to achieve stock management objectives reflected in PI 1.1.1 SG80. | The harvest strategy is responsive to the state of the stock and the elements of the harvest strategy **work together** towards achieving stock management objectives reflected in PI 1.1.1 SG80. | The harvest strategy is responsive to the state of the stock and is **designed** to achieve stock management objectives reflected in PI 1.1.1 SG80. |
| | Met? | Yes | No | No |

**Rationale**

MSC defines a harvest strategy as '*the combination of monitoring, stock assessment, harvest control rules and management actions, which may include an MP or an MP (implicit) and be tested by MSE*' (MSC – MSCI Vocabulary v1.1).

The stated objective of the WCPFC harvest strategy as defined in CMM 2020-01 is to maintain status quo biomass, pending agreement on a formal target reference point, which was due at WCPFC16 in 2019 but deferred to 2021, and then 2022.

CMM 2014-06 commits WCPFC to developing a formal harvest strategy for yellowfin and the other key stocks; none of the key milestones for yellowfin have yet been met however (see harvest strategy indicative workplan; Attachment H to the WCPFC17 report). For the moment, the elements of the WCPFC harvest strategy are the following:

- Data collection on the stock and fishery (considered in detail in PI 1.2.3 below)
- Stock assessment process (considered in detail in PI 1.2.4 below)
- Limit reference point (20% $SB_{F=0}$) and management target ($SB_{2012-15}$; from CMM 2020-01)
- 'Available' HCR (see 1.2.2), with some management tools set out in 2020-01
- Monitoring of implementation of CMM 2020-01 via data gathering and Part 1 and 2 reports to the Commission.

This management strategy is reviewed annually during the Commission meeting.

PNA harvest strategy: The PNA purse seine VDS is relevant for yellowfin because the majority of the reduction in spawning potential can be ascribed to the purse seine fishery, particularly in equatorial regions (see Figure 58 in the stock assessment report). A longline VDS has been established but plays a limited role in management for the moment.

Overall scoring: The objective of the current harvest strategy is to maintain the status quo (WCPFC: average $SB/SB_{F=0}$ for 2012-2015; PNA: purse seine effort at a maximum of 2010 levels). The most recent stock assessment suggests that the status quo is an acceptable biological target for yellowfin (see 1.1.1). SPC have evaluated the likely impact of CMM 2017-01, 2018-01 and 2020-01 with 30-year projections (most recently Hamer et al. 2021). In 2021, all scenarios resulted in a negligible risk of SB falling below the LRP or $SB_{MSY}$, or F increasing above $F_{MSY}$. On this basis, and given the results of the stock assessment (see 1.1.1), the harvest strategy is achieving stock management objectives: **SG60 is met.**

SG80 requires that management is responsive to the state of the stock. In 2017, the working group charged with developing the Tropical Tuna CMM asked SPC to evaluate the likely consequences of a large set of different management options for yellowfin, bigeye and skipjack stocks (SPC 2017). A series of options were evaluated based on the probability of future (2045) biomass and fishing mortality being the wrong side of reference points ($SB<LRP$; $F>F_{MSY}$), with levels of risk defined in a 'traffic light' scale (green: <5%, orange: 5-20%, red: >20%). For yellowfin, only a small number of options (some of those with no FAD closures and/or those resulting an estimated increase in longline catch of 30% or more) resulted in a risk of >5% of $SB<LRP$ or $F>F_{MSY}$, and none resulted in a risk of >20% for either indicator. None of the options correspond directly to CMM 2020-01, but the options with higher risk were less precautionary than 2017-01, 2018-01 or 2020-01, which include FAD closures and have established longline catch limits for bigeye, which are also likely to impact on longline catches of yellowfin.

It is also relevant to consider the history of changes to the harvest strategy in relation to perceptions of stock status, to evaluate whether there has been a response to changes in this perception. Since the harvest strategy considers all three tropical tuna species together and given that the status of yellowfin tuna has always been good, changes in status of bigeye, which has varied over time, may be considered to determine the responsiveness of the harvest strategy. Measures to reduce F on bigeye took some time to be agreed, but once introduced, the harvest strategy progressively tightened over the period 2014-2017, with measures only relaxed slightly (in 2017-01, agreed in December 2017) when the perception of stock status was revised and improved in the 2017 assessment. The history of management for bigeye is an important piece of evidence that can be used once an HCR for the three species is well defined and in place.

At SG80 it is also required that the elements of the management strategy work together to achieve management objectives. The elements of the current harvest strategy are: i) monitoring / stock assessment; ii) evaluation of management options; iii) management actions put in place by WCPFC and iv) management actions put in place by PNA. The evaluation of management options is informed by the stock assessment (which is only possible because of monitoring and data collection); WCPFC decision-making is informed by the evaluation of different options. It is also clear that PNA and WCPFC work together; the PNA VDS is incorporated into CMM 2020-01 (see Table 1 of the CMM). However, the HCR was found to be only 'available' but not well defined and in place according to MSC definitions in PI 1.2.2. Although the framework is taken as evidence that the strategy can work, there is no record of the use of triggers (or surrogate of an HCR) to modify the fishery´s behaviour to stop a perceived decline. The implication is that with one element missing, elements of the strategy cannot be assured to work together to make it responsive to the state of the stock, therefore **SG80 is not met.**

| **b** | Harvest strategy evaluation | | | |
|---|---|---|---|---|
| | Guide post | The harvest strategy is **likely** to work based on prior experience or plausible argument. | The harvest strategy may not have been fully **tested** but evidence exists that it is achieving its objectives. | The performance of the harvest strategy has been **fully evaluated** and evidence exists to show that it is achieving its objectives including being clearly able to maintain stocks at target levels. |
| | Met? | Yes | Yes | No |

**Rationale**

Yellowfin fishing mortality has always been below $F_{MSY}$, and the stock has never declined below the default target of $SB_{MSY}$. From this it can be inferred that while the harvest strategy may not have been fully tested, there is evidence that it is achieving its objectives; therefore, **SG60 and SG80 are met.**

While projections suggest that the harvest strategy will continue to maintain the stock at appropriate levels under most circumstances, management measures are for the present adjusted annually on an *ad hoc* basis. Hence these projections do not map onto the actual management, and hence the harvest strategy cannot be fully evaluated. **SG100 is not met.**

| **c** | Harvest strategy monitoring | |
|---|---|---|
| | Guide post | Monitoring is in place that is expected to determine whether the harvest strategy is working. |
| | Met? | Yes |

**Rationale**

Extensive monitoring is in place at the stock level; including biological research, tagging and extensive fishery-dependent data (catch, effort including operational level logbook data and catch-at-size sampling). Details given in Section 5.5.1.2.. **SG60 is met**.

| **d** | Harvest strategy review | | | |
|---|---|---|---|---|
| | Guide post | | | The harvest strategy is periodically reviewed and improved as necessary. |

| | | | | |
|---|---|---|---|---|
| | Met? | | | Yes |

**Rationale**

There is no evidence from stock assessments that the harvest strategy for yellowfin needs improvement in the short term. In the long term the work is ongoing under CMM 14-06 to put in place a new harvest strategy. The question here, therefore, is: Is there regular review in order to evaluate whether improvement is needed to the harvest strategy for yellowfin, pending completion of the 14-06 process?

Each year, SPC present a set of indicators and projections for each stock, and these are discussed by the SC; the SC conclusions are presented to and discussed by the plenary. The key component of the harvest strategy – i.e. the tropical tuna management measures, are reviewed and adjusted each year, with input from stock assessments (in years when available), compilations of fishery indicators and long- and short-term projections under the status quo and under different management scenarios. There is review of the stock assessment as considered in 1.2.4, and the stock assessment process (notably the pre-assessment workshop) reviews and evaluates the various data sources available for stock assessment and how they should be used. At the same time, as mentioned above, there is a process underway which aims to arrive at a formal harvest strategy (under CMM 2014-06 and associated workplans), including Management Strategy Evaluation (MSE). **SG100 is met.**

| | | | | |
|---|---|---|---|---|
| **e** | Shark finning | | | |
| | Guide post | It is **likely** that shark finning is not taking place. | It is **highly likely** that shark finning is not taking place. | There is a **high degree of certainty** that shark finning is not taking place. |
| | Met? | NA | NA | NA |

**Rationale**

The target species is not a shark.

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

| | | | | |
|---|---|---|---|---|
| | Met? | NA | NA | NA |

**Rationale**

An analysis of the observer data (see under Principle 2) shows no evidence of discarding for yellowfin. Japanese regulations state that all discards should be reported in the Fishery Catch Report for submission to the JFA. It therefore appears that there is no unwanted catch of yellowfin by the UoA.

References

Hamer, P., Pilling, G., & Williams, P. (2021). Updates to evaluation of CMM 2020-01. WCPFC-SC17-2021/MI-IP-03.

PNA. (2016). Parties to the Nauru Arrangement, 21st Annual Meeting Tarawa, Kiribati, 31 March-1 April 2016. PNA.

SPC. (2017). An evaluation of the management options for purse seine and longline fisheries defined by the TT CMM intersessional meeting. .

Vincent, M., Ducharme-Barth, N., Hamer, P., Hampton, J., Williams, P., & Pilling, G. (2020). Stock assessment of yellowfin tuna in the western and central Pacific Ocean. WCPFC-SC16-2020/SA-WP-04 (Rev.3).

WCPFC17. (2020). Commission 17th Regular Session. Electronic Meeting 8 – 15 December 2020: Summary Report.

CMMs 2018-01, 2017-01, 2014-06, 2013-01, 2014-01, 2015-01, 2016-01

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

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

## Scoring table 4. PI 1.2.2 – Harvest control rules and tools WCPO YFT

| PI 1.2.2 | | There are well defined and effective harvest control rules (HCRs) in place | | |
|---|---|---|---|---|
| Scoring Issue | | SG 60 | SG 80 | SG 100 |
| **a** | HCRs design and application | | | |
| | Guide post | **Generally understood** HCRs are in place or **available** that are **expected** to reduce the exploitation rate as the point of recruitment impairment (PRI) is approached. | **Well defined** HCRs are **in place that ensure** that the exploitation rate is reduced as the PRI is approached, are expected to keep the stock fluctuating around a target level consistent with (or above) MSY, or for key LTL species a level consistent with ecosystem needs. | The HCRs are expected to keep the stock **fluctuating at or above** a target level consistent with MSY, or another more appropriate level taking into account the ecological role of the stock, most of the time. |
| | Met? | Yes | No | No |

**Rationale**

MSC requirements:

SA2.5.2 In scoring issue (a) at the SG60 level, teams shall accept 'available' HCRs (instead of HCRs that are 'in place') in cases where:

a. Stock biomass has not previously been reduced below the MSY level or has been maintained at that level for a recent period of time that is at least longer than 2 generation times of the species, and is not predicted to be reduced below $B_{MSY}$ within the next 5 years; or

b. In UoAs where $B_{MSY}$ estimates are not available, the stock has been maintained to date by the measures in use at levels that have not declined significantly over time, nor shown any evidence of recruitment impairment.

SA2.5.3 Teams shall recognise 'available' HCRs as 'expected to reduce the exploitation rate as the point of recruitment impairment is approached' only in cases where:

a. HCRs are effectively used in some other UoAs, that are under the control of the same management body and of a similar size and scale as the UoA; or

b. An agreement or framework is in place that requires the management body to adopt HCRs before the stock declines below $B_{MSY}$.

Stock biomass has been above the estimated MSY level throughout the time series, and since the probabilities that $SB<SB_{MSY}$ and $F>F_{MSY}$ are low (see 1.2.1a), it is not likely that the stock biomass will fall below this level in the next five years (see PI 1.1.1; and Section 5.5.1.1; Table 30). WCPFC have an agreed, legally-binding framework in place to establish place formal harvest strategies and control rules for their main stocks, including WCPO yellowfin (see CMM 2014-06 and associated workplans; Section 5.5.1.12). The requirements of SA2.5.2-3 are therefore met for a HCR to be 'available'. **SG60 is met.** Since the HCR is not 'well defined' and 'in place', **SG80 is not met.**

| | | | | |
|---|---|---|---|---|
| **b** | HCRs robustness to uncertainty | | | |
| | Guide post | | The HCRs are likely to be robust to the main uncertainties. | The HCRs take account of a **wide** range of uncertainties including the ecological role of the stock, and there is **evidence** that the HCRs are robust to the main uncertainties. |
| | Met? | | No | No |

**Rationale**

GSA2.5.2 on scoring uncertainty indicates the following: *In scoring issue (b), teams must assess how well the HCRs are likely to function when the unexpected happens in the future. The scoring guideposts reflect the degree of confidence there is in the HCR performance in relation to risks, caused by both known and unknown factors*.

An HCR is ‘available’ rather than pre-agreed, ‘well defined’ and ‘in place’. The final nature of the HCR is not yet agreed so it is not yet possible to determine how much confidence we should have in its performance. The robust technical methodology that is being applied to the development of a HCR (MSE) provides confidence in the scientific aspects of HCR development, but the agreement of a HCR is a political as much as a scientific process, and this political element remains uncertain for the moment. **SG80 is not met.**

| | | | | |
|---|---|---|---|---|
| **c** | HCRs evaluation | | | |
| | Guide post | There is **some evidence** that tools used or available to implement HCRs are appropriate and effective in controlling exploitation. | **Available evidence indicates** that the tools in use are appropriate and effective in achieving the exploitation levels required under the HCRs. | **Evidence clearly shows** that the tools in use are effective in achieving the exploitation levels required under the HCRs. |
| | Met? | Yes | No | No |

**Rationale**

The tools in place for management of WCPO yellowfin are i) at regional level, CMM 2020-01 (and previous iterations), the provisions of which are described in Section 5.5.1.9; and ii) at sub-regional level the PNA VDS (Section 5.5.1.11).

Under SA2.5.5, in order to conclude that ‘available’ HCRs are ‘effective’ (SG60), MSC requires evidence of i) the use of effective HCRs in other stocks or fisheries under the same management body; or ii) a formal agreement or framework with trigger levels which will require the development of a well-defined HCR. It also requires consideration of current exploitation rates in relation to biological reference points and the agreed trigger level (guidance for SA2.5.6: ‘*evidence that current F is equal to or less than* $F_{MSY}$ *should usually be taken as evidence that the HCR is effective*’).

Taking this last point first, it is clear that $F<F_{MSY}$ (see PI 1.1.1). A formal agreement for the development of a well-defined HCR is provided by CMM 2014-06, with a framework provided by the associated workplan. A trigger level is provided by the agreed limit reference point ($20\%SB_{F=0}$). The recent assessment provides some evidence that the tools in use are sufficiently effective at controlling exploitation rates, **meeting the requirements at SG60**. As the HCR as required in CMM 2014-06 has not being yet provided or needed, there is no direct evidence that the tools in use are effectively achieving the exploitation rates under a potential HCR, therefore **SG80 is not met.**

| References |
|---|

PNA. (2016). Parties to the Nauru Arrangement, 21st Annual Meeting Tarawa, Kiribati, 31 March-1 April 2016. PNA.

SPC. (2017). An evaluation of the management options for purse seine and longline fisheries defined by the TT CMM intersessional meeting. .

Vincent, M., Ducharme-Barth, N., Hamer, P., Hampton, J., Williams, P., & Pilling, G. (2020). Stock assessment of yellowfin tuna in the western and central Pacific Ocean. WCPFC-SC16-2020/SA-WP-04 (Rev.3).

WCPFC17. (2020). Commission 17th Regular Session. Electronic Meeting 8 – 15 December 2020: Summary Report.

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CMMs 2018-01, 2017-01, 2014-06, 2013-01, 2014-01, 2015-01, 2016-01

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

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

**Scoring table 5. PI 1.2.3 – Information and monitoring WCPO YFT**

| PI 1.2.3 | | Relevant information is collected to support the harvest strategy | | |
|---|---|---|---|---|
| Scoring Issue | | SG 60 | SG 80 | SG 100 |
| **a** | Range of information | | | |
| | Guide post | **Some** relevant information related to stock structure, stock productivity and fleet composition is available to support the harvest strategy. | **Sufficient** relevant information related to stock structure, stock productivity, fleet composition and other data are available to support the harvest strategy. | A **comprehensive range** of information (on stock structure, stock productivity, fleet composition, stock abundance, UoA removals and other information such as environmental information), including some that may not be directly related to the current harvest strategy, is available. |
| | Met? | Yes | Yes | No |

**Rationale**

The following information is available, and is used as part of the harvest strategy – notably to inform the stock assessment model:

1. Fishery-dependent information

Catch, effort and CPUE: It is a requirement for all CCM fisheries to provide catch and effort data to WCPFC/SPC, and unlike in the past, most key fleets now provide operational (logbook) rather than just aggregate data (SPC 2021c). Catch and effort data go back to 1950, although as expected, historical data are sparser and generally less reliable than more recent data. The logsheet data are raised to best estimates of total catch by SPC-OFP, to account for missing data. Purse seine catch is allocated to species via an agreed methodology, recently revised. Longline CPUE data are analysed and standardised as described in Vincent and Ducharme-Barth (2020), and provide the key stock assessment input; purse seine CPUE is not used (for now) because of difficulty in measuring effort.

Length/weight-frequency data: Size-frequency data come from various port sampling programmes and some observer reports, and go back to the 1960s. These data are weighted in the stock assessment according to spatial representation, to account for differences in length-frequency by geographic region.

Fleet composition: Each CCM provides information to WCPFC annually on their active fleet, in their Part 1 reports.

2. Fishery-independent information

Age and growth: Age at size is based on otolith data and modelled using various techniques, which is part of the uncertainty grid for the stock assessment (see Section 5.5.1.3). In the previous stock assessment, SPC noted that age and growth was a significant uncertainty, but the completion of Project 82 has provided new growth data used in the 2020 stock assessment for the first time.

Natural mortality: The estimation of M for the stock assessment was also reviewed for the 2020 assessment, since the new growth model required a re-estimation in any case. A meta-analysis was conducted, resulting in significant revision relative to previous assessments (Vincent and Ducharme-Barth, 2020).

Environmental data: The Ocean Fisheries Programme of SPC undertaken environmental research as part of their ecosystem monitoring programme, focusing particularly on potential environmental drivers of tuna population dynamics.

3. Stock structure

The WCPO yellowfin fishery is assessed and managed as a single stock in the WCPFC Convention Area, although there is evidence for some stock structure within the WCPO; this is addressed to some extent by a spatially structured stock assessment model. Some work has been done for bigeye to evaluate the usefulness of a combined management approach (McKechnie et al., 2015), which concluded that the approach of separate assessments in the WCPO and the EPO was appropriate at least for now. A combined assessment has not, however, been attempted for yellowfin.

4. Information inferred from the stock assessment

A significant range of information relating to stock status comes as the output of the stock assessment (Vincent et al., 2020; WCPFC-SC16, 2020), including estimates of spawner potential, recruitment, fishery impact etc.

On this basis, the team concluded that **SG60 and SG80 are met.**

5. Data gaps

Observer coverage (providing external verification of logbook data and information about discards) is low for the longline fishery. It is high for the purse seine fleet although lower in 2020 due to the covid-19 pandemic. There is no external fishery-independent biomass indicator (such as a survey or close-kin mark-recapture). There remain significant data gaps for the large and diverse fisheries in Vietnam, Indonesia and the Philippines, although the data have improved in recent years.

Overall, given the size and complexity of the fishery, the range and comprehensiveness of the data available is impressive and improving all the time. Nonetheless, some data gaps do constrain stock assessments, although big efforts have been made to reduce uncertainty around age and growth and natural mortality. The stock assessment continues to rely on commercial CPUE as an index of stock abundance, and although these data are carefully analysed and standardised as far as possible, there are no fishery-independent datasets with which they can be compared, while issues such as spatial and temporal changes in catchability remain problematic. There are also, and perhaps more importantly, some significant concerns about the catch data provided by Indonesia, which takes a significant proportion of the WCPO yellowfin catch; considered in more detail under SIc below.

Regarding SG100, it is certainly the case that the data available for assessment of this stock are excellent in relation to most other fisheries. However, this scoring needs to be harmonised with other assessments on this stock, while harmonising across stocks is not a requirement. CABs have raised concerns in relation to this scoring based on the data gaps evaluated above. On the basis of precautionary and harmonised scoring, **SG100 is not met**.

| **b** | Monitoring | | | |
|---|---|---|---|---|
| | Guide post | Stock abundance and UoA removals are monitored and **at least one indicator** is available and monitored with sufficient frequency to support the harvest control rule. | Stock abundance and UoA removals are **regularly monitored at a level of accuracy and coverage consistent with the harvest control rule, and one or more indicators** are available and monitored with sufficient frequency to support the harvest control rule. | **All information** required by the harvest control rule is monitored with high frequency and a high degree of certainty, and there is a good understanding of inherent uncertainties in the information [data] and the robustness of assessment and management to this uncertainty. |
| | Met? | Yes | Yes | No |

**Rationale**

Fishery removals are monitored by individual CCMs via logsheets and port sampling, and are required to be submitted to the Commission annually, in the form of estimates of total catch plus catch and effort data broken down by gear and either aggregated (5° squares by month) or at operational level (individual logsheet level). Despite some gaps in this dataset, coverage is good overall. This catch, effort and CPUE dataset is the key indicator for stock assessment. Other key fisheries data which support management are size-frequency data (collected via port sampling and observer programmes) and tag returns. Biological data are also collected via research programmes e.g. (Pecoraro et al., 2016; Farley et al., 2020).

The stock assessments are based on abundance indicators derived from standardised CPUE time series of longline fisheries in each region. Starting with the previous assessment (2017) SPC were able to use a database of operational-level longline catch/effort data, including Pacific and distant-water fleets across each region. This enables the calculation of standardised abundance indices based on ‘index fisheries’ (combined longline fleets) in each region across the entire timeframe of the assessment.

Formal stock assessments have taken place every few years (2011, 2014, 2017, 2020). In between formal stock assessments, SPC provide some information on trends in fishery indicators (total catch, nominal CPUE, catch at length and at weight), to guide management.

On this basis, **SG60 and SG80 are met.**

Regarding SG100, it is certainly the case that the data available for assessment of this stock are excellent in relation to most other fisheries. However, SG100 is a high bar (‘high frequency and high degree of certainty’), and it is also relevant that there is no HCR in place in this fishery. On the basis of precautionary and harmonised scoring, **SG100 is not met**.

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

**Rationale**

WCPFC and SPC work hard to quantify all sources of removals and include them in the stock assessment. Small-scale (but extensive) subsistence and commercial fisheries in Indonesia, the Philippines and Vietnam have in the past been a particular problem, and there has been ongoing work for quite a few years to quantify the catch (and where possible effort) from these fisheries. According to the stock assessment report, there has been gradual improvement in the data from Indonesia, the Philippines and Vietnam over the last few years, and catch data are included in the most recent stock assessment. For Indonesia (important since it took 31% of the WCPO yellowfin catch in 2018 according to the WCPFC Tuna Fishery Yearbook), the system for generating catch statistics appears to have improved markedly in recent years. Recent Indonesia-SPC joint workshops under WPEA programme (WCPFC, 2019) have continued to express some concerns, particularly about over-estimates of catch by some gears and problems in allocation of catch to particular gear types, but overall concluded that estimates for 2018 (the terminal year of the stock assessment) were an improvement over 2017 and previous years.

The stock assessment report notes that the WPEA project has improved understanding of and inputs from the main fisheries operating in Region 7 (Indonesia / Philippines / Vietnam) but notes that continued work to improve these data (particularly in relation to fisheries targeting juvenile yellowfin) will improve future yellowfin assessments.

MRAG (2016) attempted to evaluate the magnitude of IUU fishing in the Asia-Pacific region and on this basis the pre-assessment workshop did not consider that it needed to be considered for the yellowfin stock assessment (although it was for bigeye). A report by Pew Charitable Trusts in 2019 (Pew, 2019), however, highlighted uncertainties in the declaration of transshipments and provides evidence that points to the possibility of significant levels of undeclared transshipments from longline vessels. WCPFC estimates that ~15% of yellowfin catch was transshipped in 2019. The WCPFC Secretariat is developing a Transshipment Analysis Tool which uses VMS data to detect potential high seas transshipment events by noting when two vessels were within 250m of each other for at least 4 hours. They note that this is so far preliminary but hope that it will eventually be able to support validation of reported transshipment data (WCPFC, 2020e). WCPFC is also reviewing its transshipment CMM (2009-06) via a Transshipment Intersessional Working Group which first met at TCC15 (2019) but as of TCC17 (2021) does not appear to have made much progress (WCPFC-TCC17 2021).

Following peer review comments on another assessment on this stock, the CAB followed up the question of transshipment data with WCPFC (Dr Peter Williams, WCPFC, pers. comm.). In fact, WCPFC does not rely on transshipment data to quantify removals from the stock, since it is very challenging for transshipment observers to estimate quantities accurately. Instead, they rely on logbooks and reports from CCMs, and use VMS data to cross-check logbook data.

Thus overall while there are some concerns around reporting of various types of data, these issues are being addressed by WCPFC and there is no evidence that they significantly compromise the robustness of the stock assessment (as per the conclusions of the pre-assessment workshop for the stock assessment). **SG80 is met.**

References

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WCPFC. (2020b). Conservation and Management Measure for bigeye, yellowfin and skipjack tuna in the Western Central Pacific Ocean (CMM 2020-01) https://www.wcpfc.int/doc/cmm-2020-01/conservation-and-management-measure-bigeye-yellowfin-and-skipjack-tuna-western-and .

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

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

**Scoring table 6. PI 1.2.4 – Assessment of stock status: WCPO YFT**

| PI 1.2.4 | | There is an adequate assessment of the stock status | | |
|---|---|---|---|---|
| Scoring Issue | | SG 60 | SG 80 | SG 100 |
| **a** | Appropriateness of assessment to stock under consideration | | | |
| | Guide post | | The assessment is appropriate for the stock and for the harvest control rule. | The assessment takes into account the major features relevant to the biology of the species and the nature of the UoA. |
| | Met? | | Yes | Yes |

**Rationale**

The assessment is conducted using an integrated assessment model Multifan-CL (MFCL) that is able to combine a range of datasets and to model several components, including (i) the dynamics of the fish population (growth, natural mortality, maturity and fecundity, recruitment); (ii) the fishery dynamics; (iii) the dynamics of tagged fish; (iv) the observation models for the data. The model partitions the population into 9 spatial regions and 40 quarterly age-classes and defines 'fisheries' to consist of relatively homogeneous fishing units that have selectivity and catchability characteristics that do not vary greatly over time and space, although in the case of catchability some allowance can be made for time series variation. SPC have considerable experience in the development and application of MFCL. The assessment is appropriate for evaluating stock status; there is no HCR in place. **SG80 and SG100 are met.**

| | | | | |
|---|---|---|---|---|
| **b** | Assessment approach | | | |
| | Guide post | The assessment estimates stock status relative to generic reference points appropriate to the species category. | The assessment estimates stock status relative to reference points that are appropriate to the stock and can be estimated. | |
| | Met? | Yes | Yes | |

**Rationale**

MFCL can estimate a range of reference points based on yield/spawner per recruit and stock-recruit relationships. As an integrated statistical method it can use the available data in as raw a form as appropriate in a single analysis. This allows for consistency in assumptions and permits the uncertainty associated with both data sources to be propagated to final model outputs such as reference points and projections. For this stock, both depletion based reference points ($SB_{F=0}$) and MSY reference points

($SB_{MSY}$, $F_{MSY}$ are estimated, and the key issues from which uncertainty arises for these reference points (e.g. current recruitment, steepness, natural mortality etc.) are evaluated via sensitivity analyses. **SG60 and SG80 are met.**

| **c** | Uncertainty in the assessment | | | |
|---|---|---|---|---|
| | Guide post | The assessment **identifies major sources** of uncertainty. | The assessment takes uncertainty into account. | The assessment takes into account uncertainty and is evaluating stock status relative to reference points in a **probabilistic** way. |
| | Met? | Yes | Yes | Yes |

**Rationale**

Several hundred runs were undertaken in conducting the 2020 yellowfin assessment; then to represent uncertainty, the assessment was based on a grid of structural uncertainties, including 72 runs focused on a small set of uncertainty axes considered to represent the 'plausible range' of stock uncertainty. The grid was constructed from 4 axes: steepness (3 settings), growth model (3), tag mixing (2) and size data weighting (4). This allowed quantitative statements about probability of achieving management objectives to be made; therefore, **SG60, SG80 and SG100 are met.**

| **d** | Evaluation of assessment | | | |
|---|---|---|---|---|
| | Guide post | | | The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored. |
| | Met? | | | No |

**Rationale**

Alternative hypotheses in terms of model input parameter values or estimation methods, or model structure, are explored based on sensitivities, as described above. The transition from the 2017 diagnostic case to the 2020 diagnostic case is explained step-by-step in the stock assessment report (Vincent et al., 2020), and shows the new or changed inputs and how they have been carefully evaluated at each stage. Alternative hypotheses are also explored externally; for example, Vincent and Ducharme-Barth (2020) evaluates different methods for estimating the natural mortality vector. Opportunities for improving the input data (Peatman et al., 2017; Farley et al., 2019) or developing new sources of input data e.g. (close-kin mark-recapture) are considered by the SC each year.

SC16, however, expressed concerns about how robust this assessment is: they note that it is optimistic compared to previous assessments, the cause of which is unclear. In relation to the bigeye assessment (which is similar), they express concern that it is over-parameterised, and they requested an external review of the assessments at the earliest opportunity (currently in prep.; SPC 2021a). On this basis, it may not be sufficiently robust to meet **SG100.**

| **e** | Peer review of assessment | | | |
|---|---|---|---|---|
| | Guide post | | The assessment of stock status is subject to peer review. | The assessment has been **internally and externally** peer reviewed. |
| | Met? | | Yes | No |

**Rationale**

Although the 2014, 2017 and 2020 assessments were not externally peer reviewed, the assessment has benefited from developments that addressed the recommendations made by the independent review of the 2011 bigeye assessment. These are detailed in the 2014 assessment report (Davies et al., 2014) and helped inform the recommendations of the 2020 pre-assessment workshop (PAW) (Hamer and Pilling, 2020). The PAW reviewed the main input datasets and provided recommendations regarding the range of assessment model options and sensitivities to be included within the stock assessment. These recommendations provided the main direction for the current assessment. There have also been several reviews of the data inputs. Therefore, although the current assessment has not been externally peer reviewed, it is regularly subject to internal scrutiny by SPC and the scientific committee of the WCPFC, during which scientists from a number of contracting parties are able to review the assessment.

A formal external peer review of the assessment was commissioned in 2021 by SC17, but has not yet taken place.

Therefore, **SG80 is met but not SG100** which requires evidence of a formal external review and an appropriate response by SPC and WCPFC.

References

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Vincent, M., Ducharme-Barth, N., Hamer, P., Hampton, J., Williams, P., & Pilling, G. (2020). Stock assessment of yellowfin tuna in the western and central Pacific Ocean. WCPFC-SC16-2020/SA-WP-04 (Rev.3).

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WCPFC-SC17. (2021). 17th Regular Session of the Scientific Committee: Electronic Meeting, 11-19 August 2021. Summary Report.

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

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

**Scoring table 7. PI 1.1.1 – Stock status: WCPO BET**

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

**Rationale**

The PRI for this stock is not known but $B_{MSY}$ is estimated at 23%$SB_{F=0}$. The guidance in GSA2.2.3.1 states: *In the case where either $B_{MSY}$ or the PRI are analytically determined, those values should be used as the reference points for measuring stock status unless additional precaution is sought.* (…) *In the case where $B_{MSY}$ is analytically determined to be lower than 40%$B_0$ (as in some highly productive stocks), and there is no analytical determination of the PRI, the default PRI should be 20%$B_0$ unless $B_{MSY}$<27%$B_0$, in which case the default PRI should be 75%$B_{MSY}$.* On this basis, since $B_{MSY}$ is analytically determined to be <27%$B_0$, we use 75%$B_{MSY}$ as a proxy for the PRI – i.e. 17.3%$SB_{F=0}$.

Based on the uncertainty grid (Table 34) (Ducharme-Barth et al., 2020), there is high probability that the SB is above the PRI proxy (minimum estimates: $SB_{latest}/SB_{F=0}$=23%, $SB_{recent}/SB_{F=0}$=21%). Although the stock assessment and the SC note with concern higher rates of depletion in equatorial regions than previously estimated, the median spawner depletion remains above 20%$SB_{F=0}$ in all regions (Figure 18).

The stock-recruit relationship is plotted in Figure 38 below and gives an opportunity to evaluate recruitment in relation to stock biomass directly. As can be seen from the figure, although biomass is reduced in the later part of the time series (yellow end of the spectrum), with the exception of two very large recruitments in the early part of the time series, recruitment does not appear to change.

Overall, the team concluded that there is a high degree of certainty that the stock is above the PRI; **SG60, SG80 and SG100 are met.**

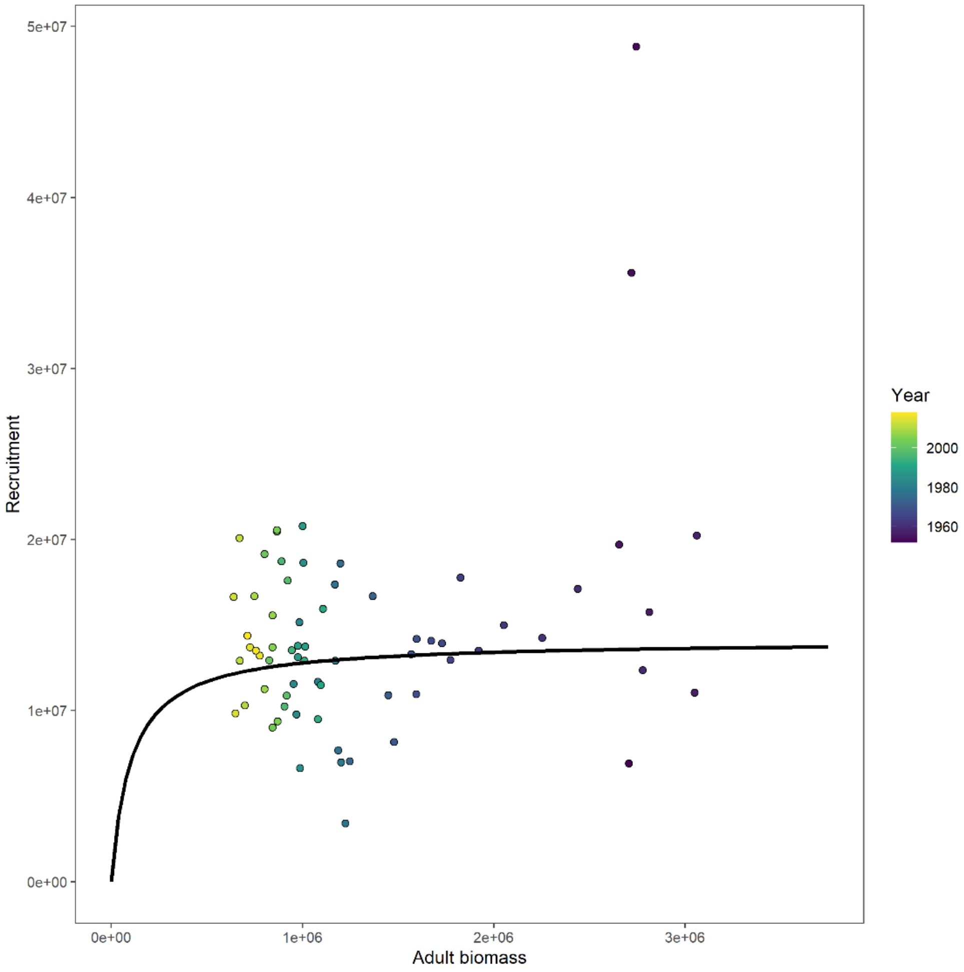

**Figure 38. Stock-recruit pairs, 1952-2018, trending from purple to yellow over time (Ducharme-Barth et al., 2020)**

| b | Stock status in relation to achievement of Maximum Sustainable Yield (MSY) | | | |
|---|---|---|---|---|
| | Guide post | | The stock is at or fluctuating around a level consistent with MSY. | There is a high degree of certainty that the stock has been fluctuating around a level consistent with MSY or has been above this level over recent years. |
| | Met? | | Yes | No |

**Rationale**

$SB_{MSY}$ is estimated (median estimate) at $23\%SB_0$.

According to the uncertainty grid, $SB_{recent}/SB_{MSY}$ is estimated as follows: 1.83 (median), 1.18 (10% CI), 0.87 (min.) - The minimum estimate is the lowest out of 24 or 4.2% (Table 34). In other words, the stock is estimated to be at a level consistent with $SB_{MSY}$ with more than 90% probability (10% CI above $SB_{MSY}$) but less than 95.8% (min. estimate below $SB_{MSY}$). (The probability has not been directly quantified in either of the reports). The grid estimates $F/F_{MSY}$ at 0.72 (median), 1.02 (90% CI), 1.21 (max) (Table 34), so based on the uncertainty grid the probability of $F>F_{MSY}$ is roughly 10% or slightly higher. Catch has been fluctuating around MSY for the last few years (Figure 19). **SG80 is met.**

In relation to SG100, a 'high degree of certainty' is defined by MSC for this PI as a probability of 95% or more. This is not met in terms of the probabilities estimated from the uncertainty grid either for SB or for F. In addition, concerns are raised by the SC around several features of the model and its outputs – depletion is high in some regions and the SC considered the model to be over-parameterised, requesting an external review at the earliest opportunity. **SG100 is not met.**

References

Ducharme-Barth, N., Vincent, M., Hamer, P., Williams, P., & Pilling, G. (2020). Stock assessment of bigeye tuna in the western and central Pacific Ocean. WCPFC-SC16-2020/SA-WP-03 (Rev. 3).

WCPFC-SC16. (2020). Sixteenth Regular Session of the Scientific Committee: Electronic Meeting, 12–19 August 2020 (Reconvened on 10 September 2020). Summary Report, adopted on 6 November 2020.

Stock status relative to reference points

| | Type of reference point | Value of reference point | Current stock status relative to reference point |
|---|---|---|---|
| Reference point used in scoring stock relative to PRI (SIa) | MSY | $75\%SB_{MSY} = 17.3\%SB_{F=0}$ | $SB_{recent} = 41\%SB_{F=0} = 1.83SB_{MSY}$;; $SB_{latest} = 38\%SB_{F=0} = 1.67\ SB_{MSY}$ (median of SC uncertainty grid) |
| Reference point used in scoring stock relative to MSY (SIb) | MSY | $SB_{MSY}$ = 23%SBF=0 | |

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

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

### Scoring table 8. PI 1.1.2 – Stock rebuilding: WCPO BET

| PI 1.1.2 | | Where the stock is reduced, there is evidence of stock rebuilding within a specified timeframe | | |
|---|---|---|---|---|
| Scoring Issue | | SG 60 | SG 80 | SG 100 |
| **a** | Rebuilding timeframes | | | |
| | Guide post | A rebuilding timeframe is specified for the stock that is the shorter of 20 years or 2 times its generation time. For cases where 2 generations is less than 5 years, the rebuilding timeframe is up to 5 years. | | The shortest practicable rebuilding timeframe is specified which does not exceed one generation time for the stock. |
| | Met? | N/a | | N/a |

**Rationale**

Rebuilding is not required – not applicable

| | | | | |
|---|---|---|---|---|
| **b** | Rebuilding evaluation | | | |

| | | | | |
|---|---|---|---|---|
| | Guide post | Monitoring is in place to determine whether the rebuilding strategies are effective in rebuilding the stock within the specified timeframe. | There is evidence that the rebuilding strategies are rebuilding stocks, or it is likely based on simulation modelling, exploitation rates or previous performance that they will be able to rebuild the stock within the specified timeframe. | There is strong evidence that the rebuilding strategies are rebuilding stocks, or it is highly likely based on simulation modelling, exploitation rates or previous performance that they will be able to rebuild the stock within the specified timeframe. |
| | Met? | N/a | N/a | N/a |

**Rationale**

Rebuilding is not required – not applicable.

| References |
|---|

Rebuilding is not required – not applicable.

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

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

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

**Scoring table 9. PI 1.2.1 – Harvest strategy: WCPO BET**

| PI 1.2.1 | | There is a robust and precautionary harvest strategy in place | | |
|---|---|---|---|---|
| Scoring Issue | | SG 60 | SG 80 | SG 100 |
| **a** | Harvest strategy design | | | |
| | Guide post | The harvest strategy is expected to achieve stock management objectives reflected in PI 1.1.1 SG80. | The harvest strategy is responsive to the state of the stock and the elements of the harvest strategy work together towards achieving stock management objectives reflected in PI 1.1.1 SG80. | The harvest strategy is responsive to the state of the stock and is designed to achieve stock management objectives reflected in PI 1.1.1 SG80. |
| | Met? | Yes | No | No |

**Rationale**

MSC defines a harvest strategy as '*the combination of monitoring, stock assessment, harvest control rules and management actions, which may include an MP or an MP (implicit) and be tested by MSE*' (MSC – MSCI Vocabulary v1.1).

The stated objective of the WCPFC harvest strategy as defined in CMM 2020-01 is to maintain status quo biomass, pending agreement on a formal target reference point, which was due at WCPFC16 in 2019 but deferred to 2021.

CMM 2014-06 commits WCPFC to developing a formal harvest strategy for bigeye and the other key stocks; none of the key milestones for bigeye have yet been met however (see harvest strategy indicative workplan; Attachment H to WCPFC (2020a)). For the moment, the elements of the WCPFC harvest strategy are the following:

- Data collection on the stock and fishery (considered in detail in PI 1.2.3 below)
- Stock assessment process (considered in detail in PI 1.2.4 below)
- Limit reference point (20% $SB_{F=0}$) and management target ($SB_{2012-15}$; from CMM 2020-01)
- 'Available' HCR (see 1.2.2), with some management tools set out in 2020-01
- Monitoring of implementation of CMM 2020-01 via data gathering and Part 1 and 2 reports to the Commission.

This management strategy is reviewed annually during the Commission meeting.

PNA harvest strategy: The PNA purse seine VDS is relevant for bigeye because the majority of the reduction in spawning potential can be ascribed to the purse seine fishery, particularly in equatorial regions where spawner depletion is highest. A longline VDS has been established but plays a limited role in management for the moment.

Overall scoring: The objective of the current harvest strategy is to maintain the status quo (WCPFC: average $SB/SB_{F=0}$ for 2012-2015; PNA: purse seine effort at a maximum of 2010 levels). The most recent stock assessment suggests that the status quo is an acceptable biological target for bigeye (see 1.1.1). SPC have evaluated the likely impact of CMM 2017-01, 2018-01 and 2020-01 with 30-year projections (most recently Hamer et al. 2021). Assuming that recent recruitment levels (high) continue, the risk of SB falling below the LRP remained negligible, while the risk of $F>F_{MSY}$ ranged from 0-13% depending on assumptions about effort. Assuming long-term mean recruitment (lower), the risk of $F> F_{MSY}$ in 2048 was significant (37-58% depending on assumed effort) while the risk of SB<LRP was not negligible but nevertheless remained low (5-19%) (noting that the LRP is close to the estimated level of $B_{MSY}$). On this basis, and given the results of the stock assessment (see 1.1.1), the harvest strategy is achieving stock management objectives: **SG60 is met.**

At SG80 it is required that the harvest strategy be responsive to the state of the stock and that the elements of the strategy work together to achieve management objectives. The Guidance to the MSC Fisheries Standard indicate in GSA2.4 that, the elements of the harvest strategy include the control rules, the information and the monitoring of stock status as well as the responsiveness of the system. For bigeye tuna in the WCPO, the elements of the current harvest strategy are: i) monitoring / stock assessment; ii) evaluation of management options; iii) management actions put in place by WCPFC, iv) management actions put in place by PNA and v) an HCR that under the definitions in PI1.2.2a is only 'available', but not well defined and not in place. The 'available' HCR condition is accepted for bigeye tuna following SA2.5.2 (a) because the evidence indicates that biomass has not previously been reduced below the level producing MSY and is not predicted to be below such level within the next 5 years. SA2.5.3 also allows to recognize that this 'available' HCR is expected to reduce exploitation as the PRI is approached because of the existence of a framework requiring to adopt an HCR if the stock declines below $B_{MSY}$. The evaluation of management options is informed by the stock assessment (which is only possible because of monitoring and data collection); WCPFC decision-making is informed by the evaluation of different options. It is also clear that PNA and WCPFC work together; the PNA VDS is incorporated into CMM 2020-01 (see Table 1 of the CMM). However, because there is no well-defined HCR in place, there is an element missing of the harvest strategy so that the elements required by the Standard cannot work together and be responsive to stock status. **SG80 is not met.**

| **b** | Harvest strategy evaluation | | | |
|---|---|---|---|---|
| | Guide post | The harvest strategy is likely to work based on prior experience or plausible argument. | The harvest strategy may not have been fully tested but evidence exists that it is achieving its objectives. | The performance of the harvest strategy has been fully evaluated and evidence exists to show that it is achieving its objectives including being clearly able to maintain stocks at target levels. |
| | Met? | Yes | Yes | No |

**Rationale**

As noted above, stock status projections suggest that current management is precautionary in the short term. The stock assessment suggests that the biomass will remain above the LRP with high probability.

Management measures over the past few years (2013-01 – 2020-01) have been adjusted (strengthened from 2013-01 through 2016-01 and then weakened in 2017-01; 2018-01 and 2020-01 are more or less identical to 2017-01 as concerns bigeye) but probably not in a way that has had a significant impact on the stock (although stock status is only estimated to 2018; i.e. in the terminal year of the assessment, 2017-01 was in force).

The team considered that the estimated low probability that SB<LRP and F>$F_{MSY}$ constitutes 'evidence' that the harvest strategy is working. **SG60 and SG80 are therefore met**. The current harvest strategy is a stop-gap and has not been fully evaluated, although projections suggest that in the longer term, depending on recruitment, it risks increasing F to unsustainable levels (Hamer et al. 2021). **SG100 is not met.**

| | | | | |
|---|---|---|---|---|
| **c** | Harvest strategy monitoring | | | |
| | Guide post | Monitoring is in place that is expected to determine whether the harvest strategy is working. | | |
| | Met? | Yes | | |

**Rationale**

Monitoring of the fishery for the purposes of stock assessment is considered in PI 1.2.3 below, and the analysis of data is considered under PI 1.2.4. Monitoring of the implementation of the harvest strategy (notably CMM 2020-01 and its predecessors) is carried out via self-assessment by CCMs, included in their Part 1 and 2 reports submitted to WCPFC annually. **SG60 is met.**

| | | | | |
|---|---|---|---|---|
| **d** | Harvest strategy review | | | |
| | Guide post | | | The harvest strategy is periodically reviewed and improved as necessary. |
| | Met? | | | No |

**Rationale**

Not scored as 1.2.1a **does not meet SG 80**.

| **e** | Shark finning | | | |
|---|---|---|---|---|
| | Guide post | It is likely that shark finning is not taking place. | It is highly likely that shark finning is not taking place. | There is a high degree of certainty that shark finning is not taking place. |
| | Met? | N/a | N/a | N/a |

**Rationale**

The target species is not a shark.

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

**Rationale**

An analysis of the observer data (see under Principle 2) shows no evidence of discarding for bigeye tuna. Japanese regulations state that all discards should be reported in the Fishery Catch Report for submission to the JFA. It appears that there is **no unwanted catch of bigeye by the UoA**.

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CMMs 2020-01, 2018-01, 2017-01, 2014-06, 2013-01, 2014-01, 2015-01, 2016-01

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

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

### Scoring table 10. PI 1.2.2 – Harvest control rules and tools: WCPO BET

| PI 1.2.2 | | There are well defined and effective harvest control rules (HCRs) in place | | |
|---|---|---|---|---|
| Scoring Issue | | SG 60 | SG 80 | SG 100 |
| **a** | HCRs design and application | | | |
| | Guide post | Generally understood HCRs are in place or available that are expected to reduce the exploitation rate as the point of recruitment impairment (PRI) is approached. | Well defined HCRs are in place that ensure that the exploitation rate is reduced as the PRI is approached, are expected to keep the stock fluctuating around a target level consistent with (or above) MSY, or for key LTL species a level consistent with ecosystem needs. | The HCRs are expected to keep the stock fluctuating at or above a target level consistent with MSY, or another more appropriate level taking into account the ecological role of the stock, most of the time. |
| | Met? | Yes | No | No |

**Rationale**

MSC requirements:

SA2.5.2 In scoring issue (a) at the SG60 level, teams shall accept ‘available’ HCRs (instead of HCRs that are ‘in place’) in cases where:

a. Stock biomass has not previously been reduced below the MSY level or has been maintained at that level for a recent period of time that is at least longer than 2 generation times of the species, and is not predicted to be reduced below BMSY within the next 5 years; or

b. In UoAs where $B_{MSY}$ estimates are not available, the stock has been maintained to date by the measures in use at levels that have not declined significantly over time, nor shown any evidence of recruitment impairment.

SA2.5.3 Teams shall recognise ‘available’ HCRs as ‘expected to reduce the exploitation rate as the point of recruitment impairment is approached’ only in cases where:

a. HCRs are effectively used in some other UoAs, that are under the control of the same management body and of a similar size and scale as the UoA; or

b. An agreement or framework is in place that requires the management body to adopt HCRs before the stock declines below $B_{MSY}$.

The 2020 stock assessment estimated a low probability that SB was below $SB_{MSY}$ at any point, and probability of $F>F_{MSY}$ of ~10% (see 1.1.1b, Figure 17, Figure 18). The projections from the stock assessment estimate that the trajectory of median biomass will remain above the LRP ($20\%SB_{F=0}$) and above $SB_{MSY}$ ($23\%SB_{F=0}$) for either recruitment assumption (Figure 20). On this basis, SA2.5.2a is met, therefore it is considered that the system has an 'available' HCR.

WCPFC have an agreed, legally binding framework in place to establish formal harvest strategies and management procedures for their main stocks, including WCPO bigeye (see CMM 2014-06 and associated workplans; Section 5.5.1.10). SA2.5.3b is therefore met. On this basis, a HCR can be considered to be 'available' for this stock and is expected to reduce the exploitation rates as the PRI is approached, **SG60 is met.**

Although the framework requires the development of an HCR if necessary, no pre-agreed rule has been presented that is well-defined nor has been set 'in place', therefore **SG80 is not met.**

| **b** | HCRs robustness to uncertainty | | | |
|---|---|---|---|---|
| | Guide post | | The HCRs are likely to be robust to the main uncertainties. | The HCRs take account of a wide range of uncertainties including the ecological role of the stock, and there is evidence that the HCRs are robust to the main uncertainties. |
| | Met? | | No | No |

**Rationale**

GSA2.5.2 on scoring uncertainty indicates the following: *In scoring issue (b), teams must assess how well the HCRs are likely to function when the unexpected happens in the future. The scoring guideposts reflect the degree of confidence there is in the HCR performance in relation to risks, caused by both known and unknown factors.*

An HCR is 'available' rather than pre-agreed, 'well defined' and 'in place'. The final nature of the HCR is not yet agreed so it is not yet possible to determine how much confidence we should have in its performance. The robust technical methodology that is being applied to the development of a HCR (MSE) provides confidence in the scientific aspects of HCR development, but the agreement of a HCR is a political as much as a scientific process, and this political element remains uncertain for the moment. **SG80 is not met.**

| **c** | HCRs evaluation | | | |
|---|---|---|---|---|
| | Guide post | There is some evidence that tools used or available to implement HCRs are appropriate and effective in controlling exploitation. | Available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the | Evidence clearly shows that the tools in use are effective in achieving the exploitation levels required under the HCRs. |

| | | | | |
|---|---|---|---|---|
| | | | HCRs. | |
| | Met? | Yes | No | No |

**Rationale**

The tools in place for management of WCPO bigeye are i) at regional level, CMM 2020-01 (and previous iterations), the provisions of which are described in detail in Section 5.5.1.10; and ii) at sub-regional level the PNA VDS (Section 5.5.1.11).

Under SA2.5.5, in order to conclude that 'available' HCRs are 'effective' (SG60), MSC requires evidence of i) the use of effective HCRs in other stocks or fisheries under the same management body; or ii) a formal agreement or framework with trigger levels which will require the development of a well-defined HCR. It also requires consideration of current exploitation rates in relation to biological reference points and the agreed trigger level (guidance for SA2.5.6: '*evidence that current F is equal to or less than $F_{MSY}$ should usually be taken as evidence that the HCR is effective*').

A formal framework is in place for the development of a harvest strategy for the stock (CMM 2014-06 and workplans; see Section 5.5.1.12). F is estimated to be below $F_{MSY}$ with ~90% probability. The criteria for 'available' tools at **SG60 are therefore met. SG80 is not met** because the HCR is not 'in place' but only 'available'.

References

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CMMs 2014-06, 2017-01, 2018-01, 2020-01

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

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

| Overall Performance Indicator score | |
|---|---|
| Condition number (if relevant) | |

## Scoring table 11. PI 1.2.3 – Information and monitoring: WCPO BET

| PI 1.2.3 | | Relevant information is collected to support the harvest strategy | | |
|---|---|---|---|---|
| Scoring Issue | | SG 60 | SG 80 | SG 100 |
| **a** | Range of information | | | |
| | Guide post | Some relevant information related to stock structure, stock productivity and fleet composition is available to support the harvest strategy. | Sufficient relevant information related to stock structure, stock productivity, fleet composition and other data are available to support the harvest strategy. | A comprehensive range of information (on stock structure, stock productivity, fleet composition, stock abundance, UoA removals and other information such as environmental information), including some that may not be directly related to the current harvest strategy, is available. |
| | Met? | Yes | Yes | Yes |

**Rationale**

The following information is available, and is used as part of the harvest strategy – notably to inform the stock assessment model:

1. Fishery-dependent information

Catch, effort and CPUE: It is a requirement for all CCM fisheries to provide catch and effort data to WCPFC/SPC, and unlike in the past, most key fleets now provide operational (logbook) rather than just aggregate data (SPC 2021c). Catch and effort data go back to 1952, although as expected, historical data are sparser and generally less reliable than more recent data. The logsheet data are raised to best estimates of total catch by SPC-OFP, to account for missing data. Purse seine catch is allocated to species via an agreed methodology ('Method 3'; recently revised) (Hampton and Williams, 2017). Longline CPUE data are analysed, standardised and used generate 'index fisheries' as described in Ducharme-Barth et al. (2020) and provide the key stock assessment input.

Length/weight-frequency data: Size-frequency data come from various port sampling programmes and some observer reports, and go back to the 1960s. These data are weighted in the stock assessment according to spatial representation, to account for differences in length-frequency by geographic region.

Fleet composition: Each CCM provides information to WCPFC annually on their active fleet, in their Part 1 reports.

2. Fishery-independent information

Size and age data: Age and growth has been a big issue for this assessment. The work done by CSIRO (Farley et al., 2017, 2018) is considered to be very detailed compared to what is available for most stocks. Concerns expressed by the SC that it did not include enough very large and very small fish are addressed by Project 81 and Project 92 (Farley et al., 2020).

Natural mortality: Estimating natural mortality is always a big problem. For bigeye (and other WCPO stocks), the methodology set out in (Hoyle and Nichol, 2008) is used to estimate M-at-length by sex, based on the levels of M which give the observed divergence in sex ratio after maturity. This M-at-length vector is then used to calculate a M-at-age vector using the growth curve, which is the input to the stock assessment model. The new growth information has therefore resulted in a new M vector. In addition, for the 2020 assessment the mean value of the vector was re-evaluated based on a meta-analysis (Vincent and Ducharme-Barth, 2020).

Environmental data: The Ocean Fisheries Programme of SPC undertaken environmental research as part of their ecosystem monitoring programme, focusing particularly on potential environmental drivers of tuna population dynamics.

3. Stock structure

The WCPO bigeye fishery is assessed and managed as a single stock in the WCPFC Convention Area, although there is strong evidence for mixing across the WCPFC/IATTC boundary, and potentially stock structure at smaller scales, which remains unresolved (Moore et al., 2018; see Section 5.5.2.1). Some work has been done to evaluate the usefulness of a combined management approach (McKechnie et al., 2015), which concluded that the approach of separate assessments in the WCPO and the EPO was appropriate for now. SC16 discussed the issue of stock structure and noted that a further pan-Pacific bigeye assessment might shed further light on the validity of existing assumptions about stock structure.

4. Information inferred from the stock assessment

A significant range of information relating to stock status comes as the output of the stock assessment (Ducharme-Barth et al., 2020), including estimates of spawner potential, recruitment, fishery impact etc.

5. Data gaps

Observer coverage (providing external verification of logbook data and information about discards) is low for the longline fishery. It is normally high for the purse seine fishery but in 2020 was limited by the Covid-19 pandemic, as was port sampling. It remains to be seen what impact this data gap will have in the future – at present we cannot judge. There is no external fishery-independent biomass indicator (such as a survey); which would be extremely difficult given the spatial scale of the stock and fishery (although a proposal is put forward in the stock assessment appendix). There remain significant data gaps for the large and diverse fisheries in Vietnam, Indonesia and the Philippines, although the data have improved in recent years.

Given the size and complexity of the fishery, the range and comprehensiveness of the data available is impressive and improving all the time. Data gaps that previously constrained stock assessments, notably age-and-growth data, have been filled. There remains bias and lack of precision in some of the datasets, particularly historical data; as well as uncertainty in others, but this is inevitable for any fishery.

Overall, the major work that has gone into developing a growth curve, which has been agreed by the WCPFC Scientific Committee to represent the best available scientific information and accepted as appropriate for the stock assessment and provision of scientific advice, has removed a major source of uncertainty. **SG60, SG80 and SG100 are met.**

| **b** | Monitoring | | | |
|---|---|---|---|---|
| | Guide post | Stock abundance and UoA removals are monitored and at least one indicator is available and monitored with sufficient frequency to support the harvest control rule. | Stock abundance and UoA removals are regularly monitored at a level of accuracy and coverage consistent with the harvest control rule, and one or more indicators are available and monitored with sufficient frequency to support the harvest control rule. | All information required by the harvest control rule is monitored with high frequency and a high degree of certainty, and there is a good understanding of inherent uncertainties in the information [data] and the robustness of assessment and management to this uncertainty. |
| | Met? | Yes | Yes | No |

**Rationale**

Fishery removals are monitored by individual CCMs via logsheets and port sampling, and are required to be submitted to the Commission annually, in the form of estimates of total catch plus catch and effort data broken down by gear and either aggregated (5° squares by month) or (preferably) at operational level (individual logsheet level). Despite some gaps in this dataset, coverage is good overall. This catch, effort and CPUE dataset is the key data set for the stock assessment. Other fisheries data which support management are size-frequency data (collected via port sampling and observer programmes) and tag returns. Biological data are also collected via research programmes (e.g. aging studies).

Formal stock assessments have taken place every few years (2011, 2014, 2017 updated 2018, 2020). In between formal stock assessments, SPC provide some information on trends in fishery indicators (total catch, nominal CPUE, catch at length and at weight, status quo projections), to guide management (e.g. SPC 2020b).

On this basis, **SG60 and SG80 are met,** because information is available to monitor stock abundance (CPUE abundance indices) and removals by fishery (operational or aggregated logbook data, port sampling data), at a level of consistency and accuracy which allows for good quality stock assessments (see 1.2.4 below). The stock assessment is able to provide a range of indicators (analysis of stock status in relation to different reference points).

Regarding SG100, it is certainly the case that the data available for assessment of this stock are excellent in relation to most other fisheries. However, SG100 is a high bar ('high frequency and high degree of certainty'), and it is also relevant that there is no HCR in place in this fishery. On the basis of precautionary and harmonised scoring, **SG100 is not met**.

| **c** | Comprehensiveness of information | | | |
|---|---|---|---|---|
| | Guide<br>post | | There is good information on all other fishery removals from the stock. | |
| | Met? | | Yes | |

**Rationale**

WCPFC and SPC work hard to quantify all sources of removals and include them in the stock assessment. Small-scale (but extensive) fisheries in Indonesia, the Philippines and Vietnam have in the past been a particular problem, and there has been ongoing work for quite a few years to quantify the catch (and where possible effort) from these fisheries. There has been gradual improvement in the data from Indonesia, the Philippines and Vietnam over the last decade or so. The most recent WCPFC/Indonesia workshop noted a considerable improvement in catch estimates from Indonesia in 2019 relative to previous years.

At the 2017 pre-assessment workshop (PAW), it was noted that there is some potential for under-reporting of bigeye catch, and the workshop (Pilling and Brouwer, 2017) requested SPC to include a one-off sensitivity with this potential IUU fish added to the catch history (details of how this was done are given in McKechnie et al. (2017a)). It did not have a significant effect on the conclusions of the assessment, which were a little more positive (see McKechnie et al., 2017b - Appendix, Table 11), and was not included in subsequent assessments.

A report by Pew Charitable Trusts (Pew, 2019) highlights uncertainties in the declaration of transshipments and provides evidence that points to the possibility of significant levels of undeclared transshipments from longline vessels. WCPFC estimates that ~34% of bigeye catch was transshipped in 2019 so for bigeye this is a significant issue. WCPFC is reviewing its transshipment CMM (2009-06) via a Transshipment Intersessional Working Group which first met at TCC15 (2019) but as of TCC17 (2021) does not appear to have made much progress (WCPFC-TCC17, 2021). The WCPFC Secretariat is also developing a Transshipment Analysis Tool which uses VMS data to detect potential high seas transshipment events by noting when two vessels were within 250m of each other for at least 4 hours. They note that this is so far very preliminary but hope that it will eventually be able to support validation of reported transshipment data (WCPFC, 2020).

Following peer review comments on another assessment, the CAB followed up the question of transshipment data with SPC (Dr Peter Williams, pers. comm.). In fact, WCPFC do not rely on transshipment data to quantify removals from the stock, since it is very challenging for transshipment observers to estimate quantities accurately. Instead, they rely on logbooks and reports from CCMs, and use VMS data to cross-check logbook data.

Thus, overall while there are some concerns around reporting of various types of data, these issues are being addressed by WCPFC and there is no evidence that they significantly compromise the robustness of the stock assessment (as per the sensitivity including IUU in the stock assessment). **SG80 is met.**

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

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

### Scoring table 12. PI 1.2.4 – Assessment of stock status: WCPO BET

| PI 1.2.4 | | There is an adequate assessment of the stock status | | |
|---|---|---|---|---|
| Scoring Issue | | SG 60 | SG 80 | SG 100 |
| **a** | Appropriateness of assessment to stock under consideration | | | |
| | Guide post | | The assessment is appropriate for the stock and for the harvest control rule. | The assessment takes into account the major features relevant to the biology of the species and the nature of the UoA. |

| | | | | |
|---|---|---|---|---|
| | Met? | | Yes | Yes |

**Rationale**

The assessment is conducted using an integrated assessment model Multifan-CL (MFCL) that is able to combine a range of datasets and to model several components, including (i) the dynamics of the fish population (growth, natural mortality, maturity and fecundity, recruitment); (ii) the fishery dynamics; (iii) the dynamics of tagged fish; (iv) the observation models for the data. The model partitions the population into 9 spatial regions and quarterly age-classes and defines fisheries to consist of relatively homogeneous fishing units that have selectivity and catchability characteristics that do not vary greatly over time and space. A new approach for the 2020 assessments is to combine longline data in each region into a standardised 'index fishery'. SPC have considerable experience in the development and application of MFCL. The assessment is considered appropriate for the stock, taking into account the major features relevant to the biology of the species and the nature of the UoA (more detail is given in Section 5.5.2.1). Although there is no HCR in place, the assessment is appropriate for the stock and for a potential rule as required by the framework in CMM 2014-06 and accounts for the major features of the species and the UoA, therefore **SG80 and SG100 are met**.

| **b** | Assessment approach | | | |
|---|---|---|---|---|
| | Guide post | The assessment estimates stock status relative to generic reference points appropriate to the species category. | The assessment estimates stock status relative to reference points that are appropriate to the stock and can be estimated. | |
| | Met? | Yes | Yes | |

**Rationale**

The stock assessment estimates stock status relative to a range of reference points, including SB and F reference points and depletion and MSY-based reference points; see Table 34 and PI 1.1.1. **SG60 and SG80 are met.**

| **c** | Uncertainty in the assessment | | | |
|---|---|---|---|---|
| | Guide post | The assessment identifies major sources of uncertainty. | The assessment takes uncertainty into account. | The assessment takes into account uncertainty and is evaluating stock status relative to reference points in a probabilistic way. |
| | Met? | Yes | Yes | Yes |

**Rationale**

The assessment is a sophisticated statistical assessment which allows input parameters to vary stochastically within parameters defined by the assessors. The key means by which uncertainty in terms of the input values themselves is taken into account is via defining sensitivity runs (described in Section 5.5.2.5). **SG60 and SG80 are met.**

The probability of the stock being above or below a given reference level, as quoted in PI 1.1.1, is evaluated based on a model grid which is defined across an agreed set of these sensitivities (e.g. as per Table 34). The probabilities quoted in 1.1.1 are based on the uncertainty grid, which normally would be defined by the SC – but in this case (lack of scope to debate the issues in a remote meeting) the grid defined by the stock assessment team was retained unchanged.

In practice, the uncertainty around these estimates is greater than these probabilities suggest, because they do not incorporate the uncertainty about which grid to choose (which is basically unquantifiable). It should be noted that this is no different to any other stock assessment. Probability is quantified to the extent possible; on this basis, **SG100 is met.**

| **d** | Evaluation of assessment | | | |
|---|---|---|---|---|
| | Guidepost | | | The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored. |
| | Met? | | | No |

**Rationale**

Alternative hypotheses in terms of model input parameter values or estimation methods, or model structure, are explored based on sensitivities, as described above (see Table 34). The transition from the 2017 to the 2020 diagnostic model is set out in the stock assessment report (Ducharme-Barth et al., 2020) and shows the new or changed inputs and how they have been carefully evaluated at each stage. Alternative hypotheses are also explored externally; for example, an alternative Pacific-wide stock structure is considered in McKechnie et al. (2015) (although the SC recommend revisiting this hypothesis, as is due to happen in 2021); the index fishery approach has been used here for the first time having been first tried in the most recent South Pacific albacore assessment. Opportunities for improving the input data (e.g. Peatman et al. (2019), Vincent and Ducharme-Barth (2020)) or developing new sources of input data (e.g. close-kin mark-recapture) are considered by SPC and/or the SC each year. In other words, alternative hypotheses and approaches are rigorously explored.

SC SC16, however, expressed concerns about how robust this assessment is: specifically they are concerned that it is over-parameterised, and they requested an external review of the assessment at the earliest opportunity. On this basis, it may not be robust – **SG100 not met.**

| | | | | |
|---|---|---|---|---|
| **e** | Peer review of assessment | | | |
| | Guide post | | The assessment of stock status is subject to peer review. | The assessment has been internally and externally peer reviewed. |
| | Met? | | Yes | No |

**Rationale**

The initial proposed approach from SPC is reviewed by external scientists in a pre-assessment workshop (Hamer and Pilling, 2020). The final assessment is then evaluated by the Scientific Committee who (in normal circumstances) make a decision on the composition of the uncertainty grid to be used for providing advice to the Commission. A previous bigeye assessment (2011) had a formal external review  (Ianelli et al., 2012). **SG80 is met**. Although there is some external review, SC16 expressed the review that it was not sufficient and a formal external review was required, so on this basis, **SG100 is not met.**

References

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Peatman, T., Fukofuka, S., Park, T., Williams, P., Hampton, J., & Smith, N. (2019). Better purse seine catch composition estimates: progress on the Project 60 work plan. Technical Report, WCPFC-SC15-2019/ST-WP-02, Pohnpei, Federated States of Micronesia.

Vincent, M., & Ducharme-Barth, N. (2020). Background analyses for the 2020 stock assessments of bigeye and yellow_n tuna in the western and central Pacific Ocean. Technical Report WCPFC-SC16-2020/SA-IP-06.

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

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

### Scoring table 13. PI 1.1.1 – Stock status: SP ALB

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

**Rationale**

The guidance in GSA2.2.3.1 states: *In the case where either $B_{MSY}$ or the PRI are analytically determined, those values should be used as the reference points for measuring stock status unless additional precaution is sought.* (…) *In the case where $B_{MSY}$ is analytically determined to be lower than 40%$B_0$ (as in some highly productive stocks), and there is no analytical determination of the PRI, the default PRI should be 20%$B_0$ unless $B_{MSY}$<27%$B_0$, in which case the default PRI should be 75%$B_{MSY}$.*

For this stock there is an estimate of the PRI, in the form of a Beverton-Holt curve fit to stock/recruit values from the diagnostic case stock assessment model, which estimates the PRI at ~~100,000 t adult biomass (Figure 39). The median estimate of $SB_{F=0}$ for the full uncertainty grid (not exactly comparable but the best we can do) is ~604,000 t and of $SB_{MSY}$ ~95,900 t, so this estimate of the PRI is roughly similar to both the limit reference point (20%$SB_{F=0}$) and $SB_{MSY}$.

Alternatively, since this estimate is not likely to be very robust (low penalty for deviation from the BH stock-recruit curve in the stock assessment model), we can use the proxies set out above. In the assessment, $SB_{MSY}$ is estimated at 15% of $SB_{F=0}$. Taking the proxy for the situation where $B_{MSY}$ is <27%$B_0$, this would set the PRI at 75% of $SB_{MSY}$, or 11.25% of $SB_{F=0}$.

In this case, for the models in the uncertainty grid, the minimum values of SB/SBF=0 are 25% / 26% for $SB_{latest}$ and 37% / 39% for $SB_{recent}$, depending on whether the full South Pacific or the WCPFC-CA are considered. Hence none of the models in the grid estimate SB at a level which is below the PRI, no matter how we choose to measure it. **SG 60, SG80 and SG100 are met.**

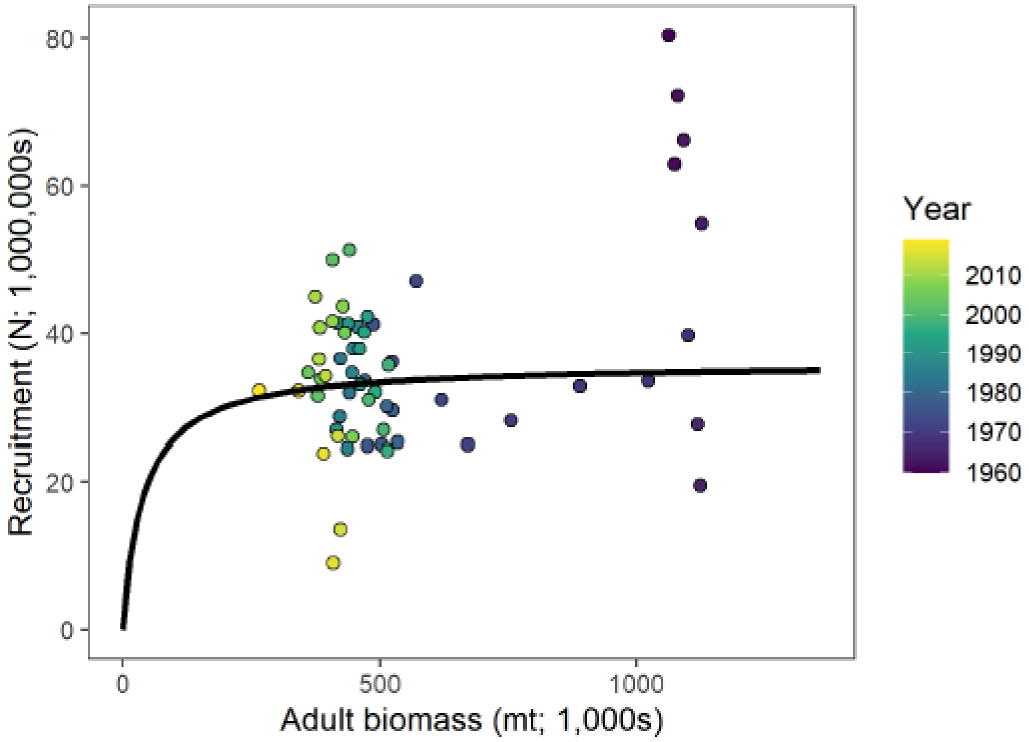

**Figure 39. Estimated relationship between recruitment and spawning potential (adult biomass) based on the diagnostic case stock assessment model (Figure 31 in Castillo-Jordan et al. 2021).**

| | | | | |
|---|---|---|---|---|
| **b** | Stock status in relation to achievement of Maximum Sustainable Yield (MSY) | | | |
| | Guide post | | The stock is at or fluctuating around a level consistent with MSY. | There is a **high degree of certainty** that the stock has been fluctuating around a level consistent with MSY or has been above this level over recent years. |
| | Met? | | Y | N |

**Rationale**

Zero out of 72 models in the structural uncertainty grid indicate that $SB<SB_{MSY}$ or $F>F_{MSY}$, noting that the estimate of $SB_{MSY}$ is quite low ($15\%SB_{F=0}$). **SG80 is met.** The projections suggest a rapid drop in SB, reaching a low point just above (S. Pacific) or around (WCPFC-CA) the $SB_{MSY}$ level in ~2021/22 before recovering slightly to fluctuate at a level between the two reference points (see Figure 27 and Figure 28).

Over recent years, there is a high degree of certainty that the stock has been above the MSY level, but there is not a high degree of certainty that it is above it now.**SG80 is met, but SG100 is not met.**

| References |
|---|

Castillo-Jordan, C., Hampton, J., Ducharme-Barth, N., Xu, H., Vidal, T., Williams, P., Scott, F., Pilling, G., & Hamper, P. (2021). Stock assessment of south Pacific albacore tuna (WCPFC-SC17-2021/SA-WP-02).

WCPFC-SC17. (2021). 17th Regular Session of the Scientific Committee: Electronic Meeting, 11-19 August 2021. Summary Report.

| Stock status relative to reference points | | | |
|---|---|---|---|
| | Type of reference point | Value of reference point | Current stock status relative to reference point<br>Taking median value for SBlatest, S. Pacific area: |
| Reference points used in scoring stock relative to PRI (SIa) | Estimate of PRI | ~100,000 t | $36\%SB_{F=0}$ = 217,000 t |
| | $75\%SB_{MSY}$ | $11.25\% SB_{F=0}$ | $36\%SB_{F=0}$ = 3.2 x ref. point |
| Reference point used in scoring stock relative to MSY (SIb) | $SB_{MSY}$ | $15\% SB_{F=0}$ | $36\%SB_{F=0}$ = 2.4 x ref. point |

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

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

**Scoring table 14. PI 1.1.2 – Stock rebuilding: SP ALB**

| PI 1.1.2 | | Where the stock is reduced, there is evidence of stock rebuilding within a specified timeframe | | |
|---|---|---|---|---|
| Scoring Issue | | SG 60 | SG 80 | SG 100 |
| **a** | Rebuilding timeframes | | | |
| | Guide post | A rebuilding timeframe is specified for the stock that is **the shorter of 20 years or 2 times its generation time**. For cases where 2 generations is less than 5 years, the rebuilding timeframe is up to 5 years. | | The shortest practicable rebuilding timeframe is specified which does not exceed **one generation time** for the stock. |
| | Met? | NA | | NA |

**Rationale**

Only scored when PI 1.1.1 scores <80.

| **b** | Rebuilding evaluation | | | |
|---|---|---|---|---|
| | Guide post | Monitoring is in place to determine whether the rebuilding strategies are effective in rebuilding the stock within the specified timeframe. | There is evidence that the rebuilding strategies are rebuilding stocks, **or it is likely** based on simulation modelling, exploitation rates or previous performance that they will be able to rebuild the stock within the specified timeframe. | There is **strong evidence** that the rebuilding strategies are rebuilding stocks, or it is **highly likely** based on simulation modelling, exploitation rates or previous performance that they will be able to rebuild the stock within the specified timeframe. |
| | Met? | NA | NA | NA |

**Rationale**

| References |
|---|

-

| | |
|---|---|
| Draft scoring range | NA |
| Information gap indicator | NA |

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

**Scoring table 15. PI 1.2.1 – Harvest strategy: SP ALB**

| PI 1.2.1 | | There is a robust and precautionary harvest strategy in place | | |
|---|---|---|---|---|
| Scoring Issue | | SG 60 | SG 80 | SG 100 |
| **a** | Harvest strategy design | | | |
| | Guide post | The harvest strategy is **expected** to achieve stock management objectives reflected in PI 1.1.1 SG80. | The harvest strategy is responsive to the state of the stock and the elements of the harvest strategy **work together** towards achieving stock management objectives reflected in PI 1.1.1 SG80. | The harvest strategy is responsive to the state of the stock and is **designed** to achieve stock management objectives reflected in PI 1.1.1 SG80. |
| | Met? | Y | N | N |

**Rationale**

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

Elements of a harvest strategy include the reference points used to set limits and targets, 'available' HCRs (1.2.2), data collection (P1 1.2.3), stock assessment (P1 1.2.4), and tools and monitoring for the implementation of management measures. Current management measures for South Pacific albacore are set out in CMM 2015-02 which requires that that CCMs do not increase the number of their vessels actively targeting SP albacore in the Convention area south of 20°S over 2005 or 2002-4 levels, and also includes data gathering and reporting requirements. Implementation of CMM 2015-02 is monitored via data gathering and Part 2 reports to the Commission.

CMM 2014-06 sets out the roadmap to establishing a harvest strategy for key stocks managed by WCPFC. Under CMM 2014-06 WCPFC have also agreed a workplan with indicative timeframes to adopt or refine harvest strategies for South Pacific albacore, which is reviewed annually. At WCPFC15 (December 2018), the Commission adopted an interim TRP for SP ALB with the objective of an 8% increase in longline CPUE (estimated by SPC to be achieved at 56%$SB_{F=0}$, and recently re-estimated at 68%$SB_{F=0}$; SPC2021d).

As with other tuna species, there have been delays and amendments to the CMM 2014-06 workplan. WCPFC16 (2019) agreed substantial changes to accommodate 'the need for additional work and time to explore and develop the details and practical implementation aspects of the multispecies framework covering all four tuna stocks' (WCPFC16, 2019). The workplan changes involve pushing back the adoption of a management procedure for SP albacore by one year to 2022 (because of a clash in 2021 with an updated albacore assessment that may also necessitate an update to the MSE operating model) (WCPFC16 (2019); Attachment H). The workplan was not adjusted further in 2020 (WCPFC17). Progress towards implementation of the harvest strategy is summarised in Section 5.5.3.6.

WCPFC16 also agreed to reinvigorate the SP ALB Roadmap Intersessional Working Group in 2020. The Group met virtually, most recently in July 2021, with the major agenda item being to examine progress on alternative catch pathways to achieve the interim TRP, and to consider revisions to CMM 2015-02 (Ravitu 2021). CMM 2015-02 is due for review at WCPFC18 but was not revised, although the Commission encouraged CPCs to take some interim measures. .

In relation to SG60, the stock assessment suggests that the stock is at or above the MSY level, and projections suggest that the current harvest strategy is likely to keep the stock above the LRP in the medium term (see Figure 27 and Figure 28). **SG60 is met**. In relation to SG80, the harvest strategy is required to be 'responsive to the state of the stock'. While some progress has been made (e.g. agreement of an interim TRP), the existing harvest strategy currently in place (i.e. CMM 2015-02) simply requires that effort is not increased above recent historical levels in a restricted area, and makes no reference to the agreed reference points nor to changes to be made according to the stock status. Furthermore, it has a range of problems (nothing north of 20°S, defining vessels 'actively targeting' SP albacore, exemption for SIDS), which makes its impact on the stock difficult to predict. It is not able to maintain the stock at the agreed target level, according to projections. On this basis, **SG80 is not met**.

| **b** | Harvest strategy evaluation |
|---|---|

| | | | | |
|---|---|---|---|---|
| | Guide post | The harvest strategy is **likely** to work based on prior experience or plausible argument. | The harvest strategy may not have been fully **tested** but evidence exists that it is achieving its objectives. | The performance of the harvest strategy has been **fully evaluated** and evidence exists to show that it is achieving its objectives including being clearly able to maintain stocks at target levels. |
| | Met? | Y | Y | N |

**Rationale**

Currently the stock is above the PRI with a high degree of certainty and F is and has always been below $F_{MSY}$, which MSC indicates should be taken as evidence that the harvest strategy is effective (GSA2.5.2-2.5.5). Therefore it appears that the harvest strategy is working and is achieving the objectives as per MSC PI 1.1.1 – although it is not achieving the stated objective of the harvest strategy (i.e. the interim target reference point), nor is it able to achieve the objective of a <20% probability of the stock falling below the limit reference point.

The performance of the harvest strategy has been evaluated using projections from the stock assessment, and it is not clear that it is able to maintain stocks at target levels. None of the status quo projections maintained the stock at the target level, and several of them resulted in the stock dipping down to around the MSY level and below $B_{LIM}$ in the short term.

**SG60 and SG80 are met but not SG100.**

| | | |
|---|---|---|
| **c** | Harvest strategy monitoring | |
| | Guide post | Monitoring is in place that is expected to determine whether the harvest strategy is working. |
| | Met? | Yes |

**Rationale**

All the major fisheries report both catch and effort data (operational or aggregated; mainly the former) to SPC. CCMs are required to report annual to WCPFC the details of their fisheries (Part 1 reports) and compliance with the CMMs (Part 2 reports). There is therefore monitoring in place, **sufficient to meet SG60**.

| | |
|---|---|
| **d** | Harvest strategy review |

| | | | | |
|---|---|---|---|---|
| | Guide post | | | The harvest strategy is periodically reviewed and improved as necessary. |
| | Met? | | | No |

**Rationale**

There is ongoing review of the elements of the current operational harvest strategy, however the harvest strategy for SP albacore has not been formalised and is not subject to a formal review process. **SG100 is not met**.

| | | | | |
|---|---|---|---|---|
| **e** | Shark finning | | | |
| | Guide post | It is **likely** that shark finning is not taking place. | It is **highly likely** that shark finning is not taking place. | There is a **high degree of certainty** that shark finning is not taking place. |
| | Met? | NA | NA | NA |

**Rationale**

Target species not a shark, N/A.

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

**Rationale**

While there is no evidence of unwanted catch from the client logbook data, there is evidence of discard rates equating to 13% for albacore tuna (undifferentiated) across the period 2018 to 2019 (Table 41). This seems to be mainly driven by greater discarding of albacore tuna in 2019, where high discards were observed in four out of the five observed trips undertaken in the northern hemisphere. In the absence of guidance from the MSC on what constitutes 'negligible', the team chose to take a precautionary approach and agreed to assess this scoring issue. Japanese regulations on discards state that discards must be reported in the Fishery Catch Report. Currently, we have no information on any review of unwanted catch, so cannot say whether **SG60 is met**.

References

Castillo-Jordan, C., Hampton, J., Ducharme-Barth, N., Xu, H., Vidal, T., Williams, P., Scott, F., Pilling, G., & Hamper, P. (2021). Stock assessment of south Pacific albacore tuna (WCPFC-SC17-2021/SA-WP-02).

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SPC. (2021). Recalibration of the target reference point for South Pacific albacore. WCPFC18-2021-17.

WCPFC15. (2018). 14th Regular Session of the Commission, Manila, Philippines, 3-7 December 2017: Summary Report, issued 16 March 2018.

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WCPFC17. (2020). Commission 17th Regular Session. Electronic Meeting 8 – 15 December 2020: Summary Report.

WCPFC-SC17. (2021). 17th Regular Session of the Scientific Committee: Electronic Meeting, 11-19 August 2021. Summary Report.

CMMs 2015-02 and 2014-06

https://meetings.wcpfc.int/meetings/wcpfc18 - see Agenda

| | |
|---|---|
| Draft scoring range | <60 |
| Information gap indicator | More information sought on discards of SP albacore |

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

**Scoring table 16. PI 1.2.2 – Harvest control rules and tools: SP ALB**

| PI 1.2.2 | | There are well defined and effective harvest control rules (HCRs) in place | | |
|---|---|---|---|---|
| Scoring Issue | | SG 60 | SG 80 | SG 100 |
| **a** | HCRs design and application | | | |
| | Guide post | **Generally understood** HCRs are in place or **available** that are **expected** to reduce the exploitation rate as the point of recruitment impairment (PRI) is approached. | **Well defined** HCRs are **in place that ensure** that the exploitation rate is reduced as the PRI is approached, are expected to keep the stock fluctuating around a target level consistent with (or above) MSY, or for key LTL species a level consistent with ecosystem needs. | The HCRs are expected to keep the stock **fluctuating at or above** a target level consistent with MSY, or another more appropriate level taking into account the ecological role of the stock, most of the time. |
| | Met? | Y | N | N |

**Rationale**

Under SA2.5.2 In scoring issue (a) at the SG60 level, teams shall accept ‘available’ HCRs (instead of HCRs that are ‘in place’) in cases where:

a. Stock biomass has not previously been reduced below the MSY level or has been maintained at that level for a recent period of time that is at least longer than 2 generation times of the species, and is not predicted to be reduced below $B_{MSY}$ within the next 5 years; or

b. In UoAs where $B_{MSY}$ estimates are not available, the stock has been maintained to date by the measures in use at levels that have not declined significantly over time, nor shown any evidence of recruitment impairment.

Under SA2.5.3 Teams shall recognise ‘available’ HCRs as ‘expected to reduce the exploitation rate as the point of recruitment impairment is approached’ only in cases where:

a. HCRs are effectively used in some other UoAs, that are under the control of the same management body and of a similar size and scale as the UoA; or

b. An agreement or framework is in place that requires the management body to adopt HCRs before the stock declines below $B_{MSY}$.

According to the most recent stock assessment (2021), SP albacore stock biomass has not previously been reduced below $SB_{MSY}$. Status quo projections based on constant effort and constant catch with the base case model suggest that the SB dip to a level around or above $SB_{MSY}$ before increasing to above this level.

WCPFC have an agreed, legally-binding framework in place to establish place formal harvest strategies and control rules for their main stocks, including SP albacore (CMM 2014-06; see Section 5.5.3.6). SA2.5.3b is therefore met. On this basis, a HCR can be considered to be 'available' for this stock**. SG60 is met**. Since a HCR is not 'in place' (CMM 2015-02 does not include a HCR), **SG80 is not met.**

| **b** | HCRs robustness to uncertainty | | | |
|---|---|---|---|---|
| | Guide post | | The HCRs are likely to be robust to the main uncertainties. | The HCRs take account of a **wide** range of uncertainties including the ecological role of the stock, and there is **evidence** that the HCRs are robust to the main uncertainties. |
| | Met? | | N | N |

**Rationale**

There is no formal HCR so it cannot be robust to the main uncertainties. **SG80 is not met.**

| **c** | HCRs evaluation | | | |
|---|---|---|---|---|
| | Guide post | There is **some evidence** that tools used or available to implement HCRs are appropriate and effective in controlling exploitation. | **Available evidence indicates** that the tools in use are appropriate and effective in achieving the exploitation levels required under the HCRs. | **Evidence clearly shows** that the tools in use are effective in achieving the exploitation levels required under the HCRs. |
| | Met? | Y | N | N |

**Rationale**

SA2.5.6 requires that as part of the evidence that tools are working, '*...teams should include current levels of exploitation in the UoA, as measured by fishing mortality rate where available*'. Associated guidance (GSA2.5.2-7) notes that current F being '*equal to or less than* $F_{MSY}$ *should be taken as evidence that the HCR is effective*.'

Under SA2.5.5, in order to conclude that 'available' HCRs are 'effective' (SG60), MSC requires evidence of i) the use of effective HCRs in other stocks or fisheries under the same management body; or ii) a formal agreement or framework with trigger levels which will require the development of a well-defined HCR. It also requires consideration of current exploitation rates in relation to biological reference points and the agreed trigger level (guidance for SA2.5.6: '*evidence that current F is equal to or less than* $F_{MSY}$ *should usually be taken as evidence that the HCR is effective*').

Taking this last point first, the recent median F is estimated by the 2021 stock assessment at 24% of $F_{MSY}$ (CIs 15-37%), and F is estimated to never have reached $F_{MSY}$. A formal agreement for the development of a well-defined HCR is provided by CMM 2014-06, with a framework provided by the harvest strategy workplan. A trigger level is provided by the agreed limit reference point (20%$SB_{F=0}$), which is above the stock assessment estimate of $SB_{MSY}$.

Overall, therefore, under the MSC requirements and guidance for 'available' HCRs, **SG60 is met. SG80 is not met** because the HCR itself is only 'available'.

References

Castillo-Jordan, C., Hampton, J., Ducharme-Barth, N., Xu, H., Vidal, T., Williams, P., Scott, F., Pilling, G., & Hamper, P. (2021). Stock assessment of south Pacific albacore tuna (WCPFC-SC17-2021/SA-WP-02).

WCPFC-SC17. (2021). 17th Regular Session of the Scientific Committee: Electronic Meeting, 11-19 August 2021. Summary Report.

CMM 2014-06, CMM 2015-02

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

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

### Scoring table 17. PI 1.2.3 – Information and monitoring: SP ALB

| PI 1.2.3 | Relevant information is collected to support the harvest strategy | | |
|---|---|---|---|
| Scoring Issue | SG 60 | SG 80 | SG 100 |
| **a** | Range of information | | |

| | | | | |
|---|---|---|---|---|
| | Guide post | **Some** relevant information related to stock structure, stock productivity and fleet composition is available to support the harvest strategy. | **Sufficient** relevant information related to stock structure, stock productivity, fleet composition and other data are available to support the harvest strategy. | A **comprehensive range** of information (on stock structure, stock productivity, fleet composition, stock abundance, UoA removals and other information such as environmental information), including some that may not be directly related to the current harvest strategy, is available. |
| | Met? | Y | Y | N |

**Rationale**

The information used by SPC to inform the stock assessment, projections etc. (and hence support the harvest strategy) is described in Section 5.5.3.4. It is extensive, including fishery-specific catch and effort data, size-frequency data from port sampling, and biological information from various research projects. The data have improved over time; for example, operational-level historical data are now available, allowing the definition of 'index fisheries'. **SG60 and SG80 are met**.

There are uncertainties around natural mortality and growth, with more information on age and growth highlighted as a priority research requirement. There is also little tagging data available for albacore (the inclusion of available tagging data in the assessment made no difference to the outcome), and uncertainty around movement was the most influential uncertainty for management advice. SC17 decided to downgrade the weighting one of the two movement hypotheses in the structural uncertainty grid but described the situation as 'unsatisfactory' (WCPFC-SC17 (2021) para. 135), with the need for more information in particular on connectivity across the S. Pacific between WCPFC and IATTC areas, now that the assessment covers both areas. The information cannot be considered 'comprehensive' so **SG100 is not met**.

| | | | | |
|---|---|---|---|---|
| **b** | Monitoring | | | |
| | Guide post | Stock abundance and UoA removals are monitored and **at least one indicator** is available and monitored with sufficient frequency to support the harvest control rule. | Stock abundance and UoA removals are **regularly monitored at a level of accuracy and coverage consistent with the harvest control rule, and one or more indicators** are available and monitored with sufficient frequency to support the harvest control rule. | **All information** required by the harvest control rule is monitored with high frequency and a high degree of certainty, and there is a good understanding of inherent uncertainties in the information [data] and the robustness of assessment and management to this uncertainty. |
| | Met? | Y | Y | N |

**Rationale**

Stock assessment is monitored by periodic stock assessments (most recently in 2021, previously in 2018). The stock assessment depend on fishery data, including from the UoA. Data are sufficient to define four 'index fisheries' incorporating several fleets and providing good spatial and temporal CPUE coverage for each region in the assessment model. These index fisheries are the main abundance indicators for the stock assessment; in turn the assessment results provide indicators (in the form of analysis of stock status in relation to various reference points, from the uncertainty grid) which inform management. **SG60 and SG80 are met.**

As noted in the background section (Section 5.5.3.6), SC17 noted a range of qualitative concerns with the quality of data and how it impacts on the stock assessment results, notably that CPUE do not show much contrast in recent years despite a 2-3 fold increase in catch, and also that hooks-between floats could not be incorporated into longline CPUE standardisation. In the discussion in SC17, Australia commented that the operational longline data (on which the index fisheries are based) are lacking the type of detailed information that would be useful for standardisation, and recommended a review of the minimum data requirements for provision of operational data. On this basis, parties seem to agree that there is not a high degree of certainty in the available data, and hence **SG100 is not met**.

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

**Rationale**

Albacore does not suffer from issues of poor catch and effort data from fisheries in Indonesia, the Philippines and Vietnam that plague the tropical tunas. However, a concern in the past has been that the IATTC area is not considered and catches in this area are not included. However, this has now been rectified by the 2021 stock assessment which covers the entire South Pacific, including all catch. **SG80 is met.**

References

Castillo-Jordan, C., Hampton, J., Ducharme-Barth, N., Xu, H., Vidal, T., Williams, P., Scott, F., Pilling, G., & Hamper, P. (2021). Stock assessment of south Pacific albacore tuna (WCPFC-SC17-2021/SA-WP-02).

WCPFC-SC17. (2021). 17th Regular Session of the Scientific Committee: Electronic Meeting, 11-19 August 2021. Summary Report.

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

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

## Scoring table 18. PI 1.2.4 – Assessment of stock status: SP ALB

| PI 1.2.4 | | There is an adequate assessment of the stock status | | |
|---|---|---|---|---|
| Scoring Issue | | SG 60 | SG 80 | SG 100 |
| **a** | Appropriateness of assessment to stock under consideration | | | |
| | Guide post | | The assessment is appropriate for the stock and for the harvest control rule. | The assessment takes into account the major features relevant to the biology of the species and the nature of the UoA. |
| | Met? | | Y | Y |

**Rationale**

The assessment is conducted using the integrated assessment model Multifan-CL which can integrate several sources of information and uses the available data in a raw form as appropriate in a single analysis. Multifan is able to take into account features of the fisheries (catchability, selectivity) and the biology of the stock (in a population model). The 2021 model partitions the population into 4 spatial regions and 48 quarterly age-classes. A structural uncertainty grid is used for developing management advice, where all possible combinations of the most important axes of uncertainty from the one-off models were included (with one downweighed by the Scientific Committee of WCPFC). The assessment is appropriate for the stock and the harvest strategy. **SG80 is met.**

The assessment takes into account many of the features relevant to albacore biology (e.g. externally-specified growth curve, analyses around natural mortality, sex ratio, movement between regions). It uses operational data from fisheries to develop 'index fisheries' which are based on standardised catch and effort data. Previous MSC assessments for this stock did not score 100 for this SI on the basis that the assessment does not cover what is presumed to be the full area of the stock, because the eastern South Pacific was not included – however this is no longer the case in the 2021 assessment which covers the entire S. Pacific. **SG100 is met.**

| | |
|---|---|
| **b** | Assessment approach |

| | | | |
|---|---|---|---|
| | Guide post | The assessment estimates stock status relative to generic reference points appropriate to the species category. | The assessment estimates stock status relative to reference points that are appropriate to the stock and can be estimated. |
| | Met? | Y | Y |

**Rationale**

An LRP and an interim TRP have been defined, with the TRP estimated in terms of SB directly from the stock assessment (based on an 8% increase in CPUE over the 2013 level) – this has recently been re-estimated from 56%$SB_{F=0}$ to 68%$SB_{F=0}$. The stock assessment model is able to estimate stock status relative to a suite of appropriate reference points. **SG60 and SG80 are met.**

| | | | | |
|---|---|---|---|---|
| **c** | Uncertainty in the assessment | | | |
| | Guide post | The assessment **identifies major sources** of uncertainty. | The assessment takes uncertainty into account. | The assessment takes into account uncertainty and is evaluating stock status relative to reference points in a **probabilistic** way. |
| | Met? | Y | Y | N |

**Rationale**

The stock assessment provides explicit commentary on the major sources of uncertainty within the model, has assessed the sensitivity of the assessment to these uncertainties, and has evaluated current and future stock status relative to these in a probabilistic way. The structural uncertainty grid, including 72 runs considered to represent the 'plausible range' of stock uncertainty, was used to estimate median values and confidence intervals. **SG60 and SG80 are met**.

Although stock status is evaluated in a probabilistic way, the SC17 report shows that there were a lot of concerns in the Scientific Committee around sources of uncertainty that were external to the model and therefore not included in this probabilistic analysis (this is always the case but the situation seems particularly concerning here). For example, they noted concerns around whether the index fisheries, as developed for the stock assessment, are robust as abundance indices (lack of contrast, and the failure of fixes such as splitting them or incorporating additional parameters into the standardisation). They decided to downweigh one of the movement hypotheses (because some of the results look implausible) but described this as 'unsatisfactory'. There are unexplained differences in some of the life history parameters used in the SP albacore vs NP albacore assessments, which increase SP albacore productivity relative to the NP stock. On this basis, it seems unlikely that the probabilistic representations of the bounds of uncertainty (CIs from the uncertainty grid) represent anything close to the true uncertainty in this assessment. **SG100 is not met**.

| | | | | |
|---|---|---|---|---|
| **d** | Evaluation of assessment | | | |
| | Guide post | | | The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored. |
| | Met? | | | No |

**Rationale**

The assessment is improved at each iteration, with the addition of new data (e.g. improved growth/mortality curves, addition of the eastern Pacific), refinements to data processing (e.g. CPUE standardisation methods, index fisheries) and different methods of generating hypotheses for model input (e.g. movement hypotheses). Each assessment provides a set of recommendations for research to improve the next one. Management advice is generated via a structural uncertainty grid which aims to incorporate the key sources of uncertainty. Alternative hypotheses and approaches have therefore been rigorously explored.

The concern is whether the assessment can be shown to be robust. As already noted, SC17 highlighted a number of concerns which could not be addressed in the assessment – such as the use of hooks between floats as a covariate in the CPUE standardisation (where the model did not converge), and whether the resulting standardised CPUE is adequate as an abundance indicator, given the strong evidence of increasing fishing pressure (they note that this is a 'significant concern for the reliability of estimates of population size'). They recommend exploring alternative methods of estimating population size, such as close-kin mark-recapture. They also express concern that the assessment model is over-parameterised.

Overall, we conclude that there are questions around the robustness of this assessment – **not met**.

| | | | | |
|---|---|---|---|---|
| **e** | Peer review of assessment | | | |
| | Guide post | | The assessment of stock status is subject to peer review. | The assessment has been **internally and externally** peer reviewed. |
| | Met? | | Y | N |

**Rationale**

Recent SPA assessments have not been formally externally peer reviewed, but are subject to considerable scrutiny by the Scientific Committee of WCPFC, as described above. **SG80 is met but SG100 is not met.**

| References |
|---|

Castillo-Jordan, C., Hampton, J., Ducharme-Barth, N., Xu, H., Vidal, T., Williams, P., Scott, F., Pilling, G., & Hamper, P. (2021). Stock assessment of south Pacific albacore tuna (WCPFC-SC17-2021/SA-WP-02).

SPC. (2021). Recalibration of the target reference point for South Pacific albacore. WCPFC18-2021-17.

WCPFC-SC17. (2021). 17th Regular Session of the Scientific Committee: Electronic Meeting, 11-19 August 2021. Summary Report.

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

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

**PI 1.1.1 – Stock status: NP ALB**

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

**Rationale**

In this context, ‘highly likely’ is defined by MSC as an 80% probability, and a ‘high degree of certainty’ as a 95% probability.

The guidance in GSA2.2.3.1 states: In the case where either $B_{MSY}$ or the PRI are analytically determined, those values should be used as the reference points for measuring stock status unless additional precaution is sought. ... In the case where $B_{MSY}$ is analytically determined to be lower than 40%B0 (as in some highly productive stocks), and there is no analytical determination of the PRI, the default PRI should be 20%B0 unless $B_{MSY}$<27%B0, in which case the default PRI should be 75%$B_{MSY}$.

In relation to the PRI, attempts have been made to estimate h directly, which could be considered an ‘analytical determination’ of the PRI. Estimates of h were in the range 0.84-0.95; the stock assessment assumes h=0.9 on this basis. This means that at 20%$SB_0$ (or 20%$SB_{F=0}$ – the LRP), mean recruitment would be reduced to 90% of the level at unfished biomass; a reduction that would most likely not be detectable. $B_{MSY}$ (see 1.1.1b below) is also analytically determined in the stock assessment. It is estimated to be below $B_{LIM}$ (15.2%$SB_{F=0}$; 76%Blim).

MSC provides no guidance around the point at which a proportional reduction in recruitment is considered to constitute ‘impaired’, so any such decision by the CAB is subjective, not analytic. On this basis, we take the proxy based on $B_{MSY}$to be the better option for scoring, following MSC’s guidance GSA2.2.3.1 stated above.

Since $B_{MSY}$ is analytically determined to be <27%B0, then following this guidance, scoring of 1.1.1a should be based on 75% $B_{MSY}$ as a proxy for the PRI - unless 'additional precaution is sought'. Albacore is known to be a highly productive stock so there is no particular reason for extra precaution. SIa is therefore scored based on 75%$B_{MSY}$=11.4%$B_{F=0}$ (57%Blim).

The most recent stock assessment by the Albacore Working Group of ISC was in 2020. The assessment estimated SB (base case model) to be ~2.3 times above the LRP (20%$SB_{F=0}$), which is equivalent to ~4 times above the PRI proxy (11.4%$SB_{F=0}$). Projections at constant fishing intensity from the base case model suggest a high degree of certainty that the SB will not fall below the LRP in 2020 and 2025 (Figure 34). Estimates of relative SB taking into account a wider range of uncertainties including the most significant one-off sensitivities (see Figure 32) show all point estimates of SB above the LRP, with 5% CIs not overlapping the LRP, and therefore not overlapping 75%$B_{MSY}$ (PRI proxy). This suggests a ‘high degree of certainty’ that the stock is above the PRI proxy. **SG60 SG80 and SG100 are met.**

| | | | | |
|---|---|---|---|---|
| **b** | Stock status in relation to achievement of Maximum Sustainable Yield (MSY) | | | |
| | Guide post | | The stock is at or fluctuating around a level consistent with MSY. | There is a **high degree of certainty** that the stock has been fluctuating around a level consistent with MSY or has been above this level over recent years. |
| | Met? | | Y | Y |

**Rationale**

The stock assessment estimates $SB_{MSY}$ to be 15.2%$SB_{F=0}$.

The Albacore Working Group sets out the results from three different model scenarios in the report: the base case and the two key one-off sensitivities; i.e. an alternative CV for Linf in the growth model, and the updated 2017 model. For the base case model, $SB_{2018}$ is estimated to be 46%$SB_{F=0}$, for the alternative growth model 33%$SB_{F=0}$ and for the 2017 model, 53%$SB_{F=0}$; i.e. all estimates are above the estimate of $B_{MSY}$.

On this basis, there is a high degree of certainty that SB is above a level consistent with MSY, as analytically determined by the stock assessment. **SG80 and SG100 are met.**

| References |
|---|
| ALBWG. (2020). Stock assessment of albacore tuna in the North Pacific Ocean in 2020. Report of the Albacore Working Group (ALBWG) to the 20th Meeting of the International Scientific Committee for Tuna and Tuna-Like Species in the North Pacific Ocean Held Virtually July 15-20, 2020. WCPFC-NC16-2020/IP-03ISC (July 2020). |

| Stock status relative to reference points | | | |
|---|---|---|---|
| | Type of reference point | Value of reference point | Current stock status relative to reference point |
| Reference point used in scoring stock relative to PRI (SIa) | PRI proxy | 75%$B_{MSY}$ which is 11.4%$SB_{F=0}$ | 4.1 x proxy PRI (base model); 2.9 x proxy PRI (alternative growth model); 4.65 x PRI proxy (2017 model) |
| Reference point used in scoring stock relative to MSY (SIb) | Depletion / MSY | $B_{MSY}$ which is 15.2% $SB_{F=0}$ | 3.0 $SB_{MSY}$ (base); 2.1 $SB_{MSY}$ (growth); 3.6 $SB_{MSY}$ (2017) |

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

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

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

**Scoring table 19. PI 1.1.2 – Stock rebuilding: SP ALB**

| PI 1.1.2 | Where the stock is reduced, there is evidence of stock rebuilding within a specified timeframe | | |
|---|---|---|---|
| Scoring Issue | SG 60 | SG 80 | SG 100 |

| **a** | Rebuilding timeframes | | | |
|---|---|---|---|---|
| | Guide post | A rebuilding timeframe is specified for the stock that is **the shorter of 20 years or 2 times its generation time**. For cases where 2 generations is less than 5 years, the rebuilding timeframe is up to 5 years. | | The shortest practicable rebuilding timeframe is specified which does not exceed **one generation time** for the stock. |
| | Met? | NA | | NA |

**Rationale**

Only scored when PI 1.1.1 scores <80.

| **b** | Rebuilding evaluation | | | |
|---|---|---|---|---|
| | Guide post | Monitoring is in place to determine whether the rebuilding strategies are effective in rebuilding the stock within the specified timeframe. | There is evidence that the rebuilding strategies are rebuilding stocks, **or it is likely** based on simulation modelling, exploitation rates or previous performance that they will be able to rebuild the stock within the specified timeframe. | There is **strong evidence** that the rebuilding strategies are rebuilding stocks, or it is **highly likely** based on simulation modelling, exploitation rates or previous performance that they will be able to rebuild the stock within the specified timeframe. |
| | Met? | NA | NA | NA |

**Rationale**

-

References

-

| | |
|---|---|
| Draft scoring range | NA |
| Information gap indicator | NA |

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

### PI 1.2.1 – Harvest strategy NP ALB

| PI 1.2.1 | | There is a robust and precautionary harvest strategy in place | | |
|---|---|---|---|---|
| Scoring Issue | | SG 60 | SG 80 | SG 100 |
| **a** | Harvest strategy design | | | |
| | Guide post | The harvest strategy is **expected** to achieve stock management objectives reflected in PI 1.1.1 SG80. | The harvest strategy is responsive to the state of the stock and the elements of the harvest strategy **work together** towards achieving stock management objectives reflected in PI 1.1.1 SG80. | The harvest strategy is responsive to the state of the stock and is **designed** to achieve stock management objectives reflected in PI 1.1.1 SG80. |
| | Met? | Y | Y | N |

**Rationale**

MSC defines a harvest strategy as '*the combination of monitoring, stock assessment, harvest control rules and management actions, which may include an MP or an MP (implicit) and be tested by MSE*' (MSC – MSCI Vocabulary v1.1).

The NP albacore harvest strategy is in two parts: i) the interim harvest strategy as proposed by the NC and accepted by WCPFC in 2017 and ii) CMM 2019-03 / Resolution C-05-02 (supplemented by C-13-03 and C-18-03).

The interim harvest strategy includes a decision rule which only applies to stock rebuilding, and does not specify any tools. It can therefore be considered more of a statement of intent than a genuinely useful method for stock management (it is called 'interim' and work towards a full harvest strategy is ongoing). On this basis, it is more pertinent here to score this PI against the harvest strategy set out in CMM 2019-03 / C-05-02.

Both have essentially the same management objective, which is to maintain the stock at 'current' levels ('current' being a different time period depending on the document; i.e. 2018 (presumably) for CMM 2019-03, 2015 for the interim harvest strategy and 2002-4 for 2005-03/C-05-02, but in all cases this results in similar levels of SB and F. This level is perceived to have a low risk of the biomass declining below the LRP (see Figure 33 and Figure 34).

The elements of the NP albacore harvest strategy are the following:

- Limit reference point (20%$SB_{F=0}$)
- Management target: status quo; avoiding LRP with high probability
- Data collection on the stock and fishery (considered in detail in PI 1.2.3 below)
- Stock assessment process (considered in detail in PI 1.2.4 below)
- 'Available' HCR (see 1.2.2); so far management tools have not been required to achieve management objectives
- Monitoring of implementation of CMM 2019-03/C-05-02 via data gathering and reporting to WCPFC / IATTC.

This management strategy is reviewed annually during the Northern Committee meeting. NC15 (2019) reviewed CMM 2005-03 in detail and made recommendations to WCPFC as to the changes required in CMM 2019-03. Since then it has not been reviewed in detail by the NC.

Japan takes more than half the catch of NP albacore, so the Japanese harvest strategy is also relevant. The Japanese harvest strategy (by which means it implements 2005-03 (and successor) /C-05-02) is to ensure that fishing capacity for NP albacore does not increase. Licences are re-attributed every five years, to a limit in total licences and fishing capacity. In practice, demand for licences has declined over the last 15 years, meaning that this limit has not been a problem to enforce.

On this basis, the harvest strategy is clearly expected to achieve stock management objectives; **SG60 is met.**

SG80 requires that the harvest strategy be responsive to the status of the stock. The stock status has varied very little over the stock assessment time series making this difficult to judge (no response has been required). The conclusions of the MSC harmonisation workshop in 2016 in relation to this PI were that since there is a regular review of 2005-03 (now 2019-03) / C-05-02 by the Northern Committee in relation to the most recent stock assessment and status quo projections, the framework is available to respond to the stock status, and the various elements of the harvest strategy (i.e. monitoring, stock assessment, management targets) work together to ensure that this happens. **On this basis, it was agreed that SG80 is met in relation to the regional harvest strategy.** Since the harvest strategy has not changed in its essentials since then, this analysis still applies.

The harvest strategy is not designed to achieve stock management objectives, in as much as the stock management objectives themselves are rather ad hoc. A MSE has been completed, but has not yet been applied to the design of the harvest strategy. **SG100 is not met.**

| **b** | Harvest strategy evaluation | | | |
|---|---|---|---|---|
| | Guide post | The harvest strategy is **likely** to work based on prior experience or plausible argument. | The harvest strategy may not have been fully **tested** but evidence exists that it is achieving its objectives. | The performance of the harvest strategy has been **fully evaluated** and evidence exists to show that it is achieving its objectives including being clearly able to maintain stocks at target levels. |
| | Met? | Y | Y | N |

**Rationale**

Fishing mortality is below $F_{MSY}$ and the stock is above $SB_{MSY}$ and the stock is highly likely to be above the PRI and the limit reference point, so **SG60 and SG80 are met**. The harvest strategy is informal (or interim) and has not been fully evaluated. A MSE has been conducted but is focused on designing a new harvest strategy rather than evaluating the existing one. **SG100 is not met.**

| **c** | Harvest strategy monitoring | |
|---|---|---|
| | Guide post | Monitoring is in place that is expected to determine whether the harvest strategy is working. |
| | Met? | Yes |

**Rationale**

Catch and effort is reported for all fleets exploiting NP albacore. In particular ISC member countries (Canada, China, Chinese Taipei, Japan, Korea, and USA; representing almost all the NP albacore fishery) are required to report annually as follows: Category I: total annual catch by species and total annual effort (active vessels by fishery); Category II: operational catch-effort (summary of logbook data); and Category III: biological data, (size composition, length or weight frequencies, sex information). ISC provides data to IATTC and WCPFC (through SPC) on an annual basis. All NP albacore catch and size composition data from ISC member countries as well as non-member countries were compiled for the stock assessment. Seven relative abundance indices (standardised catch-per-unit-effort) were available from Japan, USA and Taiwan. Monitoring is in place that is expected to determine whether the harvest strategy is working; **SG60 is met**.

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

**Rationale**

Although a MSE has been completed as part of work to put in place a new harvest strategy, the existing harvest strategy for north Pacific albacore tuna is interim and is not really applied in any practical way. However, the overall implicit harvest strategy (i.e. 2019-03 and C-05-02) is reviewed and improved as necessary, since both IATTC and WCPFC review the advice of their scientific bodies and their management measures during their annual meetings. WCPFC updated the NP albacore CMM in 2019 (2005-03 to 2019-03), and NC15 reviewed and approved a draft of CMM 2019-03 and proposed modest changes regarding reporting to better align IATTC and WCPFC requirements. **SG100 is met.**

| | | | | |
|---|---|---|---|---|
| **e** | Shark finning | | | |
| | Guide post | It is **likely** that shark finning is not taking place. | It is **highly likely** that shark finning is not taking place. | There is a **high degree of certainty** that shark finning is not taking place. |
| | Met? | NA | NA | NA |

**Rationale**

Target species is not a shark.

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

| | | | | |
|---|---|---|---|---|
| | Met? | N | N | N |

**Rationale**

While there is no evidence of unwanted catch from the client logbook data, there is evidence of discard rates equating to 13% for albacore tuna (undifferentiated) across the period 2018 to 2019 (Table 41). This seems to be mainly driven by greater discarding of albacore tuna in 2019, where high discards were observed in four out of the five observed trips undertaken in the northern hemisphere. In the absence of guidance from the MSC on what constitutes 'negligible', the team chose to take a precautionary approach and agreed to assess this scoring issue. Japanese regulations on discards state that discards must be reported in the Fishery Catch Report. Currently, we have no information on any review of unwanted catch, **so cannot say whether SG60 is met.**

References

ALBWG. (2020). Stock assessment of albacore tuna in the North Pacific Ocean in 2020. Report of the Albacore Working Group (ALBWG) to the 20th Meeting of the International Scientific Committee for Tuna and Tuna-Like Species in the North Pacific Ocean Held Virtually July 15-20, 2020. WCPFC-NC16-2020/IP-03ISC (July 2020).

WCPFC. (2017). Conservation and Management Measure on Marine Pollution. CMM 2017-04. Western and Central Pacific Fisheries Commission (WCPFC).

WCPFC15. (2018). 14th Regular Session of the Commission, Manila, Philippines, 3-7 December 2017: Summary Report, issued 16 March 2018.

WCPFC16. (2019). Outcomes document for WCPFC16. WCPFC Circular No. 2019/81.

WCPFC-NC13. (2017). 13th Regular Session of the Northern Committee, Busan, Republic of Korea, 21 August-1 September 2017: Summary Report.

WCPFC-NC15. (2019). Summary Report: Northern Committee, 15th regular session, Portland, Oregon, USA, 3-6 September 2019.

WCPFC CMMs 2005-03, 2019-03; IATTC Resolution C-05-02

| | |
|---|---|
| Draft scoring range | <60 |
| Information gap indicator | More information sought on unwanted catch and review of measures to reduce it |

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

### PI 1.2.2 – Harvest control rules and tools NP ALB

| PI 1.2.2 | | There are well defined and effective harvest control rules (HCRs) in place | | |
|---|---|---|---|---|
| Scoring Issue | | SG 60 | SG 80 | SG 100 |
| **a** | HCRs design and application | | | |
| | Guide post | **Generally understood** HCRs are in place or **available** that are **expected** to reduce the exploitation rate as the point of recruitment impairment (PRI) is approached. | **Well defined** HCRs are **in place that ensure** that the exploitation rate is reduced as the PRI is approached, are expected to keep the stock fluctuating around a target level consistent with (or above) MSY, or for key LTL species a level consistent with ecosystem needs. | The HCRs are expected to keep the stock **fluctuating at or above** a target level consistent with MSY, or another more appropriate level taking into account the ecological role of the stock, most of the time. |
| | Met? | Y | N | N |

**Rationale**

Under SA2.5.2 In scoring issue (a) at the SG60 level, teams shall accept ‘available’ HCRs (instead of HCRs that are ‘in place’) in cases where:

a. Stock biomass has not previously been reduced below the MSY level or has been maintained at that level for a recent period of time that is at least longer than 2 generation times of the species, and is not predicted to be reduced below $B_{MSY}$ within the next 5 years; or

b. In UoAs where $B_{MSY}$ estimates are not available, the stock has been maintained to date by the measures in use at levels that have not declined significantly over time, nor shown any evidence of recruitment impairment.

Under SA2.5.3 Teams shall recognise ‘available’ HCRs as ‘expected to reduce the exploitation rate as the point of recruitment impairment is approached’ only in cases where:

a. HCRs are effectively used in some other UoAs, that are under the control of the same management body and of a similar size and scale as the UoA; or

b. An agreement or framework is in place that requires the management body to adopt HCRs before the stock declines below $B_{MSY}$.

According to the most recent stock assessment (2020), NP albacore stock biomass has not previously been reduced below the LRP, nor below $SB_{MSY}$ as estimated by the stock assessment (which is below the LRP). Status quo projections based on constant effort and constant catch with the base case model suggest that the SB will be maintained above the LRP with high probability.

WCPFC have an agreed, legally-binding framework in place to establish place formal harvest strategies and control rules for their main stocks, including NP albacore (CMM 2014-06; see Section 5.5.4.5). SA2.5.3b is therefore met. On this basis, a HCR can be considered to be 'available' for this stock. **SG60 is met.** Since a HCR is not 'in place' (neither CMM 2019-03 nor C-05-02 nor the interim harvest strategy include a HCR), **SG80 is not met**.

| **b** | HCRs robustness to uncertainty | | | |
|---|---|---|---|---|
| | Guide post | | The HCRs are likely to be robust to the main uncertainties. | The HCRs take account of a **wide** range of uncertainties including the ecological role of the stock, and there is **evidence** that the HCRs are robust to the main uncertainties. |
| | Met? | | N | N |

**Rationale**

The ISC's Albacore Working Group has developed a MSE for NP albacore, but no decision have yet been taken on which HCR to select. For now, the HCR is only 'available' so **SG80 is not met.**

| **c** | HCRs evaluation | | | |
|---|---|---|---|---|
| | Guide post | There is **some evidence** that tools used or available to implement HCRs are appropriate and effective in controlling exploitation. | **Available evidence indicates** that the tools in use are appropriate and effective in achieving the exploitation levels required under the HCRs. | **Evidence clearly shows** that the tools in use are effective in achieving the exploitation levels required under the HCRs. |
| | Met? | Y | N | N |

**Rationale**

SA2.5.6 requires that as part of the evidence that tools are working, '...*teams should include current levels of exploitation in the UoA, as measured by fishing mortality rate where available*'. Associated guidance (GSA2.5.2-7) notes that current F being '*equal to or less than* $F_{MSY}$ *should be taken as evidence that the HCR is effective*.'

Under SA2.5.5, in order to conclude that ‘available’ HCRs are ‘effective’ (SG60), MSC requires evidence of i) the use of effective HCRs in other stocks or fisheries under the same management body; or ii) a formal agreement or framework with trigger levels which will require the development of a well-defined HCR. It also requires consideration of current exploitation rates in relation to biological reference points and the agreed trigger level (guidance for SA2.5.6: ‘*evidence that current F is equal to or less than* $F_{MSY}$ *should usually be taken as evidence that the HCR is effective*’).

Taking this last point first, the base case model in the 2020 stock assessment estimates $F/F_{MSY}$ as 0.60 (0.77 and 0.52 for the key sensitivities), and F is estimated to never have reached $F_{MSY}$. A formal agreement for the development of a well-defined HCR is provided by CMM 2014-06, with a framework provided by the Northern Committee workplan. A trigger level is provided by the agreed limit reference point (20%$SB_{F=0}$), as formalised in the interim harvest strategy. Projections suggest that the management objective (status quo effort) is appropriate and is being met.

Overall, therefore, under the MSC requirements and guidance for ‘available’ HCRs, **SG60 is met**. **SG80 is not met** because the HCR itself is only ‘available’.

References

ALBWG. (2020). Stock assessment of albacore tuna in the North Pacific Ocean in 2020. Report of the Albacore Working Group (ALBWG) to the 20th Meeting of the International Scientific Committee for Tuna and Tuna-Like Species in the North Pacific Ocean Held Virtually July 15-20, 2020. WCPFC-NC16-2020/IP-03ISC (July 2020).

WCPFC-NC15. (2019). Summary Report: Northern Committee, 15th regular session, Portland, Oregon, USA, 3-6 September 2019.

WCPFC CMMs 2005-03, 2019-03, 2014-06; IATTC Resolution C-05-02

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

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

## PI 1.2.3 – Information and monitoring NP ALB

| PI 1.2.3 | | Relevant information is collected to support the harvest strategy | | |
|---|---|---|---|---|
| Scoring Issue | | SG 60 | SG 80 | SG 100 |
| **a** | Range of information | | | |
| | Guide post | **Some** relevant information related to stock structure, stock productivity and fleet composition is available to support the harvest strategy. | **Sufficient** relevant information related to stock structure, stock productivity, fleet composition and other data are available to support the harvest strategy. | A **comprehensive range** of information (on stock structure, stock productivity, fleet composition, stock abundance, UoA removals and other information such as environmental information), including some that may not be directly related to the current harvest strategy, is available. |
| | Met? | Y | Y | Y |

**Rationale**

The NP albacore stock was monitored through the assessment work of the North Pacific Albacore Workshop from 1975-2004. Since 2004 this function has been assumed by the ISC Albacore Working Group. The ALBWG coordinates biological research needs and disseminates research results and statistics to cooperating scientists and the management bodies.

Stock structure: The spatial distribution and seasonal migration patterns of NP albacore is fairly well understood, as is the stock structure (see Section 5.5.4.3). The hypothesis of two discreet stocks in the Pacific is well supported by genetic data, fishery data, tagging data and ecological data.

Stock productivity: There is sufficient knowledge of the life-history parameters for NP albacore to conduct robust assessments and develop appropriate biological reference points. Biological samples are routinely collected on an annual basis from a range of albacore fisheries in the Pacific (in particular from Japan and the USA). Reliable data are available to estimate sex-specific growth rates, maturity ogive and fecundity. Length-weight relationships are established by the ALBWG to convert population numbers to biomass. In the 2017 and 2020 stock assessments, natural mortality was defined as an age-specific M schedule, estimated based on several analyses.

Fleet composition: Detailed fleet information for NP albacore tuna fisheries is available to IATTC and WCPFC (e.g. see WCPFC Tuna Fishery Yearbook). Information on fishing areas and catch size composition (for fleet selectivity) are available to allow fishing effort to be allocated to 'fisheries' within SS3.

Stock abundance: 7 abundance indices were available to ALBWG for the 2020 stock assessment, although only one was finally fit in the base case model (another was used in a sensitivity analysis).

Fishery removals: Catch and effort is reported for all fleets exploiting north Pacific albacore. In particular ISC member countries (Canada, China, Chinese Taipei, Japan, Korea, and USA; representing most of the NP albacore fishery) are required to report annually as follows: Category I: total annual catch by species and total annual effort (active vessels by fishery); Category II: operational catch-effort (summary of logbook data); and Category III: biological data, (size composition, length or weight frequencies, sex information). ISC provides data to IATTC and WCPFC (through SPC) on an annual basis. All north Pacific albacore catch and size composition data from ISC member countries as well as non-member countries were compiled for the stock assessment.

Other data: As reported above (under 'stock structure') there has been work on albacore ecology, e.g. using archival tagging to evaluate habitat and environmental influences, larval data to infer spawner areas etc.

This comprises a comprehensive range of information; **SG60, SG80, and SG100 are met.**

| **b** | Monitoring | | | |
|---|---|---|---|---|
| | Guide post | Stock abundance and UoA removals are monitored and **at least one indicator** is available and monitored with sufficient frequency to support the harvest control rule. | Stock abundance and UoA removals are **regularly monitored at a level of accuracy and coverage consistent with the harvest control rule, and one or more indicators** are available and monitored with sufficient frequency to support the harvest control rule. | **All information** required by the harvest control rule is monitored with high frequency and a high degree of certainty, and there is a good understanding of inherent uncertainties in the information [data] and the robustness of assessment and management to this uncertainty. |
| | Met? | Y | Y | N |

**Rationale**

Standardised abundance indices (as described above) are regularly monitored by the ALBWG at each stock assessment. Systems are in place for recording catch and effort for all fishing entities fishing on north Pacific albacore, as described above. UoA removals are monitored through logbooks and port sampling. **SG60 and SG80 are met**. Because there remain some sources of uncertainty (e.g. lack of sex-specific size data, with the growth model a major source of uncertainty in the stock assessment), the fishery does **not meet SG100.**

| **c** | Comprehensiveness of information |
|---|---|

| | | | |
|---|---|---|---|
| | Guide post | | There is good information on all other fishery removals from the stock. |
| | Met? | | Yes |

**Rationale**

There is adequate information on all commercial fishery removals from the stock. Other fishery removals such as recreational fishery by the US are reported in the catch tables in the annual ISC Plenary report. **SG80 is met.**

References

ALBWG. (2020). Stock assessment of albacore tuna in the North Pacific Ocean in 2020. Report of the Albacore Working Group (ALBWG) to the 20th Meeting of the International Scientific Committee for Tuna and Tuna-Like Species in the North Pacific Ocean Held Virtually July 15-20, 2020. WCPFC-NC16-2020/IP-03ISC (July 2020).

ALBWG. (2021). Report of the North Pacific Albacore Tuna Management Strategy Evaluation. WCPFC-SC17-2021/MI-IP-08.

ISC. (2021). Report of the 21st meeting of the International Scientific Committee for tuna and tuna-like species in the North Pacific Ocean. Plenary Session, 12-15 and 19 July.

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

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

### PI 1.2.4 – Assessment of stock status NP ALB

| | |
|---|---|
| PI 1.2.4 | There is an adequate assessment of the stock status |

| Scoring Issue | | SG 60 | SG 80 | SG 100 |
|---|---|---|---|---|
| **a** | Appropriateness of assessment to stock under consideration | | | |
| | Guide post | | The assessment is appropriate for the stock and for the harvest control rule. | The assessment takes into account the major features relevant to the biology of the species and the nature of the UoA. |
| | Met? | | Y | Y |

**Rationale**

The assessment for albacore tuna is carried out with the Stock synthesis (SS) model developed by Richard Methot of the US National Marine Fisheries Service. SS is a statistical age-structured population modelling framework that has been applied in a wide variety of fish assessments globally. The method has generally been accepted as rigorous. The 2020 stock assessment model (ALBWG 2020) is a sex-specific, age-structured, fully integrated, statistical model.

The base-case model represents the collective conclusion of the ALBWG as to the most plausible set of hypotheses. The specification of the base case model for north Pacific albacore followed several steps. First, the spatial and temporal extent of fisheries in the assessment was defined based on analyses of the biology and historical fishing operations of albacore fisheries. Second, the data sources and inputs for these fisheries in the model, including total catch, indices of relative abundance, and size compositions were identified, collated and reviewed for completeness, trends, and outliers or unusual behaviour. Third, important biological parameters (e.g., growth, stock-recruitment relationship) were obtained from previous studies after review by the ALBWG and included in the model as fixed parameters, or estimated within the assessment model. Sensitivity analyses were conducted to evaluate impact on model results from changes in data series, life history parameter assumptions (growth, natural mortality), selectivity parameters, and alternative weightings of composition data.

Since this model and process takes into account the biology of the species as well as the nature of the fisheries, in a detailed way in both cases, **SG80 and SG100 are met.**

| | | | | |
|---|---|---|---|---|
| **b** | Assessment approach | | | |
| | Guide post | The assessment estimates stock status relative to generic reference points appropriate to the species category. | The assessment estimates stock status relative to reference points that are appropriate to the stock and can be estimated. | |
| | Met? | Y | Y | |

**Rationale**

The 2020 assessment estimates NP albacore stock status relative to a range of reference points: see Figure 32. **SG60 and SG80 are met.**

| **c** | Uncertainty in the assessment | | | |
|---|---|---|---|---|
| | Guide post | The assessment **identifies major sources** of uncertainty. | The assessment takes uncertainty into account. | The assessment takes into account uncertainty and is evaluating stock status relative to reference points in a **probabilistic** way. |
| | Met? | Y | Y | Y |

**Rationale**

The ALBWG used model diagnostics to assess issues with model convergence, model structure, parameter mis-specification and data conflicts. Diagnostic tools included model convergence tests, profiles of estimated recruitment at unfished equilibrium, residual analysis and retrospective analysis as well as the development of an age-structured population model from the base case model.

To explore uncertainty, the ALBWG conducted sensitivity analysis to evaluate changes in data series, growth curve parameters, natural mortality, stock recruitment steepness, selectivity parameters and weighting of size composition data among other things (see summary in Section 5.5.4.3). The trajectories of SB and 95% CIs in relation to the LRP show that the stock status is expressed in a probabilistic way in relation to reference points. In addition, stochastic future projections of the north Pacific albacore stock were made with probabilities expressed as CIs. The assessment takes into account uncertainty and is evaluating stock status relative to reference points in a probabilistic way. **SG60, SG80 and SG100 are met.**

| **d** | Evaluation of assessment | | | |
|---|---|---|---|---|
| | Guide post | | | The assessment has been tested and shown to be robust. Alternative hypotheses and assessment approaches have been rigorously explored. |
| | Met? | | | Yes |

**Rationale**

As noted above, the ALBWG conducted extensive sensitivity analyses to evaluate alternative assumptions on the assessment results. These included sensitivity to biological assumptions (growth, CV of $L_{inf}$, M, h) and sensitivity to data inputs (alternative CPUE indices, size composition weighting). Also, an age-structured production model (ASPM) diagnostic indicated that the ASPM had similar scale and production trends to the base case SS3 model.

Retrospective analyses were conducted to identify systemic inconsistencies in population estimates given increasing or decreasing data periods. They did not reveal any important pattern in the estimates of spawning biomass and fishing intensity (1-SPR) with the successive elimination of terminal year data. Thus, the assessment has been tested using a systematic exploration of the interactions among different sets of assumptions. This confirms that alternative hypothesis and assessment approaches have been rigorously explored. **SG100 is met**.

| **e** | Peer review of assessment | | | |
|---|---|---|---|---|
| | Guide post | | The assessment of stock status is subject to peer review. | The assessment has been **internally and externally** peer reviewed. |
| | Met? | | Y | Y |

**Rationale**

The albacore assessments are internally reviewed by the ALBWG. The results are reviewed by the ISC Plenary, the WCPFC Scientific Committee, and the staff of the IATTC. The ISC had three independent reviewers from the Center of Independent Experts (University of Miami) conduct reviews of the ALBWG 2011 albacore stock assessment (Chen et al. 2011a,b). **SG80 and SG100 are met.**

References

ALBWG. (2020). Stock assessment of albacore tuna in the North Pacific Ocean in 2020. Report of the Albacore Working Group (ALBWG) to the 20th Meeting of the International Scientific Committee for Tuna and Tuna-Like Species in the North Pacific Ocean Held Virtually July 15-20, 2020. WCPFC-NC16-2020/IP-03ISC (July 2020).

ALBWG. (2021). Report of the North Pacific Albacore Tuna Management Strategy Evaluation. WCPFC-SC17-2021/MI-IP-08.

Chen, D. G. (2011). . CIE Review Report for Albacore Tuna Assessment. ISC/12/PLENARY/INFO /14.

Chen, Y. (2011). CIE Independent Peer Review Report on Stock Assessment of albacore tuna, Thunnus alalunga, in the North Pacific Ocean. ISC/12/PLENARY/INFO /15.

ISC. (2020). Report of the 20th meeting of the International Scientific Committee for tuna and tuna-like species in the north Pacific Ocean. Plenary Session 15-20 July 2020 (virtual meeting). http://isc.fra.go.jp/reports/isc/isc20_reports.htm.

WCPFC-SC17. (2021). 17th Regular Session of the Scientific Committee: Electronic Meeting, 11-19 August 2021. Summary Report.

https://meetings.wcpfc.int/meetings/wcpfc18 - see Agenda and meeting documents

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

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

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

## 5.6 Principle 2

### 5.6.1 Designation of species under Principle 2

The Principle 2 analysis is based on three key sources of information: logbook, bait records and at-sea observer program datasets. The assessment team was provided logbook catch, effort (number of hooks set still to be provided), bait data and at-sea observer data reports from the client (Fukuichi Fishery Co., Ltd).

The fishery's impact of non-target species is analysed differently if the species is from a "managed" stock or not, or considered ETP. These are defined as follows:

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

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

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

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

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

- Species that are recognised by national ETP legislation
- Species listed in binding international agreements (e.g. CITES, Convention on Migratory Species (CMS), ACAP, etc.)
- Species classified as 'out-of scope' (amphibians, reptiles, birds and mammals) that are listed in the IUCN Redlist as vulnerable (VU), endangered (EN) or critically endangered (CE).

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

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

- Exceptions to the rule may apply in the case of exceptionally large catches of bycatch species

### 5.6.1.1 Logbook data

The logbook catch data for the entire UoA fleet between 2018 and 2020 are detailed in Table 40 and Table 41. Further information required from client on how the logsheets are collected, any electronic reporting etc. This includes a summary of the annual retained catch (and species composition) (Table 40) and the annual discarded catch and recorded interactions with endangered, threatened and protected (ETP) species (Table 41). Total retained catches averaged 2,100 tonnes (t) annually across the time period (2018-2020), with total retained catch highest in 2019 at 2,491 t. Total discarded catch and interactions with ETP averaged 8,048 individuals across the time period (2018-2020), with total discarded catch and interactions highest in 2019 at 11,538 individuals.

The logbook catch data does not always identify catch to a species taxonomic level. For example, teleost species in the “Others” category were not identified within the dataset and represent various taxa (as detailed in the accompanying table footnote). While logbook data are considered the most reliable source of data for non-discarded species, species identification issues, coupled with the fact that ultimately it is self-reported data (and may be underreported) meant that at-sea observer data (which are more accurate but less comprehensive), were utilised to classify species as “main” or “minor” under the MSC criteria.

**Table 40. Summary of annual retained catch (in tonnes and as % of total retained catch) recorded in logbooks by the UoA fleet between 2018 and 2020 (Source: Fukuichi Fishery Co., Ltd).**

| **Species** | **Scientific name** | **Annual catch (tonnes)** | | | **Annual species composition (% total)** | | |
|---|---|---|---|---|---|---|---|
| | | **2018** | **2019** | **2020** | **2018** | **2019** | **2020** |
| Bigeye tuna | *Thunnus obesus* | 506.89 | 530.21 | 489.75 | 27.42% | 21.28% | 23.68% |
| Yellowfin tuna | *Thunnus albacares* | 894.93 | 1422.58 | 1116.50 | 48.42% | 57.10% | 53.99% |
| Albacore tuna | *Thunnus alalunga* | 284.97 | 312.79 | 262.77 | 15.42% | 12.55% | 12.71% |
| Pacific bluefin tuna | *Thunnus orientalis* | 0.33 | 0.30 | 0.86 | 0.02% | 0.01% | 0.04% |
| Swordfish | *Xiphias gladius* | 17.79 | 29.11 | 20.20 | 0.96% | 1.17% | 0.98% |
| Striped marlin | *Kajikia audax* | 4.92 | 5.99 | 3.76 | 0.27% | 0.24% | 0.18% |
| Blue marlin | *Makaira mazara* | 75.02 | 111.86 | 109.87 | 4.06% | 4.49% | 5.31% |
| Black marlin | *Istiompax indica* | 13.27 | 9.59 | 9.46 | 0.72% | 0.38% | 0.46% |
| Indo-Pacific sailfish | *Istiophorus platypterus* | 12.09 | 26.04 | 15.06 | 0.65% | 1.05% | 0.73% |
| Shortbill spearfish | *Tetrapturus angustirostris* | 0.81 | 1.83 | 1.71 | 0.04% | 0.07% | 0.08% |
| Skipjack tuna | *Katsuwonus pelamis* | 3.35 | 7.85 | 9.91 | 0.18% | 0.32% | 0.48% |
| Butterfly kingfish | *Gasterochisma melampus* | 0.00 | 0.02 | 0.02 | 0.00% | 0.00% | 0.00% |
| Others | - | 34.00 | 33.27 | 28.22 | 1.84% | 1.34% | 1.36% |
| **Total** | **-** | **1,848.36** | **2,491.42** | **2,068.07** | **100%** | **100%** | **100%** |

**Table 41. Summary of annual discarded catch (in number of individuals) recorded in logbooks by the UoA fleet between 2018 and 2020 (Source: Fukuichi Fishery Co., Ltd).**

| **Species** | **Scientific name** | **2018** | **2019** | **2020** |
|---|---|---|---|---|
| Albacore tuna | *Thunnus alalunga* | 122 | 88 | 87 |
| Bigeye tuna | *Thunnus obesus* | 132 | 229 | 69 |
| Yellowfin tuna | *Thunnus albacares* | 924 | 1352 | 638 |
| Swordfish | *Xiphias gladius* | 2 | 52 | 0 |
| Striped marlin | *Kajikia audax* | 0 | 3 | 0 |
| Blue marlin | *Makaira mazara* | 5 | 36 | 11 |
| Black marlin | *Istiompax indica* | 0 | 9 | 0 |
| Indo-Pacific sailfish | *Istiophorus platypterus* | 3 | 23 | 0 |
| Skipjack tuna | *Katsuwonus pelamis* | 0 | 96 | 148 |
| Blue shark | *Prionace glauca* | 1,295 | 2,841 | 3,169 |
| Salmon shark | *Lamna ditropis* | 562 | 432 | 451 |
| Shortfin mako shark | *Isurus oxyrinchus* | 25 | 186 | 72 |
| Sandbar shark | *Carcharhinus plumbeus* | 1,295 | 2,541 | 698 |
| Oceanic whitetip shark | *Carcharhinus longimanus* | 425 | 162 | 190 |
| Silky shark | *Carcharhinus falciformis* | 496 | 2,934 | 1,017 |
| Thresher sharks | *Alopiidae spp.* | 145 | 122 | 231 |
| Bigeye thresher shark | *Alopias superciliosus* | 121 | 370 | 98 |
| Common thresher shark | *Alopias vulpinus* | 0 | 1 | 0 |
| Hammerhead sharks | *Sphyrnidae spp.* | 3 | 3 | 3 |
| Great hammerhead | *Sphyrna mokarran* | 0 | 2 | 0 |
| Sharks (mixed) | *Elasmobranchii* | 11 | 18 | 119 |
| Leatherback turtle | *Dermochelys coriacea* | 0 | 1 | 0 |
| Hawksbill turtle | *Eretmochelys imbricata* | 0 | 0 | 2 |
| Olive ridley sea turtle | *Lepidochelys olivacea* | 20 | 36 | 14 |
| Albatross (mixed) | *Diomedeidae spp.* | 1 | 0 | 0 |
| Petrels (mixed) | *Procellariidae spp.* | 0 | 1 | 0 |
| Unknown seabird | *Procellariiformes* | 1 | 0 | 0 |
| **Total** | | **5,588** | **11,538** | **7,017** |

#### 5.6.1.2 At-sea observer data

At-sea observer data was provided by the client from two vessels in the UoA fleet and an additional "sister" vessel that no longer exists (Makoto Suzuki, pers. comm. 2021) that were fishing in either the Papua New Guinea (PNG) EEZ or FAO Area 71. The "sister" vessel conducted three trips between October 2015 to January 2016, while the other two UoA vessels conducted six trips between July to December 2018 and five trips between July and December 2019 respectively. There was no observer data provided for 2020 due to the Covid-2019 pandemic.

Effort data (number of hooks) provided by the client for the 10 vessels in the UoAs indicated that they deployed an average of XXX million hooks annually between 2018 and 2019 with an average 3,400 hooks used per set (Table 42). Observer coverage (as a proportion number of hooks set to number observed) in both 2018 and 2019 represented a small fraction (<XX%) of the total hooks deployed in the UoA (Table X). In 2018 and 2019, observer coverage was XX% and XX% respectively (Table 42) While there is no binding level of observer coverage at the vessel level, there is a binding 5% observer coverage level set by the WCPFC for all longline operations in the western and central Pacific Ocean (WCPO) under CMM 2018-05. In 2018 and 2019, the Japanese longline fleet achieved national observer coverage levels of 6.9% and 11.4% respectively (based on number of observed fishing days) (WCPFC, 2021c; WCPFC SC, 2020).

**Table 42. Summary of observer coverage as a percentage of number of hooks observed in 2018 and 2019 Source: Fukuichi Fishery Co., Ltd).**

| Year | No of vessels observed | Total no. of hooks deployed by UoA fleet | Total no. of hooks observed | Observer coverage |
|---|---|---|---|---|
| 2018 | 1 | 3,888,430 | 329,992 | 8.49% |
| 2019 | 1 | 5,431,068 | 292.913 | 5.39% |

While at-sea observer data was provided for a "sister" vessel, which conducted three trips in 2015, the assessment team determined that it shouldn't be included in the analysis as it would be less representative of fishing operations in the UoA fleet than more recent (2018-2019) years. The average observer coverage in these two years was XX%, which approaches the observer coverage requirements of the WCPFC under CMM 2018-05. Therefore, in order to ensure the observer data are representative of the UoAs' longline operations and number of sets, data extrapolation and 'scaling up' to the logbook records was undertaken for the 2018 and 2019 data.

It is important to note that the at-sea observer data provided only recorded numbers and not weights of individuals, so the assessment team used the average weights of each of the species as provided in Peatman et al. (2018) as proxies, which was similarly employed by Gascoigne et al. (2021) for the Kiribati tuna longline MSC assessment. This was considered appropriate as the UoAs target similar species (tuna), uses a similar fishing method (deep setting >10 hooks between floats) and have operated in similar waters (tropical >=10°S and <10°N) to the data analysed in Peatman et al. (2018) , thus, species are assumed to be of similar weights. However, it should be noted that average weightings rely on there being a normal distribution of weights for the animals caught, but in reality, it is likely that larger-sized individuals will be targeted and therefore, an average-weight is not entirely accurate but was the best available option.

Once the numbers of individual species were converted to weights, the at-sea observer data for 2018 to 2019 (average) were scaled up to a fleet level based on the total landings of bigeye (BET), yellowfin (YFT) and albacore (ALB) tuna from the logbook data (i.e. the key target species) and the average percentage of BET, YFT and ALB recorded as retained (i.e. landed) which was 95% (Table 43)

The scaling equation is based on the catch method (percentage of observed retained catch) with the calculation methodology as follows:

**Step 1**. BET + YFT + ALB landings (Year) raised to total catch ($\text{BET+YFT+ALB}_{\text{total}}$):

$$BET + YFT + ALBtotal = \frac{logbook\ data\ (BET + YFT + ALB;\ 2018 + 2019)}{\%\ BET + YFT + ALB\ retained\ (95\%)}$$

**Step 2**. Scaling factor (SF):

$$SF = \frac{BET + YFT + ALBtotal}{observed\ catch\ (BET + YFT + ALB;\ 2018 + 2019)}$$

**Step 3**. The observer data for each species were then raised as follows:

$$Species_{total} = SF\ (14.12)\ x\ (average\ observed\ catch\ Species\ (2018; 2019))$$

For the purposes of this assessment, the new scaled average observer values were considered as the base norm for the period. Table 43 presents the average annual scaled up catch and accompanying species composition of the catch observed between 2018 and 2019.

The majority (75%) of the scaled up average catch comprised the three target species (yellowfin, bigeye and albacore tuna), with smaller recurring catches of blue shark (9%) blue marlin (5%) and swordfish (3%). The UoA fleet normally employ on average 18 hooks (~16-20 hooks) between floats indicative of deeper setting. According to Peatman et al. (2018)  the most common species found in deep-setting (> 10 hooks between floats) in tropical areas in descending order of prevalence are bigeye, yellowfin, escolars and wahoo. While the tunas made up the majority of the catch in the UoAs, escolar and wahoo only made up 0.59% and 0.75% of the scaled up average catch respectively.

**Table 43. Summary of at-sea observer catch data (retained and discarded) and scaled up average annual catch and composition of species taken by the UoA fleet (Source: Fukuichi Fishery Co., Ltd).**

| **Species** | | **Observed catch (tonnes)** | | **Average annual scaled up catch (tonnes)** | **Average % composition (based on scaled up volume)** | **Retained (%)** | **Discarded (%)** |
|---|---|---|---|---|---|---|---|
| **Common name** | **Scientific name** | **2018** | **2019** | | | | |
| Yellowfin tuna | *Thunnus albacares* | 122.62 | 39.63 | 1,145.52 | 41.31% | 93.71% | 6.29% |
| Bigeye tuna | *Thunnus obesus* | 16.11 | 103.88 | 847.13 | 30.55% | 96.69% | 3.31% |
| Blue shark | *Prionace glauca* | 1.26 | 33.80 | 247.52 | 8.93% | 0.00% | 100.00% |
| Blue marlin | *Makaira mazara* | 9.29 | 9.72 | 134.21 | 4.84% | 91.43% | 8.57% |
| Albacore tuna | *Thunnus. alalunga* | 10.77 | 1.57 | 87.16 | 3.14% | 87.13% | 12.87% |
| Swordfish | *Xiphias gladius* | 2.49 | 8.98 | 80.96 | 2.92% | 38.05% | 61.95% |
| Indo-Pacific sailfish | *Istiophorus platypterus* | 4.61 | 0.37 | 35.18 | 1.27% | 93.20% | 6.80% |
| Black marlin | *Istiompax indica* | 3.56 | 0.00 | 25.14 | 0.91% | 93.75% | 6.25% |
| Silky shark | *Carcharhinus falciformis* | 1.54 | 1.47 | 21.22 | 0.77% | 0.00% | 100.00% |
| Wahoo | *Acanthocybium solandri* | 1.99 | 0.96 | 20.83 | 0.75% | 95.47% | 4.53% |
| Escolar | *Lepidocybium flavobrunneum* | 1.78 | 0.54 | 16.36 | 0.59% | 0.00% | 100.00% |
| Southern sennet | *Sphyraena picudilla* | 1.43 | 0.52 | 13.74 | 0.50% | 0.00% | 100.00% |
| Opah | *Lampridae spp* | 0.90 | 0.71 | 11.34 | 0.41% | 98.08% | 1.92% |
| Longfin mako | *Isurus paucus* | 0.24 | 1.36 | 11.32 | 0.41% | 0.00% | 100.00% |
| Crocodile shark | *Pseudocarcharias kamoharai* | 0.02 | 1.28 | 9.20 | 0.33% | 0.00% | 100.00% |
| Devil and manta rays | *Mobula spp.* | 0.93 | 0.21 | 8.00 | 0.29% | 0.00% | 100.00% |
| Snake mackerel | *Gempylus serpens* | 0.91 | 0.14 | 7.40 | 0.27% | 0.00% | 100.00% |

| Species | | Observed catch (tonnes) | | Average annual | Average % composition | Retained | Discarded |
|---|---|---|---|---|---|---|---|
| Lancetfishes | *Alepisaurus spp.* | 0.54 | 0.43 | 6.87 | 0.25% | 0.00% | 100.00% |
| Pelagic Stingray | *Pteroplatytrygon violacea* | 0.66 | 0.31 | 6.86 | 0.25% | 0.00% | 100.00% |
| Striped marlin | *Kajikia audax* | 0.66 | 0.00 | 4.67 | 0.17% | 100.00% | 0.00% |
| Giant devil ray | *Mobula mobular* | 0.62 | 0.00 | 4.36 | 0.16% | 0.00% | 100.00% |
| Mahi mahi | *Coryphaena hippurus* | 0.36 | 0.24 | 4.21 | 0.15% | 91.75% | 8.25% |
| Oceanic whitetip shark | *Carcharhinus longimanus* | 0.09 | 0.36 | 3.21 | 0.12% | 0.00% | 100.00% |
| Skipjack tuna | *Katsuwonus pelamis* | 0.20 | 0.16 | 2.50 | 0.09% | 86.84% | 13.16% |
| Shortfin mako | *Isurus oxyrinchus* | 0.31 | 0.00 | 2.17 | 0.08% | 0.00% | 100.00% |
| Pelagic Thresher | *Alopias pelagicus* | 0.12 | 0.15 | 1.90 | 0.07% | 0.00% | 100.00% |
| Requiem sharks | *Carcharhinidae spp.* | 0.00 | 0.22 | 1.56 | 0.06% | 0.00% | 100.00% |
| Billfishes | *Istiophoriformes spp.* | 0.08 | 0.21 | 2.07 | 0.07% | 14.29% | 85.71% |
| Ocean sunfish | *Mola mola* | 0.20 | 0.00 | 1.43 | 0.05% | 0.00% | 100.00% |
| Scalloped hammerhead shark | *Sphyrna lewini* | 0.19 | 0.00 | 1.36 | 0.05% | 0.00% | 100.00% |
| Snake mackerels | *Gempylidae spp.* | 0.12 | 0.01 | 0.96 | 0.03% | 0.00% | 100.00% |
| Tiger shark | *Galeocerdo cuvier* | 0.11 | 0.00 | 0.78 | 0.03% | 0.00% | 100.00% |
| Oilfishes | *Gempylidae spp.* | 0.03 | 0.08 | 0.73 | 0.03% | 0.00% | 100.00% |
| Thresher sharks | *Alopiidae spp.* | 0.03 | 0.07 | 0.67 | 0.02% | 0.00% | 100.00% |
| Tunas | *Scombridae spp.* | 0.00 | 0.03 | 0.66 | 0.02% | 0.00% | 100.00% |
| Bigeye thresher shark | *Alopias superciliosus* | 0.04 | 0.05 | 0.62 | 0.02% | 0.00% | 100.00% |

| Species | | Observed catch (tonnes) | | Average annual | Average % composition | Retained | Discarded |
|---|---|---|---|---|---|---|---|
| Pomfrets | *Bramidae spp.* | 0.03 | 0.05 | 0.52 | 0.02% | 0.00% | 100.00% |
| Sharks | *Elasmobranchii* | 0.07 | 0.00 | 0.47 | 0.02% | 0.00% | 100.00% |
| Great hammerhead shark | *Sphyrna mokarran* | 0.05 | 0.00 | 0.34 | 0.01% | 0.00% | 100.00% |
| Shortbill spearfish | *Tetrapturus angustirostris* | 0.02 | 0.02 | 0.33 | 0.01% | 100.00% | 0.00% |
| Rainbow runner | *Elagatis bipinnulata* | 0.03 | 0.01 | 0.29 | 0.01% | 0.00% | 100.00% |
| Fishes | *Perciformes spp.* | 0.00 | 0.03 | 0.22 | 0.01% | 0.00% | 100.00% |
| Dagger pomfret | *Taractes rubescens* | 0.02 | 0.02 | 0.21 | 0.01% | 0.00% | 100.00% |
| Velvet dogfish | *Zameus squamulosus* | 0.00 | 0.02 | 0.16 | 0.01% | 0.00% | 100.00% |
| Jacks | *Carangidae spp.* | 0.02 | 0.00 | 0.15 | 0.01% | 0.00% | 100.00% |
| Medusafishes | *Centrolophidae spp.* | 0.02 | 0.00 | 0.15 | 0.01% | 0.00% | 100.00% |
| Razorback scabbardfish | *Assurger anzac* | 0.01 | 0.00 | 0.07 | 0.00% | 0.00% | 100.00% |
| Sickle pomfret | *Taractichthys steindachneri* | 0.01 | 0.00 | 0.05 | 0.00% | 0.00% | 100.00% |
| Rough pomfret | *Taractes asper* | 0.00 | 0.00 | 0.04 | 0.00% | 0.00% | 100.00% |
| Brown booby | *Sula leucogaster* | 0.00 | 0.00 | 0.02 | 0.00% | 0.00% | 100.00% |
| Green sea turtle | *Chelonia mydas* | 0.00 | 0.00 | 0.00 | 0.00% | 0.00% | 100.00% |
| Olive ridley turtle | *Lepidochelys olivacea* | 0.00 | 0.00 | 0.00 | 0.00% | 0.00% | 100.00% |
| Toothed whales | *Odontoceti spp.* | 0.00 | 0.00 | 0.00 | 0.00% | 0.00% | 100.00% |
| **Grand Total** | **-** | **185.14** | **207.60** | **2,772.79** | **100.00%** | - | **-** |

#### 5.6.1.3 Bait use

Table 44 presents information on bait use by the UoA fleet between 2018 to 2020, including source country and as a percentage of overall logbook reported catch (Table 44). Bait use averaged around 30% of the average total retained catch between 2018 and 2020. The main bait species used by the fishery included: *Decapterus muroadsi*, *Amblygaster leiogaster* and *Sardinops sagax.*

**Table 44. Bait species used by the UoA fleet through 2018-2020 and percentage of total overall logbook catch (Source: Fukuichi Fishery Co., Ltd).**

| Species | Fishery/country | Bait use (tonnes) | | | | % of overall logbook catch | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | 2018 | 2019 | 2020 | Total | 2018 | 2019 | 2020 | Average 2018-20 |
| *Amblygaster leiogaster* | China | 106.12 | 115.69 | 92.20 | 314.01 | 5.74% | 4.64% | 4.46% | 4.95% |
| *Sardinops sagax* | Japan | 115.86 | 132.62 | 94.64 | 342.11 | 6.27% | 5.32% | 4.58% | 5.39% |
| *Illex argentinus* | Argentina | 31.39 | 30.30 | 16.33 | 78.02 | 1.70% | 1.22% | 0.79% | 1.23% |
| *Sardinella lemuru* | Japan | 0.44 | 0.00 | 13.70 | 14.14 | 0.02% | 0.00% | 0.66% | 0.23% |
| *Scomber japonicus* | Japan | 10.75 | 14.58 | 20.38 | 45.71 | 0.58% | 0.59% | 0.99% | 0.72% |
| *Decapterus muroadsi* | Indonesia | 25.59 | 108.40 | 99.87 | 233.85 | 1.38% | 4.35% | 4.83% | 3.52% |
| | China | 40.81 | 126.76 | 222.50 | 390.06 | 2.21% | 5.09% | 10.76% | 6.02% |
| | Vietnam | 219.70 | 107.17 | 75.44 | 402.31 | 11.89% | 4.30% | 3.65% | 6.61% |
| | **Total** | **286.09** | **342.33** | **397.80** | **1,026.23** | **15.48%** | **13.74%** | **19.24%** | **16.15%** |
| *Decapterus macrosoma* | Indonesia | 7.16 | 32.85 | 12.86 | 52.87 | 0.39% | 1.32% | 0.62% | 0.78% |
| | Japan | 0.64 | 0.00 | 0.00 | 0.64 | 0.03% | 0.00% | 0.00% | 0.01% |
| | **Total** | **7.80** | **32.85** | **12.86** | **53.51** | **0.42%** | **1.32%** | **0.62%** | **0.79%** |
| *Chanos chanos** | Indonesia | 27.13 | 35.43 | 6.93 | 69.49 | 1.47% | 1.42% | 0.34% | 1.07% |
| **Total** | | 585.58 | 703.79 | 654.84 | **1,944.2** | **31.68%** | **28.25%** | **31.66%** | **30.53%** |

*Note: Milk fish (*Chanos chanos*) source is from aquaculture operations and as per MSC interpretation are not considered further

### 5.6.1.4 Summary

Based on the data analyses outlined in the preceding sections, the species that will be considered under P2 for assessment are presented in Table 45. Justification for assigning each species to either Primary (main, minor), Secondary (main, minor) or ETP was provided for under GSA3.1.1 – 3.1.4 *Designation of P2 species*.

**Table 45. Species, assessment category and justification for consideration under P2 for assessment. Bait species have been written in blue.**

| **Species** | | **Country/RFMO** | **Category** | **Justification** |
|---|---|---|---|---|
| **Common name** | **Scientific name** | | | |
| Bigeye tuna | *Thunnus obesus* | WCPFC | Primary Main | Managed, >5% |
| Yellowfin tuna | *Thunnus albacares* | WCPFC | Primary Main | Managed, >5% |
| Albacore tuna | *Thunnus alalunga* | WCPFC | Primary Main | Managed, >5% |
| South American pilchard | *Sardinops sagax* | Japan | Primary Main | Managed, >5% |
| Blue marlin | *Makaira nigricans* | WCPFC | Secondary Main | Managed, >5% |
| Blue shark | *Prionace glauca* | WCPFC | Secondary Main | Managed, >5% |
| Amberstripe scad | *Decapterus muroadsi* | Indonesia, China and Vietnam | Secondary Main | Not managed, >5% |
| Smoothbelly sardinella | *Amblygaster leiogaster* | China | Secondary Main | Not managed, >5% |
| Swordfish | *Xiphias gladius* | WCPFC | Primary Minor | Managed, <5% |
| Skipjack tuna | *Katsuwonus pelamis* | WCPFC | Primary Minor | Managed, <5% |
| Argentine shortfin squid | *Illex argentines* | Argentina | Primary Minor | Managed, <5% |
| Milkfish | *Chanos chanos** | Indonesia | Secondary Minor | Not managed, <5% |
| Bali sardinella | *Sardinella lemuru* | Japan | Secondary Minor | Not managed, <5% |

| **Species** | | **Country/RFMO** | **Category** | **Justification** |
|---|---|---|---|---|
| **Common name** | **Scientific name** | | | |
| Shortfin scad | *Decapterus macrosoma* | Indonesia, Japan | Secondary Minor | Not managed, <5% |
| Chub mackerel | *Scomber japonicas* | Japan | Secondary Minor | Not managed, <5% |
| Indo-Pacific sailfish | *Istiophorus platypterus* | WCPFC | Secondary Minor | Not managed, <5% |
| Black marlin | *Istiompax indica* | WCPFC | Secondary Minor | Not managed, <5% |
| Wahoo | *Acanthocybium solandri* | WCPFC | Secondary Minor | Not managed, <5% |
| Escolar | *Lepidocybium flavobrunneum* | WCPFC | Secondary Minor | Not managed, <5% |
| Southern sennet | *Sphyraena picudilla* | WCPFC | Secondary Minor | Not managed, <5% |
| Opah | *Lampridae spp* | WCPFC | Secondary Minor | Not managed, <5% |
| Longfin mako | *Isurus paucus* | WCPFC | Secondary Minor | Not managed, <5% |
| Crocodile shark | *Pseudocarcharias kamoharai* | WCPFC | Secondary Minor | Not managed, <5% |
| Snake mackerel | *Gempylus serpens* | WCPFC | Secondary Minor | Not managed, <5% |
| Lancetfishes | *Alepisaurus spp.* | WCPFC | Secondary Minor | Not managed, <5% |
| Striped marlin | *Kajikia audax* | WCPFC | Secondary Minor | Not managed, <5% |
| Mahi mahi | *Coryphaena hippurus* | WCPFC | Secondary Minor | Not managed, <5% |
| Shortfin mako | *Isurus oxyrinchus* | WCPFC | Secondary Minor | Not managed, <5% |
| Pelagic Thresher | *Alopias pelagicus* | WCPFC | Secondary Minor | Not managed, <5% |
| Requiem sharks | *Carcharhinidae spp.* | WCPFC | Secondary Minor | Not managed, <5% |
| Billfishes | *Istiophoriformes spp.* | WCPFC | Secondary Minor | Not managed, <5% |

| **Species** | | **Country/RFMO** | **Category** | **Justification** |
|---|---|---|---|---|
| **Common name** | **Scientific name** | | | |
| Ocean sunfish | *Mola mola* | WCPFC | Secondary Minor | Not managed, <5% |
| Scalloped hammerhead shark | *Sphyrna lewini* | WCPFC | Secondary Minor | Not managed, <5% |
| Snake mackerels | *Gempylidae spp.* | WCPFC | Secondary Minor | Not managed, <5% |
| Tiger shark | *Galeocerdo cuvier* | WCPFC | Secondary Minor | Not managed, <5% |
| Oilfishes | *Gempylidae spp.* | WCPFC | Secondary Minor | Not managed, <5% |
| Thresher sharks | *Alopiidae spp.* | WCPFC | Secondary Minor | Not managed, <5% |
| Tunas | *Scombridae spp.* | WCPFC | Secondary Minor | Not managed, <5% |
| Bigeye thresher shark | *Alopias superciliosus* | WCPFC | Secondary Minor | Not managed, <5% |
| Pomfrets | *Bramidae spp.* | WCPFC | Secondary Minor | Not managed, <5% |
| Sharks | *Elasmobranchii* | WCPFC | Secondary Minor | Not managed, <5% |
| Great hammerhead shark | *Sphyrna mokarran* | WCPFC | Secondary Minor | Not managed, <5% |
| Shortbill spearfish | *Tetrapturus angustirostris* | WCPFC | Secondary Minor | Not managed, <5% |
| Rainbow runner | *Elagatis bipinnulata* | WCPFC | Secondary Minor | Not managed, <5% |
| Fishes | *Perciformes spp.* | WCPFC | Secondary Minor | Not managed, <5% |
| Dagger pomfret | *Taractes rubescens* | WCPFC | Secondary Minor | Not managed, <5% |
| Velvet dogfish | *Zameus squamulosus* | WCPFC | Secondary Minor | Not managed, <5% |
| Jacks | *Perciformes spp.* | WCPFC | Secondary Minor | Not managed, <5% |
| Medusafishes | *Centrolophidae spp.* | WCPFC | Secondary Minor | Not managed, <5% |

<table>
<tr><th colspan="2">Species</th><th rowspan="2">Country/RFMO</th><th rowspan="2">Category</th><th rowspan="2">Justification</th></tr>
<tr><th>Common name</th><th>Scientific name</th></tr>
<tr><td>Razorback scabbardfish</td><td><i>Assurger anzac</i></td><td>WCPFC</td><td>Secondary Minor</td><td>Not managed, <5%</td></tr>
<tr><td>Sickle pomfret</td><td><i>Taractichthys steindachneri</i></td><td>WCPFC</td><td>Secondary Minor</td><td>Not managed, <5%</td></tr>
<tr><td>Rough pomfret</td><td><i>Taractes asper</i></td><td>WCPFC</td><td>Secondary Minor</td><td>Not managed, <5%</td></tr>
<tr><td>Pelagic Stingray</td><td><i>Pteroplatytrygon violacea</i></td><td>WCPFC</td><td>Secondary Minor</td><td>Not managed, <5%</td></tr>
<tr><td>Silky shark</td><td><i>Carcharhinus falciformis</i></td><td>WCPFC</td><td>ETP</td><td>CMM 2019-04; CMS Appendix II; CITES Appendix II; Vulnerable on IUCN Red List</td></tr>
<tr><td>Oceanic whitetip shark</td><td><i>Carcharhinus longimanus</i></td><td>WCPFC</td><td>ETP</td><td>CMM 2019-04; CMS Appendix I; CITES Appendix II; Critically endangered on IUCN Red List</td></tr>
<tr><td>Devil and manta rays</td><td><i>Mobula spp.</i></td><td>WCPFC</td><td>ETP</td><td>CMM 2019-05; CMS Appendix I; CITES Appendix II; Either Endangered or Vulnerable on IUCN Red List</td></tr>
<tr><td>Giant devil ray</td><td><i>Mobula mobular</i></td><td>WCPFC</td><td>ETP</td><td>CMM 2019-05; CMS Appendix I; CITES Appendix II; Endangered on IUCN Red List</td></tr>
<tr><td>Brown booby</td><td><i>Sula leucogaster</i></td><td>WCPFC</td><td>ETP</td><td>CMM 2018-03; Least Concern on IUCN Red List</td></tr>
<tr><td>Albatross (mixed)</td><td><i>Diomedeidae spp.</i></td><td>WCPFC</td><td>ETP</td><td>CMM 2018-03; CMS Appendix II; Either Critically Endangered, Endangered, Vulnerable, Near Threatened, Least Concern and Data Deficient on IUCN Red List.</td></tr>
<tr><td>Petrels (mixed)</td><td><i>Procellariidae spp.</i></td><td>WCPFC</td><td>ETP</td><td>CMM 2018-03; CMS Appendix II; Either Critically Endangered, Endangered, Vulnerable, Near Threatened, Least Concern and Data Deficient on IUCN Red List.</td></tr>
<tr><td>Seabirds</td><td><i>Procellariiformes</i></td><td>WCPFC</td><td>ETP</td><td>CMM 2018-03; CMS Appendix II; Either Critically Endangered, Endangered, Vulnerable, Near Threatened, Least Concern and Data Deficient on IUCN Red List.</td></tr>
</table>

| Species | | Country/RFMO | Category | Justification |
|---|---|---|---|---|
| **Common name** | **Scientific name** | | | |
| Green turtle | *Chelonia mydas* | WCPFC | ETP | CMM 2018-04; CMS Appendix I; CITES Appendix I; Endangered on IUCN Red List |
| Olive ridley turtle | *Lepidochelys olivacea* | WCPFC | ETP | CMM 2018-04; CMS Appendix I; CITES Appendix I; Endangered on IUCN Red List |
| Leatherback turtle | *Dermochelys coriacea* | WCPFC | ETP | CMM 2018-04; CMS Appendix I; CITES Appendix I; Vulnerable on IUCN Red List |
| Hawksbill turtle | *Eretmochelys imbricata* | WCPFC | ETP | CMM 2018-04; CMS Appendix I; CITES Appendix I; Critically Endangered on IUCN Red List |
| Toothed whales | *Odontoceti spp.* | WCPFC | ETP | CITES Appendix II; Either Critically Endangered, Endangered, Vulnerable, Near Threatened, Least Concern and Data Deficient on IUCN Red List. |

### 5.6.2 Primary species and secondary species

Based on the scaled up average observer values, logbook and bait data, the "main" species in this fishery are yellowfin, bigeye and albacore tuna, blue marlin, blue shark, as well as bait species: South American pilchard, amberstripe scad and smoothbelly sardinella. As yellowfin, albacore and bigeye tuna are target species (Principle 1) in this fishery depending on the UoA, they are not discussed further under the Principle 2 background.

"Primary" species are defined in Section 5.6.1. Of the main species identified above, this applies to yellowfin, bigeye and albacore tuna (see above Principle 1), as well as the bait species - South American pilchard. While both blue marlin and blue shark have stock assessments, the lack of specific target or limit reference points with accompanying management led to the assessment team deciding to assess these species as "secondary" main. Amberstripe scad and smoothbelly sardinella were the only other secondary main species. Blue marlin, blue shark, South American pilchard, amberstripe scad and smoothbelly sardinella are all discussed further below.

No other species reached the threshold of 5% (or 2% in the case of vulnerable species); the remainder were therefore assessed as either minor primary or secondary (Table 45). While swordfish made up 3% of the overall catch it was not considered a main species in this assessment as the fishery under assessment is primarily conducting deep-setting fishing operations where according to Peatman et al. (2018) swordfish is not encountered as frequently compared to shallow-setting fishing operations. Furthermore, the latest 2021 southwest Pacific swordfish stock assessment (Ducharme-Barth et al., 2021), indicates that the stock is not at significant risk of overfishing and is not overfished -therefore it is not considered a less-resilient species.

#### 5.6.2.1 Blue marlin

Blue marlin in the Pacific Ocean is considered a single stock (ISC BWG, 2021) caught primarily in tropical and sub-tropical waters. They are caught by various gear types and by both commercial and recreational fishers throughout their range, but the largest proportion (67%) is taken by commercial longline gear (ISC BWG, 2021).

The most recent assessment (2021) for blue marlin used a two-model ensemble of age and length structured Stock Synthesis models to fit a time series of standardised CPUE and size-composition data (ISC BWG, 2021). The two models in the ensemble differed only in their growth curve assumption. It was recommended by the ISC Billfish Working Group (BWG) that both models were retained based upon their fit and diagnostics, so the biological reference points, spawning stock biomass, and fishing mortality were averaged between the two models assuming equal weights (ISC BWG, 2021). While no target or limit reference points have been established for blue marlin by the WCPFC, the stock assessment provides default biological reference point estimates, such as MSY and 20% in relation to fishing mortality (F), spawning stock biomass (SSB), recent average yield (C) and spawning potential ratio (SPR) (see

Table 46).

**Table 46 Estimates of biological reference points along with estimates of fishing mortality (F), spawning stock biomass (SSB), recent average yield (C), and spawning potential ratio (SPR) of Pacific blue marlin, derived from the assessment ensemble model. Source:** ISC BWG (2021)

| **Reference Point** | **Estimate** |
|---|---|
| $F_{MSY}$ (age 1-10) | 0.23 |
| $F_{2019}$ (age 1-10) | 0.11 |
| $F_{20\%SSB0}$ | 0.18 |
| $SSB_{MSY}$ | 20,677 mt |
| $SSB_{2019}$ | 24,241 mt |
| $SSB_{20\%SSB0}$ | 20,729 mt |
| MSY | 24,600 mt |
| $C_{2017-2019}$ | 16,512 mt |
| $SPR_{MSY}$ | 17% |
| $SPR_{2019}$ | 34% |
| $SPR_{20\%SSB0}$ | 23% |

Female SSB was estimated to be 24,272 metric tonnes (mt) in 2019, or about 17% above $SSB_{MSY}$. ($SSB/SSB_{MSY}$ = 1.17 (95% C.I. 0.87-1.51)). Fishing mortality on the stock (average *F*, ages 1 to 10) averaged *F*=0.13 during 2017-2019, which was 40% below $F_{MSY}$ and in 2019 was F=0.11, which was 50% below $F_{MSY}$ ($F/F_{MSY}$ = 0.50 (95% C.I. 0.37-0.69)). Median fishing mortality has been below $F_{MSY}$ every year except 2003 to 2006.

As depicted on the Kobe plot (Figure 40) relative to MSY-based reference points, the ensemble model indicates that overfishing was very likely not occurring (>90% probability) and blue marlin is likely not overfished (81% probability) (ISC BWG, 2021).

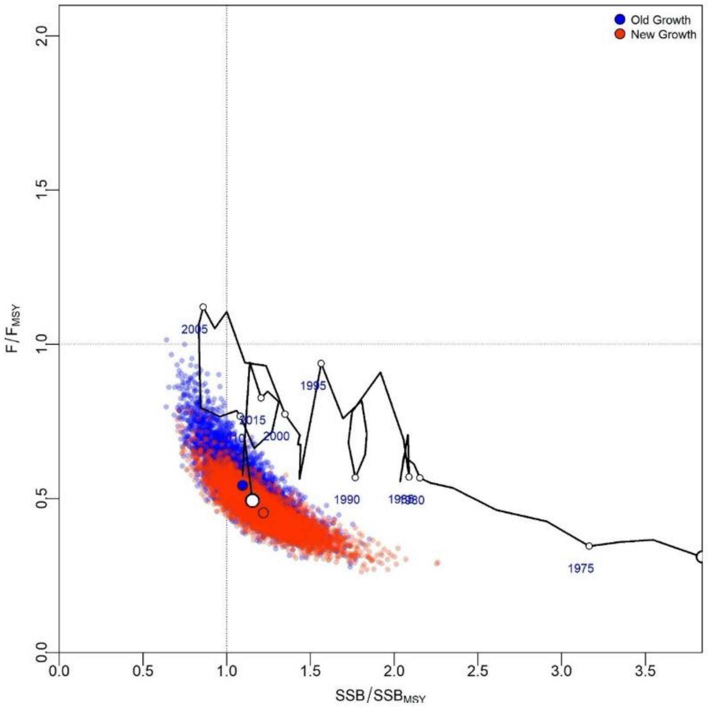


**Figure 40. Kobe plot of the time series of estimates of relative fishing mortality and relative spawning stock biomass of blue marlin between 1971 and 2019. The white circle denotes the estimate of the combined models in 2019, blue dots indicate the final year stock status of the old growth model and red dots indicate the final year stock status of the new growth model. Source:** ISC BWG (2021)

The ensemble model identified issues with both the new growth and old growth model diagnostics and sensitivity runs that were consistent with the presence of data conflicts. While none of the model diagnostics indicated that the results of either model were invalid, it was advised that further model development work will be required to reduce these conflicts and modelling uncertainties, as well as a revaluation of the input assessment data to improve the time series (ISC BWG, 2021).

Blue marlin is expected to be highly productive due to its rapid growth and high resilience to reductions in spawning potential (ISC BWG, 2021). Although fishing mortality has approached $F_{MSY}$ and exceeded $F_{MSY}$ from 2003 to 2006, the biomass of the stock has remained above $SSB_{MSY}$ since then. Catches have declined in recent years and therefore the stock has a low risk of experiencing overfishing or being overfished unless fishing mortality increases to above $F_{MSY}$ based upon stock projections (ISC BWG, 2021).

### 5.6.2.2 Blue shark

Blue shark are widely distributed throughout temperate and tropical waters of the Pacific Ocean. Two stocks are recognised in the Pacific, one in the north and another in the south Pacific.

**North Pacific**

The most recent stock assessment (2017) for the North Pacific blue shark was undertaken using Stock Synthesis (ISC SWG, 2017). From the stock assessment, the reference case model showed that the spawning stock biomass is fluctuating close to the time-series high, which was set back in the late 1970s. Recruitment has fluctuated around 37,000,000 age-0 sharks annually. Stock status is reported in relation to MSY. Female spawning biomass in 2015 ($SB_{2015}$) was 71% higher than at MSY and estimated to be 308,286 mt (Figure 41). The recent annual fishing mortality ($F_{2012-2014}$) was estimated to be well below $F_{MSY}$ at approximately 37% of $F_{MSY}$. As depicted on the Kobe plot (Figure 42), relative to MSY-based reference points, the model predicts that it is likely the stock is not overfished and overfishing is not occurring.

| Management Quantity | Reference Case Model | Range for Sensitivity Runs |
|---|---|---|
| $SB_{1971}$ | 311,312 | 174,381 - 980,878 |
| $SB_{2015}$ | 308,286 | 140,742 - 1,082,300 |
| $SB_{MSY}$ | 179,539 | 100,984 - 482,638 |
| $F_{1971}$ | 0.13 | 0.01 - 0.15 |
| $F_{2012-2014}$ | 0.13 | 0.06 - 0.15 |
| $F_{MSY}$ | 0.35 | 0.26 - 0.66 |
| $SB_{2015}/SB_{MSY}$ | 1.71 | 1.39 - 2.59 |
| $F_{2012-2014}/F_{MSY}$ | 0.37 | 0.15 - 0.50 |

**Figure 41. Estimates of key management quantities for the North Pacific blue shark stock assessment reference case model and the range of values for 13 sensitivity runs. Source:** ISC SWG (2017)

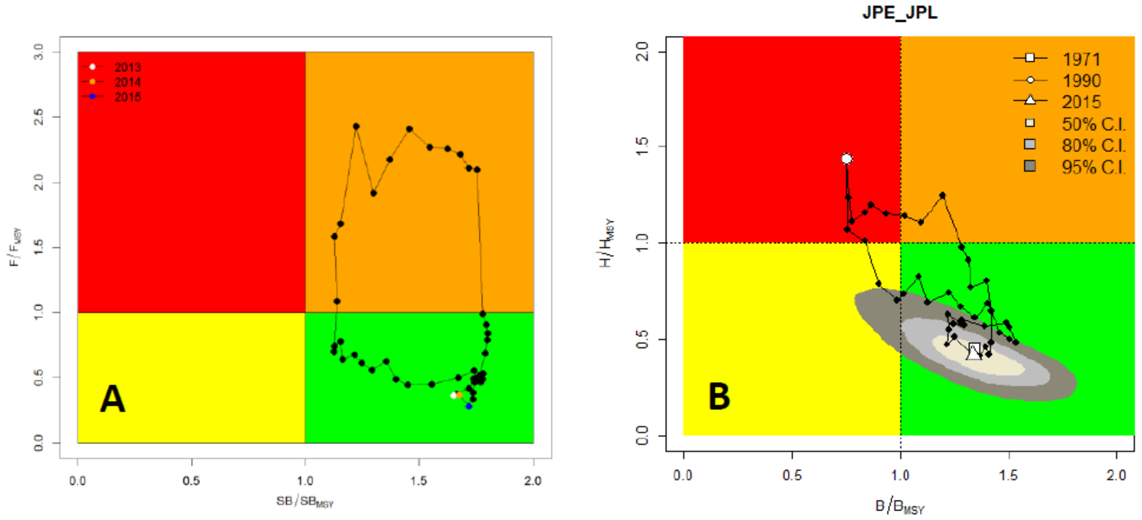


**Figure 42. Kobe plots of the trends in estimates of relative fishing mortality and biomass of North Pacific blue shark between 1971-2015 for the reference case of (A) the SS stock assessment model, and (B) the BSSPM stock assessment model. Source:** ISC SWG (2017)

### South Pacific

The most recent assessment (2021) for South Pacific blue shark was undertaken using Stock Synthesis (Neubauer et al., 2021). In addition, a surplus production model (SPM) was run with both assessment models producing very similar results. The assessment was determined an improvement over the 2016 assessment in particular the catch reconstruction, CPUE time series, and re-parameterization through combined advance from south and north Pacific assessments (WCPFC SC, 2020). A total of 90% of model runs indicated that $F_{2020}$ was below $F_{MSY}$ and 96% of model runs shows that $SB_{2020}$ was above $SB_{MSY}$ (See Figure 34 in the stock assessment report for detailed Kobe plots) with an estimate of SSB of over 60,000 t.

The WCPFC Scientific Committee did not approve the results for providing management advice due to the need to conduct a more thorough investigation of diagnostics across the grid of models (WCPFC SC, 2020). However, it was noted that stock biomass is likely increasing, and fishing pressure has declined through the recent decade due to the fact that most sharks are released upon capture in most longline fleets. The results indicate that if assessed against conventional reference points it is likely that the stock will not be found to be overfished nor would overfishing be occurring (WCPFC SC, 2020).

#### 5.6.2.3 South American pilchard

According to information provided by the client, South American pilchard (*Sardinops sagax*) used as bait by the UoAs between 2018 and 2020 was sourced from Japan. The relevant fishery for this species in the Northwest Pacific is predominantly a Japanese one, although according to Yatsu (2019), the stock is also targeted by Chinese vessels just outside the Japanese EEZ, near Hokkaido Island (See Fishbase, Schwartzlose and Alheit, 1999 and Whitehead, 1988).

Japanese fisheries harvest two South American pilchard stocks: (i) Japanese Pacific Ocean and (ii) Tsushima Warm Current. Both stocks are assessed annually by the Fisheries Research and Education Agency of Japan (FRA) and are managed through a Total Allowable Catch (TAC), termed allowable biological catches (ABCs). It is important to note that the official World Register of Marine Species (WoRMS) now register *Sardinops melanostictus* as *Sardinops sagax* but the FRA stock assessment continues to name them as *S. melanostictus*. To determine stock status, assessment scientists use cohort analysis to estimate biomasses at age and evaluate spawning stock biomass (SSB) against a target reference point aiming to achieve MSY ($SSB_{MSY}$) set at 1,187,000 t (Pacific stock) and 1,093,000 t (Tsushima stock) with the limit reference points set at 60% of MSY. This limit reference point was the estimated SSB level below which recruitment is thought to be poor (Yukami et al., 2017). This was considered a suitable proxy for PRI by this assessment team. Furthermore, if the SSB is below a reference point set at 10% of MSY, a fishing moratorium or other measures to ensure similar effect are imposed (Yatsu, 2019).

The latest assessment conducted for the Pacific stock was in 2021 (FRA, 2021a). The catch in 2020 was 622,00 t, which was an increase from 521,000 t in 2019 (FRA, 2021a). It is evident that in many early years, fishing mortality (F) exceeded $F_{MSY}$ which is the point at which $SSB_{MSY}$ is achieved, but since 2012 has decreased to around $F_{MSY}$ with a slight increase in 2020 (Figure 43), resulting in the SSB increasing and exceeding $SSB_{MSY}$ since 2017 (1.45 in 2020 -$SB_{2020}/SB_{MSY}$) (Figure 43). This provides confidence that the stock is highly likely to be above biologically based limits. Projections indicate a 55% probability that the stock will exceed the target reference point (TRP) by 2031 if fishing mortality is set at 1.2 until 2023 and then remains around 0.85 $F_{MSY}$ (FRA, 2021a). However, the population dynamics of this stock, particularly recruitment, are strongly linked to oceanographic variables, which fluctuate on decadal timescales, making long-term management complex (FRA, 2021a, 2021b).

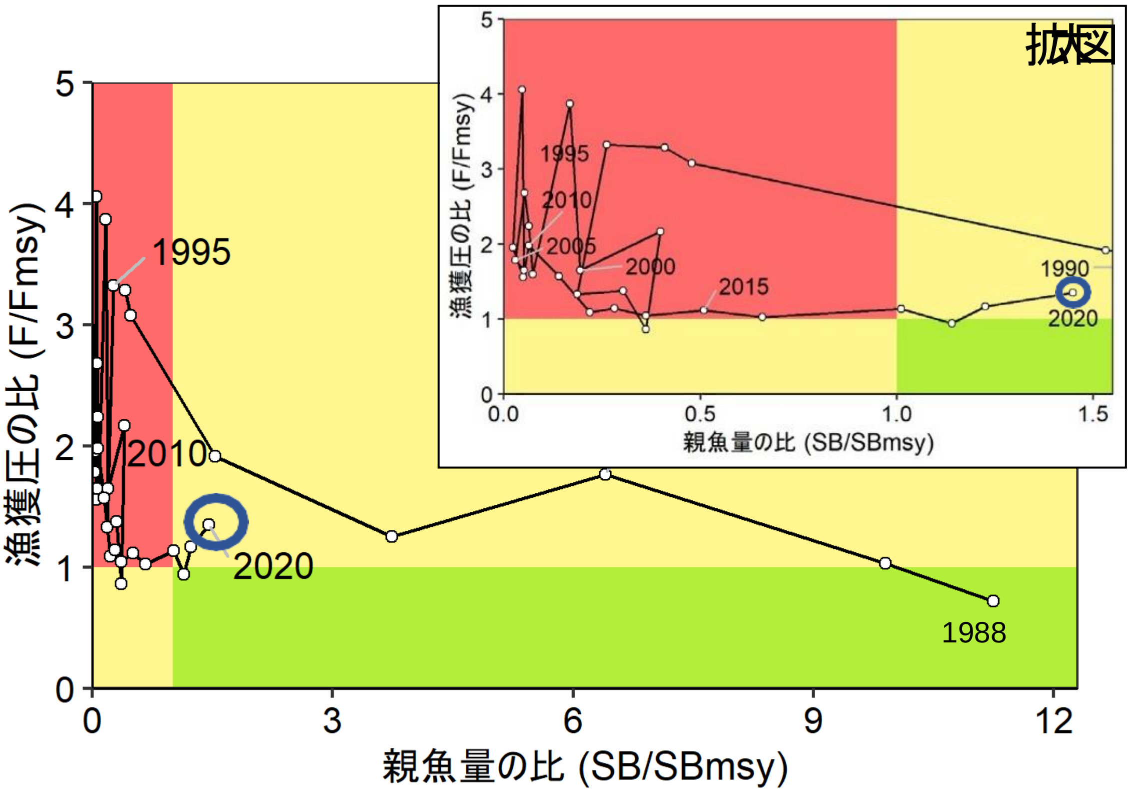


**Figure 43. Kobe plot of the time series of estimates of relative fishing mortality and relative spawning stock biomass of South American Pilchard (Pacific Japanese stock). Note the top right figure is an enlargment of bottom figure to improve readability. Source:** FRA (2021)**.**

The latest assessment conducted for the Tsushima stock was in 2021 (FRA, 2021b). The catch in 2020 was estimated at 73,000 t, which was a sharp increase from 14,000 t in 2019 (FRA, 2021b). It is evident that for many years F exceeded $F_{MSY}$ and as a result, the level of SSB is currently lower than that to achieve MSY (0.22 in 2020 $SB_{2020}/SB_{MSY}$) (Figure 44). Trends in SSB suggest it has remained at low levels since 1994 (FRA, 2021b). Thus the stock is currently below the PRI set at 60% of MSY. Fishing mortality has been slightly higher than $F_{MSY}$ in recent years but declined to a level significantly lower than $F_{MSY}$ in 2019 (0.19 in 2019 -$F_{2019}/F_{MSY}$) before increasing in 2020 to slightly lower than $F_{MSY}$ (Figure 44). Projections indicate a 56% probability of the stock rebuilding to the TRP by 2031 if fishing mortality does not exceed 0.80 $F_{MSY}$ from 2021 to 2023 and 0.75 $F_{MSY}$ after 2024 (FRA, 2021b). However, the population dynamics of this stock, particularly recruitment, are strongly linked to oceanographic variables which fluctuate on decadal timescales, making long-term management complex (FRA, 2021a, 2021b).

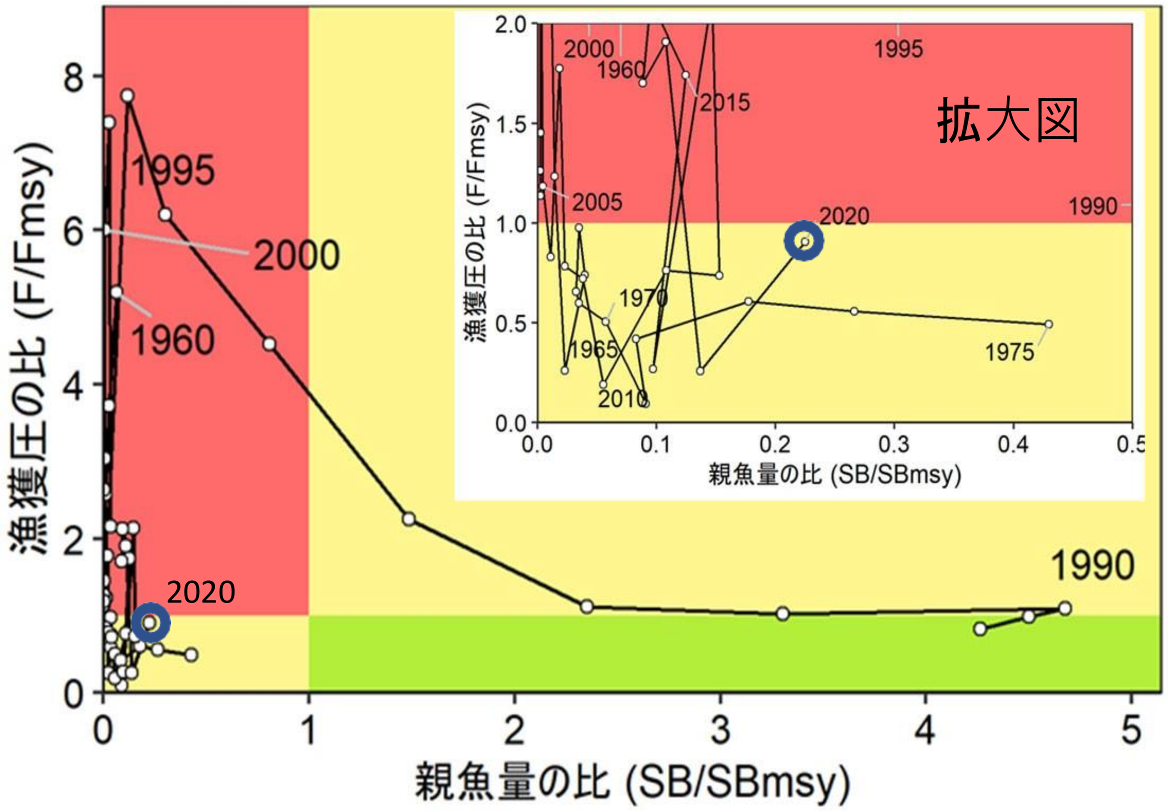


**Figure 44. Kobe plot of the time series of estimates of relative fishing mortality and relative spawning stock biomass of South American Pilchard (Tsushima Japanese stock). Note the top right figure is an enlargment of bottom figure to improve readability. Source:** FRA (2021b)**.**

This species is used as bait by the UoA vessels, accounting for an average 114 t annually between 2018 and 2020, which represented around 5.4% of the total catch reported in the logbook catch across the same time period. This represents a very small amount of the total catch (<1% in 2019) in the Japanese South American pilchard fishery.

#### 5.6.2.4 Amberstripe scad

According to the information provided by the client, the majority of amberstripe scad (*Decapterus muroadsi*) used as bait by the UoAs between 2018 and 2020 was sourced from Indonesia, China and Vietnam, with the majority (39%) in that time period sourced from Vietnam.

Amberstripe scad belongs to the *Carangidae* family and genus *Decapterus*. The genus *Decapterus* (Bleeker, 1851) contains 11 valid species, distributed in tropical to temperate areas of the Pacific, Indian and Atlantic Oceans (Eschmeyer et al., 2018). Amberstripe scad are very widely distributed in the tropics and well into the temperate zone, everywhere except the western and northern Atlantic Ocean (Figure 45) and are found to a depth of 320 metres (Jawad and Al-Mamry, 2018). Generally this genus are not vulnerable to fishing due to their fast life history (growth, maturation, reproduction). The species is listed as Least Concern by the IUCN Red List (https://www.iucnredlist.org/species/20431538/45036107).

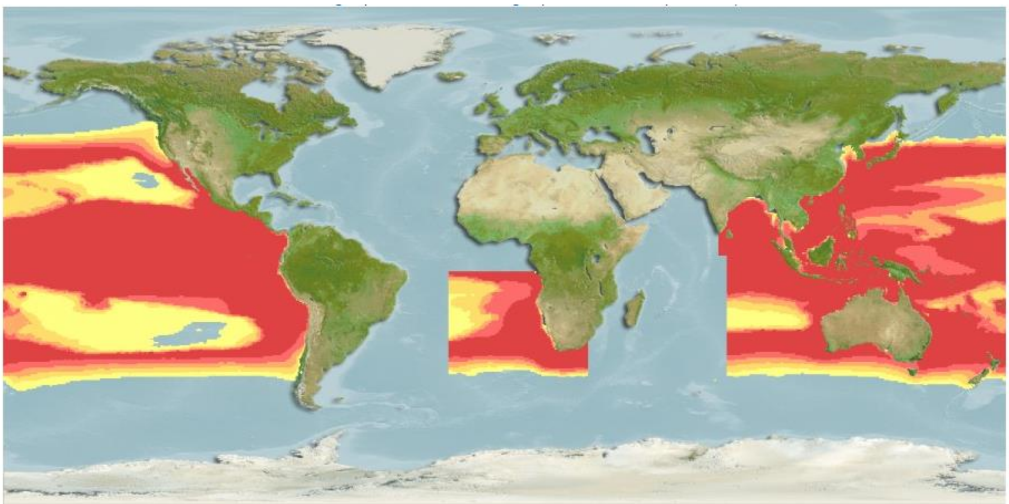


**Figure 45. Distribution of amberstripe scad (*Decapterus muroadsi*). Source: Kaschner et al. (2019)**

There is limited information to be found on commercial catches or management of this species in Indonesia, China or Vietnam. Jones et al. (2020) reported anecdotal information from several bait suppliers estimating that approximately 2,000 tonnes of this species were harvested annually in Indonesia. Primary gear types include gillnets and purse seine, although purse seine is the dominant gear type used (Jones et al., 2020). Any further information on bait source and fisheries would be useful here, particularly from Vietnam.

Given that there is not sufficient information to determine the outcome status with respect to biologically based limits, the Risk Based Framework (RBF) has been triggered and a Productivity Susceptibility Analysis (PSA) was undertaken for this species. The rationales for the PSA scoring can be found in the Appendices. In undertaking the RBF there was only limited information found on the life history characteristics of amberstrip scad. Therefore, where there were data gaps, proxy data were used from *Decapterus* species, as similarly undertaken by Jones et al. (2020). All information concerning this species and other related *Decapterus* species were taken from either www.fishbase.org or the references cited in the PSA scoring tables (Appendices).

#### 5.6.2.5 Smoothbelly sardinella

According to the information provided by the client, all of the smoothbelly sardinella (*Amblygaster leiogaster*) used as bait by the UoAs between 2018 and 2020 was sourced from China.

Smoothbelly sardinella belongs to the Family *Clupeidae* and Genus *Amblygaster*, which contains 4 recognised species: *Amblygaster indiana, Amblygaster sirm, Amblygaster clupeoides* and *Amblygaster leiogaster* (Whitehead, 1985; Mary et al., 2017). It is distributed within the coastal tropical and subtropical waters of the Indo-west Pacific region, including along the coast of Africa eastwards to Okinawa Japan and south to Western Australia (Figure 46). It is reported to be widespread throughout this region (Hunnam, 2021) and can be found to a depth of 50 metres (Whitehead, 1985). Generally, this genus are not vulnerable to fishing due to their fast life history (growth, maturation, reproduction). The species is listed as Least Concern by the IUCN Red List (https://www.iucnredlist.org/species/75153246/75153434).

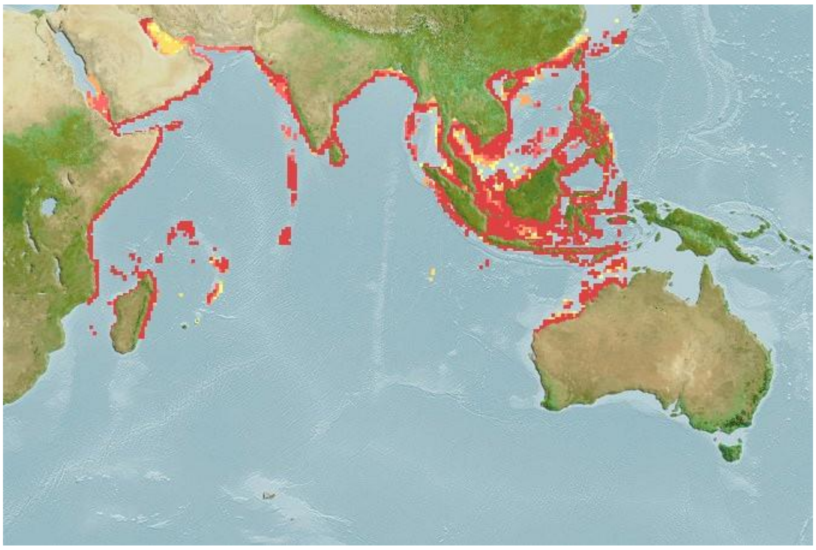


**Figure 46. Distribution of smoothbelly sardinella (*Amblygaster leiogaster*). Source: Kaschner et al. (2019)**

There is limited information to be found on commercial catches or management of this species in China. Hunnan (2021) reports commercial fisheries for *Amblygaster spp.* in Sri Lanka, India, Thailand (Devaraj and Martosubroto 1997), the Philippines (Willette et al., 2011), Solomon Islands (Roeger et al. 2016) and New Caledonia (Conand 1991).

Given that there is not sufficient information to determine the outcome status with respect to biologically based limits, the RBF has been triggered and a PSA was undertaken for this species. The rationales for the PSA scoring can be found in the Appendices. In undertaking the RBF there was only limited information found on the life history characteristics of smoothbelly sardinella. Therefore, where there were data gaps, proxy data were used from other *Amblygaster* species. All information concerning this species and other related *Amblygaster* species were taken from either www.fishbase.org or the references cited in the PSA scoring tables (Appendices).

### 5.6.3 ETP species

- The criteria for designating ETP species are set out in Section 5.6.1. For this assessment, the team considered species protected under the following national legislation and/or international treaties to be ETP:Japan – *Fisheries Law 1949 (*as amended), *Basic Law on Fisheries Policy* (2001, revised in 2005*) Act on Special Measures for Enhancement of the Conservation and Management of Tuna Resources 1996*
- Papua New Guinea – *Fisheries Management Act 1998* (as amended), *Fisheries Management Regulations* (2000 and 2016)
- CITES Appendix I;
- IUCN Red List (vulnerable, endangered or critically endangered status) for species classified as “out-of-scope” (amphibians, reptiles, birds and mammals);
- Convention on Highly Migratory Species (CMS) Appendices I and II where binding agreements are in place; and
- WCPFC CMMs, which provides protection (i.e. a ban on landing), rather than management.

The observer (and logbook) data from 2018 to 2019 (2018 to 2020) were used to identify ETP species (see Table 40 and Table 41). The raw (unscaled) numbers and scaled numbers from the observer records in addition to any recorded logbook interactions are provided below in Table 47. For details on observer coverage and fleet-level estimates of scaled catch by weight, see Section 5.6.1.

**Table 47. Details of ETP species interacting with the UoA according to at-sea observer data and logbook entries between 2018 and 2020 (unscaled and scaled numbers). (Source: Fukuichi Fishery Co., Ltd).**

| **Species** | **Scientific name** | **2018** | | | **2019** | | | **2020** |
|---|---|---|---|---|---|---|---|---|
| | | **Raw** | **Scaled** | **Logbook** | **Raw** | **Scaled** | **Logbook** | **Logbook** |
| Green turtle | *Chelonia mydas* | 1 | 14 | 0 | 1 | 14 | 0 | 0 |
| Leatherback turtle | *Dermochelys coriacea* | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Olive ridley turtle | *Lepidochelys olivacea* | 16 | 226 | 20 | 16 | 226 | 36 | 14 |
| Hawksbill turtle | *Eretmochelys imbricata* | 0 | 0 | 0 | 0 | 0 | 0 | 2 |
| Toothed whales | *Odontoceti spp.* | 3 | 42 | 0 | 2 | 28 | 0 | 0 |
| Brown booby | *Sula leucogaster* | 0 | 0 | 0 | 1 | 14 | 0 | 0 |
| Albatrosses unidentified | *Diomedeidae* | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Petrels unidentified | *Procellariidae* | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Unknown seabirds | *Procellariiformes* | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Silky shark | *Carcharhinus falciformis* | 122 | 1,713 | 496 | 116 | 1,638 | 2,934 | 1,017 |
| Oceanic whitetip shark | *Carcharhinus longimanus* | 3 | 42 | 425 | 12 | 169 | 162 | 190 |
| Giant devil ray | *Mobula mobular* | 6 | 85 | 0 | 0 | 0 | 0 | 0 |
| Devil and manta rays | *Mobula spp.* | 9 | 127 | 0 | 2 | 28 | 0 | 0 |

#### 5.6.3.1 Elasmobranchs

Elasmobranchs (sharks and rays) were the main group of ETP species interacting with the fishery under assessment. In total, 270 individuals were recorded by at-sea observers in 2018 and 2019. The majority of these interactions (253) were with silky shark and oceanic whitetip shark. The average annual scaled-up estimate of these two sharks in both weight and numbers combined between 2018 and 2019 was 24.4 t and 1,786 individuals respectively. The estimated total catch of other elasmobranch species was relatively low, with only a small number of individuals recorded in the observer data (Table 47).

The at-sea observer data (Table 47) indicated that 100% of elasmobranchs were discarded. For elasmobranchs, at-vessel and post-release survivability depends on a range of factors associated with capture, including gear type, soak time and handling practices, as well as biological attributes (species, size, sex and mode of gill ventilation) (Ellis et al., 2016). For longline fisheries specifically, post-release survival depends on where the shark was hooked and whether the line was cut off or bitten off. Verification of gear use and configurations, including hook type and leader type will need to take place at the site visit. Figure 47 extracted from Patterson et al. (2014) depicts the range of variables involved.

Curran (2014) and references therein reported post-release mortality rates for blue shark ranging from 15 to 19%. More information on at-vessel mortality is available with blue sharks having the highest chance of survival (3-14% mortality) and thresher and silky sharks the lowest (up to 56% mortality).

A post-release shark tagging study recently commissioned by the WCPFC for silky and shortfin mako sharks was undertaken in 2019 (ABNJ, 2019). In this study, a total of 117 ‘survival’ popup archival tags (sPAT) were attached to silky and shortfin mako sharks in New Zealand (n=35), Fiji (n=58), New Caledonia (n=10) and the Republic of the Marshall Islands (n=14). Post-release mortality was determined for 110 sharks classified as either “alive and uninjured” or “alive and injured”. Most tagged sharks were reported to be uninjured (89%) and the majority (88%) survived until tag loss or the programmed pop-up date with 13 estimated mortalities. Mortality rates were found to be significantly higher for smaller shark individuals and for sharks with a high gangion ratio (the ratio of the amount of trailing gangion left on the released shark to its fork length). When the study data were accompanied by data from similar Pacific fisheries, mortality rates for silky sharks were found to be significantly higher for injured sharks and for sharks with high gangion ratios, with an overall post-release mortality rate of 15.4% (ABNJ, 2019). For mako sharks, post-release mortality at 60 days was predicted to be 20.5% (ABNJ, 2019). The study concluded that the proportion of sharks that survive fishing operations (hauling, handling and post-release mortality) was 44% for shortfin makos and 56% for silky sharks.

Based on this, and taking into account the prevalence of silky sharks in the dataset and the fact that most individuals are cut off the line, the assessment team assumed 50% mortality for all sharks concerned.

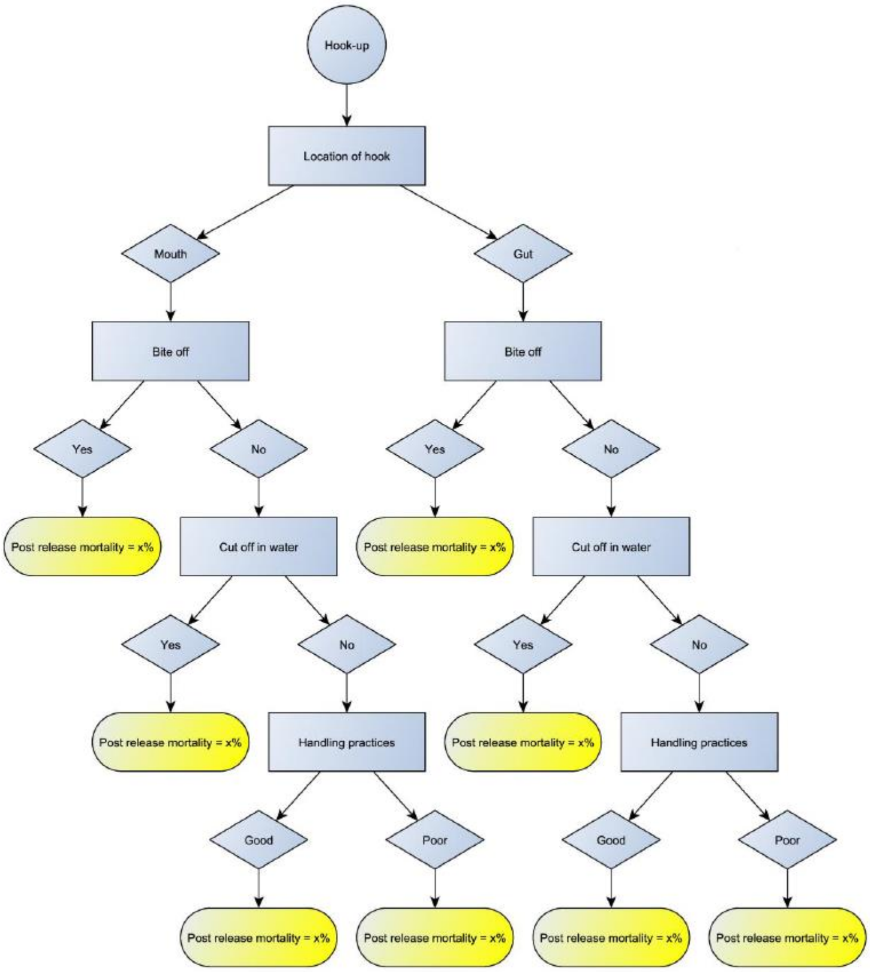


**Figure 47. Flowchart depicting the mortality associated with the hooking and release of sharks in a longline fishery and factors that influence that mortality. Source: Patterson et al. (2014).**

Several elasmobranch species caught by longline operations in the WCPO have been listed on either CITES, CMS Appendices or as either vulnerable, endangered or critically endangered on the IUCN Red List (https://www.iucnredlist.org/). Japan has developed a National Plan of Action (NPOA) for Sharks, which has been implemented since February 2001 (subsequently revised in 2009 and 2016) and is available here: https://www.fao.org/3/bt662e/bt662e.pdf. UoA-specific management of shark bycatch is to be discussed at the site visit. The WCPFC has also implemented various CMMs for sharks and specific shark species and rays as detailed below.

**CMM 2019-04** covers all species of sharks, skates, rays and chimaeras and in recognising their vulnerability aims to introduce measures in the high seas and EEZs of the Convention Area to promote their conservation and management. CMM 2019-04 states *inter alia* the following, as applicable to longline vessels:

- 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 its Part 2 Annual Report.
- 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. In

order to implement this provision CCMs shall require their vessels to land sharks with fins naturally attached to the carcass.

- 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.
- 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.
- The implementation of these measures shall be on a vessel by vessel or CCM basis.
- The Commission shall adopt and enhance bycatch mitigation measures and develop new or amend, if necessary, existing Shark Safe Release Guidelines 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
- Each CCM shall submit data on the WCPFC Key Shark Species for Data Provision in accordance with Scientific Data to be Provided to the Commission and CCMs shall advise the Commission (in their Part 2 Annual Report) on implementation of this CMM in accordance with Annex 2.

There are also species-specific requirements for oceanic whitetip shark and silky shark in CMM 2019-04 including:

- 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.
- CCMs shall require all vessels flying their flag and vessels under charter arrangements to the CCM to 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.

**CMM 2019-05** covers species of the family Mobulidae, which includes manta rays and mobula rays and are considered to be vulnerable to overfishing. In recognising their vulnerability CMM 2019-05 aims to introduce measures in the high seas and EEZs of the Convention Area to promote their conservation and management. CMM 2019-05 states *inter alia* the following, as applicable to longline vessels:

- CCMs shall prohibit their vessels from targeted fishing or intentional setting on mobulid rays in the Convention Area.
- CCMs shall prohibit their vessels from retaining on board, transhipping, or landing any part or whole carcass of mobulid rays caught in the Convention Area.

- CCMs shall require their fishing vessels to promptly release alive and unharmed, to the extent practicable, mobulid rays as soon as possible, and to do so in a manner that will result in the least possible harm to the individuals captured. CCMs should encourage their fishing vessels to implement the handling practices, while taking into consideration the safety of the crew.
- CCMs shall advise the Commission (in their Part 2 Annual Report) on implementation of this CMM in accordance with Annex 2.
- CCMs shall ensure that fishers are aware of proper mitigation, identification, handling and releasing techniques and should encourage them to keep on board all necessary equipment for the safe release of mobulid rays

Specific ETP elasmobranch species are discussed further in the ETP species performance indicators.

#### 5.6.3.2 Marine turtles

In total, there was 34 individual marine turtles recorded by at-sea observers between 2018 and 2019. This included 32 olive ridley turtles and 2 green sea turtles. The average annual scaled-up estimate of these marine turtles, in numbers between 2018 and 2019 was 480 individuals. There was also 73 individuals recorded in the logbook between 2018 and 2020. This included 70 olive ridley turtles, 2 hawksbill turtles and 1 leatherback turtle (Table 47).

Six out of the seven species of marine turtles are threatened with extinction and fisheries bycatch has been ranked as the most significant threat to sea turtle populations globally, followed by climate change. A global comparison of calculated impact scores between three types of fishing gear (longlines, nets and trawls) interacting with marine turtles indicated that longline gear had similar interaction rates to other gears and affected similar sized individuals, but had a significantly lower mortality rate and thus had a significantly lower overall impact score (Wallace et al., 2013).

Incidental catch of marine turtles in longline fisheries occurs when opportunistic-feeding marine turtles encounter baited longline hooks, or when they are accidentally entangled with the longline gear (Jones et al., 2020). Mortalities are directly related to entanglement or hooking with the longline gear and typically result from drowning (Williams et al., 2009). Both the use of fish bait and circle hooks has been shown to reduce the interaction with some species of marine turtles, compared to the use of squid bait and J-style hooks (Gilman & Huang, 2017). Furthermore, wider circle hooks have been shown to reduce marine turtle catch rates and deep hooking, relative to narrower circle hooks (Gilman & Huang, 2017). Verification of gear use and configurations, including hook type will need to take place at the site visit. The depth of longline fishing and position of the hooks relative to floats has also been shown to influence marine turtle interaction rates (ABNJ, 2017; Clarke et al., 2018). It is understood that the majority of turtles spend the majority of their time in shallower waters <40 m deep and trials have shown that setting gear deeper than 100m does reduce interactions with turtles (Figure 48) (Wallace et al., 2013). For example, ABNJ (2017) found that interactions were increasingly likely for hooks closer to floats (i.e. the shallowest hooks in the basket) and increasing likely as the number of hooks between floats decreased, which is indicative of shallower setting. Furthermore, when deep-setting, the probability of interactions were significantly reduced for green, loggerhead and olive ridley marine turtles but less so for leatherback turtles. It is evident from the client data, that an average 18 (~16-20) hooks between floats are being used across the time period (2018-2020), indicative of deeper setting.

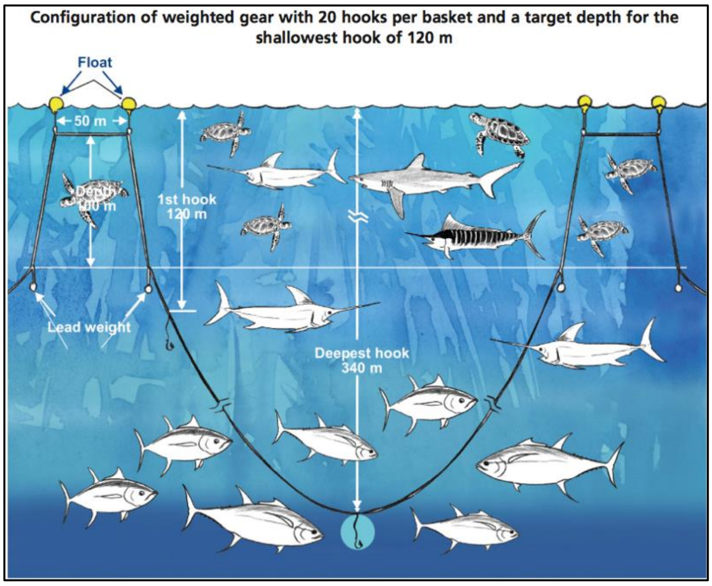
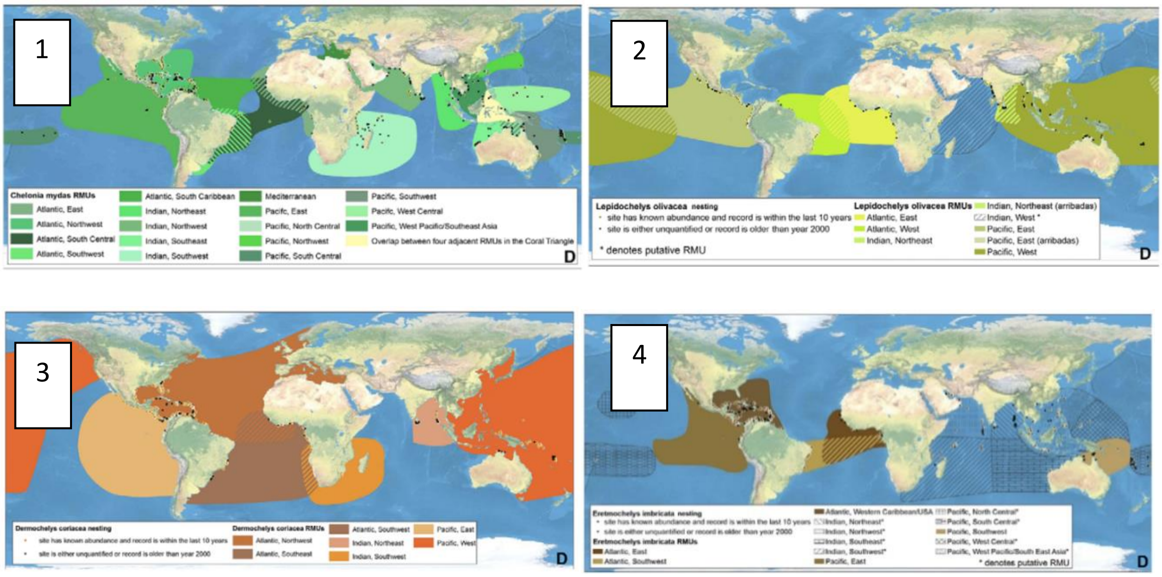


**Figure 48. Diagram of example of deep-set longline gear to avoid turtle interactions, no hook is above 100 m. Source: Clarke et al. (2014)**

Wallace et al. (2010) defined 58 sea turtle Regional Management Units (RMUs) globally, comprising multiple nesting sites, nesting populations and breeding populations, defining core distribution areas that are considered optimal for assessing the conservation status of marine turtles and for management applications. The fishery under assessment overlaps with several RMUs for five marine turtles as shown in Figure 48 (note that the RMUs are continually updated as new stock information becomes available - for the latest map, see this link: [http://seamap.env.duke.edu/swot](http://seamap.env.duke.edu/swot)). According to the ABNJ (2017) report, the distribution area of four of these five turtles including leatherback, olive ridley, loggerhead and green turtles overlaps with 59.1%, 60.6%, 59.7% and 66% respectively of the WCPFC Convention Area.



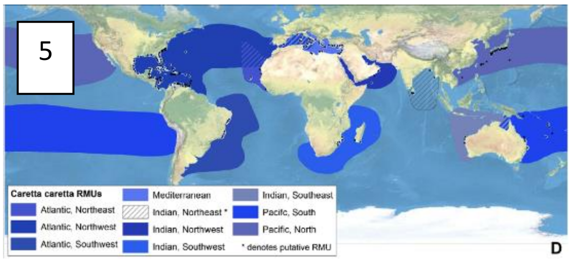


**Figure 49. Sea turtle Regional Management Units according to** Wallace et al. (2010)**. The fishery under assessment overlaps with the *Chelonia mydas* Pacific west central, Pacific west/southeast Asia and Pacific southwest RMU (1), *Lepidochelys olivacea* Pacific west RMU (2), *Dermochelys coriacea* Pacific west RMU (3), *Eretmochelys imbricata* Pacific west/southeast Asia, Pacific west central and south west RMU (4), *Caretta caretta* Pacific south RMU (5).**

Wallace et al. (2011) assessed the risk level and threats to marine turtles within these RMUs. This was based on the risk of a range of population parameters (e.g. population size, recent and long-term population trends, rookery distribution and vulnerability, genetic diversity) and the degree of threats (e.g. bycatch, coastal development, pollution and pathogens, climate change) impacting each RMU. Wallace et al. (2013) further evaluated the relative bycatch rates across longline, net and trawl fisheries to determine bycatch impact scores, which integrated information on bycatch rates, fishing effort, mortality rates, and body sizes (i.e. proxies for reproductive values) of turtles taken as bycatch—as well as mortality rates. In this study it was noted that the relative impacts of bycatch to marine turtle populations depend on the magnitude (i.e. the quantity that are captured), mortality rates, and reproductive values of individuals affected relative to amounts of fishing effort (Wallace et al., 2013). Therefore, a threat that incurs high mortality and occurs in areas of high density of reproductively valuable individuals is likely to have a negative population-level impact. In this context, fisheries operating in near-shore areas, overlapping with high-use areas for turtles, are more likely to negatively affect turtle populations than offshore fisheries operating in low-use areas.

The resulting risk, threat levels and bycatch impact for each relevant RMU is shown in Table 48. The olive ridley turtle in Pacific East RMU ranked at high risk of longline bycatch, while all other RMUs for each species were considered either medium or low risk (Wallace et al. 2013). Specific ETP marine turtle species are discussed further in the ETP species outcome rationales (PI 2.3.1).

**Table 48. Sea turtle Regional Management Units (RMU) that overlap with the UoAs (from** Wallace et al. (2010) **and their risk and threat level (from** Wallace et al. (2011) **and their longline bycatch impact (from** Wallace et al. (2013) **and IUCN Red List Status.**

| **Species** | **Scientific name** | **RMU** | **RMU Risk and Threat** | **RMU Bycatch Impact** | **IUCN Red List Status** |
|---|---|---|---|---|---|
| Green turtle | *Chelonia mydas* | Pacific West Central, Pacific West/Southeast Asia and Pacific Southwest | Low Risk<br>Low Threat (Pacific West Central)<br>Low Risk High Threat (Pacific Southwest and Pacific West/Southeast Asia) | Low Bycatch Impact (Pacific West Central and Pacific Southwest)<br>N/A Bycatch Impact (Pacific West/Southeast Asia) | Endangered |
| Olive ridley turtle | *Lepidochelys olivacea* | Pacific West | Low Risk<br>High Threat | Medium Bycatch Impact | Vulnerable |

| **Species** | **Scientific name** | **RMU** | **RMU Risk and Threat** | **RMU Bycatch Impact** | **IUCN Red List Status** |
|---|---|---|---|---|---|
| Leatherback turtle | *Dermochelys coriacea* | Pacific West | High Risk<br>Low Threat | Medium Bycatch Impact | Critically Endangered (West Pacific subpopulation) |
| Hawksbill turtle | *Eretmochelys imbricata* | Pacific West/Southeast Asia<br>Pacific Southwest, and Pacific West Central | High Risk<br>High Threat (Pacific West/Southeast Asia and Pacific West Central)<br>Low Risk<br>Low Threat (Pacific Southwest) | Low Bycatch Impact (Pacific West Central)<br>N/A Bycatch Impact (Pacific Southwest and Pacific West/Southeast Asia) | Critically Endangered |
| Loggerhead turtle | *Caretta caretta* | Pacific South (Partial overlap) | High Risk<br>High Threat | Medium Bycatch Impact | Critically Endangered (South Pacific subpopulation) |

Given the vulnerability of marine turtles to commercial fishing operations, the WCPFC has also implemented CMM 2018-04 to specifically address marine turtle bycatch while fishing within the Convention Area. Japanese vessels also fully implement the FAO Sea Turtle Guidelines (https://www.fao.org/3/i0725e/i0725e00.htm). UoA-specific management of marine turtle bycatch is to be discussed at the site visit.

CMM 2018-04 recognises that the marine turtles in the WCPFC Convention Area are threatened or critically endangered and aims to introduce measures in the high seas and EEZs of the Convention Area to reduce sea turtle bycatch and mortality. CMM 2018-04 states *inter alia* the following as applicable to longline vessels:

- CCMs will implement, as appropriate the FAO Guidelines to Reduce Sea Turtle Mortality in Fishing Operations and ensure the safe handling of all captured sea turtles, in order to improve their survival.
- CCMs shall require fishermen on vessels targeting species covered by the Convention to bring aboard, if practicable, any captured hard-shell sea turtle that is comatose or inactive as soon as possible and foster its recovery, including giving it resuscitation, before returning it to the water. CCMs shall ensure that fishermen are aware of and use proper mitigation and handling techniques, as described in WCPFC guidelines.
- CCMs with longline vessels that fish in the Convention Area shall ensure that operators of all longline vessels carry and use line cutters and de-hookers to handle and promptly release sea turtles caught or entangled, and that they do so in accordance with WCPFC guidelines. CCMs shall also ensure that operators of such vessels are, where appropriate, required to carry and use dip-nets in accordance with these WCPFC guidelines.
- Shallow setting longline vessels need to ensure that while they are fishing in the Convention Area they employ or implement at least one of the following three methods to mitigate the capture of sea turtles:

    - Use only large circle hooks;
    - Use only finfish for bait; or
    - Use any other measure, mitigation plan or activity that has been reviewed by the SC and TCC and approved by the Commission to be capable of reducing the interaction rate of turtles in shallow-set longline fisheries.
- The requirements outlined in the paragraph above are not applied to those shallow-set longline fisheries determined by the SC, (based on information provided by the relevant CCM), to have minimal levels of observed interaction rates of sea turtles over a three-year period and a level of observer coverage of at least 10% during each of those three years. Furthermore, for the purpose of implementing this provision, CCMs must establish and enforce their own definitions of shallow-set longline fisheries, large circle hooks, and any measures outlined above or adopted by the Commission ensuring that they are as enforceable as possible, and report these definitions to the Commission in Part 2 of their annual reports.
- For longline vessels to record all incidents involving sea turtles during fishing operations and report such incidents to the appropriate authorities of the CCM and in their annual reporting of Scientific Data to the Commission.
- CCMs with longline fisheries other than shallow-set fisheries are urged to undertake research trials of circle hooks and other mitigation methods in those longline fisheries.

#### 5.6.3.3 Seabirds

There was only 1 reported interaction with a seabird (brown booby) by at-sea observers between 2018 and 2019. The average annual scaled-up estimate of this in numbers between 2018 and 2020 was 14 individuals (Table 47). There was also 3 individuals recorded in the logbook between 2018 and 2020. This included 1 unidentified albatross, 1 unidentified petrel and 1 unidentified seabird (Table 47).

According to the at-sea observer data, the UoA fleet in the period between 2018 and 2019 has been operating mainly in the tropical waters of the WCPO between >= 15°S and < 10°N, which is considered a low-risk area for seabird interactions (Figure 50). This also incorporates most of the PNG EEZ (Figure 50) and likely explains why there was only one recorded individual across all observed trips. Furthermore, given that the distributions of albatrosses and large petrels, (which are the main vulnerable species susceptible to capture in pelagic longline fisheries), occur poleward of 20 degrees latitude in both hemispheres, it is unlikely that this fishery overlaps with these species. However, the team considered potential impacts of this fishery on vulnerable seabird species on a precautionary basis given the low level of at-sea observer coverage.

Filippi et al. (2010) compared the distribution of seabirds and their likelihood of capture in relation to longline fishing effort in the WCPFC 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 level impacts and the fisheries which contributed the greatest risk. The resulting areas of likely species-level effects of fishing in the WCPFC Convention Area are shown in Figure 50. It is evident on this map that this fishery operates in a low-risk area for seabird interactions.

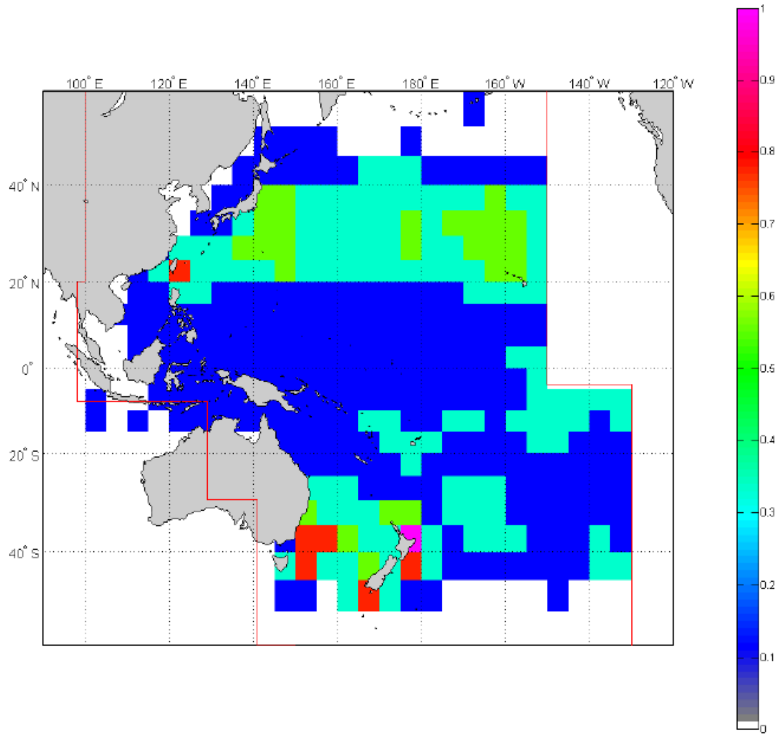


**Figure 50. Areas of likely species-level effects of fishing in the WCPFC Convention Area. Highest risk areas - pink, Medium-high - orange; Medium – green; Medium-low – pale blue; Low – dark blue; Negligible risk – White. Map adapted from** Filippi et al. (2010)**.**

In an assessment of annual mortalities of seabirds in longline and purse seine fisheries between 2015 to 2018, Peatman et al. (2019) fitted bycatch per unit effort (BPUE) and catch condition models for seabirds to obtain a "best estimate" of total seabird mortality for three regions: (i) the north Pacific - the region north of 10°N; (ii) south Pacific - the region south of 25°S; and (iii) the equatorial Pacific - the region between 10°N and 25°S. Estimated longline seabird bycatch from 2015 to 2018 was between 14,700 – 20,600 individuals per year (95% CIs ranging from 12,000 to 28,600). A total of 65% were accounted for by longline fisheries north of 20°N, with 23% accounted for by longline fisheries south of 30°S. The remainder was accounted for by fishing between 25°S and 25°N (9%), and between 25°S and 30°S (4%). The majority of bycatch was estimated to be dead at-vessel, with estimates of mortality ranging from 13,000 to 19,000 individuals per year (95% CIs ranging from 10,800 to 25,000). It was noted that the proportions dead at vessel were relatively low for the region between 25°S and 20°N (75%), compared to fishing elsewhere (95%). This provides further evidence that the UoAs are operating in a low risk area for seabird interactions.

Japan has developed a National Plan of Action (NPOA) for Seabirds, which has been implemented since 2001 (subsequently revised in 2005, 2009 and 2016) and available here: https://www.iotc.org/sites/default/files/NPOA_portal/Japan/Japan_NPOA_Seabirds_2016.pdf. UoA-specific management of seabird bycatch is to be discussed at the site visit. The WCPFC has also implemented CMM 2018-03 to specifically address seabird bycatch, while fishing within the Convention Area. It is important to note, however, that the seabird mitigation measures set forth in CMM 2018-03 only apply to longline fisheries operating South of 30°S, between 25°S and 30°S, and North of 23°N; and therefore they do not apply to the UoA fleet. Longline fisheries operating in 'other areas' (between 25°S and 23°N), where necessary, are encouraged to employ one or more of the seabird mitigation measures listed in Table 1 of the CMM (See Table 49). However this clause in CMM 2018-03 is not enforceable.

**Table 49. Seabird mitigation measures as detailed in WCPFC CMM 2018-03.**

| Column A | Column B |
|---|---|
| Side setting with a bird curtain and weighted branch lines | Tori line |
| Night setting with minimum deck lighting | Blue-dyed bait |
| Tori line | Deep setting line shooter |
| Weighted branch lines | Management of offal discharge |
| Hook-shielding devices | |

#### 5.6.3.4 Cetaceans

Five interactions with cetaceans were observed in the at-sea observer data from the UoA fleet between 2018 and 2019. All of these were with unidentified toothed whales. The average annual scaled-up estimate of these cetaceans, in numbers between 2018 and 2019 was 70 individuals.

There are two main types of interaction between cetaceans and longlines: depredation and capture via hooking and entanglement, the latter often following on from the former (Anderson R.C, 2014; Gilman et al., 2007; Williams et al., 2021). Although relative to other fishing gear, longline fishing generally does not pose as much of a threat, many individuals suffer mortality and serious injury as a result of the interactions (Gilman et al., 2006, Garrison, 2007 cited in Werner et al. (2015)). An investigation of observer-reported cetacean interactions in the WCPFC for the period 2015-2020 by Williams et al. (2020, 2021) identified that in longline fisheries the top five interactions (based on frequency of interactions per 100 sets) were false killer whale (*Pseudorca crassidens*), toothed whales, and several species of oceanic dolphins (bottlenose, rough-toothed and Risso's) (See Figures below). For all reported interactions 95% were sightings beside the vessel without interacting with the gear and for the 5% that did interact with the gear, around 84% of individuals were released alive (Williams et al., 2021).

The WCPFC currently does not have any management or requirements regarding cetaceans in their longline fisheries. However, the WCPFC through CMM 2011-03 does have management measures and requirements for purse seine fisheries. In 2021, both the WCPFC SC and TCC reviewed a draft best handling practices for the safe handling and release of both large and small cetaceans (WCPFC-SC17, 2021/EB-WP-02), which were endorsed and will be considered at WCPFC 18 in December 2021 for endorsement. UoA specific management of cetaceans remains to be discussed.

Despite a lack of specific longline management at the regional level, the Pacific Islands where the fishery also operates (in PNG EEZ) are signatories to the *Memorandum of Understanding (MoU) for the Conservation of Cetaceans and their Habitats in the Pacific Island Region* (15 September 2006) (see: https://www.sprep.org/attachments/Legal/CMS_Pacific_Cetaceans_MoU__annexes_E.pdf), which is a Multilateral Environmental MoU concluded under the auspices of the *Convention on the Conservation of Migratory Species of Wild Animals* (CMS or Bonn Convention) and protects all populations of cetaceans (whales and dolphins) in the Pacific Island Region (area between the Tropic of Cancer and 60° South latitude and between 130° east longitude and 120° West longitude). Although Japan is not a signatory, it is bound to follow the conditions and indeed management set by the authorities for the waters in which their distant water fleet operate.

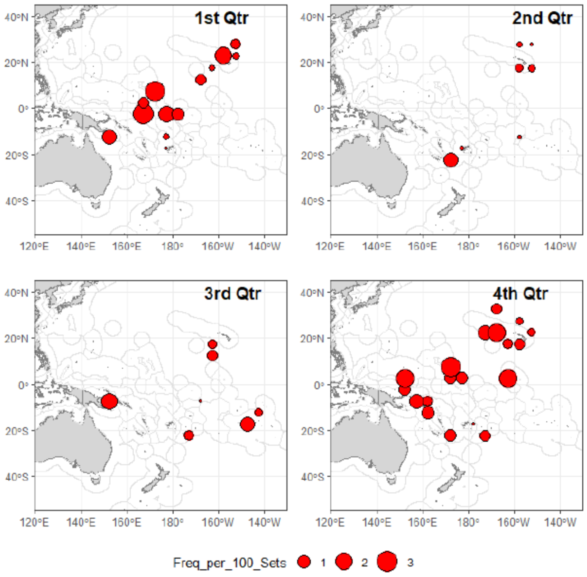


**Figure 51. Interactions (frequency per 100 sets) with killer whales in the WCPFC longline fishery between 2015-2020. Adapted from** Williams et al. (2020)

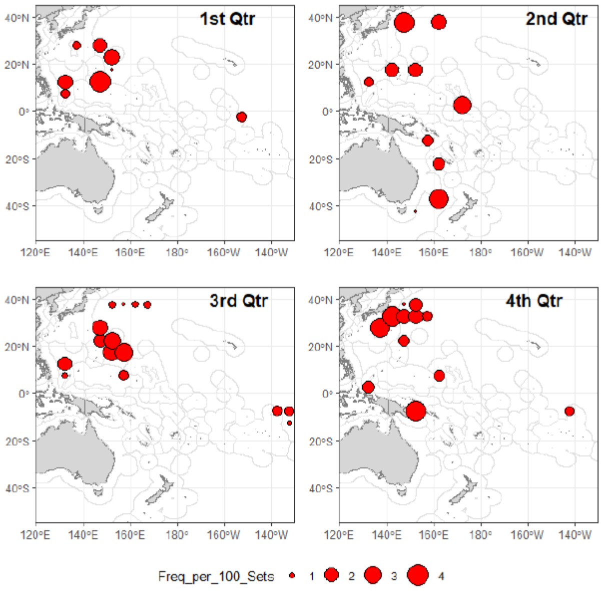


**Figure 52. Interactions (frequency per 100 sets) with toothed whales in the WCPFC longline fishery between 2015-2019. Adapted from** Williams et al. (2020)

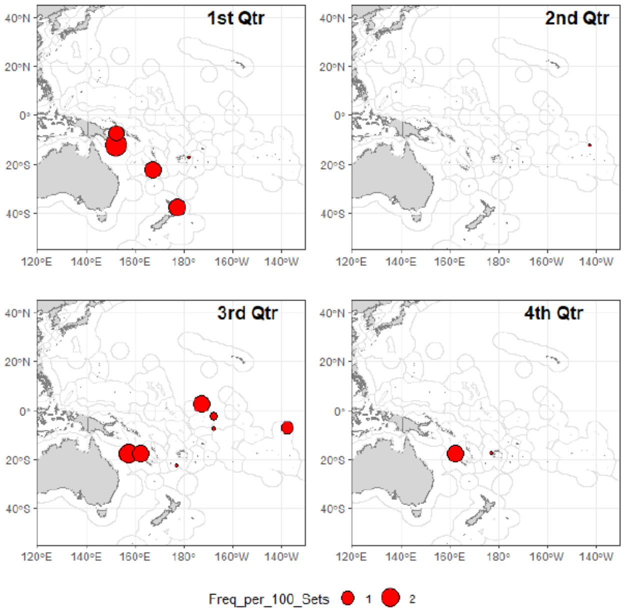


**Figure 53. Interactions (frequency per 100 sets) with short-finned pilot whales in the WCPFC longline fishery between 2015-2019. Adapted from** Williams et al. (2020)

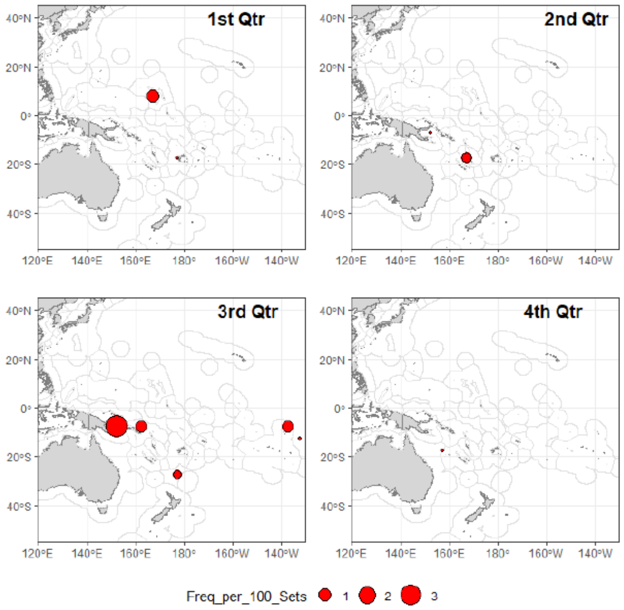


**Figure 54. Interactions (frequency per 100 sets) with melon-headed whales in the WCPFC longline fishery between 2015-2019. Adapted from** Williams et al. (2020)

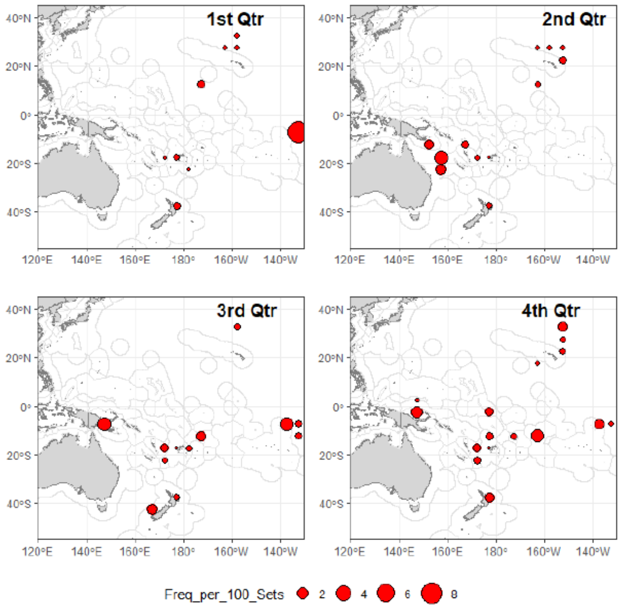


**Figure 55. Interactions (frequency per 100 sets) with oceanic dolphins in the WCPFC longline fishery between 2015-2019. Adapted from** Williams et al. (2020)

### 5.6.4 Habitats

The habitat under consideration in this assessment is the tropical pelagic Pacific Ocean.

The MSC FCR v2.01 requires habitats interacting with the fishery to be defined as 'commonly-encountered', 'VME' or 'minor', with definitions as given in Table 50.

**Table 50. Habitat definitions as per the MSC Fisheries Certification Requirements v2.01.**

| FCR reference | Definition |
|---|---|
| **SA3.13.3.1** | A commonly encountered habitat shall be defined as a habitat that regularly comes into contact with a gear used by the UoA, considering the spatial (geographical) overlap of fishing effort with the habitat's range within the management area(s) covered by the governance body(s) relevant to the UoA. |
| **SA3.13.3.2** | A Vulnerable Marine Ecosystem (VME) shall be defined as is done in paragraph 42 subparagraphs (i)-(v) of the FAO Guidelines (definition provided in GSA3.13.3.2). This definition shall be applied both inside and outside EEZs and irrespective of depth. |
| **GSA3.13.3.2** | VMEs have one or more of the following characteristic, as defined in paragraph 42 of the FAO Guidelines:<br>Uniqueness or rarity – an area or ecosystem that is unique or that contains rare species whose loss could not be compensated for by similar areas or ecosystems<br>Functional significance of the habitat – discrete areas or habitats that are necessary for survival, function, spawning/ reproduction, or recovery of fish stocks; for particular life-history stages (e.g., nursery grounds, rearing areas); or for ETP species<br>Fragility – an ecosystem that is highly susceptible to degradation by anthropogenic activities<br>Life-history traits of component species that make recovery difficult – ecosystems that are characterised by populations or assemblages of species that are slow growing, are slow maturing, have low or unpredictable recruitment, and/or are long lived |

| FCR reference | Definition |
|---|---|
| | Structural complexity – an ecosystem that is characterised by complex physical structures created by significant concentrations of biotic and abiotic features |
| **N/a** | Minor habitats are those that do not meet the above definitions. |

All of the UoAs fishing operations in the WCPO occur in pelagic waters and gear is not expected to contact with any substrata (seafloor, seamount, corals, etc.), nor do they have any impact on any physical habitat during operations. As such, the water column (epipelagic zone) is the only habitat to be considered potentially impacted and it is not considered a Vulnerable Marine Ecosystem (VME).

A single set by vessels in the client fleet usually consists of a mainline that is 90 to 110 km line in length, with an average 40 m branchlines attached at intervals along the length of the line. The distance between floats is about 1km. The depth of the shallowest hook is at approx. 100m and deepest hook at about 300m. There are usually around 16-20 hooks deployed between floats (to be confirmed by the client). The lines are designed only for use in the water column, and do not come into contact with the seabed. Therefore the UoA fleet is confined mostly to operating in the epipelagic habitat (top 200m of the water column).

The issue of unobserved mortality due to ghost fishing caused by discarded or lost fishing gear (monofilament line and hooks) needs to be considered. Currently, information on the proportion of hooks that are lost at sea (via bite-offs of terminal tackle or loss of complete branch lines) is not routinely collected in logbooks or by at-sea observers. Hook loss is estimated to be about XXX hooks per vessel, per day. Therefore, gear loss expressed as mainline, branchline and hook replacements, as well as gear marking (e.g. the use of radio buoys) will need to be discussed further at the site visit.

In any case, lost pelagic longline gear is only likely to continue to fish as long as bait remains on the hooks. Bait tends to be stripped relatively quickly off the hooks and as such, the ghost fishing mortality rate associated to lost longlines is usually low (Macfadyen et al., 2009).

Furthermore, under CMM 2017-04, CCMs are required to encourage their fishing vessels within the WCPFC Convention Area to retrieve abandoned, lost or discarded fishing gear and retain the material on board, separate from other waste for discharge to port reception facilities. Where retrieval is not possible or does not occur, CCMs shall encourage their fishing vessels to report the latitude, longitude, type, size and age of abandoned, lost or discarded fishing gear.

### 5.6.5 Ecosystem

The UoA fleet is operating across different ecological provinces in the tropical areas of the Pacific Ocean (Figure 56) including in the Western Pacific Warm Pool (Warm Pool), Archipelagic Deep Basins (ARCH) and the Pacific Equatorial Divergence (PEQD). The Warm Pool, which represents the western boundary of the South Pacific Subtropical Gyre is characterised by low salinity, low nitrates, low macronutrients and therefore low primary productivity, but is where the majority of tuna in the Pacific Ocean is caught. Le Borgne et al. (2011) discuss how in the PEQD, nutrient-rich water is brought to the surface from the Equatorial Undercurrent (EUC) and is carried poleward until sinking occurs at the convergences between the South Equatorial Current (SEC) and South Equatorial Counter Current (SECC), and with the SEC and North Equatorial Counter Current (NECC). The SEC further carries the water from the EUC upwelling to the west, where they meet with the Warm Pool.

Along with the water converging between the PEQD and Warm Pool, there is also a transfer of phytoplankton and other particles.

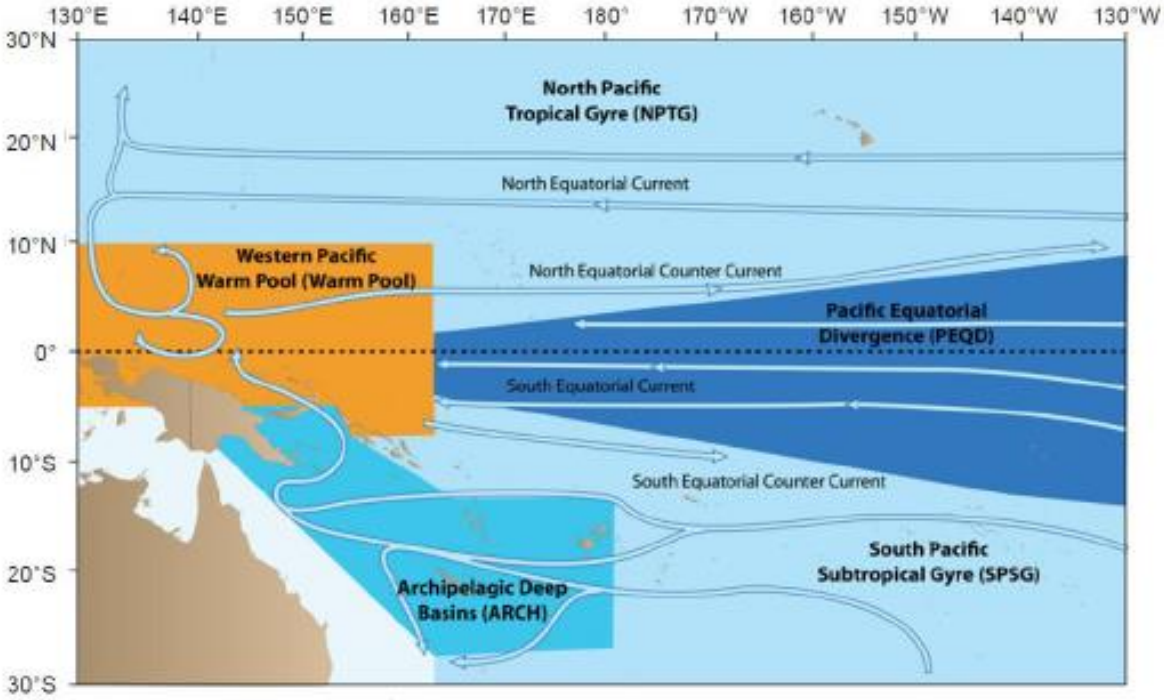


**Figure 56. The five ecological provinces of the tropical Pacific Ocean. According to the at-sea observer data the UoA fleet is operating mainly within the Western Pacific Warm Pool (Warm Pool) and the Pacific Equatorial Divergence (PEQD). Source: Le Borgne et al. (2011).**

In addition to the flux between the PEQD and Warm Pool, the equatorial Pacific Ocean is strongly influenced by the El Niño Southern Oscillation (ENSO), which is the main cause of variability in both environmental factors such as sea surface temperatures, and the spatial distribution of tuna (Lehodey, 2004). El Niño events in the central (and eastern) tropical Pacific are typically associated with decreases in primary productivity, which corresponds to increases in productivity in the western tropical Pacific (Brainard et al., 2018). El Niño events have been documented to cause a cessation of upwelling, leading to extended periods of low chlorophyll-*a*, and heightened sea surface temperatures Pacific (Brainard et al., 2018) causing tuna to migrate to the east in El Niño years (Lehodey et al., 1997) and has been linked to significant variations in tuna catches throughout the tropical Pacific (Lehodey et al., 1997).

In the Pacific Ocean, exploited tuna populations have declined steadily to levels near the equilibrium biomass that is likely to produce MSY for each stock (See [https://www.wcpfc.int/current-stock-status-and-advice](https://www.wcpfc.int/current-stock-status-and-advice)). The impacts of this fishery under assessment on primary and secondary species, ETP species as well as habitats have all been considered and described in earlier sections of this report with further information available in the Ecosystem scoring tables. However, other risks exist and further impacts of the fishery may still arise at a higher ecosystem level, most notably those risks to ecosystem structure and function. All the target species in this fishery (albacore, yellowfin and bigeye tuna) are considered second tier, high-level trophic predators, all of which are opportunistic carnivores with high degrees of trophic interaction and diet overlap (Kitchell et al., 1999). They therefore play an ecologically important role in the food chain and influence the overarching ecosystem structure and function (Cox et al., 2002; Sibert, Hampton, Kleiber, &

Maunder, 2006, as referenced in Erauskin-Extramiana et al. (2019)). The “Warm Pool” Ecosim simulation by Allain et al. (2007) highlighted bigeye, yellowfin and other top predators’ vulnerability to fishing, with biomass increasing dramatically in the simulation which removed all fishing pressure. Allain et al. (2012) later constructed a trophic mass-balance ecosystem model using Ecopath with Ecosim software. The authors demonstrated that the ecosystem responds to both top-down and bottom-up processes, and has the characteristics of a complex form of ‘wasp-waist’ structure where the majority of the system’s biomass is comprised of mid-trophic level groups. Significant complexity was further added through the effects of climate change, including increased sea surface temperature leading to changes in ocean stratification dynamics and changes in the depth of the thermocline. On their own and not taking into account fisheries pressure, these drivers have the ability to cause large and unpredictable changes to the biomasses of groups in both higher and lower trophic levels, and thus change the overall integrity of the ecosystem structure.

Given the likelihood that industrial tuna fisheries have altered the structure and function of the ecosystem in the WCPO through the removal of key predator species, it is important to determine how much could be removed before cascading effects occur and whether there are clear thresholds for large-scale ecosystem transformations (Baum & Worm, 2009). The ecosystem roles of the target species in this assessment: bigeye, albacore and yellowfin tuna are not explicitly considered within management decisions by the WCPFC, but the overarching goal of managing to MSY levels (or above) implicitly takes this into account assuming ecosystem stability. The assessment team therefore considered the stock biomass in relation to the point of recruitment impairment (PRI), MSY and any other relevant target and limit reference points to inform the likelihood of irreversible ecosystem impacts occurring.

It is also important to note that there is evidence to suggest that ecosystem impacts caused by commercial fishing are not serious or irreversible. For example, Allain et al. (2007) found that most species rebuilt to virgin biomass after five years of no fishing. A further study by Allain et al. (2015) using Ecopath with Ecosim on a more restricted area of the warm pool pelagic ecosystem (Figure 56) that overlapped with the PNG EEZ explored nine different scenarios of fishing effort to show that the warm pool ecosystem structure is resistant to considerable perturbation (e.g. changes in the harvest of the surface fish community). The intrinsic resistance of the ecosystem to perturbation appears to be related to the high diversity of predators in the food web that consume a wide range of prey species. The structure of the ecosystem was most sensitive to changes in the biomass of prey groups (e.g. small pelagic fish).

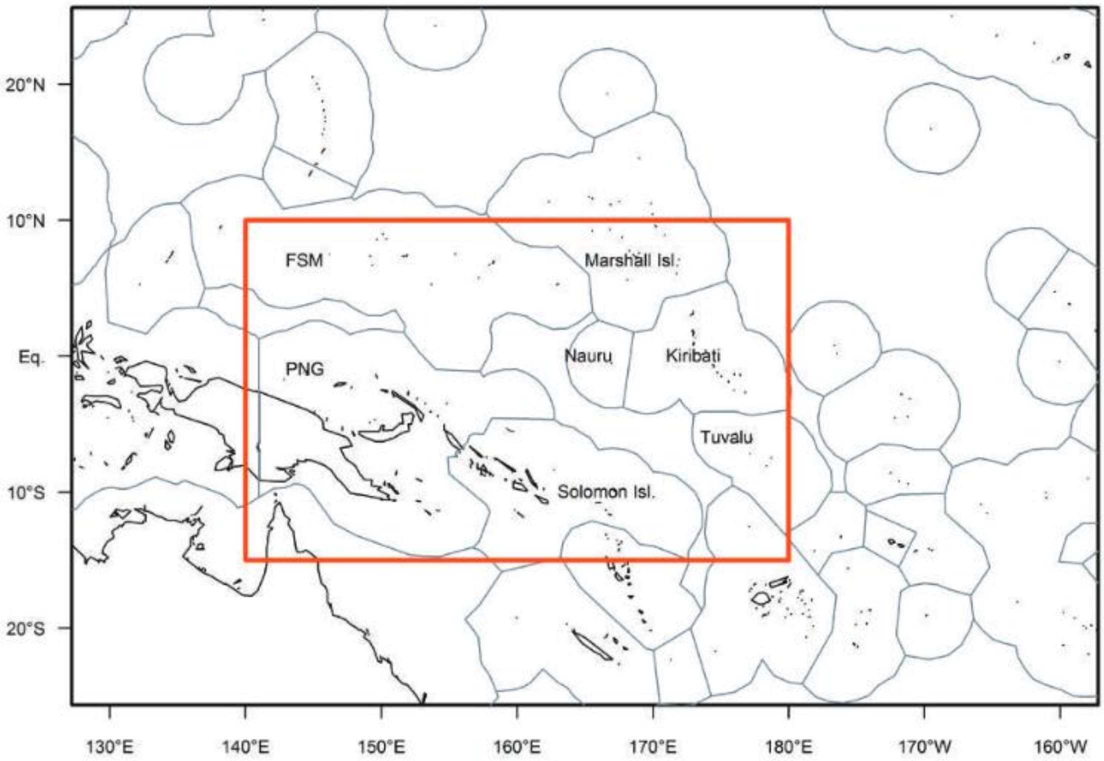


**Figure 57. The boundaries of the area covered by the "Warm Pool" ecosystem model, and the exclusive economic zones of the countries included in the model (FSM = Federate States of Micronesia, PNG= Papua New Guinea). Source:** Allain et al. (2015)**.**

### 5.6.6 Cumulative impacts

The MSC introduced requirements for cumulative impact assessments in Principle 2 with the release of the Fisheries Certification Requirements v2.0. These requirements are to ensure that MSC certified fisheries will no longer cumulatively be at risk of generating negative impacts on Principle 2 species (and habitat).

- For primary species, cumulative impacts assess whether the collective impact of overlapping MSC fisheries are hindering the recovery of 'main' primary species that are below a point of recruitment impairment (PRI); i.e. ensuring that the combined impact of MSC fisheries are not harming the recovery of the stock; if relevant this is scored at PI 2.1.1 SIa SG80.
- For secondary species, the same intent applies when a species is below a biologically based limit, but only in cases where two or more MSC fisheries have 'main' catches that are 'considerable', defined as a species being ten per cent or more of the total catch; if relevant this is scored at PI 2.2.1 SIa SG80.
- For ETP species, the combined impacts of MSC fisheries on all ETP species needs to be evaluated, but only in cases where either national and/or international requirements set catch limits for ETP species and only for those fisheries subject to the same national legislation or within the area of the same binding agreement'; if relevant this is scored at PI 2.3.1 SIa SG80.
- For habitats, in contrast, cumulative impacts are evaluated in the management PI (PI 2.4.2). The requirements here aim to ensure that the impacts of all fisheries (including

non-MSC fisheries) on habitats, including vulnerable marine ecosystems (VMEs), are managed cumulatively to ensure serious and irreversible harm does not occur; this is scored for all fisheries and habitat types at SIa SG100. If relevant, there is also consideration of the UoA's compliance with VME management measures established by other fisheries at SId SG80.

The results of the cumulative impact analysis for this fishery is found below in Table 51.

**Table 51. Cumulative impact assessment for overlapping MSC fisheries**

| Outcome PI | Element | Cumulative impact? | Rationale |
|---|---|---|---|
| **Primary species (main)** | WCPO yellowfin tuna | No | Not below PRI |
| | WCPO bigeye tuna | No | Not below PRI |
| | North Pacific albacore tuna | No | Not below PRI |
| | South Pacific albacore tuna | No | Not below PRI |
| | South American pilchard (Japanese Pacific) | No | Not below PRI |
| | South American pilchard (Japanese Tsushima) | Yes | Below PRI; cumulative impact assessment triggered |
| **Secondary species (main)** | Pacific blue marlin | No | Not below PRI |
| | Blue shark | No | Not below PRI |
| | Amberstripe scad | No | Not below PRI, based on PSA result (preliminary scoring) |
| | Smoothbelly sardinella | No | Not below PRI, based on PSA result (preliminary scoring) |
| **ETP species** | Green turtle | No | There are currently no national and/or international requirements setting catch limits for marine turtles in the WCPO. No retention policy does not constitute a "limit |
| | Olive ridley turtle | No | |
| | Leatherback turtle | No | |
| | Hawksbill turtle | No | |
| | Loggerhead turtle | No | |
| | Albatrosses | No | No limit in place |
| | Petrels | No | No limit in place |
| | Brown booby | No | No limit in place |
| | Silky shark | No | No limit in place |
| | Oceanic whitetip shark | No | No limit in place |
| | Giant devil ray | No | No limit in place |
| | Devil and manta rays | No | No limit in place |
| | Toothed whales | No | No limit in place |
| **Habitats** | N/A | N/A | This fishery does not interact with any benthic habitats |

### 5.6.7 Scoring elements

**Table 52. Principle 2 scoring elements**

| Component | Scoring elements | Designation | Data-deficient |
|---|---|---|---|
| **Primary species** | Western Central Pacific yellowfin | Main | No |
| | Western Central Pacific bigeye | Main | No |
| | North Pacific albacore | Main | No |
| | South Pacific albacore | Main | No |
| | South American Pilchard (Japanese Pacific) | Main | No |
| | South American Pilchard (Japanese Tsushima) | Main | No |
| | Western Central Pacific Skipjack | Minor | No |
| | Southwest Pacific Swordfish | Minor | No |
| | Argentine shortfin squid | Minor | No |
| **Secondary species** | Pacific Blue Marlin | Main | No |
| | Blue Shark | Main | No |
| | Smoothbelly sardinella | Main | Yes (RBF applied) |
| | Amberstripe Scad | Main | Yes (RBF applied) |
| | Table 45 | Minor | Some, although no RBF applied which caps the score at 80. |
| **ETP species** | Green turtle | N/a | No |
| | Olive ridley turtle | N/a | No |
| | Leatherback turtle | N/a | No |
| | Hawksbill turtle | N/a | No |
| | Loggerhead turtle | N/a | No |
| | Albatrosses | N/a | No |
| | Petrels | N/a | No |
| | Brown booby | N/a | No |
| | Silky shark | N/a | No |
| | Oceanic whitetip shark | N/a | No |

| | | | |
|---|---|---|---|
| | Giant devil ray | N/a | No |
| | Devil and manta rays | N/a | No |
| | Toothed whales | N/a | No |
| **Habitats** | Water column (epipelagic habitat) | Commonly encountered | No |

### 5.6.8 Principle 2 Performance Indicator scores and rationales

**Scoring table 20. PI 2.1.1 – Primary species outcome**

| PI 2.1.1 | | The UoA aims to maintain primary species above the point where recruitment would be impaired (PRI) and does not hinder recovery of primary species if they are below the PRI | | |
|---|---|---|---|---|
| Scoring Issue | | SG 60 | SG 80 | SG 100 |
| **a** | Main primary species stock status | | | |
| | Guide post | Main primary species are **likely** to be above the PRI.<br>OR<br>If the species is below the PRI, the UoA has measures in place that are expected to ensure that the UoA does not hinder recovery and rebuilding. | Main primary species are **highly likely** to be above the PRI.<br>OR<br>If the species is below the PRI, there is either **evidence of recovery** or a demonstrably effective strategy in place **between all MSC UoAs which categorise this species as main**, to ensure that they collectively do not hinder recovery and rebuilding. | There is a **high degree of certainty** that main primary species are above the PRI **and are** fluctuating around a level consistent with MSY. |
| | Met? | All scoring elements – Yes | All scoring elements – Yes | WCPO yellowfin – Yes<br>WCPO bigeye – Yes<br>SP Albacore – Yes<br>NP Albacore – Yes<br>SA pilchard (Japanese Pacific) – No<br>SA pilchard (Japanese Tsushima) – No |

**Rationale**

Based on the scaled average observer values, logbook and bait data, the main primary species in this assessment include WCPO yellowfin, WCPO bigeye and SP and NP albacore tuna and South American pilchard. The tuna species are included here as SA 3.1.3.1 requires that primary species in Principle 2 must be assigned to species in the catch that are not covered under Principle 1 because they are not included in the UoAs. More specifically, yellowfin tuna is a target (P1) species in UoAs 1,2 and a component of the non-target (P2) catches in UoAs 3,4,5,6,7 and 8. Bigeye tuna is a target (P1) species in UoAs 3,4 and a component of the non-target (P2) catches in UoAs

1,2,5,6,7 and 8. North Pacific albacore tuna is a a target (P1) species in UoAs 5,6 and a component of the non-target (P2) catches in UoAs 1,2,3,4,7 and 8. South Pacific albacore tuna is a a target (P1) species in UoAs 7,8 and a component of the non-target (P2) catches in UoAs 1,2,3,4,5 and 6.

WCPO bigeye, yellowfin tuna and SP and NP albacore

- WCPO bigeye tuna – see Section 5.5.2 and commentary under PI 1.1.1 scoring. There is a high degree of certainty that the stock is above the PRI, and it is considered to be at or around a level consistent with MSY. **SG60, SG80 and SG100 are met.**
- WCPO yellowfin tuna - see Section 5.5.1 and commentary under PI 1.1.1 scoring. There is a high degree of certainty that the stock is above the PRI and above a level consistent with MSY. **SG60, SG80 and SG100 are met**.
- SP albacore tuna – see Section 5.5.3.2 and commentary under PI 1.1.1 scoring. There is a high degree of certainty that the stock is above the PRI, and it is considered to be at or around a level consistent with MSY. **SG60, SG80 and SG100 are met**.
- NP albacore tuna - see Section 5.5.4 and commentary under PI 1.1.1 scoring. There is a high degree of certainty that the stock is above the PRI and above a level consistent with MSY. **SG60, SG80 and SG100 are met.**

South American pilchard (Japanese Pacific and Tsushima stocks)

This species is made up of two stocks (Kuroshio, or Pacific Ocean, and Tsushima, or East Chinese Sea and Japan Sea). According to the information provided by the client the bait is being supplied from Japan who harvest South American Pilchard. Need to determine what specific stock the client is sourcing bait from.

Both stocks are assessed annually by the Fisheries Research and Education Agency of Japan (FRA) and are managed through a TAC, termed allowable biological catches (ABCs). To determine stock status, assessment scientists use cohort analysis to estimate biomasses at age and evaluate spawning stock biomass (SSB) against a target reference point (TRP) aiming to achieve MSY ($SSB_{MSY}$) set at 1,187,000 t (Pacific stock) and 1,093,000 t (Tsushima stock) with the respective limit reference points (LRPs) set at 60% of MSY. This LRP was the estimated SSB level below which recruitment is thought to be poor (Yukami et al., 2017) - i.e. this is a suitable proxy for the PRI.

The latest assessment conducted for the **Pacific stock** was in 2021 (FRA, 2021a). The catch in 2020 was 622,000 t which was an increase from 521,000 t in 2019 (FRA, 2021a).
It is evident that in many early years fishing mortality (F) exceeded $F_{MSY}$ at which $SSB_{MSY}$ is achieved but since 2012 has decreased to around $F_{MSY}$ with a slight increase in 2020, resulting in the SSB increasing and exceeding $SSB_{MSY}$ since 2017 (1.45 in 2020 $SB_{2020}/SB_{MSY}$). Trends in spawning stock biomass suggest the stock is increasing (FRA, 2021a). This provides confidence that the stock is highly likely above biologically based limits such **that SG60 and SG80 are met**. Projections indicate a 55% probability that the stock will remain near the TRP by 2031 if fishing mortality is set at 1.2 until 2023 and then remains around 0.85 $F_{MSY}$ (FRA, 2021a).Given current (2020) fishing mortality is above 0.85 $F_{MSY}$ and the population dynamics of this stock, particularly recruitment, are strongly linked to oceanographic variables, which fluctuate on decadal timescales, there is not a high degree of certainty that the SSB will fluctuate around a level consistent with MSY and the TRP. **SG100 is not met**.

The latest assessment conducted for the **Tsushima stock** was in 2021 (FRA, 2021b). The catch in 2020 was estimated at 73,000 t, which was a sharp increase from 14,000 t in 2019 (FRA, 2021b). It is evident that in many years fishing mortality (F) exceeded $F_{MSY}$ at which $SSB_{MSY}$ is achieved and as a result the level of spawning stock is currently lower than that to achieve MSY (0.22 in 2020 $SSB_{2020}/SSB_{MSY}$). Trends in spawning stock biomass suggest it has remained at low levels since 1994 (FRA, 2021b). Thus, the stock is currently below the PRI and the first part of SG60 and SG80 is therefore not met. Fishing mortality has been slightly higher than $F_{MSY}$ in recent years but declined to a level significantly lower than $F_{MSY}$ in 2019 (0.19 in 2019 -$F_{2019}/F_{MSY}$) before increasing in 2020 to slightly lower than $F_{MSY}$.

As outlined by GSA 3.4.6 this is an indication of "evidence of recovery". However, for P2 primary species at the SG80 level, the assessment team needs to "evaluate whether the cumulative impact of overlapping MSC UoAs hinders the recovery of "main" primary species." Other MSC UoAs which classified this bait (South American Pilchard/Japanese Sardine) as a main species include the Kiribati albacore, bigeye, and yellowfin tuna longline fishery (Gascoigne et al., 2021), DFC/HEC Western and Central Pacific longline bigeye, yellowfin and albacore tuna fishery (Sieben et al, 2021), Japanese pole and line skipjack and albacore tuna fishery (Akroyd & McLoughlin, 2021), Tri Marine Atlantic albacore longline fishery (DiNardo et al., 2021a) and Owasebussan Co. Ltd. North Pacific longline for albacore, yellowfin & bigeye tuna (DiNardo et al., (2021b). Average annual bait use between 2018 and 2020 was 114 t in this fishery under assessment. DiNardo et al (2021a) reported bait use of 3,038 t annually, DiNardo et al. (2021b) reported bait use of 19.9 t annually, Sieben et al. (2021) reported bait use of 278 t annually, Akroyd & McLoughlin, (2021) reported bait use of 70.8 t annually and Gascoigne et al. (2021) reported bait use at around 185-241 t annually (this is to be confirmed at the site visit). Assuming this all came from the Tsushima stock, this comes out at around 5% of the total catch in 2020. This is below the 30% guideline set by the MSC for determining if the UoA combined catches are hindering recovery in a marginal sense under GSA 3.4.6. **SG60 and SG80 are met**. However, because the stock is below the PRI, **SG100 is not met**. Note: this scoring is preliminary until other MSC UoA bait quantities and source stock can be verified at the site visit.

In relation to the unobserved mortality of main primary species, the team considered the possible issue of ghost fishing caused by discarded or lost fishing gear (monofilament line and hooks). Gear loss is reportedly minimal (mainly limited to hooks that have been lost to sharks). The use of radio beacons and GPS on the mainline mean they are often able to be located even if the mainline breaks when hauling or otherwise. The assessment team therefore concluded that the incidence of gear loss is rare. This conclusion remains to be confirmed. In any case, lost pelagic longline gear is only likely to continue to fish as long as bait remains on the hooks. Bait tends to be stripped relatively quickly off the hooks and as such, the ghost fishing mortality rate associated to lost longlines is usually low (Macfayden et al., 2009). Under CMM 2017-04, CCMs should encourage their fishing vessels within the WCPFC Convention Area to retrieve abandoned, lost or discarded fishing gear and retain the material on board, separate from other waste for discharge to port reception facilities. Where retrieval is not possible or does not occur, CCMs shall encourage their fishing vessels to report the latitude, longitude, type, size and age of abandoned, lost or discarded fishing gear. It was therefore concluded that unobserved mortality through ghost fishing at the scale of the UoA was highly unlikely to be a significant factor in the fishery's interactions with main primary species to the extent that this will have stock-level effects. This conclusion remains to be confirmed.

| | | | | |
|---|---|---|---|---|
| **b** | Minor primary species stock status | | | |
| | Guide<br>post | | | Minor primary species are highly likely to be above the PRI.<br>OR<br>If below the PRI, there is evidence that the UoA does not hinder the recovery and rebuilding of minor primary species. |

| | Met? | All scoring elements – Yes |
|---|---|---|

**Rationale**

Based on the scaled average observer values, logbook and bait data, the minor primary species in this assessment include South Pacific swordfish, skipjack tuna and Argentine shortfin squid. The status for each stock is summarised in the table below. All stocks are above the PRI. **SG100 is therefore met**.

In relation to the unobserved mortality of minor primary species, the team considered the possible issue of ghost fishing caused by discarded or lost fishing gear (monofilament line and hooks). Gear loss is reportedly minimal (mainly limited to hooks that have been lost to sharks) This conclusion remains to be confirmed. The use of radio beacons and GPS on the mainline mean they are often able to be located even if the mainline breaks when hauling or otherwise. The assessment team therefore concluded that the incidence of gear loss is rare. This conclusion remains to be confirmed. In any case, lost pelagic longline gear is only likely to continue to fish as long as bait remains on the hooks. Bait tends to be stripped relatively quickly off the hooks and as such, the ghost fishing mortality rate associated to lost longlines is usually low (Macfayden et al. , 2009). It was therefore concluded that unobserved mortality through ghost fishing at the scale of the UoA was highly unlikely to be a significant factor in the fishery's interactions with minor primary species to the extent that this will have stock-level effects. This conclusion remains to be confirmed

| **Stock** | **Highly likely to be above PRI?** | **Evidence that the UoA does not hinder the recovery or rebuilding?** | **Reference** |
|---|---|---|---|
| Argentine shortfin squid | Yes. The management objective is to allow for a sufficient number of spawners to escape to ensure good recruitment the next year (this is set at 40% and is an appropriate proxy for PRI). The 2019 Falkland Islands stock assessment used a depletion time-series model to identify that the maximum likelihood estimate of Argentine shortfin squid in the survey area decreased from 263,440 t (95% CI 152,310 to 451,860 t) in week 1 (commencing 1 January 2019) to 57,022 t (15,426 to 123,956 t) in week 22 (ending 31 May, 2019). Assuming the estimated starting biomass (263,440 t) is representative of the entire Argentine shortfin squid, then the 2019 catch of 134,468 t (91,077 t -Argentine fisheries and 43,392 t Falkland Island fisheries) equated to an escapement rate of 49% (128,972 t). It is therefore above the PRI based on latest information. | N/A | Winter (2019) |
| Southwest Pacific swordfish | Yes. Latest assessment in 2021 indicates the stock is above both the $SB_{MSY}$ and the biomass LRP (applied to tunas) and | N/A | Ducharme-Barth et al. (2021) |

| **Stock** | **Highly likely to be above PRI?** | **Evidence that the UoA does not hinder the recovery or rebuilding?** | **Reference** |
|---|---|---|---|
| | recent fishing mortality is below $F_{MSY}$. Estimates of depletion ($SB/SB_{F=0}$) over the recent period were 0.39 (0.18-0.79 – 10th and 90th percentiles) with a 13% risk the stock is below 20% $SB_{F=0}$. Recent fishing mortality is estimated to be below $F_{MSY}$ ($F_{recent}/F_{MSY}$ median 0.47; 0.25 – 1.29, 10th and 90th percentiles) with a 20% risk of $F_{recent}$ exceeding $F_{MSY}$. The stock is estimated to have spawning potential above the MSY level ($SB_{latest}/SB_{MSY}$ median 2.95; 0.99 – 6.78, 10th and 90th percentiles) with a 10% risk of $SB_{latest}$ being below $SB_{MSY}$. | | |
| WCPO skipjack | Yes. Latest assessment in 2019 indicates the stock is above the adopted LRP and fished at rates below $F_{MSY}$ with 100% probability. Estimates of depletion ($SB/SB_{F=0}$) over the recent period 2015-2018 was 0.44 (0.36-0.52 – 80th percentile) for the 8 region model and 0.40 (0.30-0.50 – 80th percentile) for the 5 region model. Fishing mortality ($F/F_{MSY}$) on the stock averaged $F$=0.44 (0.34-0.61 - 80th percentile) during 2014-2017 for the 8 region model and $F$=0.48 (0.35-0.66 – 80th percentile) for the 5 region model. | N/A | Vincent et al. (2019) |

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| | |
|---|---|
| Draft scoring range | All UoAs: ≥80 |
| Information gap indicator | More information sought:<br>- the specific stock of South American pilchard being used as bait: is it Japanese Pacific or Japanese Tsushima? The information provided by client suggests they are sourcing bait from Japan but further information is needed to determine exact stock, in its absence we score both of them.<br>- Overlapping UoAs to be identified and finalised to complete scoring of South American pilchard. |

| | |
|---|---|
| | - Information regarding gear loss (hooks, mainlines) to be obtained. |

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

**Scoring table 21. PI 2.1.2 – Primary species management strategy**

| PI 2.1.2 | | There is a strategy in place that is designed to maintain or to not hinder rebuilding of primary species, and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch | | |
|---|---|---|---|---|
| Scoring Issue | | SG 60 | SG 80 | SG 100 |
| **a** | Management strategy in place | | | |
| | Guide post | There **are measures** in place for the UoA, if necessary, that are expected to maintain or to not hinder rebuilding of the main primary species at/to levels which are likely to be above the PRI. | There is a **partial strategy** in place for the UoA, if necessary, that is expected to maintain or to not hinder rebuilding of the main primary species at/to levels which are highly likely to be above the PRI. | There is a **strategy** in place for the UoA for managing main and minor primary species. |
| | Met? | All scoring elements – Yes | All scoring elements – Yes | WCPO yellowfin – Yes<br>WCPO bigeye – Yes<br>SP Albacore – Yes<br>NP Albacore – Yes<br>SA pilchard (Japanese Pacific) – Yes<br>SA pilchard (Japanese Tsushima) – Yes<br>Minor species – No |

**Rationale**

In the context of this performance indicator (Source: MSC FCR v2.01; Table SA8):

- "Measures" are actions or tools in place that either explicitly manage impacts on the component or indirectly contribute to management of the component under assessment having been designed to manage impacts elsewhere.

- A "partial strategy" represents a cohesive arrangement which may comprise one or more measures, an understanding of how it/they work to achieve an outcome and an awareness of the need to change the measures should they cease to be effective. It may not have been designed to manage the impact on that component specifically.

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

Main primary species are as follows:

- WCPO yellowfin tuna
- WCPO bigeye tuna
- SP albacore tuna
- NP albacore tuna
- South American pilchard (Japanese Pacific and Tsushima stocks)

WCPO bigeye, yellowfin tuna and SP albacore

CMM 2014-06 commits WCPFC to putting in place a formal harvest strategy for its key tuna stocks (WCPO skipjack, yellowfin and bigeye, and SP albacore), with an associated workplan, the latest version of which was drafted in 2021 at WCPFC 18 (See: https://meetings.wcpfc.int/node/11954).

Currently, WCPO yellowfin, skipjack and bigeye are managed through CMM 2018-01, which is intended as a "bridging measure" while work continues towards a formal harvest strategy (its timeframe was later extended through CMM 2020-01 until 15 February 2022). The objective of CMM 2020-01 for WCPO bigeye and yellowfin are to ensure that (pending agreement on a TRP) the spawning biomass depletion ratio ($SB/SB_{F=0}$) is to be maintained at or above the average $SB/SB_{F=0}$ for 2012-2015. Available HCR and some management tools are set out in 2020-01, along with the WCPFC process of monitoring, assessment and management review for each of the stocks. All of this can be regarded as a cohesive and strategic arrangement, with an understanding of how it works to achieve an outcome, and which is designed to manage the impact on that component specifically, **SG100 is met**.

Currently, SP albacore is managed through CMM 2015-02 with the objective of ensuring that fishing vessels actively fishing for South Pacific albacore in the Convention Area south of 20°S do not increase above 2005 levels or recent historical (2000-2004) levels. It also sets out (catch and effort) reporting arrangements for CCMs and that the status of the stock is reviewed annually. Under the harvest strategy workplan (CMM 2014-06) a TRP was agreed for SP albacore in 2018 set at $56\%SSBcurrent_{F=0}$ with the objective of achieving an 8% increase in CPUE compared to 2013 levels. **This meets the requirements for SG60 and SG80**. This TRP is also subject to change if revised stock assessments indicate it is not suitable for meeting this objective, which indicates it contains a mechanism for modification in the light of identification of unacceptable impacts. All of this can be regarded as a cohesive and strategic arrangement, with an understanding of how it works to achieve an outcome, and which is designed to manage the impact on that component specifically, **SG100 is met.**

NP Albacore

In 2017, the WCPFC adopted the *Interim harvest strategy framework for North Pacific albacore* with the interim management objective to maintain the biomass around its current level and to ensure there is a low risk of breaching the LRP. The framework establishes a LRP of 20%SSBcurrent$_{F=0}$ with a decision rule, which is consistent with the LRP for the other tropical tunas and SP albacore. The TRP is to be established following a MSE approach. Aside from this interim harvest strategy WCPFC and IATTC have harmonised management measures in place, which have applied since 2005: i.e. CMM 2005-03 (WCPFC) and Resolution C-05-02 (IATTC) which have the same requirements. In 2019, CMM 2005-03 was replaced by CMM 2019-03, which requires the total level of fishing effort for NP albacore in the Convention Area north of the equator to not be increased beyond current levels and that CCMs take measures to ensure that the level of fishing effort by their vessels is not increased beyond 2002-2004 annual average levels. It also sets out (catch and effort) reporting arrangements for CCMs and that the status of the stock is reviewed annually. CMM-2019-03 recognises the need to adopt a consistent set of CMMs for NP albacore and tasks the WCPFC Executive Director to engage with IATTC to ensure continued harmonisation. All of this can be regarded as a cohesive and strategic arrangement, with an understanding of how it works to achieve an outcome, and which is designed to manage the impact on that component specifically, **SG60, SG80 and SG100 are met.**

Furthermore, in relation to the PNG EEZ UoAs and the management of these target species, PNG has developed and implemented a Tuna Management and Development Plan (TMP) in 2014 (PNG, 2014). The TMP serves as a guide to NFA and stakeholders to ensure the sustainable development, conservation and use of tuna resources in the PNG EEZ. By implementing the plan, PNG aims to ensure it: (a) manages its tuna fishery in a sustainable manner, taking into the best available scientific advice, catch, effort, economic, industry and social issues; (b) maximises the economic and social benefits from the sustainable use of its tuna resources, and (c) strives to achieve high levels of compliance. Species covered under the TMP include the target species for this assessment (bigeye, yellowfin and albacore), as well as other tunas (skipjack), swordfish and marlins. Also, species taken in association with these targeted tuna stocks (termed “associated bycatch” in the plan). The types of fishing addressed in the TMP (in relation to longline fishing effort) include: DWFN bilateral access to PNG’s EEZ, domestically-based longline operations and locally-based foreign fishing longline operations. The impacts of fishing on bycatch and the general marine ecosystem are also recognised under the TMP and strategies and tools listed for the explicit purpose of ensuring the conservation and management of tuna resources in the EEZ. These include measures such as controls on fishing effort, the purse seine and longline vessel day schemes (VDS), licensing, fishery closures, catch reporting (for logbooks, observer reports, port sampling, electronic reporting, catch documentation schemes etc.) and enforcement measures (that include surveillance activities, monitoring of VMS, and AIS etc.). The TMP references fishery reference points and harvest control rules and the use of a range of rules and controls as management measures to control both total catch and effort. It also advises that PNG will observe any reference points established under any regional or subregional arrangement or agreement for fishing operations within its EEZ, and shall have regard to such reference points when establishing any reference points for other parts of the fishery management area within their EEZ. Lastly, in the event that any reference point is exceeded on two or more consecutive occasions the provisions of the TMP will be reviewed with the specific goal of identifying the level of effort required to meet the agreed reference points.

South American pilchard (Japanese Pacific and Tsushima stocks)

Based on the information provided, the client is purchasing this bait from Japan. The relevant fishery as outlined in PI 2.1.1 is the South American pilchard fishery off Japan. It is predominately a Japanese one; however, according to Yatsu (2019), the Pacific stock of Japanese pilchard is targeted by Chinese vessels just outside the Japanese EEZ, near Hokkaido Island. As the client is purchasing this bait from Japan, only Japanese management is discussed below.

A review of bait purchase information indicates that the quantities of bait used by the UoA fleet annually are negligible (<0.01%) compared to the overall biomass and landings from these two stocks, constituting a measure that contributes to the UoA not having a significant impact on these stocks. **SG60** is met for both stocks**.** Both South American pilchard stocks are assessed annually by the Fisheries Research and Education Agency of Japan (FRA) and are managed through a TAC, termed allowable biological catches (ABCs). Available information suggests the Pacific stock is above the PRI but the Tsushima stock is below the PRI. Available information suggests these stocks are strongly impacted by environmental variability, in particular the Pacific Decadal Oscillation, which is why the probabilities of the stock remaining near the TRP based on varying levels of fishing mortality are uncertain. A harvest strategy is in place to manage these stocks to a TRP of $SSB_{MSY}$ with LRPs set at 60% of MSY. This LRP was the estimated SSB level below which recruitment is thought to be poor (Yukami et al., 2017). Furthermore, if the SSB is below a reference point set at 10% of MSY a fishing moratorium or other measures to ensure similar effect are imposed (Yatsu, 2019). Annual projections are undertaken to determine the probability of being near the TRP based on alternative levels of fishing mortality. The assessment team considered there was in place a strategy (annual stock assessment with harvest control rules), with an understanding of how it works to achieve an outcome, and which is designed to manage the impact on that component specifically **SG 80** and **SG 100** are met for both stocks.

Minor primary species are as follows:

- WCPO skipjack tuna
- SW Pacific swordfish
- Argentine shortfin squid

Note that minor species are only considered at the **SG100** level; **SG60 and SG80 are therefore met by default.**

WCPO Skipjack tuna

Currently WCPO skipjack tuna is managed through 2018-01 (now 2020-01) similar to the other tropical tunas. Under CMM 2015-06 an interim TRP has been introduced, which is set at maintaining the spawning biomass at 50% of the estimated recent average spawning biomass in the absence of fishing (50% $SB_{F=0}$). There is also a process of monitoring, assessment and management review in place for skipjack tuna through the WCPFC. Similar to the other tuna stocks, **SG100 is met.**

SW Pacific swordfish

Currently SW Pacific swordfish is managed through CMM 2009-03. In the absence of TRP or LRPs and a formal harvest strategy, the team considered the measures in CMM 2009-03 to be insufficient to meet the requirements for **SG100**.

Argentine shortfin squid

Currently Argentine shortfin squid in the Falkland Islands and Argentina is managed through effort controls limiting the length of the fishing season and number of vessels. There is a TRP set, with an aim to ensure a 40 % proportional escapement (this was defined as the ratio of the final stock size after fishing to the final stock size that would have been present in the absence of fishing). While in 2019, the stock assessment indicated that the escapement rate had been adhered to (Winter, 2019), this has not occurred in other years. Furthermore, pre-recruitment surveys have not occurred as often as intended due to disputes within the Argentine Government. In the absence of a formal harvest strategy that contains mechanisms for modification of fishing practices in light of the identification of unacceptable impacts (i.e. ensuring the escapement rate is adhered to) or any further information to suggest this is in place, the team considered the measures to be insufficient to meet the requirements for **SG100**.

In conclusion, **SG100 is not met for minor species overall**.

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

**Rationale**

WCPO yellowfin: For yellowfin tuna, fishing mortality has always been below $F_{MSY}$, and the stock has never declined below the default target of $SB_{MSY}$. Stochastic projections were considered in the 2020 assessment, which provided an indication of 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. Projections indicated that the risk that $SB_{2048}/SB_{F=0}$ is less than the LRP is 0%. Although the information on stock status and stock projections indicate that the harvest strategy is maintaining the stock at appropriate levels, providing some objective basis for confidence that the strategy will work (**SG60 and SG80 are met**), the strategy has not been fully tested. Evaluation of the performance of the harvest strategy and harvest control rules against management objectives is an element of CMM 2014-06 and its workplan. **SG100 is not met**.

WCPO bigeye: For bigeye tuna, stochastic projections were considered in the 2020 assessment (Ducharme-Barth et al., 2020), which provided an indication of the potential stock consequences of fishing at two “status quo” conditions: (i) 2016-2018 average fishing and short term recruitment scenario and (ii) 2016-2018 average fishing and long term recruitment scenario. Projections indicated that the risk that $SB_{2048}/SB_{F=0}$ is less than the LRP is 0 and 5% respectively. Although the information on stock status and stock projections indicate that the harvest strategy is maintaining the stock at appropriate levels, providing some objective basis for confidence that the strategy will work (**SG60 and SG80 are met**), the strategy has not been fully tested. Evaluation of the performance of the harvest strategy and harvest control rules against management objectives is an element of CMM 2014-06 and its workplan. **SG100 is not met**.

SP albacore: For SP albacore tuna, stochastic projections were considered in the 2021 assessment (Castillo-Jordan et al., 2021), which provided an indication of the potential stock consequences of fishing at alternative “status quo” conditions based upon recent catch and effort levels including: 2017-19 average catches and effort levels across the South Pacific and 2020 average catches and effort levels within the WCPFC Convention Area. Projections indicated that the risk that $SB_{2049}/SB_{F=0}$ is less than the LRP ranged between 26-36% for the catch based scenario and 0-4% for the effort based scenario. On that basis, the team did not consider there was high confidence that the strategy would work (**SG100 is not met**). However, taking into account the fact that WCPFC have committed to a workplan to adopt a management procedure for SP albacore, which will now occur in 2022 and potential update to the interim TRP based on the results of 2021 assessment, this provides some objective basis for confidence that the strategy will work. **SG60 and SG80 are met**.

NP albacore: Stochastic projections were considered in the 2020 assessment (ISC, 2020), which provided an indication of the potential stock consequences of fishing at two harvest scenarios – F constant at the 2015-2017 rate over ten years ($F_{2015\text{-}2017}$) and constant catch ($C_{2013\text{-}2017}$ – 69,354 t ) over ten years. If a constant fishing intensity ($F_{2015\text{-}2017}$) is applied to the stock, then median SSB is expected to increase to 62,873 t and there will be a low probability of falling below the LRP as established by the WCPFC by 2028. If a constant average catch ($C_{2013\text{-}2017}$ = 69,354 t) is removed from the stock in the future, then the median SSB is also expected to increase to 66,313 t and the probability that SSB falls below the LRP by 2028 will be slightly higher than the fishing intensity scenario. Under both scenarios the 95% CI for the projected SSB being below the LRP in 2030 was 0%. This provides some objective basis for confidence that the strategy will work. **SG60 and SG80 are met**. However, the strategy has not been fully tested, **SG100 is not met**.

South American pilchard (Japanese Pacific and Tsushima stocks):

Available information suggests that the Japanese Pacific stock is currently above PRI, but the Japanese Tsushima stock is below the PRI (FRA 2021a, 2021b). Projections undertaken indicate that for the Pacific and Tsushima stocks respectively, there is a 55% and 56% probability of the stock remaining at and rebuilding to the TRP by 2031 if fishing mortality does not exceed 0.85 $F_{MSY}$ from 2023 for the Pacific stock and 0.80 $F_{MSY}$ from 2021 to 2023 and 0.75 $F_{MSY}$ after 2024 for the Tsushima stock (FRA 2021a, 2021b). On that basis, the team did not consider there was high confidence that the management in place would work, especially given the population dynamics of the stock, particularly recruitment, which is strongly linked to oceanographic variables (**SG100 is not met for either stock**).

Average annual bait use between 2018 and 2020 was 114 t in this fishery under assessment. This represents a very small amount of the total catch (<1% in 2020) in the Japanese South American pilchard fisheries. This should provide some objective basis for confidence that the management measures in place will work, at least at the UoA level and furthermore, not hinder the recovery of the Tsushima stock. **SG60** and **SG80** are met for both stocks. To be reviewed after the ACDR stage.

Minor primary species

Minor species are scored at the SG100 level only; **SG60 and SG80 are therefore met by default**. Given that partial strategy for SW Pacific swordfish has not been tested, **SG100** is not met for minor species overall.

| | |
|---|---|
| **c** | Management strategy implementation |

| | | | | |
|---|---|---|---|---|
| | Guide post | | There is **some evidence** that the measures/partial strategy is being **implemented successfully**. | There is clear evidence that the partial strategy/strategy is being implemented successfully and is achieving its overall objective as set out in scoring issue (a). |
| | Met? | | All scoring elements – No | All scoring elements – No |

**Rationale**

Main primary species

Evidence for implementation of the partial strategies/strategies for all primary species includes VMS and observer data, landings data (port sampling), logbooks, bait volumes purchased, and the MCS system as described under Principle 3. All primary species stocks with the exception of Japanese Tsushima stock are above the PRI but as outlined in PI 2.1.1a, the overall bait use (114 t annually) by the UoA fleet is low relative to the total landings from both stocks (695,000 t in 2020) and even the Tsushima stock on its own (73,000 t in 2020).While the team works to determine whether there is any degree of non compliance in the UoA fleet (PI 3.2.3d) – this is provisional scoring based on ACDR P3, the team considered that **SG80** should not be met overall. However, considering the non-comprehensive level of observer coverage in the fishery under assessment and the fact that bait purchase records are self-reported (similar to logbooks), the team felt that clear evidence of its successful implementation is lacking. **SG100 is not met for main species overall**.

Minor primary species

Minor species are scored at the SG100 level only; **SG60 and SG80 are therefore met by default**. Owing to the non-comprehensive level of observer coverage in the fishery under assessment and the fact that bait purchase records are self-reported (similar to logbooks), the team felt that clear evidence of its successful implementation is lacking. **SG100 is not met for minor species overall**.

| | | | | |
|---|---|---|---|---|
| **d** | Shark finning | | | |
| | Guide post | It is **likely** that shark finning is not taking place. | It is **highly likely** that shark finning is not taking place. | There is a **high degree of certainty** that shark finning is not taking place. |
| | Met? | NA | NA | NA |

**Rationale**

No primary species are sharks in the UoAs so this issue is not scored.

| **e** | Review of alternative measures | | | |
|---|---|---|---|---|
| | Guide post | There is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main primary species. | There is a **regular** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of main primary species and they are implemented as appropriate. | There is a **biennial** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of all primary species, and they are implemented, as appropriate. |
| | Met? | WCPO yellowfin – NA<br>WCPO bigeye – NA<br>SP Albacore – No<br>NP Albacore – No<br>SA pilchard (Japanese Pacific) – NA<br>SA pilchard (Japanese Tsushima) – NA | WCPO yellowfin – NA<br>WCPO bigeye – NA<br>SP Albacore – No<br>NP Albacore – No<br>SA pilchard (Japanese Pacific) – NA<br>SA pilchard (Japanese Tsushima) – NA | WCPO yellowfin – NA<br>WCPO bigeye – NA<br>SP Albacore – No<br>NP Albacore – No<br>SA pilchard (Japanese Pacific) – NA<br>SA pilchard (Japanese Tsushima) – NA |

**Rationale**

MSC GSA3.5.3 states that: “any non-negligible proportion of the catch that meets the unwanted definition for a particular species should be assessed as unwanted catch”. Unwanted catch is defined under MSC GSA 3.1.6 as including: “that part of the catch that has been thrown away or slipped where the components of that catch may not survive after release”. South American Pilchard are a bait species, sourced from a targeted fishery, and all of which is used by the UoA; consequently there is no unwanted catch. According to the client logbook data, the majority of yellowfin (98%), bigeye (99%) and albacore (99%) tuna are retained, which is aligned with estimated discards of the target tuna species at the WCPFC level (see Table 16 in SPC OFP, 2021). Nevertheless, this in contrast to the at-sea observer data from 2018 to 2019, which indicated that while the majority of yellowfin (95%) and bigeye (97%) tuna are retained, there is evidence of discard rates equating to 13% for albacore tuna across the period 2018 to 2019 (Table 41). This seems to be mainly driven by greater discarding of albacore tuna in 2019, where high discards were observed in four out of the five observed trips. In the absence of guidance from the MSC on what constitutes ‘negligible’, the team chose to take a precautionary approach and agreed to assess this scoring issue.

According to MSC guidance, when assessing this scoring issue, CABs are expected to review evidence to determine whether the client (UoA) has undertaken a review of the potential effectiveness and practicality of alternative measures to minimise mortality of unwanted catch of main species, in order to achieve the SG60 level. “This evidence could be, for example, a summary document listing information and measures reviewed along with an analysis of the measures and their appropriateness for the UoA, or the minutes of a meeting which has considered alternative measures”. Furthermore “ the fishery were to adopt the use of this measure and it was being used at the time of the site visit, but there were no plans to undertake another review of measures, it would still only meet the SG60 level. If the fishery were to adopt the use of this measure and it was being used at the time of the site visit, and another review was scheduled to take place in three years’ time, it would meet the SG80 level. If the plan was that alternative measures would be reviewed every two years, it would meet the SG100 level.”

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

| | |
|---|---|
| Draft scoring range | All UoAs: <60 |
| Information gap indicator | More information sought:<br>-the specific stock of South American pilchard being used as bait: is it Japanese Pacific or Japanese Tsushima? The information provided by client suggests they are sourcing bait from Japan but further information is needed.<br>More information south on unwanted catch – albacore tuna by UoA.<br>Information on alternative measures employed to minimise unwanted catch of main species – albacore tuna<br>Generally more information on the compliance of UoA vessels with national and international regulations |

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

**Scoring table 22. PI 2.1.3 – Primary species information**

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

**Rationale**

As discussed in Section 5.6.1 there is quantitative information available for the catch of all main primary species (catch from logbooks and catch and discards from at-sea observer data), including bait purchase records, which are provided to research (SPC), national government (Japan and PNG) authorities and RFMOs (WCPFC) as well to assist in undertaking stock assessments, research and management. Each of the main primary species (yellowfin, bigeye, north and south pacific albacore and south American pilchard) has a stock assessment (as detailed in PI 2.1.1a) that provides quantitative information on *inter alia* total landings, stock biomass, species life history characteristics and total mortality and in some cases environmental parameters affecting recruitment. **Consequently SG60 and SG80 are met**.

With regard to yellowfin, bigeye, NP and SP albacore, the WCPFC only requires an at-sea observer coverage level of 5% for longline fisheries under CMM 2018-05. In 2018 and 2019, the Japanese longline fleet achieved observer coverage levels of 6.9% and 11.4% respectively (based on number of observed fishing days) (WCPFC SC, 2020, 2021), although for the UoA fleet this translated into coverage rates still to be ascertained (see Table 42), which only involved a single vessel from the UoA fleet in each year. The assessment therefore scaled up the observer data to mirror the actual catch taken by the UoA fleet between 2018 and 2019 (Table 43). Given the assessment team had to scale up the observer data in 2018 and 2019, coupled with the fact that discarding of albacore tuna based on the at-sea observer data is not negligible (see, PI

2.1.2(e)), the assessment team decided that the impact of the fishery under assessment on these stocks cannot be evaluated with a "high degree of certainty". Therefore, **SG100 is not met.**

With regard to South American Pilchard, the quantities of this bait used by the fishery under assessment annually are reported by the client fishery and are negligible (<0.01%) compared to the overall biomass and landings from these two stocks (FRA 2021a, 2021b). **SG60 and SG80 are therefore met**. However, it is not clear that there is sufficient quantitative information to assess with a "high degree of certainty" the impact of the UoA fleet on the Japanese Tsushima stock given its below the PRI and therefore necessitates higher quality information and data as detailed in GSA 3.6.3.1. Ultimately, bait purchase records are self-reported (similar to logbooks) so it cannot be concluded that there is "a high degree of certainty". Furthermore, its not clear what amount of the bait is being purchased that is caught from either the Japanese Pacific or Tsushima stocks. Therefore **SG100 is not met**.

| **b** | Information adequacy for assessment of impact on minor primary species | | | |
|---|---|---|---|---|
| | Guide post | | | Some quantitative information is adequate to estimate the impact of the UoA on minor primary species with respect to status. |
| | Met? | | | All scoring elements – Yes |

**Rationale**

As detailed above in 2.1.3a there is quantitative information for the catch of minor primary species (catch from logbooks and catch and discards from at-sea observers), including bait purchase records, which are provided to research and government authorities to assist in stock assessments, research and management. Each of the minor primary species has a stock assessment as detailed in Section 2.1.1b that provides quantitative information on *inter alia* total landings, stock biomass, species life history characteristics and total mortality and in some cases environmental parameters affecting recruitment. As detailed in GSA3.6 **SG100** for minor primary species is equivalent to **SG80** for main primary species. **Consequently SG100 is met**.

| **c** | Information adequacy for management strategy | | | |
|---|---|---|---|---|
| | Guide post | Information is adequate to support **measures** to manage main primary species. | Information is adequate to support a **partial strategy** to manage main primary species. | Information is adequate to support a **strategy** to manage **all** primary species, and evaluate with a **high degree of certainty** whether the strategy is achieving its objective. |
| | Met? | All scoring elements – Yes | All scoring elements – Yes | WCPO yellowfin – Yes<br>WCPO bigeye – Yes |

| | | | |
|---|---|---|---|
| | | | SP Albacore – Yes<br>NP Albacore – Yes<br>SA pilchard (Japanese Pacific) – Yes<br>SA pilchard (Japanese Tsushima) – Yes<br>Skipjack tuna – Yes<br>Southwest Pacific swordfish – Yes<br>Argentine shortfin squid – No |

**Rationale**

All primary species (main and minor) have sufficient information available (fishing effort through logbooks, VMS, landings and discards through at-sea observers) that is adequate to support at least a partial strategy to manage them accordingly and detect changes in risk levels to those species from UoA-level operations. WCPFC uses this information (for main primary target species) in scientific stock assessments and accompanying analyses to assess their sustainability. At a national level, Japan has been shown to exceed its at-sea observer coverage requirements in 2018 and 2019 (5% under CMM 2018-05), which provide information sufficient to support the management of these stocks. While there is evidence (see PI 3.2.3a) that the reporting of bycatch species is lacking in the logbooks and Japan does not suitably enforce this requirement, the scaled up at-sea observer data is probably a more accurate reflection of the catch of main primary species than of ETP species, which are rare events. Within the PNG EEZ, distant water fishing vessels need permission to participate in the fishery, are licensed and subject to the VMS, as well as catch and effort reporting requirements, which provide information sufficient to support the management of these stocks. Projections undertaken by the WCPFC SC for the main primary target species can be used to evaluate the efficacy of strategies (as detailed in PI 2.1.2b), which indicate that there is an objective basis for confidence that the strategies are achieving their objectives. **Therefore SG60, SG80 and SG 100 are met for the main primary target species (yellowfin, bigeye and albacore**).

In relation to South American pilchard, there is a strategy in place to manage both the Japanese and Tsushima stocks (as detailed in PI 2.1.2a) and the information available (bait purchase data, stock assessment, see PI 2.1.3a) is sufficient to support this strategy into the future, **SG60 and SG80 are met**. However, as stated in scoring issue a, bait purchase records are self-reported (similar to logbooks) so it cannot be concluded that there is “a high degree of certainty”. Furthermore, it isnot clear what amount of the bait is being purchased that is caught from either the Japanese Pacific or Tsushima stocks. **Therefore SG100 is not met.**

Minor species are scored at SG100 only; **therefore SG60 and SG80 are met by default**. Each of the minor primary species has a stock assessment that provides quantitative information on *inter alia* total landings, stock biomass, species life history characteristics and total mortality and in some cases environmental parameters affecting recruitment. Projections undertaken by the WCPFC SC for southwest Pacific swordfish (SPC, 2021) and skipjack tuna (Vincent et al. 2019) can be used to evaluate the efficacy of strategies, which indicate that there is an objective basis for confidence that the strategies are achieving their objectives. **SG100 is met.** For Argentine shortfin squid, however, there is not always sufficient to provide a high degree of certainty. **SG100 is not met**.

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|---|

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| | |
|---|---|
| Draft scoring range | All UoAs: ≥80 |
| Information gap indicator | More information sought:<br>the specific stock of South American pilchard being used as bait: is it Japanese Pacific or Japanese Tsushima? The information provided by client suggests they are sourcing bait from Japan but further information is needed. |

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

**Scoring table 23. PI 2.2.1 – Secondary species outcome**

| PI 2.2.1 | | The UoA aims to maintain secondary species above a biologically based limit and does not hinder recovery of secondary species if they are below a biological based limit | | |
|---|---|---|---|---|
| Scoring Issue | | SG 60 | SG 80 | SG 100 |
| **a** | Main secondary species stock status | | | |
| | Guide post | Main secondary species are **likely** to be above biologically based limits.<br>OR<br>If below biologically based limits, there are measures in place expected to ensure that the UoA does not hinder recovery and rebuilding. | Main secondary species are **highly likely** to be above biologically based limits.<br>OR<br>If below biologically based limits, there is either **evidence of recovery** or a **demonstrably effective partial strategy** in place such that the UoA does not hinder recovery and rebuilding.<br>AND<br>Where catches of a main secondary species outside of biological limits are considerable, there is either evidence of recovery or a, demonstrably effective strategy in place between those MSC UoAs that have considerable catches of the species, to ensure that they collectively do not hinder recovery and rebuilding. | There is a **high degree of certainty** that main secondary species are above biologically based limits. |
| | Met? | Blue marlin – Yes<br>Blue shark– Yes<br>Amberstripe scad – RBF score 92<br>Smoothbelly sardinella – RBF score 94 | Blue marlin – Yes<br>Blue shark– Yes<br>Amberstripe scad – RBF score 92<br>Smoothbelly sardinella – RBF score 94 | Blue marlin – Yes<br>Blue shark – No<br>Amberstripe scad – RBF score 92<br>Smoothbelly sardinella – RBF score 94 |

**Rationale**

Based on the scaled average observer values, logbook and bait data, the main secondary species in this assessment include blue marlin, blue shark, amberstripe scad and smoothbelly sardinella (See Table 42).

Blue marlin

The most recent assessment (2021) for blue marlin used a two-model ensemble of age and length structured Stock Synthesis models to fit time series of standardised CPUE and size-composition data (ISC BWG, 2021). The two models in the ensemble differed only in their growth curve assumption. It was recommended by the ISC BWG that both models were retained based upon their fit and diagnostics, so the biological reference points, spawning stock biomass, and fishing mortality were averaged between the two models assuming equal weights (ISC BWG, 2021).

Female spawning stock biomass was estimated to be 24,272 mt in 2019, or about 17% above $SSB_{MSY}$ ($SSB/SSB_{MSY}$ = 1.17 (95% C.I. 0.87-1.51). Fishing mortality on the stock (average *F*, ages 1 to 10) averaged *F*=0.13 during 2017-2019, which was 40% below $F_{MSY}$ and in 2019 was F=0.11, which was 50% below $F_{MSY}$ ($F/F_{MSY}$ = 0.50 (95% C.I. 0.37-0.69)) (ISC BWG, 2021). Median fishing mortality has been below $F_{MSY}$ every year except 2003 to 2006. Relative to MSY-based reference points for other tunas, the ensemble model indicates that overfishing was very likely not occurring (>90% probability) and blue marlin is likely not overfished (81% probability) (ISC BWG, 2021). On that basis, there remains a high degree of certainty that this stock is above its biologically-based limits. **SG60**, **SG80 and SG100 are met**.

Blue shark

Blue shark are widely distributed throughout temperate and tropical waters of the Pacific Ocean. Two stocks are recognised in the Pacific, one in the north and another in the south Pacific. It is unclear from the data, from which stock the blue shark recorded in the fishery originated from.

The most recent stock assessment (2017) for the North Pacific blue shark was undertaken using Stock Synthesis (ISC SWG, 2017). From the stock assessment, the reference case model showed that the spawning stock biomass is fluctuating close to the time-series high set back in the late 1970s. Recruitment has fluctuated around 37,000,000 age-0 sharks annually. Stock status is reported in relation to MSY. Female spawning biomass in 2015 ($SB_{2015}$) was 71% higher than at MSY and estimated to be 308,286 mt. The recent annual fishing mortality ($F_{2012-2014}$) was estimated to be well below $F_{MSY}$ at approximately 37% of $F_{MSY}$. The results indicate that if assessed against conventional reference points it is likely that the stock is not overfished and that overfishing is not occurring (ISC SWG, 2017).

The most recent assessment (2021) for South Pacific blue shark was undertaken using Stock Synthesis (Neubauer et al., 2021). In addition a surplus production model (SPM) was run with both assessment models producing very similar results. The assessment was determined an improvement over the 2016 assessment in particular the catch reconstruction, CPUE time series, and re-parameterization through combined advance from south and north Pacific assessments (WCPFC SC, 2021). A total of 90% of model runs indicated that $F_{2020}$ was below $F_{MSY}$ and 96% of model runs shows that $SB_{2020}$ was above $SB_{MSY}$, with an estimate of SSB of over 60,000 t. The WCPFC Scientific Committee did not approve the results for providing management advice due to the need to conduct a more thorough investigation of diagnostics across the grid of models (WCPFC SC, 2021). However, it was noted that stock biomass is likely increasing, and fishing pressure has declined through the recent decade due to the fact that most sharks are released upon capture in most longline fleets. The results indicate that if assessed against conventional reference points it is likely that the stock will not be found to be overfished nor would overfishing be occurring.

Based on the above, the team concludes it is highly likely that both stocks are above biologically-based limits. **SG60 and SG80 are met**. Owing to the non-comprehensive level of observer coverage in the fishery under assessment and some of the uncertainties in the assessments (ISC SWG, 2017; Neubauer et al., 2021) **SG100 is not met**.

Amberstripe scad

Due to the lack of stock status reference points for this species/stock, the RBF triggered to score this scoring element, requiring a Productivity Susceptibility Analysis to be undertaken. Although stakeholder input will be required to finalise the PSA, the provisional PSA results are shown in the Appendices. The provisional PSA score for amberstripe scad is 2.18. **This equates to an MSC PSA-derived score of 92**.

Smoothbelly sardinella

Due to the lack of stock status reference points for this species/stock, the RBF triggered to score this scoring element, requiring a Productivity Susceptibility Analysis to be undertaken. Although stakeholder input will be required to finalise the PSA, the provisional PSA results are shown in the Appendices. The provisional PSA score for Indian oil sardine is 2.09. **This equates to an MSC PSA-derived score of 94.**

In relation to the unobserved mortality of secondary species, the team considered the possible issue of ghost fishing caused by discarded or lost fishing gear (monofilament line and hooks). Gear loss is reportedly minimal (mainly limited to hooks that have been lost to sharks). To be confirmed. The use of radio beacons and GPS on the mainline mean they are often able to be located even if the mainline breaks when hauling or otherwise. The assessment team therefore concluded that the incidence of gear loss is rare. To be confirmed. In any case, lost pelagic longline gear is only likely to continue to fish as long as bait remains on the hooks. Bait tends to be stripped relatively quickly off the hooks and as such, the ghost fishing mortality rate associated to lost longlines is usually low (Macfayden et al., 2009). Under CMM 2017-04, CCMs should encourage their fishing vessels within the WCPFC Convention Area to retrieve abandoned, lost or discarded fishing gear and retain the material on board, separate from other waste for discharge to port reception facilities. Where retrieval is not possible or does not occur, CCMs shall encourage their fishing vessels to report the latitude, longitude, type, size and age of abandoned, lost or discarded fishing gear. It was therefore concluded that unobserved mortality through ghost fishing at the scale of the UoA was highly unlikely to be a significant factor in the fishery's interactions with main primary species to the extent that this will have stock-level effects. This conclusion remains to be confirmed.

| | | | | |
|---|---|---|---|---|
| **b** | Minor secondary species stock status | | | |
| | Guide<br>post | | | Minor secondary species are highly likely to be above biologically based limits.<br>OR<br>If below biologically based limits', there is evidence that the UoA does not hinder the recovery and rebuilding of secondary species |

| | Met? | All scoring elements – No |
|---|---|---|

**Rationale**

There is a large list of minor secondary species (see Table 45) and they have not been evaluated individually. Using an all or nothing approach, this scoring issue is therefore not met.

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

| | |
|---|---|
| Draft scoring range | All UoAs: ≥80 |
| Information gap indicator | More information sought:<br>- Further review of the amberstripe scad and smoothbelly sardinella bait use among MSC certified fisheries will need to occur.<br>- Information regarding gear loss (hooks, mainlines) needs to be determined from the client<br>- RBF to be carried out for amberstripe scad and smoothbelly sardinella |

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

**Scoring table 24. PI 2.2.2 – Secondary species management strategy**

| PI 2.2.2 | There is a strategy in place for managing secondary species that is designed to maintain or to not hinder rebuilding of secondary species and the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of unwanted catch | | |
|---|---|---|---|
| Scoring Issue | SG 60 | SG 80 | SG 100 |

| | | | | |
|---|---|---|---|---|
| **a** | Management strategy in place | | | |
| | Guide post | There are **measures** in place, if necessary, which are expected to maintain or not hinder rebuilding of main secondary species at/to levels which are highly likely to be above biologically based limits or to ensure that the UoA does not hinder their recovery. | There is a **partial strategy** in place, if necessary, for the UoA that is expected to maintain or not hinder rebuilding of main secondary species at/to levels which are highly likely to be above biologically based limits or to ensure that the UoA does not hinder their recovery. | There is a **strategy** in place for the UoA for managing main and minor secondary species. |
| | Met? | Blue marlin – Yes<br>Blue shark – Yes<br>Amberstripe scad – Yes<br>Smoothbelly sardinella – Yes<br>Minor species – Yes (default) | Blue marlin – Yes<br>Blue shark – Yes<br>Amberstripe scad – No<br>Smoothbelly sardinella – No<br>Minor species – Yes (default) | Blue marlin – No<br>Blue shark – Yes<br>Amberstripe scad – No<br>Smoothbelly sardinella – No<br>Minor species – No |

**Rationale**

Blue marlin

Blue marlin received a score of 100 in PI 2.2.1(a) – as such, the term 'if necessary' applies here and management as described under **SG60** and **SG80** is not required (GSA3.5.1). **SG80** is therefore met by default for blue marlin. There is no specific strategy in place to manage the fishing mortality of blue marlin in either this fishery -to be confirmed or at regional WCPFC level; bycatch is instead covered under the more generic WCPFC Resolution 2005-03 on Non-Target Fish Species. In relation to the PNG EEZ UoAs, PNG has developed and implemented a Tuna Management and Development Plan (TMP) in 2014 (PNG, 2014) (see also PI 2.1.2). Species covered by the plan include the target species in this assessment and "all other non-target and target bycatch, and associated or dependent species taken in the course of fishing for tuna" – which includes blue marlin. The impacts of fishing on bycatch and the general marine ecosystem are also recognised under the TMP and strategies and tools listed for the explicit purpose of ensuring the conservation and management of tuna resources in the EEZ. These include measures such as controls on fishing effort, the purse seine and longline vessel day schemes (VDS), licensing, fishery closures, catch reporting (for logbooks, observer reports, port sampling, electronic reporting, catch documentation schemes etc.) and enforcement measures (that include surveillance activities, monitoring of VMS, and AIS etc.). The TMP references fishery reference points and harvest control rules and the use of a range of rules and controls as management measures to control both total catch and effort. It also advises that PNG will observe any reference points established under any regional or subregional arrangement or agreement for fishing operations within its EEZ, and shall have regard to such reference points when establishing any reference points for other parts of the fishery management area within their EEZ. Lastly, in the event that any reference point is exceeded on two or more consecutive occasions the provisions of the TMP will be reviewed with the specific goal of identifying the level of effort required to meet the agreed reference points. While this represents a partial strategy, because it is not designed to manage that component (i.e. blue marlin) specifically, it does not represent a strategy and **SG100 is not met.**

Blue shark

Currently, blue shark is managed through CMM 2019-04 with the objective to ensure the long-term conservation and sustainable use of sharks. CMM 2019-04 encompasses all species of sharks, skates, rays and chimaeras, which stipulates *inter alia*, that all sharks retained on board vessels should be fully utilised and the practice of shark finning is prohibited. CCMs are required to ensure their vessels land sharks with fins naturally attached to the carcass and longline fisheries targeting tuna and billfish are required to either not use or carry wire trace as branch lines or leaders or do not use shark lines. There are also various reporting requirements in place. According to PI 3.2.1a, Japan must adopt all the all the WCPFC CMMs as stipulated in the *Act on Special Measures for Enhancement of the Conservation and Management of Tuna Resources*. Furthermore, the Japan Fisheries Agency has set "compliance rules for the operations of the offshore tuna fisheries" to ensure the regulations and CMMs set by WCPFC are followed. Japan has formulated a National Plan of Action for Sharks which has been implemented since 2001 (revised in 2009 and 2016), which reiterates that Japan "is obliging its fishers to comply with all the management measures adopted by these RFMOs as conditions for granting the fishing licence." Japanese distant water and offshore tuna longline fishing vessels under the NPOA for Sharks are prohibited either to possess wire as branch lines and leaders or to use branch lines running directly off the longline floats (shark lines). At the UoA level, the management measures in place for blue sharks are to be confirmed but the UoA fleet does not target sharks. According to the logbook data, all sharks are released, however its unknown at the time of release whether those sharks are alive or not. At-sea observer data support the logbook data in relation to the release of sharks, but observer coverage is low. In terms of the PNG EEZ UoAs, the scope of the PNG's National Tuna Management and Development Plan (2014) specifically includes the provisions of all CMMs adopted by the WCPFC. In 2021, PNG released a National Plan of Action for Sharks and Rays (2021-2024), which covers all species in the class Chondrichthyes. Its objectives are to *inter alia*, reduce shark bycatch to near zero by implementing mitigation measures for sharks consistent with best practices and minimise waste and discards of sharks by requiring full retention of sharks on vessels. Measures to achieve these objectives are identified in the NPOA and include *inter alia*, licensing of all commercial vessels, regulation of harvesting of sharks in PNG EEZ that is compliant with WCPFC CMMs, improved data collection and analysis, stakeholder consultation, reporting and scientific research, as well as capacity building and comprehensive MCS frameworks. The NPOA also has in place a (biennial) review mechanism that will consider the: (i) latest decisions of the WCPFC and CITES, (ii) specific measures taken in other relevant international and regional shark instruments to which PNG is a party or non-cooperating non-member; and (iii) identify gaps and highlight specific areas for improvement and intervention. The assessment team considered that all these elements constitute examples of a strategy (as detailed in Table GSA3), designed to minimise mortality on blue shark such that **SG60, SG80 and SG100 are met**.

Amberstripe scad

According to the bait source information, the client is sourcing the bait from Vietnam, China and Indonesia. Some management measures in place (input controls) in Indonesia to manage amberstripe scad, including limited entry, logbook records and various gear restrictions that they determined were consistent with a partial strategy (see, e.g. Marine and Fisheries Ministerial Regulation 18/PERMEN-KP/2014; Marine and Fisheries Ministerial Regulation 71/PERMEN-KP/2016; Marine and Fisheries Ministerial Regulation 23/PERMEN- KP/2013). The Client also provided some information on minimum mesh sizes in place in Chinese waters from the Ministry of Agriculture to protect small pelagic species (including amberstripe scad) from trawl and seine fishing operations (MOA, 2013).However, there is an overall lack of information on current management measures and strategies in place within all three countries to manage the catch of this species. – further information needed. The amount of bait (342 t annually between 2018-2020) being utilised is small compared to the reported global catch of *Decapterus spp.* (scads) as reported by the FAO in 2018 (1,336,000 t) (https://www.fao.org/3/ca9229en/ca9229en.pdf), but knowledge of local catches at a species level and importantly stock structure is unknown. Given the reproductive strategy of amberstripe scad (broadcast spawner), however, it is likely at a broad scale and the fishing activity within Vietnam, China and Indonesia would likely cover less than 10% of the species' global distribution (See: https://www.aquamaps.org/receive.php?type_of_map=regular). There were no indications from the RBF results that the populations are below biologically based limits (see Appendices). Consequently, the low MSC UoAs collective catches, constitute measures that would contribute to the fishery under assessment maintaining amberstripe scad at levels highly likely to be above biologically based limits. **SG60 is met**. Nevertheless, it is not clear that the Client Group has in place a cohesive arrangement that ensures that bait is proactively purchased from sustainable fisheries.- this remains to be determined and there is an overall lack of information on current management. – further information needed. It therefore does not meet MSC's definition of a partial strategy as given above, so **SG80 is not met**.

Smoothbelly sardinella

According to the bait source information, this is being sourced exclusively from China. The Client provided some information on minimum mesh sizes in place in Chinese waters from the Ministry of Agriculture to protect small pelagic species (including smoothbelly sardinella) from trawl and seine fishing operations (MOA, 2013). However, there is an overall lack of information on current management measures and strategies in place within China to manage the catch of this species. – further information needed. The amount of bait (105 t annually between 2018-2020) being utilised is negligible compared to the reported global catch of *Sardinella spp.* (sardines) as reported by the FAO in 2018 (887,000 t) (https://www.fao.org/3/ca9229en/ca9229en.pdf) but knowledge of local catches at a species level and importantly stock structure is unknown. Given the reproductive strategy of smoothbelly sardinella (broadcast spawner), however, it is likely at a broad scale and the fishing activity within China would likely cover less than 10% of the species' distribution in the Indo-west Pacific basin (See: https://www.aquamaps.org/receive.php?type_of_map=regular). There were no indications from the RBF results that the populations are below biologically based limits (see Appendices). Consequently, the low MSC UoAs collective catches, constitute measures that would contribute to the fishery under assessment maintaining smoothbelly sardinella at levels highly likely to be above biologically based limits. **SG60 is met**. Nevertheless, it is not clear that the Client Group has in place a cohesive arrangement that ensures that bait is proactively purchased from sustainable fisheries.- this remains to be determined and there is an overall lack of information on current management. – further information needed. It therefore does not meet MSC's definition of a partial strategy as given above, so **SG80 is not met**.

Minor species

Note that minor species are only considered at the **SG100** level; **SG60** and **SG80** are therefore met by default. For minor species, bycatch is covered under the more generic WCPFC Resolution 2005-03 on Non-Target Fish Species (this also includes the main species), which does not constitute a 'strategy'. Minor species were not considered to meet **SG100** as a whole.

| **b** | Management strategy evaluation | | | |
|---|---|---|---|---|
| | Guide post | The measures are considered **likely** to work, based on plausible argument (e.g. general experience, theory or comparison with similar UoAs/species). | There is some **objective basis for confidence** that the measures/partial strategy will work, based on some information directly about the UoA and/or species involved. | **Testing** supports **high confidence** that the partial strategy/strategy will work, based on information directly about the UoA and/or species involved. |
| | Met? | Blue marlin – Yes<br>Blue shark – Yes<br>Amberstripe scad – Yes<br>Smoothbelly sardinella – Yes<br>Minor species – Yes (default) | Blue marlin – Yes<br>Blue shark – Yes<br>Amberstripe scad – Yes<br>Smoothbelly sardinella – Yes<br>Minor species – Yes (default) | Blue marlin – No<br>Blue shark – No<br>Amberstripe scad – No<br>Smoothbelly sardinella – No<br>Minor species – No |

**Rationale**

Blue marlin

In the 2021 assessment (ISC BWG, 2021) deterministic stock projections were conducted to evaluate the impact of various levels of fishing mortality on future SSB and yield. This included (i) a high F scenario, (ii) a $F_{MSY}$ scenario, (iii) a status quo F scenario and (iv) low F scenario. Results indicated that for fishing mortalities at or above $F_{MSY}$ (i and ii), SSB biomass decreases towards $SSB_{MSY}$, but remains above it in 2029. For scenarios iii and iv, F is below $F_{MSY}$ therefore SSB remains above $SSB_{MSY}$ and increases from 2019 levels to 2029. It was determined that all of the constant F projections have at least a 50% probability of being above $SSB_{MSY}$ and below $F_{MSY}$ in 2029. On that basis, the team did not consider there was high confidence that the partial strategy would work (**SG100 is not met**). In terms of the PNG EEZ UoAs, the TMP has provisions for review "as necessary" to confirm with regional and international developments and agreements, which will be submitted to the Minister for approval and notified in the National Gazette. According to Anhalzer et al., (2020) this has occurred twice, and the TMP has two Annexures, one dealing with the management of Fish Aggregating Devices and a second on reference points, gazetted in September 2015. This along with the projections from the stock assessment provide some objective basis for confidence that the current management in place is working. **SG60 and SG80 are met.**

Blue shark

Future projections from 2015 to 2024 under different fishing mortality harvest policies (status quo, +20%, -20%, $F_{MSY}$) were considered in the 2017 North Pacific blue shark assessment (ISC SWG, 2017). These indicated that the median biomass in the North Pacific will likely remain above $B_{MSY}$ in the foreseeable future. Projections showed that maintaining current fishing mortality levels resulted in much higher levels of spawning biomass than $SSB_{MSY}$. No stock projections were undertaken in the 2021 South Pacific blue shark assessment (Neubauer et al., 2021), however 90% of model runs indicated that $F_{2020}$ was below $F_{MSY}$ and 96% of model runs shows that $SB_{2020}$ was above $SB_{MSY}$. It has been recognised that there has been a clear decline in fishing mortality (due to most sharks being released upon capture in longline fleets) over the last decade to low levels. Given the uncertainties in the 2021 South Pacific blue shark assessment (as detailed in PI 2.2.1a) and lack of future projections under different levels of fishing mortality the assessment team did not consider there was high confidence that the strategy would work (**SG100 is not met**). Furthermore, in terms of the PNG EEZ UoAs, while the PNG National Plan of Action for Sharks and Rays (2021-2024) represents a strategy, consistent with assisting in the sustainable management of sharks and rays and has a mechanism for biennial review (to take into account new information, such as the implementation of new WCPFC CMMs), it has not been tested as the strategy is new (2021). Nevertheless, the results from the future projections in the stock assessment provide some objective basis for confidence that the current management in place is working. **SG60 and SG80 are met**.

Amberstripe scad

The highly fecund, wide distribution and fast maturing (r-selected) life history status of amberstripe scad together with the small amount of bait used by the fishery under assessment relative to the global catch of *Decapterus spp*. (FAO, 2020), provides an objective basis for confidence that it is highly unlikely to be having any impact on the stock and the measures in place at the UoA level are likely to work – **SG60 and SG80 are met**. Although the assessment team had high confidence of a lack of impact from the UoAs, there is nothing in place that would constitute testing. **SG100 is not met.**

Smoothbelly sardinella

The highly fecund, wide distribution and fast maturing (r-selected) life history status of smoothbelly sardinella together with the small amount of bait used by the fishery under assessment relative to the global catch of *Sardinella spp*. (FAO, 2020), provides an objective basis for confidence that it is highly unlikely to be having any impact on the stock and the measures in place at the UoA level are likely to work – **SG60 and SG80 are met**. Although the assessment team had high confidence of a lack of impact from the UoAs, there is nothing in place that would constitute testing. **SG100 is not met.**

Minor species

Note that minor species are only considered at the **SG100** level; **SG60 and SG80 are therefore met by default.** The quantity of bait used is known. The existence of at-sea observer data, although limited to around 5%, provides some objective data against which to evaluate with confidence that the current fishery under assessment is not having adverse impacts on the minor secondary species. Logbook data for this fishery under assessment are not identified to a species level for species other than main target and bycatch species (see Table 40) so do not assist in the assessment of the fishery's impact on secondary minor species. Although the assessment team had some level of confidence of a lack of impact from the UoAs given the low scaled up catches from the at-sea observer data, there is nothing in place that would constitute testing. **SG100 is not met**.

| **c** | Management strategy implementation | | | |
|---|---|---|---|---|
| | Guide | | There is **some evidence** that the measures/partial strategy is being | There is clear evidence that the partial strategy/strategy is being implemented |

|  |  |  |  |  |
|---|---|---|---|---|
|  | post |  | **implemented successfully**. | successfully and is achieving its objective as set out in scoring issue (a). |
|  | Met? |  | Preliminary scoring<br>Blue marlin – Yes<br>Blue shark – Yes<br>Amberstripe scad – Yes<br>Smoothbelly sardinella – Yes<br>Minor species – Yes (default) | Blue marlin – No<br>Blue shark – No<br>Amberstripe scad – No<br>Smoothbelly sardinella – No<br>Minor species – No |

**Rationale**

Main secondary species

Evidence for implementation of the measures, partial strategies or strategies for all main secondary species includes VMS and observer data, landings data (port sampling), logbooks, bait volumes purchased, and the MCS system as described under Principle 3. All secondary main species stocks are considered to be above the PRI. Furthermore, the low catches of bait species –amberstripe scad and smoothbelly sardinella from MSC UoAs relative to the total catches can be considered measures to take effect in maintaining these species at or above biologically-based limits or to ensure that the UoA does not hinder their recovery. More generally however, as outlined in PI 3.2.3a, there is a lack of a comprehensive monitoring, control and surveillance system within Japan that sufficiently ensures compliance with licence conditions and regional CMMs. There is also a recent history of infractions that include shark finning and illegal trade of fish. This reduces confidence that the measures and strategies for main secondary species as implemented by the WCPFC and Japan are being implemented successfully. Nevertheless, In the absence of systematic non-compliance by the UoA fleet (PI 3.2.3d), the team considered that **SG80 should be met** on the whole for all main secondary species. However, considering the low level of observer coverage in the fishery, evidence of non-compliance and a lack of clear information about bait source fisheries, **SG100 was not considered met**.

Minor primary species

Note that minor species are only considered at the **SG100** level; **SG60 and SG80 are therefore met by default**. Evidence for implementation of the measures or partial strategies for all minor secondary species includes VMS and observer data, landings data (port sampling), logbooks, bait volumes purchased, and the MCS system as described under Principle 3. In the absence of a partial strategy however, for all minor species, **SG100 is not met.**

|  |  |  |  |  |
|---|---|---|---|---|
| **d** | Shark finning |  |  |  |
|  | Guide | It is **likely** that shark finning is not taking place. | It is **highly likely** that shark finning is not | There is a **high degree of certainty** that shark |

| | | | | |
|---|---|---|---|---|
| | post | | taking place. | finning is not taking place. |
| | Met? | No | No | No |

**Rationale**

According to Japan's NPOA for sharks, they do have a seasonal offshore longline fleet targeting sharks (blue sharks, shortfin mako shark) in the subtropical and temperate northwest Pacific (Government of Japan, 2001) but shark finning is prohibited – "in case harvested sharks are possessed, possession of all parts of the shark, excepting head, guts and skins to the point of first landing…". PI 3.2.3b outlines that there is evidence of shark finning occurring in other Japanese distant-water purse seine fisheries, which resulted in criminal convictions in 2021. Furthermore, there is anecdotal evidence suggesting it is common practice for these violations to occur. At the UoA level, evidence from both the logbook and at-sea observer data suggests that sharks caught incidentally in tuna longline operations are discarded (Table 43). WCPFC CMM 2019-04 requires all CCMs to take necessary measures to ensure all shark retained and board vessels are fully utilised. This includes banning the practice of shark finning and requiring that vessels land sharks with fins naturally attached to the carcass or an alternative measure as listed (e.g. tied to carcass using rope or wire). In the PNG EEZ, shark finning is prohibited in accordance with CMM 2019-04 as stipulated in their National Plan of Action for Sharks and Rays (2021-2024). The UoA's compliance with all WCPFC CMMs and the PNG NPOA is to be confirmed at the site visit. Based on the information received at this ACDR stage, no non-compliance incidents were identified at UoA level, however PI 3.2.3b outlines incidents of shark finning among other Japanese vessels. As the at-sea observer coverage is low, though the team does not yet know the percentage coverage, there is no comprehensive external validation of the vessel's activities to confirm with a high degree of certainty that shark finning is not taking place so **SG100 is not met.** Until further information is collected, the team cannot award a score, so the precautionary score of <60 will be given for the time being.

| | | | | |
|---|---|---|---|---|
| **e** | Review of alternative measures to minimise mortality of unwanted catch | | | |
| | Guide post | There is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of **unwanted** catch of main secondary species. | There is a **regular** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of **unwanted** catch of main secondary species and they are implemented as appropriate. | There is a **biennial** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of **unwanted** catch of all secondary species, and they are implemented, as appropriate. |
| | Met? | Blue marlin – NA<br>Blue shark –TBD<br>Amberstripe scad – NA<br>Indian oil sardine – NA<br>Minor species – Yes (default) | Blue marlin – NA<br>Blue shark –TBD<br>Amberstripe scad – NA<br>Indian oil sardine – NA<br>Minor species – Yes (default) | Blue marlin – NA<br>Blue shark –TBD<br>Amberstripe scad – NA<br>Indian oil sardine – NA<br>Minor species – No |

**Rationale**

Amberstripe scad and smoothbelly sardinella are bait species and consequently there is no unwanted catch. The majority of blue marlin is retained for sale (Table 43) but 100% of blue shark is discarded, so there is unwanted catch of this species. The regular review of blue shark stock status at the WCPFC level and evolution of CMMs on policies for sharks, in combination with existing regulations and practices to release sharks, would likely reach the requirements of the **SG60**. However, there is a lack of information about post-release mortality and UoA practice to avoid unwanted catch of blue shark. Further information is requested from the client at UoA level to score this SI for blue shark. For the PNG EEZ UoAs, the PNG National Plan of Action for Sharks and Rays (2021-2024) has in place strategies, measures and actions to support the objectives of the NPOA, which includes a biennial review mechanism to evaluate specific by-catch mitigation measures and alternatives to minimise discarding/mortality of unwanted catch of sharks, which would be consistent with **SG100**.

Minor species are scored at SG100 only; **SG60 and SG80 are therefore met by default**. Many of the minor secondary species are discarded, however, and as far as the team are aware, there is no biennial review for any of these species. **SG100 is not met**.

According to MSC guidance, when assessing this scoring issue, CABs are expected to review evidence to determine whether the client (UoA) has undertaken a review of the potential effectiveness and practicality of alternative measures to minimise mortality of unwanted catch of main species, in order to achieve the SG60 level. "This evidence could be, for example, a summary document listing information and measures reviewed along with an analysis of the measures and their appropriateness for the UoA, or the minutes of a meeting which has considered alternative measures". Furthermore "if the fishery were to adopt the use of this measure and it was being used at the time of the site visit, but there were no plans to undertake another review of measures, it would still only meet the SG60 level. If the fishery were to adopt the use of this measure and it was being used at the time of the site visit, and another review was scheduled to take place in three years' time, it would meet the SG80 level. If the plan was that alternative measures would be reviewed every two years, it would meet the SG100 level".

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| | |
|---|---|
| Draft scoring range | All UoAs: <60 |
| Information gap indicator | More information sought:<br>- Any specific management of blue marlin catches in the UoA fleet.<br>- Discuss any shark non-retention policy that the client has in place.<br>- Compliance with shark finning regulations and reporting obligations<br>- Review of measures for unwanted catch of blue shark<br>- Information on bait use and sourcing strategy for amberstripe scad and smoothbelly sardinella |

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

## Scoring table 25. PI 2.2.3 – Secondary species information

| PI 2.2.3 | | Information on the nature and amount of secondary species taken is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage secondary species | | |
|---|---|---|---|---|
| Scoring Issue | | SG 60 | SG 80 | SG 100 |
| **a** | Information adequacy for assessment of impacts on main secondary species | | | |
| | Guide post | Qualitative information is **adequate to estimate** the impact of the UoA on the main secondary species with respect to status.<br>OR<br>If RBF is used to score PI 2.2.1 for the UoA:<br>Qualitative information is adequate to estimate productivity and susceptibility attributes for main secondary species. | Some quantitative information is available and **adequate to assess** the impact of the UoA on main secondary species with respect to status.<br>OR<br>If RBF is used to score PI 2.2.1 for the UoA:<br>Some quantitative information is adequate to assess productivity and susceptibility attributes for main secondary species. | Quantitative information is available and **adequate to assess with a high degree of certainty** the impact of the UoA on main secondary species with respect to status. |
| | Met? | Blue marlin – Yes<br>Blue shark – Yes<br>Amberstripe scad – Yes<br>Smoothbelly sardinella – Yes | Blue marlin – Yes<br>Blue shark – Yes<br>Amberstripe scad – Yes<br>Smoothbelly sardinella – Yes | Blue marlin – No<br>Blue shark – No<br>Amberstripe scad – No<br>Smoothbelly sardinella – No |

**Rationale**

Blue marlin and blue shark

As discussed in Section 6.6.1 there is quantitative information for the catch of main secondary species (catch as detailed in the logbooks and catch and discards from limited at-sea observer data), which are provided to research and government authorities to assist in stock assessments, research and management. Both blue marlin and blue shark have stock assessments (as detailed in PI 2.2.1a) that provides quantitative information on *inter alia* total landings, stock biomass, species life history characteristics and total mortality and in some cases environmental parameters affecting recruitment. **SG60 and SG80 are met**. The WCPFC only requires an at-sea observer coverage level of 5% for longline fisheries under CMM 2018-05. In 2018 and 2019, the Japanese longline fleet achieved observer coverage levels of 6.9% and 11.4% respectively (based on number of observed fishing days) (WCPFC SC, 2020, 2021), although for the UoA fleet this translates into coverage rates which are still to be determined (see Table 42). Furthermore there was no at-sea observer data provided for 2020. Consequently, the assessment team had to scale up the observer data to mirror the actual catch taken by the UoA fleet between 2018 and 2019 (Table 43) and decided that the impact of the fishery under assessment on blue marlin and blue shark cannot be evaluated with a "high degree of certainty". Therefore, **SG100 is not met**.

Smoothbelly sardinella

The RBF was used to score PI 2.2.2a for smoothbelly sardinella. There is quantitative information on the purchase of bait, including smoothbelly sardinella. The client collects information on the bait species name (common and scientific), country where it was sourced/caught and the total tonnage used.

For productivity information - species specific information was only available for average maximum size, reproductive strategy and trophic level. All other attributes were available at the genus taxonomic level using congenerics. Therefore, three of the productivity attributes can be adequately scored on quantitative information about the species and four can be adequately scored based on related species of the same genus.

For susceptibility information – aerial overlap data was easy to assess given the production of global distribution maps (from Aquamaps). Encounterability is a default score. Selectivity of gear was given a precautionary score based on a lack of information on the gear used in the Chinese fisheries and post capture mortality is a default score. Therefore, only one of the susceptibility attributes (that are not default) could be adequately scored using quantitative information.

**This meets SG60 and SG80**. However, there is a paucity of information regarding the stock structure of this species and the Chinese fisheries where bait is sourced. In the case of uncertainties, the most precautionary risk score had to be applied for the selectivity attribute due to a lack of information regarding the selectivity of fishing gears used, as per PF 4.4.2.2 (MSC, 2020). Consequently, there is not enough quantitative information available, nor is it adequate to assess with a high degree of certainty the impact of the fishery under assessment on smoothbelly sardinella with respect to status. **SG100 is not met**.

Amberstripe scad

The RBF was used to score PI 2.2.2a for amberstripe scad. There is quantitative information on the purchase of bait, including amberstripe scad. The client collects information on the bait species name (common and scientific), country where it was sourced/caught and the total tonnage used.

For productivity information - species specific information was only available for average maximum size, reproductive strategy and trophic level. All other attributes were available at the genus taxonomic level using congenerics. Therefore, three of the productivity attributes can be adequately scored on quantitative information about the species and four can be adequately scored based on related species of the same genus.

For susceptibility information – aerial overlap data was easy to assess given the production of global distribution maps (from Aquamaps). Encounterability is a default score. Selectivity of gear was given a precautionary score based on a lack of information on the gear used in Vietnam and Chinese fisheries and post capture mortality is a default score. Therefore, only one of the susceptibility attributes (that are not default) could be adequately scored using quantitative information.

**This meets SG60 and SG80**. However, there is a paucity of information regarding the stock structure of this species and the Chinese and Vietnamese fisheries where bait is sourced. In the case of uncertainties, the most precautionary risk score had to be applied for the selectivity attribute due to a lack of information regarding the selectivity of fishing gears used, as per PF 4.4.2.2 (MSC, 2020). Consequently, there is not enough quantitative information available, nor is it adequate to assess with a high degree of certainty the impact of the fishery under assessment on amberstripe scad with respect to status. **SG100 is not met**.

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

**Rationale**

There are a number of minor secondary species in this fishery (Table 45). The impact of the fishery under assessment on these stocks in terms of catch (landings, discards, mortality to point of discard) can be evaluated through the at-sea observer reports (albeit with only limited ~5% coverage), but in some cases, little is known about the stock structure and status as well as possible issues with species identification, so **SG100 is not met in full**.

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

**Rationale**

All secondary main species have sufficient information available (fishing effort through logbooks, VMS, landings and discards through at-sea observers) that is adequate to support at least a partial strategy to manage them accordingly if one was developed and implemented. Japan has been shown to exceed its at-sea observer coverage requirements in 2018 and 2019 (5% under CMM 2018-05) but the UoA level of observer coverage is still to be determined. While there is evidence (see PI 3.2.3a) that the reporting of bycatch species is lacking in the logbooks and Japan does not suitably enforce this requirement, the scaled up at-sea observer data is probably a more accurate reflection of the catch of main secondary species than of ETP species, which are rare events. **Therefore SG60 and SG80 are met**. In relation to all secondary main species: (blue marlin, blue shark, amberstripe scad and smoothbelly sardinella), the fact that no partial strategy is currently in place (as detailed in 2.2.2a), does not preclude **SG80** from being met, as the information available (as detailed in 2.2.3a) is sufficient to support the development of a partial strategy. However, as there is a lack of formal management strategies for many secondary species, **SG100 cannot be met.**

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

| | |
|---|---|
| Draft scoring range | All UoAs: ≥80 |
| Information gap indicator | Information sufficient to score PI |

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

## Scoring table 26. PI 2.3.1 – ETP species outcome

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

**Rationale**

ETP species are discussed in Section 5.6.3 and formal ‘limits’ (national or international) which trigger management action are not in place for any of these species. This SI was therefore not scored.

| **b** | Direct effects | | | |
|---|---|---|---|---|
| | Guide post | Known direct effects of the UoA are likely to not **hinder recovery** of ETP species. | Direct effects of the UoA are **highly likely** to not **hinder recovery** of ETP species. | There is a high degree of confidence that there are no significant detrimental direct effects of the UoA on ETP species. |
| | Met? | All scoring elements – Yes | Preliminary scoring…<br>Silky shark – Yes<br>Oceanic whitetip shark – Yes<br>Giant devil ray – No<br>Devil and manta rays – No | All scoring elements – No |

| | | | |
|---|---|---|---|
| | | Olive ridley turtle – No<br>Green turtle – No<br>Loggerhead turtle – No<br>Hawksbill turtle – No<br>Leatherback turtle – No<br>Brown booby – Yes<br>Albatrosses (seabirds) – Yes<br>Petrels (seabirds) – Yes<br>Toothed whales (cetaceans) – No | |

**Rationale**

ETP species are discussed in Section 5.6.3 and include the following species:

Elasmobranchs: silky shark, oceanic whitetip shark, giant devil ray and devil rays and mantas.

Marine turtles: green turtle, olive ridley turtle, hawksbill turtle, loggerhead turtle and leatherback turtle

Seabirds: brown booby, albatrosses, petrels.

Cetaceans: toothed whales

**Elasmobranchs**

Elasmobranchs (sharks and rays) were the main group of ETP species interacting with the fishery under assessment. In total, 270 individuals were recorded by at-sea observers in 2018 and 2019. The majority of these interactions (253) were with silky shark and oceanic whitetip shark. The average annual scaled-up estimate of these two sharks in both weight and numbers between 2018 and 2019 was 24.4 t and 1,786 individuals respectively. The estimated total catch of other elasmobranch species was relatively low, with only a small number of individuals recorded in the observer data (Table 43).

Silky shark

Silky shark are a circumtropical species found in tropical waters of the Pacific Ocean. Scaled up observer data suggest that an average 1,680 individuals (21.2 t) were caught between 2018 and 2019. According to the raw observer data, 100% were discarded, and an average 77% were released alive. Assuming a precautionary 50% post release mortality this was 840 individuals annually.

The most recent stock assessment (2018) for silky shark in the Pacific was undertaken using Stock Synthesis (Clarke et al., 2018). The assessment model estimated spawning biomass in 2016 to be at 47% of the unfished level ($SB_{2016}/SB_0 = 0.469$). Current biomass is estimated to be above the MSY reference biomass level; however, there is considerable uncertainty associated with the estimate of stock status ($SB_{2016}/SB_{MSY} = 1.178$ 95% CI 0.590-1.770). Fishing mortality is estimated to be above $F_{MSY}$ ($F_{2016}/F_{MSY} = 1.607$, $Pr(F_{2016} > F_{MSY}) = 84\%$). The results indicated that if assessed against conventional reference points it is likely that the stock will not be found to be overfished but that overfishing is occurring (Clarke et al., 2018). WCPFC SC noted the considered uncertainty in the assessment and that current estimates of stock status should be considered indicative only and are not considered a reliable basis for management decision-making (WCPFC SC, 2020). While the model estimates of depletion are not considered reliable, they do indicate that Pacific Ocean silky shark populations are likely to have declined considerably over the last two decades in response to the increased levels of catch. Correspondingly, fishing mortality rates are likely to have increased considerably over the same period (Clarke et al., 2018). The 2018 assessment estimates the most recent (2016) catches in the WCPO to be 725,400 sharks and 570,000 in the longline fishery based on trade-based records. Also SPC have reported 974 mt of silky shark caught in the WCPFC Convention Area in 2019 – as reported from CCM logbook data but this is likely an underestimate (SPC OFP, 2020).

This catch compares with an estimated annual mortality (including an estimate of post-release mortality) from this fishery to the order of 840 ind./year (<0.01% of recent 2016 catches in the WCPO). On this basis, the known direct effects of the fishery are highly unlikely to hinder recovery of silky shark meaning **SG60 and SG80 are met**. Silky shark is considered “vulnerable” on IUCN red list. Owing to the non-comprehensive level of observer coverage in the fishery under assessment, as well as the decreasing population trend from the most recent assessment, **SG 100 is not met**.

<u>Oceanic whitetip shark</u>

Oceanic whitetip sharks are distributed worldwide in epipelagic tropical and subtropical waters (warmer than 20°C) between the latitudes of 30° North latitude and 35° South. Scaled up observer data suggest that an average 106 individuals (3.2 t) were caught between 2018 and 2019. According to the raw observer data, 100% were discarded, and on average 63% were released alive. Assuming a precautionary 50% post release mortality this was 53 individuals annually.

The most recent stock assessment (2019) for oceanic whitetip shark was undertaken using Stock Synthesis (Tremblay-Boyer et al., 2019). This was the first stock assessment carried out since CMM 2011-04 became active in 2013 (later replaced by CMM 2019-04), enacting a no-retention measure for this species for WCPFC CCMs. A new development in this assessment was the inclusion of three discard mortality (DM) scenarios in the historical catches to account for the potential impacts of the CMM. In addition, results from two new WCPO growth studies predicted a much less productive profile for the stock than what had been assumed previously. As was the case in the 2012 stock assessment, the assessment estimates the stock to be overfished and undergoing overfishing based on $SB/SB_{MSY}$ and $F/F_{MSY}$ reference points. Most model runs predict $SB/SB_0$ to be below 0.05, and all model runs predict $SB/SB_0$ to be below 0.1.F-based reference points improved in the period since the implementation of CMM 2011-04. Notably, $F/F_{MSY}$ is predicted to have declined by more than half from 6.12 to 2.67 (median) for the last year of the assessment when the impact of CMM 2011-04 on survival is accounted for under the 25% and 43.75% discard mortality scenarios, although the median value of $F/F_{CRASH}$ over all 648 grid runs for 2016 remains above 1 indicating that the population should go extinct on the long-term under current levels of fishing mortality (Tremblay-Boyer et al., 2019). These model conclusions were robust to uncertainties in key model assumptions and there was no indication that the WCPFC SC considered the current estimates of stock status as unreliable (WCPFC SC, 2020). The assessment's catch reconstruction between 1995 and 2016 indicated around 50,000-250,000 individuals were caught in 2016 (extrapolated from Figure 5 in Tremblay-Boyer et al. (2019)) based on median predictions of longline bycatch. MSY was estimated to be around 3,000-4,900 mt or 6,755 individuals (Tremblay-Boyer et al., 2019). Also SPC have reported 905 mt of silky shark caught in the WCPFC Convention Area in 2019 – as reported from CCM logbook data but this is likely an underestimate (SPC-OFP, 2020)

This catch compares with an estimated annual mortality (including an estimate of post-release mortality) from this fishery to the order of 53 individuals/year (<0.01% of recent 2016 catches in the WCPO). Oceanic whitetip shark is considered "critically endangered" on IUCN red list. The recent stock assessment was accepted for providing management advice on stock status (WCPFC SC, 2020). On this basis, the known direct effects of the fishery are highly unlikely to hinder recovery of oceanic whitetip shark. **SG60 and SG80 are met**. Owing to the non-comprehensive level of observer coverage in the fishery under assessment **SG100 is not met**.

Other elasmobranch species

| **Species** | **Average annual scaled up catch (tonnes)** | **Average annual scaled up catch (numbers)** | **Scoring conclusion** |
|---|---|---|---|
| Giant devil ray *Mobula mobular* | 4.4 | 42 | Giant (spinetail) devil ray is considered "Endangered" on the IUCN Red List and they are vulnerable to fishing as their life history traits (k-selected) mean their maximum rates of intrinsic population increase are among the lowest of all elasmobranchs (Dulvy et al., 2014). Mobulids are particularly susceptible to incidental catch in tuna fisheries due to their epipelagic distribution in regions of high productivity, leading to a high level of distributional overlap with target species (Croll et al., 2012). The populations of giant devil rays are patchily distributed, with abundance varying based on food availability and fishing pressure. Throughout most of its range, populations seem to be in decline, due to targeted fishing and incidental capture as bycatch. Populations in some areas of the Pacific (Australia, New Zealand and some Pacific Island countries) are expected to be more resilient than other areas due to lower fishing pressure and strong fisheries management (Marshall et al., 2020). A total of 6 observed interactions were recorded for the UoA across 2018-2019 for giant (spinetail) devil ray. According to the observer data, 100% of these have been released alive. Does the client adhere to WCPFC CMM 2019-05 in relation to mobulid rays caught in association with longline fishing (to be confirmed at the site visit). This interaction rate (per hooks observed between 2018 and 2019) is <0.0001. According to Peatman et al. (2018) the percentage of sets with observed catches of manta rays is around 2.5% for deep-set fishing in tropical areas, which is |

| | | | |
|---|---|---|---|
| | | | where the client is mainly fishing and employing their gear. Therefore, the team considered the UoAs highly unlikely to hinder recovery of this species. Therefore **SG60 and SG80 are met**. Given the non-comprehensive level of at-sea observer coverage **SG100 is not met**. |
| Devil rays and mantas (*Mobula spp.*)<br>Possible species:<br>Reef manta ray (*Manta alfredi*)<br>Oceanic (Giant) manta ray *(Manta birostris*)<br>Shortfin devilray (*Mobula kuhlii*)<br>Sicklefin devilray (*Mobula tarapacana*)<br>Bentfin devilray *(Mobula thurstoni*)<br>Longhorned pygmy devilray (*Mobula eregoodoo*)<br>Spinetail mobula *(Mobula japanica*) | 8.0 | 78 | *Mobula spp.* species are considered either "Vulnerable" or "Endangered" on the IUCN Red List and they are vulnerable to fishing as their life history traits (k-selected) mean their maximum rates of intrinsic population increase are among the lowest of all elasmobranchs (Dulvy et al., 2014). Mobulids are particularly susceptible to incidental catch in tuna fisheries due to their epipelagic distribution in regions of high productivity, leading to a high level of distributional overlap with target (Croll et al., 2012). A total of 11 observed interactions were recorded for the UoA for devil rays and mantas unspecified across 2018-2019. According to the observer data, 100% of these have been released alive. Does the client adhere to WCPFC CMM 2019-05 in relation to mobulid rays caught in association with longline fishing (to be confirmed at the site visit). This interaction rate (per hooks observed between 2018 and 2019) is <0.0001. According to Peatman et al. (2018) the percentage of sets with observed catches of manta rays is around 2.5% for deep-set fishing in tropical areas, which is where the client is mainly fishing and employing their gear. Therefore, the team considered the UoAs highly unlikely to hinder recovery of these possible species. Therefore **SG60 and SG80 are met.** Given the non-comprehensive level of at-sea observer coverage and also unspecified *mobula spp*. catch **SG100 is not met**. |

**Marine turtles**

In total there was 34 individuals recorded by at-sea observers between 2018 and 2019, which included 32 interactions with olive ridley turtles and 2 interactions with green sea turtles. The majority of these were discarded dead (89%). The average annual scaled-up estimate of these marine turtle interactions in both weight and numbers between 2018 and 2019 was <1 t and 240 individuals. These numbers are highly uncertain. There were also some interactions recorded in the logbook for hawksbill turtle (2), leatherback turtle (1) and olive ridley turtle (70) between 2018 and 2020. These numbers are likely an underestimate.

The fishery overlaps with several marine turtle Regional Management Units (RMUs), for green, leatherback, olive ridley, hawksbill and loggerhead turtles as outlined in Section 5.6.3.2. According to ABNJ (2017), the distribution area of leatherback, olive ridley, loggerhead and green turtles overlaps with 59.1%, 60.6%, 59.7% and 66% respectively of the WCPFC Convention Area. The fishery under assessment does not operate inshore, uses circle hooks, fish bait – this seems correct from the data provided but needs to be confirmed at site visit and is conducting deeper pelagic longline sets according to the at-sea observer data. These have all been shown to reduce marine turtle interactions (Gilman and Huang, 2017; Gilman et al., 2017, 2019). In a study of the locally-based Palau tuna pelagic longline fishery and its interaction with bycatch and ETP species, Gilman et al. (2017) observed that the interaction rates for marine turtles were low when the Palau fleet conducted deeper sets (> 14 hooks between floats) (See Table 3 in Gilman et al. 2017)). While this study did not include distant water fishing pelagic longline vessels, it still provides an indication of relative interactions rates for deep and shallow set pelagic longlines, which is aligned with existing literature (e.g. Beverly et al. (2009) and Watson and Bigelow (2014)).

Population estimates for marine turtles are difficult to acquire due to a lack of demographic information. Data on nesting females were used as the most readily accessible component of sea turtle populations in order to acquire a population estimate and assess the status of commonly encountered marine turtles in the WCPO. The source of this information came from ABNJ (2017) and is reproduced below.

- **Green turtle**: In the Indo-Pacific, there may be approximately 200,000 females nesting annually at over 230 nesting locations (Seminoff et al., 2015). Some published and unpublished satellite telemetry data exists for Pacific green turtles and suggest that post-nesting females tend to migrate west from Oceania nesting beaches to foraging habitats of the western Pacific;

- **Olive ridley:** the western Pacific population nests primarily in India while an eastern Pacific population nests primarily in Mexico, Costa Rica and Nicaragua. The eastern Pacific population may consist of approximately 2.5 million nesting females and the western Pacific population may be comprised of approximately 300,000 females nesting annually with additional unquantified nesting activity in northern Australia (Limpus, 2009; NMFS USFWS, 2014).

- **Leatherback turtles** in the Pacific are comprised two demographic populations identified through genetic studies (Dutton et al., 2007) occurring in the western and an eastern Pacific. The western Pacific meta-population nests in Indonesia, Papua New Guinea and Solomon Islands where approximately 500-600 females may nest annually (Pilcher, 2011, Tapilatu et al., 2013). The eastern Pacific meta-population nests primarily in Mexico and Costa Rica where approximately 150-200 females may nest annually (IUCN Marine Turtle Specialist Group, 2013).

- **Loggerhead turtles** in the Pacific Ocean are comprised of two distinct population segments, a North Pacific and a South Pacific population. Approximately 500 to 1,000 loggerheads may nest annually in Japan and roughly 2,000-5,000 loggerheads may nest annually in eastern Australia and New Caledonia (Y. Matsuzawa, Sea Turtle Association of Japan, pers. comm. unpublished; UNEP/CMS/COP11 2014 cited in ABNJ (2017)). Both populations are currently stable or increasing.

Wallace et al. (2013), evaluated the relative bycatch rates across longline, net and trawl fisheries to determine bycatch impact scores, which integrated information on bycatch rates, fishing effort, mortality rates, and body sizes (i.e. proxies for reproductive values) of turtles taken as bycatch—as well as mortality rates. The resulting risk, threat levels and bycatch impact for each relevant RMU is shown in Table 48. All RMUs for each species, which overlap with the UoA were considered either medium or low risk (Wallace et al., 2013). A threat that incurs high mortality and occurs in areas of high density of reproductively valuable individuals is likely to have a negative population-level impact. In this context, fisheries operating in near-shore areas, overlapping with high-use areas for turtles, are more likely to negatively affect turtle populations than offshore fisheries operating in low-use areas.

Taking into account the likelihood of interactions with marine turtles based on the fishery under assessment's gear configuration, the population estimates for individual species (from ABNJ (2017)) and the estimated threat level to individual turtle species (from Wallace et al. (2013)) it was considered that the direct effects of the UoAs are highly likely to not hinder recovery of green, olive ridley, leatherback, and hawksbill turtles. **SG60 and SG80 are met**. **SG100 is not met** because of the non-comprehensive observer coverage in the fishery under assessment.

**Seabirds to be broken down to species level at the site visit**

There was only one recorded interaction with a seabird (brown booby) by at-sea observers between 2018 and 2019. It was discarded dead. This species is located around inshore and offshore waters in tropical regions globally, and breeds on offshore islands. It is considered of Least Concern on the IUCN Red List due to its extremely large distribution and population size. The global population size is estimated to number > 200,000 individuals (del Hoyo et al., 1992). National population sizes have been estimated at c.10,000-100,000 breeding pairs and c.1,000-10,000 individuals on migration in Chinese Taipei and c.10,000-100,000 breeding pairs, c.1,000-10,000 individuals on migration and c.1,000-10,000 wintering individuals in Japan (Brazil 2009 cited in Birdlife International (2021)). Therefore, the team considered the UoAs highly unlikely to hinder recovery of this species. **SG60 and SG80 are met. SG100 is not met** because of the non-comprehensive observer coverage in the fishery under assessment.

There were also three individuals recorded in the logbook between 2018 and 2020, including a single albatross (unidentified), a single petrel (unidentified) and a single unknown seabird. The UoA fleet in the period 2018 to 2019 has been operating mainly in the tropical waters of the WCPO between >= 15°S and < 10°N, which is considered a low risk area for seabird interactions (See Filippi et al. (2010)) and likely explains why there was only one recorded individual across all observed trips. Furthermore, given that the distributions of albatrosses and large petrels, (which are the main vulnerable species susceptible to capture in pelagic longline fisheries), occur poleward of 20 degrees latitude in both hemispheres, it is unlikely that this fishery significantly overlaps with these species.

Filippi et al. (2010)) compared the distribution of seabirds and their likelihood of capture in relation to longline fishing effort in the WCPFC 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 level impacts and the fisheries which contributed the greatest risk. The resulting areas of likely species-level effects of fishing in the WCPFC Convention Area are shown in Figure 50. It is evident on this map that this fishery under assessment operates in a low-risk area for seabird interactions.

In an assessment of annual mortalities of seabirds in longline and purse-seine fisheries between 2015 to 2018, Peatman et al. (2019) fitted bycatch per unit effort (BPUE) and catch condition models for seabirds to obtain a “best estimate” of total seabird mortality for three regions: (i) the north Pacific - the region north of 10°N; (ii) south Pacific - the region south of 25°S; and (iii) the equatorial Pacific - the region between 10°N and 25°S. Estimated longline seabird bycatch from 2015 to 2018 was between 14,700 – 20,600 individuals per year (95% Cis ranging from 12,000 to 28,600). A total of 65% were accounted for by longline fisheries north of 20°N, with 23% accounted for by longline fisheries south of 30°S. The remainder was accounted for by fishing between 25°S and 25°N (9%), and between 25°S and 30°S (4%). The majority of bycatch was estimated to be dead at-vessel, with estimates of mortality ranging from 13,000 to 19,000 individuals per year (95% CIs ranging from 10,800 to 25,000). It was noted that the proportions dead at vessel were relatively low for the region between 25°S and 20°N (75%), compared to fishing elsewhere (95 %). This provides further evidence that the UoAs are operating in a low risk area for seabird interactions.

Based on this information the assessment team considered that the direct effects of the UoAs are highly likely to not hinder recovery of seabird (albatross and petrel) species. **SG60 and SG80 are met. SG100 is not met** because of the non-comprehensive observer coverage in the fishery under assessment.

**Cetaceans to be broken down to species level at the site visit**

Five interactions with unidentified toothed whales (cetaceans) were observed by at-sea observers between 2018 and 2019, with four of the five whales released alive. The average annual scaled-up estimate of these in numbers between 2018 and 2019 was 70 individuals. There were no interactions with cetaceans recorded in the logbook.

There are two main types of interaction between cetaceans and longlines: depredation and capture via hooking and entanglement, the latter often following on from the former (Gilman et al., 2007; Anderson, 2014, Williams et al. 2021). Although relative to other fishing gear, longline fishing generally does not pose as much of a threat, many individuals suffer mortality and serious injury as a result of the interactions (Werner et al. 2015). An investigation of observer-reported cetacean interactions in the WCPFC for the period 2015-2020 by Williams et al. (2020; 2021) identified that in longline fisheries the top five interactions (based on frequency of interactions per 100 sets) were False Killer Whale (*Pseudorca crassidens*), Toothed whales, and several species of oceanic dolphins (bottlenose, rough-toothed and Risso's) (See Section 5.6.3.4). For all reported interactions 95% were sightings beside the vessel without interacting with the gear and for the 5% that did interact with the gear, around 84% of individuals were released alive (Williams et al. 2021). While the UoAs clearly overlap with cetaceans, according to Williams et al. (2020; 2021) most recorded interactions are innocuous (i.e. no interaction with the gear), with the majority released alive. Therefore the assessment team considered that the direct effects of the UoAs are highly likely to not hinder recovery of unidentified tooth whales (cetacean) species. **SG 60** and **SG 80** are met. **SG 100** is not met because of the non-comprehensive observer coverage in the fishery under assessment.

In relation to the unobserved mortality of ETP species, the team considered the possible issue of ghost fishing caused by discarded or lost fishing gear (monofilament line and hooks). Gear loss is reportedly minimal (mainly limited to hooks that have been lost to sharks) to be confirmed. The use of radio beacons and GPS on the mainline mean they are often able to be located even if the mainline breaks when hauling or otherwise. The assessment team therefore concluded that the incidence of gear loss is rare- to be confirmed. In any case, lost pelagic longline gear is only likely to continue to fish as long as bait remains on the hooks. Bait tends to be stripped relatively quickly off the hooks and as such, the ghost fishing mortality rate associated to lost longlines is usually low (Macfadyen et al., 2009). Under CMM 2017-04, CCMs should encourage their fishing vessels within the WCPFC Convention Area to retrieve abandoned, lost or discarded fishing gear and retain the material on board, separate from other waste for discharge to port reception facilities. Where retrieval is not possible or does not occur, CCMs shall encourage their fishing vessels to report the latitude, longitude, type, size and age of abandoned, lost or discarded fishing gear. It was therefore concluded that unobserved mortality through ghost fishing at the scale of the UoAs was highly unlikely to be a significant factor in the fishery's interactions with ETP species. This conclusion remains to be confirmed.

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

**Rationale**

Indirect effects on ETP species might include disturbance of nesting/roosting behaviour, noise or pollution and removal of potential prey species. Note: Discard and post-release mortality is accounted for in the information cited above and is therefore not an indirect effect.

Indirect trophic effects of fishing for tuna on the tropical pelagic ecosystem have been considered through a variety of modelling approaches (Allain et al., 2007, 2015) and, although the impacts are not negligible, they have not been considered irreversible and no particular impacts on ETP species have been identified.

The team considered possible indirect effects to be as follows:

*Elasmobranchs*: *Removal of prey* – sharks are opportunistic feeders with a varied diet consisting a range of teleosts including barracuda, jacks, dolphinfish, tuna, skipjack and other scombrids, white marlin, and squid, and occasionally stingrays, seabirds, turtles, marine gastropods, crustaceans, carrion from marine mammals, and garbage (Compagno, 1984 in Bonfil et al. (2008)). Although they are apex predators, the diversity of prey items makes it highly unlikely that the UoA fishery, through its exploitation of mainly tunas, would lead to unacceptable impacts on any of the ETP shark species through competition. Giant devil and manta rays are planktivorous. The diet of sea turtles is restricted to algae, grasses and seaweeds, invertebrates and small fish. Finally, none of the bird species considered (brown booby) feed on the target species in this fishery.

*Sea turtles: Disturbance around nesting / inter-nesting foraging areas* – this is highly unlikely given the fishery is operating offshore and away from foraging or roosting areas.

*Seabirds: Disturbance around nesting / roosting, foraging areas* – this is highly unlikely given the fishery is operating in a low risk area for seabird interactions, offshore and away from foraging or roosting areas.

*Cetaceans: Noise disturbance, change in foraging behaviour areas* – this is highly unlikely given the fishery is operating in offshore areas and the number of vessels operating in close proximity is minimal. It is known that marine mammals have changed their foraging behaviour in response to the availability of fish on longlines – individual fishers will try to mitigate this by avoiding setting or hauling in the presence of mammals if possible. Aside from the risk of bycatch (considered above), it has been shown in other fisheries (e.g. orcas in toothfish fisheries) that the impact on the mammals themselves is positive, as one would expect.

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

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| | |
|---|---|
| Draft scoring range | All UoAs: ≥80 |
| Information gap indicator | More information sought:<br>- Does the client have in place a no retention shark policy for UoA vessels?<br>- Further information on specific gear configurations and amount of gear loss.<br>- VMS data for the UoA fleet to confirm area of operation |

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

**Scoring table 27. PI 2.3.2 – ETP species management strategy**

| PI 2.3.2 | | The UoA has in place precautionary management strategies designed to:<br>meet national and international requirements;<br>ensure the UoA does not hinder recovery of ETP species.<br>Also, the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of ETP species | | |
|---|---|---|---|---|
| Scoring Issue | | SG 60 | SG 80 | SG 100 |
| **a** | Management strategy in place (national and international requirements) | | | |
| | Guide post | There are **measures** in place that minimise the UoA-related mortality of ETP **species, and are expected to be highly** likely to achieve national and international requirements for the protection of ETP species. | There is a **strategy** in place for managing the UoA's impact on ETP species, including measures to minimise mortality, which is designed to be **highly likely to achieve** national and international requirements for the protection of ETP species. | There is a **comprehensive strategy** in place for managing the UoA's impact on ETP species, including measures to minimise mortality, which is designed to **achieve above** national and international requirements for the protection of ETP species. |
| | Met? | All scoring elements – Yes | Preliminary scoring… species groups to be broken down to species level at site visit<br>Silky shark – Yes<br>Oceanic whitetip shark – Yes<br>Giant devil ray – Yes<br>Devil and manta rays – Yes<br>Olive ridley turtle – Yes<br>Green turtle – Yes<br>Loggerhead turtle – Yes<br>Hawksbill turtle – Yes<br>Leatherback turtle – Yes | All scoring elements – No |

| | | | | |
|---|---|---|---|---|
| | | | Brown booby – Yes<br>Albatrosses (seabirds) – Yes<br>Petrels (seabirds) – Yes<br>Toothed whales (cetaceans) – No | |

**Rationale**

In the context of this performance indicator (Source: MSC FCR v2.01; Table SA8):

- "Measures" are actions or tools in place that either explicitly manage impacts on the component or indirectly contribute to management of the component under assessment having been designed to manage impacts elsewhere.

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

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

All ETP species

There is a binding 5% observer coverage level set by the WCPFC for all longline operations in the WCPO under CMM 2018-05. The ROP aims to collect independent fishery information on interactions with *inter alia* ETP species during longline operations, which inform management decision-making. In 2018 and 2019, the Japanese longline fleet achieved national observer coverage levels of 6.9% and 11.4% respectively (based on number of observed fishing days) (WCPFC SC, 2020, 2021), which met the requirements of CMM 2018-05. UoA specific fleet at-sea observer coverage remains to be determined in 2018 and 2019 respectively.

Elasmobranchs (4 scoring elements – see PI 2.3.1b for complete list)

The WCPFC has implemented various CMMs and resolutions for elasmobranch species. CMM 2019-04 encompasses all species of sharks, skates, rays and chimaeras, which stipulates *inter alia*, that all sharks retained on board vessels should be fully utilised and the practice of shark finning is prohibited. CCMs are required to ensure their vessels land sharks with fins naturally attached to the carcass and longline fisheries targeting tuna and billfish are required to either not use or carry wire trace as branch lines or leaders or do not use shark lines. Within CMM 2019-04 there is also species-specific management for silky and oceanic whitetip sharks. Both these sharks are prohibited from being retained and if an individual is caught, CCMs should ensure they are released as soon as possible after being brought alongside the vessel, and in a manner that results in as little harm to the shark as possible. There are also various reporting requirements in place. CMM 2019-05 encompasses all species in the family *Mobulidae*, which includes mantas and mobula rays, which stipulates *inter alia*, that CCMs are prohibited from targeted fishing or intentional setting on mobulid rays.

CCMs are prohibited from retaining any of these species and if an individual is caught, CCMs should ensure they are released as soon as possible after being brought alongside the vessel, and in a manner that results in as little harm to the mobulid ray as possible. There are also various reporting requirements in place.

According to PI 3.2.1a, Japan must adopt all the all the WCPFC CMMs as stipulated in the *Act on Special Measures for Enhancement of the Conservation and Management of Tuna Resources*. Furthermore, the Japan Fisheries Agency has set "compliance rules for the operations of the offshore tuna fisheries" to ensure the regulations and CMMs set by WCPFC are followed. Japan has formulated a National Plan of Action for Sharks which has been implemented since 2001 (revised in 2009 and 2016), which reiterates that Japan "is obliging its fishers to comply with all the management measures adopted by these RFMOs as conditions for granting the fishing licence." (Government of Japan, 2001). Japanese distant water and offshore tuna longline fishing vessels under the NPOA for Sharks are prohibited either to possess wire as branch lines and leaders or to use branch lines running directly off the longline floats (shark lines). Compliance with this will need to be determined at site visit. According to PI 3.2.3a the reporting of bycatch and ETP species in logbooks is often lacking and Japan has not suitability enforced this requirement. Clearly, there are issues with logbook underreporting of ETP species in logbook at a national level. Require evidence of the use of shark and ray mitigation measures as specified by CMM 2019-04 – to be confirmed at the site visit

In terms of the PNG EEZ UoAs, the scope of the PNG's National Tuna Management and Development Plan (2014) specifically includes the provisions of all CMMs adopted by the WCPFC. In 2021, PNG released a National Plan of Action for Sharks and Rays (2021-2024), which covers all species in the class Chondrichthyes. Its objectives are to *inter alia*, reduce shark bycatch to near zero by implementing mitigation measures for sharks consistent with best practices and minimise waste and discards of sharks by requiring full retention of sharks on vessels. Measures to achieve these objectives are identified in the NPOA and include *inter alia*, licensing of all commercial vessels, regulation of harvesting of sharks in PNG EEZ that is compliant with WCPFC CMMs, improved data collection and analysis, stakeholder consultation, reporting and scientific research, as well as capacity building and comprehensive MCS frameworks. The NPOA also has in place a (biennial) review mechanism that will consider the: (i) latest decisions of the WCPFC and CITES, (ii) specific measures taken in other relevant international and regional shark instruments to which PNG is a party or non-cooperating non-member; and (iii) identify gaps and highlight specific areas for improvement and intervention.

At the UoA level, the fleet has in place the following measures for sharks… No retention of any species of sharks or rays (including shark fins or other parts of sharks and rays), including no transshipping, landing or trading any sharks or rays – all this is to be confirmed at site visit.

The assessment team considered that all these elements constitute examples of a strategy (as detailed in Table GSA3), designed to minimise mortality on elasmobranchs such that **SG60 and SG80 are met. SG100 is not met** because of the non-comprehensive observer coverage in the fishery under assessment, lack of specific stock assessments and population estimates for some species, which mean it is not a comprehensive, tested, strategy made up of linked monitoring, analyses, and management measures and responses.

Marine turtles (5 scoring elements – see PI 2.3.1b for complete list)

The WCPFC has implemented various CMMs and resolutions for marine turtles species. CMM 2018-04 specifically addresses marine turtle bycatch which stipulates *inter alia*, ensuring all longline vessels that fish in the Convention Area shall carry line cutters and de-hookers to handle and promptly release sea turtles caught or entangled, that CCMs implement the FAO Guidelines to Reduce Sea Turtle Mortality in Fishing Operations and ensure the safe handling of captured sea turtles. Furthermore, for shallow-setting longline vessels they must implement at least one measure to mitigate capture of marine turtles out of: (i) using large circle hooks; (ii) using finfish for bait or; (iii) any other measure or mitigation plan/activity approved by SC and Commission to be capable of reducing sea turtle interactions. There are also various reporting requirements in place.

According to PI 3.2.1a, Japan must adopt all the all the WCPFC CMMs as stipulated in the *Act on Special Measures for Enhancement of the Conservation and Management of Tuna Resources*. Furthermore, the the Japan Fisheries Agency has set "compliance rules for the operations of the offshore tuna fisheries" to ensure the regulations and CMMs set by WCPFC are followed. Japan implements the FAO Guidelines to Reduce Sea Turtle Mortality in Fishing Operations (See, https://www.iotc.org/science/table-progress-implementing-npoa-sharks-npoa-seabirds-and-fao-guidelines-reduce-sea-turtle-mortality). According to PI 3.2.3a the reporting of bycatch and ETP species in logbooks is often lacking and Japan has not suitability enforced this requirement. Clearly, there are issues with logbook underreporting of ETP species in logbook at a national level. Require evidence of the use of marine turtle mitigation measures as specified by CMM 2018-04 – to be confirmed at the site visit. The WCPFC CMM for marine turtles is based on information that shows that the use of circle hooks, changing baits from squid to fish bait and fishing at greater depths (i.e., >100m) can reduce marine turtle interactions (Gilman and Huang, 2017; Gilman et al., 2017, 2019). This aligns with the fishing operations of the UoA fleet, which is operating in offshore waters, using circle hooks, fish bait and are conducting deeper pelagic longline sets – to be confirmed at site visit. Therefore the risk of marine turtle mortality is reduced and the propensity for indirect effects seems highly unlikely.

In relation to the PNG EEZ UoAs, PNG has developed and implemented a Tuna Management and Development Plan (TMP) in 2014 (PNG, 2014) (see also PIs 2.1.2 and 2.2.2). Species covered by the plan include the target species in this assessment and "all other non-target and target bycatch, and associated or dependent species taken in the course of fishing for tuna" – which includes marine turtles. The impacts of fishing on bycatch and the general marine ecosystem are also recognised under the TMP and strategies and tools listed for the explicit purpose of ensuring the conservation and management of tuna resources in the EEZ. These include measures such as controls on fishing effort, the purse seine and longline vessel day schemes (VDS), licensing, fishery closures, catch reporting (for logbooks, observer reports, port sampling, electronic reporting, catch documentation schemes etc.) and enforcement measures (that include surveillance activities, monitoring of VMS, and AIS etc.). The TMP references fishery reference points and harvest control rules and the use of a range of rules and controls as management measures to control both total catch and effort.

The assessment team considered that all these elements constitute examples of a strategy (as detailed in Table GSA3), designed to minimise mortality on marine turtles such that **SG60 and SG80 are met**. **SG100 is not met** because of the non-comprehensive observer coverage in the fishery under assessment, uncertainty in some population estimates for some species, which mean it is not a comprehensive, tested, strategy made up of linked monitoring, analyses, and management measures and responses.

Seabirds (3 scoring elements – see PI 2.3.1b for complete list)

The WCPFC has implemented various CMMs and resolutions for seabirds. CMM 2018-03 specifically addresses seabird bycatch but it only applies to longline fisheries operating South of 30°S, between 25°S and 30°S, and North of 23°N; and therefore they do not apply to the UoA fleet in their area of operation. Longline fisheries operating in 'other areas' (between 25°S and 23°N), where necessary, are encouraged to employ one or more of the seabird mitigation measures but this is not enforceable. Based on the analysis by Filippi et al. (2010) and Peatman et al. (2019), seabird interaction in the area of operation of the UoA fleet is considered low, as such the risk of seabird mortality is reduced and the propensity for direct effects seems highly unlikely.

According to PI 3.2.1a, Japan must adopt all the all the WCPFC CMMs as stipulated in the *Act on Special Measures for Enhancement of the Conservation and Management of Tuna Resources*. Furthermore, the Japan Fisheries Agency has set "compliance rules for the operations of the offshore tuna fisheries" to ensure the regulations and CMMs set by WCPFC are followed. Japan has developed a National Plan of Action (NPOA) for Seabirds, which has been implemented since 2001 (subsequently revised in 2005, 2009 and 2016) and available here: https://www.iotc.org/sites/default/files/NPOA_portal/Japan/Japan_NPOA_Seabirds_2016.pdf. This document states that Japan will contribute to the "development of mitigation measures for incidental catch of seabirds and steady implementation of such measures at each RFMOs…" (Government of Japan, 2001a). According to PI 3.2.3a the reporting of bycatch and ETP species in logbooks is often lacking and Japan has not suitability enforced this requirement. Clearly, there are issues with logbook underreporting of ETP species in logbook at a national level. Require evidence of the use any seabird mitigation measures as specified by CMM 2018-03 – to be confirmed at the site visit. Evidence of measures employed by the client group include weighted branch lines as one part of the recommended measures from CMM 2018-03 and also management of offal discharge as necessary – to be confirmed at site visit.

The assessment team considered that all these elements constitute examples of a strategy (as detailed in Table GSA3), designed to minimise mortality on seabirds such that **SG60 and SG80 are met. SG100 is not met** because of the non-comprehensive observer coverage in the fishery under assessment, which mean it is not a comprehensive, tested, strategy made up of linked monitoring, analyses, and management measures and responses.

Cetaceans (1 scoring element – see PI 2.3.1b for complete list)

The WCPFC currently does not have any management or requirements regarding cetaceans in their longline fisheries. However, the WCPFC through CMM 2011-03 does have management measures and requirements for purse seine fisheries. At WCPFC 16 a proposal was first introduced to amend CMM 2011-03, to include longline fisheries (WCPFC16-2019-DP15_Rev2). This wasn't supported at WCPFC 16 without a review of available of data to provide estimates of fishing interaction types and levels with cetaceans. This was subsequently reported on at SC 16 and SC 17 (See, Williams et al. 2020; 2021), which indicated overlap of cetaceans with longline fisheries, but the majority of interactions were innocuous. This will lead to the WCPFC to consider whether CMM 2011-03 is updated to include longline fisheries. Furthermore, SC 17 developed and recommended guidelines for the safe handling and release of cetaceans in both purse seine and longline gear (WCPFC, 2021), which will be forwarded to the WCPFC 18 to consider for implementation (see, WCPFC18-2021-26).

While there are no regional management requirements regarding cetaceans in longline fisheries, Japan has the following management for cetaceans…. To be determined at site visit. According to PI 3.2.3a the reporting of bycatch and ETP species in logbooks is often lacking and Japan has not suitability enforced this requirement. Clearly, there are issues with logbook underreporting of ETP species in logbook at a national level. Further information sought on UoA level management of cetaceans.

Despite a lack of specific longline management at the regional level, the Pacific Islands where the fishery also operates (in PNG EEZ) are signatories to the *Memorandum of Understanding (MoU) for the Conservation of Cetaceans and their Habitats in the Pacific Island Region* (15 September 2006) (see: https://www.sprep.org/attachments/Legal/CMS_Pacific_Cetaceans_MoU__annexes_E.pdf), which is a Multilateral Environmental MoU concluded under the auspices of the *Convention on the Conservation of Migratory Species of Wild Animals* (CMS or Bonn Convention) and protects all populations of cetaceans (whales and dolphins) in the Pacific Island Region (area between the Tropic of Cancer and 60° South latitude and between 130° east longitude and 120° West longitude). Although Japan is not a signatory, it is bound to follow the conditions and indeed management set by the authorities for the waters in which their distant water fleet operate.

There were only five reported interactions with cetaceans (only one dead at time of release) in the at-sea observer data and work by Williams et al. (2020; 2021) suggests that the majority of interactions are innocuous and do not result in mortality. With this in mind the assessment team considered **SG 60** to be met, however the absence of any regional or national management of cetaceans, coupled with the non-comprehensive observer coverage in the fishery under assessment, meant that the team did not consider there a strategy in place for managing the UoAs impact on cetaceans that is highly likely to achieve national and international requirements for their protection. **SG 80** is not met.- this is scored provisionally in the absence of any UoA level or national management. It may also be scored higher for PNG UoAs given the MoU.

As detailed in PI 2.3.1b ghost fishing may be a factor in the unobserved mortality of ETP species. In terms of management, the team concluded that this falls under the wider concept of waste management. Any UoA specific management of waste? Under the WCPFC Regional Observer Program and accompanying ROP Minimum Standard Data Fields, observers are required to report whether the vessel abandoned, lost or discarded any fishing gear, whether it discharged any oil or disposed of metals, plastics, chemicals or fishing gear at sea. Furthermore, under CMM 2017-04, CCMs should encourage their fishing vessels within the WCPFC Convention Area to retrieve abandoned, lost or discarded fishing gear and retain the material on board, separate from other waste for discharge to port reception facilities. Where retrieval is not possible or does not occur, CCMs shall encourage their fishing vessels to report the latitude, longitude, type, size and age of abandoned, lost or discarded fishing gear. The assessment team was therefore satisfied that there is a management strategy in place to address the issue of ghost fishing, **SG60 and SG80 are met**, however, it cannot be said that there is a comprehensive strategy. **SG100 is not met.**

| **b** | Management strategy in place (alternative) | | | |
|---|---|---|---|---|
| | Guide post | There are **measures** in place that are expected to ensure the UoA does not hinder the recovery of ETP species. | There is a **strategy** in place that is expected to ensure the UoA does not hinder the recovery of ETP species. | There is a **comprehensive strategy** in place for managing ETP species, to ensure the UoA does not hinder the recovery of ETP species. |
| | Met? | NA | NA | NA |

**Rationale**

Since there are requirements for protection and rebuilding provided through national ETP legislation or international agreements, the team has only scored scoring issue (a) following SA 3.11.2.1.

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

| | | | | |
|---|---|---|---|---|
| | | | | **confidence** that the strategy will work. |
| | Met? | All scoring elements – Yes | Preliminary scoring…<br>Silky shark – No<br>Oceanic whitetip shark – No<br>Giant devil ray – No<br>Devil and manta rays – No<br>Olive ridley turtle – No<br>Green turtle – No<br>Loggerhead turtle – No<br>Hawksbill turtle – No<br>Leatherback turtle – No<br>Brown booby – Yes<br>Albatrosses (seabirds) – Yes<br>Petrels (seabirds) – Yes<br>Toothed whales (cetaceans) – No | All scoring elements – No |

**Rationale**

Elasmobranchs and marine turtles (4 and 5 scoring elements – see PI 2.3.1b for complete list)

According to PI 3.2.1a, Japan must adopt all the all the WCPFC CMMs as stipulated in the *Act on Special Measures for Enhancement of the Conservation and Management of Tuna Resources*. Furthermore, the the Japan Fisheries Agency has set “compliance rules for the operations of the offshore tuna fisheries” to ensure the regulations and CMMs set by WCPFC are followed. Japan has formulated a National Plan of Action for Sharks which has been implemented since 2001 (revised in 2009 and 2016), which reiterates that Japan “is obliging its fishers to comply with all the management measures adopted by these RFMOs as conditions for granting the fishing licence.” As this relates to elasmobranchs and respective CMMs, it is not clear whether at the UoA level there is compliance with shark and marine turtle CMMs. – to be confirmed after the site visit According to PI 3.2.3a the reporting of bycatch and ETP species in logbooks is often lacking and Japan has not suitability enforced this requirement. Clearly, there are issues with logbook underreporting of ETP species in logbook at a national level. Furthermore, from PI 3.2.3b, there is evidence of non-compliance for shark finning and evidence of illegal trade of fish species. This reduces confidence that any measures or strategies for elasmobranchs and marine turtles will work. Therefore, while these regional and national measures are considered likely to work such that **SG60 is met**, there is a lack of an objective basis for confidence that the strategies will work, particularly given that SG80 is not met for PI 3.2.3a at a national level. Therefore, **SG80 is not met.**

Seabirds (3 scoring elements – see PI 2.3.1b for complete list)

CMM 2018-03 and the seabird mitigation measures detailed therein only apply to longline fisheries operating South of 30° South, between 25° South and 30° South, and North of 23° North. The fishery under assessment is not operating in this area and therefore these measures do not apply. Longline fisheries operating in 'other areas' (between 25°S and 23°N), where necessary, are however encouraged to employ one or more of the seabird mitigation measures listed in Table 1 of the CMM. Based on the at-sea observer data and analyses by Filippi et al. (2010) and Peatman et al. (2019), seabird interactions and resulting mortalities are likely to be rare and mitigation measures would therefore not seem to be required. Overall, there is a strategy in place to manage the fishery's impact on seabirds as detailed in PI 2.3.2a, which is in any case minimal, providing confidence that this would work by default. **Therefore, SG60 and SG80 are met.** The evidence base is not sufficiently comprehensive, however, to provide high confidence, especially in the absence of quantitative analyses for all species, an absence of accurate reporting of ETP species in the logbook and non-comprehensive observer coverage. **SG100 is not met**.

Cetaceans (1 scoring element – see PI 2.3.1b for complete list)

The WCPFC currently does not have any management or requirements regarding cetaceans in their longline fisheries (see PI 2.3.2a), further information is required on national and UoA level management. For the PNG UoAs, PNG is a signatory to the Memorandum of Understanding (MoU) for the Conservation of Cetaceans and their Habitats in the Pacific Island Region. It contains an Action Plan, which includes measures such as: "SPC Secretariat to produce an identification sheet for species of toothed whales that may be involved in depredation of hooked fish on pelagic longlines in this region and dolphins that may remove bait from hooks." and "Development of an education campaign to teach fishers mitigation methods as they become available". In other words, there is some management requirements in place within these UoAs. According to PI 3.2.3a however, the reporting of bycatch and ETP species in logbooks is often lacking and Japan has not suitability enforced this requirement. Clearly, there are issues with logbook underreporting of ETP species in logbook at a national level. Furthermore, from PI 3.2.3b, there is evidence of non-compliance for shark finning and evidence of illegal trade of fish species. This reduces confidence that any measures or strategies for cetaceans will work. There were five reported interactions with cetaceans in the at-sea observer data but the work by Williams et al. (2020; 2021) suggests that the majority of interactions are innocuous and do not result in mortality. As a result, **SG60** is met. However there is a lack of an objective basis for confidence that the strategies will work, particularly given that SG80 is not met for PI 3.2.3a at a national level. Therefore, **SG80 is not met.**

| **d** | Management strategy implementation | | | |
|---|---|---|---|---|
| | Guide<br>post | | There is some **evidence** that the measures/strategy is being implemented successfully. | There is **clear evidence** that the strategy/comprehensive strategy is being implemented successfully and **is achieving its objective as set out in scoring issue (a) or (b).** |

| | | | | |
|---|---|---|---|---|
| | Met? | | All scoring elements – No - preliminary | All scoring elements – No |

**Rationale**

All ETP species (13 scoring elements – see PI 2.3.1b for complete list)

Evidence for implementation of the measures or strategies for all ETP species includes: VMS and observer data and the MCS system as described under Principle 3. The UoA fleet is operating in a low risk area for seabirds and using circle hooks, fish bait amongst others – to be determined are conducting deeper pelagic longline sets (according to the logbook data), which reduces the risk for marine turtles.

More generally however, as outlined in PI 3.2.3a, there is a lack of a comprehensive monitoring, control and surveillance system within Japan that sufficiently ensures compliance with licence conditions and regional CMMs. There is evidence that Japan does not adequately enforce reporting requirements for ETP and bycatch species (as detailed in PI 2.3.2c), with an absence of sanctions and a recent history of infractions that include shark finning and illegal trade of fish. This reduces confidence that the measures and strategies for ETPs as implemented by the WCPFC and Japan are being implemented successfully for all ETP species. Further information on UoA compliance with these measures and strategies will be required at site visit. **SG80 is not met**.

| | | | | |
|---|---|---|---|---|
| **e** | Review of alternative measures to minimize mortality of ETP species | | | |
| | Guide<br>post | There is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of ETP species. | There is a **regular** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of ETP species and they are implemented as appropriate. | There is a **biennial** review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality ETP species, and they are implemented, as appropriate. |
| | Met? | All scoring elements – Yes | All scoring elements – Yes | All scoring elements – No |

**Rationale**

All ETP species (13 scoring elements – see PI 2.3.1b for complete list)

At annual WCPFC SC and TCC meetings, the CCMs are tasked with reviewing alternative bycatch management strategies with respect to improving existing CMMs or Resolutions. This is undertaken through a review of catch, interaction and compliance data with CMMs or Resolutions from a variety of sources (observer, logbooks, port sampling). Specifically, at the annual WCPFC SC meeting, the Ecosystem and Bycatch Mitigation Theme exists to conduct this review for ETP species. Close to 20 working and information papers presented to SC17 (2021) can be found here: https://meetings.wcpfc.int/meetings/sc17, which provide CCMs with the best available science on ETP mitigation in WCPO fisheries. Furthermore, as part of the ABNJ Tuna project, there have been a number of workshops on bycatch in longlines with particular emphasis on sharks, sea turtles and seabirds with several studies (shark post-release tagging studies, seabird mortality analysis) being carried out as a result (See, e.g. ABNJ, 2017 – and others to be updated at the site visit). Recommendations from these meetings are developed and provided to the main WCPFC Commission meeting later in the year.

As a consequence of the above bycatch mitigation studies, WCPFC CMMs are regularly revised to ensure best practice. For example, WCPFC 16 first introduced a proposal to amend CMM 2011-03, to include longline fisheries (Republic of Korea, 2019). This was not supported at WCPFC 16 without a review of available of data to provide estimates of fishing interaction types and levels with cetaceans. This was subsequently reported on at SC 16 and SC 17; see Williams et al. (2020b; 2021). This will also lead to the WCPFC to consider whether CMM 2011-03 is updated to include longline fisheries. Other examples include the WCPFC adopting CMM 2017-06 *Conservation and Management Measure for Mitigating Impacts of Fishing on Seabirds*, to replace CMM 2015-03 based on further scientific information. This revision was largely based on *WCPFC14-2017-DP05 Proposed changes to CMM 2015-03 in regards the seabird mitigation requirements (Rev 1).* CMM 2017-04 *Conservation and Management Measure on Marine Pollution* was also adopted following proposal WCPFC14- 2017-DP15 submitted by the Republic of the Marshall Islands to limit marine pollution from fishing vessels, including abandoned, lost or otherwise discarded fishing gear. At the annual WCPFC Commission meetings, the SC and TCC are further tasked to consider alternative bycatch management strategies with respect to improving existing CMMs. This is clearly evidenced in WCPFC Commission Regular Session reports, the latest of which is WCPFC 17 (see: https://meetings.wcpfc.int/meetings/wcpfc17). For the PNG EEZ UoAs, the PNG National Plan of Action for Sharks and Rays (2021-2024) has in place strategies, measures and actions to support the objectives of the NPOA, which includes a biennial review mechanism to evaluate specific by-catch mitigation measures and alternatives to minimise discarding/mortality of unwanted catch of sharks.

The potential effectiveness and practicality of alternative measures to minimise UoA-related mortality on ETP species are regularly reviewed through the various instruments cited above (either at regional level, through WCPFC or projects such as ABNJ, or at client level through national submissions made to the WCPFC SC in Part 1-Annual Reports detailing information on fisheries, research and statistics (see: https://meetings.wcpfc.int/meetings/sc17) further information on UoA-specific measures to be provided by the client) and are implemented as appropriate, either at regional level through CMMs (which are then adopted by Japan and must be implemented by the UoA) or at UoA level. **SG60 and SG80 are met**. **SG100 is not met** because it is not clear that there is a biennial review of measures for all ETP species.

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| | |
|---|---|
| Draft scoring range | 60-79 |
| Information gap indicator | More information sought:<br>- Fleet-specific management of sharks and ray species – i.e. is there a non-retention ban in place and other measures such as leader material, best practice handling and release practices<br>- Any UoA specific management of waste on board vessels<br>- Any UoA specific management of cetaceans<br>- Information on bait use and hook types used during fishing operations<br>- Further information on compliance with WCPFC CMMs and national regulations for ETP species.<br>- Further information on the review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of ETP species and whether they are implemented as appropriate. |

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

**Scoring table 28. PI 2.3.3 – ETP species information**

| | |
|---|---|
| PI 2.3.3 | Relevant information is collected to support the management of UoA impacts on ETP species, including:<br>Information for the development of the management strategy;<br>Information to assess the effectiveness of the management strategy; and |

| | Information to determine the outcome status of ETP species | | | |
|---|---|---|---|---|
| Scoring Issue | | SG 60 | SG 80 | SG 100 |
| **a** | Information adequacy for assessment of impacts | | | |
| | Guide post | Qualitative information is **adequate to estimate** the UoA related mortality on ETP species.<br>OR<br>If RBF is used to score PI 2.3.1 for the UoA:<br>Qualitative information is adequate to estimate productivity and susceptibility attributes for ETP species. | Some quantitative information is **adequate to assess** the UoA related mortality and impact and to determine whether the UoA may be a threat to protection and recovery of the ETP species.<br>OR<br>If RBF is used to score PI 2.3.1 for the UoA:<br>Some quantitative information is adequate to assess productivity and susceptibility attributes for ETP species. | Quantitative information is available to assess with a high degree of certainty the **magnitude of UoA-related impacts, mortalities and injuries and the consequences for the status** of ETP species. |
| | Met? | All scoring elements – Yes | All scoring elements – No | All scoring elements – No |

**Rationale**

All ETP species (13 scoring elements – see PI 2.3.1b for complete list)

At the regional level, there is sufficient information about ETP species and there is also arguably quantitative information about some ETP stocks/populations (e.g. various shark and marine turtle species) that interact with this type of fishery under assessment. The client has some records of interactions with ETP species in their logbook but this is likely to be underestimated compared to primary and some secondary species (see Table 43). Furthermore, according to PI 3.2.3a the reporting of bycatch and ETP species in logbooks is often lacking and Japan has not suitability enforced this requirement. Clearly, there are issues with logbook underreporting of ETP species in logbook at a national level. This made the assessment team reliant on at-sea observer records. The coverage of the at-sea observer is low for the period 2018 to 2019, with no observer data provided for 2020. In both 2018 and 2019 the observer coverage is to be determined, with none reported in 2020 due to the Covid-19 pandemic. While the observer coverage levels between 2018 and 2019 (on average) are aligned with WCPFC CMM 2018-05 (and similar to other MSC-certified longline fisheries), the coverage levels across the entire period 2018 to 2020 represent a low basis of information to determine a robust estimate of UoA related mortality on ETP species. To be determined still need UoA level coverage from Client. Consequently, the scaled-up at-sea observer data provides some qualitative information with which to estimate the UoA-related mortality on ETP species such that **SG60 is met**. However, the observer coverage is currently too low (in some specific years i.e. 2020) and only available for two years. This does not enable a robust estimation of mortality rates and conclusions cannot be drawn about the exact amount of species being caught. Consequently, **SG80 is not met**.

| **b** | Information adequacy for management strategy | | | |
|---|---|---|---|---|
| | Guide post | Information is adequate to support **measures** to manage the impacts on ETP species. | Information is adequate to measure trends and support a **strategy** to manage impacts on ETP species. | Information is adequate to support a **comprehensive strategy** to manage impacts, minimize mortality and injury of ETP species, and evaluate with a **high degree of certainty** whether a strategy is achieving its objectives. |
| | Met? | All scoring elements – Yes | All scoring elements – No | All scoring elements – No |

**Rationale**

All ETP species (13 scoring elements – see PI 2.3.1b for complete list)

Interactions with ETP species (possibly with the exception of some shark species) are rare events and much of the scoring of PI 2.3.1 is reliant on a non-comprehensive observer dataset and regional studies and research from pelagic longline fisheries (e.g. Filippi et al. (2020); Peatman et al. (2019) and Peatman et al. (2018)). As detailed in PI 2.3.3a, there are issues with logbook underreporting of ETP species in logbook at a national level. This made the assessment team reliant on at-sea observer records. The coverage for the at-sea observer records is low (<5%) for the period 2018 to 2019, with no observer data provided for 2020. This led to the assessment team only using at-sea observer data from 2018 to 2019 to scale up the catch. This does not meet the requirements detailed in WCPFC CMM 2018-05 (for 2018 to 2020) and represents a low basis of information to support a strategy to manage impacts on ETP species. Nevertheless, it does mean that there is some information to support measures to manage the impacts on ETP species, particularly for species that are not rare events, such as specific elasmobranchs. **SG60 is met**. While less than 5% may be adequate for detecting whether ETP bycatch occurs, the estimation of bycatch rates will not be precise and conclusions cannot be drawn about the exact amount of species being caught (Babcock et al., 2003; Gilman et al., 2012, Pierre, 2019). In the absence of having adequate information to measure trends in ETP bycatch rates **SG80 is not met**.

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| | |
|---|---|
| Draft scoring range | 60-79 |
| Information gap indicator | More information sought:<br>Annual observer coverage levels for UoA fleet |

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

### Scoring table 29. PI 2.4.1 – Habitats outcome

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

| | | | | |
|---|---|---|---|---|
| | | serious or irreversible harm. | irreversible harm. | point where there would be serious or irreversible harm. |
| | Met? | Yes | Yes | Yes -preliminary |

**Rationale**

This fishery under assessment takes place in the high seas, in deep water and is highly unlikely to interact with benthic features. The gear impact on the water column – epipelagic habitat (considered here as the commonly encountered habitat, in line with MSC interpretation https://mscportal.force.com/interpret/s/article/pelagic-habitats-and-gear-Box-GSA7-1527262009346) is considered negligible. Gear loss may consist of monofilament and/or hooks, which could interact with the commonly encountered habitat. Under CMM 2017-04, CCMs are required to encourage their fishing vessels within the WCPFC Convention Area to retrieve abandoned, lost or discarded fishing gear and retain the material on board, separate from other waste for discharge to port reception facilities. Where retrieval is not possible or does not occur, CCMs shall encourage their fishing vessels to report the latitude, longitude, type, size and age of abandoned, lost or discarded fishing gear. There is evidence that the fishery under assessment is highly unlikely to reduce structure and function of any habitats to a point where there would be serious or irreversible harm. **Therefore SG60, SG80 and SG100 are provisionally scored as met.**

| | | | | |
|---|---|---|---|---|
| **b** | VME habitat status | | | |
| | Guide post | The UoA is **unlikely** to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm. | The UoA is **highly unlikely** to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm. | There is **evidence** that the UoA is highly unlikely to reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm. |
| | Met? | NA | NA | NA |

**Rationale**

See Section 5.6.4 and PI 2.4.1a rationale. This fishery does not interact with VMEs as defined in GSA 3.13.3.2. **This scoring issue is not relevant.**

| | | | | |
|---|---|---|---|---|
| **c** | Minor habitat status | | | |
| | Guide post | | | There is **evidence** that the UoA is highly unlikely to reduce structure and function of the minor habitats to a point where there would be serious or irreversible harm. |

| | | |
|---|---|---|
| | Met? | Yes |

**Rationale**

See Section 5.6.4 and PI 2.4.1a rationale. **SG100 is met.**

| References |
|---|

VMS data

CMM 2017-04: Conservation and Management Measure on Marine Pollution - Western and Central Pacific Fisheries Commission (WCPFC)

| | |
|---|---|
| Draft scoring range | ≥80 |
| Information gap indicator | More information sought:<br>- Client specific information about gear loss and retrieval<br>- Information on VMS tracks to confirm the fishery is operating in deep water/open ocean. |

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

**Scoring table 30. PI 2.4.2 – Habitats management strategy**

| PI 2.4.2 | There is a strategy in place that is designed to ensure the UoA does not pose a risk of serious or irreversible harm to the habitats | | |
|---|---|---|---|
| Scoring Issue | SG 60 | SG 80 | SG 100 |
| **a** | Management strategy in place | | |

| | | | | |
|---|---|---|---|---|
| | Guide post | There are **measures** in place, if necessary, that are expected to achieve the Habitat Outcome 80 level of performance. | There is a **partial strategy** in place, if necessary, that is expected to achieve the Habitat Outcome 80 level of performance or above. | There is a **strategy** in place for managing the impact of all MSC UoAs/non-MSC fisheries on habitats. |
| | Met? | Yes | Yes | No -preliminary |

**Rationale**

As discussed under PI 2.4.1a the fishery under assessment is highly unlikely to interact with benthic habitats as it is a pelagic longline fishery. Consequently, the term "if necessary" applies here and management measures should not be required. **SG60 and SG80 are met by default**. To meet **SG100** however, requires a strategy in place to manage the impact of the fishery under assessment on habitat types (either directly or indirectly through ghost fishing). Consequently **SG100 is provisionally not met**.

| | | | | |
|---|---|---|---|---|
| **b** | Management strategy evaluation | | | |
| | Guide post | The measures are **considered likely** to work, based on plausible argument (e.g. general experience, theory or comparison with similar UoAs/habitats). | There is some objective basis for confidence that the measures/partial strategy will work, based on information directly about the UoA and/or habitats involved. | Testing supports high confidence that the partial strategy/strategy will work, based on information directly about the UoA and/or habitats involved. |
| | Met? | Yes | Yes | Yes |

**Rationale**

As detailed in 2.4.2a the partial strategy is the nature of the fishery (pelagic longline). Knowledge in relation to the way pelagic longline fishing gear is fished, as well as the ocean areas where the UoA fleet operates (open ocean, deep waters) is sufficient to discount any significant impacts on benthic habitats from the fishery and there is high confidence that it works. **SG60, SG80 and SG100 are met**.

| | | | | |
|---|---|---|---|---|
| **c** | Management strategy implementation | | | |
| | Guide post | | There is **some quantitative evidence** that the measures/partial strategy is being implemented successfully. | There is **clear quantitative evidence** that the partial strategy/strategy is being implemented successfully and is achieving its objective, as outlined in scoring issue (a). |
| | Met? | | Yes -preliminary | Yes -preliminary |

**Rationale**

Quantitative evidence such as latitude and longitude data from the at-sea observer data as well as VMS data tracks demonstrates the fishery is operating offshore in deep water and given the nature of the fishing gear would have no impact on benthic habitats. **SG80 and SG100 are provisionally scored as met.**

| **d** | Compliance with management requirements and other MSC UoAs'/non-MSC fisheries' measures to protect VMEs | | |
|---|---|---|---|
| Guide post | There is **qualitative evidence** that the UoA complies with its management requirements to protect VMEs. | There is **some quantitative evidence** that the UoA complies with both its management requirements and with protection measures afforded to VMEs by other MSC UoAs/non-MSC fisheries, where relevant. | There is **clear quantitative evidence** that the UoA complies with both its management requirements and with protection measures afforded to VMEs by other MSC UoAs/non-MSC fisheries, where relevant. |
| Met? | NA | NA | NA |

**Rationale**

In the absence of interactions with VMEs (see PI 2.4.1), this scoring issue is not relevant.

References

VMS data to be viewed at the site visit.

| | |
|---|---|
| Draft scoring range | ≥80 |
| Information gap indicator | More information sought:<br>- Client specific information about gear loss while fishing and its retrieval is required. Information on any strategy to reduce gear loss.<br>- Information on VMS tracks to confirm the fishery is operating in deep water/open ocean. |

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

| | |
|---|---|
| Overall Performance Indicator score | |

| | |
|---|---|
| Condition number (if relevant) | |

### Scoring table 31. PI 2.4.3 – Habitats information

| PI 2.4.3 | | Information is adequate to determine the risk posed to the habitat by the UoA and the effectiveness of the strategy to manage impacts on the habitat | | |
|---|---|---|---|---|
| Scoring Issue | | SG 60 | SG 80 | SG 100 |
| **a** | Information quality | | | |
| | Guide post | The types and distribution of the main habitats are **broadly understood**.<br>OR<br>If CSA is used to score PI 2.4.1 for the UoA:<br>Qualitative information is adequate to estimate the types and distribution of the main habitats. | The nature, distribution and **vulnerability** of the main habitats in the UoA area are known at a level of detail relevant to the scale and intensity of the UoA.<br>OR<br>If CSA is used to score PI 2.4.1 for the UoA:<br>Some quantitative information is available and is adequate to estimate the types and distribution of the main habitats. | The distribution of all habitats is known over their range, with particular attention to the occurrence of vulnerable habitats. |
| | Met? | Yes | Yes | No |

**Rationale**

As detailed in Section 5.6.4 and rationale PI 2.4.1a, the fishery under assessment is mostly confined to the epipelagic habitat – the uppermost 200 m of the water column. The distribution of the pelagic habitat is known over the spatial range in which the fishery operates from wildly available bathymetric maps and sea charts of the WCPO. The effect of pelagic longlines from the UoAs on this habitat (i.e. epipelagic habitat) is negligible. **SG60 and SG80 are met**. Despite this, it cannot be said that the distribution of all habitats (pelagic and benthic) is known over their range and **SG100 cannot be awarded**.

| | |
|---|---|
| **b** | Information adequacy for assessment of impacts |

| | | | | |
|---|---|---|---|---|
| | Guide post | Information is adequate to broadly understand the nature of the main impacts of gear use on the main habitats, including spatial overlap of habitat with fishing gear.<br>OR<br>If CSA is used to score PI 2.4.1 for the UoA:<br>Qualitative information is adequate to estimate the consequence and spatial attributes of the main habitats. | Information is adequate to allow for identification of the main impacts of the UoA on the main habitats, and there is reliable information on the spatial extent of interaction and on the timing and location of use of the fishing gear.<br>OR<br>If CSA is used to score PI 2.4.1 for the UoA:<br>Some quantitative information is available and is adequate to estimate the consequence and spatial attributes of the main habitats. | The physical impacts of the gear on all habitats have been quantified fully. |
| | Met? | Yes | Yes | No |

**Rationale**

At-sea observer data and logbook data is also collected from the UoA fleet allowing a spatial assessment of impacts on habitats through GPS coordinates of fished areas. The fishery does not interact with the benthic habitats due to operating in deep water and the open ocean – to be confirmed by VMS. The only encountered habitat is the epipelagic habitat. **SG60 and SG80 are met**. Despite this it cannot be said that the physical impacts of the fishing gear on the epipelagic habitat have been fully quantified. **SG100 is not met**.

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

**Rationale**

The only commonly encountered habitat is the epipelagic habitat. VMS, logbook and at-sea observer data enable any increase in risk to benthic features to be detected – to be confirmed by VMS. **SG80 is met. SG100 is not met** because changes in all habitat distributions (not just relevant to the UoA) are not measured over time.

| References |
|---|

VMS data to be viewed at the site visit.

| | |
|---|---|
| Draft scoring range | ≥80 |
| Information gap indicator | More information sought:<br>- Information on VMS tracks to confirm the fishery is operating in deep water/open ocean. |

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

**Scoring table 32. PI 2.5.1 – Ecosystem outcome**

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

**Rationale**

Section 5.6.5 of this report provides an overview of the Western Pacific Warm Pool (Warm Pool), Archipelagic Deep Basins (ARCH) and the Pacific Equatorial Divergence (PEQD) within the Pacific Ocean where the fishery under assessment is operating. The impacts of the UoAs on primary and secondary species, ETP species as well as habitats, have all been considered and described in the previous sections of this report. However, other risks exist and further impacts of the fishery under assessment may still arise at a higher ecosystem level, most notably those risks to ecosystem structure and function through the removal of higher-trophic level species (i.e. tuna and billfish). There are a myriad of scientific papers that outline the declines of predatory fish species, and the potential/likely impacts to the ecosystem through disturbance of trophic dynamics (e.g. Allain et al. (2015), Allain et al. (2007), Kitchell et al. (1999), Lehodey et a. (2013) and Sibert et al. (2006)). From these studies it is evident that there has been substantial impacts from the depletion of the main target species, however there is evidence that these are not irreversible or catastrophic. For example, Allain et al (2007) found that most species rebuilt to virgin biomass after five years of no fishing. Furthermore, Sibert et al. (2006) showed that although the trophic level of the catch was found to have decreased slightly, there was no detectable decrease in the trophic level of the population. Other modelling by Allain et al. (2015) suggests that the structure of the Warm Pool ecosystem is resistant to considerable perturbation (e.g. large changes in the harvest of the predatory fish species). Nevertheless, given the likelihood that industrial tuna fisheries have altered the structure and function of the ecosystem in the WCPO to some extent, through the removal of key predator species, it is important to determine how much could be removed before cascading effects occur and whether there are clear thresholds for large-scale ecosystem transformations (Baum and Worm, 2009). The assessment team therefore considered the stock biomass in relation to the point of recruitment impairment (PRI), MSY and any other relevant target and limit reference points to inform the likelihood of irreversible ecosystem impacts occurring.

As has been presented under Principle 1 of this report, all of the stocks are near MSY. Furthermore, the UoAs take a small percentage (<0.01%) of the overall total catch of target tuna stocks (yellowfin, bigeye and albacore tuna) across the WCPFC Convention Area (based on 2019 data from WCPFC Tuna Fishery Yearbook - https://www.wcpfc.int/doc/wcpfc-tuna-fishery-yearbook-2019). Coupled with the relatively low-level impact on Principle 2 components (as detailed above), it is therefore highly unlikely that the fishery under assessment would lead to irreversible ecosystem impacts. On this basis, it is considered highly unlikely that the fishery will disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm. **SG60 and SG80 are met.** There is however limited formal evidence supporting this conclusion, particularly given the non-comprehensive at-sea observer coverage in the fishery under assessment. This means there is not enough evidence to demonstrate that the UoAs are highly unlikely to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm. **SG100 is not met.**

References

Allain, V., Griffiths, S., Bell, J., & Nicol, S. (2015). Monitoring the pelagic ecosystem effects of different levels of fishing effort on the western Pacific Ocean warm pool. Issue-specific national report. Oceanic Fisheries Programme, Secretariat of the Pacific Community, Nouméa, New Caledonia.

Allain, V., Nicol, S., Essington, T., Okey, T., Olson, B., & Kirby, D. (2007). An ecopath with ecosim model of the Western and Central Pacific Ocean warm pool pelagic ecosystem. WCPFC-SC3-EB-SWG/IP-8, Western Central Pacific Fisheries Commission, Honolulu, United States of America.

Baum, J. K., & Worm, B. (2009). Cascading top-down effects of changing oceanic predator abundances. Journal of Animal Ecology Vol 78, pp. 699–714.

Kitchell, J. F., Boggs, C. H., He, X., & Walters, C. J. (1999). Keystone predators in the central Pacific. Ecosystem approaches for fisheries management 665–683.

Lehodey, P., Nicol, S., Hampton, J., Caillot, S., & Williams, P. G. (2013). Project 62: SEAPODYM applications in WCPO [EB WP 03]. [Pohnpei, Federated States of Micronesia]: Western and Central Pacific Fisheries Commission (WCPFC).

Leroy, B., Phillips, J. S., Nicol, S., Pilling, G. M., Harley, S., Bromhead, D., Hoyle, S., Caillot, S., Allain, V., & Hampton, J. (2013). A critique of the ecosystem impacts of drifting and anchored FADs use by purse-seine tuna fisheries in the Western and Central Pacific Ocean. Aquatic Living Resources Vol 26, pp. 49–61.

Sibert, J., Hampton, J., Kleiber, P., & Maunder, M. (2006). Biomass, size, and trophic status of top predators in the Pacific Ocean. Science Vol. 314, pp. 1773–1776.

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

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

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

### Scoring table 33. PI 2.5.2 – Ecosystem management strategy

| PI 2.5.2 | | There are measures in place to ensure the UoA does not pose a risk of serious or irreversible harm to ecosystem structure and function | | |
|---|---|---|---|---|
| Scoring Issue | | SG 60 | SG 80 | SG 100 |
| **a** | Management strategy in place | | | |
| | Guide post | There are **measures** in place, if necessary which take into account the potential impacts of the UoA on key elements of the ecosystem. | There is a **partial strategy** in place, if necessary, which takes into account **available information and is expected to restrain impacts** of the UoA on the ecosystem so as to achieve the Ecosystem Outcome 80 level of performance. | There is a **strategy** that consists of a plan, in place which contains measures to **address all main impacts of the UoA on the ecosystem**, and at least some of these measures are in place. |

| | | | | |
|---|---|---|---|---|
| | Met? | Yes | Yes | No |

**Rationale**

The objectives of the WCPFC Convention are to ensure, through effective management, the long-term conservation and sustainable use of highly migratory fish stocks in the WCPO in accordance with the 1982 Convention and the Agreement. The Convention sets out to assess the impacts of fishing, other human activities and environmental factors on target stocks, non-target species, and species belonging to the same ecosystem or dependent upon or associated with the target stocks (Article 5), to encourage and promote cooperation in scientific research, (…), in order to improve information on highly migratory fish stocks, non-target species, and species belonging to the same ecosystem or associated with or dependent upon such stocks in the Convention Area (Article 12) and to conduct assessments of highly migratory fish stocks, non-target species, and species belonging to the same ecosystem or associated with or dependent upon such stocks, within the Convention Area. As detailed in PI 1.2.3, 2.1.2, 2.2.2, 2.3.2 and 2.4.2 there are management measures, partial strategies and strategies in place for target, non-target, ETP species and habitats (see these PI rationales for further information), which often take the form of CMMs at the regional level that are binding on CCMs. The WCPFC has also established the Ecosystem and Bycatch Scientific Working Group and the Ecosystem and Bycatch Mitigation Theme, which illustrates their commitment to the ecosystem approach to fisheries. In 2019, the WCPFC adopted *the Resolution on Climate Change as it relates to the Western and Central Pacific Fisheries Commission* (Resolution 2019-01), which highlighted the need to consider the the potential impacts of climate change on highly migratory fish stocks in the Convention Area. SA 3.17.3.2 states that ‘it may not be necessary to have a specific “ecosystem strategy” other than that which comprises the individual strategies for the other components under P1 and P2.” For the most part, the the range of CMMs and Resolutions used by the WCPFC and management measures by Japan at a national level (See PI 3.1.1, 3.2.1 and 3.2.3), although not specifically designed to manage impacts on the ecosystem, represents a “partial strategy” that works to achieve the proposed outcome. There is some evidence that this partial strategy is being implemented successfully. For example, the main target tuna stocks are highly likely to be near MSY. Furthermore, within the WCPFC, there is a system of regular assessment, data collection, sharing of information as well as agreement over new and expanded management initiatives through the adoption of WCPFC CMMs (https://www.wcpfc.int/conservation-and-management-measures). **Therefore, SG60 and SG80 are met.** However, while it could be argued that this constitutes a strategy, it does not consist of a plan that addresses all aspects and impacts of the UoAs, therefore **SG100 is not met.**

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

**Rationale**

There is an objective basis for confidence that the measures at the regional and national level (detailed in Principle 1 and 2 sections of this report), which form part of the measures outlined in PI 2.5.2a will work. As has been presented under Principle 1 of this report, none of these stocks are currently below the PRI. Furthermore, the extensive ecosystem modelling (described under PI 2.5.1) suggests that substantial impacts from the depletion of the main target tuna species are not irreversible or catastrophic and the UoAs only take a small percentage of the overall total catch of target tuna stocks (yellowfin, bigeye and albacore tuna) anyway across the WCPFC Convention Area. When coupled with the relatively low-level impact on Principle 2 components (as detailed in the rationales above), there is some objective basis for confidence that the measures will work**. SG60 and SG80 are met.** Testing in the form of say, ecosystem models for all UoA relevant stocks (eg. ETP species), has not been undertaken, **so SG100 is not met.**

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

**Rationale**

The stock status (all target species being above PRI), a relatively small fleet size, and small volumes of target species taken compared to the total volumes caught in the WCPFC Convention Area overall, provides some evidence that the measures in place are being implemented successfully. Available ecosystem modelling suggests it is unlikely the fishery under assessment is having an irreversible impact on ecosystem functioning under 2.5.1a. **SG80 is met**. However, considering the non-comprehensive observer coverage in this fishery under assessment, the necessary clear evidence is **not present in the UoAs in order to meet SG100.**

References

WCPFC Convention https://www.wcpfc.int/convention-text

WCPFC Conservation and Management Measures: https://www.wcpfc.int/conservation-and-management-measures

WCPFC (2019) Resolution on climate change as it relates to the Western and Central Pacific Fisheries Commission. Resolution 2019-01.

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

| | |
|---|---|
| Draft scoring range | ≥80 |

| | |
|---|---|
| Information gap indicator | Information sufficient to score PI |

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

### Scoring table 34. PI 2.5.3 – Ecosystem information

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

**Rationale**

The key elements of the ecosystem are broadly understood when the main features of the ecosystem and their major inter-relationships can be specified (MSC, 2018). Key elements in this ecosystem have been identified to be the target species of tuna (bigeye, yellowfin and albacore) and the associated species engaged in trophic interactions with these tuna stocks (including elasmobranchs, cetaceans and teleosts). There are no associated habitat elements in this fishery, as it is strictly confined to the epipelagic zone of the water column (see PI 2.4.1). Information on these elements is collected through fishery logbooks, landings records, at-sea observer data, port sampling and electronic monitoring records. Information is also collected through various scientific research programs and studies, which is used by the WCPFC SC to provide recommendations to the Commission for developing new or modifying existing CMMs. For example, tagging studies by the FAO's ABNJ tuna project has collected information about vulnerable shark species in the ecosystem and post capture mortality following release from commercial fisheries operations (ABNJ, 2019). As stipulated in previous MSC assessments for Pacific tuna fisheries, there is ongoing work to collect detailed data on the structure of the Pacific Ocean pelagic ecosystem (where the fishery operates), e.g. through at-sea observer programmes (e.g. bycatch composition and quantities), trophic analyses (e.g. stomach contents, stable isotopes), mid-trophic level sampling (e.g. acoustics and net sampling of micronekton and zooplankton), behavioural analyses (tagging of a range of species), tagging studies (e.g. through the ABNJ Tuna Project). This information is thought to be adequate to broadly understand the key elements of the ecosystem. **SG60 and SG80 are met.**

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

**Rationale**

The trophic structure and top predator size-structure of pelagic ecosystems in the Pacific, including the WCPO, has been characterised using Ecopath and Ecosim models based on diet data (Allain et al., 2007, 2012). Recent work in the WCPO has also seen the formulation of a potential list of candidate ecosystem indicators of relevance to tuna RFMOs that can be used to track the impacts, on the broader pelagic ecosystem, of fisheries targeting tuna and tuna-like species (Allain et al., 2020). The dynamic model SEAPODYM was developed by the Oceanic Fisheries Programme of SPC and Collected Localisation Satellite (CLS) for investigating spatiotemporal dynamics of tuna populations under the influence of both fishing (which would include the UoA datasets) and environmental assumptions (Lehodey, 2004, Senina et al., 2016), and has been used to consider impacts of changing climate and environmental conditions as well as spatio-temporal effects of fishing (Dunn and Webber, 2020). The continued development and application of SEAPODYM for understanding the population dynamics of tropical tunas in the WCPO remains a key priority for SPC and the WCPFC under Project 62. In recent years, SEAPODYM has been applied to modelling each key tuna species in the WCPO and other ocean basins individually (Senina et al., 2018), providing abundance and distribution estimates for other studies (Miller et al., 2018), and including mark-recapture tagging data to directly inform movement parameters for target tuna species in the Pacific (Senina et al., 2020). The SEAPODYM model and its ability to fully understand the influence of fishing and environmental effects on tuna population dynamics is still under development within WCPFC, with a recent review (2020), highlighting several key areas for further development (Dunn and Webber, 2020). **This meets the requirements of SG60 and SG80**. However, it cannot be said that the main interactions between the UoAs and the ecosystem elements have been investigated in detail. **SG100 is not met.**

| **c** | Understanding of component functions | | | |
|---|---|---|---|---|
| | Guide post | | The main functions of the components (i.e., P1 target species, primary, secondary and ETP species and Habitats) in the ecosystem are **known**. | The impacts of the UoA on P1 target species, primary, secondary and ETP species and Habitats are identified and the main functions of these components in the ecosystem are **understood**. |

| | | | | |
|---|---|---|---|---|
| | Met? | | Yes | No |

**Rationale**

As presented in the previous SIs, the ecology of the main species in the fishery (target, non-target and ETP) is relatively well known through information collected and collated by SPC and WCPFC from fishery logbooks, landings records, at-sea observer data, as well as completed and ongoing research projects and programs. Sufficient information is available to identify the range of species that are impacted by commercial fishing operations and to determine their respective role in the ecosystem; e.g. their trophic level and potential roles in transfer of energy and nutrients between various pelagic habitats (epipelagic, mesopelagic and bathypelagic) or between pelagic and demersal habitats. In order to improve the availability of data, the Kobe Bycatch Technical Working Group (KBTWG) was established in 2009 with the aim to "Identify, compare and review the data fields and collection protocols of logbook and observer bycatch data being employed by each Tuna RFMO". The KBTWG provides guidance for improving data collection efforts and, to the extent possible, the harmonization of data collection protocols among tuna RFMOs. These data will improve future analysis of ecosystem functioning. Furthermore, the ABNJ Tuna Project aims to achieve responsible, efficient and sustainable tuna production and biodiversity conservation through: (i) supporting the use of sustainable and efficient fishing practices by the stakeholders of the tuna resources; (ii) reducing illegal, unreported and unregulated fishing; and (iii) mitigating adverse impacts of bycatch on biodiversity. In the WCPFC, work on this project has focused on inter alia collecting integrated bycatch data on sharks from the WCPFC and IATTC regions, carrying out a tuna RFMO shark data inventory and data improvement field studies, including tagging; preparing an assessment methods catalogue for sharks for one ocean basin with results made available globally, four additional species assessments (including species risk assessments) and promoting the use of results for priority setting and development of robust pan-Pacific CMMs; and collating and disseminating new information on mitigation of impacts to bycatch species, thereby reducing technical uncertainties across a range of stakeholders allowing tuna RFMO discussions to focus on management issues such as cost and feasibility. The information gathered is sufficient to identify species impacted and understand the main functions of the ecosystem components. **SG80 is met**. **SG100 is not met** due to limited observer coverage in the fishery under assessment, which creates uncertainty as to the UoAs impacts on ecosystem components.

| | | | | |
|---|---|---|---|---|
| **d** | Information relevance | | | |
| | Guide post | | Adequate information is available on the impacts of the UoA on these components to allow some of the main consequences for the ecosystem to be inferred. | Adequate information is available on the impacts of the UoA on the components **and elements** to allow the main consequences for the ecosystem to be inferred. |
| | Met? | | Yes | No |

**Rationale**

As presented in the previous SIs, adequate information is available on the impacts of the UoAs on ecosystem components (e.g. target, non-target, ETP species and habitats) to ensure that the main consequences for the ecosystem of commercial fishing operations can be estimated. For example, information on target species can be collected through the fishery logbooks and information on non-target, ETP species can be collected from the at-sea observer data. This information, when combined with similar data from other tuna and billfish fisheries in the WCPFO is sufficient to allow ecosystem modelling to detect an increase in risk levels to ecosystem components and allow some of the main consequences for the ecosystem to be inferred. **SG80 is met.** However, **SG100 is not met** due to limited observer coverage in the fishery under assessment, meaning that information on elements cannot necessarily be inferred.

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

**Rationale**

As presented in the previous SIs, logbook and observer data are sufficient to detect any changes which might have ecosystem impacts e.g. changes in rates of bycatch and interactions with ETP species. **SG80 is therefore met**. However limited observer coverage in the fishery and the fact that there is not something that could be formally defined as an ecosystem management strategy (as yet) means **SG100 is not met.**

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

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

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

## 5.7 Principle 3

### 5.7.1 Jurisdictions within the area of operation: Regional governance framework

The fishery under assessment may take place within the Japanese EEZ, but mostly in the high seas, and also in the EEZ of Papua New Guinea (PNG) under bilateral agreements, all within the Western and Central Pacific Ocean (WCPO). It targets yellowfin, bigeye plus North Pacific albacore tuna, while South Pacific albacore are normally a bycatch while fishing in PNG, all of which are highly migratory species (HMS). These target species are therefore subject to both national (Japanese and Papua New Guinean) and RFMO (WCPFC and IATTC) measures and policies. The yellowfin, bigeye and south Pacific albacore tuna in the Western Central Pacific Ocean (WCPO) are under the management jurisdiction of the Western Central Pacific Fisheries Commission (WCPFC) while north Pacific albacore tuna in the northern Pacific Ocean is under the jurisdiction of the Inter–American Tropical Tuna Commission (IATTC) and the WCPFC, since the NP albacore stock occurs in both the WCPFC and the IATTC Convention areas. Stock assessments for NP albacore are carried out by the International Scientific Committee for Tuna and Tuna-like Species (ISC) in the North Pacific Ocean. ISC is the science service provider for the WCPFC Northern Committee, but NP albacore is not officially designated as a northern stock. However, the ISC and the Northern Committee do have an informal agreement for the stock assessment. In 2012-13 there was a request to formalize this situation, but it was not supported by the Scientific Committee of WCPFC. Unlike the SPC, the ISC does not have its own office or infrastructure and works by convening working groups of scientists from member countries to address different issues. United Nations Convention on the Law of the Sea (UNCLOS), Article 63 or 64 states that highly migratory fish species that migrate through several EEZs and/or several high seas are managed by cooperation among coastal and fishing countries and countries who are fishing in the area either directly or based on the decisions of relevant RFMOs. As a signatory to UNCLOS as well as WCPFC and IATTC, Japan and Papua New Guinea subscribe to these management precepts.

#### 5.7.1.1 Western and Central Pacific Fisheries Commission

The WCPFC is one of the two RFMOs responsible for the management of tunas, billfish, and associated species, as well as addressing the impacts of fishing on the wider ecosystem of the Pacific Ocean Basin, relevant to this assessment. Japan as well as Papua New Guinea have signed the WCPFC Convention. The WCPFC was established under the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the WCPO (WCPFC, 2000) and entered into force on June 19, 2004. It is a multilateral agreement having the primary objective of providing for the long-term conservation and sustainable use of highly migratory fish stocks in the WCPO. The WCPFC is the most recently established and largest of the tuna RFMOs, with over half of the world's tuna catch taken within the Convention Area. These stocks include tunas, billfish and associated fishes among the 17 "species" listed in Annex I of the 1982 UN Convention, but not sauries (or sanma, see Art. 3.3 of the WCPFC Convention). The WCPFC Convention (WCPFC, 2000) follows closely the provisions of the UNFSA, including in particular:

- The objective of ensuring the long-term conservation and sustainable use of highly migratory fish stocks (Article 2);
- The general principles of the UNFSA including the application of the precautionary approach, incorporating the UNFSA Annex II Guidelines for The Application of Precautionary Reference Points (Article 5);

- The application of these principles by Parties in their cooperation under the Convention, including the application of these principles in areas under national jurisdiction (Article 7);
- Compatibility of measures established for the high seas and those adopted for areas under national jurisdiction (Article 8);
- Application of the dispute settlement provisions of the UN Fish Stocks Agreement to disputes between WCPFC Members (Article 31); and
- Recognition of the interests of small-scale and artisanal fishers, and of communities and small island states dependent for their food and livelihoods on tuna resources (Article 30).

The legal framework for fishery management in the WCPO has been analysed (Miller et al., 2014). The authors concluded that it provided the WCPFC with the tools to manage tuna and tuna-like species sustainably and is consistent with the current international fisheries law and standards for the management of highly migratory species (HMS) and ecosystems. The WCPFC has incorporated some of the most progressive provisions from other international treaties in its Convention, and it has adopted numerous CMMs based on the requirements of the Convention. The Commission has 26 Members, of which most are small island developing states (SIDS). All major coastal and fishing states in the WCPO are Members, except for Vietnam. Current members are Australia, Canada, People's Republic of China, Cook Islands, European Union, Federated States of Micronesia, Fiji, France, Indonesia, Japan, Kiribati, Republic of Korea, Republic of Marshall Islands, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Philippines, Samoa, Solomon Islands, Chinese Taipei, Tonga, Tuvalu, United States of America, and Vanuatu. Participating Territories include American Samoa, Commonwealth of the Northern Mariana Islands, French Polynesia, Guam, New Caledonia, Tokelau and Wallis and Futuna. Several other states are granted cooperating non-member (CNM) status on an annual basis. As CNMs, they participate as observers and agree to comply with WCPFC measures in return for being authorised to allow their vessels to fish in the WCPO within set limits. CNM status applications for 2021 under WCPFC17-2020-07 were approved for Bahamas, Curaçao, Ecuador, El Salvador, Liberia, Nicaragua, Panama, Thailand, and Vietnam (WCPFC, 2021a). The Compliance Monitoring Scheme for 2020 and 2021 (see CMM 2019-06) will remain in effect until 31st December 2021. Recently, RFMO compliance "best practices" were assessed (Koehler, 2021), and other Commission subsidiary bodies are regularly reviewed, and findings then considered at plenary meetings of the Commission. These reviews result in significant numbers of recommendations, many of which have now been addressed. The Executive Director's Annual Report at WCPFC17-2020-04 (WCPFC, 2021a), which is a requirement under Rule 13 of the Commission's Rules of Procedure, was issued on 28 October 2020. This report outlines progress with addressing outstanding recommendations of the reviews, including the implementation of the Commission Strategic Plan (see WCPFC17-2020-10 – WCPFC (2021a)) and the most recent Secretariat Corporate Plan 2020-2023 (see WCPFC16-2019 for details – WCPFC16 (2019)). An independent review of the Commission's management structure and performance was conducted in 2013 (Gillett, 2013), following a previous similar independent review of the Commission's science structure and functions (MRAG, 2009). This report resulted in overhauling the operation of the Scientific Committee, and adoption of a peer review process and other changes to the data and science functions.

The 16th Scientific Committee meeting (WCPFC SC, 2020) once again endorsed a process for a multi-year schedule for independent review of stock assessments. The subsidiary bodies of the Commission (see **Figure 58***) provide extensive, detailed reports to the Commission (see (WCPFC, 2020a; WCPFC SC, 2020; WCPFC TCC, 2020a)), which include a range of specific advice and recommendations for full Commission consideration.

Decision-making is open, with the process, outcomes and basis for decisions recorded in detail in minutes of Commission sessions and publicly available papers. Consensus is the general rule for decision-making. If consensus cannot be reached, voting, grounds for appealing decisions, conciliation and review are all part of the established decision-making process, as described in Article 20 of the Convention. If a vote is invoked by the Chair, Participating Territories cannot participate. The roles and responsibilities of WCPFC members are clearly described in the Convention, especially Articles 23 and 24, the Commission Rules of Procedure, CMMs and other Commission rules and decisions, including the Rules for Scientific Data to be Provided to the Commission, and the Rules and Procedures for Access to and Dissemination of Data Compiled by the Commission. In addition to Member participation, the WCPFC allows participation by non-members and territories (Article 44 and Annex 1), with opportunities for CNMs, and allows observers to participate in meetings of the Commission and its subsidiary bodies, including the Scientific Committee (SC), the Technical and Compliance Committee and the Finance and Administration Committee (refer to **Figure 58**). As part of the conditions for cooperating non-member (CNM) status, applicants are required to annually provide "a commitment to cooperate fully in the implementation of conservation and management measures adopted by the Commission and to ensure that fishing vessels flying its flag and fishing in the Convention Area and, to the greatest extent possible, its nationals, comply with the provisions of the Convention and conservation and management measures adopted by the Commission." (CMM-2019-01, para 2b). The composition, roles and functions of WCPFC subsidiary bodies are described in more detail in the sections that follow.

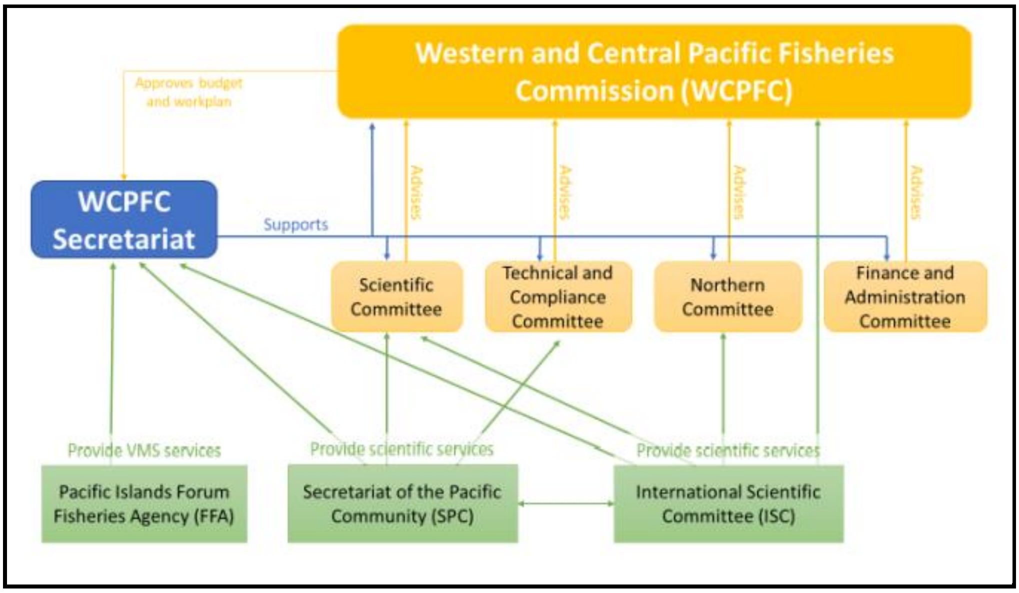


**Figure 58*. WCPFC Institutional Arrangements. Source:** (WCPFC, 2019)**.**

Publicly accessible records of Commission meetings show that the Commission takes a wide range of advice and inputs from its subsidiary bodies, members and observers before implementing decisions, including the adoption of CMMs. These bodies include the Forum Fisheries Agency (FFA), International Scientific Committee (ISC) and the Pacific Community (SPC – formerly the Secretariat of the Pacific Community). Scientific advice clearly identifies the extent to which different sources of information have been considered. Successive records of the SC and the Commission provide a comprehensive record of the degree to which scientific advice has been incorporated into management decisions (e.g. WCPFC17-2020 WCPFC (2021) which reported progress with implementing a new tropical tuna CMM 2020-01; basically, an extension of CMM 2018-1 to February 15, 2022).

The WCPFC is responsible for decision-making on key management measures which affect the swordfish, bigeye and yellowfin stocks, bycatch species and ecosystem. Long-term objectives are explicit within the WCPFC Convention. For example, Article 2 specifies that the Commission has the objective to "ensure through effective management, the long-term conservation and sustainable use of highly migratory fish stocks in the WCPO in accordance with the 1982 Convention and Agreement (UNCLOS and UNFSA respectively)". Article 5 of the Convention then provides principles and measures for achieving this conservation and management objective. More specifically Article 5(c) requires the Commission to apply the precautionary approach in decision-making and Article 6 outlines how this will be given effect through the application of the guidelines set out in Annex II of the FSA. Article 10 of the Convention is consistent with MSC principles and objectives in specifying long-term objectives of "maintaining or restoring populations…above levels at which their reproduction may become seriously threatened". Evidence that these objectives are guiding or at least starting to guide, decision-making is provided in various Commission reports and in CMMs. The Commission's CMM 2020-01 for bigeye, yellowfin and skipjack has the objective to ensure that the fishing mortality rate is no greater than $F_{MSY}$. To meet this objective, the Commission's CCMs continue to agree to take measures to not increase catches by their longline vessels of yellowfin. The CMM for swordfish (CMM 2009-03) recognises the need for both WCPFC and IATTC to adopt conservation and management measures to provide for the sustainable management of swordfish stocks across the Pacific Ocean. The Commission has also adopted a number of measures to protect the unintentional catch of marine mammals and other non-target species that include: managing North Pacific striped marlin (CMM 2010-01), Mitigating Impacts of Fishing on Seabirds (CMM 2018-03), Sea Turtles (CMM 2018-04), Sharks (CMM 2019-04), and rays (CMM 2019-05). An up-to-date list of WCPFC CMMs can be found here: https://www.wcpfc.int/conservation-and-management-measures. Commission reports indicate that explicit action is being undertaken through CMMs to support achievement of objectives. However, this is yet to result in limit and/or target reference points or harvest control rules and strategies being formulated for all managed stocks.

#### 5.7.1.2 Scientific Committee (SC)

The WCPFC Convention requires the Scientific Committee (SC) to "recommend to the Commission a research plan, including specific issues and items to be addressed by the scientific experts or by other organisations or individuals, as appropriate, and identify data needs and coordinate activities that meet those needs". At each meeting of the Committee (SC14 (2018), SC15 (2019), SC16 (2020) and SC17 (2021)) the Committee is charged with the development of the following years' work programme and budget, with the latest work for 2021 and projections for 2022-2023 provisional work programme with a corresponding indicative budget. These Plans have been and still are substantially directed towards providing information to enable the Commission to avoid overfishing or depletion of targeted stocks and the application of an ecosystem approach, while continuing to improve governance and policy, through the development of management information tools such as Management Strategy Evaluation (MSE) and the development of relevant scientific and technical capacities in developing country Commission members.

#### 5.7.1.3 Technical and Compliance Committee (TCC)

The Compliance Monitoring Scheme (CMM 2019-06) entered into effect for 2020 and was to remain in effect until the Commission meeting at WCPFC18, December 2021. The Technical and Compliance Committee (TCC) is the primary group responsible to the WCPFC for reporting and dealing with CCM compliance with the WCPFC CMMs and allied measures. The purpose of the WCPFC Compliance Monitoring Scheme as outlined in CMM 2019-06, is: "to ensure that Members, Cooperating Non-

Members and Participating Territories (CCMs) implement and comply with obligations arising under the Convention and conservation and management measures (CMMs) adopted by the Commission. The purpose of the CMS is also to assess flag CCM action in relation to alleged violations by its vessels, not to assess compliance by individual vessels." The Compliance Monitoring Scheme (CMS) is designed to:

- Assess CCMs' compliance with their obligations;
- Identify areas in which technical assistance or capacity building may be needed to assist CCMs to attain compliance;
- Identify aspects of conservation and management measures which may require refinement or amendment for effective implementation;
- Respond to non-compliance through remedial options that include a range of possible responses that take account of the reason for and degree of non-compliance, and include cooperative capacity-building initiatives and, in case of serious non-compliance, such penalties and other actions as may be necessary and appropriate to promote compliance with CMMs and other Commission obligations; and
- Monitor and resolve outstanding instances of non-compliance.

This current measure was reviewed in 2020 as determined by progress with the work plan outlined in this CMM, with a few refinements and adjustments as needed to reporting protocol and level of compliance definitions.

The TCC annual reports (e.g. (WCPFC TCC, 2020a)) provide detailed breakdowns of the WCPFC compliance performance, referencing all pertinent CMMs and any other issues raised. Thus, the WCPFC recognises and uses information from its subsidiary bodies, members and observers before implementing decisions, including the adoption of CMMs. Scientific advice clearly identifies the extent to which different sources of information have been considered. These bodies also include the SPC and the FFA.

#### 5.7.1.4 The Pacific Community (SPC)

Based in Noumea, New Caledonia, the Pacific Community or SPC, founded in 1947 is an intergovernmental organisation that provides technical and policy advice to its members. SPC has 26 member countries and territories, including American Samoa, Australia, Cook Islands, Federated States of Micronesia, Fiji Islands, France, French Polynesia, Guam, Kiribati, Marshall Islands, Nauru, New Caledonia, New Zealand, Niue, Northern Mariana Islands, Palau, **Papua New Guinea**, Pitcairn Islands, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, United States of America, Vanuatu and Wallis and Futuna. The Oceanic Fisheries Programme (OFP) within the SPC Division of Fisheries, Aquaculture and Marine Ecosystems (FAME) provides Pacific Island members of SPC with scientific information and advice necessary to rationally manage fisheries exploiting the region's resources of tuna, billfish and related species. The OFP also is, under contract, the scientific service provider to the Commission, as allowed for under Article 13 of the Convention. The OFP has three sections:

- Statistics and Monitoring: including compilation of catch and effort data, data processing and technical support for port sampling programmes and observer programmes in member countries and territories, training in fisheries statistics and database management, statistical analyses and the provision of statistical support to the WCPFC;
- Tuna Ecology and Biology: including analysis of the biological parameters and environmental processes that influence the productivity of tuna and billfish populations, focusing on age and growth, movement and behaviour as observed from classical or

electronic data archiving tags, and diet in a more general study devoted to the food web of the pelagic ecosystem; and development of mathematical models to understand environmental determinants of tuna fishery production, including impacts of climate fluctuation; and
- Stock Assessment and Modelling: including regional stock assessments for the WCPFC, development of tuna movement and simulation models, bioeconomic modelling, and scientific input to national tuna management plans and support for national EAFM analyses, tag-recapture database management. Confidential (to SPC and national governments) National Tuna Fisheries Status Reports are also produced.

#### 5.7.1.5 The Pacific Islands Forum Fishery Agency (FFA)

The FFA is an expertise-based organisation providing advice, technical assistance and other support to its members who make sovereign decisions about their fisheries resources, especially their tuna resources, and participate in regional decision making on tuna management through organisations such as the WCPFC. The Pacific Islands FFA was established through an international treaty (FFA, 1979), with a mission "To drive regional cooperation to create and enable the maximum long term social and economic benefit from the sustainable use of our shared offshore fishery resources, with its governing body as the Forum Fisheries Committee (FFC)". The FFC is comprised of one representative of each of the following 17 members: Australia, Federated States of Micronesia, Fiji, Kiribati, Cook Islands, Marshall Islands, Nauru, New Zealand, Niue, Palau, **Papua New Guinea**, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, and Vanuatu. The FFC meets annually, and again in special meetings held at other times of the year, according to its discretion and agenda. Meetings are closed to the public and attempt is made to reach decisions by consensus among member countries, although there is also the ability to take issues to a vote. Each party has one vote, and a two-thirds majority is required. In addition to the proposed FFA Work Programme and Budget, agenda items for FFC meetings may include items deferred or requested by previous Committees, items proposed by the FFA, and items proposed by members.

The FFA Secretariat, based in Honiara, Solomon Islands, is responsible, through the FFC, for updating and harmonising the Minimum Terms and Conditions (MTCs) for fisheries access throughout the Pacific region (FFA, 2019). MTCs are given national effect through vessel licensing conditions (FFA, 2020a) or by incorporation into national law as appropriate.

The FFA fisheries management programme is designed to assist its members in refining and maintaining effective policy and legal frameworks for the sustainable management of the shared tuna fisheries resources of the region by providing advice on:

- Appropriate legal frameworks for national tuna management, including members' obligations under various treaties and arrangements;
- Appropriate fisheries management frameworks including the incorporation of the principles of ecosystem-based fisheries management;
- Effective fisheries administration, including access arrangements, licensing of foreign and domestic fishing vessels, economic implications of different management systems, and the use of new systems and technologies;
- Development and implementation of monitoring, control and surveillance systems and effective compliance regimes; and provides these services assisting members to keep abreast of best practice fisheries management models, and develop stronger and deeper regional cooperation in fisheries management;

- Providing effective oversight, and where appropriate management of a regional vessel register, vessel monitoring system, and observer program (including for US vessels; and
- Servicing regional fisheries treaties and arrangements; and improving capacity in fisheries management.
-

Two key instruments in the implementation of this programme are:

- The Regional Tuna Management and Development Strategy, and
- The Regional Monitoring Control and Surveillance Strategy (MCS) (FFA, 2020b).

FFA maintains databases on regional VMS, licensing, vessel register, violations and prosecutions. Over-flight surveillance is provided by France, US, Australia, and New Zealand (QUAD – Quadrilateral Defence Coordinating Group). The FFA secretariat also supports the WCPFC regional Vessel Monitoring System (VMS), providing establishment, maintenance, diagnostic and support infrastructure and services, automatic location communicator (ALC) management services and communication gateways for the Commission VMS, along with training for Commission staff.

The FFA also commissions independent external reviews of its performance, most recently through the Pacific Islands Regional Oceanscape Program (PROP) Mid-term Review (July 2019), to supplement the existing processes that the Forum Fisheries Committee (FFC) and its Audit Committee use to assess routine performance, project development efficiencies and to provide advice on future need. The FFC/FFA has also published a new Strategic Plan (2020 – 2025), celebrating 40 years (FFA, 2020a) of cooperation, which identifies and structures the ways for FFA to maintain sustainable tuna fisheries. (https://www.ffa.int/system/files/FFA%20PROP%20MTR%20Final%20Report%2024%20July%202019.pdf) and (https://www.ffa.int/system/files/2020%20%202025%20Pacific%20Islands%20Forum%20Fisheries%20Agency%20Strategic%20Plan.pdf).

#### 5.7.1.6 The FFA Sub-Committee on South Pacific Tuna and Billfish (Southern Committee)

Membership of the Southern Committee comprises: Australia, Cook Islands, Fiji, New Zealand, **PNG**, Samoa, Solomon Islands, Tonga, Tokelau, Tuvalu and Vanuatu. Kiribati, New Caledonia, French Polynesia, American Samoa, Western Pacific Regional Fishery Management Council are permanent observers and FFA members are observers. The Committee makes recommendations on issues including the management of southern tunas (focussing mainly on albacore) and billfish to FFC for approval. Their work plan encompasses or has proposed projects that include third-party certification, MCS, management/policy, research & analytical work (e.g., characterisation of the longline fishery, bioeconomic analyses). A number of the FFA proposals on albacore, swordfish, striped marlin, sharks etc., relevant to the fishery under certification, originate from the Southern Committee (SC) including proposals for a revised south Pacific albacore CMM, shark CMM and 'eastern pocket' closure. More recently, this has morphed into the WCPFC South Pacific Albacore Roadmap Intersessional Working Group, focussing discussions on future amendments to CMM 2015-02 (see for example WCPFC17-2020-SPALB-Roadmap-IWG).

#### 5.7.1.7 Parties to the Nauru Agreement (PNA)

The Nauru Agreement is a binding Treaty-level instrument considered to be a sub-regional or regional fisheries management arrangement for the purpose of the United Nations Fish Stocks Agreement (UNFSA 1995) and the Western Central Pacific Fisheries Commission (WCPFC) Convention. It is an agreement between eight Pacific Island countries to facilitate cooperation in the management of fisheries resources of common interest. This has already been introduced in Sections above. The Parties to the Nauru Agreement (PNA) are Federated States of Micronesia, Kiribati, Marshall Islands, Nauru, Palau, **Papua New Guinea**, Solomon Islands and Tuvalu (see Figure 59 below). Tokelau is not a member of PNA but in 2012 Tokelau signed an agreement with the PNA countries to join the Vessel Day Scheme (VDS). The Cook Islands, likewise, is not a member of the PNA, has instituted its own VDS under the Marine Resources (Purse Seine Fishery) Regulations 2013. The PNA secretariat is located in Majuro in the Marshall Islands. PNA's functions include operating an access and management regime, which optimises revenue collection for the parties, as well as promoting the development of the Parties' indigenous fishery sector. The Nauru Agreement has three Implementing Arrangements, which set out specific rules for fishing in these countries.

**1st Arrangement (1983)**

- The introduction of a regional register for foreign fishing vessels, which was adopted by the Forum Fisheries Agency (FFA) and became operational in 1988;
- It was later followed by the development of a Vessel Monitoring System (VMS), which requires all licensed vessels to fit an Automatic Location Communicator (ALC) that monitors the vessel's position, speed and course allowing for its surveillance round the clock.

**2nd Arrangement (1990)**

- Prohibition of transhipment at sea;
- High seas catch reporting and maintenance of logbooks;
- Recording catch and effort on a daily basis;
- Placement of observers upon request by a licensing Party;
- Request for an electronic position and data transfer device to be installed on the vessel.

**3rd Arrangement (2008)**

- A ban on fishing vessels from operating in high seas pockets adjacent to the EEZs as a term of their licences;
- Adding the ban on operations in any additional high sea areas located within 10°N and 20°S latitude and 170°E and 150°W longitude (3IA Amendment 2014);
- A ban on the use of Fish Aggregating Devices (FADs) on purse seine vessels in the PNA members' EEZs between July and October of each year;
- Catch retention of bigeye, skipjack and yellowfin tuna on board purse seine vessels as a means of preventing fish dumping and bycatch.

The Federated States of Micronesia Arrangement (1992) was developed as a mechanism for domestic vessels of the PNA to access the fishing resources of other non-PNA parties, thus establishing arrangements for preferential access among the parties for vessels meeting certain standards for the provision of domestic economic benefits. The focus of PNA efforts to sustainably manage the purse seine fishery within PNA EEZs is the Vessel Day Scheme (VDS), which was introduced in 2005 to replace the former limit on the number of *purse seine fishing licences*, which was set at 205. The Palau Arrangement (PNA, 2016)enhanced the management of purse seine fishing vessel effort in the waters of the Parties by:

- Promoting optimal utilisation and conservation of tuna resources;
- Maximising economic returns, employment generation and export earnings from sustainable harvesting of tuna resources;

- Supporting the development of domestic locally based purse seine fishing industries;
- Promoting effective and efficient administration, management and compliance; and
- Encouraging collaboration between all parties.

Regarding decision-making in the PNA, as within the WCPFC, it is primarily based on consensus (or "the Pacific way"). Decisions and decision processes are recorded in records of PNA meetings. An annual meeting of the parties is required by the Nauru Agreement; there are PNA rules governing preparation of the agenda, circulation, reporting and who can attend. These were first promulgated in 2005 and have been amended to account for the transfer of the Secretariat to the PNA Office in Majuro, Marshall Islands in 2010. The record of proceedings is distributed to the Parties. Industry representatives often form part of the Delegation and papers are provided to attendees. Generally, the outputs from internal PNA deliberations are collated in specific areas of interest in their reporting to the WCPFC annual Plenary (see Discussion Paper at WCPFC17-2020 for example). Other materials and documents prepared by the PNA as well as generic reports are freely available on their website. The PNA has an intensive consultative process among Members with meetings at technical, officials and Ministerial levels, with an annual Leader-level meeting. Member delegations to meetings typically include industry participants. PNA also consults collectively as PNA and as individual Parties with other WCPFC Members through the WCPFC process, and other Pacific Island Countries through the FFA process. The Palau Arrangement (Article 6) includes recognition of the need to cooperate with other states or international organisations and provides for cooperation to take place through informal consultations between the Parties and other states or international organisations.

#### 5.7.1.8 International Science Committee (ISC)

The International Scientific Committee (ISC) for Tuna and Tuna-Like Species in the North Pacific Ocean is an intergovernmental body established in 1995, dedicated to advancing fishery science of the North Pacific tuna and tuna-like fishes through cooperation and collaboration. Current ISC country Members are Canada, Chinese Taipei, **Japan**, Republic of Korea, Mexico, People's Republic of China and The United States of America. Non-Voting Member organisations are the Food and Agriculture Organization of the United Nations (FAO), the North Pacific Marine Science Organization (PICES - an intergovernmental science organization, established in 1992 to promote and coordinate marine research in the North Pacific and its adjacent seas. Its present members are Canada, Japan, People's Republic of China, Republic of Korea, the Russian Federation, and the United States of America), the Pacific Community (SPC), and the Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean (WCPFC). The Inter-American Tropical Tuna Commission (IATTC – see below) is a Cooperating Non-Member.

Providing an historical timeline of ISC activities, in 1996, three species Working Groups (WG) (Bigeye Tuna Working Group, Pacific Bluefin Tuna Working Group, and Swordfish Working Group) and a Statistics Working Group were created. A fourth species Working Group, the Marlin Working Group, was established in 1999. In 2004, the Bigeye Tuna Working Group was dissolved, being replaced by a Bycatch Working Group. Then in 2005, the North Pacific Albacore Workshop became the Albacore Working Group. In 2007, the Swordfish and Marlin Working Groups were merged into a Billfish Working Group. In 2010, the Bycatch Working Group was dissolved, and a Shark Working Group was established in its stead. Today in 2021, under Plenary session, there are now 5 working groups: an Albacore Working Group, a Billfish Working Group, a Pacific bluefin Tuna Working Group, a Shark Working Group, and the Statistics Working Group.

These Working Groups are subsidiary bodies of the Committee and report to the Committee. Each provide a separate forum for cooperation and collaboration in research by Member and Non-voting Member scientists as well as for focused consideration of technical matters assigned by the Committee. The species Working Groups' primarily focus is on understanding the dynamics and ecology of highly migratory and associated-species populations such that accurate stock assessments can be conducted to determine each stock's condition and status. The Statistical Working Group focuses on collection, exchange and archiving of fishery, biological and other data needed for these stock assessments. The WG also monitors fishery developments, statistics, and bycatch. The work of these Working Groups is guided by multi-year work plans as determined by the Committee.

When the species Working Groups conduct stock assessments (both benchmark and updates) they are mandated to use the best scientific information available, which is provided through the Statistics WG. These Stock assessments then provide scientific advice to resource managers on the current status and future trends in abundance and productivity of exploited marine resources. They also provide the technical basis for guiding establishment of fishery management measures in order to achieve optimum yield from the fishery while also avoiding overfishing and ecosystem harm.

Detailed information concerning ISC Rules and Procedures, Organizational Chart, Working Groups' makeup, Meetings Reports, Stock Status Reports and General Fisheries Statistics can readily be found on the ISC home page at [www.isc.fra.go.jp](http://www.isc.fra.go.jp).

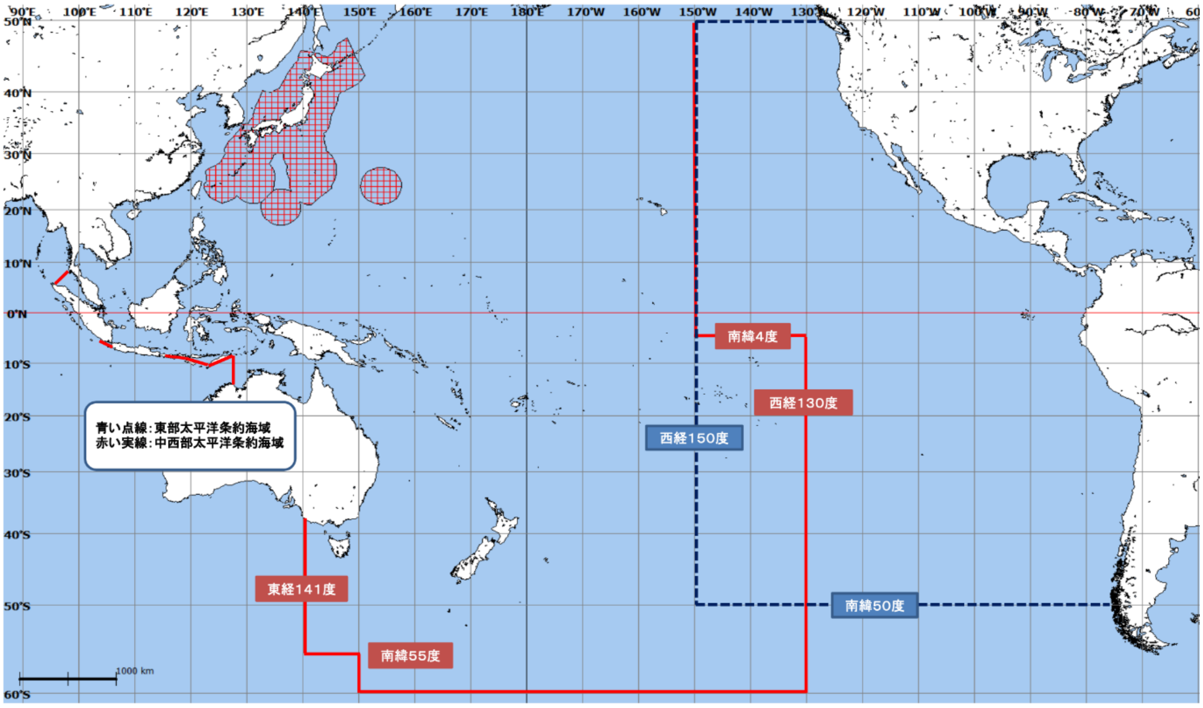


**Figure 59. Area of WCPFC and IATTC jurisdiction in the Pacific Ocean, with Japanese EEZ also displayed (*Source: JFA*).**

### 5.7.1.9 Inter-American Tropical Tuna Commission (IATTC)

The Inter-American Tropical Tuna Commission (IATTC) was established by the Convention for the Establishment of an Inter-American Tropical Tuna Commission in 1949 but was replaced by the Antigua Convention (UN Convention for Cooperation in the Protection and Sustainable Development of the Marine and Coastal Environment of the Northeast Pacific – (IATTC, 2003)), which entered into force on August 27, 2010. The Area of Competence extends over an area of approximately 55 million km$^2$ as follows for the area shown in

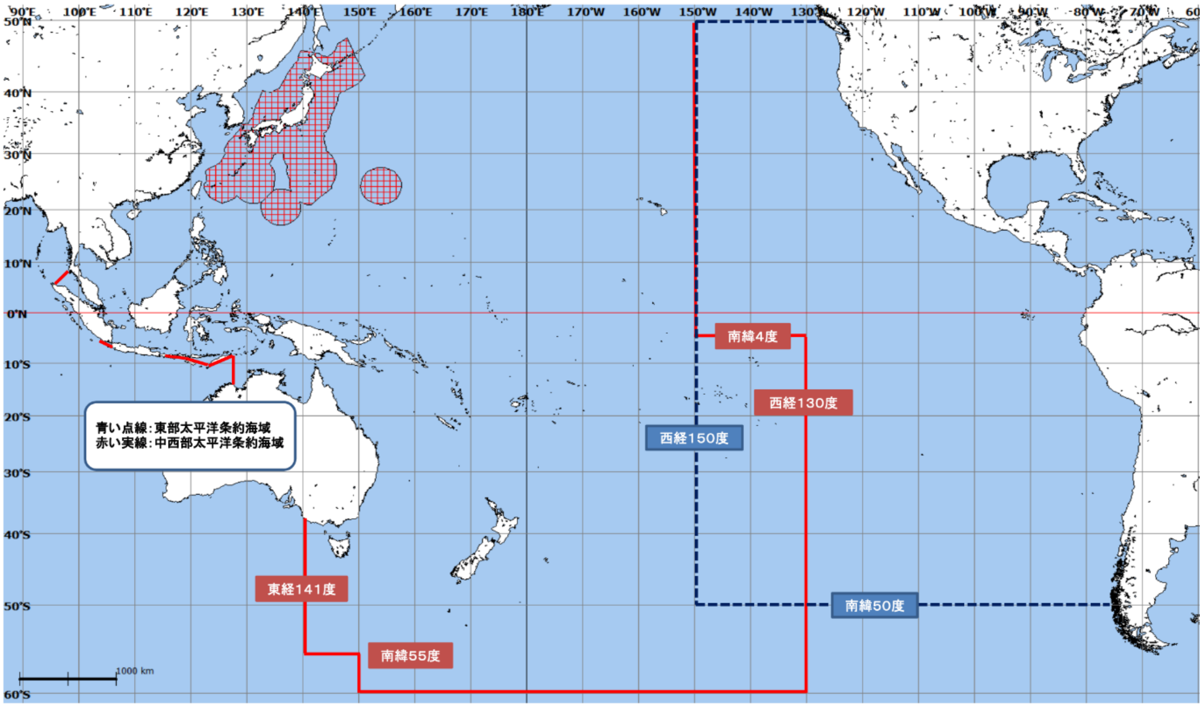


Figure 59 above:

- The 50°N parallel from the coast of North America to its intersection with the 150°W meridian;
- The 150°W meridian to its intersection with the 50°N parallel; and
- The 50°S parallel to its intersection with the coast of South America.

IATTC is responsible for the conservation and management of the fisheries for tunas and other species taken by tuna-fishing vessels in the Eastern Pacific Ocean (EPO). The objective of the Antigua Convention is "to ensure the long-term conservation and sustainable use of the fish stocks covered by this Convention, in accordance with the relevant rules of international law". The Antigua Convention also has an explicit provision under Article IV, paragraph 1 to apply the "precautionary approach, as described in the relevant provisions of the Code of Conduct and/or the UNFSA, for the conservation, management and sustainable use of fish stocks". This is re-iterated in the functions of the Commission under Article VII, along with the need to take an ecosystem approach to management. Current members are: Belize, Canada, China, Colombia, Costa Rica, Ecuador, El Salvador, the European Union, France, Guatemala, **Japan**, Kiribati, Korea, Mexico, Nicaragua, Panama, Peru, Chinese Taipei, United States, Vanuatu, and Venezuela. In addition, Bolivia, Honduras, Indonesia and Liberia are cooperating non-members. To ensure that the IATTC management framework is consistent with national laws, each contracting state must take the measures necessary for the implementation of and compliance with the Convention and related conservation and management measures including the adoption of the necessary national laws and regulations. IATTC ensures the long-term conservation and sustainable use of tuna, tuna-like and other species of fish caught in the EPO by fishing vessels (primarily purse seine and longline over 24 m) in accordance with the relevant rules of international law. The functions of the Commission (Article VII) and its subsidiary bodies (Article X and XI) are explicitly defined in the Convention text, and well-articulated in the Rules of Procedure of the Antigua Convention. The IATTC is closely linked to the WCPFC, formally recognised through a Memorandum of Understanding (WCPFC, 2009b) and two Memoranda of Cooperation (WCPFC, 2009a, 2011), clearly laying out the types and levels of such cooperation. In addition, beginning in 2007, there have been WCPFC-IATTC Consultative meetings and as of 2019 there are now annual WCPFC-IATTC Joint Working Group meetings which involve the Northern Committee of the WCPFC (refer to https://meetings.wcpfc.int/meetings/type/17).

The IATTC has a participatory consultative and decision-making process, including its subsidiary bodies, working groups and other scientists, the private sector, fisheries authorities, and non-governmental organizations from all member states. However, not all parties can vote on the adoption of resolutions and recommendations. The IATTC studies tunas and billfish biology in the EPO to determine the effects of fishing and natural factors on their abundance (see Figure 60). The data gathered are used to formulate appropriate management measures recommendations in order to promulgate IATTC Resolutions and then to collect information on compliance with such Resolutions. In addition, the IATTC maintains a program to study the effects of fishing mortality on other fish and marine organisms of the pelagic ecosystem. These IATTC-established subsidiary bodies meet annually:

- Committee on Administration and Finance;
- Scientific Advisory Committee;
- Committee on Compliance Review; and
- Working groups.

The composition, roles and functions of these subsidiary bodies are detailed in the sections below.

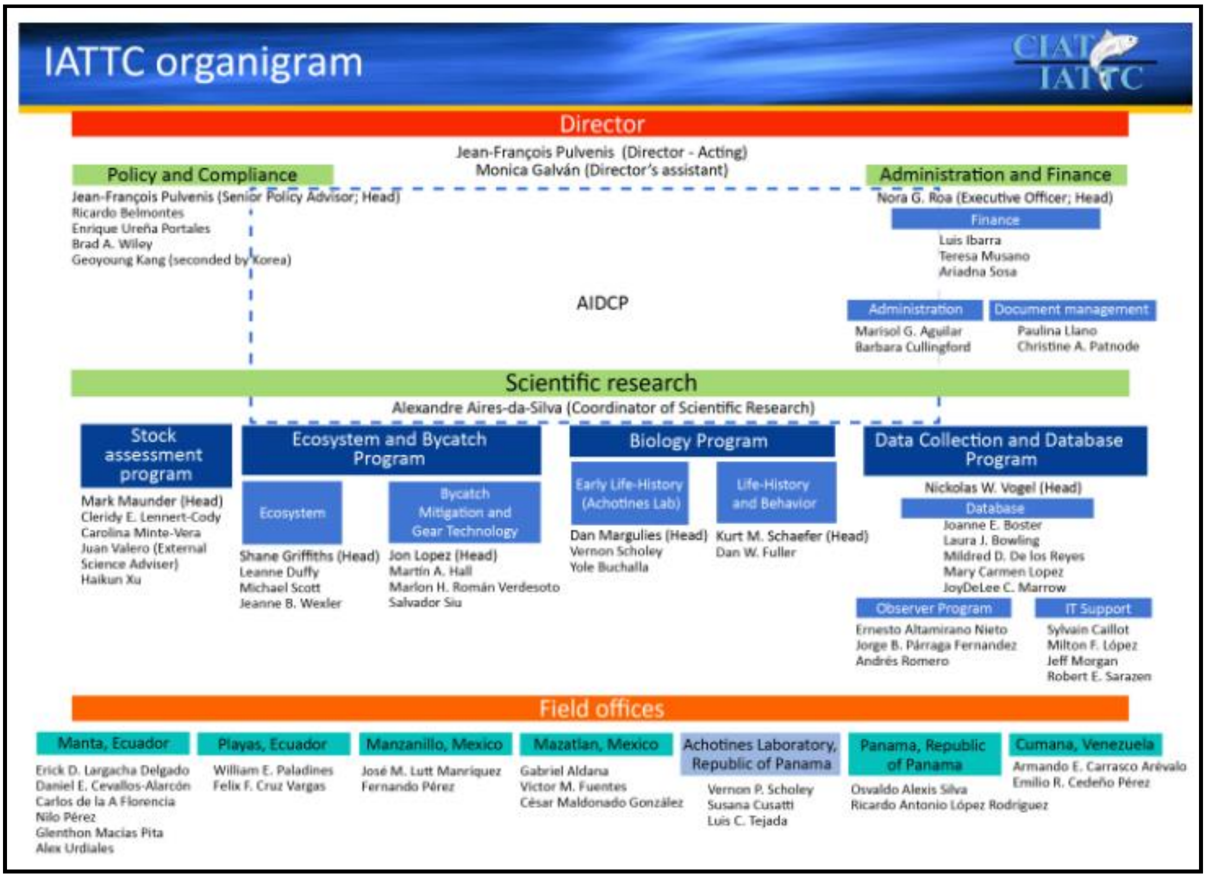


**Figure 60. Organisational structure of the IATTC. Source: https://www.iattc.org/StaffENG.htm**

Rules for participation of observers at meetings are outlined in Annex 2 of the Convention. Annex 2 provides opportunity to become a Contracting Party or Co-operating Non-Contracting Party, open to all, including non-States. Like SPC and WCPFC, IATTC too has a special fund to strengthen the institutional capacity of developing countries to sustainably develop their fisheries so they can comply with IATTC Resolutions and Recommendations. An up-to-date list of IATTC Resolutions and Recommendations can be found at https://www.iattc.org/ResolutionsENG.htm.

As with the WCPFC, all decisions are made by consensus (Article IX of the Antigua Convention), Resolutions become binding 45 days after their notification, barring an effective "veto" by dissension from any voting member. However, recommendations are non-binding. Decision-making is based on scientific advice and where there is consensus among members it leads to measures and strategies to achieve fishery-specific objectives. There is detailed reporting available to explain the decisions taken in relation to the management system. All meeting documents and minutes are uploaded to the website and publicly accessible, and also distributed to members, as outlined in the Rules of Procedure in Article IV.

Regulations approved by members, based on recommendations by IATTC staff or scientific committees, must be implemented by members and cooperating non-parties. To monitor compliance by members, the "Committee for the Review of Implementation of Measures Adopted by the Commission" (Antigua Convention, Annex 3) shares information on the actions taken by the Members to ensure compliance with measures agreed to under the Convention, by their vessels.

#### 5.7.1.10 Committee on Administration and Finance

Resolution C-12-02 established a Committee on Administration and Finance in 2012, composed of representatives designated by each Member of the Commission, who may be accompanied by such experts and advisers as that Member may deem advisable. The functions of the Committee are to:

- Examine the draft budget for the ensuing year and the subsequent year;
- Alert the Commission, as appropriate, about any matter of an administrative or financial nature;
- Prepare a report of each meeting of the Committee for transmission to the Commission, that includes advice and recommendations on matters related to the budget, finance, and administration of the Commission; and
- Examine the financial audit reports.

Commission staff itself are to assist this Committee in collecting information necessary for the work of the Committee, in accordance with the procedures established by the Commission. Commission staff may also provide such analyses as the Committee deems necessary for carrying out its functions, prepare the reports for and records of the Committee meetings and distribute all pertinent information to the members of the Committee.

#### 5.7.1.11 Scientific Advisory Committee (SAC)

Under the Antigua Convention (Article IX and Annex 4), a formal Scientific Advisory Committee was established by the Commission in 2003. It is composed of a representative designated by each member of the Commission, with appropriate qualifications or relevant experience, accompanied by such experts or advisers as deemed advisable by that member. The Commission may invite other organizations or persons with recognized scientific experience in matters related to the work of the Commission to participate in the work of the SAC.

The functions of the Committee are as follows:

- Review plans, proposals and research programs of the Commission, and provide the Commission appropriate scientific advice;
- Review relevant assessments, analyses, research or work, as well as recommendations to the Commission prepared by its scientific staff having such considered by the Commission itself, and provide additional information, advice and comments, as needed on these matters, to the Commission;
- Recommend items or specific issues to be addressed by the scientific staff, as part of its future work, to the Commission;
- In consultation with the Committee on Compliance Review, recommend to the Commission the priorities and objectives of the program for data collection and monitoring as established the Convention, and assess and evaluate the results of that program;
- Assist the Commission and the Director in locating sources of funding to conduct the research to be undertaken under this Convention;
- Develop and promote cooperation with members of the Commission's research institutions, to expand the knowledge base and understanding of fish stocks covered by this Convention;
- Promote and facilitate, as appropriate, the cooperation of the Commission with other national and international public or private organizations with similar objectives;
- Consider any matter referred to it by the Commission; and
- Perform such other functions and tasks as may be requested or assigned to it by the Commission.

As illustrated in 5.7.1 above, there is a full IATTC Scientific Staff that operates under the supervision of the Director, and a Coordinator of Scientific Research. The Scientific Research Program has the following functions, which obviously gives priority to tunas and tuna-like species:

- Conduct scientific research projects and other activities approved by the Commission in accordance with the work plans adopted for this purpose;
- Provide the Commission Director, scientific advice and recommendations to support formulation of conservation and management measures and other relevant matters, following consultations with the Scientific Advisory Committee;
- Provide the Scientific Advisory Committee with the information necessary to carry out the functions of the SAC as specified above;
- Provide the Commission, through the Director, with recommendations for scientific research in support of the Commission's own functions;
- Collect and analyze data relating to current and past conditions and trends of the populations of the fish stocks covered by this Convention;
- Provide the Commission, through the Director, with proposed standards for collection, verification, and timely exchange and reporting of data concerning the fisheries for the relevant fish stocks covered by this Convention;
- Collect statistical data including, as appropriate, social and economic aspects, and catch reports of fish stocks covered by this Convention as well as relevant information concerning the operations of vessels in the Convention Area;
- Study and appraise information concerning methods and procedures for maintaining and increasing the fish stocks covered by this Convention; and
- Publish and disseminate findings reports within the scope of this Convention as well as scientific, statistical and other data relating to the fisheries for the fish stocks covered by

this Convention, ensuring confidentiality in conformity with the provisions of this Convention.

#### 5.7.1.12 Committee on Compliance Review

Formally called the Committee for the Review of the Implementation of the measures adopted by the Commission, the Committee on compliance Review was along with the SAC, created under the Antigua Convention. It is composed of representatives designated for that purpose by each member of the Commission, who may be accompanied by experts and advisors. The functions of the Committee established under Article X and Annex 3 of the Convention are as follows:

- To review and monitor compliance with conservation and management as well as cooperative measures adopted by the Commission, referred to in Article XVIII (Rights of States), paragraph 9 (concerning cooperation), of this Convention;
- To analyze information by flag or, when information by flag would not cover the relevant case, by vessel, and any other information necessary to carry out its functions;
- To provide the Commission with information, technical advice and recommendations relating to the implementation of, and compliance with, conservation and management measures;
- To recommend to the Commission means for promoting compatibility among the fisheries management measures of the members of the Commission;
- To recommend to the Commission means to promote the effective implementation of Article XVIII, paragraph 10 of the Convention (i.e., vessels in contravention of management measure(s) shall be deterred from such activities until such time as appropriate action is taken by the flag State to ensure that such vessels do not continue those activities);
- To recommend, in consultation with the SAC, priorities and objectives for the data collection and monitoring program to the Commission, as specified in the Convention (Article VII), and to assess and evaluate the results of that program; and
- To perform such other functions as the Commission may direct.

#### 5.7.1.13 Working Groups

A working group is a group of experts working together to achieve specified goals and are domain-specific and focus on discussion or activity around a specific subject area. Under the rules of procedure of the IATTC and at the request of the Director, Scientific Staff or SAC, several working groups may be established to address specific questions or topics that require additional consideration, and then prepare documents for discussion at regularly convened committee meetings. Some working groups are permanent (e.g., the Permanent Working Group on Fleet Capacity) while others are *ad hoc* (e.g., the Ad Hoc Working Group on Resolutions or the Ad Hoc Working Group on FADs). Meetings are publicly announced and records of meetings are available on the IATTC website (Refer to Meeting records at https://www.iattc.org/IATTC-WGsENG.htm).

### 5.7.2 National Governance Framework

Since the fishery under assessment may be prosecuted within the Japanese EEZ and in the EEZ of Papua New Guinea (PNG) under bilateral agreements, with the majority of catch in the high seas within the Western and Central Pacific Ocean (WCPO), consideration of the two national governance frameworks for fisheries management must also be taken into consideration.

#### 5.7.2.1 Japan

The principal law that regulates all fishery activities is the Fisheries Law (1949, as revised in 1962), which deals in detail with several kinds of fishing rights and licenses for Japanese individuals and groups of persons and is the basis of Japanese Fisheries management. The Law is administered by the Fisheries Agency of Japan (FAJ) within the Ministry of Agriculture, Forestry and Fisheries (MAFF). The Fisheries Agency is first and foremost, responsible for preserving and managing marine biological resources and fishery production activities within the EEZ (Figure 61).

**Figure 61. Japan's Contiguous Zone, Territorial Sea, and EEZ. (*Source: Japanese Coast Guard, 2015*).**

Also, within the Ministry of Foreign Affairs (MOFA), there is a Fishery Division, which focuses primary on “big picture” issues such as Japan’s position on combatting IUU fishing globally, through adoption of port state measures, and cooperation among RFMOs to which Japan is signatory. This Ministry has also forwarded an overarching National Biodiversity Strategy for 2012-2020, which has articulated goals and actions for fisheries, both in-zone and international, included in this roadmap (MOFA, 2012). As is stated in the Strategic plan, the management and sustainable use of highly migratory fish species, conservation and management measures will be promulgated based on the best scientific information available. Striving to end IUU fishing will involve local and international fishery management organizations, while at the same time taking into consideration the importance of these species for fishery production and consumption in Japan. In the plan, it is stated that the government will also implement fishery management measures which take ecosystems into consideration, especially in-zone, such as setting of fishing prohibition periods and establishing Marine Protected Areas for resource protection (time and area closures), as well researching methods to avoid bycatch, in particular ETP species. For instance, use of Tori lines (bird scaring lines on poles) and circle hooks in the longline fishery have already shown effectiveness. The government will also scientifically demonstrate that these types of fishing activities will make it possible to conserve and sustainably use marine biodiversity, in order to contribute to building international consensus on appropriate fishing activities.

### 5.7.2.2 In-zone management systems

So, firstly, within the EEZ, many tasks have been delegated to the prefecture governments, especially when it comes to consideration of coastal and offshore fisheries.

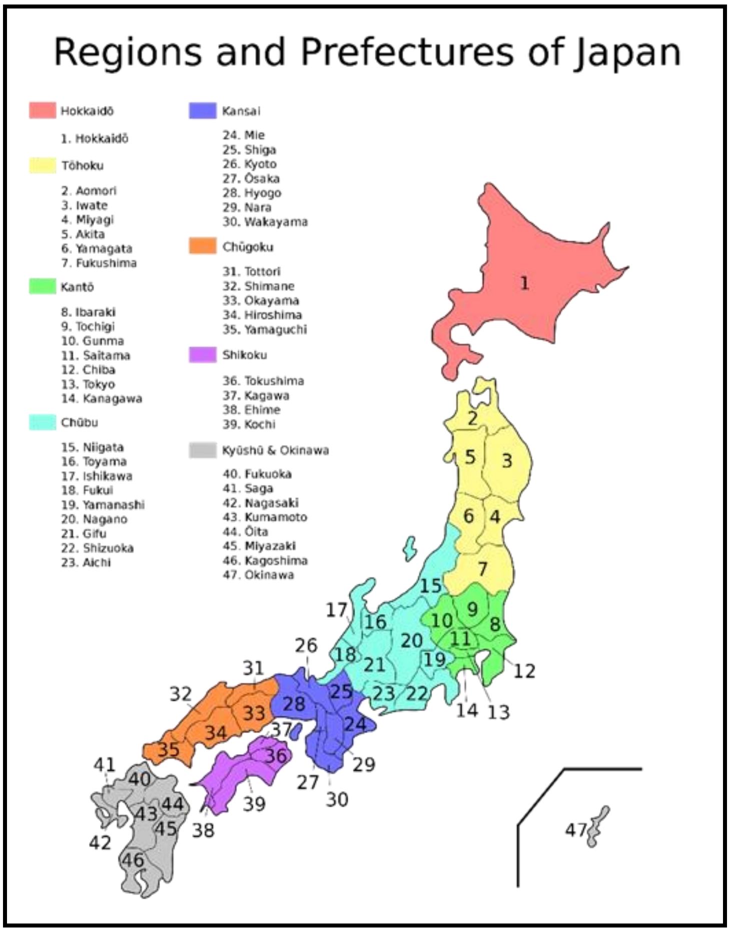
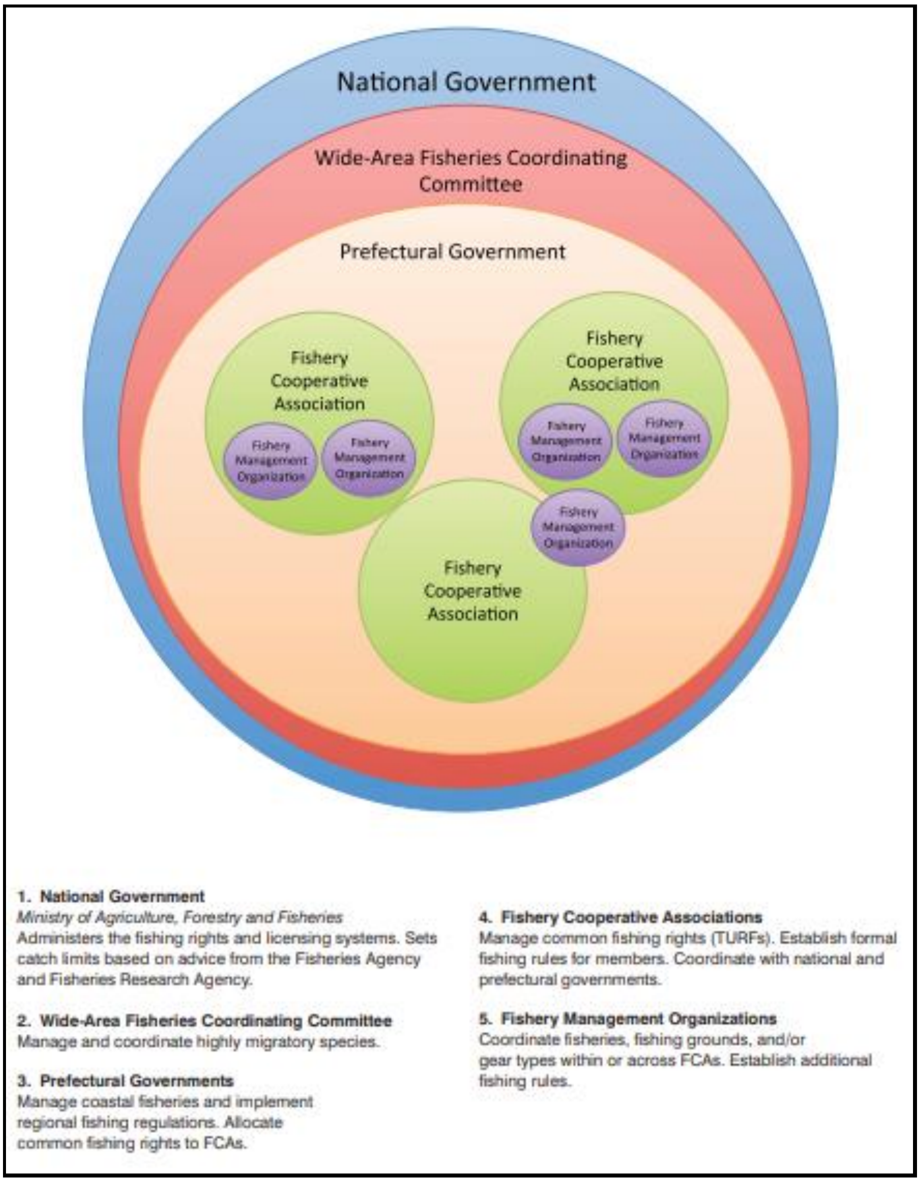


**Figure 62. Regions and prefectures of Japan. Source: Wikipedia.**

Japan's marine waters are divided into several sea areas as administrative units for fisheries adjustment purposes. With a few exceptions, essentially each sea area corresponds to the maritime zone of a coastal prefecture (see Figure 62 above).

The Fisheries Law establishes Sea Area Fisheries Adjustment Commissions and a Central Fisheries Adjustment Council to address matters of policy, implementation, and enforcement under the Law in each sea area and ensures the coordination of prefectural fisheries development within the overall national framework. The Sea Area Fishery Adjustment Commissions come under the joint jurisdiction of the MAFF and the prefecture governments. The Fisheries Cooperative Association Law (1948, as amended) provides the legal framework for local Fisheries Cooperative Associations (FCAs) which bear the responsibility for a particular geographical area and whose membership are fishers from communities within this area. Within the framework laid out by the prefectures, and as local conditions dictate, each FCA establishes its own regulations for the control and operation of that fishery, and the conservation and rational exploitation of marine resources within the entire EEZ. In terms of day-to-day operations, the Japanese fisheries sector, although still subject to higher level regulations, is essentially self-managed by the FCAs or federations of FCAs, schematized in Figure 63.



1. **National Government**
*Ministry of Agriculture, Forestry and Fisheries*
Administers the fishing rights and licensing systems. Sets catch limits based on advice from the Fisheries Agency and Fisheries Research Agency.

2. **Wide-Area Fisheries Coordinating Committee**
Manage and coordinate highly migratory species.

3. **Prefectural Governments**
Manage coastal fisheries and implement regional fishing regulations. Allocate common fishing rights to FCAs.

4. **Fishery Cooperative Associations**
Manage common fishing rights (TURFs). Establish formal fishing rules for members. Coordinate with national and prefectural governments.

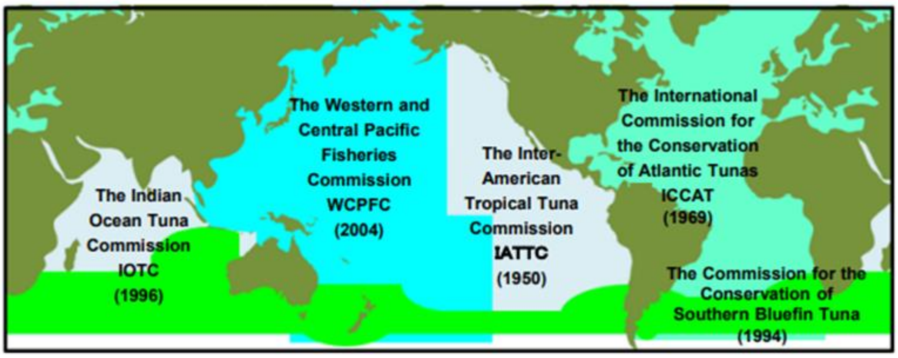
5. **Fishery Management Organizations**
Coordinate fisheries, fishing grounds, and/or gear types within or across FCAs. Establish additional fishing rules.

**Figure 63. Japanese EEZ fisheries co-management system. Source:** (McIlwain, 2013)**.**

The Fisheries Cooperative Association Law (1948 with consecutive amendments) forms the basis of the legal framework for these local FCAs to act as the institutions that carry out resource management at an operational level. FCAs are a voluntary association of local fishermen that hold the responsibilities of managing fish stocks, fishing grounds, and the overall marine environment in their designated coastal area. In addition, there is also the Fishery Management Organizations (FMOs), which deal with more specialized sections of the fishing industry and are mainly involved with offshore or distant water fishing management. Therefore, this law and the Fisheries Law mentioned above are the two most important legal frameworks for Japanese fisheries management (Makino, 2017). The area administrated by a FCA varies depending on local conditions. The responsibility of a local FCA is the management of particular geographical area and the governance is based on the membership of fishers operating within the area. An FCA develops its own regulations within national legislative frameworks. However, some of the regulations may be created by the FCA uniquely for fisheries operating under control of that individual FCA. For such in-zone fisheries there are other important fishery organizations which include the Area Fishery Coordinating Committees (AFCCs), set up at prefectural level as coordinating bodies consisting of nine elected fishermen, four academic experts and two representatives of public interests. The community-based coastal fisheries management systems developed for both coastal and offshore fisheries are extremely important since fishers, as part of an FCA have large stakes and claims in the marine resources and regulations placed upon them, thereby giving higher incentives to manage these resources responsibly. Thus, especially for coastal fisheries, and to some extend offshore fisheries, these are managed on a bottom-up approach. The individual fishermen first exercise their fishing rights and cover the costs for conservation. It is up to fishermen to peer monitor and report to local fishery cooperatives, but the prefectural governments still issue fishing licenses based on the central Fishery Law (Yagi et al., 2010).

#### 5.7.2.3 Designated Fisheries (from 2020 onwards referred to as Minister-permit fisheries)

In addition to the above, Ministerial Ordinance on the Permission, Regulation, Etc. of Designated Fisheries (1963) is for 13 specific fisheries which are recognized as those requiring multi-national coordination or national control on the number of operators and vessels in those fisheries. Offshore tuna fisheries is in fact one covered by this ordinance. This ordinance states that tuna fisheries need to follow international rules, including any no-fishing areas as defined by RFMOs or Treaties, catch prohibition on identified ETP shark species or if retained they must be with fins attached. Specific to the tuna fishery in Japan, the Act on Special Measures for Enhancement of the Conservation and Management of Tuna Resources ("Tuna Law", 1997 revised 1999) of Japan also defines as compulsory, full compliance with international frameworks such as RFMOs, for sustainable resource management. The fishery permits for individual vessels occur via two separate licensing structures: Ministry Permits (Ministry of Agriculture, Forestry and Fisheries (MAFF)) and Prefectural Governor Permits, depending on the type and size of the fishery.



Note: The years in parentheses are the years of effectuation of the relevant treaties.

**Figure 64. Japan's membership in the world's tuna RFMOs. Source: Fisheries Agency of Japan (FAJ 2020).**

Most of the offshore/distant water longliners are members of the Japan Tuna Fisheries Cooperative Association (founded 2006), or Japan Tuna Cooperative. Most offshore longliners (19 members in 2021) adhere to the National Offshore Fisheries Association of Japan (founded 1982). The remaining distant water longliners (6 members in 2021) are represented by the National Ocean Tuna Fishing Association (founded 1979). These associations play a significant support role in representing Japanese longline industry interests to the Japanese Government, RMFO's and coastal states. These vessels (163 total in 2021) are also members of the international Organization for the Promotion of Responsible Tuna Fisheries (see OPRT 2021), of which membership also includes all major distant water and Pacific Island Countries and Territories (PICT) longline fleets. This non-governmental organization was established in 2004 by Japan as a response to Japan's acting upon implementation of the FAO International Plan of Action for the Management of Fishing Capacity (FAO, 1999;

Gréboval & Munro, 1999), namely its initially scrapping of twenty percent (totalling 132 vessels) of its large-scale tuna longline fleet in 1998/1999.

As mentioned in 4.2.2 above, Japan's longline fleet is divided into distant water, offshore and coastal classes, but there are considerable interactions among them – especially the distant water and offshore classes. In the fishery under assessment the offshore vessels are divided into two sub-categories of which one is under contract to Fukuichi: (a) small offshore (10-20 GRT) which can range widely even outside the Japan EEZ, within the WCPO and even to the EPO, and (b) (medium) offshore longliners (20 -120 GRT, but mostly > 50GRT) which fish in similarly extensive areas. The rest of the Fukuichi contract vessels are distant water longliners (120 GRT and up) which can fish in all oceans (Atlantic, Indian, and Eastern and Western Pacific), typically with some restrictions; that they have the necessary authorizations in place to fish, while also observing domestic regulations. Hence, in theory, a single vessel may fish in all three oceans. In practice, some vessels may shift between two oceans (i.e., between the WCPO and the Indian Ocean, or between the WCPO and the Atlantic), but overall, most vessels usually operate in one ocean because of the cost considerations of shifting between oceans. In many analyses and data presentations (e.g., WCPFC Japan AR Part 1), the (medium) offshore and distant water longliners are grouped because of operational similarities. The WCPFC Register of Fishing Vessels (RFV) Japan currently has 476 longline vessels authorized to fish in the WCPFC-CA, with offshore distant water vessels making up 235 (49%) of these.

#### 5.7.2.4 Japan Fisheries Agency (JFA)

The Basic Law on Fisheries Policy (2001, revised in 2005) aims to provide measures to ensure sustainable exploitation of fisheries resources, and guarantee a steady supply of fishery products for the country, promote the development of fisheries communities, and ensure the protection of the marine environment. As already mentioned, Japan has several agencies involved in the protection of their marine resources. The Japan Fisheries Agency itself is divided into four departments (Popescu & Ogushi, 2013):

1. The Fisheries Policy Planning Department, consisting of the Policy Planning Division, Fisheries Management Division , Fisheries Product Processing Industries Division and Seafood Marketing Division;
2. The Resource Management Department, consisting of the Resource Management Division, Fisheries Management Division and International Affairs Division;
3. The Resource Enhancement and Promotion Department including the Research and Technological Guidance Division, Resources and Environment Division, and Fish Farming and Aquaculture Division; and finally
4. The Fisheries Infrastructure Department comprising the Planning Division, Construction Division, Fishing Communities Promotion Division and Disaster Prevention Division.

It is important to note that although offshore fisheries make up a much smaller portion of Japan's fishing fleet, it obviously contributes key species to the market (i.e., tuna and other pelagics) and are managed somewhat differently than coastal fisheries. Only distant water fishing (fishing outside of the nation's exclusive economic zone) is regulated directly by the central government. Offshore and distant water fisheries thus are controlled on a top-down basis. This means that offshore fisheries are first given legal control based on the Fishery Law, then the government provides enforcement mechanisms to cover the cost of conservation, and finally controls are based on patrolling vessels and on-board inspections by the government (Yagi et al., 2010).

### 5.7.2.5 Japan Fisheries Research Agency (JFRA)

The Minister of Agriculture, Forestry, and Fisheries also provides funding for research through the National Research and Development Agency in conjunction with the Japan Fisheries Research and Education Agency (FRA) established in 2016, through a merger of the Fisheries Research Agency, and the National Fisheries University (see Figure 65 below).

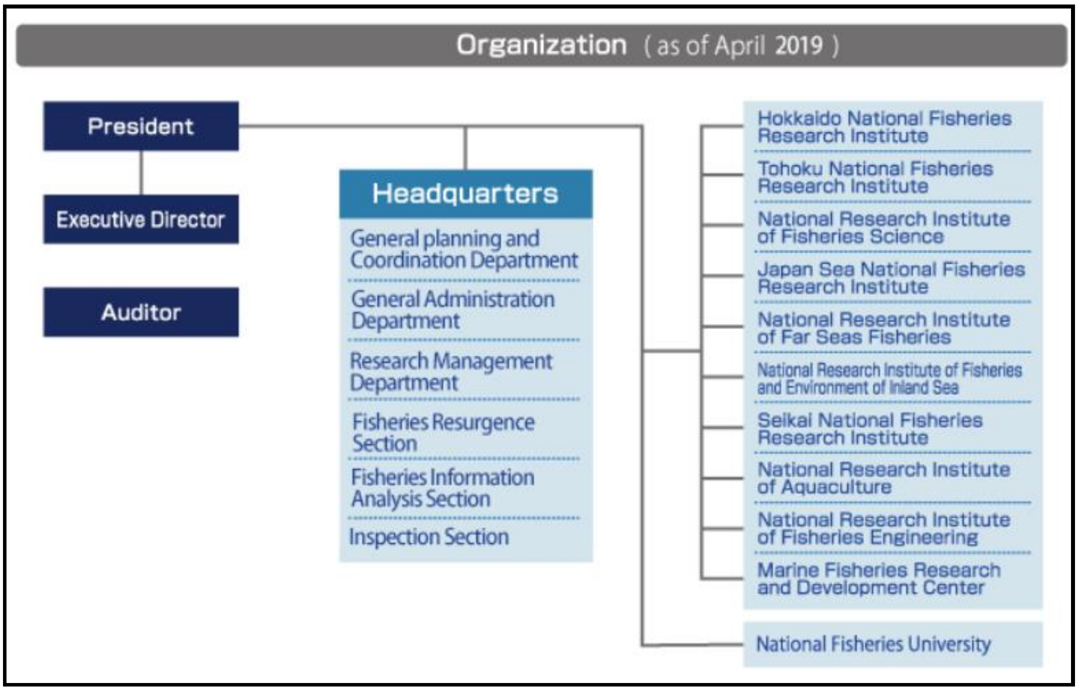


**Figure 65. Institutional organisation of the Japan Fisheries Research Agency.**

As of 2001, it also incorporates the National Research Institute of Far Seas Fisheries (NRIFSF) established in 1967, in a previous reorganization. The NRIFSF had covered research on tunas, whales, walleye pollock, snapper, squids, and krill caught by the Japanese fisheries operating widely in the Pacific, Indian, Atlantic and Antarctic Oceans, but now focuses mainly on tunas, whales/dolphins and groundfish throughout the world and on krill in the Antarctic Oceans. The FRA seeks maximization of research and development (R&D) outcomes as it is now the only comprehensive fisheries R&D organization in Japan. This is to be achieved by creating a synergistic effect through the utilization of advanced research results and research facilities for student education while maintaining the R&D function of the old Fisheries Research Agency and the human resource development functions of the previous National Fisheries University as well as striving to be a core human resource development organization that leads Japan's new fishing industry. As far back as 2009, the previous iteration of the FRA put forward a "Grand Design" (JFA, 2009), in which there was firm recognition that the existing management system needed to address sustainable and effective use of fishery resources, to clarify the effects and issues of Japan's conventional fisheries management systems, including the fishery rights and fishing license, and to propose appropriate management frameworks in the context of both national and international obligations. This "Grand Design" was to consider not only the output control through catch quota management measures such as TACs (Total Allowable Catches), IQs (Individual Quotas), or ITQs (Individual Transferable Quotas), but also the various qualitative and technical control measures such as seasonal/spatial regulations, size/sex restrictions, gear limitations, etc. The roles that the fishing industry is to play are identified in the five principles:

1. Resource and environmental policy aspect,

2. Food policy aspect,
3. Industrial and economic policy aspect,
4. Local and community policy aspects, and
5. Cultural and science policy aspects.

**Figure 66. Five principles and sixteen roles for "ideal fisheries" in Japan. Source: Fisheries Research Agency,** (MAFF, 2009)**).**

These are illustrated in Figure 66, above, which also include specific roles proposed for fisheries under each principle In response to the new Medium- to Long-term Objectives announced by the Minister of Agriculture, Forestry, and Fisheries for the five-year period between FY2016 and FY2020 (MAFF, 2016), focused on four key issues; (1) research and development on the sustainable use of fishery resources, (2) sound development of the fishery industry and supply of safe marine products, (3) monitoring and basic research on marine ecosystems, and (4) development of core human resources in the fishing industry, the FRA also formulated its Fourth Medium- to long-term Plan, basically as an extension and expansion on the "pre-meager" outline of the principles and roles summarized above. Based on these Objectives and the Plan, the FRA is mandated to continue contributing to the revival of Japan as a nation of sustainable fisheries by maximizing R&D outcomes through prioritizing research topics, refining education content in their human resources development operations, finding and maximizing synergies for outcomes from these two operations, and establishing an overall organization which can effectively and efficiently promote fisheries operations.

#### 5.7.2.6 Papua New Guinea

The Fisheries Management Act 1998 (as amended), the Fisheries Management Regulations (2000 and 2016) and the National Tuna Fishery Management and Development Plan 2014 form the backbone of fisheries management in Papua New Guinea (PNG). Since PNG is signatory to UNCLOS, the UNFSA, WCPF Convention and the Nauru Agreement, its regulations mandate compliance with provisions of these Agreements, and the Act (1998) provides legislation which implements all these required obligations.

The Fisheries Management Act established The National Fisheries Authority (NFA) by legislation, the government agency responsible for administering PNG fisheries laws. This Fisheries Management Act (1998) covers a wide range of important topics, including:

- Institutional Arrangements
- Fisheries Management, Conservation and Development
- Licences
- Enforcement and Observer Programme
- Jurisdiction, Procedures, Offences, Penalties and Liability
- Administrative Proceedings
- Evidence
- Miscellaneous

The Act also provides the legislative framework such that Fishery Management Plans are required to be developed and implemented, either by the NFA Managing Director or the Minister. Such plans must:

- identify the fishery and its characteristics, including its current state of exploitation;
- specify the objectives to be achieved in the management of the fishery;
- identify any possible adverse environmental effects of the operation of fishing activities in the fishery; and
- identify, where appropriate, any relevant customary fishing rights or practices.

Once promulgated, the Act stipulates that such plans must be “kept under review and revised as necessary” and such review shall be endorsed by the NFA Board, submitted to the Minister for approval then notified in the Official National Gazette. The organizational makeup, divided into “business groups” of the NFA, is illustrated in Figure 67.

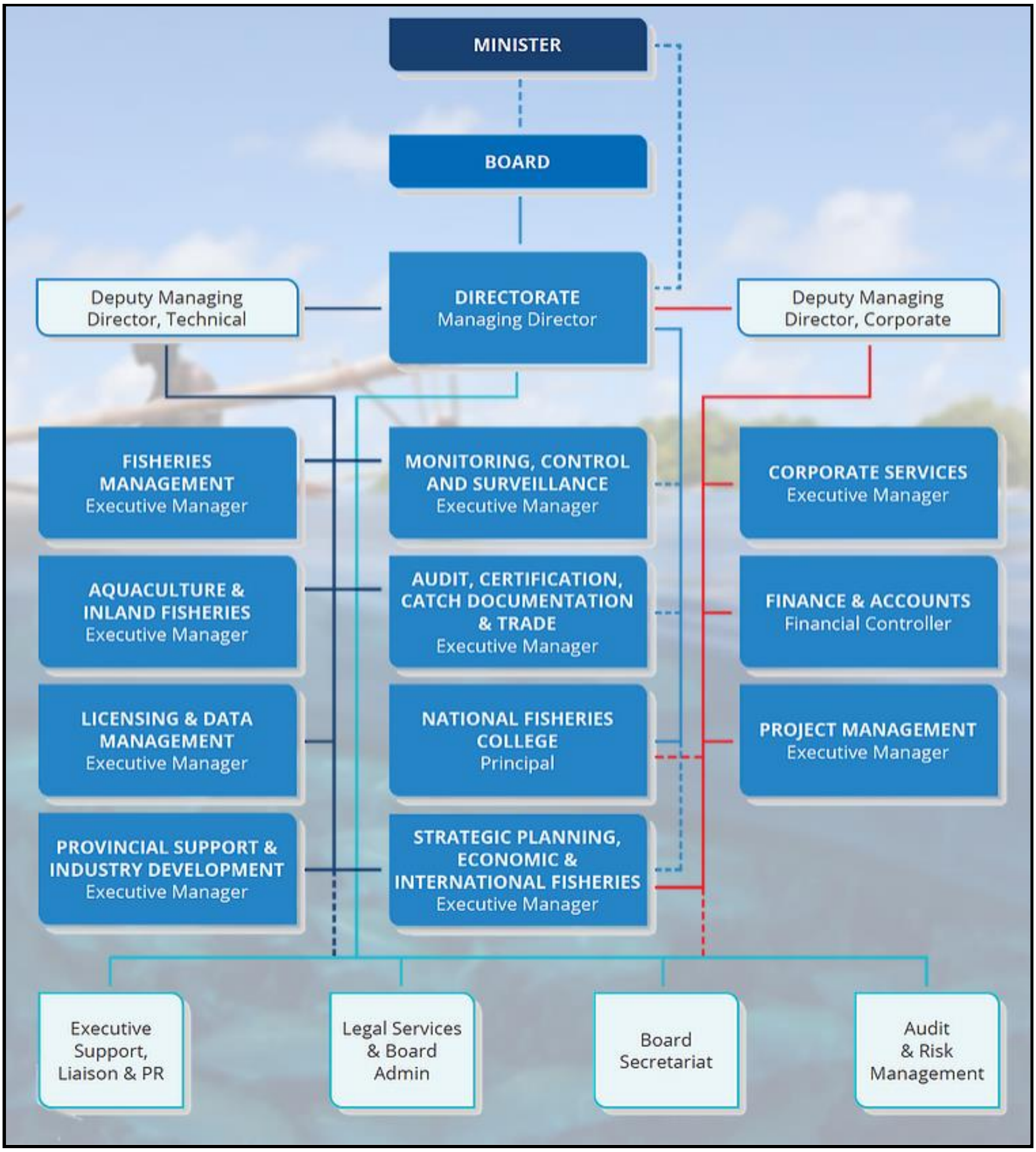


**Figure 67. The NFA organisational structure as approved by the National Fisheries Board in 2019. Source: NFA Corporate Plan 2021-2025** (NFA, 2021)**.**

The Plan is designed to guide future management and development of tuna fisheries to achieve the overall goals of the PNG Government in order to fulfil the five National Goals and Directive Principles:

1. integral human development,
2. equality and participation,
3. national sovereignty and self-reliance,
4. national resources and environment, and
5. **Papua New Guinean** ways.

as originally set out in its Constitution (PNG, 1975). Under the fourth goal, the nation's fisheries resources are to be managed in a manner which maximises PNG's participation in the sustainable development of the fisheries resource while still meeting obligations and commitments under national law, international law, and regional agreements. Therefore, the Plan was constructed to ensure that Papua New Guinea:

- Manages its tuna fishery in a sustainable manner, considering the best available scientific advice available on catch, effort, economics, industry need and social issues;
- Maximises the economic and social benefits from the sustainable use of its tuna resources; and
- Strives to achieve the highest levels of compliance.

The Plan is quite extensive, applying to all tuna fisheries, all tuna catches and associated bycatch, transshipment and other handling of catch, processing of catch, marketing of catch, and export of catch, from the fishery management area, unless specifically excluded, with attendant applicable regulatory provisions. Obviously, the Plan and all tuna fishing in the fishery management area are subject to the provisions of the Act and any relevant subordinate legislation, which includes:

- PNG's obligations under international legal instruments to which PNG is a signatory;
- Regional and sub-regional agreements and arrangements to which PNG is a party;
- Conservation and Management Measures (CMMs) of the Western and Central Pacific Fisheries Commissions; and
- Relevant provisions of any National Plan of Action (NPOA).

The Fisheries Management Regulation 2000 (as amended) also provides extensive regulatory support for the Fisheries Management Act, including:

- Licensing (fishing, trial fishing, aquaculture, fish buyers, fish storage, fish factory/export etc);
- Licence application, consideration of applications, issuance and fees;
- Foreign fishing vessel fees;
- Performance bonds;
- Surrender, suspension, termination of licence;
- Serious Offences or violations;
- Penalties and penalty notices;
- Cancellation of licence by the Board;
- Vessel reporting requirements, electronic transmission and storage, VMS etc;
- Port State Measures, port calls;
- Transhipment;
- Marking of vessel, gear and support craft; and
- Offences and penalties (Note: Schedule 1 of the Fisheries Management (Amendment) Regulations 2016 also provides a table of licence fees and Schedule 2 provides details of Penalty Notice Offences and Penalties).

The provisions of the Plan are taken to be a licence condition and are applicable to any licence issued for tuna fishing under the provisions of the Act and associated subordinate legislation. Any breach of a provision of the Plan are taken to be a breach of licence condition.

#### 5.7.2.7 Longline Effort Control

As described in the Plan, the longline fishery is comprised of Distant Water Fishing Nations (DWFN) bilateral access to PNG's EEZ (Figure 68), north of 10°S, targeting yellowfin and bigeye, with associated bycatch such a albacore, domestically-based and Locally-Based Foreign Fishing Vessel (LBFV), which be definition is a chartered foreign fishing vessel which operates from Papua New Guinea in the fishery management area during its licensing period operations and seasonal charters of LBFV by processors to target albacore.

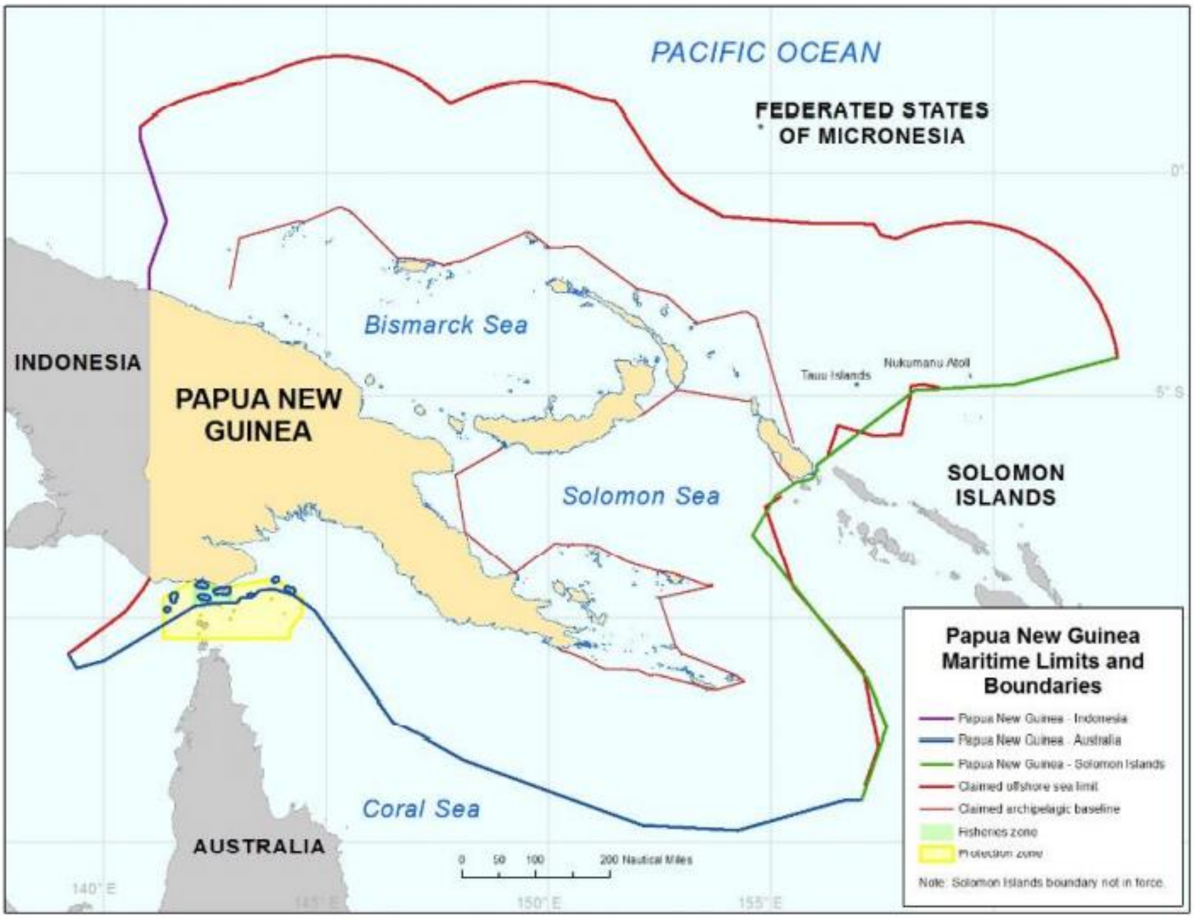


**Figure 68. Illustrative Map of the Maritime Boundaries of Papua New Guinea. Source: Map 3, US Department of State, Bureau of Oceans and International Environmental and Scientific Affairs - Limits in The Seas, No. 138, Papua New Guinea Archipelagic and other Maritime Claims and Boundaries. May 23, 2014. http://www.state.gov/e/oes/ocns/opa/c16065.htm**

Under this Plan, it was envisioned that longline fishing would be subject to effort control through the PNG Longline Day Scheme (PLDS) and would apply to all longline fishing in the fishery management area. Under the PLDS, a TAE would be established by the NFA Board for each sector, having regard to the best available scientific information, and relevant economic and social data and information, in accordance with the objectives of this Plan, and considering PNG's obligations under WCPFC CMMs. The TAE was to be allocated to operators in a manner determined by the Board, having taken into consideration, *inter alia*, the catch and other operational history of a vessel or a group of vessels (including compliance history), and the objectives of the Plan (including PNG's fishery development goals). The Board may also determine that an allocation to processors is appropriate if it is determined as being supportive of and consistent with PNG's fishery development goals. Any allocation is to be made on an annual basis, with no guarantee of any future allocation. And no allocation may be carried forward.

The Longline Vessel Day Scheme Plan also stipulates that longline operations may retain bycatch, including non-endangered sharks, subject to any license conditions and with all fins attached to trunks. The possession of shark fins removed from any trunk shall be a breach of this Plan. Further management measures may be introduced under this Plan, for example:

- the mandatory use of circle hooks; and
- prohibition of the use of wire leaders to mitigate against shark mortality, and to assist the live release of non-target species including shark, billfish and turtles, and juvenile tunas.

Such measures, when approved by the Board are published as an annex to this Plan. All vessels will be required to facilitate E-reporting, and E-monitoring video, as required and shall accommodate human observers as necessary, including to validate data.

The "domestic" longline fishery specifically targeting albacore will normally be prosecuted from April 1st to September 30th. This fishery's management area is **south of 10° south**, and in the EEZ only (i.e., not in other archipelagic waters). Yellowfin and bigeye tuna are permitted bycatch, but all catch must be processed onshore and mothership operations are only permitted for transferring catches to PNG processors.

A limited number of *bilateral access longline vessels* shall be provided for under this Plan. These are not required to land fish in PNG. Longline fishing by any DWFN vessel is prohibited within 12 miles of any land, island, or declared reef. The area of operations for longline vessels operating under DWFN bilateral access agreements is restricted to that part of the fishery management area **north of 10° south.** Bilateral access shall be phased out as domestic demand for PLDS days grows, assuming the PLDS ever becomes active in practice. Domestic-based fresh and frozen boats are to be either PNG-flagged, or LBFV chartered to companies with >51% PNG equity, and where landing and minimum employment are compulsory. To be eligible for LBFV charter, a company must also operate domestically-flagged PNG vessels and shall be eligible to LBFV charters at a ratio of 1:1 for each domestic PNG flagged vessel operated by the company in the fishery.

#### 5.7.2.8 Vessel Day Scheme Implications

It has already been mentioned above that a VDS was first established under the Palau Arrangement and became operational on 1 December 2007, initially limiting *purse seine* effort levels of PNA countries to 2004 levels. But the National Tuna Fishery Management and Development Plan has set PNG arrangements not only for the PS VDS, but also for longline fishing, both domestic and for distant water fishing nations (DWFN in the EEZ and archipelagic waters (AWs)). While initially there was only a purse seine VDS as a regional scheme and administered by the PNA Office based in Majuro, Marshall Islands, the PNG longline VDS was to be mostly managed at the NFA level. But at least management procedures were to closely mirror those of the PNA. Each year the NFA Board appoints a Total Allowable Effort (TAE) Committee for both LL and PS fisheries to set an annual limit, based on a range of criteria and having regard to WCPFC obligations. At the Regional level, the TAE is allocated amongst the Parties as their individual Party Allowable Effort (PAE) after making allowance for an allocation of days to be fished by vessels operating under the US Treaty, and the FSM Arrangement. PNG then allocates that PAE to licence holders in a manner determined by the NFA Board which is subsequently published as an annex to the Plan each year. It should be noted that foreign Bilateral Longline vessels were only re-introduced into PNG waters in 2015, after non-access for more than two decades. Beginning in 1996, the PNG government initiated a longline fishing "domestication plan" to prioritise local participation, thus resulting in the ban in foreign bilateral longline fishing activities inside the PNG EEZ. Changes in government policy in 2014 and 2015 saw DWFN longline vessels once again being given access. Particularly, if a VDS for the longline fishery is ever actively implemented and not just "on the books", either regionally or simply nationally, then in the absence of any regionally agreed PAE for PNG under the VDS, the Board will still establish a TAE for the PNG EEZ taking into account any applicable WCPFC CMMs, historic fishing catch and effort in the EEZ, the best available scientific information, and other relevant social and economic data and information.

#### 5.7.2.9 Setting the PNG Total Allowable Effort (TAE)

As cited above, any TAE required to be set under this Plan whether for purse seine or longline fishing, shall be set annually by the NFA Board, having consideration to the best available scientific information, total catch, effort, as well as economic, social and other relevant considerations including PNGs obligations under the PNA VDS, and relevant WCPFC CMMs. The Managing Director shall appoint a TAE Committee to provide advice and recommendations to the Board on appropriate TAE levels for both the purse seine and (eventually) longline fisheries.

As per section 16 of the ACT, the TAE Committee shall comprise of two staff from NFA and two independent persons with high level skills, qualifications and experience in fisheries management, fisheries economics and fisheries science. The committee will then appoint a Chair from amongst its members. The NFA will then prepare a comprehensive submission for the consideration of the TAE Committee prior to the first meeting each year, including recommendations on effort levels, and any other matter they consider relevant to the TAE committee's role. In particular, the TAE Committee shall explicitly consider the issue of effort creep in all fisheries and shall make recommendations to the Board if they form the view this is likely to impact on the aims and objectives of this management Plan. The TAE Committee will be serviced by NFA, shall meet annually and as required and authorised by the Managing Director, to prepare their recommendations, and shall be authorised to request technical data, reports and other information necessary to undertake their function effectively. The TAE Committee shall be subject to operational policies and guidelines as are determined by the NFA Managing Director. The report of the committee shall be presented to the NFA Board by the Chair of the Committee no later than July 31st each year. In the event that a report is not submitted and endorsed by the NFA Board, then the preceding year's TAE remains in force, other than for the VDS where any determination of the PNA shall apply. It is important to note that bilateral access negotiations shall not occur prior to the establishment of any TAE required under this Plan.

As an obvious extension from the Board's mandate, it is incumbent on the TAE Committee, in making any recommendation to the Board, that it has also considered the best available scientific information, as well as economic, social and other relevant considerations including PNGs obligations under the PNA VDS, and relevant WCPFC CMMs. The Board may seek the advice of, and recommendations from, the TAE Committee on any other fisheries management matter consistent with the aims of this Plan. When the Plan was initially Gazetted in 2014, the interim Total Allowable Longline Effort was allocated as follows: DWFN EEZ longline 6,000 days, Domestically-based and LBFV longline 10,000 days, and Albacore longline at 8,000 days. However, it should be noted that since the PNG EEZ has re-opened to DWFN longline activity, effort from 2016 to 2020, as reported to the WCPFC at SC in the Annual Country Report 1, remains the *number of hooks set* (Table 53).

**Table 53. Catch and effort estimates for foreign (DWFN) longline fishing in PNG waters from 2016-2020. Source:** (WCPFC, 2021b)

| Year | *Effort (HHooks)* | Catch (mt) / Species | | | |
|---|---|---|---|---|---|
| | | ALB | YFT | BET | Total |
| 2016 | *95* | 0 | 1 | 7 | 8 |
| 2017 | *7,295* | 17 | 333 | 203 | 553 |
| 2018 | *11,429* | 45 | 402 | 2,548 | 2,995 |
| 2019 | *67,994* | 647 | 1,339 | 7,704 | 9,690 |
| **2020** (Provisional) | *96* | 1 | 0 | 4 | 6 |

### 5.7.2.10 Licence Conditions

Documentation available indicates that all vessels in the fishery are subject to the same management arrangements, including licence conditions. All vessels, regardless of flag, are subject to PNG law and any breach of that law will be pursued either administratively or via prosecution in PNG. Permission to fish within the EEZ is granted by licences, established in accordance with Section 43 (Terms and Conditions of Licences) of the Fisheries Management Act 1998. Once granted, any and all fishing entities must also be aware of specific provisions of the Act, the Regulations, the Management Plan, regional, sub-regional and international agreements, treaties, and laws, and other relevant and applicable regulatory instruments. Licence conditions thus put the onus on the operator to be aware of these and ensure they comply fully. Failure to comply with any licence conditions is an offence under the Act and may result in prosecution of the operator, including the suspension or cancellation of the licence and the detention or seizure of the vessel.

A licence granted under this Act may be subject to such terms, conditions and endorsements as are imposed by the NFA Board from time to time, any licence comes into force on a date specified therein. And it remains in force, until the day on which it expires in accordance with the period approved by the Board, in the case DWFN access agreement for one calendar year, unless sooner revoked or suspended in accordance with this Act. It may also be subject to a performance bond issued in accordance with regulations made under this Act for an amount specified in the licence; and shall be subject to the licence fee prescribed for that class of licence.

The following Statutory licence conditions are applicable to all licenses:

1. the vessel shall at all times fly its national flag;
2. the vessel shall hold a valid registration issued by the flag State and shall not be registered in any other State;

3. the vessel shall display markings in accordance with approval given by the Managing Director;
4. the continuous monitoring of the international distress and call frequency 2182 Khz (HF), and the international safety and calling frequency 156.8 MHz (channel 16, VHF-FM) to facilitate communication with the Authority;
5. that a recent and up-to-date copy of the International Code of Signals (INTECO) is carried on board and accessible at all times;
6. that a recent and up-to-date set of charts showing Papua New Guinea fisheries waters is carried on board at all times;
7. that such position-fixing, identification and vessel monitoring system equipment as may be required is installed, maintained and fully operational at all times as may be required;
8. compliance with all laws of Papua New Guinea, the terms and conditions of any applicable licence and any applicable access agreement;
9. compliance with all relevant provisions of national law relating to navigational standards and the safety of vessels at sea;
10. that there is full compliance with such other licence terms and conditions as may be prescribed or otherwise specified in accordance with this Act, and failure to comply fully with any of these conditions may result in suspension or cancellation of the licence in accordance with this Act, in addition to any penalty that may be imposed.

At Section 43(4): A licensed vessel shall carry the original copy of the licence on board the vessel at all times during the licence period and it shall be the responsibility of the Master to produce it to a Fishery Officer upon the request, and failure to comply with this condition or any part of it on more than two occasions may result in forfeiture of the vessel in accordance with Section 61, in addition to any penalty that may be imposed, provided that a faxed copy of a licence may be carried in circumstances where it has not been practical for the original to be placed on board the vessel.

At Section 43(5): A licensed vessel shall be Operated in such a way that customary fishing activities are not disrupted, or any way adversely affected. Further licence conditions for DWFN longline vessels operating in the fisheries waters of Papua New Guinea include:

1. The operator shall not transship any catch of any species whilst at sea except as provided for in the regulations or Management plan.
2. Where applicable the Operator must ensure the specific requirements of third-party regulations or agreements applicable to fishing operations in PNG are adhered to (e.g., EU Commission Regulations 1005/2008 (illegal, Unregulated and Unreported Fishing; and traceability and catch documentation requirements).
3. The operator shall allow a Fishery Officer or an authorized Observer to board the vessel and shall always provide accommodation and food to the standard of an officer of the vessel at no cost, when applicable.
4. The operator shall ensure a safe operating environment and workplace for any Observer or Fishery Officer on board the vessel or when conducting any work associated with the vessel.
5. The operator, or any agent or employee of the operator shall not intimidate, bully or harass any Observer or Fishery Officer, nor offer any gift, bribe or any other form of inducement to any Observer or Fishery Officer.
6. It is strictly prohibited to dump, dispose of, or release any chemical or other unwanted products including fishing gear, chlorofluorocarbon (CFC), fuel, oil, paint or any other toxic chemicals, that may, in the opinion of the Managing Director, be harmful to the environment.

7. The operator shall ensure a daily catch record is kept of all fish caught in PNG's fisheries waters which is to be entered on the NFA approved forms specified as the Daily Tuna Catch Record. The forms shall be returned to the NFA no later than the 20th day of each succeeding month and shall be provided to any Fishery Officer or Observer upon request at any time.
8. The operator shall record the vessel's daily position and catches by grid, latitude and longitude and submit each week a report to the NFA in the required form.
9. The operator shall, as applicable, comply with the terms and conditions of any treaty or agreement of FFA, WCPFC, or PNA, including Conservation and Management Measures, PNG's Archipelagic Waters Conservation Measures, and all laws and regulations of Papua New Guinea.
10. The vessel shall Operate in accordance with the provisions of any applicable food safety requirements (see NFA (2019)).
11. The vessel shall at all times when licensed be included on any applicable FFA, PNA, and WCPFC vessel register. In the event a vessel is not maintained on such registers this licence is invalid.
12. The vessel shall not appear on any IUU list of any RFMO. In the event a vessel appears on any IUU list, this licence is invalid.

#### 5.7.2.11 Monitoring, Control and Surveillance (MCS)

In order for NFA to effectively monitor compliance with the conditions set forth in granting of fishing licences to conduct activities in the PNG EEZ, the Fisheries Management Act 1998 (refer to Licences in Part IV), has further legislations spelling our Enforcement and Observer arrangements (see Part V), Jurisdiction, Procedure, Offences, Penalties and Liability (see Part VI), Administrative Proceedings (see Part VII, and Evidence in Part VIII. Additionally, in the National Tuna Fishery Management and Development Plan 2014 under Division 5 (Monitoring and research - Measures to enhance compliance, and combat and eliminate IUU fishing) there are specific details on arrangements to combat and eliminate IUU fishing, arrangements for the use and monitoring of VMS and AIS, the Catch Documentation Scheme, and research and monitoring arrangements, including E-reporting and E-monitoring. These legislative and regulatory provisions are implemented via an integrated Fisheries Information Management System (iFIMS) which integrates fisheries management, compliance and marketing information, covering fishing industry catch reporting, vessel position and activity data generated via the VMS, as well as fisheries observer reporting and direct submission to NFA and SPC. This platform also has an industry-queryable database for fishing companies to view vessel catch data. And in the case of purse seiners, license application information is integrated directly into the system and is automatically delivered to the PNA Office, facilitating the operation of the PS VDS.

This System is now being used by all PNA members and data related to catch and vessel activity in particular EEZs can be viewed through iFIMS by individual PNA members. The system holds industry, government and flag state information and through various modules it provides catch data to SPC, allows observer managers to manage their observers, including the provision of electronic reports. In addition to the surveillance services provided by the FFA which provides risk assessments, VMS monitoring and annual coordinated operations, there are comprehensive MCS measures in place in the domestic fishery.

### 5.7.2.12 National Fisheries College

The National Fisheries College (NFC), under the aegis of the National Fisheries Authority, is another business unit specialising in providing competency-based specialised skills training for the fisheries sector of Papua New Guinea and the wider Pacific Islands region. It is PNG's leading fisheries and marine resources training and education institution, providing technical and applied training in capture fisheries, post-harvest processing and marketing, aquaculture practices, marine resources management and sustainable fisheries development.

The National Fisheries College is the only Division of the National Fisheries Authority based outside of the capital, Port Moresby. It is located in Kavieng, New Ireland Province. The College provides a diverse range of training services to a wide variety of clients across branches of Government, Pacific Islands' fisheries administrations, regional and international organisations, the public and the private sector. All training is competency-based for all Programs. The NFC has some of the best training facilities in the country including the state-of-the art Nago Island Mariculture Research Facility, which opened in 2016. This facility, also in New Ireland, was created primarily to conduct research into highly valued sea cucumber species ornamental fish, pearl oysters, corals, and giant clams.

The stated principal goal for creation of this institution was to undertake strategic and sustained interventions in support of sectoral skills development and enhancement, and effective policy implementation.

The strategic objective is to ensure the provision of high-quality and appropriate technical and practical training opportunities to the fisheries sector to enhance production, processing, and general capacity-building for the sector, thus contributing effectively to the national economy of Papua New Guinea. The main programs at the NFC are:

- Commercial Fishing Operation Program –Providing training for Commercial Fishing Vessel operations and Artisanal Fisheries in the fishing communities;
- Post-Harvest Operations Program - Providing training for "industrial" Fish Processing Facilities and for Artisanal Fisheries in fishing communities, all based on HACCP seafood safety principles, in PNG;
- Aquaculture Program - Providing training for Commercial Aquaculture Farms and Community-based fish farming activities;
- Governance and Compliance Program - Providing training for Governance and compliance in the fisheries sector; and
- Fisheries Business Program- Providing training for Fisheries communities and others in the industry.

The Institute of Sustainable Marine Resources was the latest "Business Division" of the NFA, established in 2008. The Institute encompasses the National Fisheries College and its associated training courses and programmes and the management of the Nago Island Research Facility. The Institute continues to provide core training in fisheries and post-harvest seafood operations, in addition to expanding training activities to include aquaculture and community fisheries. NFA established the Institute to better resource NFA policy implementation in relation to human resource and capacity-building in fisheries and marine resource management and development. Although part of NFA, the Institute operates in a semiautonomous manner because of its location in Kavieng and in reflection of the specialized nature of its operations.

### 5.7.3 Principle 3 Performance Indicator scores and rationales

**Scoring table 35. PI 3.1.1 – Legal and/or customary framework**

| PI 3.1.1 | | The management system exists within an appropriate legal and/or customary framework which ensures that it:<br>Is capable of delivering sustainability in the UoA(s);<br>Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood; and<br>Incorporates an appropriate dispute resolution framework | | |
|---|---|---|---|---|
| Scoring Issue | | SG 60 | SG 80 | SG 100 |
| **a** | Compatibility of laws or standards with effective management | | | |
| | Guide post | There is an effective national legal system **and a framework for cooperation** with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2 | There is an effective national legal system and **organised and effective cooperation** with other parties, where necessary, to deliver management outcomes consistent with MSC Principles 1 and 2. | There is an effective national legal system and **binding procedures governing cooperation with other parties** which delivers management outcomes consistent with MSC Principles 1 and 2. |
| | Met? | Yes | Yes | Yes |

**Rationale**

At the international and the regional level, there are specific provisions for straddling stocks and highly migratory fish stock spelled out in UNCLOS (1982) in Articles 63 and 64. These require that “states cooperate directly or through appropriate international organisations with a view to ensuring conservation and promoting the objective of optimal utilisation...” of these stocks. Through Articles 118 and 119, States are also required to cooperate in conservation and management of high seas stocks, through development of catch limits, using the best available scientific evidence. Also recognised is the need to rebuild stocks determined to be overfished and to manage fishing impacts on non-target stocks. The SFA (1995 – entry into force 11 December 2001) is the implementing Agreement of UNCLOS and thus specifies roles, responsibilities, and requirements with respect to managing straddling and highly migratory fish stocks. Article 8 again requires States to cooperate “to ensure the long-term conservation and sustainable use of straddling fish stocks and highly migratory fish stocks through effective implementation of the relevant provisions of the Convention is achieved**”**.

The **WCPFC** is the first RFMO established after the FSA entered into force. As such, it extensively incorporates all key provisions of the FSA while still reflecting WCPO environmental, political, socio-economic, and geographical specificities. Functioning of the Convention is implemented through CMMs, and since all Commission CCMs are legally bound to implement all obligations under the Convention in their domestic law, management outcomes are consistent with MSC Principles 1 and 2.

Within the Convention there are also mechanisms for cooperation specifically for Principle 2 species (e.g., CMMs for other tuna species, sharks, turtles *etc.*), as well as for research on issues such as ecosystems (via SPC and the SC). Through the SPC, regionally (and sub-regionally) supported management initiatives are developed and promoted at the WCPFC level. The Nauru Agreement is such sub-regional agreement made to facilitate cooperation in the management of fisheries resources of common interest. The Agreement is a binding treaty-level regional fisheries management instrument established in the 1980's to manage tuna stocks within national waters. The Parties to the Nauru Agreement (PNA) are Solomon Islands, Tuvalu, Kiribati, Marshall Islands, Papua New Guinea, Nauru, Federated States of Micronesia and Palau. Support for management outcomes is provided through:

- The collection and sharing of scientific data via in-country logbook and observer programmes;
- Regular stock assessments carried out by SPC;
- The development and consideration of scientific advice, primarily through the scientific committee of the WCPFC;
- Agreements on matters of common interest between states fishing for bigeye, yellowfin as well as North and South Pacific albacore, via the full WCPFC; and
- Regional MCS initiatives, including the regional VMS, VDS and vessel register.

While providing for the development of cooperative and compatible regional fisheries management approaches, this framework of cooperation also effectively overcomes capacity and resource constraints facing some Pacific Island Countries and Territories' (PICTS) national fisheries management authorities. There is also an agreement over the cross-endorsement of regional high-seas observer programmes between WCPFC and IATTC. Cooperation through SPC and the WCPFC has allowed for the development and to some extent implementation of sustainable management arrangements for the tuna fishery as required under the obligations of UNCLOS Articles 63 (1 & 2), 64 and FSA Article 8. The work of SPC as the science provider, and the Commission as coordinating secretariat, provides a strong framework for cooperation as required under SFA Article 10 (in reference to RFMOs).

Additionally, the Nauru Agreement (subregional within FFA) has a primary focus to:

- Develop strategic fisheries conservation and management initiatives;
- Develop initiatives to maximise the sustained direct and indirect economic benefits to the Parties; and
- Maximise the profitability of the fishery and ancillary industries within the PNA.

The PNA continue to seek development and implementation arrangements designed to improve the sustainability of tuna stocks in Party members' waters and maximise the economic return to them, especially when allowing other non-Party fleets to fish these stocks. The Parties have effective national legal systems and have demonstrated effective cooperation to deliver management outcomes consistent with MSC Principles 1 and 2. Based on the above, there is an effective system and effective binding procedures for regional cooperation. Of course, the philosophical question of how "binding" such *cooperation procedures* are in practice within the greater context of "binding Treaty language" can certainly be debated *ad nauseum* for SG100. **As such, SG60, SG80 and SG100 are met.**

The Antigua Convention of 2003 governs fishing for tuna and tuna-like species on the high seas and in zones of national jurisdiction (Medley et al., 2021) of the EPO, east of 150°W or the Eastern Pacific Ocean (EPO). The Antigua Convention, which modernizes the provisions of the original 1949 Convention between the United States of America and the Republic of Costa Rica for the establishment of an **Inter-American Tropical Tuna Commission**, entered into force in 2010. Akin to the WCPFC Convention, the Antigua Convention now explicitly recognizes the 1982 UNCLOS (especially the concept of EEZs), the FAO Code of Conduct for Responsible Fisheries (FAO, 1995), including the 1993 FAO Compliance Agreement and International Plans of Action adopted by FAO within the framework of the Code of Conduct, and the 1995 UN Fish Stocks Agreement (UNFSA or SFA). IATTC was established to ensure the long-term conservation and sustainable use, via the precautionary approach (Article IV), of the fish stocks in the Convention area in accordance with the relevant rules of international law contained in the Convention. The IATTC is tasked to co-ordinate scientific research and to make recommendations designed to maintain populations of tuna at levels which will permit maximum sustainable yield. The Convention clearly promotes implementation of these international agreements within its area of jurisdiction to deliver management outcomes consistent with MSC Principles 1 and 2. The Antigua Convention further recognises the Rio Declaration on Environment and Development and Agenda 21 (UN 1992) on sustainable development, conservation of biodiversity and protection and management of oceans, and the follow-up Johannesburg Declaration and Plan of Implementation adopted by the World Summit on Sustainable Development (UN 2002). But WCPFC has these prerequisites directly in its Article 8 already. Much like the WCPFC Resolutions, those for IATTC are also more “aspirational statements” on appropriate behaviour or actions, which may not necessarily be binding. However, Recommendations for management measures, agreed to by consensus and adopted by the Commission, are binding for all members forty-five (45) days after their notification (Article IX (7)) unless any member notifies the Director in writing before 45 days, that it cannot join such consensus, in which case the relevant decision or decisions shall have no effect, and the Commission shall seek to reach consensus at the earliest opportunity. Again, the philosophical question of how “binding” such *cooperation procedures* are in practice within the greater context of “binding Treaty language” can be debated *ad nauseum* for SG100 when considering this for IATTC as well.

Nationally, the **Japanese** Ministry of Agriculture, Forestry and Fisheries (MAFF) is in charge of overall fisheries management in Japan, administered by the Japan Fisheries Agency (JFA). Chapter 1, Article 2 of the Fisheries Basic Act (MAFF, 2001), the overarching framework for the management of fisheries in Japan, requires conservation and management of fisheries resources to ensure its sustainable use as a component of the marine ecosystem, following the recommendations of the UN Convention on the Law of the Sea (UNCLOS). In December 2018 Japan made a major amendment to fisheries-related laws first time in about 70 years, to modernize the fisheries management system, and promulgated in 2020. The Fisheries Act No. 267 (MAFF, 1949), the Law for Conservation and Management of Marine Living Resources (MAFF, 1996a), the Act on Special Measures for Enhancement of the Conservation and Management of Tuna Resources (MAFF, 1996b), which secure compliance with International cooperation and Japanese national and local licensing scheme which control all the tuna vessels, all have been subsequently amended, and the Fisheries Basic Act (MAFF, 2001) set the overarching legal framework and functional roles and responsibilities for the management of fisheries in Japan. These laws (as amended) have strengthened the utilization of scientific-based fisheries objectives for sustainable fisheries and legal management obligation of the government. The Fisheries Act (MAFF, 1949) requires vessels and fishers who plan to operate in offshore fisheries to be licensed by MAFF. The number of licensed vessels by tonnage and by fishing area is reviewed every five years and publicised in the Official Gazette. Wherever the vessels are fishing, the vessels must be registered, obtain permission from the authority and abide by all the legislative requirements. There are detailed regulations that prescribe the permission and control of licenced fisheries, stipulated in Article 52 of the Fisheries Act and the Ministerial Ordinance on the Permission, regulation etc. of designated fisheries. Japan has signed and ratified the United Nations Convention on the Law of the Sea (UNCLOS), the UN Fish Stock Agreement, the FAO Code of conduct for responsible Fisheries. It supports four International Plans of Action (IPOA) on management of sea birds, sharks, fishing capacity and IUU fishing. Up to date WCPFC vessel registry and report information show that reports (including scientific observer reports for Principle 2) for the Japanese longline fleet are submitted regularly and on time, also indicating effective cooperation.

In conclusion, Japan’s overarching legal framework of fisheries management, administered by the Fisheries Agency (FA) guides protection of Japan’s surrounding ecosystem and habitat, and therefore would qualify as being in accordance with MSC Principles 1 and 2. As such, it is deemed that **SG60, SG80 *and* SG100 are met.**

At the national level for **Papua New Guinea**, there is quite extensive legislation, which includes the Fisheries Management Act 1998 (as amended, (NFA, 1998)), the Fisheries Management Regulations (NFA, 2000), the National Tuna Fishery Management and Development Plan 2014 and the Papua New Guinea Fisheries Strategic Plan (2021-2030) providing governance for the management of the PNG fishery for tuna. As a Party to the UNFSA, WCPF Convention and the Nauru Agreement, PNG has accepted the obligation to comply with the provisions of these Agreements, in particular the obligation to apply the precautionary approach and the need for compatible management arrangements, in their EEZ. Implementation by PNG of these provisions are transposed into national laws and therefore indicate their willingness to collaborate PNG in tuna management through PNA, the FFA and the WCPFC. The Fisheries Management Act 1998 in a follow-on from previous legislation, providing forceful legal language requiring the implementation of all required international and regional obligations.

The National Fisheries Authority (NFA) is the government agency responsible for administering PNG fisheries laws. Under The Fisheries Management Act (NFA, 1998) it is stipulated that either the Minister and/or the NFA shall:

- Promote the objective of optimum utilisation and long-term sustainable development of living resources and the need to utilise living resources to achieve economic growth, human resource development and employment creation and a sound ecological balance;
- Conserve the living resources for both present and future generations;
- Ensure management measures are based on the best scientific evidence available, and are designed to maintain or restore stocks at levels capable of producing maximum sustainable yield, as qualified by relevant environmental and economic factors including fishing patterns, the interdependence of stocks and generally recommended international minimum standards;
- Apply a precautionary approach to the management and development of aquatic living resources;
- Protect the ecosystem as a whole, including species which are not targeted for exploitation, and the general marine and aquatic environment;
- Preserve biodiversity;
- Minimise pollution; and
- Implement any relevant obligations of Papua New Guinea under applicable rules of international laws and agreements.

In addition, the National Tuna Fishery Management and Development Plan (NFA, 2014a) objectives provide for:

- Enhancing regional cooperative arrangements;
- Improving harvest strategies;
- Increasing control of overfishing in PNG fisheries management areas;
- Increasing the use of rights-based approaches;
- Actively combatting IUU activities;
- Applying technology and tools for comprehensive near real-time management;
- Implementing Longline effort controls via establishment of a PNG longline VDS which would also include a DWFN EEZ TAE; and
- Establishing fishery reference points and harvest control rules.

As stated above, the Nauru Agreement is a regional treaty-level agreement made to facilitate cooperation in the management of fisheries resources of common interest, and Papua New Guinea is one of the signatory Parties to the PNA. The comprehensive suite of legislation described above, combined with catch statistics for albacore, yellowfin, and bigeye, as well as the bycatch of the main billfishes, along with the fact that PNG is signatory to the UNFSA, WCPF Convention as well as the Nauru Agreement, clearly demonstrate that national management outcomes are consistent with MSC Principles 1 and 2.

Therefore, in conclusion **SG60, SG80 and SG100 requirements are met** for all regional and national rationales.

| **b** | Resolution of disputes | | | |
|---|---|---|---|---|
| | Guide post | The management system incorporates or is subject by law to a **mechanism** for the resolution of legal disputes arising within the system. | The management system incorporates or is subject by law to a **transparent mechanism** for the resolution of legal disputes which is **considered to be effective** in dealing with most issues and that is appropriate to the context of the UoA. | The management system incorporates or is subject by law to a **transparent mechanism** for the resolution of legal disputes that is appropriate to the context of the fishery and has been **tested and proven to be effective.** |
| | Met? | Yes | Yes | No |

**Rationale**

At regional and international levels, there are three mechanisms for dealing with legal disputes. First, disputes can be dealt with at the **WCPFC** annual meeting of members through consultation or conciliation. Second, disputes might be resolved through convening of a review panel, or third, they might be resolved through either the International Court of Justice (ICJ) or the International Tribunal for the Law of the Sea (ITLOS). The dispute resolution mechanism is set out under Article 31 of the Convention and allows for a transparent process to occur. Essentially, this Article implements the dispute settlement arrangements established in the FSA and binds all WCPFC Members to those arrangements, whether they are Parties to the FSA or not. These arrangements are set out in Part VIII of the Agreement where Article 30 sets out the Procedures for the Settlement of Disputes. These arrangements mirror the provisions of Part XV of UNCLOS. The WCPFC has a consensus-based decision-making process, with provision for a two-chambered voting process (without voting rights for Participating Territories) requiring a 75% majority in both chambers if all efforts to reach a decision by consensus have been exhausted. Article 20 (with details in Annex 2) of the Convention allows for the establishment of a Panel to review decisions of the Commission in certain defined circumstances. These are:

- The decision is inconsistent with the provisions of this Convention, the Agreement or the 1982 Convention; or
- The decision unjustifiably discriminates in form or in fact against the member concerned.

This review process was recently invoked at WCPFC13 (2016) over implementation of a CMM which was blocked by only one member country (Japan), thus provoking the call for a vote, for the first time in Commission history. However, consensus was achieved at the 11th hour of the last day of the meeting. To date there have not been any sanctions imposed by WCPFC, therefore there has not been a need for a panel to be convened to resolve disputes. According to Medley et al. (2021), the Commission has yet to be subject to any court challenges. This suggests that the “prescribed” WCPFC dispute mechanism is transparent and is considered effective in dealing with most issues, such that **SG60 and SG80 are met**. The effectiveness of the other informal WCPFC mechanisms is unclear, and it is possible that some disputes are under suspension rather than resolved. Therefore, the available evidence indicates that resolution of legal disputes is appropriate but has yet to be tested and proven effective for fisheries under WCPFC management, thereby **not meeting SG100.**

Like the WCPFC, there are three mechanisms for dealing with legal disputes in the **IATTC**. First, Part VII Article XXV of the Antigua Convention establishes a non-prescriptive dispute resolution framework, outlining that disputes between or among members can be dealt with at the IATTC annual meetings of the Parties through consultation and conciliation. Second, if there are technical disputes, and if both parties agree, these may be resolved through an appropriately composed expert or technical panel without recourse to binding procedures to the settlements. As a last step, disputes might be resolved through either the ICJ or the ITLOS. The adoption of resolutions and recommendations proposed by IATTC members is transparent. Members and observers present at meetings can participate in informed discussions. Resolutions require consensus however, so members can "veto" decisions simply by not agreeing to a measure and there is no formal system of arbitration or conciliation when differences arise over recommendations (i.e., no voting mechanism as explained in PI 3.1.1a). This case was illustrated at 96th IATTC extraordinary meeting (IATTC, 2020b) held to address potential changes to resolution C-17-02 on the conservation and management measures for tropical tunas in 2021 discussed, without consensus, at the 95th IATTC meeting. Based on recommendations from the SAC 11, further actions to limit fishing mortality at appropriate levels and in particular to avoid increases of fishing mortality beyond the status quo conditions should be taken. However, the decision was adopted through Resolution C-20-05 such that the conservation and management measures established in Resolution C-17-02 were maintained for 2021, and commitments were established for consultations through various IATTC discussion bodies to strengthen the conservation and management measures for tunas over a three-year period. Therefore, Resolution C-20-06 for tropical tunas is now 2022 – 2024, and at the 97th IATTC extraordinary meeting (IATTC, 2021c) it was decided that further discussions on this subject will continue at the Annual Meeting in August 2021 (IATTC_SAC, 2021). According to (Medley et al., 2021), there are no outstanding disputes among members for the relevant fisheries and no disputes have been referred to ICJ/ITLOS. This suggests that the IATTC mechanism prescribed under Part VII can be considered effective in dealing with most issues, and therefore **SG60 and SG80 are met**. As for WCPFC, the effectiveness of the other informal WCPFC mechanisms is unclear, and it is possible that some disputes are under suspension rather than resolved. However, the effectiveness of formal IATTC mechanisms have not been tested since no evidence could be found of disputes from the documentation available. Therefore, **SG100 is not met**.

At national level, under **Japan's** Fisheries Basic Act a Fisheries Policy Discussion Committee within MAFF, has been established, which deals with issues related to all fisheries-related laws in Japan (Chapter 4, Article 35-39). Specifically, for in-zone fisheries, the law states that there must be a dispute prevention and resolution process whereby the Minister orders detailed resolution measures to be adjudicated by prefectural governors (see article 10, No. 6). Additionally, the Fishery Cooperative Law (Chapter 7, section 3) outlines the process by which the Minister can designate a legal adjudicator (or similar institutions) if disputes cannot be resolved at the local Fishery Cooperative level. This approach allows the resolution of issues by discussion before they develop into a dispute, therefore development of legal disputes is rare. This Fisheries Policy Discussion Committee can advise the Minister or related administration's chief or request cooperation for information and clarification. The scheduled committee meetings and minutes are open and available online. It is considered that this is generally effective, as legal disputes are minimal in the fisheries management in Japan, but internal discussions are frequent. As most fisheries infractions are settled within the Fisheries Policy Discussion Committee, it rarely develops into legal issues. Therefore, the resolution of legal disputes has not been fully tested and proven to be effective. Japan's Policy Discussion Committee members are appointed by the chief of the committee, but their selection mechanism is not explained clearly nor with much with transparency. In addition, Japanese courts recognise foreign final and conclusive civil judgments for claims obtained in a foreign court and will issue an enforcement order provided that:

- the jurisdiction of such court is recognised under Japanese law or applicable international conventions;

- the defendant received due notice of the foreign proceedings or voluntarily appeared before the foreign court;
- such judgment, or the proceedings at the foreign court, are not contrary to public policy as applied in Japan; and
- reciprocity exists as to recognition by the foreign court of a final judgment obtained in a Japanese court.

If the enforcement order is instated, the plaintiff may proceed with enforcement procedures against the defendant's assets, just as they would be able to in the case of a Japanese domestic court judgment (Ruddle, 1992). Japan also has a general Arbitration Law (JAA, 2003) set out by Secretariat of the Office for Promotion of Justice System Reform as well as the recently established Japan International Dispute Resolution Center (JIDRC) in February 2018, as an agency to contribute to the further activation of international arbitration and international mediation in Japan. These are however, not specific to fisheries issues, but do provide several legal means by which any and all matters can be resolved through the Japanese Courts' systems, with arbitration identified as one of the principle methods of dispute resolution listed in the UN Charter, Chapter VI: seek a solution by negotiation, enquiry, mediation, conciliation, arbitration, judicial settlement, resort to regional agencies or arrangements, or other peaceful means of their own choice (UN, 1945).

Although appropriate dispute settlement mechanisms exist at both levels of management (in-zone and distant water fisheries), they have not been fully tested and proven to be effective. Therefore, **SG60 and SG80 are considered to be met, but SG100 is not.**

For **Papua New Guinea**, the Fisheries Management Act 1998 (as amended (NFA, 1998)) does have quite specific legal language for the resolution of disputes, in addition to those provided for as a signatory to the WCPFC. With such amendments, legislative language allows parties to deal with:

- Refusal to Grant a Licence under Section 41A;
- Suspension and Cancellation of a licence at Section 41B; and
- Opportunity for review of a decision to suspend or cancel a licence also at Section 41B (under subsection 4).

Further, as outlined in its Section 44, an appeal mechanism in relation to the granting of fishing licenses was inserted, whereby a Licence Appeals Committee can be formed to make recommendations to the Minister on the circumstances/conditions of granting such a license issued pursuant to the Act. Therefore, it is deemed that PNG law has established a management system that provides for transparent mechanisms for the resolution of legal disputes and is considered effective in dealing with most issues. It is also deemed appropriate for dealing with issues which may arise for the fishery under assessment. However, the effectiveness of the formal, and perhaps non-identified informal mechanisms, is unclear. Nonetheless, at least from available information, the effectiveness of the formal mechanisms have not been tested. Therefore, **only SG60 and SG80 are met, but not SG100.**

| **c** | Respect for rights | | | |
|---|---|---|---|---|
| | Guide post | The management system has a mechanism to **generally respect** the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC Principles 1 and 2. | The management system has a mechanism to **observe** the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood in a manner consistent with the objectives of MSC | The management system has a mechanism to **formally commit** to the legal rights created explicitly or established by custom of people dependent on fishing for food and livelihood in a manner consistent with the |

| | | | | |
|---|---|---|---|---|
| | | | Principles 1 and 2. | objectives of MSC Principles 1 and 2. |
| | Met? | Yes | Yes | No for WCPFC and IATTC<br>Yes for Japan and PNG |

**Rationale**

At the regional level, the **WCPFC** Convention provides for the recognition of the interests of small-scale and artisanal fishers with the overall framework for sustainability in the WCPFC Convention. For example, under Article 5, the Convention states that "in order to conserve and manage highly migratory fish stocks in the Convention area…. the members of the Commission shall… (h) take into account the interests of artisanal and subsistence fishers". Under Article 10, paragraph 3, the Convention States that "in developing criteria for allocation of the total allowable catch or total allowable effort the Commission shall take into account… (d) the needs of small island developing States and territories and possessions, in the Convention area whose economies, food supplies and livelihoods are overwhelmingly dependent on the exploitation of marine living resources and (g) the needs of coastal communities which are dependent on the fishing stock." Furthermore, under Article 30, the Convention specifies that the Commission shall give all recognition to the special requirements of the developing State parties to this Convention, in particular small island developing States, territories, and possessions, in particular (b) the need to avoid adverse impacts on and ensure access to fisheries by subsistence, small-scale and artisanal fishers and fish workers, as well as indigenous people. Based on the above, the management system has a mechanism to formally commit to the legal rights created explicitly or established by custom of people dependent on fishing for food and livelihood in a manner consistent with the objectives of MSC Principles 1 and 2. Therefore, **SG60, SG80 are met.** However, although the WCPFC considers common allocation principles such as historical participation, the rights of Coastal States, and the rights of developing States, these are not yet *formally* part of an allocation process of fishing rights. Thus, **SG100 is not met.**

While there is no formal commitment from **IATTC** to ensure the management system considers the legal rights of customary fishing practices, the intention to take this into account in a manner consistent with MSC P1 and P2 can be found in the IATTC Antigua Convention (Part VI Article XXIII). This states that the Commission will adopt measures to assist developing countries to carry out their responsibilities and obligations under the Convention and will improve the capacity for fisheries development in national jurisdictions, as well as to enhance their ability to develop fisheries under their respective national jurisdictions and to participate in high seas fisheries on a sustainable basis. The intention to protect legal rights of those customary fishing is perhaps demonstrated by an absence of measures preventing catches by those dependent on fishing for food and livelihoods and exemptions under the current Resolution which appear designed to protect artisanal fleets. For example, longline vessels less than 24 metres in length are exempt from various measures designed to limit fishing activity on bigeye and yellowfin tuna stocks. It may also be assumed that customary rights are being addressed with the opening statement of the Convention "Taking into account the special circumstances and requirements of the developing countries of the region, particularly the coastal countries, in order to achieve the objective of the Convention" while also under Part IV Article XVII where "No provision of this Convention may be interpreted in such a way as to prejudice or undermine the sovereignty, sovereign rights, or jurisdiction exercised by any State in accordance with international law". Fishing rights such as those allocated by IATTC for bigeye or on effort levels are broadly based on a Party's track record in the fishery, thereby providing a certain measure of protection of traditional fishing rights in a manner consistent with the objectives of MSC Principles 1 and 2. Based on the above **SG60 and SG80 are met**. But, given there is no formal commitment under IATTC language, **SG100 is not considered met.**

In **Japan**, the provision for Common Fishery Rights within the text of the 1949 Fisheries Law (amended 2019 (MAFF, 2019)) observes and protects rights of *coastal* fishermen who are dependent on fishing for food or livelihood. The systematic co-management system is also protected by Fisheries Cooperative Law, developed to allow fishermen's discretion in the management of local resources within a legal community-based framework. Under the Fisheries Cooperative Law, all offshore and distant-water longline fishermen in Japan are the members of Fisheries Cooperatives or Association working in close collaboration with all related government agencies to observe and implement necessary management regulations. They also provide feedback into the government policy. Since Japan is a member of the WCPFC, for the purposes of this assessment, it is obliged to take measures to ensure that its flag vessels comply with the Convention and the CMMs, since the UoA only operates in the WCPO. Japan follows this obligation via with the Fisheries Law of Japan, and the Fisheries Resources Conservation and Management Act. Further, the Act on Special Measures for Enhancement of the Conservation and Management of Tuna Resources ("Tuna Law", 1997 (MAFF, 1996b) revised 1999) also defines the obligation for full compliance with international frameworks for sustainable resource management. The Fisheries Act at Chapter II (Articles 6 through 51) describes the mechanisms by which the legal rights created for people dependent on food for livelihood are demonstrated. These include:

- a definition of fishing rights and who can have such rights (Articles 6 and 7)
- the procedure for new applicants for fishing rights (Articles 10 to 12)
- the consultation process for engagement with the local fishery adjustment commission (Article 12)
- the legal rights protection provided for existing rights holders (Article 13-4, Articles 15 to 19)
- the consultation process for attributing shared rights (when a current rights holder needs to either cede or divide those rights to someone else, article 26 to 33)

The management system does indeed have mechanisms to observe legal rights that are consistent with MSC Principles 1 and 2 and therefore **SG60, SG80 and SG100 are met**.

For **Papua New Guinea**, protection of customary rights is explicit within the Fisheries Management Act 1998 (NFA, 1998). Section 3 of the Act provides that: "Unless otherwise specified by or under this Act, the provisions of this Act do not apply to or in relation to the taking of fish – (a) for personal consumption, and not for sale or trading or for manufacturing purposes; or (b) for sport or pleasure; or (c) by customary fishing; or (d) by artisanal fishing." Further, Section 26 (Customary Resource Ownership) states: "The rights of the customary owners of fisheries resources and fishing rights shall be fully recognised and respected in all transactions affecting the resource or the area in which the right operates." In developing Fishery Management Plans, the Act also requires that such plans identify any relevant customary fishing rights or practices. Additionally, the National Tuna Fishery Management and Development Plan again states that special consideration shall be given to avoid any adverse impacts on customary resource owners in accordance with Section 26 of the Fisheries Management Act, again mandating that the rights of customary owners of fisheries resources and fishing rights be fully recognized and respected in all transactions affecting the resource or the area in which the right is exercised. Therefore, PNG law provides an explicit framework formally committing to recognition of the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood. The management system exists within an appropriate legal and/or customary framework which ensures delivering or resource sustainability as well as incorporating an appropriate dispute resolution framework, consistent with the objectives of MSC Principles 1 and 2. Therefore, it is deemed that **SG60, SG80 and SG100 are all met.**

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

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

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

**Scoring table 36. PI 3.1.2 – Consultation, roles and responsibilities**

| PI 3.1.2 | | The management system has effective consultation processes that are open to interested and affected parties<br>The roles and responsibilities of organisations and individuals who are involved in the management process are clear and understood by all relevant parties | | |
|---|---|---|---|---|
| Scoring Issue | | SG 60 | SG 80 | SG 100 |
| **a** | Roles and responsibilities | | | |
| | Guide post | Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are **generally understood.** | Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are **explicitly defined and well understood for key areas** of responsibility and interaction. | Organisations and individuals involved in the management process have been identified. Functions, roles and responsibilities are **explicitly defined and well understood for all areas** of responsibility and interaction. |
| | Met? | Yes | Yes | No |

**Rationale**

Functions, roles and responsibilities are explicitly defined within the **WCPFC**. Convention Articles 9 – 16, 23 – 24 and 44 provide information on the functions, roles and responsibilities of CCMs and the committees formed under Commission control (e.g., Scientific Committee and Technical Compliance Committee). The Commission and its associated committees have clear operating procedures and terms of reference, and the roles and responsibilities of members and non-members are clearly defined in the Convention, Rules of Procedure and relevant CMMs. WCPFC also cooperates with all relevant sub-regional organisations; for example, the Forum Fishery Agency (FFA), International Scientific Committee for Tuna and Tuna-like Species in the North Pacific Ocean (ISC), Secretariat for the Pacific Regional Environment Programme (SPREP), Indian Ocean Tuna Commission (IOTC), Inter-American Tropical Tuna Commission (IATTC). Although not relevant directly to the client fishery, WCPFC also cooperates with the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), the Commission for the Conservation of Southern Bluefin Tuna (CCSBT), the Agreement for the Conservation of Albatross and Petrels (ACAP) and North Pacific Anadromous Fish Commission (NPAFC)), whose roles are also well-defined and understood. The Offshore Fisheries Programme (OFP) of the Pacific Community (SPC) is the scientific service provider of the WCPFC and provides members with scientific support and advice on the status of tuna stocks and other related species. The FFA is an advisory body that provides expertise and technical assistance to member countries and facilitates effective regional cooperation and co-ordination on fisheries policy, management, legal frameworks and MCS and other operational activities. The roles and responsibilities of CCMs and the Commission Secretariat are explicitly defined within the WCPFC Convention, and, through the effective administration and outputs of the various committees and other consultative arrangements administered by the Commission, there is clear evidence that roles and responsibilities are well understood such that SG60 and SG80 are met. However, Medley et al. (2021) deem that WCPFC still has problems with some Flag States that have not applied appropriate controls to all their vessels, as it appears that not all vessels understand their responsibilities. In some cases, there appears to be conflicts between requirements for confidentiality and the responsibilities to provide information necessary for management. Part of the problem may be attributed to translation of the Convention text from English, into other languages. These problems are not in key areas and do not prevent WCPFC from completing its primary tasks. On the above evidence **SG60 and SG80 are considered to be met but SG100 is not met.**

Functions, roles and responsibilities are explicitly defined within the **IATTC**. The Antigua Convention explicitly defines decision-making processes (under Article IX) and the roles of the Commission (Article VII), the Committee for the Review of Implementation of Measures Adopted by the Commission (Article X), the Scientific Advisory Committee (Article XI), the Director (Article XII), the scientific staff and Flag States. The performance of the Secretariat is sound and well regarded as both efficient and effective by the Parties (Medley et al., 2021). IATTC is closely linked to the WCPFC, which is recognised through a Memorandum of Understanding (MOU) that clearly lays out the type and level of cooperation. The Parties to IATTC themselves may vary in their ability to perform their role, but the roles and responsibilities are nevertheless explicitly defined, at least at the national level for key areas. Key areas include providing catch and monitoring data to the Secretariat, taking part in various meetings, sharing and exchanging information and making decisions, meeting the requirements for conservation and other recommendations for IATTC and applying appropriate levels of MCS (Medley & Gascoigne, 2017). On this basis both **SG60 and SG80 are considered met**. However, according to Medley et al. (2021), roles and responsibilities are not necessarily well-understood for all areas, as IATTC continues to have issues with Flag States not applying appropriate controls to all their vessels and not submitting timely and correct data due to a lack of understanding of requirements, which undermines the overall effectiveness of IATTC, especially with regard to target species stock assessments being up to date. This last issue thus results in **SG100 not being met.**

The roles of the **Japanese** government are well defined, understood and elaborated in the Fisheries Act. The Ministry of Agriculture, Forestry and Fisheries (MAFF) is responsible for management of marine biological resources and fishery production activities, administered by the Fisheries Agency (JFA). All distant-water fisheries are managed directly by the ministry and the fisheries are operated with minister-issued licenses. The industrial organization specific to tuna longline UoA (Japan Tuna Fisheries Cooperative Association or Japan Tuna Cooperative, the National Offshore Fisheries Association of Japan or the National Ocean Tuna Fishing Association) do still play key roles to passing on WCPFC or national decisions to their members. So, these associations do play a significant support role in representing Japanese longline industry interests to the Japanese Government, RMFO's and coastal states. These vessels are also members of the international Organization for the Promotion of Responsible Tuna Fisheries (OPRT, 2021), where membership also includes all major distant water and PICT longline fleets. Also, the Japan Fishery Agency publishes decisions made at WCPFC for public information on their website. Research institutes and fisheries cooperatives (concerning both in-zone and high seas) also work closely together to gather data from the field and collaborate on experiments otherwise not possible through institutes working on their own. This leads to practical solutions to "real world" fisheries problems. As one of the national research institutes of the JFRA, NRIFSF covers the research for, among other topics, international tuna stocks commercially fished by Japan, and works in collaboration with RFMOs' scientific committees globally in providing data and scientific analysis. Therefore, it would appear that Organisations and individuals involved in the management process have been identified. Their functions, roles and responsibilities are explicitly defined and well understood for key but not necessarily all areas of responsibility and interaction, most notably when it concerns bycatch data submissions to science providers and the role of fishers versus the Fishery Agency in this undertaking. Thus, only **SG60 and SG80 are deemed to be met.**

The **PNG** legislation and policy clearly identifies organisations and individuals involved in the management process. It provides explicit information on functions, roles and responsibilities for all key areas of interaction. Part II of the Act legislatively stipulates what Institutional Arrangements will be enacted, including establishment of the National Fisheries Authority, the functions and powers of that Authority, the Membership of its Board, the functions and powers of that Board, the appointment of the Managing Director and Deputy Managing Director, plus staffing and reporting obligations of the Authority. Also in the Act are the roles and responsibilities Officers of the

Authority, including Fisheries Officers and Observers. The National Tuna Fishery Management and Development Plan sets up the TAE Committee tasked with providing advice and recommendations to the Board on appropriate TAE levels for both the purse seine and (at least in theory) the longline fisheries. Since PNG is a party to all decisions at WCPFC level, including participation in the Scientific Committee, Technical Compliance Committee and WCPFC general sessions where final decisions are taken at regional level and party to PNA decision-making, the NFA roles and responsibilities at regional and international levels are well established and understood. Whether roles and responsibilities are well understood for **all areas** of responsibility and interaction is difficult to discern from the available information. Nonetheless, **at least SG60 and SG80 are considered met, this will be further discussed during the team's scoring meeting.**

| **b** | Consultation processes | | | |
|---|---|---|---|---|
| | Guide post | The management system includes consultation processes that **obtain relevant information** from the main affected parties, including local knowledge, to inform the management system. | The management system includes consultation processes that **regularly seek and accept** relevant information, including local knowledge. The management system demonstrates consideration of the information obtained. | The management system includes consultation processes that **regularly seek and accept** relevant information, including local knowledge. The management system demonstrates consideration of the information and **explains how it is used or not used.** |
| | Met? | Yes | Yes | No |

**Rationale**

At the regional level, there are extensive formal and informal consultation processes at the **WCPFC** that regularly seek and accept information from members and cooperating non-members specifically via Part 1 and Part 2 Country reports, including information on compliance, economics and social issues. The Commission is active in assisting and facilitating the regular and timely provision of fisheries data and information for assessment by the Commission secretariat and scientific providers, such as SPC. The Commission actively uses information from the fishery and its member states including use of "local knowledge". At the international level this is assumed to refer to national information and experience, to inform fisheries management decisions and assist in the formulation of CMMs. This is demonstrated through reports and outcomes of WCPFC meetings, which detail the decision-making process and are readily accessible online. However, what is not totally clear is how such information is selected/chosen for incorporation (or not) into such reports that are publicly available. At this regional level, **SG60, SG80 are met but SG100 is not deemed to be met.**

Consultation processes and the generation of relevant information are formalised and regularly scheduled through the **IATTC** and its subsidiary bodies. There are annual meetings of the Commission and specialist working groups (comprising scientists from contracting parties) as well as technical meetings. Information derived from these working groups and meetings are used by decision-makers and considered as part of the generation of management advice provided by IATTC. As is the case for the WCPFC, "local knowledge" as understood at IATTC is also assumed to refer to national information and experience (Medley et al., 2021). The IATTC management system demonstrates consideration of the information obtained, with scientific reports stating exactly what information is being used, how it is used and providing justification when information is rejected. However, information used by management other than the scientific information is not so clearly reported (Medley et al., 2021). Although much of this information can be inferred from various sources, it is not necessarily clear how different sources of information on compliance, economics and social issues for instance, are selected for incorporation or not, into publicly available reports. Therefore, **only SG60 and SG80 are met.**

At the **Japanese** national level, the FAJ regularly undertakes fishery management discussion and coordination meetings as both formal and informal consultation with fishing industry stakeholders, organized with tuna fisheries cooperatives associations to form a corrective opinion, and coordinate among purse seine, longline, pole and line fishery targeting same resources, while implementing agreed measures at RFMO within the industry when necessary. In this way the government interacts throughout the year with industry stakeholders that provide the parties opportunities to inform the management system and their opinion to be reflected to governments. The participants to the government-industry meetings are representing each local fisheries cooperative, such as cooperative head to reflect local knowledge. The key industry stakeholder groups for distant-water tuna fisheries includes the Japan Tuna and Skipjack Fisheries Co-operative Association (JTSFCA), the Japan Distant Water Tuna Fishery Association (JDWTFA), the Japan Adjacent Sea Tuna Fishery Association (JASTFA) and the Japan Far Seas Purse Seine Fishing Association (JFSPSFA). These organizations represent the interests of the tuna fisheries at regular consultation meetings organized by the government, and participate in RFMO meetings with stakeholders to ensure collective opinions of stakeholders are reflected in Japan's proposal and negotiations. JTSFCA actively participates in international meetings such as WCPFC with the FA, and conducts its own lobbying activities. It also negotiates directly with Pacific island nations to gain entry to their EEZs as necessary for their members, and pays the entry fee if necessary. JTSFCA establishes a Resources Management Plan for its members (who are consulted in the drafting process), and reports their voluntary management measures to FA, while guiding fishers to implement them.

When there is a major change in management measures or strategy, or a determination of TAC is to be made and requires scientific consultation, the Fisheries Policy Council plays a key role to consult among science experts, academia, industry representatives and government staff, before official decisions are made. The Council (specifically the Division of Resource Management) normally consists of government employees, science research staff, representatives from fisheries industry or cooperatives, appointed experts from academia. Decisions at the WCPFC are shared and discussed at the Fishery Policy Council and then MAFF seeks their advice. Notifications for WCPFC and ISC meetings and their outcomes are widely published through the Fishery Agency's website. In addition, observers from conservation organizations are allowed to at least *request* to be present. However, observers are not usually given any opportunity to comment. This contrasts with internal meetings and coordination among the selected official members, which are frequently held, with opinions coordinated in-house. However, there have been recent signs of increased transparency in the consultation process since meeting records show that WWF-Japan was invited to the policy discussions prior to and ISC meeting for the first time in 2017, with public comments welcomed online by the Japanese government. It is well-known that WWF-Japan has a special interest in sustainable fisheries, and especially for Pacific bluefin tuna. This implies that there is a tendency to improve the opportunity for participation for an expanded universe of interested and affected parties. However, it is difficult to say whether such participation is *encouraged,* at either the international or national level. Meetings at the national level (e.g., meetings on determination of Pacific bluefin tuna TAC) are also notified, usually calling for wide participation from fishers and processors. All five of the main ministry-permitted tuna fisheries industry organizations (Japan Tuna Fisheries Cooperative Association or Japan Tuna Cooperative, National Offshore Fisheries Association of Japan, National Ocean Tuna Fishing Association, Japan Inshore Tuna Fishery Association and Japan Far-Seas Purse Seine Fishing Association) meet together to craft a common document of their concerns and requests for improvement in the fisheries, for discussion at the annual meeting of the Policy Council. Based on the above, **SG60 and SG80 are met.** However, because the process does not formally explain or demonstrate how the information provided in these meeting is or is not used to inform management policy, **SG100 is not met**.

The **PNG** management arrangements for the fishery under assessment are elucidated in both the Fisheries Management Act (NFA, 1998) and the National Tuna Fishery Management and Development Plan (NFA, 2014b). The Act mandates the objectives and goals of management shall be through implementation of fisheries management plans. However, neither the Act nor the Plan provide any guidance to consultations or processes by which to seek feedback, accept or use relevant information, including local knowledge, on the functionalities of both. Nonetheless, it must be assumed that consultation between key stakeholders the NFA does occur, the new PNG National

Fisheries Strategic Plan 2021-2030 implicitly seeks local knowledge for the coastal fisheries. It is stated that fisheries resources are to be managed in a manner consistent with the principles of inclusivity and ecological sustainability. Local resource rights for shared marine resources are to be respected and observed, while due recognition is to be given to the customary and heritage values of indigenous peoples in the management of the sector. Equal opportunity is given to all to earn a living from the utilisation of PNG's fisheries resources. Decisions are to be made in consultation with all relevant stakeholders, such that the fisheries sector can be managed in a manner that is consistent with relevant international obligations. While certain aspects for the use of full consultation in fisheries management have been presented in a "broad strokes" manner in the Strategic Plan, there does not as yet appear to be a systematic approach to regular consultation with industry and broader stakeholders. However, evidence is not available at this point as to the extent to which the management system demonstrates consideration of the information that is obtained via the various consultation information streams. As such **SG60 and SG80 requirements are tentatively met, pending further information collection at the site visit but SG100 is not. These scores are to be discussed further at the site visit.**

| c | Participation | | | |
|---|---|---|---|---|
| | Guide post | | The consultation process **provides opportunity** for all interested and affected parties to be involved. | The consultation process provides **opportunity and encouragement** for all interested and affected parties to be involved, and **facilitates** their effective engagement. |
| | Met? | | Yes | Yes regional<br>No national |

**Rationale**

The **WCPFC** Secretariat facilitates effective engagement by stakeholders. Attendance at Commission and related meetings is comprehensive and logistic and financial support is provided to cooperating non-members to ensure attendance and meaningful involvement and interaction in the cooperative management of fisheries in the WCPO. NGOs can attend meetings as observers and may make statements, which are included in the official record. As several stocks and fisheries are shared with WCPFC and IATTC, there is an MOU as well as two Memoranda of Cooperation in place which establish and maintain consultation, cooperation and collaboration in respect of matters of common interest, including the exchange of data and information, scientific research and conservation and management measures for stocks and species of mutual interest (Medley et al., 2021). The respective Secretariats also encourage representatives at each other's meetings where appropriate, as well as facilitate a WCPFC-IATTC consultative meeting. Additional services are provided to member States sub-regionally through the FFA and SPC as well. Based on information available from WPRFMC and Sub-regional meetings held by FFA, SPC and PNA for example, there is enough evidence to conclude that all interested parties have the opportunity and are encouraged to participate in consultation processes, with formal arrangements in place to facilitate engagement. As there is a formal consultation process at the regional and sub-regional level that provides opportunity and encouragement for all interested parties to be involved and facilitates their active engagement, **SG80 and SG100 are met.**

Under the rules of **IATTC** procedure, consultation at the international level is formalised and there are well-developed mechanisms for obtaining and using appropriate information. The opportunity to become a Contracting Party or Co-operating Non-Contracting Party is open to all, including non-States, without a *numerus clausus*. Article XVI 1b of the Antigua Convention *requires* the commission to "facilitate consultations with, and the effective participation of, non-governmental organizations, representatives of the fishing industry, particularly the fishing fleet, and other interested bodies and individuals". IATTC has a special fund to strengthen the institutional capacity of developing countries to sustainably develop their fisheries so they can comply with IATTC conservation and management measures (Resolution C-14-03). This includes sufficient capacity to collect, maintain and analyse relevant data and to participate at meetings (Medley et al., 2021). Interested NGOs also have an opportunity to observe at meetings, and participation by fishers is also encouraged. As noted above, an MOU as well as two Memoranda of Cooperation have been established that governs cooperation between the WCPFC and IATTC in relation to shared stocks. These instruments establish and maintain consultation, cooperation and collaboration in respect of matters of common interest, including the exchange of data and information, scientific research and conservation and management measures for stocks and species of mutual interest (Medley et al., 2021). The respective Secretariats also encourage representatives to participate at each other's meetings, where appropriate, as well as facilitate WCPFC-IATTC consultative meetings. On this basis **SG80 and SG100 are met.**

At the **Japanese** national level, the Fisheries Policy Council, resources management section group plays a key role in consultation processes that seeks and accepts relevant information. The Council normally consists of a range of stakeholders, including government staff, research scientists, representatives from fisheries industry and cooperatives, and appointed experts from academia. Other interested parties can request attendance as observers. However, they are not allowed to comment. In 2017, WWF Japan was involved and included in the Japanese government tuna management discussions. The Council discussions and minutes are available to the public, with a 30-day comment period, although there are also some irregular, closed meetings and usually a shorter public comment period for Pacific bluefin council meetings for example. Based on available information obtained, there is a tendency to improve the opportunity for participation for all interested and affected parties to be involved in the past few years. As explained above in Scoring Issue (b), the consultation process covers the entire Japanese tuna industry members, from the local prefecture level, the national in-zone level and the high-seas operations, for all the gear types, not just longlining. Therefore, the consultation process certainly provides ample opportunity for interested and affected parties to be involved. Therefore, **SG80 is tentatively met**. However, there is no evidence at the national level that *encouragement* for participation in these consultative processes is provided. Thus, **SG100 is deemed not met**.

Neither the **PNG** Fisheries Management Act (NFA, 1998), nor the National Fishery Tuna Management and Development Plan (NFA, 2014b) have explicit consultative arrangements which regularly provide the opportunity for stakeholder input, as has already been detailed in Scoring Issue (b) above. However, evidence can be found in general press releases and news articles, as well as news articles of interest on the NFA website, of ad hoc consultative arrangements on a range of important issues, including input to regional meetings (FFA, PNA and WCPFC) as well as important domestic issues (i.e., the implementation of the FAO Port State Measures Agreement, bunkering policy, market access and regional and domestic management arrangements). Since already stated above, that, while the WCPFC arrangements are extensive and do facilitate and encourage effective engagement from all members, and especially PICTs, thereby meeting the SG 100 level, it is not clear that the PNG arrangements also actively encourage and facilitate all interested and affected parties in participating in such consultative and meeting processes. **As such only SG80 is tentatively satisfied for the longline fishery.**

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WCPFC, SC, ISC and TCC meeting records

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

| | |
|---|---|
| Draft scoring range | 60-79 |
| Information gap indicator | Japan and PNG national level consultation and Participation processes need to be clarified. Information on how these processes work, how regularly they operate, and what stakeholders are included (e.g., |

| | |
|---|---|
| | minutes of meeting at Japan Offshore Tuna Fisheries Association etc.). |

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

## Scoring table 37. PI 3.1.3 – Long term objectives

| PI 3.1.3 | | The management policy has clear long-term objectives to guide decision-making that are consistent with MSC Fisheries Standard, and incorporates the precautionary approach | | |
|---|---|---|---|---|
| Scoring Issue | | SG 60 | SG 80 | SG 100 |
| **a** | Objectives | | | |
| | Guide post | Long-term objectives to guide decision-making, consistent with the MSC Fisheries Standard and the precautionary approach, are implicit within management policy. | **Clear** long-term objectives that guide decision-making, consistent with MSC Fisheries Standard and the precautionary approach are explicit within management policy. | **Clear** long-term objectives that guide decision-making, consistent with MSC Fisheries Standard and the precautionary approach, are **explicit** within **and required by** management policy. |
| | Met? | Yes | Yes | Partial |

Rationale

The **WCPFC** is responsible for decision-making for key management measures which affect WCPO bigeye, yellowfin as well as NP and SP albacore stocks, the bycatch species and ecosystem (P2). Long-term objectives are explicit within the WCPFC Convention. Article 2 specifies that the Commission has the objective to "ensure through effective management, the long-term conservation and sustainable use of highly migratory fish stocks in the WCPO in accordance with the 1982 Convention and Agreement [UNCLOS and FSA respectively]". Article 5 of the Convention then provides principles and measures for achieving this conservation and management objective. More specifically Article 5(c) requires the Commission to apply the precautionary approach in decision-making and Article 6 outlines how this will be given effect, including through the application of the guidelines set out in Annex II of the FSA. Article 10 of the Convention is consistent with MSC principles and objectives in specifying long term objectives of "maintaining or restoring populations…above levels at which their reproduction may become seriously threatened". Evidence that these objectives are beginning to guide decision-making is provided in various Commission reports and in CMMs. Commission reports also indicate that explicit action is being undertaken through CMMs to support achievement of objectives. Nonetheless, target reference points, harvest strategies and harvest control rules still have not been formulated for all managed stocks. However, four Commission Management Objectives Workshops (MOWs) have been held on this issue (up to 2015) and SC along with Intersessional working groups continue to further these efforts. While the precautionary approach is a stated requirement for WCPFC, in practice it is less clear that the precautionary approach is applied uniformly or consistently across member decisions. Earlier stock assessments in 2010, 2011 and 2014 indicated that bigeye fishing mortality exceeded levels consistent with MSY. Thus, bigeye tuna was considered overfished from 2011-2017. Precautionary limit reference points were set and CMMs updated, clear precautionary action that sufficiently reduced exploitation levels were not evident before an updated assessment (from 2017 onward) indicated that the stock was in fact not overfished and overfishing was no long occurring, but without being able to reduce fishing mortality on the stock. Additionally, the guidelines set out in Annex II of the SFA provide additional objectives to guide decision-making that include the use of target reference points to meet the management objectives and the adoption of fisheries management strategies to ensure that target reference points are not exceeded. Long-term objectives are guiding decision-making and explicit actions are being undertaken to continue to develop and implement management arrangements that support achievement of the objectives. Based on the above, **SG60 and SG80 are met for this regional system, but SG100 is not**.

The Nauru Agreement (the core PNA instrument) does not explicitly require objectives consistent with the precautionary approach. Nonetheless, these are implicit as the PNA rely on healthy and sustainable stocks to underpin domestic management arrangements and economic returns. PNA members have all ratified the UNFSA, which requires the application of the precautionary approach and all commit to fully implement WCPFC CMMs.

Concerning **IATTC**, the Antigua Convention provides clear, long-term objectives that guide decision-making under MSC P1 and P2. For example, the objective of the Antigua Convention under Article II is to "ensure the long-term conservation and sustainable use of the fish stocks by this Convention, in accordance with the relevant rules of international law." The Antigua Convention also has an explicit provision under Article IV, paragraph 1 to apply the "precautionary approach, as described in the relevant provisions of the Code of Conduct and/or the FSA, for the conservation, management and sustainable use of fish stocks". This is reiterated in the functions of the Commission under Article VII, along with the need to take an ecosystem approach to management. For example, under Article VII, paragraph 1(f), the Commission is required to "adopt, as necessary, conservation and management measures and recommendations for species belonging to the same ecosystem and that are affected by fishing for, or dependent on or associated with, the fish stocks covered by this Convention, with a view to maintaining or restoring populations of such species above levels at which their reproduction may become seriously threatened." Although the precautionary and ecosystem approaches to management are explicit in the Antigua Convention text, it is less clear that they are applied in all policy. Medley et al. (2021) suggest that reference points for bigeye tuna may be precautionary when considering scientific uncertainties, but decisions taken at the Commission level and implementation of those adopted regulations did little to prevent bigeye stock declining to current levels. Nonetheless, an analysis of progress in implementing Ecosystem-Based Fisheries Management in policy among tuna RFMOs, Juan-Jorda et al. (2017) stipulated that IATTC had made considerable progress within the ecological component of target species (through defining a long-term operational objective of MSY to tuna and tuna-like species), moderate progress in the ecological component of bycatch species as well as ecosystem properties and trophic relationships (through emphasizing its importance in Article VII of the Antigua Convention), but little progress in the habitat component. Based on this evidence**, SG60 and SG80 are met** as there are clear explicit objectives incorporating the precautionary approach and ecosystem-based management, **but SG100 is not**, as it is not clear that the precautionary approach and ecosystem approach to fisheries is required by management policy.

At the **Japanese** national level, the Fisheries Basic Act (MAFF, 2001) and the amended Fisheries Act (MAFF, 1949) both require conservation and management of fisheries resources to ensure sustainability as an integral part of the marine ecosystem, as prescribe in the UN Convention on the Law of the Sea (UNCLOS), ratified by Japan in 1996. Japan also ratified the Straddling Stocks Agreement (formally, the Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks) in 1996. This agreement "mandates" Japan to manage its marine resources within international frameworks and requires application of the precautionary and ecosystem-based approaches to stocks managed through RFMOs. Japan formally acceded to the 1992 UN Convention on Biological Diversity through Japan's Basic Act on Biodiversity (No. 58 of June 6, 2008), leading to the formulation of The National Biodiversity Strategy of Japan 2012-2020 (MOFA, 2012), which clearly states the legal objective of conservation of biodiversity and sustainable use of resources.

A National Fisheries Master Plan (JFA, 2018), which was touted as rewriting the country's fishery laws for the first time in about 70 years, shows the commitment to full utilization of fishery resources with sustainable management to provide stable supply of products and contribute to development of fishing communities. Of particular interest in this 2018 amendment of the Fishery Act, are provisions for setting targets and maintaining or recovering resources based on best scientific evidence available and reviewing the appropriateness of practices, such that there is effective use of the marine resources (i.e., resource management). The upshot is that certain designated resources will now be managed basically by a total allowable catch (TAC) system and shall be maintained at, or recovered to, a sustainable level, based on stock assessments for each particular fishery. These TACs will then be managed via individual quotas (IQ) when it is ready. If, however, a fisheries management category is not ready to introduce the IQ system, the TAC for the category is to be managed on the basis of the total allowable efforts. Promulgation of the laws was December 2020 and implementation is still at the early stage.

Japan has also specified the objectives for sustainable tuna fishing development under the Act on Special Measures for Enhancement of the Conservation and Management of Tuna Resources established in 1996, when Japan was still a major fishing nation of tuna, to avoid international criticism and to lead fishermen to comply with international rules set by RFMOs. This act states that:

1. The government will make every effort to work in coordination with International organization for tuna resource conservation and management and will promote other countries to join the organizations,
2. The government will make every effort for appropriate rules to be agreed to within International organizations,
3. The government will make every effort on necessary International coordination to strengthen tuna resource conservation and management in addition to those stated above.
4. Japan will fully apply all binding CMMs implemented by the WCPFC and theirs are objectives.

While the long-term sustainability goals are explicit in written documents existing before the latest amendment to the Act outlined above, it does not seem required at all times for management as actually prosecuted. In Japan, before the 2018 amendment of the Fishery Act, there was a history of decision-making within the Fishery Policy Council TACs settings, often adopted in excess of scientifically recommended total allowable biological catch limits. This is an obvious contradiction to the use of a precautionary approach. In Japan's annual MAFF "Fishery White Paper" in 2017, the government formally stated that, going forward, it would set measurable objectives using the precautionary approach for all major commercial fisheries, which is now reflected in the amended Fishery Act. It is thus generally in accordance with MSC Fishery Standard and the precautionary approach, but it is difficult to agree that the SG100 requirements are fully met in practice, as in the cases of bluefin tuna, where management action has not been sufficiently precautionary to prevent the stock becoming overfished as indicated in the latest assessment. Therefore, only **SG60 and SG80 are met.**

Under the **PNG** Fisheries Management Act 1998 (as amended), long-term objectives which explicitly guide decision-making, consistent with MSC fisheries standards, incorporating the precautionary approach are specifically included. Specifically, in exercising powers under this Act, the Minister or the NFA shall have regard to the following objectives and principles in respect of the fisheries in PNG waters:

- promotion of the objective of optimum utilisation and long-term sustainable development of living resources and the need to utilise living resources to achieve economic growth, human resource development and employment creation and a sound ecological balance;
- conserving the living resources for both present and future generations;
- ensuring management measures are based on the best scientific evidence available, and are designed to maintain or restore stocks at levels capable of producing maximum sustainable yield, as qualified by relevant environmental and economic factors including fishing patterns, the interdependence of stocks and generally

recommended international minimum standards;
- applying a precautionary approach to the management and development of aquatic living resources;
- protecting the ecosystem as a whole, including species which are not targeted for exploitation, and the general marine and aquatic environment;
- preserving biodiversity;
- minimising pollution; and
- implementing any relevant obligations of Papua New Guinea under applicable rules of international law and international agreements.

Given the above information for the PNG national system **SG60, SG80 and SG100 are deemed met.**

Therefore, based on partial scoring at the **SG100 level, the overall score is 85.**

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

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

## Scoring table 38. PI 3.2.1 – Fishery-specific objectives

| PI 3.2.1 | | The fishery-specific management system has clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2 | | |
|---|---|---|---|---|
| Scoring Issue | | SG 60 | SG 80 | SG 100 |
| **a** | Objectives | | | |
| | Guide post | **Objectives**, which are broadly consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are implicit within the fishery-specific management system. | **Short and long-term objectives**, which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are **explicit** within the fishery-specific management system. | **Well defined and measurable short and long-term objectives**, which are demonstrably consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are **explicit** within the fishery-specific management system. |
| | Met? | Yes | No | No |

**Rationale**

The overarching long-term objective of the **WCPFC** is "to ensure, through effective management, the long-term conservation and sustainable use of highly migratory fish stocks in the western and central Pacific Ocean in accordance with the 1982 UNCLOS and the 1995 UNFSA." Regional fishery-specific objectives are set out in CMMs, which are reviewed regularly. Long-term objectives for WCPFC, already covered above in PIs 3.1.1, 3.1.2 and 3.1.3, also require that the specific management system be consistent with the fishery objectives (but not the strategies) for this PI. Objectives relating to MSC P1 and P2 outcomes are endorsed by each member and states as CMMs related to target fish stocks (CMM 2020-01 and 2009-03), sea turtles (CMM 2018-04), seabirds (CMM 2018-03), sharks and rays (CMM 2019-04 and 2019-05). More specifically, CMM 2020-01 for bigeye and yellowfin tuna still has the following explicit objectives, pending agreement on a target reference point; the spawning biomass depletion ratio ($SB/SB_{F=0}$) be maintained at or above the average $SB/SB_{F=0}$ for 2013-2015 for bigeye, and at or above the average $SB/SB_{F=0}$ for 2012-2015 for yellowfin. To meet these objectives, CCMs have agreed to take measures to not increase catches by their longline vessels of yellowfin and bigeye. Similarly, provisions for other species are designed to maintain current exploitation with the objective for sustainable use, but do not address fisheries development. For the fishery under assessment, the target species' current stock status all indicate none are overfished nor is there overfishing occurring. Thus, while short and long-term objectives may not be explicitly stated, they can certainly be inferred from results of application of the various CMM texts in practice. For CMMs addressing bycatch, such as turtles, the objective is to minimise bycatch in the relevant fisheries and return bycatch, if possible, alive, using "mandated" best handling practices. These objectives are assessed through the regional observer programme. Juan-Jorda et al. (2017) have noted that while there is a range of conservation and management measures within WCPFC to manage target species and mitigate effects of fishing on bycatch species, these are not yet linked to agreed-upon operational objectives, associated indicators, or reference points, precluding them from being activated when such reference points are exceeded (assuming they will exist). Furthermore, while the WCPFC Convention captures the importance of addressing broader impacts of fishing on species belonging to the same ecosystem that are affected by fishing, no actual measures have been adopted to account for and minimise the impacts of fishing on the trophic relationships and food web structure of marine ecosystems or protection of habitats of special concern as required under an Ecosystem-based Management regime. Nonetheless, the fishery under consideration (longline method) may have a smaller "ecological footprint" aside from simply comparing total catches of target species between longline and purse seine fleets. This assertion has been tested (Allain et al., 2015) using computer simulations showing that the largest impacts of changes in purse seine and longline fishing effort are likely to be on the groups comprising long-lived, bycatch species with lower productivity, with increases in longline fishing resulting in greater mortality of sharks, opah and some billfish species. However, the negative impacts on shark mortality decreased by the implementation of current shark and the other bycatch mitigation measures. Therefore, because current CMMs in force contain reasonably explicit and specific intentions and objectives, and also allow evaluation of performance against these objectives, **SG60 and SG80 are met**. However, although broadly measurable (annual observer data from Part 1 country reports to SC), they are not necessarily well-defined from an all-inclusive ecosystem point of view for MSC P2, so **SG100 is not met**.

As previously described in PI 3.1.3, there are well-defined, long-term objectives for **IATTC** under the Antigua Convention in relation to target stocks and the ecosystem and which are considered when scientific advice is given in developing conservation and management measures. The Antigua Convention offers guidance and principles on which management plans can be developed. This includes objectives that apply to both target stocks (MSC P1) and the ecosystem (MSC P2). Each conservation and management measure has an explicit aim and intention, which allows for monitoring of performance against these objectives. Concerning target stocks, new benchmark assessments for yellowfin and bigeye tuna were presented at SAC11 (IATTC_SAC, 2020) following an external review of assessment methodologies (Cass-Calay et al., 2019; Punta et al., 2019). For yellowfin, the overall results of the IATTC risk analysis, indicate only a 9% probability that the fishing mortality corresponding to the maximum sustainable yield ($F_{MSY}$) has been exceeded and that there is only a 12% probability that the spawning stock biomass corresponding to the maximum sustainable yield ($S_{MSY}$) has been breached. The probability that the F and S limit reference points as specified in the Harvest Control Rules have been exceeded is zero. Thus, the risk analysis unambiguously shows that the yellowfin stock in the EPO is healthy. For bigeye, the overall results of the risk analysis indicate a 50% probability that $F_{MSY}$ has been exceeded and a 53% probability that $S_{current}$ is below $S_{MSY}$. So, the probabilities that the F and S limit reference points have been exceeded are not negligible. However, the combined probability distribution for the pessimistic models shows only a 10% probability of exceeding $F_{LIMIT}$ for the current purse seine closure duration (72 days), indicating that it is unlikely that this limit has been exceeded. Therefore, a status quo harvest strategy is deemed appropriate in the short term.

Therefore, there is a range of conservation and management measures within IATTC to manage target species and mitigate the effects of fishing on bycatch species, and these are beginning to be better linked to pre-agreed operational objectives, associated indicators, and reference points, such that they can eventually be activated when pre-defined reference points are exceeded (Juan-Jorda et al., 2017). Furthermore, IATTC has adopted measures to account for and minimise the impacts of fishing on some aspects of trophic relationships and food web structure of marine ecosystems but not necessarily the protection of habitats of special concern as required under Ecosystem-based Approach to Fisheries Management (EAFM). These include data gathering and analyses of fishery interactions with such species groups as marine mammals, sea turtles, seabirds, sharks, mobulid and other rays, other large bycatch fish species, and forage species. IATTC, through its SAC, has collected and analysed physical environmental indicators to inform their effects on the dynamics and catchability of target and bycatch species since 2007 (see IATTC_SAC (2021)). Short and long-term objectives, which are consistent with achieving the outcomes expressed by MSC's Principles 1 and 2, are explicit. However, given some but not all objectives are well-defined and measurable, both **SG60 and SG80 can be awarded, but SG100 cannot.**

**Japan** must adopt all the WCPFC CMMs as stipulated in the Act on Special Measures for Enhancement of the Conservation and Management of Tuna Resources. Specific to Bigeye tuna, Japan's catch allocation is set to 18,265 tons at 15th regular session of the WCPFC and carried through to WCPFC17 (2020). Regarding Principle 2, the Japan Fisheries Agency has set "compliance rules for the operations of the offshore tuna fisheries" to ensure the regulations and CMMs set by WCPFC are followed. Japan also implements their NPOA and other policies to achieve additional Principal 2 outcomes, including shark bycatch objectives. The Japanese government's Marine

Biological Resources Management Policy as stated in their Annual “White Paper” (JFA, 2017) also mandates that highly migratory fish species that pass through several EEZs and/or several high seas are to be managed by cooperation among coastal and fishing countries and countries who are fishing in the area, directly by the coastal country or based on the decisions of relevant RFMOs. This resource management policy also states that Japan manages tuna resources through introduction and implementation of management measures, working and being compliant with WCPFC decisions. In addition, depending upon the fishery, Japan can establish other voluntary measures at the level of the fishery cooperatives, primarily as voluntary off-fishing days, within each fisheries cooperative’s Fisheries Management Plan. (this will be further discussed at the site visit) The current Japanese fishery management objective for distant water longline fishery targeting bigeye and yellowfin is to comply RFMO’s CMMs and not to increase or reduce fishing effort to maintain and recover resources. The official management measures are incorporated into the Minister Order on designated fishery’s license conditions and monitoring, which is annually reviewed and revised to implement RFMO requirements.

Under the new TAC system based on the new Fisheries Act (JFA, 2020), fisheries resources subject to management based on TAC are defined as “Specified Fisheries Resources” in the Basic Policy of Resources Management, decided by the Minister of Agriculture, Forestry and Fisheries. For each Specified Fisheries Resource, the resource level that produces MSY a Target Reference Point (TRP) and the level that prevents overfishing or Limit Reference Point (LRP), are set based on stock assessments. TAC is decided according to the harvest control rule (HCR) which presents various management scenarios, determined beforehand to achieve the management goal. If the fisheries stock biomass is below the LRP, a rebuilding plan should be developed and implemented to recover the biomass to TRP. For tuna species, southern bluefin tuna and Atlantic bluefin tuna have plans for this management implementation in 2021, however, albacore, yellowfin and bigeye tuna are not yet have clear plans of when this application will start. Therefore, **SG60 is met**, but it is deemed that **SG80, 100 is not**.

Client has not submitted sufficient documents related to fishery-specific objectives, including any existing voluntary management plan (fishery management plan), established by FCA. Prior to or at site visit the information should be submitted to the assessment team.

In Fishery Progress, the last client FIP update information on Fishery Specific Objectives as; (the plan creation) “Not started yet”. Originally, this action was planned to start after the fishery enter full assessment in September 2020. The schedule was revised and the fishery plans to enter full assessment in August 2021, this action will start in September 2021 (https://fisheryprogress.org/node/12073/improvement#overlay=action/12219). An update on this matter should be checked at the site visit.

For fisheries in **PNG,** the government has required fully implementing WCPFC CMMs within its EEZ, and as a responsible coastal State, has committed to UNCLOS, UNFSA and the WCPFC. Regulations also specify implementing compatible arrangements within archipelagic waters under the provisions of the same Fisheries Management Act (NFA, 1998) which specifically states that the Minister/NFA has a mandate to “implement any relevant obligations of Papua New Guinea under applicable rules of international law and international agreements.” The long-term objectives set out in the Act are consistent with achieving MSC’s Principles 1 and 2 outcomes expressed and are explicit within the fishery-specific management system under the Act. Although the management arrangements for both the EEZ and AW are the same, the National Tuna Fishery Management and Development Plan (2014) establishes such arrangements, it is lacking the Act’s long-term objectives and references to achieving the outcomes expressed by MSC’s Principles 1 and 2. The Plan does identify broad short-term objectives, but still lack explicit MSC Principle 1 and Principle 2. The focus of the objective simply enumerates desirable developmental, economic, market and social attributes, thus not building on the long-term objectives established in the Act. The Plan is nonetheless adaptive since these more specifics objectives of the Act provide for action that can be initiated through the Plan. The flexibility allows the objectives to be amended if there are further supporting strategies presented, action statements put forth, or progress in monitoring any milestones published by NFA to be appended to this document. Therefore, for PNG, long-term objectives, consistent with achieving the outcomes expressed by MSC’s Principles 1 and 2, are explicit within the fishery-specific management system by virtue of the Act. Since the National Tuna Fishery Management and Development Plan, is in fact the more detailed tool to implement management via the Act, which is designed to build on longer-term fisheries objectives and desirable goals. The Plan does not do this, with its objectives focusing more on other non-fishery specific management outcomes. Therefore, only **SG60 is deemed met**. But considering the SG 80 outcomes for both WCPFC and IATTC a similar long-term objective score for PNG can be awarded But since there appears to be a lack of specific short-term objectives for the fishery-specific management system**, only a partial score of 75 can be awarded**.

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

| | |
|---|---|
| Draft scoring range | 60-79 |
| Information gap indicator | Need more specific indication that for Japan's legislation, there are clearly stated short-term objectives for the fishery-specific management system. |

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

**Scoring table 39. PI 3.2.2 – Decision-making processes**

| PI 3.2.2 | | The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives, and has an appropriate approach to actual disputes in the fishery | | |
|---|---|---|---|---|
| Scoring Issue | | SG 60 | SG 80 | SG 100 |
| a | Decision-making processes | | | |
| | Guide post | There are **some** decision-making processes in place that result in measures and strategies to achieve the fishery-specific objectives. | There are **established** decision-making processes that result in measures and strategies to achieve the fishery-specific | |

| | | | |
|---|---|---|---|
| | | | objectives. |
| | Met? | Yes | Yes |

**Rationale**

Decision-making processes within the **WCPFC** are transparent and clearly defined in Article 20 of the Convention and Rules of Procedure and allows consideration of serious and important issues through its committees (SC and TCC) as well as at the Commission Plenary itself. These decision-making processes use the precautionary approach and are based on the best available scientific information. The system allows Commission members to be fully informed of the issues under consideration and enables participation in informed decision-making. Information used in decision-making is published and decisions are made by consensus whenever possible. If consensus cannot be reached, then voting becomes necessary (by a 75% majority but without voting rights for Participation Parties and Territories). All CMMs are binding, but resolutions are non-binding on members. There is no opt out procedure, but members may request an independent review of a decision, to ensure it is consistent with the Convention and management objectives. All CMMs apply equally inside EEZs and on the high seas. Flag states enforce management measures on their own vessels and coastal States within their own EEZ. The decision-making processes have therefore resulted in a comprehensive set of CMMs and strategies to achieve the specific objectives for the longline fishery. SC provides scientific advice based on the precautionary approach, with its report submitted to the WCPFC annual meeting in December. Conservation and management measures are adopted by member's consensus and are binding. If consensus cannot be reached, voting, grounds for appealing decisions, conciliation and review are all part of the established decision-making process, as described in Article 20 of the Convention. The SC conducts assessments annually, reflecting concerns with status of stocks or uncertainty in the assessments. Procedures and stock assessment methodology for the assessments are now fine-tuned amongst CCMs of the WCPFC. All management measures apply equally inside EEZ and on high seas. Flag states enforce management measures on their own vessels and coastal states within their own EEZ. These processes are well documented, and aspects of measures and strategies related to data collection and review, as well as the production and updating of stock assessments and relevant management measures and strategies to achieve fishery-specific objectives, are established. Therefore, both **SG60 as well as SG80 are met.**

Decision-making processes within **IATTC** are explicitly defined in Article IX of the Antigua Convention and Rules of Procedure (IATTC, 2012). These are responsive and largely transparent (Medley et al., 2021). IATTC has a website (https://www.iattc.org/ResolutionsActiveENG.htm) where Resolutions, Recommendations and other materials used for decision-making are published (access to some information considered confidential requires registration, however). Decisions are made by consensus, so in theory, members can veto resolutions. And there is also a “no objection” or “opt out” procedure. However, there is no evidence that a lack of consensus has prevented necessary measures being adopted in the past, although the consensus model of governance has limitations that impact the Commission's decision-making ability (Medley et al., 2021) in that the requirement for consensus could delay the adoption of appropriate conservation and management measures, while lengthy negotiations take place, since Resolutions are binding 45 days after their notification (recommendations however, are non-binding). Conservation and management measures apply equally inside EEZs and on the high seas, with Parties responsible for enforcing management measures within their own EEZ. Despite this, the decision-making processes in place do generally result in measures and strategies to achieve objectives, thus **meeting SG60 and SG80.**

When WCPFC conservation and management measures (CMM) are agreed upon, member states' performance requirements are determined. Japan Fishery Agency staff and industry representatives attend the WCPFC to represent Japan's interests. Before the WCPFC meetings, JFA holds meetings with fisheries associations to consult industry perspectives thus forming a consolidated front for Japanese delegates. As a member state, **Japan** has an obligation to implement them in accordance with the Fisheries Act (MAFF, 1949), the Law for Conservation and Management of Marine Living Resources (MAFF, 1996a), both of which were recently amended (the Act to amend a part of the fisheries Laws, 2018), and the Fisheries Basic Law (MAFF, 2001). Within Japan, to implement the decision of RFMO to restrict fishing efforts at current levels, license (permits) controls are conducted. If the implementation of any new CMMs requires related domestic law amendment, the Japan Fishery Association consults with the Fishery Policy Council (FPC). Within the FPC, which consists of government, academic and industry representatives, the possible actions for implementation and law modification are discussed. But before any decision-making at this Council, several resources management working groups meet, and where appropriate, prefectural and local fishermen's opinions are also invited. Ministerial orders may be issued to implement a change in fishery management system. Once the law amendment or management reform is made, JFA announces them through the national government's official media outlet, as well as in letters sent directly to the Associations concerned. Any change of regulation after RFMO meetings or guidance issued by JFA for compliance measures with fishermen are then disseminated through the various Associations to its members. **SG60 and SG80 are met.**

At the **PNG** level, the Fisheries Management Act (NFA, 1998), along with the detailed arrangements set out in the National Tuna Fishery Management and Development Plan (2014) provide established decision-making processes in support of measures and strategies to achieve regional and national fishery-specific objectives. These are not only underpinned by the legislation but also translated into legally binding licence conditions which apply to all vessels fishing for tuna in both the EEZ and AWs. Decision-making processes relating to fishery objectives are therefore well documented, and in most cases established at the WCPFC level. The arrangements at the national level in PNG provide decision-making processes which support both regional and local fishery-specific objectives for the tuna longline fishery. As such, both **SG60 and SG80 are met.**

| **b** | Responsiveness of decision-making processes | | | |
|---|---|---|---|---|
| | Guide post | Decision-making processes respond to **serious issues** identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take some account of the wider implications of decisions. | Decision-making processes respond to **serious and other important issues** identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions. | Decision-making processes respond to **all issues** identified in relevant research, monitoring, evaluation and consultation, in a transparent, timely and adaptive manner and take account of the wider implications of decisions. |
| | Met? | Yes | Yes | No |

**Rationale**

**WCPFC** decision-making processes allow for appropriate consideration of serious and important issues through its committees (SC and TCC and other stakeholders) and at the Commission itself. The WCPFC responds to these regional or sub-regional level issues through CMMs and Resolutions and these provide transparent and adaptive responses to scientific, technical, social, and cultural issues (see Compendium - (WCPFC, 2020)). The transparency in decision-making is a requirement of the Convention (Article 21). The system does enable Commission members to be fully informed of the issues under consideration and provides participation in decision-making processes. However, decision-making is sometimes hampered due to the operational particularities of cooperative regional fisheries management, especially with consensus decision-making, illustrated by the fact that a Harvest Strategy Workplan developed in 2015 in accordance with CMM 2014-06 (see Harvest Strategy Workplan as at Dec. 2020), is still delayed due to the complexity of developing the harvest strategies for multiple species as well as the capacity of the CCMs to understand and participate fully in the process. Consequently, the Commission has yet to establish HCRs for bigeye and yellowfin tuna. Additionally, stock assessments (notably from SPC) and studies presented at the SC had identified overfishing of bigeye tuna from 2011 – 2017, at the regional level, using an older assessment model and life history parameters. However, since WCPFC-SC14 (2018), updated assessments have determined this stock to no longer have an overfished status, nor is overfishing occurring. These determinations were reaffirmed at WCPFC-SC16 (2020). Additionally, it is difficult to assert that WCPFC responds to all serious and important issue, with an example of failing to maintain Pacific Bluefin tuna stock by adopting necessary CMMs in a timely and precautionary manner to prevent stock depletion in the past, although adaptive measures have been agreed upon. **SG60 and SG80 are met but SG100 is not met at this time.**

The PNA has established effective decision-making processes which respond to issues identified in relevant research, monitoring, evaluation and consultation. All PNA members have tuna management plans that are applied at the national level. The PNA management system is underpinned by a fishery information system, the Fisheries Information Management System (FIMS) which provides ready access to timely data. The PNA Office and PNA members make use of the services provided by both SPC and FFA to identify and respond to important issues, which should allow timely and adaptive management changes as needed. Decision-making processes at the WCPFC and PNA level respond to serious and other important issues in a timely manner indicating **SG60 and SG80 are met**. However**, SG 100 is not met** as it is not clear that all issues are dealt with in a timely manner.

While outcomes of decision-making are transparent within the **IATTC**, with relevant information published online (e.g. Resolutions from annual meetings) and frequent feedback delivered, determining exactly how a decision was reached is not necessarily obvious (Medley & Gascoigne, 2017). There is no formal detailed explanation linking the information provided to the decision made, but there is enough information provided to show any discrepancy between the information being provided and the subsequent decision, which underlines the fact that Parties are fully informed of the issues under consideration and able to participate in decision-making (Medley et al., 2021). The Commission can be shown to react appropriately through the Resolutions and Recommendations it makes for stocks it is responsible for managing; however, the timeliness of such decision-making is less clear. The requirement for consensus can delay decision-making, but no such delay has actually been observed (or at least noted from documents available) to date. The IATTC staff's 2020 risk analysis (Minte-Vera et al., 2020), and recommendations at the 97th IATTC meeting (IATTC, 2021c) for the tropical tuna fishery in the EPO and again reviewed at 98th IATTC meeting (IATTC, 2021b), indicates that the recent management measures (C-17-02), which expired at the end of 2020 and were extended for 2021 (C-20-06), will be adequate within the recommended 3-year management cycle (2022-2024), as long as the status quo conditions are maintained, with data collection and analyses advancing according to the agreed-upon work plan. However, as seen in the scoring of 1.1.1 for EPO bigeye tuna, there is uncertainty in the status of this stock, with the potential that the stock is below the PRI. IATTC staff did recommend additional precautionary measures to address potential increases in fishing mortality caused by the floating-object fishery to prevent fishing mortality increasing beyond the status quo conditions associated with maintaining the current 72-day closure. They concluded that a limit on floating-object sets for all purse-seine vessels, combined with individual-vessel daily active FAD limits, would be the best option for maintaining the status quo to prevent an increase in fishing mortality within a management cycle. Despite these meetings, no agreement was reached on any additional measures. The assessment team, therefore, considers the lack of implementing any additional management action an important and serious issue needing to be resolved at IATTC and it remains unclear as to whether decision-making processes have responded to all or even the serious and important issues identified, sufficiently and in a timely manner. It is deemed that at least **SG60 is met and SG80 is tentatively met** for this fishery since it does not actually fish in the EPO, pending further team discussions. **SG100 is definitely not met** as it is clear that serious and important issues are not dealt with in a timely manner.

**Japanese** tuna fisheries Associations/Cooperatives, government fisheries management and scientific research agencies meet regularly to discuss and exchange opinions on management policy, scientific research priorities, international fisheries relationships and even domestic management coordination. However, the overarching management decisions are made at the RFMO level. A specific case can be made for N. Pacific Bluefin tuna, where decisions at WCPFC are further discussed at the Subcommittee of Resource Management (Bluefin group) of the Japan Fishery Policy Council. Of course, the special interest here is the subsequent quota allocation policy among prefecture level and individual fisheries. Minutes of these meetings are available to the public.

In general, Japan incorporates decisions made at RFMOs, such as WCPFC and SPC for WCPO, to respond to **serious and other important issues** identified in relevant research, monitoring, evaluation and consultation into domestic regulations. The Fishery Policy Council is convened for domestic consultation before legal amendments or changes in management measures, and this is conducted in a transparent, timely and adaptive manner and take account of the wider implications of decisions with attendance of stakeholders. For highly migratory species, the national fishery resources management policy is reviewed at least once a year to reflect the up-to-date requirements for the fishery, in which management objectives and measures are clearly determined for each fishery gear types. The official management measures are incorporated into the Minister Oder on designated fishery's license conditions and monitoring, which is annually reviewed and revised to implement RFMO requirements. Therefore at least **SG60 and SG80 are deemed to be met.** Scoring at SG100 will be discussed at- and following the site visit.

**PNG's** Fisheries Management Act (NFA, 1998), in addition to requiring the implementation of WCPFC CMMs, specifically mandates that the Minister/NFA ensure that management measures are based on the best available scientific evidence, designed to maintain or restore stocks at levels capable of producing maximum sustainable yield (MSY), while considering relevant environmental and economic factors, such as fishing patterns, the interdependence of stocks, and generally recommended international minimum standards. Consultation with come stakeholders, in particular before PNA and WCPFC meetings, provides evidence of effective decision-making processes responding to serious and other important issues in a timely and adaptive manner, while taking account of the wider implications of these decisions. What is not immediately evident is how effective such arrangements are at the domestic level. NFA staff are required to manage the fishery in accordance with the provisions of the Act, but the level of broader stakeholder consultation and the timeliness of input to serious and important issues at the local and regional level is uncertain. There is some indication that this occurs based on the limited evidence available from news outlets and the NFA website. However, a structured decision-making approach which responds to serious and other important issues in a transparent, timely and adaptive manner while taking account of the wider implications of decisions is in place for both the EEZ and Aws is not readily apparent. Overall, though, the fishery-specific management system does includes effective decision-making *processes* in place which would result in measures and strategies to achieve the objectives and also has an appropriate approach to dispute resolution in the fishery. Thus **SG60 and SG80 are met.** Scoring at SG100 will be discussed at- and following the site visit.

| | | | | |
|---|---|---|---|---|
| c | Use of precautionary approach | | | |
| | Guide post | | Decision-making processes use the precautionary approach and are based on best available information. | |

| | Met? | Yes |
|---|---|---|

**Rationale**

Under provisions of Article 5(c) of the **WCPFC** Convention the Commission and members are directly or, through the Commission, required to apply the precautionary approach in decision-making. Article 6 further requires the application of the precautionary approach and use of a Scientific Committee to ensure that the Commission obtains the best scientific information available (see Res. 2012-01 - Resolution on the best available science) for its consideration and decision-making. The Convention, in compliance with Annex II of the UNFSA, requires that the Commission be more cautious when information is uncertain, unreliable or inadequate and does not use the absence of adequate scientific information as a reason for postponing or failing to take conservation and management measures. In all cases, decisions are required to be based on the best scientific information available. Evidence that WCPFC is attempting to apply the precautionary approach is found in the limitations on the expansion of south Pacific albacore tuna fishery, pending further development of management plans, even where the stock is evaluated to be above the MSY level. The evidence is less clear in the bigeye tuna fishery, where bycatch issues contributed from the purse seine sector were presumed to be hampering the fishery meeting its targets. However, the most recent stock assessments have indicated that BET are no longer overfished, and that overfishing is no longer occurring. Therefore, there is sufficient information to conclude that decision-making processes are based on the best available information and the precautionary approach. There is, however, sufficient information to conclude that decision-making processes for WCPFC are based on the best available information and the precautionary approach, **meeting SG80.**

At the PNA members' national levels, some concerns in relation only to the purse seine VDS, as to whether decision-making processes use the precautionary approach and are based on best available information, have been raised. PNA has repeatedly asserted that the application of the precautionary approach is explicit in the actions taken at WCPFC, PNA and national measures, and these should be assessed in scoring elements of 3.1.3 and 3.2.2 (c). Use of the precautionary approach throughout the MSC Certification Requirements is a reference to the assessors' application of the scoring process (i.e. where there is uncertainty due to limited information available), teams should be more precautionary in their assessment of information adequacy to support an Outcome PI score. There are specific examples where the precautionary approach is considered, for instance in the WCPFC CMM establishing a harvest strategy for key fisheries and stocks (CMM 2014-06), which explicitly refers to establishment of precautionary stock-specific reference points to implement the precautionary approach. The PNA's setting of the TAE reviews other recent scientific information available to assess whether there is a need for a lower TAE than that associated with the WCPFC decision, including catches in the most recent years and any updated WCPFC advice or projections. There is evidence that national legislations of PNA members include references to the precautionary approach to fisheries management, and by virtue of these national Acts, Parties are obliged to take the precautionary approach into account when formulating national, regional and sub-regional measures, as would be applied to their zones (see also PNA 2019). And while a longline VDS has been on the books for some time, and even accommodated for in PNG legislation, its implementation, either at the PNA level or nationally, has yet to come to be. While the precautionary approach has not been explicitly adopted by the PNA, member commitments to the WCPFC and the UNFSA demonstrate an implicit commitment to the precautionary approach in management of regional fisheries.

Article IV of the Antigua Convention requires IATTC members to apply the precautionary approach directly and through the Commission. Specifically, Article IV, paragraph 2 requires members to "be more cautious when information is uncertain, unreliable or inadequate" and an absence of adequate scientific information shall not be used as a reason for postponing or failing to take conservation and management measures." Furthermore, under Article VII of the Antigua Convention, a function of the Commission is to "adopt measures that are based on the best scientific evidence available to ensure the long-term conservation and sustainable use of fish stocks." According to Medley et al. (2021), the large number of meetings that have been conducted, and reports written for the Commission (and readily available), indicate that analyses and advice given have arisen from the requirement to use the best scientific information **therefore meeting SG80.**

At national level, **Japan** adopts WCPFC decisions and implements allocation of quota (where applicable) and CMMs. As a WCPFC member, it has accepted the principle of the precautionary approach as under Article 5(c) above. Japan also recognizes the UN fish Stocks Agreement and its concept of "the precautionary approach". The Act on Clause 2 of Basic Policies in the Special Measures for Enhancement of the Conservation and Management of Tuna Resources (1996) states that the Minister at MAFF shall promulgate the following basic policies in order to:

- Strengthen the management of tuna resource conservation and management,
- Define the basic items needed by which to achieve such strengthened management, and
- Define ant other important items appropriate that may be initiated to arrive at a strengthened management system.

Therefore, SG80 is met.

The Fisheries Management Act (1998) for **PNG** under Section 25 specifically requires that the Minister and the NFA to:

- ensure that management measures are based on the best scientific evidence available, and are designed to maintain or restore stocks at levels capable of producing maximum sustainable yield, as qualified by relevant environmental and economic factors including fishing patterns, the interdependence of stocks and generally recommended international minimum standards; and
- apply a precautionary approach to the management and development of aquatic living resources;" the Act applies to all waters – EEZ and AWs.

Based on the above information it is evident that decision-making processes for the WCPFC, PNA, IATTC, Japan and PNG are required to adopt the precautionary approach and use the best available scientific information, **meeting SG80** for the fishery under assessment.

| **d** | Accountability and transparency of management system and decision-making process | | | |
|---|---|---|---|---|
| | Guide post | Some information on the fishery's performance and management action is generally available on request to stakeholders. | **Information on the fishery's performance and management action is available on request**, and explanations are provided for any actions or lack of action associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review activity. | Formal reporting to all interested stakeholders **provides comprehensive information on the fishery's performance** and management actions and describes how the management system responded to findings and relevant recommendations emerging from research, monitoring, evaluation and review activity. |
| | Met? | Yes | No | No |

**Rationale**

The **WCPFC** maintains a publicly accessible website where meeting minutes, reports and scientific reports from the Commission and subsidiary bodies are posted and available for download. However, TCC management and compliance issues in country reports remain confidential; only annual summary reports are available. However, national and regional 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 at the Commission. This level of reporting represents good practice. Nonetheless, while reports are available, some sub-regional groups/organisations still believe that how all information is used in the decision-making is not reported, but it is difficult to see how the current system could be improved in this respect. Even where doubt is expressed as to how a decision is reached, all information available for the decision-making is published, allowing any stakeholder to draw their own conclusions, and there is frequent feedback from NGOs, scientists and other stakeholders. There is no formal, detailed explanation linking the information provided to the decisions that result (Medley et al., 2021). In an international context, it is recognised that it is very difficult to give full explanations for all decisions, since this might undermine co-operation. Decisions are often negotiated outcomes, with the trade-offs not always apparent. With detailed formal public reporting of decisions and information on which those decisions are based, the WCPFC **meets SG60 and SG80**. However, this falls short of a formal justification that can be clearly linked to all information available, so **SG100 is not met**

**IATTC** decision-making is by consensus and in Article XVl of the Antigua convention it clearly stipulates transparency in all dealings at the Commission. No evidence could be found to suggest that any decisions were either not transparent or lacked accountability. IATTC officially publishes the recommendations of research, monitoring, evaluation, and performance review on its searchable website. Also, the reports of the plenary sessions of the meetings are officially published and available to the public. Even when doubts are expressed about how a decision was reach (or not), available information is published for such decision-making, allowing any interested party to draw their own conclusions NGOs, scientists and other stakeholders often give their opinion and can also become part of the written record for meetings. However, while reports are available, it is not clear that they represent all the information that is used. There is no formal, detailed explanation linking the information provided with the resulting decision (Medley et al., 2021). Decisions are presented in resolutions as outcomes, with minimal justification. With formal and detailed public reporting of decisions and the information on which those decisions are based, IATTC fisheries comply with **SG60 and SG80**. However, since there is no formal information link to decisions, **SG100 is not met**.

In **Japan**, there is adequate formal reporting of information on the fishery's performance and management actions as required by RFMO from national government. The scientific stock assessment from FRA, and SHUN are available for general fishery's management information for all stakeholders. The minutes of the Fishery Policy Council are available for review online.

For any specific inquiry, in general, stakeholders can contact and request information either directly through the JFA or through Fishery Cooperative Associations (FCA), and a response received. Explanations in response to the questions may be limited, depending on the type of information or contact persons. Especially so far the observer related information was considered confidential within the JFA, Research Institutes and industry. In other assessment (Atlantic bluefin tuna MSC) observer data summary have been provided by JFA upon request and the explanations were provided for non-availability of raw report data as being confidential. The observer manual is only available for viewing under a confidentiality agreement and a special request to the JFA. However, the Terms Of Reference for scientific observer data collection program is openly available online, and an evaluation report of the program can also be accessible upon special request. Therefore, for Japan this PI is deemed to only **meet SG60**.

The assessment team has not yet received specific information regarding fishery's performance and management actions (compliance data, review and reporting data, management plan, etc.) from the fisheries cooperatives that UoA belong to regarding longline fishery, therefore more information is needed to determine if this SI meets SG80.

In **PNG** both the Fisheries Management Act (NFA, 1998) and the National Tuna Fishery Management and Development Plan (NFA, 2014b) provide information on the goals, objectives and mechanisms for management of the fishery. While the Act presents the broad framework and overarching objectives and management structure, the Plan provides detailed information on fishery management arrangements. However, neither the Act nor the Plan provides a framework by which to access information on the fishery's performance. Further, neither instrument provides explanations for management action or inaction. It must be assumed that ad hoc stakeholder engagement must occur, where fishery-relevant information is exchanged, and some news media outlet information is available in support of this supposition. Nonetheless, there is no systematic mandate to actually provide information on fishery performance or management actions, nor and requirement for explanations on any actions/inactions associated with findings and relevant recommendations emerging from research, monitoring, evaluation and review. Therefore, from the information above, the lack of formal arrangements to provide information on the fishery's performance and management action within the EEZ and limited regular stakeholder engagement means that **SG60 requirements are met,** until full discussions can be held with the assessment team.

| **e** | Approach to disputes | | | |
|---|---|---|---|---|
| | Guide post | Although the management authority or fishery may be subject to continuing court challenges, it is not indicating a disrespect or defiance of the law by repeatedly violating the same law or regulation necessary for the sustainability for the fishery. | The management system or fishery is attempting to comply in a timely fashion with judicial decisions arising from any legal challenges. | The management system or fishery acts proactively to avoid legal disputes or rapidly implements judicial decisions arising from legal challenges. |
| | Met? | Yes | Yes | Yes regional<br>No national |

**Rationale**

Peaceful settlement of disputes (Articles 30 & 31) of the **WCPFC** ultimately also involves Article 20 of the Convention. And under Article 20, the WCPFC has a consensus-based decision-making process, with provision for a "two-chambered" voting process requiring a 75% majority in both chambers if all efforts to reach a decision by consensus have been exhausted, provided that such majority includes a three-fourths majority of the members of the South Pacific Forum Fisheries Agency (FFA) present and voting, and a three-fourths majority of non-members of the FFA present and voting, and provided further that in no circumstances shall a proposal be defeated by two or fewer votes in either chamber. WCPFC has not been subject to any court challenges based on the latest available records of meetings where any such challenges might be noted as being filed, for Plenary (WCPFC, 2021a), Scientific Committee (WCPFC SC, 2020) and TCC (WCPFC TCC, 2020b). Parties seem to have pro-actively avoided legal disputes by resolving them through WCPFC meetings since they are members of this Commission and agree to abide by its provisions. There is no evidence that other entities flout the law, with the notable exception of particular fishing companies and fishing vessels, which may be listed on the IUU fishing list (which does not include any client vessels – see meeting records of WCPFC17 and TCC16). Nonetheless, while the management system does appear to be acting proactively to avoid legal disputes, there is increasing potential for legal challenges, especially in relation to resource allocation, yet there is no evidence of proactive actions by WCPFC to develop Commission language to limit such disputes. From the above, **SG60 andSG80 are met, but SG100 is not considered met.**

The **IATTC** has not been subject to any court challenges, based on records available where such legal challenges might be noted as registered, up to 2021 (IATTC, 2021c). Records also do not indicate any disrespect or defiance of the law through repeated violations. There is no evidence that other entities flout the law, with the notable exception of particular fishing companies and fishing vessels, which are listed on the IATTC IUU fishing list (which do not include any client vessels) established at its 95th meeting on 04 December 2020, in compliance with the 2019 Resolution on IUU fishing (IATTC, 2021b). Therefore, excluding these, IATTC and its Parties **meet SG60**. It would appear that Parties have pro-actively avoided legal challenges by resolving disputes through IATTC meetings since they are members of IATTC and agree to abide by IATTC provisions. Given that there are no current outstanding judicial disputes and that to date, members have not used international law to settle disputes, the management system meets **SG80 and SG100**.

The **Japanese** management system has well-established decision-making mechanisms for administrative and legal appeals and has legal other frameworks to respond to judicial decisions in a timely fashion in place. The Fishery Policy Council, resources management section group is held to discuss issues in a timely fashion to comply with RFMO decisions (or judicial decisions arising from any legal challenges – to be confirmed at site visit), thus avoiding disputes by consulting with industry, associations and cooperatives. In this manner, it is rare for the issues to develop into legal challenges in Japan. At local level in-zone, fisheries cooperatives are well established to achieve broad agreement, coordinating among fishermen, administrations, and other numerous stakeholder groups. Thus, at the Japanese national/high seas and local management levels, the fishery under assessment **meets SG60 and SG80,** but with the lack of evidence that shows the fishery management system acts proactively to avoid disputes, **SG100 is not met.**

The **PNG** management arrangements for the UoA are implemented via domestic legislation, the National Tuna Fishery Management and Development Plan (2014) and licence conditions for DWFN. PNG participates in PNA meetings and is actively involved in developing sub-regional management arrangements. Domestically, arrangements are negotiated with key stakeholders and through meetings with the NFA and the representative (Fukuichi) for the companies in the UoA. From the information available during this assessment there appear to be no current no legal challenges to the management system. The fishery under assessment meets **SG60 and SG80**, but with the lack of evidence that shows the fishery management system acts proactively to avoid disputes, **SG100 is not met.**

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

| | |
|---|---|
| Draft scoring range | 60-79 |
| Information gap indicator | Specific information regarding fishery’s performance and management actions (compliance data, review and reporting data, voluntary management plan, etc.) regarding longline fishery from the fisheries cooperatives that UoA belong to are insufficient to score this PI. |

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

**Scoring table 40. PI 3.2.3 – Compliance and enforcement**

| PI 3.2.3 | | Monitoring, control and surveillance mechanisms ensure the management measures in the fishery are enforced and complied with | | |
|---|---|---|---|---|
| Scoring Issue | | SG 60 | SG 80 | SG 100 |
| **a** | MCS implementation | | | |
| | Guide post | Monitoring, control and surveillance **mechanisms** exist, and are implemented in the fishery and there is a reasonable expectation that they are effective. | A monitoring, control and surveillance **system** has been implemented in the fishery and has demonstrated an ability to enforce relevant management measures, strategies and/or rules. | A **comprehensive** monitoring, control and surveillance system has been implemented in the fishery and has demonstrated a consistent ability to enforce relevant management measures, strategies and/or rules. |
| | Met? | Yes | No | No |

Rationale

Note: scoring for this PI considers each jurisdiction but is scored at the fishery level. Therefore, only a single score is provided.

The WCPFC aims to ensure compliance through VMS (CMM 2014-02), an IUU vessel list (CMM 2019-07), port state controls, observers (and e-monitoring) (CMM 2017-02), logbooks (plus e-reporting), a record of fishing vessels (CMM 2014-03) and transshipment monitoring (CMM 2009-06). The WCPFC TCC has codified chartering arrangements (CMM 2019-08), catch/statistical documentation, the control of nationals, and compliance monitoring and reporting. The WCPFC relies largely on the IUU vessel listing process as an incentive for compliance. WCPFC has a well-established Compliance Monitoring Scheme (CMS) under CMM 2019-06, which is largely dependent on the submission by members of information in annual TCC country reports. The stated purpose of the CMS is to:

- Assess CCMs' compliance with their obligations;
- Identify areas in which technical assistance or capacity building may be needed to assist CCMs to attain compliance;
- Identify aspects of conservation and management measures which may require refinement or amendment for effective implementation;
- Respond to non-compliance through remedial options that include a range of possible responses that take account of the reason for and degree of noncompliance, and include cooperative capacity-building initiatives and, in case of serious non-compliance, such penalties and other actions as may be necessary and appropriate to promote compliance with CMMs and other Commission obligations; and
- Monitor and resolve outstanding instances of non-compliance.

Regional monitoring, control and surveillance (MCS) is supported by the Quadrilateral (QUAD) Defence Operational Working Group. This group comprises the aerial and naval arms of Australia, France, New Zealand and the U.S. which provide military assets to assist regional surveillance and participate in annual coordinated sea surveillance actions. FFA has the responsibility for facilitating the coordination of the surveillance assets provided by the QUAD nations in support of national and multilateral fishing surveillance and response activities. Client fishers comply with the management system under assessment, including, when required, providing information of importance to the effective management of the fishery. WCPFC continues to refine its developing Catch Documentation Scheme, which should reduce IUU fishing and complement the vessel register. Port State Measures are in the process of being fully implemented by all WCPFC members through CMM 2017-02 (Conservation and Management Measure on Minimum standards for Port State Measures), and therefore also at the U.S. national level. At-sea observer coverage requirements under CMM 2018-05 are 5% for longline vessels operating in high seas areas and in more than one jurisdiction, which historically has been difficult to achieve for many States but is certainly beginning to improve everywhere, especially with increasing awareness of perhaps using electronic monitoring (EM) so supplement the human observer programmes. Ultimately, it is the Flag State's responsibility for any failure to ensure that WCPFC conservation and management measures are implemented and for the resulting violations of those measures by that State's vessels. However, according to Medley et al. (2021) problems continue over the failure of certain Flag States (client fleet not involved) to exercise effective control over vessels.

The **FFA** is the main service organisation providing MCS support for the coastal States in the WCPO. The arrangements FFA provide are comprehensive and include a regional MCS strategy endorsed by Forum Fisheries Committee Ministers, covering regional operations and cooperation, under a regionally-agreed benchmark level of observer coverage. Monitoring, control and surveillance mechanisms ensure the management measures in the fishery are enforced and complied with. The FFA Regional Fisheries Surveillance Centre (RFSC) undertakes regional coordination of MCS activity and assesses the risk of non-compliance by vessels. The RFSC monitors fishing vessel activity using a combination of the Vessel Monitoring System (VMS), Automatic Identification System (AIS) and Synthetic Aperture Radar (SAR). MCS arrangements are also supported by the QUAD Operational Working Group. This group comprises the aerial and naval arms of Australia, France, New Zealand and the USA who provide aerial and surface assets to assist regional surveillance.

To improve compliance with its requirements and procedures, IATTC focuses on vessel registration but also monitors catch and effort. This Commission also uses diplomatic and other pressures on nation states (Medley et al., 2021), especially the threat of IUU listing, information which is shared with other RFMOs. While there is a regional observer programme for purse-seine vessels coordinated by the Secretariat, a similar regional programme for longline fisheries does not exist. IATTC does however still require each member and cooperating non-member to ensure at least 5% coverage for longline vessels greater than 20 meters in length, which may be supplemented by electronic monitoring systems (EMS – see Resolution C-19-08). Some members do have national programmes for longliners (as does the client fishery) while a private company, MRAG Americas has been the observer provider for the IATTC longline transshipment observer programme since 2008.  All vessels over 24 m length catching tuna within the region must also have VMS (Resolution C-14-02). IATTC uses its longline vessel register to establish a 'positive list' (C-11-05) and identify IUU vessels under the AIDCP (A-04-07). Vessels not entered into the record are deemed to be unauthorised to fish for, retain on board, transship, or land tuna and tuna-like species, although these lists do not indicate if and where a particular vessel is active in other RFMOs. IATTC implements some port state measures with a specific bigeye tuna catch documentation scheme. Landings and transshipments are monitored and data collected. There are systems for verifying compliance with management measures and other information. Unfortunately, there are still gaps in implementing procedures across the region since there is limited information sharing re IUU activities and a lack of measures against IUU vessels' use of port facilities in the region (Medley et al., 2021). IATTC members are to submit annual landings and other data to the Commission in a timely manner. Compliance information is then reviewed by the Committee for the Review of Implementation of Measures Adopted by the Commission. Ultimately, it's a Flag State responsibility for any failure to ensure that IATTC Resolutions and Recommendations are implemented and for the resulting violations of those measures by that State's vessels.

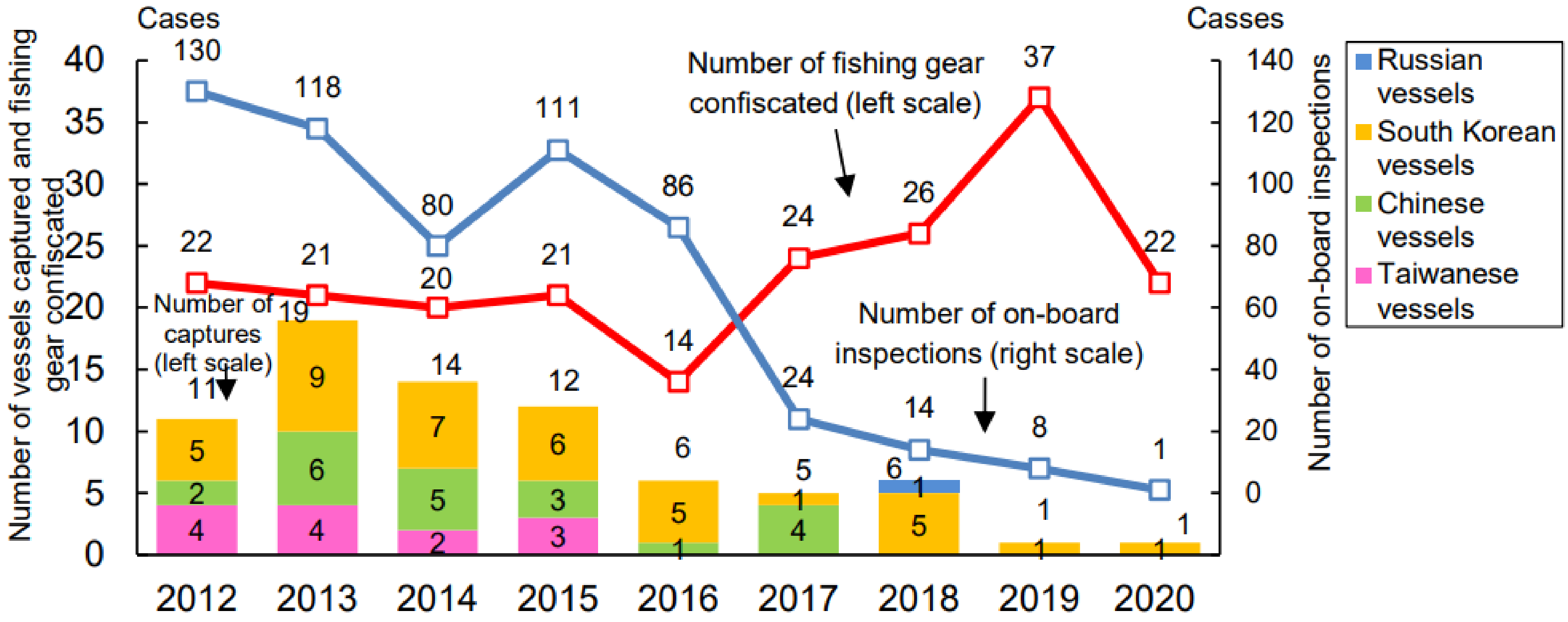
Enforcement activities are reportedly conducted through vessel monitoring (VMS and AIS) and inspections at landing sites, however frequency and staff allocation for recent monitoring for longline fisheries landing are not clear, and this needs to be checked at site visit. Longline tuna fisheries are controlled with Minister-issued license conditions, and JFA's international department, tuna and skipjack fishery section is responsible for advisory and monitoring. JFA issues an official guidance notification "compliance measures required for operation of skipjack and tuna fisheries within WCPFC convention area (last updated in August 2021." to ensure awareness on the latest requirements, based on RFMO CMMs, the Fishery Act, Ministry Order on the Fishery Permission and Surveillance.  Longline fisheries must record logbooks every day and submit logbook or catch and bycatch reports every month to JFA. Also, transhipment activity must be reported with designated procedure and format and obtain prior approval from JFA. As WCPFC adopted recently, the new CMM on avoidance of marine pollution is now enforced, and compliance to this measure is mandatory. Other detailed measures for recording and reporting are elaborated in the JFA's notification. Minister-licensed Longline tuna fisheries are required to carry observers when ordered by the Minister.

The government is reportedly dispatching patrol vessels and aircrafts, both inside and outside of its EEZ, for monitoring and surveillance of fishing operations, and monitoring of activities using VMS are mandatory for the fishery under assessment (for longline fisheries there need to be evidences of recent surveillances and inspections conducted, as well as any detected non-compliance). For each vessel under assessment, updated licenses, logbooks from each vessel, and evidence to comply bycatch mitigation measures, waste management records (pursuant to the new CMM of marine pollution) are required before or at assessment site visit. The reporting of bycatch species with designated format should be also confirmed with the submission of evidence. The ETP and bycatch reporting forms are often omitted by tuna fishermen and recently these trends had been discovered through MSC assessments on Japanese pole and line tuna fisheries. It revealed that in reality, Japan has not been enforcing the bycatch / ETP species reporting measures required in JFA's official notification well. The synopsis document recently prepared and available online by JFA titled "Minister-permitted Fishery Regulation After Fishery Law Amendment" page 9 summarises reporting requirement for minister-licensed fishery, but this also only instruct to report fishery catch by species, not touching to the report of bycatch or ETP species. There is no legal sanction for not submitting the bycatch information page. It is currently unknown if JFA enforces the bycatch and ETP species reporting to tuna fisheries, other than issuance of the notification.

Client has submitted Excel-based logbook information for each vessel and scientific observer records summary provided by JFA. In most of 2018 and 2019 logbooks by vessels appears incomplete, without insertion of zero for no-bycatch existence of each species as instructed by JFA requirement, but in 2020 there appears improvements on these records. For example, Kinei Maru 83's observer data reported at least 16 Olive ridley turtles and many other shark species, along with other bycatch species, however the same 2018 Kinei Maru 38's logbook does not have any record of bycatch. Let alone, in 2018's Kinei maru's logbook is recorded empty and there is not even target catch record – this may be some mistake, but explanations should be provided. Observer-carrying vessels are limited within the UoA during the past several years and comparison between logbook and scientific observer record cannot be done except for 2018 Kinei maru. However, no bird bycatch has been recorded until 2018, although since 2019 there are bird bycatch in almost all years. Further checks on logbook records should be warranted to determine if data is sufficient to understand the trends of bycatch and ETP catches of UoA under assessment.

Since some of the offshore resources are shared with neighbouring countries, ensuring joint MCS efforts among these countries for resource conservation on such species is one of the most important tasks in this fishery. Current surveillance records and systems of international cooperation needs further clarification.

## Trends in the number of foreign fishing vessels captured or inspected, etc.



Source: Prepared by the Fisheries Agency

For illustrative purposes, in 2019, the Fisheries Agency conducted 8 onboard inspections but only 1 in 2020. In both 2019 and 2020 it captured one foreign fishing vessel and the number of confiscations of illegal fishing gear totalled 37 in 2019 and 22 in 2020. In waters surrounding the Yamato ridge of the Sea of Japan, illegal operations conducted by fishing vessels belonging to North Korea, etc. is an obvious problem. Fishery control vessels have therefore been intensively deployed in the area in collaboration with the Japan Coast Guard to address the situation. In 2019, by the Fisheries Agency recommended the removal of 5,122 illegal vessels. The government also strengthened its fisheries control system by deploying two new fisheries control vessels to Niigata and Sakaiminato in FY2020 replacing old existing vessels. As a result, 5,315 expulsion warnings were issued to foreign fishing vessels. Further, a Fisheries Agency's "Fisheries Enforcement Headquarters" was established in January 2018, headed by the Director-General of the Fisheries Agency. The number of inspection vessels (currently seven vessels) increased since FY2017 and is expected to be nine vessels in FY2021. The Fisheries Agency deploys fisheries inspection vessels, including two large fisheries inspection vessels that went into service in March 2020, focussing high seas violations in cooperation with the Japan Coast Guard. In 2020 the Agency issued expulsion orders to 4,394 Chinese and other fishing vessels. As of March 2020, the agency deployed 45 fisheries inspections operations by vessels and 4 patrol aircrafts to control fishery activities around the clock. Furthermore, completion of another new vessel and one replacement are scheduled in FY2021. The agency also participated in joint training of its fisheries inspection vessels with patrol vessels of the Japan Coast Guard (JFA "White Paper" for 2021 summary of 2020 actions). However, targets of these recently strengthened monitoring measures are foreign vessels. As the international maritime relations continues to become tense around Japan especially around borders, domestic fishery surveillances are reportedly weakening, therefore actual record of monitoring and surveillance activities targeting longline tuna fisheries is necessary to inform for this assessment.

Due to the international MCS system in place and applicable to the fishery**, SG60 is met**. However, more information is needed to determine if this fishery meets SG80 for Japan.

The **PNG** Fisheries Management Act (1998) contains quite extensive MCS provisions, such as:

- Part IV - Issuance of Licences,
- Part V - Enforcement and Observer arrangements,
- Part VI - Jurisdiction, Procedure, Offences, Penalties and Liability,
- Part VII - Administrative Proceedings, and
- Part VIII - Evidence.

Within the National Tuna Fishery Management and Development Plan (2014) there are supplemental provisions for arrangements to:

- combating and eliminating IUU fishing,
- using and monitoring of VMS and AIS,
- using a Catch Documentation Scheme, and
- implementing fisheries-related research and monitoring.

These legislative and policy provisions are implemented via the integrated Fisheries Information Management System (iFIMS). This platform integrates fisheries management, compliance and marketing information, covering fishing industry reporting of catch, vessel position and activity data generated by VMS as well as fisheries observer reporting. The platform also has an industry-queryable database where companies can see their own vessels and catch information and apply electronically for licenses through a portal. License application information is integrated directly into the system and is automatically delivered to the PNA Office facilitating the operation of the PS VDS. The System is in fact used by all PNA country members and data related to catch and vessel activity in particular EEZs can be viewed through iFIMS by individual PNA members. The system holds industry, government and flag state information and through various modules it provides catch data to SPC, allows ROP/National OP to manage placements, including the provision of electronic reports and facilitates the operation of the VDS (now only PS but eventually also LL if it is ever adopted). In addition to the surveillance services provided by the FFA which provides risk assessments, VMS monitoring and annual coordinated operations, there are comprehensive MCS measures in place in the fishery domestically. Before considering the licensing of a vessel, it must be in good standing on the FFA Register and must agree to the terms and conditions of the bilateral permit agreement. Subject to meeting these requirements and payment of any necessary fees, a licence will be issued.

Based on the above, there is evidence that both the Regional and National systems have comprehensive and integrated monitoring, control and surveillance systems in place and have demonstrated an ability to enforce relevant management measures, strategies and/or rules. Therefore, while some jurisdictions score higher, only SG60 is met for this SI.

| **b** | Sanctions | | | |
|---|---|---|---|---|
| | Guide post | Sanctions to deal with non-compliance exist and there is some evidence that they are applied. | Sanctions to deal with non-compliance exist, **are consistently applied** and thought to provide effective deterrence. | Sanctions to deal with non-compliance exist, are consistently applied and **demonstrably** provide effective deterrence. |
| | Met? | Yes | No | No |

**Rationale:**

Conservation measures are set by **WCPFC**, but their enforcement falls to member States. The WCPFC relies largely on the IUU vessel listing process (CMM 2019-07) as an incentive for compliance along with port state controls, at-sea observers, logbooks and transshipment monitoring. Compliance failures by vessels are addressed by the application of the WCPFC IUU listing procedure. Compliance failures by member States, rather than vessels, are currently addressed through Commission processes of monitoring, reporting and accountability under the Compliance Monitoring Scheme (CMM 2017-07), but sanctions are applied only to fishing entities (IUU vessels and vessels detected as being non-compliant with CMMs and/or resolutions). WCPFC notifies Flag States of non-compliant vessels, which the Flag States should order to withdraw from the Commission Area. Sanctions appears to be consistently applied and provides effective deterrence in relation to proven IUU fishing. Compliance issues based on available information on infringements from observers and other sources are discussed at WCPFC TCC meetings. Responses to reported non-compliance are considered at the TCC and reported to the Commission plenary in the Compliance Monitoring (CMS) Report. The compliance monitoring scheme (CMM 2019-06) has recently undergone an independent review (Koehler, 2021) and this CMM now has a work plan for 2020-2021 to:

- develop a risk-based assessment framework to inform compliance assessments and ensure obligations are meeting the objectives of the Commission;
- develop corrective actions to encourage and incentivise CCMs' compliance with the Commission's obligations, where non-compliance is identified; and
- to develop guidelines for participation of observers in closed meetings of the Commission and its subsidiary bodies which consider the Compliance Monitoring Report.

The outcomes and recommendations from the CMS work plan will be put before plenary for consideration at WCPFC18 (December 2021). In summary, each annual TCC report provides a matrix of each CCM's and Participating non-members compliance performance with CMMs. And, while progress towards transparency in reporting on Flag State compliance continues, TCC reports still do not provide sufficient information on outcomes of investigations into non-compliance, nor any specific cases, such that effective deterrence can be demonstrated. Nonetheless, the client fleet is not directly concerned with any reported non-compliance notification from WCPFC, from available documentation.

Sanctions exist and are applied by the **IATTC**, but only to fishing entities by way of listing IUU vessels and vessels detected as being non-compliant with resolutions, much the same as with WCPFC. IATTC notifies Flag States of non-compliant vessels, which the Flag States should then order to withdraw activity from the Commission Fishing Area. The UoA could certainly be subject to sanctions including penalties and loss of fishing license if Japan, as party to this Convention, is notified that one of its flag vessels has been found in non-compliance. Compliance information is reviewed at annual IATTC meetings (under the "Committee for the Review of Implementation of Measures Adopted by the Commission"), and these Compliance Measures should be deterrents to any contracting party to IATTC. And other than IUU listings, the only sanction would potentially be loss of membership to the Convention. Medley et al. (2021) note that some non-compliance is still being detected by the observer programmes. However, it should be noted that observers are not fishery enforcement officers, so information they provide cannot be used for enforcement or sanction purposes. Their reports are therefore used in the MCS to only review compliance with IATTC management measures. Information on non-compliance with IATTC measures is available but is limited. There is also some evidence that where port state measures are better enforced, catch documentation relating to BET via C-03-01 (IATTC bigeye tuna statistical document program) is beginning to show positive trends in helping to reduce IUU fishing of BET, thus providing some degree of effective deterrence. There are no indications that non-compliance is systematic, but no records are available to show that sanctions have been applied to *demonstrably* provide evidence of effective deterrence.

However, it should be noted that Fukuichi Gyogyo Kabushiki Kaisha ("Fukuichi"), was convicted and sentenced for two violations of the Act to Prevent Pollution from Ships and one count of obstruction of an agency proceeding at the District Court of Guam in 2019. The charges stemmed from discharges of waste oil and oily bilge water from their purse seine F/V Fukuichi Maru No. 112 into international waters and the attempt to cover up those discharges when the vessel was inspected by the U.S. Coast Guard in Apra Harbor, Guam. The charges also included failing to properly document the discharge of fishing gear and plastics from the vessel and obstructing a Coast Guard Port State Control inspection. Fukuichi pleaded guilty to one count of obstruction of an agency proceeding, and two counts of violating the Act to Prevent Pollution from Ships. The company was ordered to pay a $1.5 million criminal fine and to serve a five-year term of probation, during which vessels owned and/or operated by the company will be banned from entering the Exclusive Economic Zone, Territorial Sea, or a port or terminal belonging to the United States without prior approval. Fukuichi will also be required to implement a comprehensive Environmental Compliance Plan (ECP) that includes vessel audits. The ECP and associated audits must be sent to the nearest U.S. Coast Guard Captain of the Port prior to any of the company's vessels entering U.S. waters or a U.S. port (PNC 2019) .

Similarly, in June 2021, 2 purse seine vessels of the Taiyo Micronesia Corporation, which is a joint venture company between Taiyo A & F Corporation, a subsidiary company of a major Japanese fishing Company, Maruha Nichiro Co. Ltd. and the National Fisheries Corporation (NFC) of the Federated States of Micronesia (FSM) have been criminally charged and civilly sued in the FSM Supreme Court for unlawful removal of shark fins. The vessel's Japanese captain and the company have been also criminally charged for hindering or disallowing the ship's observer to collect fish samples, and for inaccurately recording catches on four separate occasions, and for violating the Access Agreement. For the other vessel Taiyo Tofol, which have been filed in the FSM Supreme Court, the ship's Japanese Captain, and the ship's Japanese master, were charged criminally for violating the Access Agreement on two separate occasions; for unlawful removal of shark fin; for not immediately releasing shark back into the ocean; and for contamination of the Exclusive Economic Zone (EEZ) (https://fsmembassy.fm/taiyo-micronesia-corporation-criminally-charged-for-unlawful-removal-of-shark-fins/). The news was not broadcasted in Japan and was only available through Embassy of Micronesia's online report, with anecdotal information tells that without observers, it is a common practice for Japanese distant water tuna purse seine fishing vessels to conduct these violations, and fishermen says it was rather just a bad timing to be caught and actually charged. It is heard that since these violations are very common, sanctions are often reduced through negotiations with fishermen and officials, or dismissed at the first time. However, rumors among the industry tells that since the COVID-19, WCPFC observer requirement has been temporary exempted for tune vessels and reportedly vessels are violating the CMMs more than ever. The above and the Fukuichi's actual case for purse seine tell that it might be not that effective deterrence is in place for distant water tuna fishing vessels.

In addition, on November 29th 2021, a nation-wide news reported that at Yaizu Fisheries Cooperative Association, to which the Fukuichi Fishery belongs to, five FCA employees and FCA member presidents of fish processing companies were arrested and prosecuted for stealing 4.5t of frozen skipjack tuna from the Yaizu fishing port. After investigation committee has been established, it was revealed that from several decades ago, staff members had been stealing fish to hand over to fish processing companies and receiving cash to cover expenses for FCA staff's entertainment in company trips and New Year drinking parties.

In addition to the latest incident, it was also revealed that FCA's staff auctioneer had stolen skipjack tuna from auctions to receive money several times, and this was not even the full extent of the breaches. In a press conference, the fishermen's cooperative denied any systematic involvement, but explained that "many of the people who had worked as FCA auctioneers were involved in the fraud, and even if those people became supervisors, they would not stop their subordinates from committing inappropriate acts, so there was an organizational problem. The union president, Mr. Nishikawa, then said, "There was a lack of education for our staff, and we should have ensured compliance. We will do our best to prevent a recurrence so that we can regain the lost trust."
It is unknown whether the Fukuichi Fishery Co. is involved as one of the "fish processing companies", however it is undeniable that FCA's operation and fishery environment in general could be construed as subject to poor management ethics, although this time the sanction is well applied for the violation.

**Japanese** fisheries sanctions are issued through a Ministerial Ordinance on the Permission, Regulation, Etc. of Designated Fisheries (MAFF, 1963), based on the Fisheries Act (MAFF, 1949) and the Act on Protection Fishery Resources (MAFF, 1951), for violation of regulations and relevant conditions applicable to these fishery permits such as vessel capacity, catch reporting, surveillance compliance, VMS, transshipment and landing of fish, etc. The sanctions can range over imprisonment, fines, permit removals or suspensions, confiscation of catch, confiscation of the vessel and gear, or combinations of these. However, without submission of past records of non-compliance and sanctions applied for Japanese longline tuna fishing vessels, either from FCA or government, there is insufficient information to assess this PI. However, see above for a Fukuichi purse seine vessel sanction recently recorded. Sanctions to deal with non-compliance exist, as described above, and are thought to provide reasonably effective deterrence. However, IUU fishing continues to be a problem in tuna fisheries in general, although tightening the Port State Controls does seem to have reduced this problem. But there is very little evidence that sanctions are effective actually reducing IUU overall.

In SH"U"N report, it was evaluated that the submission of catch report from tuna fishery is 100%, however this appears to not include appropriate recording of bycatch and ETP species.  In the ecosystem section, it is stated that JFA requires longline fisheries to use circle hook, measure for bird bycatch mitigation, and catch of silky shark and oceanic whitetip shark is prohibited. However, JFA requirements are self-reporting of bycatch and use of mitigation gears only. Unless observer is on board, it is not clear if the self-reporting is accurate. There is little evidence so far that JFA and FCA make sure that fishers implement these measures.

For the recently MSC-certified pole and line fisheries, it has been revealed that many licensed fishing company/vessels did not know about requirement of bycatch and ETP reporting. There is no strict system in the government to check the compliance (submission of 2nd page of the catch document form, which is to report bycatch and ETP information) There is no penalty of sanction applied for non-reporting of these, and JFA just interpret as "zero" bycatch for non-submission of self-report. It is known that with longline fisheries silky sharks and many species of sea turtles are caught as bycatch, while silky sharks resources status are seriously depleted.  As well, the risk evaluation of longline fisheries by SHUN indicated the risk for sea turtle bycatch was high.

SH”U”N reported that no violation of marine pollution and waste disposal was found by Japanese fishing vessels in WCPFC, however, see above for detected violation by Fukuichi and Taiyo Micronesia Corporation’s purse seine fisheries. It is not certain how marine pollutions regulations are actually complied consistently, while there is only 5% observer coverage for longline to confirm such violations. 100% observer coverage had been required for purse seine fisheries, and there are currently violations while observers are exempted for COVID. Although since 2008, 5% coverage scientific observer program and scientific research vessels are collecting bycatch information from longline fishery, it does not appear that actual fishing vessels’ bycatch are monitored (2.1.3 monitoring through fishing activities, SHUN report), and the government admit that bycatch data is partially collected through the scientific observer system. Due to the limited data, SHUN uses PSA method (data-deficient assessment method) to evaluate bycatch impact from longline and purse seine fisheries.

For vessels over 100 tons, equipment of oil and water separation system is required, and certain areas and discharge density are regulated to prevent marine pollution. Although SHUN reports that no violation has been reported for waste disposal within WCPFC for Japanese vessels, instalment and use of the system for UoA should be confirmed during the assessment.

Therefore, **SG60 is met**, however, further evidence is required to prove that sanctions are consistently applied and thought to provide effective deterrence to meet SG80.

Part VI of the **PNG** Fisheries Management Act (NFA, 1998) deals with Jurisdiction, Procedure, Offences, Penalties and Liabilities. Within this, under Section 57 (1) stipulates that: “An offence against this Act shall be prosecuted summarily before a Principal Magistrate, except where administrative proceedings are taken in accordance with Part VII.” Further, Section 58 of the Act details a comprehensive list of offences, penalties and costs which are identified and can be applied under the Act (as amended). Then, under Part VII of the Act arrangements for the use of Administrative Proceedings and the establishment of an Administrative Panel are spelled out. The use of Administrative Proceedings is determined by the NFA Managing Director, subject to the consent of the Public Prosecutor. Some recent Act amendments include extending the powers of fishery officers to undertake inspections beyond PNG’s waters; increasing court-imposed penalties to a maximum of PGK5m ($1.7mUS) for a first offence and PGK20m ($6.8mUS) for a repeat offence within 24 months; and providing additional grounds for refusing to issue, cancel or suspend a fishing licence. Traceability measures are also in place based on a new catch-documentation scheme, which ensures improved traceability of fishery products through comprehensive record-keeping, enhanced port inspections, a stronger focus on enforcement and better collaboration with other government agencies. Records of sanctions can be found in the press as provided by the NFA. For example, the PNG National (September 21, 2020) reported that the National Fisheries Authority detained and fined a Panama-flagged vessel in Rabaul when it was found with an expired “authorisation to fish” invalidating its PNG licence to receive fish from licensed fishing boats in PNG waters. The fish carrier vessel was fined a total of K3.6 million after being found to have broken several laws under the PNG Fisheries Management Act (1998). The Korean-owned, Panama-flagged vessel displayed a false PNG licence number and when boarded for inspection, attempted to bribe the fishery officer with US$400 (PGK1,379). The vessel was charged with engaging in fishing-related activities with an invalid licence (PGK2 million); inducement of a fisheries officer during the performance of his duties (PGK800,000); and, falsifying markings of a PNG licence number when navigating PNG waters (PGK800,000). The vessel was released after investigation was concluded, and the penalty of PGK3.6 million was fully paid. Another example was reported in the PNG Post-Courier (January 28, 2020), where a Chinese ex-pat was prosecuted after investigation and found guilty of sexually harassing a female Fisheries Office observer aboard a fishing vessel authorized for activity in the PNG EEZ. The defendant was charged under Section 46(2)(d) of the Act, ordered to pay a court fine of PGK15,000 (or in default 2 year hard labour) and pay US$3,000 restitution to the victim. He was subsequently deported. All these infringements were dealt with under Part VII of the Act (Administrative Proceedings) with proceeding to court proceedings. The provisions of the Act demonstrate that sanctions exist to deal with non-compliance, which are consistently applied and are considered to provide effective deterrence. Further penalty provisions can also be found in the Fisheries Management Regulation (2000) under PART IX. – OFFENCES AND PENALTIES.

Based on the above, **SG60 requirements are met** in that actions to deal with non-compliance exist and there is some evidence that they are applied. But **neither SG80 or SG100 requirements are currently being met** because the evidence for sanctions being applied "consistently", and that they provide effective deterrence cannot be demonstrated Nor is there evidence that sanctions demonstrably provide effective deterrence for the case of IUU fishing.

| **c** | Compliance | | | |
|---|---|---|---|---|
| | Guide post | Fishers are **generally thought** to comply with the management system for the fishery under assessment, including, when required, providing information of importance to the effective management of the fishery. | **Some evidence exists** to demonstrate fishers comply with the management system under assessment, including, when required, providing information of importance to the effective management of the fishery. | There is a **high degree of confidence** that fishers comply with the management system under assessment, including, providing information of importance to the effective management of the fishery. |
| | Met? | Yes | No | No |

**Rationale**

**WCPFC** aims to ensure compliance through VMS, IUU vessel listing, port state controls, observers, logbooks and transshipment monitoring. WCPFC TCC has a permanent working group, with a role to review and monitor compliance with WCPFC management measures. The working group also recommends measures to promote compatibility among the national fisheries management measures, addressing matters related to compliance with fisheries management measures, analyse information on compliance and report the findings to the WCPFC, which will in turn inform the members and non-members (Medley et al., 2021). An annual report is produced as part of the compliance review. Identified infringements are reported but not all fisheries comply and clearly there is some non-compliance issues with some vessels and Flag States, as reported by the TCC. WCPFC has a comprehensive MCS system in place, supported by at-sea monitoring coordinated through the FFA (Operation Island Chief), and allows an assessment of relative compliance with the management system, at least over a short snapshot in time of fishing activity in the WCPFC zone. Recent Operation Island Chief (OPIC 2019, from 8-23 August and OPIC 2020), have involved eight Pacific patrol boats and 9 aircraft from the following participating countries: Australia, Fiji, Federated States of Micronesia, Kiribati, Nauru, Papua New Guinea, Republic of Marshall Islands, Solomon Islands, Timor Leste and Vanuatu, along with the Quadrilateral Defence Coordination Group (QUAD – Operation Nasse) – Australia, New Zealand, France and the United States. For the 2019 operation, of the 272 vessels sighted during the Operation, there were 126 boardings at sea and in port, and a total of 90 days in total at sea and included 137 hours of air surveillance. Over the period of 2017 to 2020 (OPIC 2021 closed on Friday 6th August 2021 (FFA, 2021)), most infringements centred around non-reporting or misreporting of critical information or having unmarked gear. A relatively low 3.5% non-compliance rate as documented in the Operation Reports in the available reports from these joint surveillance operations, provides some evidence that a majority of fishers comply with WCPFC management systems. However, there are sufficient gaps reported in data submission timeliness and quality (from data in TCC 2019 and 2020 summary compliance data) to prevent there being a high degree of confidence that fishers in the WCPFC fishing area comply. Therefore, only S**G60 and SG80 are determined to be met.**

**IATTC** has a permanent working group that reviews and monitors compliance with IATTC conservation and management measures, the Committee for the Review of

Implementation of Measures Adopted by the Commission. The annual report minutes (available for 2019 on the IATTC website) are produced as part of the compliance review on observed infringements, but details of infractions and any potential resulting sanctions are difficult to access publicly, due to their deemed confidential nature (see https://www.iattc.org/complianceq2/Login.aspx?ReturnUrl=%2fcomplianceq2). In any case, according to Medley et al. (2021), not all fisheries comply and there is some non-compliance by vessels. However, compliance appears adequate and while issues have been identified, they do not appear widespread or systematic, and none for the issues involve the client fishery. Because the United States and thus the client fishery must share data submission to both IATTC and WCPFC, catch data and other information will still be publicly available when fishing activity is in the EPO. Consequently, available information suggests there is evidence to demonstrate fishers comply with the management system. Therefore, from the above it is deemed that **SG60 and SG80 are met**. However, the confidential nature of much of this sort of information at IATTC means it is difficult to have any high degree of confidence in relation to compliance, thus **not meeting SG100**.

In **Japan**, as mentioned in 3.2.2 and 3.2.3 a and b, there is insufficient information regarding the fishery-specific compliances. Logbook and landing reports, licensing, and VMS, ETP and bycatch report, pollution management and compliance to surveillance and monitoring are all required to score this issue. It is yet to be confirmed if the client company actively engages in voluntary measures on bycatch mitigation, participation in cooperative and/or government meetings or considers any information provided of importance to the effective management of the fishery. However, it can be noted that Fukuichi Fishery Co., Ltd., did conduct a MSC pre-assessment in 2018 for partner fisheries (the client tuna longline vessels), which showed the fishery needed improvement particularly on Principle 2, because of limited information/data about bycatch and bait use. To address the issues and achieve MSC certification, they launched a Fishery Improvement Project (FIP) to improve the accuracy of logbook records and acquire better data on bait species caught in China and Vietnam (MRAG Europe/MRAG Americas 2019). Latest records on the progress to date are from June 2021 (https://fisheryprogress.org/fip-profile/western-central-pacific-ocean-tuna-longline-Yaizu) but this does not report any improvement actions. The Client must provide evidence for proceeding with and successful outcomes of FIP to prove the improvement on actions. Currently, the fishery provided some catch and bycatch information, therefore **SG60 is met** but **SG80 is not met** for Japan.

**PNG's** iFIMS platform integrates fisheries management, compliance and marketing information. It covers catch reporting, vessel position and activity data generated by VMS, as well as real-time fisheries observer reporting. The system holds industry, government and flag State information and through various modules. It provides catch data to SPC via electronic reports, allows observer placement management, facilitates the operation and management of the PS VDS not only in the PNG EEZ and Aws, but all PNA waters. At least for the purse seine fishery, with 100% observer coverage, theoretically there is limited scope for non-compliance and hence confidence that fishers are complying with management arrangements. Such confidence may not be the same for the longline fishery, with much lower mandated observer coverage. Nonetheless, MCS mechanisms ensure the management measures in the fishery are enforced and complied with. **SG60 and SG80 requirements are thus met** but even given the comprehensive nature of the MCS arrangements supported by iFIMS "a high degree of confidence" that fishers are complying with all management arrangements, including providing information of importance in managing the fishery, **is not met for SG100**.

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|---|---|---|---|---|
| **d** | Systematic non-compliance | | | |
| | Guide post | | There is no evidence of systematic non-compliance. | |

| | Met? | | No |
|---|---|---|---|

**Rationale**

By reviewing publicly available summary reports and meeting documents of the annual meetings of **WCPFC** Commission Plenary (WCPFC, 2020c, 2021d) and the Technical Compliance Committee (WCPFC TCC, 2020b), as well as data from observer reports under Country Report 1 to the Science Committee (WCPFC, 2021a; WCPFC SC, 2018, 2020), there is no evidence of systematic non-compliance. When non-compliance does occur, offences vary from minor (e.g., late submissions of reports) to more serious issues, such as not complying with the conditions of FAD closures or not fully complying with the regional observer programme (e.g., at least 5 % mandatory observer coverage for longline vessels and 100% for purse seine vessels). Overall, however, there is no evidence of systematic non-compliance with CMMs that would impede the Commission in performing its management functions.

There is some evidence of non-compliance with conservation measures from meetings of the **IATTC** Committee for the Review of Implementation of Measures Adopted by the Commission, however this does not suggest systematic non-compliance. There is a high level of monitoring of the fishery (100% purse seine coverage and 5% longline coverage), and although there is evidence of potential infractions, there is no evidence of systematic non-compliance.

In general, from the reports of activities to the annual meetings of the WCPFC TCC, on a national level, J**apan's** fisheries do not appear to have problems with systematic non-compliance, and the available information from the client fishery under assessment indicates that there have been no *serious* cases reported, however, this need verification during the site visit.

At Yaizu port, recently a systematic and chronic organizational problem has been found and sensationally broadcasted in national news, as explained in 3.2.3. This suggests that there is no robust checking and reporting system at main landing port when receiving fish and conducting auctions. Without proof with other evidence, it is not clear if systematic non-compliances do not exist**. SG80 is not met for the jurisdiction of Japan**, but this is to be discussed at the site visit.

Since it has been noted that for **PNG**, even with its well-managed and financially supported domestic fisheries, augmented by a functional and effective MCS system, some non-compliance could still occur. However, the information presented in PI 3.2.3 SIa-SIc would at least suggest that there is little evidence of systematic non-compliance.

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| | |
|---|---|
| Draft scoring range | 60-79 |
| Information gap indicator | Information regarding fishery's specific performance and management actions (compliance data, review and reporting data, voluntary management plan, etc.) regarding longline fishery from the fisheries cooperatives that UoA belong to are insufficient to score this PI.<br>The client fishery should submit updated licenses, logbooks from each vessels, and evidences to comply bycatch mitigation measures, waste management records (pursuant to the new CMM of marine |

| | |
|---|---|
| | pollution), VMS track records to demonstrate the outcome of FIP progress.<br>For longline fisheries there need to be evidences of recent surveillances and inspections conducted, along with monitoring structure, observer coverage %, as well as any detected non-compliance from JFA. |

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

| | |
|---|---|
| Overall Performance Indicator score | |
| Condition number (if relevant) | |

**Scoring table 41. PI 3.2.4 – Monitoring and management performance evaluation**

| PI 3.2.4 | | There is a system of monitoring and evaluating the performance of the fishery-specific management system against its objectives<br>There is effective and timely review of the fishery-specific management system | | |
|---|---|---|---|---|
| Scoring Issue | | SG 60 | SG 80 | SG 100 |
| **a** | Evaluation coverage | | | |
| | Guide post | There are mechanisms in place to evaluate **some** parts of the fishery-specific management system. | There are mechanisms in place to evaluate **key** parts of the fishery-specific management system. | There are mechanisms in place to evaluate **all** parts of the fishery-specific management system. |
| | Met? | Yes | Yes | No |

**Rationale**

**WCPFC** has mechanisms in place to evaluate all parts of the management system through the various committees and working groups that meet regularly and report their findings to the Commission. The WCPFC Secretariat submits a report on compliance of members with the reporting provisions of the Commission (CMM 2019-06). Progress with implementation of CMMs is monitored through the reporting provisions within the CMMs themselves, or the members' Annual Reports (Parts 1 & 2) to the Commission. Stock assessments conducted by the SPC are subject to peer review by other members of the Scientific Committee and through occasional external reviews. Commission meetings provide an overall review of processes and outcomes. The WCPFC has well-developed arrangements to provide a range of information to the Secretariat and Commission Members through the Scientific Committee and the Technical and Compliance Committee. Both these committees are established by the Convention, which sets out the functions for each. The Scientific Committee (SC):

- Recommends a research plan;
- Reviews stock assessments, analyses, other work and recommendations prepared for the Commission by scientific experts;
- Reviews the results of research and analyses of target stocks, non-target, associated or dependent species in the Convention Area;
- Reports to the Commission its findings or conclusions on the status of target stocks or non-target or associated or dependent species in the Convention Area;
- In consultation with the Technical and Compliance Committee, recommends to the Commission the priorities and objectives of the regional observer programme and assesses results of that programme; and
- Makes reports and recommendations on the conservation and management of and research on target stocks or non-target or associated or dependent species in the Convention Area.

On the other hand, the Technical and Compliance Committee (TCC):

- Provides the Commission with information, technical advice and recommendations relating to the implementation of and compliance with conservation and management measures;
- Monitors and reviews compliance with conservation and management measures adopted by the Commission and makes such recommendations to the

Commission as may be necessary; and

• Reviews the implementation of cooperative measures for monitoring, control, surveillance and enforcement adopted by the Commission and makes such recommendations to the Commission as may be necessary.

In addition, there was an overall performance review of the WCPFC in 2012 (WCPFC, 2012). Based on the above information, mechanisms exist to evaluate "all" and not just the key parts of the management system, thus showing that **SG60, SG80 and SG100 are deemed met.**

**IATTC** has extensive *mechanisms* in place to evaluate the management system as demonstrated by the various committees and working groups of IATTC that meet regularly and report their findings to the Commission. As well as the annual Commission meetings, regular meetings include those for the Scientific Advisory Committee, the Committee for the Review of Implementation Measures and the International Review Panel, as well as an overall performance review in 2016 (Moss-Adams, 2016). Reports from meetings of the various groups are available on the IATTC website. While the purse seine fishery is the major component of overall fishing in the EPO and receives a strong focus in IATTC processes, the longline sector is less well served in the attention given to its management. Nonetheless, all aspects of fishing activity and their relative effects on target species stocks are taken into consideration when implementing Harvest Control Rules (Resolution C-16-02) once fully agreed to. These have recently been evaluated during Management Strategy workshops (IATTC, 2019, 2021a). So, mechanisms do *exist* to evaluate most of the key elements of the management system, thus **meeting SG60 and SG80 requirements.** However, **SG100 is deemed not met** because, although Harvest Control rules exist, their final mechanisms for implementation are still under discussion and therefore cannot be fully evaluated yet, thus not meeting the "*all parts"* criterion.

In addition, both WCPFC and IATTC performances are routinely monitored by NGOs, such as International Seafood Sustainability Foundation, Oceana, Pew Foundation and WWF.

**Japan's** offshore and distant-water fishery performance is usually reviewed at the time of license renewal, with annual reporting (the JFA "White Paper) of catch reports, and VMS monitoring by FA officials through satellite tracking. Catch data are regularly monitored by the Tuna Associations as well, under their obligation to inform and guide members. However, monitoring and evaluation in the Japanese management system itself takes place more as a "cursory" internal audit, since there appears to be lack of an any comprehensive systematic analysis to effectively evaluate strength and weakness of fishery management performance. Although there are occasional Minister-issued "Notice of Compliance Requirement" informing fishers that they must follow WCPFC and other RFMOs' decisions, someone in the management system has been aware of such lack by someone in authority, although the same "non-compliance" issues, especially in reporting, seem to keep cropping up. Thus, **only SG60 and SG80 are deemed met.**

In **PNG**, there are no formal mechanisms requiring regular evaluation of key parts of the fisheries management system. However, the Fisheries Management Act (NFA, 1998) does provide instruction on the preparation and implementation of Fisheries Management Plans. For instance, such plans shall:

- identify the fishery and its characteristics, including its current state of exploitation;
- specify the objectives to be achieved in the management of the fishery;
- identify any possible adverse environmental effects of the operation of fishing activities in the fishery;
- identify, where appropriate, any relevant customary fishing rights or practices; and

- shall be kept under review and shall be revised as necessary.

The National Tuna Fishery Management and Development Plan (NFA, 2014b) implements this last statutory obligation. Key areas identified in this review process identify the use of fishery reference points, harvest control rules and the monitoring and control of effort and effort creep, especially when considering the purse seine fishery. The combination of the WCPFC measures, those implemented by PNA as part of the PS VDS and the National Tuna Fishery Management and Development Plan 2014 provide mechanisms to evaluate key parts of the fishery-specific management. There is a system of monitoring and evaluating the performance of the fishery-specific management system against its objectives. There is effective and timely review of the fishery-specific management system. system. Given the above, **SG60 and SG80 requirements are met** but, since these arrangements do not ensure that there are mechanisms in place to evaluate *all parts* of the management system, **SG 100 is not met.**

| **b** | Internal and/or external review | | | |
|---|---|---|---|---|
| | Guide post | The fishery-specific management system is subject to **occasional internal** review. | The fishery-specific management system is subject to **regular internal** and **occasional external** review. | The fishery-specific management system is subject to **regular internal and external** review. |
| | Met? | Yes | Yes | No |

**Rationale**

Although the **WCPFC** does not have a regular programme of external reviews, independent performance reviews were undertaken in 2011 and in 2014, consistent with the Kobe Course of Actions. As a result, the Commission established several working groups to address the different recommendations of the reports, which can be found on the WCPFC website. Also, independent reviews (MRAG, 2009; MRAG Asia Pacific, 2016) have also been conducted of the Commission's science and TCC structure and functions, resulting in overhauling of their operations and adoption of review processes and other changes to the data submissions and science functions. There have also been Independent Reviews of the Compliance Monitoring Scheme (Koehler, 2021; MacKay et al., 2018) which assessed CCMs' compliance with their obligations; identified areas that required capacity building and technical assistance; identified aspects of CMMs that need to be amended or refined and responded to non-compliance through remedial options. The WCPFC does however, have a regular programme of internal review. For example, CMS is reviewed and updated as per a pre-determined review schedule (e.g., CMM 2019-06), which is not limited to specific parts but can include all aspects of the management system (e.g., compliance, science, management). Evidence presented to support this process include the submission of the WCPFC Secretariat reports on compliance (and IUU) of its members with the reporting provisions of the Commission (CMM 2019-06). WCPFC has been subject to occasional external review of the methodologies used by the science service provider (SPC) for their stock assessments as well as overall management performance (see Medley et al., 2021), there is no clear commitment to regular external performance reviews at WCPFC. Therefore, **SG60 and SG80 are met, but SG100 is not met.**

**IATTC** performance has also been reviewed relative to other Tuna RFMOs (FAO, 2015; Medley et al., 2021). The IATTC Commission and its various committees and working groups do meet regularly. Discussions and scientific documents relating to stock assessments have well-established processes for review. Thus, IATTC has several subsidiary bodies that also meet annually:

1) The Committee on Administration and Finance,

2) The Scientific Advisory Committee,
3) The Committee on Compliance Review (including Review of Implementation Measures) as well as,
4) An International Review Panel, including the AIDCP, which is administered by IATTC.

IATTC therefore, has a regular and systematic process relating to each of its main components – Science, Policy, Compliance, Administration and Finance. The scientific advisory committee (SAC) undergoes a rigorous scientific process that includes assessments of stock status, including external reviews of assessment methodologies (Cass-Calay et al., 2019; Punt et al., 2019), as well as Management Strategy Evaluation (MSE). Administration components have also been included in the performance reviews (Moss-Adams, 2016). These reviews demonstrate that IATTC has mechanisms in place to evaluate the fishery-specific management system occasionally. **Therefore, SG60 and SG80 are considered met**, but since external reviews appear to be mostly *ad hoc*, **SG100 is not met.**

In **Japan**, management plans are not reviewed by prefectures, but minister is responsible for approving the FC's voluntary management system, if in place. The FC's management plan is not submitted yet to the assessment team and thus request this submission before site visit. Management measures are determined at RFMOs and Japan follows the decision to apply to the domestic regulations. The chances for internal reviews for overall fishery-specific management system of longline tuna fisheries appear to exist during the regular government-industry (FCA with representatives of local FCs or vessel owners) meetings, and external reviews may be occasionally conducted at Fisheries Policy Council with presence of NGOs and academia, as well as industry and government representatives.

Management measures are decided at RFMOs meetings and Japan applies the decisions to the domestic regulations. For the implementation, licensing systems and member allocations are discussed through regular government-industry (FCA with representatives of local FCs or vessel owners) meetings. There are regular meetings between fisheries cooperative members, the Fisheries Agency, and the Fisheries Research Agency to discuss and review overall management regulations and WCPFC compliance implementation among members. Where peer reviews are performed, with attendance of JFA and FRA, these could be construed as constituting an internal review. If FCA or FC has voluntary management plans, the minister is responsible for reviewing and approving the voluntary management system. (The FC's management plan is not submitted yet to the assessment team and thus request this submission before site visit.) Annual reports submitted by JFA to WCPFC, could then be considered as an external review process, by extension of the previous logic. The Fishery Policy Council is also an instrument for internal/external review of local fisheries management, as it consists of external academic and industry representatives, despite the members chosen for the discussions are selected internally by the Council. Stock assessment conducted at National level includes 52 species with 84 stocks (MAFF), including the species of UoAs under assessment (http://kokushi.fra.go.jp/index-2.html). National Research and Development Agency, Japan Fisheries Research and Education Agency (FRA) has introduced a new holistic stock status assessment (called SH"U"N Project) and in 2019 published a new method, whereby 113 species are assessed, including those within the UoA. This assessment method covers not only stock status but also analyses the fishery impacts on ecosystem and environment, fishery management and sustainability in fishery communities. These evaluation reports on North Pacific Albacore, Yellowfin and Bigeye were published early in 2020, after an extensive public consultation period. These evaluation reports are now programmed annually. The last independent review was conducted in 2012, however, and therefore cannot be considered part of a "regular" external review. Therefore, the fishery-specific management system is subject to regular internal and occasional external review, **thus meeting SG60 and SG80**. However, in the "External" reviews at the RFMO level, not all areas are completely covered, and it is certainly not clear whether SC or TCC actually verify the details of data submitted, to confirm results in the country reports, and thus **SG100 is not met.**

As noted in 3.2.4 SI(a), **PNG** has no formal system to conduct regular internal reviews of its fishery specific management system. However, there are legislative obligations built into the Fisheries Management Act (NFA, 1998) and the National Tuna Fishery Management and Development Plan (NFA, 2014b) requiring review of key parts of its management systems. In 2014, the European Commission issued a yellow card warning under the Commission's IUU regulations, after review of PNGs management implementation. A finding under the Regulations indicates non-EU countries have failed to fight IUU fishing and urges the "carded" country to improve fisheries management, enforcement and compliance. Upon implementing numerous reforms and amendments to strengthen legislation and the MCS systems, the yellow card was lifted in 2015. Overall, considering regional and national arrangements, including the role of the National Tuna Fishery Management and Development Plan and the EC review of management arrangements following the yellow card issued in 2014, there is evidence to suggest that the overall management system is subject to some sort of regular internal and very occasional external review. As such **SG60 and SG80 are deemed met**, but since the management system is not subject to *regular* internal nor external review, **SG100 is not met**.

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

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

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

| | |
|---|---|
| Overall Performance Indicator score | |

| | |
|---|---|
| Condition number (if relevant) | |

# 6 References

Section added by CU UK

The report shall include a reference list detailing all information sources used in assessing the fishery and preparing the report.

[For example: *Author, Year. Title of Article, Title of Journal, Volume number, Page(s)*.]

# 7 Appendices

## Appendix 1 Assessment information

## Appendix 1.2 Small-scale fisheries

| Unit of Assessment (UoA) | Percentage of vessels with length <15m | Percentage of fishing activity completed within 12 nautical miles of shore |
|---|---|---|
| UoA 1 | 0 | 0 |
| UoA 2 | 0 | 0 |
| UoA 3 | 0 | 0 |
| UoA 4 | 0 | 0 |
| UoA 5 | 0 | 0 |
| UoA 6 | 0 | 0 |
| UoA 7 | 0 | 0 |
| UoA 8 | 0 | 0 |

# Appendix 2 Evaluation processes and techniques

## Appendix 2.1 Site visits

The report shall include:

- An itinerary of site visit activities with dates.
- A description of site visit activities, including any locations that were inspected.
- Names of individuals contacted.

Reference(s): FCP v2.2 Section 7.16

The site visit was held at XXXX, on the XXXX. The individuals met during the site visit and their roles in the fishery are listed in Table 54.

**Table 54. List of attendees at the on-site meetings.**

| Name | Position | Type of consultation |
|---|---|---|
| | | |
| | | |

## Appendix 2.2 Stakeholder participation

The report shall include:

- Details of people interviewed: local residents, representatives of stakeholder organisations including contacts with any regional MSC representatives.
- A description of stakeholder engagement strategy and opportunities available.

Reference(s): FCP v2.2 Section 7.16

## Appendix 2.3 Evaluation techniques

At Announcement Comment Draft report stage, if the use of the RBF is triggered for this assessment, the CAB shall include in the report:

- The plan for RBF activities that the team will undertake at the site visit.
- The justification for using the RBF, which can be copied from previous RBF announcements, and stakeholder comments on its use.
- The RBF stakeholder consultation strategy to ensure effective participation from a range of stakeholders including any participatory tools used.
- The full list of activities and components to be discussed or evaluated in the assessment.

At Client Draft Report stage, if the RBF was used for this assessment, the CAB shall include in the report:

- A summary of the information obtained from the stakeholder meetings including the range of opinions.
- The full list of activities and components that have been discussed or evaluated in the assessment, regardless of the final risk-based outcome.

The stakeholder input should be reported in the stakeholder input appendix and incorporated in the rationales directly in the scoring tables.

Reference(s): FCP v2.2 Section 7.16, FCP v2.2 Annex PF Section PF2.1

# Appendix 3 Peer review reports

## To be drafted at Public Comment Draft Report stage

The report shall include unattributed reports of the Peer Reviewers in full using the relevant templates. The report shall include explicit responses of the team that include:

- Identification of specifically what (if any) changes to scoring, rationales, or conditions have been made; and,
- A substantiated justification for not making changes where peer reviewers suggest changes, but the team disagrees.

Reference(s): FCP v2.2 Section 7.14

# Appendix 4 Stakeholder input – delete if not applicable

## To be drafted at Client and Peer Review Draft Report

The CAB shall use the ‘MSC Template for Stakeholder Input into Fishery Assessments’ to include all written stakeholder input during the stakeholder input opportunities (Announcement Comment Draft Report, site visit and Public Comment Draft Report). Using the ‘MSC Template for Stakeholder Input into Fishery Assessments’, the team shall respond to all written stakeholder input identifying what changes to scoring, rationales and conditions have been made in response, where the changes have been made, and assigning a ‘CAB response code’.

The ‘MSC Template for Stakeholder Input into Fishery Assessments’ shall also be used to provide a summary of verbal submissions received during the site visit likely to cause a material difference to the outcome of the assessment. Using the ‘MSC Template for Stakeholder Input into Fishery Assessments’ the team shall respond to the summary of verbal submissions identifying what changes to scoring, rationales and conditions have been made in response, where the changes have been made, and assigning a ‘CAB response code’.

Reference(s): FCP v2.2 Sections 7.15, 7.20.5 and 7.22.3

# Appendix 5 Conditions – delete if not applicable

## Appendix 5.1 New Conditions - delete if not applicable

### To be drafted at Client and Peer Review Draft Report stage

The CAB shall document in the report all conditions in separate tables.

Reference(s): FCP v2.2 Section 7.18, 7.30.5 and 7.30.6

**Table 55. Condition 1**

| | |
|---|---|
| **Performance Indicator** | |
| **Score** | State score for Performance Indicator |
| **Justification** | Cross reference to page number containing scoring template table or copy justification text here. If condition relates to a previous condition or one raised and closed in the previous assessment include information required here |
| **Condition** | State condition |
| **Condition deadline** | State deadline of condition |
| **Exceptional Circumstances** ☐ | Check the box if exceptional circumstances apply and condition deadline is longer than the period of certification (FCP v2.2 7.18.1.6). Provide a justification |
| **Milestones** | State milestones and resulting scores where applicable |
| **Veriication with other entities** | Include details of any verification required to meet requirements in FCP v2.2 7.19.8. |
| Complete the Following Rows for reassessments | |
| **Carried over condition** ☐ | Check the box if the condition is being carried over from a previous certificate and include a justification for carrying over the condition (FCP v2.2 7.30.5.1.a).<br>Include a justification that progress against the condition and milestones is adequate (FCP v2.2 7.30.5.2). The CAB shall base its justification on information from the reassessment site visit. |
| **Related condition** ☐ | Check the box if the condition relates to a previous condition that was closed during a previous certification period but where a new condition on the same Performance Indicator or Scoring Issue is set.<br>Include a justification – why is a related condition being raised? (FCP v2.2 7.30.6 & G7.30.6). |
| **Condition rewritten** ☐ | Check the box if the condition has been rewritten. Include a justification (FCP v2.2 7.30.5.3). |

# Appendix 6 Client Action Plan

## To be added from Public Comment Draft Report stage

The report shall include the Client Action Plan from the fishery client to address conditions.

Reference(s): FCP v2.2 Section 7.19

**Before accepting the Client Action Plan please make sure that FCP v2.2 7.19.8 has been addressed correctly.**

*"7.19.8 The CAB shall not accept a Client Action Plan if the client is relying upon the involvement, funding and/or resources of other entities (fisheries management or research agencies, authorities or regulating bodies that might have authority, power or control over management arrangements, research budgets and/or priorities) without:*

*a. Verifying with those same entities, whether the closure of conditions is likely to require any or all of the following:*

*i. Investment of time or money by these entities.*

*ii. Changes to management arrangements or regulations.*

*iii. Re-arrangement of research priorities by these entities.*

*b. Being satisfied that the closure of conditions is both achievable by the client and realistic in the period specified."*

**INSERT CAP TABLE HERE**

**Please complete Table:**

| | |
|---|---|
| **7.19.8a i-iii : Verified by :** | Initials: **TO BE COMPLETED**<br>Date: **TO BE COMPLETED** |
| **7.19.8b Based on the above Control Union UK (CUUK) is satisfied that the closure of conditions is both achievable by the client and realistic in the period specified.** | |

# Appendix 7 Surveillance

## To be drafted at Client and Peer Review Draft Report stage

The report shall include the program for surveillance, timing of surveillance audits and a supporting justification

Reference(s): FCP v2.2 Section 7.28

**Table 56. Fishery surveillance programme**

| Surveillance level | Year 1 | Year 2 | Year 3 | Year 4 |
|---|---|---|---|---|
| e.g. Level 5 | e.g. On-site surveillance audit | e.g. On-site surveillance audit | e.g. On-site surveillance audit | e.g. On-site surveillance audit & re-certification site visit |
| | | | | |

**Table 57. Timing of surveillance audit**

| Year | Anniversary date of certificate | Proposed date of surveillance audit | Rationale |
|---|---|---|---|
| e.g. 1 | e.g. May 2018 | e.g. July 2018 | e.g. Scientific advice to be released in June 2018, proposal to postpone audit to include findings of scientific advice |
| | | | |

**Table 58. Surveillance level justification**

| Year | Surveillance activity | Number of auditors | Rationale |
|---|---|---|---|
| e.g.3 | e.g. On-site audit | e.g. 1 auditor on-site with remote support from 1 auditor | e.g. From client action plan it can be deduced that information needed to verify progress towards conditions 1.2.1, 2.2.3 and 3.2.3 can be provided remotely in year 3. Considering that milestones indicate that most conditions will be closed out in year 3, the CAB proposes to have an on-site audit with 1 auditor on-site with remote support – this is to ensure that all information is collected and because the information can be provided remotely. |
| | | | |

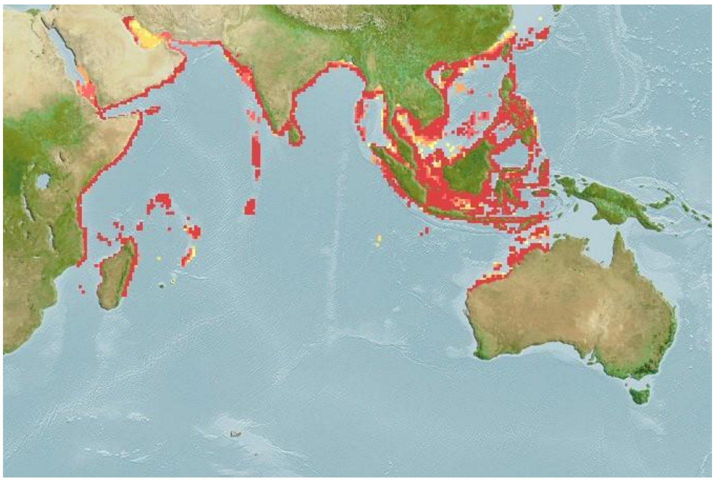
# Appendix 8 Risk-Based Framework outputs

## To be drafted at Client and Peer Review Draft Report stage

The following PSA analyses are provisional only and were carried out to provide an indicative score in the ACDR. The analyses will be finalised following stakeholder input during the site visit.

**Table 59. PSA Rationale Table – Smoothbelly sardinella (*Amblygaster leiogaster*)**

| **PI number** | **2.2.1 (Secondary species outcome)** | |
|---|---|---|
| Productivity | | |
| Scoring element (species) | **Smoothbelly sardinella (*Amblygaster leiogaster*)** | |
| **Attribute** | **Rationale** | **Score** |
| Average age at maturity. | While this information is not available for this species, it is known for other *Amblygaster* species including: *Amblygaster sirm*.<br>For *Amlygaster sirm* this is around: 7 months (Milton and Blaber, 1993), 10-12 months of age (Conand, 1991),) to over a year (Bennet et al. 1986).<br>This is below 5 years so are considered low risk and awarded a 1 in the PSA. | 1 |
| Average maximum age | While this information is not available for this species, it is known for other *Amblygaster* species including *Amblygaster sirm*.<br>For *Amlygaster sirm* this is around 1.2-2 years of age (Conand, 1991; Milton et al. 1993) and 2-4 years (Bennet et al. 1986)<br>This is below 10 years and is considered low risk and awarded a 1 in the PSA. | 1 |
| Fecundity | While this information is not available for this species, it is known for other *Amblygaster* species including *Amblygaster sirm*.<br>For *Amlygaster sirm* this is up 96,500 eggs or average 47,029 ± 1,435,13 (Sululu et al,. 2020)<br>This is >20,000 eggs per year and is considered low risk and awarded a 1 in the PSA. | 1 |
| Average maximum size | Average max size: 18-23cm (Peralta, 2013). 23cm according to Fishbase. This is considered low risk and awarded a 1 in the PSA. (*Fishbase* - https://www.fishbase.se/summary/1500). | 1 |
| Average size at maturity | While this information is not available for this species, it is known for other *Amblygaster* species including *Amblygaster sirm* and *Amblygaster clupeoides*.<br>For *Amlygaster sirm* this is between 16-17cm (Conand, 1991), 18cm (Milton et al., 1994) and 15-17cm (Sululu et al,. 2020), 15-22cm (Hunnam, 2021) and 15cm (Fishbase: https://www.fishbase.se/summary/Amblygaster-sirm)<br>For *Amlygaster clupeoides* this is around 18cm (Rahman, 2017). | 1 |

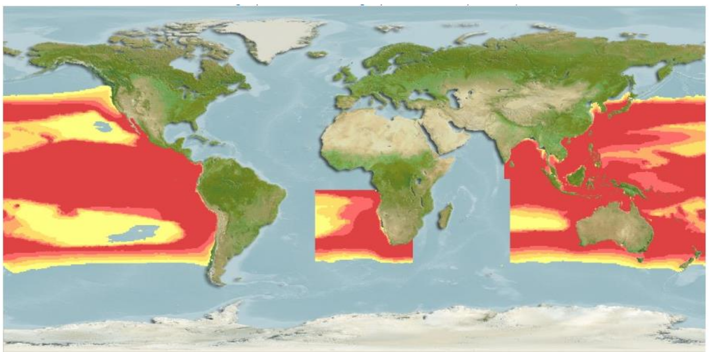
| | | |
|---|---|---|
| | This is considered low risk and awarded a 1 in the PSA. | |
| Reproductive strategy | Is a broadcast spawner according to *Fishbase* so is considered low risk and awarded a 1 in the PSA.<br>(*Fishbase* - https://www.fishbase.se/summary/1500) | 1 |
| Trophic level | Trophic level 3.4 ± 0.5 se so considered high risk and awarded a score of 3 in PSA https://www.fishbase.se/summary/1500.<br><br>Feeds mostly on planktonic invertebrates primarily copepods, but also on gastropod larvae, ostracods and pteropods | 3 |
| **Susceptibility** | | |
| Fishery only where the scoring element is scored cumulatively | . | |
| **Attribute** | **Rationale** | **Score** |
| Areal Overlap | Smoothbelly sardinella is distributed within the coastal tropical and subtropical waters of the Indo-west Pacific region, including along the coast of Africa eastwards to Okinawa Japan and south to Western Australia. It is reported to be widespread throughout this region (Hunnam, 2021). The UoAs currently source smoothbelly sardinella from China.<br><br>The species has a wide distribution in coastal waters of the Indo-west Pacific, with a distribution map available from Aquamaps (Figure A). Knowledge of stock structure is unknown, but given the reproductive strategy of the species (broadcast spawners) is likely at a broad scale as per *Amblygaster sirm* (Sululu et al. 2020). Fishing activity within China would likely cover less than <10% of the Indo-west Pacific basin. A score of 1 has been awarded.<br><br><br>**Figure A. Distribution of Amblygaster leiogaster (*Smoothbelly sardinella*) Source: Kaschner et al. (2019)**<br><br>**https://www.aquamaps.org/receive.php?type_of_map=regular** | 1 |
| Encounterability | This species makes up one of the many target species taken by Chinese fisheries, therefore by default must score a 3. | 3 |

| | | |
|---|---|---|
| Selectivity of gear type | The specific gear types that were used to catch this bait species for the vessels in the UoA is unknown. Fisheries (mainly reported as *Ablygaster.sirm*) are noted in Sri Lanka, India, Thailand (Devaraj and Martosubroto 1997), the Philippines (Willette et al., 2011), Solomon Islands (Roeger et al. 2016) and New Caledonia (Conand 1991) (see Hunnam, 2021 for further information). There is no information on the commercial fisheries in China.<br><br>Due to an inability to assess the selectivity of this gear and overall high level of uncertainty due to a lack of information it was decided to take a precautionary approach to scoring this attribute. Therefore, the highest risk level score was awarded. | 3 |
| Post capture mortality | This is a retained target species. Therefore, by default must score a 3. | 3 |

**Table 60. PSA Rationale Table – Amberstripe Scad (*Decapterus muroadsi*)**

| **PI number** | **2.2.1 (Secondary species outcome)** | |
|---|---|---|
| Productivity | | |
| Scoring element (species) | **Amberstripe Scad (*Decapterus muroadsi*)** | |
| **Attribute** | **Rationale** | **Score** |
| Average age at maturity. | While this is not available for this species, it is known for other scad species including *Decapterus russelli*, *Decapterus macrosoma, Decapterus macarellus* and *Decapterus maraudsi* which indicate average age at maturity of two years (Ohshimo et al., 2006; Shiraishi et al., 2010). This is below 5 years so are considered  low risk and awarded a 1 in the PSA. | 1 |
| Average maximum age | While this is not available for this species, it is known for only two other scad species from the same Genus including *Decapterus russelli* and *Decapterus maraudsi*, which indicate average maximum age between six and 13-15 years (Ohshimo et al., 2006). As this ranges across the high and medium productivity classifications a precautionary approach has been taken by awarding a higher PSA score to account for the highest age value. | 2 |
| Fecundity | Scad species such as *Decapterus russelli* and *Decapterus maraudsi*, are all highly fecund species producing well over 20,000 eggs each spawning. Some species such as *Decapterus russelli* produce over 100,000 eggs (Poojary et al., 2015). This is considered  low risk and awarded a 1 in the PSA. | 1 |
| Average maximum size | Average max size: 50cm more commonly found around 30cm (*Fishbase - https://www.fishbase.se/summary/12302*) | 1 |
| Average size at maturity | Average size at maturity ranges for the species, including:<br><br>24-27cm for *Decapterus macarellus* (Costa et al., 2020).<br>16-19cm for *Decapterus macrosoma* (Asni and others, 2019)<br>17cm for *Decapterus russelli* (Bintoro et al., 2019)<br>15.3cm for *Decapterus russeli* (Poojary et al., 2015) | 1 |

<table>
<tr><td></td><td>14-24.5cm for <i>Decapterus russeli</i><br>(<i>https://www.fishbase.se/summary/Decapterus-russelli.html</i> )<br><br>These values are all below the 40cm value so are considered low risk and awarded a 1 in the PSA.</td><td></td></tr>
<tr><td>Reproductive strategy</td><td>All scads are broadcast spawners so are considered low risk and awarded a 1 in the PSA.<br>https://www.fishbase.se/summary/12302</td><td>1</td></tr>
<tr><td>Trophic level</td><td>Trophic level 3.4 ± 0.5 se so considered high risk and awarded a score of 3 in PSA. https://www.fishbase.se/summary/12302.<br><br>Feeds mostly on planktonic invertebrates primarily copepods, but also on gastropod larvae, ostracods and pteropods.<br>http://fishesofaustralia.net.au/home/species/4271#moreinfo</td><td>3</td></tr>
<tr><td colspan="3"><b>Susceptibility</b></td></tr>
<tr><td>Fishery only where the scoring element is scored cumulatively</td><td colspan="2"></td></tr>
<tr><td><b>Attribute</b></td><td><b>Rationale</b></td><td><b>Score</b></td></tr>
<tr><td>Areal Overlap</td><td>The UOAs currently source Amberstripe scad from three countries, China, Indonesia and Vietnam. The percentage contributions from suppliers as provided by the client are detailed below:<br><br>
<table>
<tr><th>Year</th><th>Country</th><th>Tonnes</th><th>%</th></tr>
<tr><td>2018</td><td>Indonesia</td><td>25.59</td><td>8.94%</td></tr>
<tr><td></td><td>China</td><td>40.81</td><td>14.26%</td></tr>
<tr><td></td><td>Vietnam</td><td>219.70</td><td>76.79%</td></tr>
<tr><td>2019</td><td>Indonesia</td><td>108.40</td><td>31.67%</td></tr>
<tr><td></td><td>China</td><td>126.76</td><td>37.03%</td></tr>
<tr><td></td><td>Vietnam</td><td>107.17</td><td>31.31%</td></tr>
<tr><td>2020</td><td>Indonesia</td><td>99.87</td><td>25.10%</td></tr>
<tr><td></td><td>China</td><td>222.50</td><td>55.93%</td></tr>
<tr><td></td><td>Vietnam</td><td>75.44</td><td>18.96%</td></tr>
</table>
<br>The species has a global distribution with a distribution map available from Aquamaps (Figure B) . Knowledge of stock structure is unknown, but given the reproductive strategy of the species (broadcast spawners) is likely at a broad scale as per <i>Decapterus russelli</i> (Sen et al. 2011). Fishing activity within Indonesia, China and Vietnam would likely cover less than <10% of the global distribution and the Indo-Pacific basin. A score of 1 has been awarded similar to Jones et al. (2020).</td><td>1</td></tr>
</table>

| | | |
|---|---|---|
| | <br>**Figure B. Distribution of amberstripe scad (*Decapterus muroadsi*). Source: Kaschner et al. (2019)**<br>**https://www.aquamaps.org/receive.php?type_of_map=regular** | |
| Encounterability | This species makes up one of the many target species taken by China, Indonesia and Vietnam fisheries, and is a target species of these fisheries, therefore by default must score 3. | 3 |
| Selectivity of gear type | The specific fisheries and gear types that were used to catch this bait species for the vessels in the UoA is assumed to be the same as in Jones et al. (2020) and identified as gillnet and purse seine. However, there are many other various fisheries and gear types that catch this species within the three countries where it was sourced. Due to an inability to assess the selectivity of this gear and overall high level of uncertainty it was decided to take a precautionary approach to scoring this attribute. Therefore, the highest risk level score was awarded. | 3 |
| Post capture mortality | This is a retained species from all fisheries and by all gear types. Therefore, by default must score 3. | 3 |

# Appendix 9 Harmonised fishery assessments – delete if not applicable

Harmonisation is required in cases where assessments overlap, or new assessments overlap with pre-existing fisheries.

If relevant, in accordance with FCP v2.2 Annex PB requirements, the report shall describe processes, activities and specific outcomes of efforts to harmonise fishery assessments. The report shall identify the fisheries and Performance Indicators subject to harmonisation.

Reference(s): FCP v2.2 Annex PB

**Table 61. Overlapping fisheries**

| Fishery name | Certification status and date | Performance Indicators to harmonise |
|---|---|---|
| | | |
| | | |

**Table 62. Overlapping fisheries**

| **Supporting information** | |
|---|---|
| Describe any background or supporting information relevant to the harmonisation activities, processes and outcomes. | |
| **Was either FCP v2.2 Annex PB1.3.3.4 or PB1.3.4.5 applied when harmonising?** | Yes / No |
| **Date of harmonisation meeting** | DD / MM / YY |
| **If applicable, describe the meeting outcome** | |
| e.g. Agreement found among teams or lowest score adopted. | |

**Table 63. Scoring differences**

| Performance Indicators (PIs) | Fishery name | Fishery name | Fishery name | Fishery name |
|---|---|---|---|---|
| PI | Score | Score | Score | Score |
| PI | Score | Score | Score | Score |

**Table 64. Rationale for scoring differences**

| **If applicable, explain and justify any difference in scoring and rationale for the relevant Performance Indicators (FCP v2.2 Annex PB1.3.6)** |
|---|
| |
| If exceptional circumstances apply, outline the situation and whether there is agreement between or among teams on this determination |
| |

# Appendix 10 Objection Procedure

**To be added at Public Certification Report stage**

The report shall include all written decisions arising from the Objection Procedure.

Reference(s): MSC Disputes Process v1.0, FCP v2.2 Annex PD Objection Procedure