Eastern Pacific Ocean tropical tuna – purse seine (TUNACONS) fishery

MSC Fishery Assessment Report

Announcement Comment Draft Report

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Fishery client	Tuna Conservation Group (TUNACONS)
Assessment type	Scope Extension
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4. Glossary

AIDCP	The Agreement on the International Dolphin Conservation Program
ARAP	The Aquatic Resources Authority of Panama (Autoridad de los Recursos Acuáticos de Panamá)
BET	Bigeye tuna
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CPCs	Members and cooperating non-Members of IATTC
CPDF	Catch per day fished
CPUE	Catch per unit effort
dFAD	Drifting Fishery Aggregation Device
EEZ	Exclusive Economic Zone
EEZ	Exclusive Economic Zone
EPO	Eastern Pacific Ocean
ETP	Endangered, Threatened or Protected species
FADs	Fishing Aggregation Device
FAO	Food and Agriculture Organization of the United Nations
FAO	Food and Agriculture Organization
Fcur	the average fishing mortality for the three most recent years
FLIMIT	Fishing Mortality Limit Referente point
FMSY	the fishing mortality that will produce the maximum sustainable yield
HCR	Harvest Control Rules
IATTC	Inter-American Tropical Tuna Commission
IUU	address illegal, unreported and unregulated
Kg	Kilogram
Lb.	Pound, equivalent to roughly 2.2 kg
LL	Longline
LL-C	Central Longline fishery
LL-S	Southern Longline fishery
LOA	Length Over-All
M	Million (lbs.)
MSC	Marine Stewardship Council
MSE	Management Strategy Evaluation
MSY	Maximum Sustainability Yield
nm	nautical mile
NOA	Unassociated fishery
NOAA	The National Oceanic and Atmospheric Administration
OBJ	Floating-object fishery
OFL	Over-Fishing Level
PI	Performance Indicator

SAR	Stock Assessment Reports
SCS	SCS Global Services
SI	Scoring Issue
SK	Skipjack tuna
SLIMIT	Sustainable yield limit reference point
Smsy	maximum sustainable yield
SRP	Under Secretariat for Fishery Resources in Ecuador
SSB	Spawning Stock Biomass
t and mt	metric ton
TAC	Total Allowable Catch
UNFSA	UN Fish Stocks Agreement
WCPFC	Western and Central Pacific Fisheries Commission
WWF	World Wildlife Fund
YFT	Yellowfin tuna

5. Executive Summary

This report presents the Marine Stewardship Council (MSC) scope extension of the Eastern Pacific Ocean tropical tuna – purse seine (TUNACONS) fishery, harvested by purse seine fishing gear in the Exclusive Economic Zones (EEZs) and international waters in the Inter American Tropical Tuna Commission Convention Area (IATTC). A smaller fleet of purse seine vessels operate out of California within the United States EEZs. Within the report, the Unit of Assessment will be modified by the addition of big eye tuna (*Thunnus obesus*) as a Principle 1 species. The UoA will be referred to more simply as the TUNACONS fishery. The assessment was conducted, and the findings were prepared by SCS Global Services (SCS), an MSC-accredited, independent, third-party conformity assessment body, in accordance with the MSC Principles and Criteria for sustainable fishing. The assessment complies with the MSC Certification Requirements v2.3 (2022) and the guidance to the Certification Requirements v2.6 (2022).

6. Fishery Operations Overview

The fishery is comprised of a group of larger purse seine vessels operating in the Exclusive Economic Zones (EEZs) and international waters in the IATTC (Inter American Tropical Tuna Commission) Convention Area and fleet of smaller purse seine vessels operating out of California within the US EEZ. The larger fleet is referred to as the 'TUNACONS UoAs' and is comprised of purse seine vessels from five fishing companies and three countries that set on both free schools and Fish Aggregating Devices (FADs). Fishing vessel carrying capacities range from 270 t to 2,304 t and fishing generally occurs in high seas areas of the EPO equatorial region. The California Coastal Small Purse Seine UoA is comprised of three small purse-seine vessels flagged to the U.S. with carrying capacities ranges from 127 t to 145 t that set exclusively on free schools. Fishing is conducted in waters adjacent to San Pedro, California U.S.A.

7. Report Details

1.1 Authorship and peer review details

Table 1. Authorship and assessment team

Role	Name	Area of expertise
Team leader	Ms. Gabriela Anhalzer	*P1, P2 & P3*
Team members	Dr. Gerard DiNardo	P1
	Dr. Kari Fenski (supporting)	P1

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

Table 2. Peer reviewers

1.2 Version details

The following MSC assessment was assessed against the MSC Fisheries Standard Version 2.01, using the MSC Fisheries Certification Process Version 2.3, the MSC General Certification Requirements Version 2.6 on the MSC Reporting Template Version 1.3.

Table 3. Fisheries program documents versions

Document/Assessment Tree	Version number/Type
MSC Fisheries Certification Process	Version 2.3
MSC Fisheries Standard	Version 2.01
Assessment tree	Default
MSC General Certification Requirements	Version 2.6
MSC Reporting Template	Version 1.3

8. Unit(s) of Assessment (UoA) and Unit(s) of Certification

1.3 Unit(s) of Assessment

Table 4. Unit(s) of Assessment (UoA)

UoAs 1-9	Description
Species	UoA 1, 4, 7: Yellowfin Tuna *Thunnus albacares* UoA 2,5, 8: Skipjack Tuna *Katsuwonus pelamis* UoA 3,6, 9: Bigeye Tuna *Thunnus obesus*
Stock	Eastern Pacific Ocean stock
Geographical area	UoA 1 -3: Vessels flagged to Ecuador operating in the Inter-American Tropical Tuna Commission Convention area and Ecuador's EEZ UoA 4 - 6: Vessels flagged to Panama operating in the Inter-American Tropical Tuna Commission Convention area and Panama EEZ UoA 7 - 9: Vessels flagged to USA operating in the Inter-American Tropical Tuna Commission Convention area and USA EEZ
Harvest method / gear	UoAs 1-9: purse seine gear, all set types
Client group	Vessels identified by TUNACONs members, including Eurofish, NIRSA, Servigrup, Tri Marine, and Jadran.
Other eligible fishers	There are no other eligible fishers.
Flag states	Vessels flagged to Ecuador, Panama and USA

US California Coastal based small purse seine fleet

UoAs 10-12	Description
Species	UoA 10: Yellowfin Tuna *Thunnus albacares* UoA 11: Skipjack Tuna *Katsuwonus pelamis* UoA 12: Bigeye Tuna *Thunnus obesus*
Stock	Eastern Pacific Ocean stock
Geographical area	Vessels operating in the US EEZ.
Harvest method / gear	Purse-seine gear types using free school
Client group	Tri Marine
Other eligible fishers	There are no other eligible fishers.
Flag states	Vessels are flagged to the United States.

1.4 Unit(s) of Certification

Unit of Assessment and Unit of Certification are the same size. Please see Table 4 above.

9. Confirmation of scope

SCS Global Services and the assessment team confirms that the fishery is within scope of the MSC Fisheries Standard v 2.01:

- Does not target amphibians, birds, reptiles or mammals (FCP v2.3 7.4.8.1), use destructive fishing practices including poisons or explosives (FCP v2.3 7.4.8.2), or operate under a controversial unilateral exemption to an international agreement (FCP v2.3 7.4.8.3).
- Does not include an entity successfully prosecuted in respect of violation of a forced or child labor law (FCP v2.3 7.4.8.4).
- The fishery does not include an entity successfully prosecuted for shark finning within the last 2-years (FCP v2.3 7.4.8.5).
- There are mechanisms for resolving disputes in place and the UoA applying for certification is not the subject of controversy and/or dispute at the time of this assessment (FCP 7.4.8.6).
- Is an enhanced fishery based on the use of FADs, is not based on an introduced species and does not represent an inseparable or practically inseparable species (FCP 7.5.1, 7.5.2, 7.5.8-13)[1].
- Does overlap with other MSC certified or applicant fisheries (FCP v2.3 7.7.2) but and scores have been harmonized following FCP Annex PB. For a list of overlapping fisheries see Section 14.7
- The Unit of Assessment, the Unit of Certification, and eligible fishers have been clearly defined, traceability risks characterized, and the client has provided a clear indication of their position relative to certificate sharing (FCP v2.3 7.5.10).

10. Overview of the fishery

The TUNACONS fishery is a commercial fishing operation with 51 vessels landing in Paita, Chimbote, San Diego, Mazatlan, Pago Pago, Posorja, Manta, San Pedro, Barranquilla, Puerto Quetzal, La Union, Manzanillo, Puerto Madero. The fleet fishes primarily for Eastern Pacific Ocean yellowfin, skipjack and bigeye tuna.

[1] Fish Aggregating Devices (FADs) are considered by the MSC (FCP v2.2 G7.4.2.12) as habitat modifications in enhanced fisheries. SCS determined, using the criteria in Table 1 of the MSC FCP v2.2, that the fishery is an eligible enhanced fishery. More details in Section 6.1.3.

11. Assessment results overview

1.5 Determination

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

1.6 Principle level scores

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

Please note that scores for Principle 2 were not evaluated during this scope extension. However, they are included here for clarity and to ensure compliance with MSC implementation timeframes under FCP v2.2: "For fisheries that are certified (including those that are suspended) or have announced an initial assessment, reassessment or scope extension before 25 September 2020, CABs shall apply the Unit of Assessment (UoA) and Unit of Certification (UoC) requirements (FCP 7.5.2, 7.5.3 and 7.5.6) by 25 March 2023. CABs shall follow 7.27 to determine if Annex PE applies. If Annex PE applies, CABs shall announce the scope extension by 25 March 2023. CABs may apply the new UoA and UoC requirements earlier to fisheries that are certified or in assessment before 25 September 2020".

Table 5. Principle level scores

	Ecuador	Panama	USA	USA -small fleet
Principle 2 - Ecosystem	All Set Types			
	81.3	**81.3**	**81.3**	**82.0**

1.7 Summary of Performance Indicator level scores

The table below displays draft scoring ranges that may be adjusted during the assessment process for Principle 1. Please see explanation above for Principle 2 scores.

Principle	Component	Performance Indicator (PI)		Score		
One	Outcome	1.1.1	Stock status	>80		
		1.1.2	Stock rebuilding	>80		
	Management	1.2.1	Harvest strategy	>80		
		1.2.2	Harvest control rules & tools	>80		
		1.2.3	Information & monitoring	>80		
		1.2.4	Assessment of stock status	>80		
				Ecuador - All Set Types	Panama - All Set Types	USA - Small Fleet

Two	Primary species	2.1.1	Outcome	70	70	60
		2.1.2	Management strategy	80	80	80
		2.1.3	Information/Monitoring	85	85	85
	Secondary species	2.2.1	Outcome	90	90	80
		2.2.2	Management strategy	80	80	75
		2.2.3	Information/Monitoring	95	95	80
	ETP species	2.3.1	Outcome	80	80	80
		2.3.2	Management strategy	80	80	80
		2.3.3	Information strategy	75	75	70
	Habitats	2.4.1	Outcome	75	75	90
		2.4.2	Management strategy	75	75	85
		2.4.3	Information	75	75	95
	Ecosystem	2.5.1	Outcome	90	90	90
		2.5.2	Management	80	80	80
		2.5.3	Information	95	95	95

1.8 Summary of conditions

To be drafted at Client and Peer Review Draft Report stage

Table 6. Summary of conditions

1.8.1 Recommendations

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

12. Traceability and eligibility

1.9 Eligibility date

To be drafted at Client and Peer Review Draft Report stage

Traceability – initial review and planning at announcement

Table 7. Traceability initial planning

The proposed point of change of ownership of product to any party not covered by the fishery certificate
Change of ownership occurs at the point of offloading. Several of the fishing fleets and processing companies are vertically integrated companies, for which the change of ownership may occur after initial processing.
The proposed point from which subsequent Chain of Custody (CoC) is required
Chain of Custody starts at offloading, except for select vessels authorized to fish on dolphin sets, for which CoC starts at point of capture.
The plan for reviewing traceability at the site visit
At the site visit, the auditor will collect traceability information and updates using the Traceability Checklist that outlines key components: - Eligibility date - Traceability – initial review and planning at ACDR - Traceability within the fishery - Traceability risks and mitigation - Eligibility to enter further chain of custody. - Eligibility of inseparable or practicably inseparable (IPI) stocks to enter further chains of custody

1.11 Traceability within the fishery

To be drafted for the Client and Peer Review Draft Report

Table 8. Traceability within the fishery

1.12 Traceability risks and mitigations

Table 9. Traceability risks and mitigation within the fishery

Factor	Description
Will the fishery use gears that are not part of the Unit of Certification (UoC)? If Yes, please describe: - If this may occur on the same trip, on the same vessels, or during the same season; - How any risks are mitigated.	*Tunacons UoAs:* Vessels only target tuna using purse-seine gear. No gear types not included in the UoC would be used. Gear type and set type is verified via several mechanisms including 100% observer coverage, vessel logbook and port inspections. For vessels in the Tunacons UoA that are authorized only fish on FAD and Free school sets, there is no risk that gears or set types that are not part of the UoC are employed, allowing CoC to start at point of landing. In the Tunacons UoAs a few select large purse seine vessels are permitted by the IATTC to employ set types that are not covered in the assessment (dolphin sets). IATTC regulation require large purse seine vessels to always carry an observer on board, and that both the observer and vessel logbook report information on set type. enter. Observers must be present any time fish is transferred between wells. Systems in place are considered appropriate to manage the risk of mixing between non-certified and certified fishing method, however segregation systems would need to be confirmed through a chain of custody audit. For this reason, for these two vessels, chain of custody begins at the point of capture. There is no risk that other vessels in the fleet *US small PS UoA:* In the US Small PS UoA, all gear and set types are part of the UoA, thus chain of custody begins at the point of landing. This information is validated via vessel logbook and fishing permits.
Will vessels in the UoC also fish outside the UoC geographic area? If Yes, please describe: - If this may occur on the same trip; - How any risks are mitigated.	*Tunacons UoAs:* The large purse-seine vessels flagged to Ecuador and Panama do not operate outside of the UoA geographic area (Ecuador EEZ and IATTC comission area), thus segregation is not required. However, the larger US flagged vessels (Tri Marine vessels) under assessment also fishes in the Western Pacific Ocean under the purview of the WCPFC. These vessels also covered under another MSC fisheries certificate in the WCPFC (F-SCS-0094). Vessels will continue to fish in both convention areas. The US fleet. Fishing masters are required to complete official logbooks which records information about the fishing vessel's activities including inter alia set location, type of set, catch volumes by species and well numbers. Only fish captured in the IATTC is MSC eligible under this assessment. The fishing master's logbook and well chart enables identification of catch from MSC-eligible areas. If there is catch from non-UoA regions, it must either be stored in separate wells, or a double-separation net must be used to prevent mixing when stored within the same dry well.

	In July 2020, under the authority of the Western and Central Pacific Fisheries Convention Implementation Act and the Tuna Conventions Act, NMFS issued a final rule revising the management regime for U.S. fishing vessels that target tunas and other highly migratory fish species in the overlap area. The rule applies all regulations implementing IATTC resolutions in the area of overlapping jurisdiction and some regulations implementing WCPFC provisions. US flagged vessels fishing on the high seas in the overlap area must be registered on the IATTC Regional Vessel Register and be authorized by NOAA to fish on the high seas in the WCPFC Area. Catch and effort data is reported to both the WCPFC and IATTC. However, only the IATTC catch and effort limits implemented by the United States in NMFS regulations apply in the overlap area. Based on this rule and its application to the UoC we consider all catch and effort in the overlap area as part of the EPO and therefore as part of the UoC for this assessment. These vessels segregate MSC-eligible catch in the WCPFC from any catch from the EPO. Non-MSC eligible catch is segregated at the well-level (or by double-nets if stored in the same well). The following records are passed on: captain's log sheet records the location, set type, and well chart identifying the fish as MSC or non-MSC. The Tri Marine office receives a weekly update on the well report and reviews these documents and then issues an MSC qualification determination. The systems in place are already in place for the certified Tri Marine Western and Central Pacific skipjack and yellowfin fishery and considered appropriate to manage the risk of mixing between non-certified and certified fishing methods. *US small PS UoA:* The US-based fleet fishes uniquely in areas under assessment (US EEZ).
Do vessels from outside the UoC and/or client group ever fish on the same stock?	There may be other fleets flagged to other countries that have access to the stock in the same jurisdiction that are not a part of the UoA and therefore not assessed in this report.
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 and should reflect those listed in product movement in Table 9. It includes: • Translocation • Transhipment • Transport • Storage • Processing • Sorting/ grading • Packing • Landing • Auction	*Tunacons UoAs:* The fishery clients handle both certified and non-certified fish. See the section above regarding fishing activity outside the geographic area and using non-certified set types and description of mitigation of these risks. *US small PS UoA:* The fishery clients handle only certified fish. No mitigation is necessary.

Does transhipment occur within the fishery? If yes, include in the description: • What is the type of transhipment in-port/ high seas/ other • What are the systems used to track and trace to UoC For high seas transhipment include in the description how the systems to track and trace to the UoC: • Are verified independently of the fishery client • Cover all fishing and receiving vessels involved in transhipment • Apply to all transhipment events If any of these 3 criteria above are not met for high seas transhipment CoC certification is required for both the fishing and receiving vessels involved in this transhipment.	*Tunacons UoAs:* No transshipment occurs for any vessels in the fishery. *US small PS UoA:* No transshipment occurs for any vessels in the fishery.
Are trading agents to be covered within the fishery certificate? If yes, include in the description: • How information on UoC is passed through	There are no trading agents covered within the fishery certificate
Are there any other risks of mixing or substitution between certified and non-certified fish? If No, refer to the section describing product movement and segregation which demonstrates this.	*Tunacons UoAs:* No other risks are known at this stage. *US small PS UoA:* No other risks are known at this stage.
Are there any other risks of mixing between different Units of Certification? If Yes, include in the description: • link to any relevant variations relating to this If No, refer to the section describing product movement and segregation which demonstrates this.	*Tunacons UoAs:* No other risks are known at this stage. *US small PS UoA:* No other risks are known at this stage.

1.13 Eligibility to enter further chains of custody

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

Table 10. Eligibility to enter Chain of Custody

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

There are no IPI stocks in this fishery.

13. Scoring

Principle 1

Principle 1 background

Life History Information

Bigeye Tuna

- Taxonomic classification
- Class: Actinopterigii
- Order: Perciformes
- Family: Scombridae
- Genus: *Thunnus*
- Species: *obesus*

Behavior

Bigeye tuna are distributed throughout tropical and sub-tropical waters of the Pacific Ocean, between 40°N and 40°S, and vertically from the surface to depths of 500 m; they occasionally dive up to 1000 m due to their tolerance of low oxygen levels and low temperatures. In tropical and sub-tropical waters adult bigeye tuna exhibit diurnal movement from cooler deeper waters during the day to shallower warmer

waters at night. Juvenile bigeye tuna tends to inhabit shallower waters, forming mixed schools with skipjack and yellowfin, resulting in catches by surface fisheries, particularly in association with floating objects. Bigeye tuna feed on a wide variety of fishes, cephalopods, and crustaceans during the day and at night.

Growth and Natural Mortality Bigeye tuna growth rates are slower than either yellowfin or skipjack, reaching around 40cm after one year. Bigeye can reach 2 m in length and weigh up to 180-200 kg. Estimating growth rates of EPO bigeye has been problematic. Age-at-length data derived from readings of daily increments on otoliths are only available for fish up to four years of age, although the species is estimated from tagging studies to have a lifespan of at least 15-16 years. Recent studies have updated bigeye age and growth estimates in the WCPO and examined growth of some specimens from the EPO (Farley et al. 2017; Farley et al. 2018). The studies indicated differences in the growth rates of bigeye tuna across the Pacific, with greater length at age in the far east and far west of the area examined compared to the central longitudes. Otolith weight data suggests faster growth eastern part of the EPO. Natural mortality (M) is assumed for young fish of both sexes to be 0.25 and M for females increases after they mature.

Reproduction and Recruitment

Spawning takes place across most months of the year in tropical regions of the Pacific Ocean. It is seasonal at higher latitudes when sea surface temperatures are above 24°C. Regional variation in maturity-at-length have been detected; reaching maturity at larger sizes in the EPO than the WCPO. Recruitment of EPO bigeye is highly variable.

Distribution and Stock Structure

Bigeye tuna are distributed throughout tropical and sub-tropical waters of the Pacific Ocean. Genetic studies have failed to reveal significant evidence of widespread population subdivision in the Pacific Ocean (Grewe and Hampton 1998). These results are not conclusive regarding the rate of mixing of bigeye tuna throughout the Pacific, however they are broadly consistent with the results of historic tagging experiments on bigeye tuna undertaken by the Secretariat of the Pacific Community (SPC) and the IATTC. While tagging data from earlier studies did indicate some long-distance movement based on recaptures a large majority of the returns come from locations relatively close to the release points. More recent tagging work, however, has suggested that while bigeye tuna in the far eastern and western Pacific may have relatively little exchange, those in the central part of the Pacific between about 180° and 120°W may mix more rapidly over distances of 1000–3000 nm (Schaefer et al., 2015). It is now accepted that there is extensive movement of bigeye across the nominal WCPO/EPO boundary of 150°W (Figure 1). Nevertheless, stock assessments of bigeye tuna are routinely undertaken separately for the WCPO and EPO based on management boundaries of the WCPFC and IATTC.

Seasonal Operation of the Fishery

Annual catches of bigeye tuna by gear from 1975-2022 and the average annual distribution of purse seine catches by set type from 2017-2021 and 2022 are shown in Figures 2, 3 and 4, respectively. Longline fisheries catch primarily large and mature bigeye tuna, whereas purse-seine vessels catch mostly small and immature bigeye (Xu et al. 2020). From 1975 to 1993 bigeye catches were more important in the longline fisheries and since 1995 catches from purse seine fisheries accounted for the majority of the catch, mostly because of the expansion in the number of vessels using FADs. Bigeye are generally caught from the western end of the ocean basin, eastward to 95°E (Figures 3 and 4). Purse seines generally catch bigeye in the equatorial region, whereas the majority of longline bigeye catch in the EPO is taken north of 10°N. Bigeye catches peaked in 2000 at approximately 149,000 mt, before declining to 86,000 mt in 2013, thereafter fluctuating from 93,000 to 105,000 mt from 2014-2020 (Figure 2). Recent catches have declined and the reported catch in 2022 was approximately 64,000 mt.

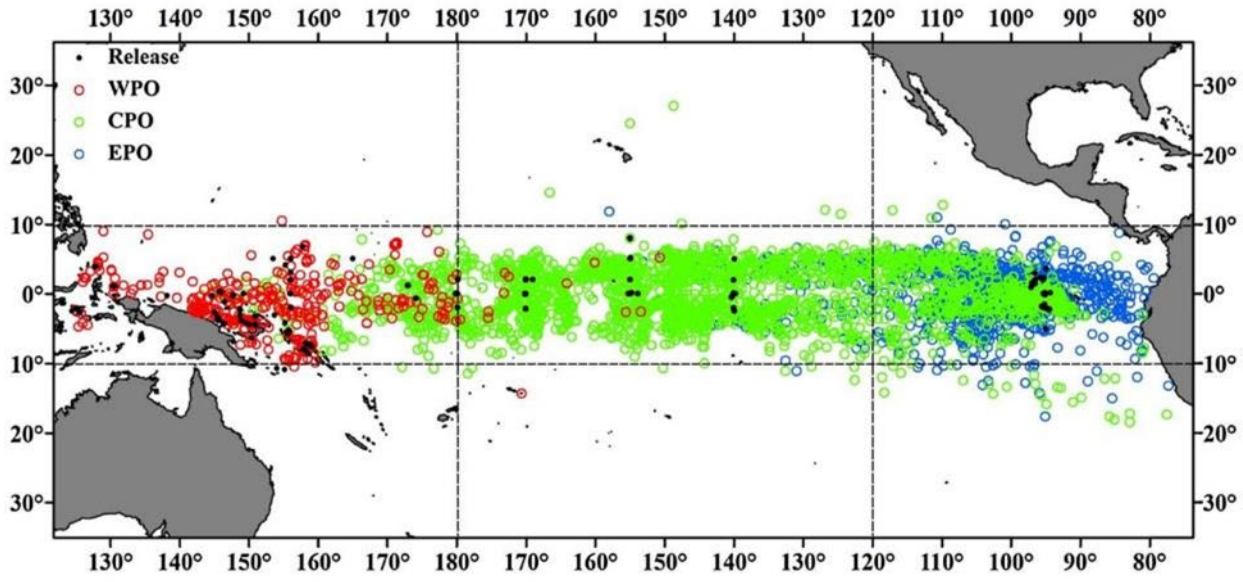

Figure 1. Tag release and recovery positions of bigeye tuna, at liberty for >30 days. Release locations (black) and recoveries released in the WPO (red), CPO (green) and EPO (blue) are shown (source Schaefer et al. 2015).

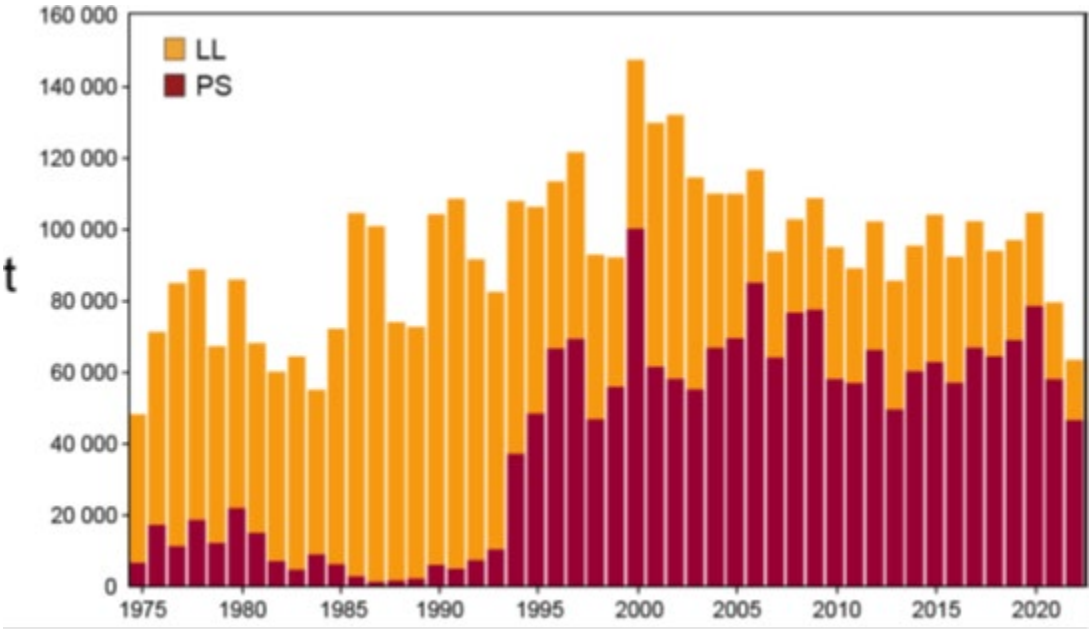

Figure 2. Total catches (retained catches plus discards) by the purse-seine (PS) fisheries, and retained catches by the longline (LL) fisheries, of bigeye tuna in the eastern Pacific Ocean, 1975-2022. The purse-seine catches are adjusted to the species composition estimate obtained from sampling the catches. 2020 and 2021 data are preliminary (from IATTC 2023).

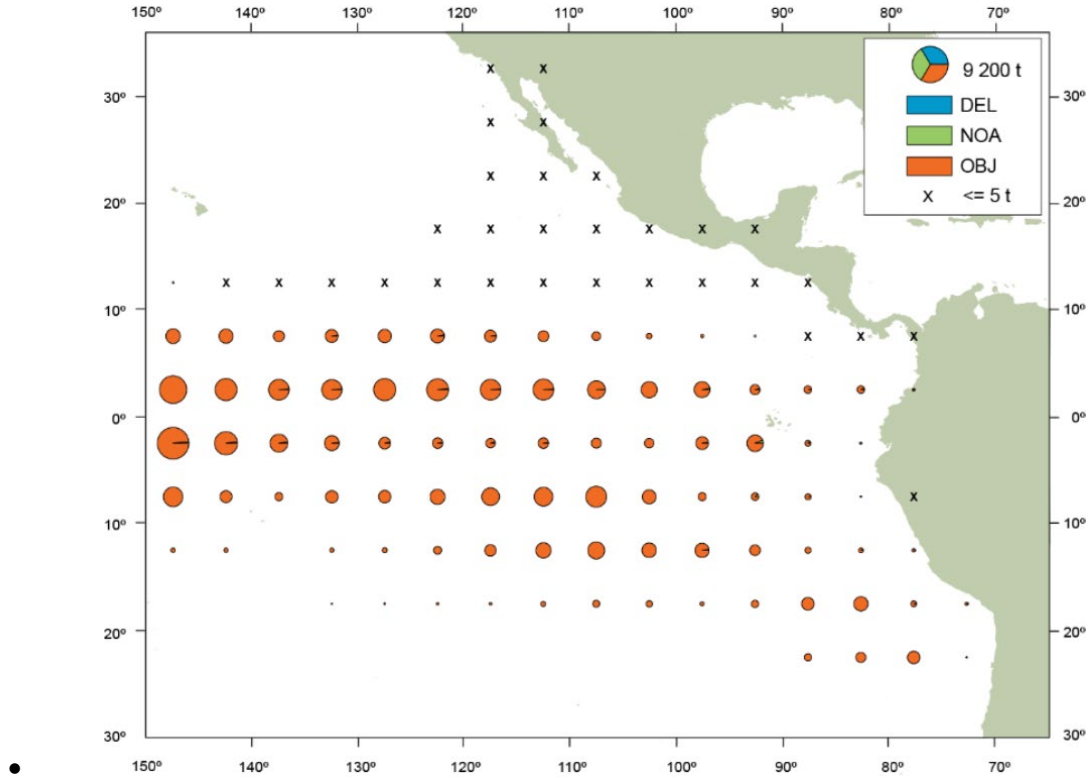

Figure 3. Average annual distributions of the purse-seine catches of bigeye, by set type, 2017-2021. The sizes of the circles are proportional to the amounts of bigeye caught in those 5° by 5° areas (from IATTC 2023).

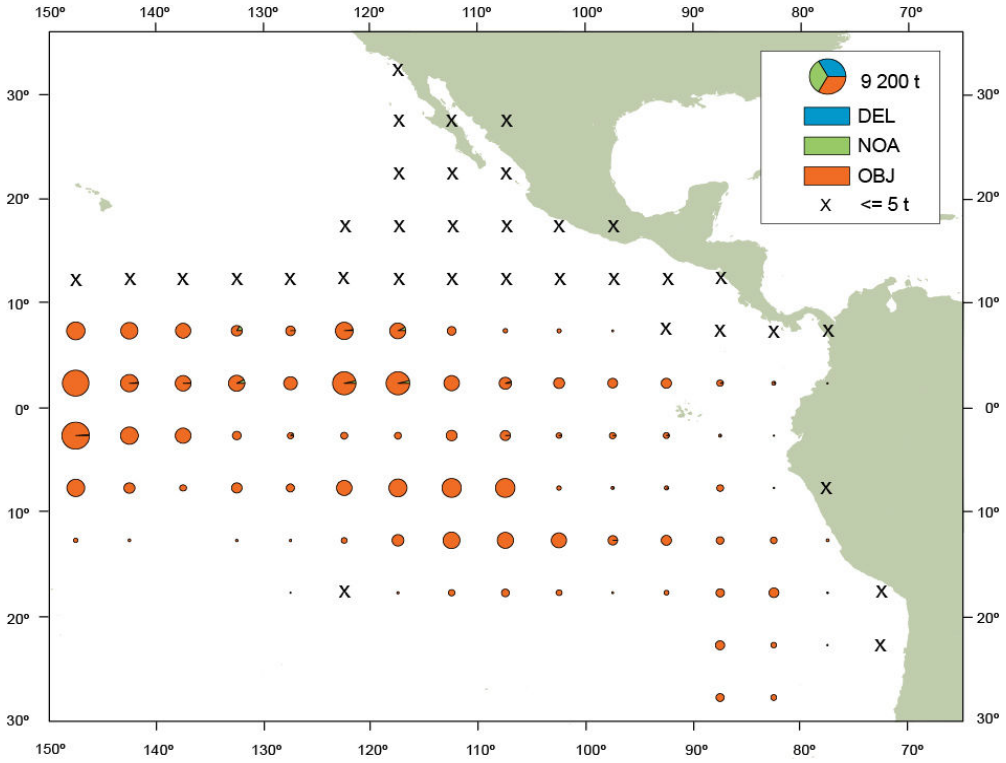

Figure 4. Average annual distributions of the purse-seine catches of bigeye, by set type, 2022. The sizes of the circles are proportional to the amounts of bigeye caught in those 5° by 5° areas (from IATTC 2023).

9.1.1.3 Status of Stock

Previously, a 'best assessment' approach was used for the evaluation of stock status using a single 'base-case' model that represented the most plausible assumptions and data about the biology and fisheries (IATTC-SAC 2020). In 2018, the updated base-case assessment approach proved to be very sensitive to the inclusion of new data from the longline fishery and the IATTC staff concluded that the results of the stock assessment were unreliable to provide management advice to the Commission (IATTC 2018). A workplan was adopted to improve assessments of EPO tropical tunas (IATTC-SAC 2020), including bigeye, and in 2020 a bigeye benchmark assessment was completed. The 2020 assessment used a risk assessment approach to incorporate uncertainties identified in previous assessments including a regime shift in recruitment, the misfit to the composition data for the longline fishery that is assumed to have asymptotic selectivity, and the steepness of the stock-recruitment relationship (Xu et al. 2020). The risk assessment approach replaced the use of a best assessment model to derive decisions, which also allowed for the explicit evaluation of probability statements specified in the IATTC harvest control rule for tropical tunas established in Resolution C-16-02. The benchmark assessment developed 14 reference models within a hierarchical, each representing alternative states of nature, with four different values of steepness (0.7, 0.8, 0.9, 1.0).

Current status relative to a reference point was calculated as a weighted average of the point estimates of the ratio from each of the alternative stock assessment models, with weights equal to the relative

model probabilities (equal to the expected value under the normal distribution assumption made for each model). The probability of exceeding a reference point was calculated using the cumulative distribution functions (CDFs) for the ratios of F_{cur} and S_{cur} relative to the reference points for each of the alternative models, which are then combined using the model probabilities.

The results of the 2020 risk assessment indicated a 50% combined probability across the weighed models, that FMSY has been exceeded and a 53% probability that Scur is below SMSY, which translates to the stock abundance being fluctuating around a level consistent with MSY, and fishing mortality equally fluctuating around a level consistent with MSY. The probabilities that the F and S limit reference points have been exceeded were (P(Fcur>FLIMIT) = 5%; P(Scur<SLIMIT) = 6%) (Aires-da-Silva et al. 2020).

The results of the 2020 benchmark assessment produced bimodal statistical distribution patterns in management reference quantities (Figure 5 and Figure 6). This divided the reference models into two distinct states, one 'pessimistic' and the other 'optimistic', particularly in quantities related to MSY. An optimistic model opened the opportunity to greatly increase fishing mortality, whereas a pessimistic model would mean that fishing mortality had to be reduced to achieve the level established by the target reference point. As the two scenarios were equally plausible, it was difficult to provide effective management advice. Additionally, the outcomes of the 2020 assessment are subject to large uncertainty, as indicated by the wide confidence intervals around the most recent estimate in the Kobe plot (Figure 7).

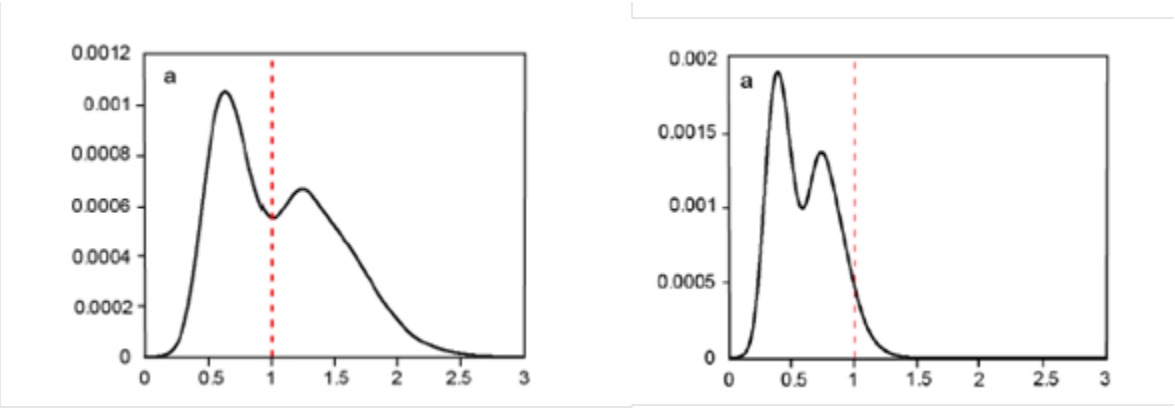

Figure 5. Bigeye probability density functions for Fcur/FMSY (left) and Fcur/Flimit (right) (Aires-da-Silva et al., 2020)

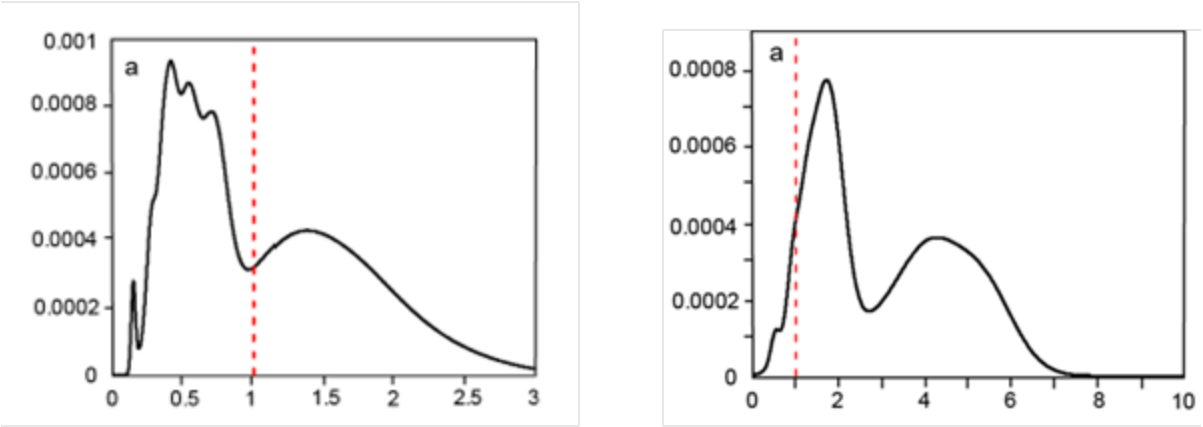

Figure 6. Bigeye probability density functions for Scur/SMSY (left) and Scur/Slimit (right) (Aires-da-Silva et al., 2020).

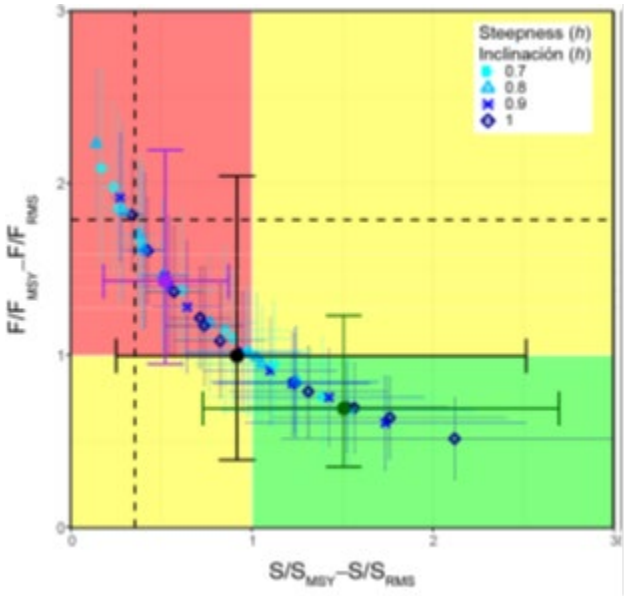

Figure 7. Kobe plot showing the latest estimates of spawning stock size (S) and fishing mortality (F) of bigeye tuna relative to MSY reference points. The colored panels are separated by the target reference points (SMSY and FMSY) and limit reference points (dashed lines). The center point for each model indicates the current stock status, based on the average fishing mortality (F) over the last three years. The solid black circle represents all models combined. The purple and green solid circles represent, respectively, the stock status for the 'pessimistic' and 'optimistic' states related to the bimodal pattern in the risk analysis. The lines around each estimate represent its approximate 95% confidence interval (from Aires-da-Silva et al., 2020).

The bimodality in the joint distribution of terminal year depletion observed in the 2020 stock assessment impacted subsequent decisions on BET stock status in the EPO. Progress to address this issue has been steady and incremental since 2020, and in exploratory analyses completed by IATTC scientific staff the

bimodality in the joint distribution of terminal year depletion has been significantly reduced through development of a new “base” reference assessment model considered superior to the “base” reference assessment model used in the 2020 benchmark assessment (Xu et al., 2023). Modifications in the new assessment model fall into three categories: fishery definitions, survey fleet characteristics, and fishery fleet characteristics and a variety of model diagnostics tracked the improvements including:

- Improved fit to length composition data;
- Improved fit to the index of abundance;
- Included an additional source (Korean) of data in the calculation of longline length compositions;
- Estimated more realistic initial conditions;
- Reduced conflict between the information from the index of abundance and from length compositions about the scale of population abundance;
- Reduced magnitude of the regime shift in recruitment (from 2.4 to 1.5); and
- Showed very similar scales and trends of absolute abundance estimated by the new base model and its age-structured production model.

The improvements in the assessment model show potential in significantly reducing or even resolving the bimodal pattern in model-combined joint distributions of management quantities (Figure 8). Specifically, these improvements result in more optimistic estimates of terminal year depletion for the pessimistic group of assessment models, and more pessimistic estimates of terminal year depletion for the optimistic group of assessment models. While the new base reference assessment model still includes a high level of uncertainty (XU et al., 2023) it is being addressed with promising results towards the 2024 bigeye benchmark assessment. Additionally, testing of the harvest strategy is being conducted in an application of the management strategy evaluation (MSE) on bigeye and the research plan is expected to be extended into 2024 (see Valero 2023).

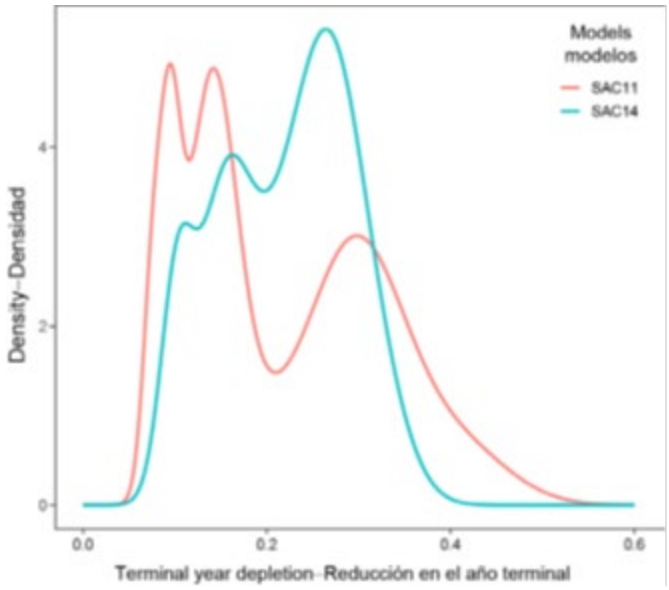

Figure 8. Comparison of model-combined joint distribution of terminal year depletion (spawning biomass ratio) between the last benchmark assessment (SAC11) and this exploratory analysis (SAC14). The reference models used to compute the joint distribution are equally weighted under each overarching recruitment hypothesis (from Xu et al. (2023)).

9.1.1.4 Fishing and Management

MSC defines a harvest strategy as the combination of monitoring, stock assessment, harvest control rules and management actions, which may include a management process or a management procedure (implicit) and be tested by management strategy evaluation (MSE). The IATTC management objective for tuna stocks, including BET, is to maintain or restore populations to levels capable of producing MSY and is specified in Resolution C-16-02 and amended in Resolution C-23-06. SMSY and FMSY is the spawning biomass corresponding to the MSY and the fishing mortality rate corresponding to the MSY, respectively, and if reliability estimated within the assessment model shall be used as interim target reference points. Proxy target reference points can be specified if SMSY and FMSY cannot be reliably estimated. The current version of the HCR (as of August 2023) operates in accordance with the following principles:

- The scientific recommendations for establishing management measures in the fisheries for tropical tunas, such as closures, which can be established for multiple years, shall attempt to prevent the fishing mortality rate (F) from exceeding the best estimate of the rate corresponding to the maximum sustainable yield (FMSY or Fproxy-MSY) for the species that requires the strictest management.

- If the probability that F will exceed the limit reference point (FLIMIT) is greater than 10%, as soon as is practical management measures shall be established that have a probability of at least 50% of reducing F to the target level (FMSY or Fproxy-MSY) or less, and a probability of less than 10% that F will exceed FLIMIT.

- If the probability that the spawning biomass (S) is below the limit reference point (SLIMIT) is greater than 10%, as soon as is practical management measures shall be established that have a probability of at least 50% of restoring S to the target level (dynamic SMSY or Sproxy-MSY) or greater, and a probability of less than 10% that S will descend to below SLIMIT in a period of two generations of the stock or five years, whichever is greater.

- For fisheries that use gears other than purse-seine nets, the recommendations by the IATTC scientific staff on additional management measures shall be as consistent as possible with those adopted for the purse-seine fishery, while taking account of the impact of those fisheries on the species compared with that of purse-seine fishery.

With adherence to these principles, the HCR strives to keep the stock at or below FMSY while at the same time, in consideration to uncertainties associated to the estimates of S, implement measures if there is a small probability that the stock is below SLIMIT or is exceeding FLIMIT.

The HCR is implemented via time/area closures and catch limits which vary for different fleets (Resolution C-21-04). The duration of the area closure is set according to the level of Fmult (FMSY/Flatest) for the stock requiring the strictest management (at present bigeye).

The 2018 stock assessment of bigeye suggested that the stock status was worse than previously thought, and application of the HCR should have resulted in an increase in the duration of the closure from 72 days to 107 days. However, this was not done, because IATTC scientific staff considered that the bigeye assessment was too uncertain to provide a robust basis for such a large change in management, and because fishing mortality for yellowfin was estimated to be at the appropriate level. IATTC scientists recommended that a precautionary limit on purse seine sets be imposed in addition to the seasonal closure, but no resolution was passed to this effect at IATTC plenary in 2018. It is therefore questionable in practice whether the HCR is being applied in a way which is clearly responsive to the state of the stocks. Most recently, this has been addressed with the adoption of a risk-based decision analysis approach guiding the scientific advice, and has led to recommendations for additional precautionary controls, particularly on FAD management.

The main conservation measure established by the IATTC for bigeye is Resolution C-21-04 that establishes a multi-annual management measure for tropical tunas in the eastern Pacific Ocean during 2022-2024. This measure calls for:

- A 72-day closure for purse seiners greater than 182 tons capacity through 2024;

- Additional days of closure for vessels exceeding a particular annual bigeye catch limit (i.e. 8 additional days in 2022 if a vessel has exceeded 1200 tons in 2017-2019, and 10-13-16-19-22 additional days in 2023-2024 if a vessel has exceeded 1200-1500-1800-2100-2400 tons, respectively, in previous year;

- Strengthen the monitoring and control system for tropical tuna species (particularly bigeye) catches through on-board observers, logbooks, port sampling and information from tuna processing facilities to control individual vessel bigeye catches;

- A seasonal closure of the purse seine fishery in an area known as "El Corralito", west of the Galapagos Islands, where catch rates of small bigeye are high;

- A full retention requirement for all purse seine vessels regarding bigeye, skipjack and yellowfin tunas;

- Bigeye catch limits for the main longline fishing nations;

- Limits on the number of active FADs that each purse seiner can have at any time, ranging from 66 FADs/vessel for the smallest ones to 400 FADs/vessel for Class 6 vessels (1,200 m3 capacity). These ranges will decrease to 64 to 340 in 2023 and 50 to 340 in 2024;

- All purse seines are also required to not deploy FADs 15 days before the selected closure period and Class 6 vessels to recover within 15 days prior to the start of the closure period a number of FADs equal to the number of FADs set upon during that same period; and

- In order to support the scientific analysis of FAD fisheries, the measure requires that CPCs or vessels report daily information on all active FADs (position and echosounder biomass data) as well as Vessel Monitoring System (VMS) data to the Secretariat.

Catch Data

The target species is not managed by TAC, total BET catch data in the EPO and catch by the UoC are reported below in Table 11.

Principle 1 catch

Table 11. Total Allowable Catch (TAC) and catch data

TAC / Catch Data	Year	Amount
Total catch of the target stock in the EPO	2022	63,661 mt
Total catch of the target stock in the EPO	2021	79, 867 mt
Total catch by UoC (most recent year)	Year 2022	11,392 mt
Total catch by UoC (second most recent year)	Year 2021	11,029 mt

1.15 Principle 1 Performance Indicator scores and rationales

PI 1.1.1 – Stock Status

PI 1.1.1	The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing

Scoring Issue		SG 60	SG 80	SG 100
a	Stock status relative to recruitment impairment			
	Guide post	It is likely that the stock is above the point where recruitment would be impaired (PRI).	It is highly likely that the stock is above the PRI.	There is a high degree of certainty that the stock is above the PRI.
	Met?	Yes	Yes	No

Rationale

IATTC Resolution C-16-02 defines target and limit reference points, in terms of biomass and fishing mortality. The *S*LIMIT adopted as interim by the IATTC (in the 87th meeting) is the spawning biomass that produces half of the virgin recruitment ($SB=0.5R_0$) given that the stock-recruitment relationship follows the Beverton-Holt function with a steepness of 0.75. This spawning biomass is equal to 0.077 of the equilibrium virgin spawning biomass (Maunder and Deriso, 2014).

The limit reference point of fishing mortality (F_{LIMIT}) is the fishing mortality threshold that should be avoided because fishing harder could endanger the sustainability of the stock. The F_{LIMIT} adopted as interim by the IATTC (in its 87th meeting) is the fishing mortality rate that, under equilibrium conditions, maintains the spawning population level at S_{LIMIT}.

The most recent benchmark stock assessment was conducted in 2020 (Xu et al., 2020). Current status relative to a reference point was calculated as a weighted average of the point estimates of the ratio from each of the alternative stock assessment models (N=44; 12 model configurations with four steepness (h) values (0.7, 0.8, 0.9, 1.0) associated with each configuration were tested, four models did not converge), with weights equal to the relative model probabilities (equal to the expected value under the normal distribution assumption made for each model). The probability of exceeding a reference point was calculated using the cumulative distribution functions (CDFs) for the ratios of F_{cur} and S_{cur} relative to the reference points for each of the alternative models, which are then combined using the model probabilities.

The combined distribution of F_{cur}/F_{LIMIT} from the 44 models tested in the 2020 benchmark assessment was bimodal, due to the substantial differences in the estimates between the “short-term models” which are more pessimistic (F_{cur}/F_{MSY} mostly above 1), and the “medium-term” models that do not assume the recruitment shift (R) is real, which are more optimistic (F_{cur}/F_{MSY} mostly below 1). For the combined distribution, F_{cur} is at about 60% of F_{LIMIT} and the probability of ($F_{cur} > F_{LIMIT}$ is 5% (Figure 9 and Table 12 below). The probability distribution for S_{cur}/S_{LIMIT} was also bimodal. The combined ratio of S_{cur}/S_{LIMIT} is estimated at approximately 3.07 and the probability of $S_{cur} < S_{LIMIT} = 6\%$ (Figure 10 and Table 12) .

Estimates of relative annual recruitment are not sensitive to the value of steepness. During the 1980s recruitment was generally below the long-term average, increasing to average levels through 2005, before declining to levels below average through 2015. In recent years recruitment was variable with large confidence intervals. Recruitment was variable throughout the approximate 40-year time series of recruitment, the magnitude and timing of the recruitment shifts depending on the reference model (Figure 11).

While IATTC established interim reference points for tropical tuna in the EPO, they are lower than values used in other MSC certified stocks. Using guidance provided in GSA 2.2.3.1, where an analytically determined estimate for MSY is available and no estimate of PRI available, a more precautionary approach is required and the default MSC PRI of 20% S_0 is recommend. Weighted estimates of S_{MSY}/S_0, based on 12 potential states of nature, were computed for each level of steepness (1.0, 0.9, 0.8, and 0.7). For bigeye tuna the average PRI across all states of nature and steepness combinations was 0.23 (range 0.21 - 0.25). Past assessments

assumed a steepness value of 0.75. Given that the tested states of nature and steepness combinations encapsulate a wide range of uncertainties, the PRI is precautionary (well above the established LRP in the IATTC), and $S_{CURRENT}$ is above PRI. Recalling PRI=20%S_0 and considering the outputs of all combined models together (the black dot in the Kobe plot (Figure 12), it can be inferred that the 70th %ile and 80th %ile lower confidence limits are above PRI and meeting requirements at the SG 60 and SG 80 levels. However, the 95th %ile lower confidence limit is clearly below the PRI threshold and requirements at the SG 100 level are not met.

The bimodality in the joint distribution of terminal year depletion observed in the 2020 stock assessment impacted subsequent decisions on BET stock status in the EPO. Progress to address this issue has been steady and incremental since 2020, and in exploratory analyses completed by IATTC scientific staff the bimodality in the joint distribution of terminal year depletion has been significantly reduced through development of a new "base" reference assessment model considered superior to the "base" reference assessment model used in the 2020 benchmark assessment (Xu et al., 2023). The improvements in the assessment model show potential in significantly reducing or even resolving the bimodal pattern in model-combined joint distributions of management quantities. Specifically, these improvements result in more optimistic estimates of terminal year depletion for the pessimistic group of assessment models, and more pessimistic estimates of terminal year depletion for the optimistic group of assessment models. Noting that results show a lower uncertainty and a higher accuracy in the model outputs provides added confidence that the stock is likely above PRI. To assess the conformity of this fishery with the MSC standard, the team considered that, despite the level of uncertainty the combined results of the benchmark assessment and the exploratory analysis, provide results in probabilistic terms that, even if observed in the pessimistic scenarios, lead to the following conclusions. Given that, in the pessimistic scenario, the estimated probability of the bigeye stock to be below the limit reference point was about 10%, the fishery meets the requirements at SG80 that it is highly likely that the stock is above the PRI (with a probability equal or greater than 80%). However, the fishery does not meet the requirements at SG100 that there is a high degree of certainty that the stock is above the PRI with a probability equal or greater than 95%.

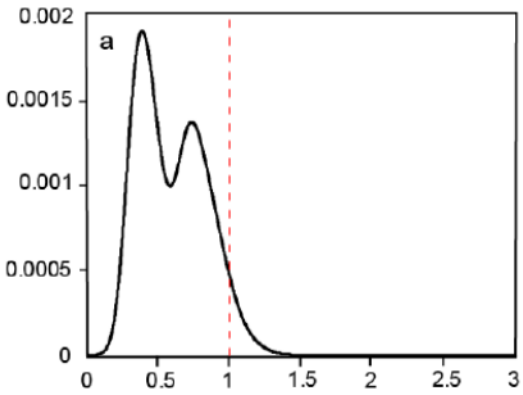

Figure 9. Bigeye probability density functions for F_{cur}/F_{LIMIT} (figure from Aires-da-Sivva et al., 2020).

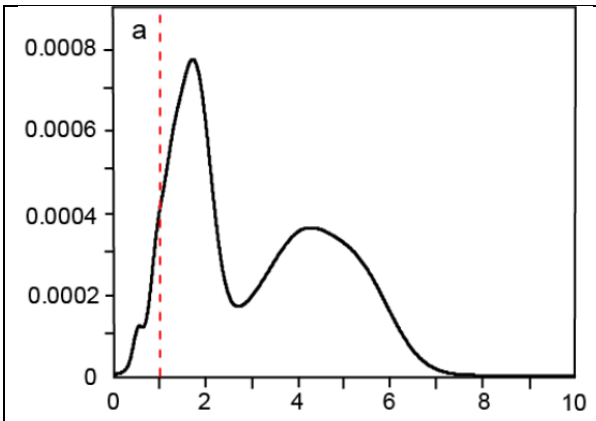

Figure 10. Bigeye probability density functions for Scur/SLIMIT (figure from Aires-da-Silva et al., 2020).

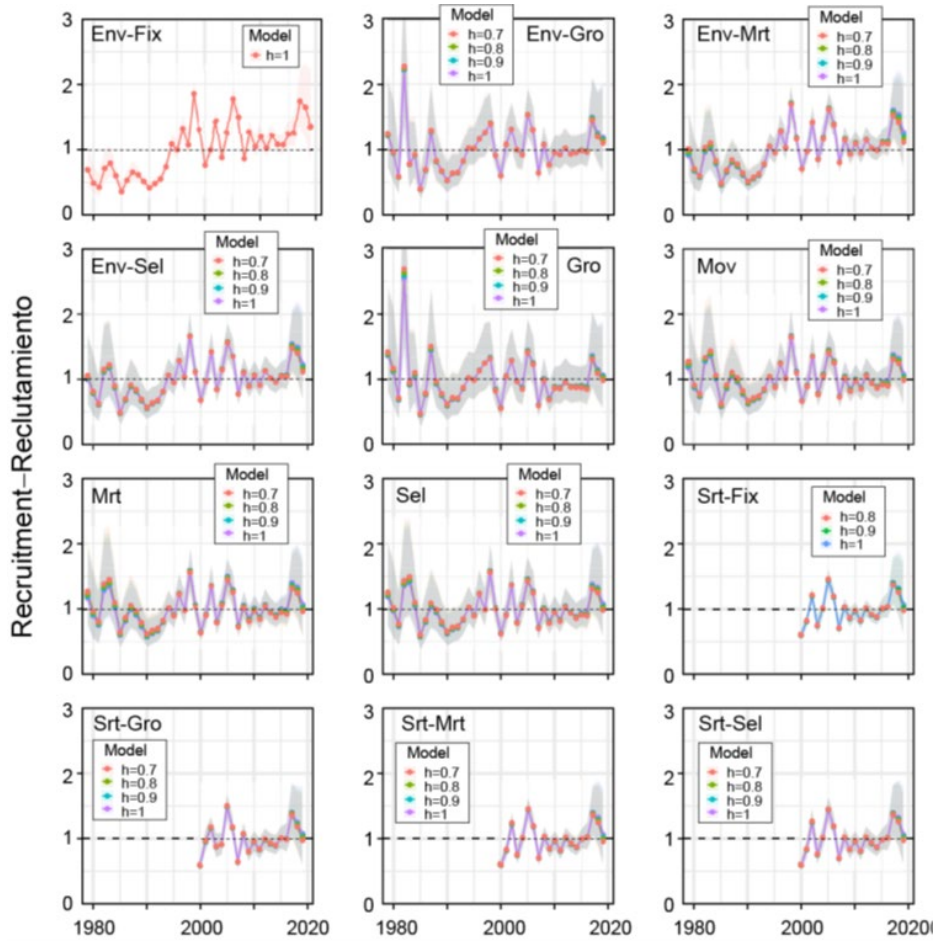

Figure 11. Comparison of estimated relative annual recruitment of bigeye tuna in the eastern Pacific Ocean from each reference model under different assumptions on the steepness of the Beverton-Holt stock-recruit

relationship (h). The shaded areas represent the 95% confidence interval. The meaning of model name can be found in background and the X-axis represents time (from Xu et al., 2020).

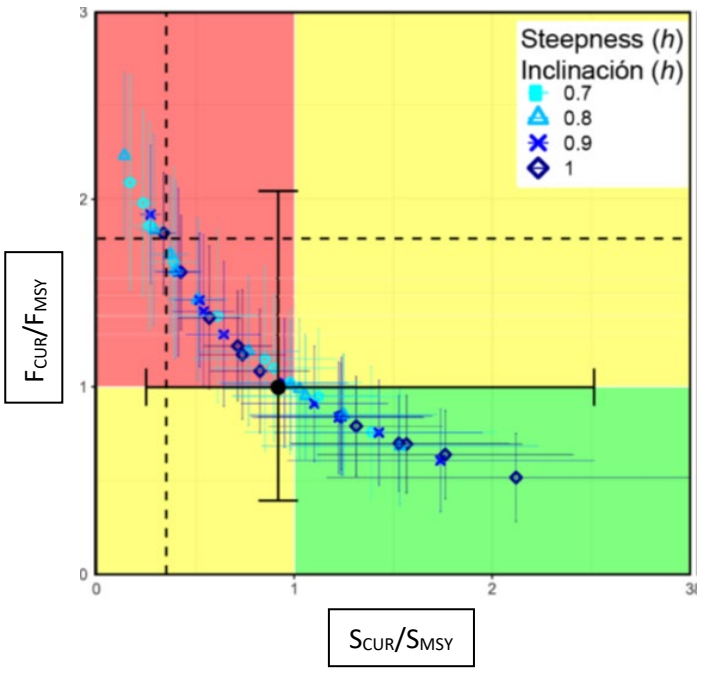

Figure 12. Kobe (phase) plot of the time series of estimates of spawning stock size (S) and fishing mortality (F) of bigeye tuna relative to their MSY reference points. The colored panels are separated by the target reference points (S_{MSY} and F_{MSY}). Limit reference points (dashed lines), which correspond to a 50% reduction in recruitment from its average unexploited level based on a conservative steepness value (h = 0.75) for the Beverton-Holt stock-recruitment relationship, are only indicative since they vary by model and are based on all models combined. The center point for each model indicates the current stock status, based on the average fishing mortality (F) over the last three years; The solid black circle represents all models combined, and to be consistent with the probabilistic nature of the risk analysis and the HCR, it is based on $P(S_{cur}/S_{LIMIT}<x) = 0.5$ and $P(F_{cur}/F_{MSY}>x) = 0.5$. The lines around each estimate represent its approximate 95% confidence interval.

Table 12. Management quantities for bigeye tuna in the EPO. E(x) is the expected value. P=0.5: median of the distributions of P(Scur/SMSY) and P(Fcur/FMSY) (table from Aires-da-Silva et al., 2020).

	Env-Fix	Env-Gro	Env-Sel	Env-Mrt	Srt-Fix	Srt-Gro	Srt-Sel	Srt-Mrt	Mov	Gro	Sel	Mrt	Combined	
P(Model)	0.01	0.13	0.05	0.02	0.04	0.22	0.11	0.07	0.01	0.24	0.09	0.02	*E*(x)	*P*=0.5
Fishing mortality (*F*)														
F_{cur}/F_{MSY}	1.82	0.82	0.99	1.25	1.84	1.42	1.36	1.57	0.81	0.59	0.73	0.89	1.07	1.00
$P(F_{cur}>F_{MSY})$	1.00	0.18	0.44	0.84	1.00	0.97	0.92	0.99	0.15	0.01	0.07	0.25	0.50	
F_{cur}/F_{LIMIT}	0.96	0.47	0.58	0.69	0.97	0.78	0.77	0.84	0.47	0.34	0.43	0.50	0.60	
$P(F_{cur}>F_{LIMIT})$	0.33	0.00	0.00	0.01	0.38	0.07	0.06	0.14	0.00	0.00	0.00	0.00	0.05	
Spawning biomass (*S*)														
S_{cur}/S_{MSY_d}	0.34	1.32	1.02	0.69	0.32	0.56	0.59	0.45	1.31	1.85	1.53	1.16	1.09	0.92
$P(S_{cur}<S_{MSY})$	1.00	0.19	0.49	0.96	1.00	1.00	1.00	1.00	0.16	0.03	0.07	0.27	0.53	
S_{cur}/S_{LIMIT}	0.97	3.61	2.67	2.04	0.97	1.65	1.65	1.38	3.84	5.24	4.21	3.63	3.07	
$P(S_{cur}<S_{LIMIT})$	0.59	0.00	0.00	0.02	0.50	0.06	0.09	0.19	0.00	0.00	0.00	0.00	0.06	

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

According to the risk analysis, the model-weighted median of the B_{2019}/B_{MSY_d} ratio across all 44 models is 0.92 and the probability that the stock is below the MSY level ($B_{2019} < B_{MSY\_d}$) is 53%. In terms of fishing mortality, the probability that current fishing mortality is above MSY levels is 50% (Xu et al., 2020). Even taking into account some of these models are implausible, the stock is likely to be close to a level consistent with MSY and fishing mortality is likely to be close to the F_{MSY}. Noting that the stock seems stable in recent years and recruitment shows signs of a slight improvement provides further evidence that the stock is close to a level consistent with MSY. Furthermore, MSC guidance GSA2.2.2 which allows a score of SG 80 (the stock is at or fluctuating around a level consistent with MSY) if the instantaneous estimate of current stock status is not less than 90%B_{MSY}. Recalling that the estimated median value of SB in the 2020 assessment was equal to 92%SB_{MSY} (Table 12), this satisfies the requirement stipulated in GSA2.2.2 and the stock is considered to be at or fluctuating around a level consistent with MSY; SG 80 is net.

As there is not a high degree of certainty that the stock is above MSY or fluctuating around a level consistent with MSY, requirements at the SG 100 level are not met.

References

Xu et al. (2020); Aires-da-Silva et al. (2020); Maunder and Deriso (2014); Xu et al. (2023)

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)	S_{LIMIT} $Pr[(S_{CURRENT}/S_{LIMIT}) <1]$ $Pr[(F_{CURRENT}/F_{LIMIT}) <1]$ MSC defined PRI (based on GSA 2.2.3.1) = $20\%S_0$	0.077 ≤ 0.1 ≤ 0.1	 $Pr[(S_{CURRENT}/S_{LIMIT}) = 0.06$ $Pr[(F_{CURRENT}/F_{LIMIT}) = 0..05$ While $Pr(S_{CUR} <$ PRI) is not explicitly stated it can be inferred and $Pr(S_{CUR} <$ PRI) = 0.
Reference point used in scoring stock relative to MSY (Sib)	SB_{MSY}		$0.92SB_{MSY}$ (95^{th} CI = 0.25-2.54)
Draft scoring range and information gap indicator added at Announcement Comment Draft Report			
Draft scoring range			≥80
Information gap indicator			

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

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 that does not exceed 1 generation time for the stock.
	Met?	N/A		N/A
Rationale		N/A		
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	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

			able to rebuild the stock within the specified timeframe.	will be able to rebuild the stock within the specified timeframe.
	Met?	N/A	N/A	N/A
Rationale		N/A		

Draft scoring range and information gap indicator included in Announcement Comment Draft Report stage only

Draft scoring range	**N/A**
Information gap indicator	**N/A**

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

PI 1.2.1 – Harvest strategy

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

Rationale

MSC defines a harvest strategy as the combination of monitoring, stock assessment, harvest control rules and management actions, which may include a management process or a management procedure (implicit) and be tested by management strategy evaluation (MSE). The IATTC management objective for tuna stocks, including BET, is to maintain or restore populations to levels capable of producing MSY and is specified in Resolution C-16-02 and amended in Resolution C-23-06. SMSY and FMSY is the spawning biomass corresponding to the MSY and the fishing mortality rate corresponding to the MSY, respectively, and if reliability estimated within the assessment model shall be used as interim target reference points. Proxy target reference points can be specified if SMSY and FMSY cannot be reliably estimated. The HCR recommended by the IATTC scientific staff for the purse-seine fishery for tropical tunas shall be adopted, in accordance with the following principles:

- If the probability that F will exceed the limit reference point (FLIMIT) is greater than 10%, as soon as is practical management measures shall be established that have a probability of at least 50% of reducing F to the target level (FMSY or Fproxy-MSY) or less, and a probability of less than 10% that F will exceed FLIMIT.

- If the probability that the spawning biomass (S) is below the limit reference point (SLIMIT) is greater than 10%, as soon as is practical management measures shall be established that have a probability of at least 50% of restoring S to the target level (dynamic SMSY or Sproxy-MSY) or greater, and a probability of less than 10% that S will descend to below SLIMIT in a period of two generations of the stock or five years, whichever is greater.

- For fisheries that use gears other than purse-seine nets, the recommendations by the IATTC scientific staff on additional management measures shall be as consistent as possible with those adopted for the purse-seine fishery, while taking account of the impact of those fisheries on the species compared with that of purse-seine fishery.

The HCR is implemented via time/area closures and catch limits which vary for different fleets (Resolution C-21-04). The duration of the area closure is set according to the level of Fmult (FMSY/Flatest) for the stock requiring

the strictest management (at present bigeye). Thus, the harvest strategy is in theory responsive to the state of the stock and expected to achieve stock management objectives reflected in PI 1.1.1 SG80; SG 60 is met.

The 2018 stock assessment of bigeye suggested that the stock status was worse than previously thought, and application of the HCR should have resulted in an increase in the duration of the closure from 72 days to 107 days. However, this was not done, because IATTC scientific staff considered that the bigeye assessment was too uncertain to provide a robust basis for such a large change in management, and because fishing mortality for yellowfin was estimated to be at the appropriate level. IATTC scientists recommended that a precautionary limit on purse seine sets be imposed in addition to the seasonal closure, but no resolution was passed to this effect at IATTC plenary in 2018. It is therefore questionable in practice whether the HCR is being applied in a way which is clearly responsive to the state of the stocks. Most recently, this has been addressed with the adoption of a risk-based decision analysis approach guiding the scientific advice, but this has not yet been adopted by the Commission. The risk-based method has led to recommendations for additional precautionary controls, particularly on FAD management.

The main conservation measure established by the IATTC for bigeye is Resolution C-21-04 that establishes a multi-annual management measure for tropical tunas in the eastern Pacific Ocean during 2022-2024. This measure calls for:

A 72-day closure for purse seiners vessels greater than 182 tons capacity through 2024;
Additional days of closure for vessels exceeding a particular annual bigeye catch limit (i.e. 8 additional days in 2022 if a vessel has exceeded 1200 tons in 2017-2019, and 10-13-16-19-22 additional days in 2023-2024 if a vessel has exceeded 1200-1500-1800-2100-2400 tons, respectively, in previous year;
Strengthen the monitoring and control system for tropical tuna species (particularly bigeye) catches through on-board observers, logbooks, port sampling and information from tuna processing facilities to control individual vessel bigeye catches;
A seasonal closure of the purse seine fishery in an area known as "El Corralito", west of the Galapagos Islands, where catch rates of small bigeye are high;
A full retention requirement for all purse seine vessels regarding bigeye, skipjack and yellowfin tunas;
Bigeye catch limits for the main longline fishing nations;

- Limits on the number of active FADs that each purse seiner can have at any time, ranging from 66 FADs/vessel for the smallest ones to 400 FADs/vessel for Class 6 vessels (1,200 m3 capacity). These ranges will decrease to 64 to 340 in 2023 and 50 to 340 in 2024;
  All purse seines are also required to not deploy FADs 15 days before the selected closure period and Class 6 vessels to recover within 15 days prior to the start of the closure period a number of FADs equal to the number of FADs set upon during that same period;
- And in order to support the scientific analysis of FAD fisheries, the measure requires that CPCs or vessels report daily information on all active FADs (position and echosounder biomass data) as well as Vessel Monitoring System (VMS) data to the Secretariat.

Based on the totality of information and noting that the current ad hoc approaches can be incorporated into the harvest strategy, 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; requirements at the SG80 level are met.

To achieve SG100 the harvest strategy is required to be ‘designed’ to achieve stock management objectives. This implies testing of the harvest strategy and harvest control rule within a Management Strategy Evaluation framework, and while there was some initial MSE testing, the framework was limited in its ability to capture the complexity of uncertainties. MSE research and testing is proceeding within the IATTC, and results are scheduled to be available sometime in 2024. On this basis SG 100 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	No	Not scored

Rationale

At the SG 60 level, PI1.2.1 Si-b requires that the harvest strategy is likely to work based on prior experience or plausible argument, while at the SG 80 level, even if the harvest strategy has not have been fully tested, evidence exists that it is achieving its objectives. Achieving SG 100 requires the performance of the harvest strategy to be fully evaluated and evidence exists to show that it is achieving its objectives including being clearly able to maintain stocks at target levels.

The IATTC management objective for tuna stocks, including BET, is to maintain or restore populations to levels capable of producing MSY and is specified in Resolution C-16-02 and amended in Resolution C-23-06. S_{MSY} and F_{MSY} is the spawning biomass corresponding to the MSY and the fishing mortality rate corresponding to the MSY, respectively, and if reliability estimated within the assessment model shall be used as interim target reference points. Proxy target reference points can be specified if S_{MSY} and F_{MSY} cannot be reliably estimated and adoption of the HCR for the purse-seine fishery for tropical tunas follows principles noted above in Si-a. Additionally, the HCR is implemented via time/area closures and catch limits which vary for different fleets (Resolution C-21-04). The duration of the area closure is set according to the level of F_{mult} (F_{MSY}/F_{latest}) for the stock requiring the strictest management (at present bigeye). Noting time time/area closures and catch limits are common approaches to reducing F (Walters and Martell, 2005) the harvest strategy is likely to work based on prior experience or plausible argument; SG 60 is met.

The results of the 2019 yellowfin tuna assessment (Minte-Vera et al. 2019) indicated uncertainties large enough to prevent useful management advice from being provided and an external review suggested changes to the entire assessment model leading to an all-new approach to assess stock status and to provide management advice (Cass-Calay et al., 2019). While the review focused on yellowfin tuna in the EPO the recommended changes to the assessment model and management advice were applied to bigeye tuna during the revised BET stock assessment conducted in 2020 (Xu et al., 2020).

According to the 2020 stock assessment, the overall results of the risk analysis indicate a 50% probability that F_{MSY} has been exceeded and a 53% probability that spawning stock biomass is below B_{MSY}. The probabilities that the F and B limit reference points have been exceeded are not negligible ($P(F_{cur}>F_{lim})$ = 5%; $P(B_{cur}<B_{lim})$ = 6%). The bimodality in the joint distribution of terminal year depletion observed in the 2020 stock assessment impacted subsequent decisions on BET stock status in the EPO. Progress to address this issue has been steady and incremental since 2020, and in exploratory analyses completed by IATTC scientific staff the bimodality in the joint distribution of terminal year depletion has been significantly reduced through development of a new "base" reference assessment model considered superior to the "base" reference assessment model used in the 2020 benchmark assessment (Xu et al., 2023). Modifications in the new assessment model fall into three categories: fishery definitions, survey fleet characteristics, and fishery fleet characteristics and a variety of model diagnostics tracked the improvements including:

- Improved fit to length composition data;

- Improved fit to the index of abundance;
- Included an additional source (Korean) of data in the calculation of longline length compositions;
- Estimated more realistic initial conditions;
- Reduced conflict between the information from the index of abundance and from length compositions about the scale of population abundance;
- Reduced magnitude of the regime shift in recruitment (from 2.4 to 1.5); and
- Showed very similar scales and trends of absolute abundance estimated by the new base model and its age-structured production model.

The improvements in the assessment model show potential in significantly reducing or even resolving the bimodal pattern in model-combined joint distributions of management quantities. Specifically, these improvements result in more optimistic estimates of terminal year depletion for the pessimistic group of assessment models, and more pessimistic estimates of terminal year depletion for the optimistic group of assessment models. Testing of the harvest strategy is being conducted in an application of the management strategy evaluation (MSE) on bigeye and the research plan is expected to be extended into 2024 (see Valero 2023).

Even if the latest assessment has reduced the uncertainty around management quantities, it is still large enough to be of concern and for this reason the staff is working in improving data handling and model specification. While new measures have been implemented to address the increasing trend in the number of sets on floating objects, it is too soon to determine if the new measures are being effective in reducing the risk on the stock to be driven to undesirable levels relative to the reference points, particularly since the catch of BET in 2021 and 2022 is lower than the historic average. On this basis the Assessment Team concluded that additional testing is required to ensure that the harvest strategy is still achieving its objectives given the significant increase in fishing effort on FADs; SG 80 is not met.

Noting that SG 80 is not achieved, SG 100 is not scored.

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

Rationale

There are a considerable amount of reporting requirements and in-place monitoring programs specified under Resolutions C-20-06 and C-21-04 to support stock assessment activities and regular reviews to determine the efficacy of harvest strategies. Observer coverage at 100% (for vessel categories 3-6), logbook records, and additional research data gathering provide the basic inputs for assessment models that have been developed over a long period of time and are used in conjunction with the HCR to support decision making. Contracting parties are required to submit annual national reports on national compliance schemes and actions taken to implement agreed IATTC measures, including any controls on fleets and any Monitoring, Control and Surveillance (MCS) measures established. Additionally, Resolution C-20-06 requires that IATTC scientific staff analyse the effects of implementing these measures, as well as previous conservation and management measures on the stocks, and, if necessary, to propose appropriate measures to be applied in future years. On this basis there is sufficient monitoring in place to determine whether the harvest strategy is working, and SG 60 is met.

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

Rationale

To achieve SG 100 the requirement is for the harvest strategy to be periodically reviewed and improved as necessary.

Resolution C-16-02 provides guidelines and a roadmap for the evaluation of the harvest control rule (HCR) for tropical tunas (yellowfin, bigeye and skipjack) where the objective is to define a HCR that limits fishing mortality (F) to levels that do not exceed the level corresponding to the MSY. The F-based reference points have been incorporated into a more complete HCR, that includes Kobe plots and strategy matrices (Maunder et al. 2012; Minte-Vera et al. 2013; Maunder and Deriso 2014).

C-21-04 requires a review of the harvest strategy annually (para. 35). IATTC has been going through a process for some years of reviewing, evaluating, and adjusting the harvest strategy, including identification of appropriate reference points (Maunder and Deriso 2014). Similarly, there has been consistent improvements in the estimation of parameters and uncertainty in IATTC tropical tuna stock assessments, including bigeye tuna (Xu et al., 2020; Aires-da-Silva et al., 2020; Xu et al., 2023).

Paragraph 44 of Resolution C-21-04 further stipulates IATTC scientific staff shall continue to establish the scientific basis, through Management Strategy Evaluation (MSE) testing, to advise the Commission on initial candidate harvest strategies, starting with bigeye tuna in 2024. During the 87th annual meeting of the IATTC (IATTC 2014), interim limit and target reference points for tropical tunas in the Eastern Pacific Ocean (EPO), including bigeye tuna, were adopted., and during the 101st annual meeting the reference points were amended (Resolution C-23-06). While the appropriateness of the operational HCR currently used with regard to limit reference points for bigeye tuna in the EPO has not been investigated in depth, a comprehensive MSE is necessary to evaluate the HCR (IATTC-SAC 2016). Maunder et al. (2015) outlined current and future research on management strategy evaluation (MSE) for tunas and related species in the EPO and Valero (2023) presented a progress report with advances in the construction of the MSE.

Based on the totality of the information there is ample evidence that the harvest strategy is periodically reviewed and improved as necessary.

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

Not applicable as the target 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
Unwanted catch is defined by MSC as catch which is unwanted and not used (i.e., not sold or consumed). Under P1 it refers only to unwanted catch of the target species. Discards are routinely estimated for all target species where possible, but discarding of target tunas is not generally considered significant compared to other sources of mortality and low compared to other fisheries (Gilman et al. 2020). Catch data of bigeye tuna from 2017 to 2022 in the EPO indicates that the level of discards that can be considered unwanted catch has been less than 1%, and in 2021 and 2022 bigeye discards represented approximately 0.1% of total reported catch (IATTC 2023) Therefore, the volume of unwanted catch is considered negligible (GSA 3.5.3) and this Si is scored as not relevant.

References
Gilman et al. (2020); Xu et al. (2023); Valero (2023); Maunder and Deriso (2014); Aires-da-Silva et al. (2020); Minte-Vera et al. 2013; Maunder et al. (2015); Xu et al. (2020); Cass-Calay et al., 2019;

Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	60-79
Information gap indicator	

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

PI 1.2.2 – Harvest control rules and tools

PI 1.2.2	**There are well defined and effective harvest control rules (HCRs) in place**		
Scoring Issue	SG 60	SG 80	SG 100

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

Rationale

The Commission has consistently recommended the use of an HCR. IATTC Resolutions C-16-02 and C-23-06 outlines the HCR for tropical tunas in the IATTC Commission Area as:

- If the probability that $F>F_{lim}$ is >10%, management measures shall be established such that there is at least a 50% probability that F will reduce to F_{MSY} or below, and with a probability of <10% of $F>F_{lim}$.
- If the probability that $SB<SB_{lim}$ is >10%, management measures shall be established such that there is at least a 50% probability that SB will recover to SB_{MSY} or above, and with a probability of <10% that SB will decline to $<SB_{lim}$ within two generations or 5 years, whichever is greater.
- Purse seine closures can be established for multiple years and shall attempt to prevent the fishing mortality rate (F) from exceeding the best estimate of the rate corresponding to the maximum sustainable yield (F_{MSY}) for the species that requires the strictest management.

These measures are expected to keep the biomass above the LRPs, and above the PRI. Thus, requirements for SG 60 are met.

To satisfy the requirements at the SG 80 level the HCR must be “well defined”, “in place”, and “expected to keep the stock fluctuating around a target level consistent with MSY’. Based on Resolutions C-16-02 and C-23-06 the HCR is well defined. There is also evidence that the HCR is functionally in place because there has been reliable and systematic use of its main tool - temporal closures as specified in Resolution C-21-04 (Conservation Measures for Tropical Tunas in the Eastern Pacific Ocean During 2022-2024). Closures are the main tool used to control effort and are numerically explicit; utilizing as input the F multiplier parameter representing the change in effort needed to keep stocks at F_{MSY} or below F_{MSY} (IATTC 2007). Additional measures noted in Res. C-21-04 include enhanced reporting and monitoring requirements for vessels operating in the IATTC Convention area, limitations on the number of FADs deployed and specifications on buoy satellite instrumentation, establishment of catch limits for bigeye tuna, advancing the risk analysis implemented for bigeye tuna in 2020, and continuing efforts to identify candidate harvest strategies through the development and implementation of Management Strategy Evaluation (MSE) testing. Noting that a precautionary well-defined harvest control rule is being applied that is expected keep the stock fluctuating around or above MSY and to reduce exploitation as the stock approaches its PRI, requirements at the SG 80 level are met.

Noting that the HCR lacks detail or justification to keep stocks at levels higher than MSY and does not take into account the ecological role of the stock, requirements at the SG 100 level are not met.

b	HCRs robustness to uncertainty

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

Rationale

IATTC Resolutions C-16-02 and C-23-06 established a HCR for tropical tunas in the EPO. A preliminary MSE approach, limited in scope and testing of uncertainties, was utilized to develop, and test the HCR developed for all tropical tunas using bigeye as an example. Results of the testing indicated the harvest strategy did rebuild the bigeye stock under all management scenarios supporting the robustness of the HCR. Unfortunately, the 2018 BET stock assessment was highly uncertain and deemed not appropriate for management use, prompting the IATTC scientific staff to enhance the assessment model by providing parameters suitable for the HCR and to implement a risk-based approach to guide decision-making under risk. The 2020 BET benchmark assessment further explored the robustness of the assessment model and successfully applied the risk-based approach allowing for the determination of stock status. These results, combined with outcomes from the initial MSE testing, suggests that the HCR are likely robust to main uncertainties; SG 80 is met.

While the overall harvest strategy did rebuild the bigeye stock towards the target under all management scenarios, a more comprehensive MSE is required to evaluate the robustness of the HCR (Maunder and Deriso 2016). Although simulations support the robustness of the HCR, there is still a lack of direct evidence, and, as noted, not all uncertainties have been evaluated (Aires-da-Silva et al., 2020). On this basis SG 100 is not met.

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

Rationale

The main tool supporting the HCR is the F multiplier (F_{MSY}/F_{recent}), which in turn determines the temporal closure of purse seine fisheries. These closures are adjusted to manage exploitation in reaction to status determination of stocks with respect to the agreed reference points and timeframes currently set out in Resolution C-16-02. Resolutions C-17-02 and C-21-04 describe the rational and implementation process for the closures using the F-multiplier and provides a cap on FAD numbers and closure to purse-seine vessels within the area of 96º and 110ºW and between 4°N and 3°S, known as the “corralito”. C-16-02 does not specify a HCR that requires specific exploitation rates against which the effectiveness of tools can be evaluated but provides a framework for providing advice on measures that will achieve outcomes. The primary evidence to judge whether tools are effective is therefore estimates of status from stock assessments.

The HCR defined in C-16-02 and C-23-06 aims to prevent fishing mortality from exceeding the MSY level for the tropical tuna stock (bigeye, yellowfin, or skipjack tuna) that requires the strictest management based on the current estimates of fishing mortality. The duration of closures is intended to be adjusted according to the estimated F-multiplier and other factors (such as estimated increases in capacity). Although, as reflected in PI

1.1.1, there are uncertainties in the 2022 skipjack assessment, there is some evidence that appropriate exploitation levels have been maintained, hence meeting SG60.

In 2017, the closure period for 2017-2020 was extended to 72 days based on the F-multiplier adjusted for capacity increases. However, due to uncertainties in the relationship between exploitation and closure period, the duration of the closure period was not increased in 2018 as recommended by IATTC staff. The duration of the closure period was tested in 2020 as part of the benchmark assessments for yellowfin and bigeye tuna in the EPO and a procedure developed to assess the risk of a range of closure periods in meeting management objectives (from 0 to 100 days). Results indicated that the current closure period of 72 days meets the management objectives and IATTC staff recommended no additional closure days were required (Aires-da-Silva et al., 2020).

At the 95th meeting of the IATTC held in early December 2020, no agreement was reached on new management measures for 2021, putting management arrangements for 2021 in doubt. Subsequently, IATTC convened an extraordinary meeting on 22 December 2020 where it was agreed that the measures in force in 2020 (reflected in C-17-02) would be carried over for one year (to be recorded as Resolution C-20-06) and that they be reviewed for subsequent years no later than the annual meeting in 2021. At the 98th meeting of IATTC in October 2021 new management measures were adopted (reflected in C-21-04) covering the years 2022-2024. On this basis available evidence indicates that the tools in use are appropriate and effective in achieving the exploitation levels required under the HCRs and SG 80 requirements are met.

While testing of the main tool (F-multiplier) provides some confidence that it is effective in achieving the exploitation levels required under the HCRs, the procedure linking a specific closure duration to an exploitation rate is unclear. As a result, the closure duration tends to be a negotiated outcome between CPCs. On this basis SG 100 requirements are not met.

References
IATTC 2007; Maunder and Deriso 2016; Aires-da-Silva et al., 2020

Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	≥ 80
Information gap indicator	

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

PI 1.2.3 – Information and monitoring- EPO Bigeye Tuna

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 Commission monitors the fishery in a variety of ways, leading to a very complete record of fishing operations, catch, size-at-catch (size frequency sampling) bycatch, efficiency and environmental interactions. In 2016, total catch of BET by all fleets of all size and gear was approximately 93,000 mt. Of this total, purse seiners caught approximately 57,000 mt. The total purse seine catch was obtained setting approximately 33,000 times, and out of these, only about 7,000 were by vessels smaller than 363 mt (IATTC 2019). This means that the majority of the fishing effort on BET was monitored by an observer program that has 100% coverage for purse seiners larger than 363 mt. This coverage is by all standards large enough to consider that sufficient information is being recorded about the behaviour and performance of the fishery. As noted, considerable environmental data that has been collected, but to date is not directly used in the harvest strategy. While some key information on stock productivity is not well-estimated, notably on growth and natural mortality, improvements in these estimates have taken place. Overall, available data are sufficient for stock assessments to monitor stock status to support the harvest strategy; requirements at the SG 60 and SG 80 level are met.

Data gaps in information from some fleets remains, as well as issues with biological data (stock structure, growth, and mortality). On this basis a comprehensive range of information does not exist and requirements at the SG 100 level are 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

Regular stock assessments are conducted to estimate the status of stocks BET in the EPO. To this end, extensive amounts of data are obtained by observers placed on every trip on vessels of class 4-6, including data on retained catches, discards, indices of abundance (CPUE), and the size compositions of the catches of the various fisheries. While modifications to enhance the observer program have occurred over time the IATTC initiated the observer program in 1993 and a considerable amount of information has been historically obtained to get a reasonable understanding of the stock abundance, removals and dynamics. Understanding of status for BET is obtained through direct evaluation of the indicator metrics relative to historical trends. To collect removals of all target stocks the UoA implemented an observer program on those vessels not monitored through the IATTC observer program (vessels of class < 4) and routinely provides these data to the IATTC. Based on this information, 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: the SG 80 is met.

The main uncertainties are generally well identified and understood, however reporting from some fleets is limited (particularly from smaller class vessels). On this basis SG 100 is not met.

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

Rationale

The fishery for BET and the other two tropical tunas in the EPO is conducted by many countries including Mexico and Ecuador that together hold more than half of the carrying capacity of the fleet. Other countries include Venezuela, Colombia, Panama, Argentina, and Nicaragua. Although the number of boats of small capacity is similar to others of larger size, most of the capacity is in vessels of class 4 and above (nearly 95% in 2014).

There has been an IATTC observer program since 1993 for larger vessels, and the United States has had an observer program from the 1970s. Observer coverage has allowed discards of tuna to be estimated, as well as estimates of bycatch of other species. IATTC members are required to annually report BET catch by all gears including purse seiners, LL and pole and line, and IATTC stock assessments include all removals and discards. There is no indication from the information available that IUU fishing is at a level which would impact stock assessment outcomes. On this basis there is good information on all fishery removals from the stock and the level of monitoring is sufficient to support the harvest strategy; SG 80 is met.

References

IATTC 2019

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

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

Overall Performance Indicator score	
Condition number (if relevant)	

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

PI 1.2.4 – Assessment of stock status- EPO Bigeye Tuna

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	No

Rationale

The assessment employees the integrated statistical age-structured population modelling framework, stock synthesis, to assess bigeye tuna in the EPO (Methot and Wetzel 2013). This framework has been applied in a wide variety of fish assessments globally and requires substantial amounts of information, including data on retained catches, discards, indices of abundance (CPUE), and the size compositions of the catches of the various fisheries. Assumptions have been made about processes such as growth, recruitment, movement, natural mortality and stock structure.

The 2020 benchmark assessment of bigeye tuna in the EPO represents a new approach. Previously, a 'best assessment' approach was used for the evaluation of stock status using a single 'base-case' model. The new approach is based on 'risk analysis' methodologies, which use several reference models to represent various plausible states of nature (assumptions) about the biology of the fish, the productivity of the stocks, and/or the operation of the fisheries, and considers the different results, thus effectively incorporating uncertainty into the formulation of management advice. This change, which represents a paradigm shift at IATTC, both for the staff's work and for the Commission's decision-making regarding the conservation of tropical tunas, also allows the staff to evaluate explicitly the probability statements specified in the IATTC harvest control rule for tropical tunas established in Resolution C-16-02.

The risk analysis developed alternative hypotheses (different states of nature) in a hierarchical risk framework that addressed uncertainties and issues from previous assessments by integrating 44 reference models covering a) the apparent regime shift in recruitment (R shift), b) the misfit to the length-composition data for the longline fishery that is assumed to have asymptotic selectivity, and c) the steepness of the stock-recruitment

relationship, representing 12 different model configurations, each with four different values of steepness (0.7, 0.8, 0.9, 1.0).

Current status relative to a reference point was calculated as a weighted average of the point estimates of the ratio from each of the alternative stock assessment models, with weights equal to the relative model probabilities (equal to the expected value under the normal distribution assumption made for each model). The probability of exceeding a reference point was calculated using the cumulative distribution functions (CDFs) for the ratios of Fcur and Scur relative to the reference points for each of the alternative models, which are then combined using the model probabilities.

Noting the wide application of the stock synthesis framework to assess tuna stocks globally and its use by IATTC to assess other tropical tuna stocks, the assessment is appropriate for bigeye tuna and provides necessary information for the HCR. On this basis SG 80 is met.

While the assessment evaluates uncertainty across a suite of alternative hypotheses within a hierarchical risk framework, two factors requiring additional evaluation include an alternative spatial/stock structure hypotheses (biological) and an assumption that catchability has been incrementally increasing through time (nature of the UoA). On this basis the Assessment Team considers there are still relevant evaluations to be conducted and SG 100 is not 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 has been used to estimate the MSY-related reference points, and these have been used to determine stock status. A broad range of uncertainty has been incorporated into the assessment thus effectively incorporating uncertainty into stock status determinations and formulation of management advice. On this basis the assessment estimates stock status relative to known reference points appropriate to the stock (bigeye tuna), thus meeting requirements at the SG 60 and SG 80 levels.

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 2020 benchmark assessment of bigeye tuna in the EPO represents a new approach that explicitly takes multiple sources of uncertainty into account in defining stock status and formulating management advice within a risk-based framework. Several reference models are constructed to represent various plausible states of nature (assumptions) about the biology of the fish, the productivity of the stocks, and/or the operation of the fisheries. Projections of future stock trajectories under different model assumptions were used to evaluated

management quantities related to the HCR, thus effectively incorporating uncertainty into the formulation of management advice. Stock status relative to reference points is calculated as a weighted average of the point estimates of the ratio from each of the alternative stock assessment models, with weights equal to the relative model probabilities. The probability of exceeding a reference point is calculated using the cumulative distribution functions (CDFs) for the ratios of Fcur and Scur relative to the reference points for each of the alternative models, which are then combined using the model probabilities. On this basis the assessment takes into account uncertainty and is evaluating stock status relative to reference points in a probabilistic way; SG 60, SG 80, and SG 100 are met.

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

Rationale

The 2020 benchmark assessment forms the basis of a risk analysis and the process used is consistent with recommendations from the external review panel. The assessment used fourteen reference models within a hierarchical framework that addressed three major uncertainties: a) the apparent regime shift in recruitment (R shift), b) the misfit to the length-composition data for the longline fishery that is assumed to have asymptotic selectivity, and c) the steepness of the stock-recruitment relationship. Additionally, sensitivity analyses were conducted to explore a wide range of alternative hypotheses (Xu et al., 2020).

While significant testing was conducted it is not clear if the assessment is robust. The IATTC has moved towards a decision analysis framework to manage risks in its assessments, including bigeye tuna (Aires-da-Silva et al., 2020). Xu et al. (2020) has identified additional uncertainties that should be explored as alternative hypotheses in future assessments including spatial/stock structure, uncertainty in growth and selectivity, as well as natural mortality. On this basis alternative hypotheses and assessment approaches have not been rigorously explored and the SG100 level is not met.

e	Peer review of assessment			
	Guide post		The assessment of stock status is subject to peer review.	The assessment has been internally and externally peer reviewed.
	Met?		Yes	Yes

Rationale

Results of IATTC research, including stock assessments, are reviewed by the Stock Advisory Committee (SAC) each year. Published summary reports of the committee meetings show extensive discussion on model inputs and uncertainty, stock structure, and data gaps. The 2020 bigeye tuna stock assessment underwent an internal review during virtual meetings of the SAC in October 2020 and further review occurred during the 95th Meeting of the IATTC in November/December 2020. Based on the regular review of assessments by the SAC (as well as the Commission) they are routinely subject to peer reviews; SG 80 is met.

The Commission also assembles external expert panels to periodically peer review stock assessments and the bigeye tuna assessment was externally peer reviewed in March 2019 (Punt et al., 2019). On this basis the SG80 and SG100 requirements are met.

References	
Methot and Wetzel (2013); Punt et al. (2019); Aires-da-Silva et al. (2020); Xu et al. (2020)	
Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	≥80
Information gap indicator	Information sufficient to score PI

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

1.16 Principle 2 Performance Indicator Scores and Rationales

PI 2.1.1 – Primary species outcome

PI 2.1.1		The UoA aims to maintain primary species above the point where recruitment would be impaired (PRI) and does not hinder recovery of primary species if they are below the PRI		
Scoring Issue		SG 60	SG 80	SG 100
a	Main primary species stock status			
	Guide post	Main primary species are likely to be above the PRI. OR If the species is below the PRI, the UoA has measures in place that are expected to ensure that the UoA does not hinder recovery and rebuilding.	Main primary species are highly likely to be above the PRI. OR If the species is below the PRI, there is either evidence of recovery or a demonstrably effective strategy in place between all MSC UoAs which categorise this species as main, to ensure that they collectively do not hinder recovery and rebuilding.	There is a high degree of certainty that main primary species are above the PRI and are fluctuating around a level consistent with MSY.
	Met?	TUNACONS all set types Skipjack tuna: Yes Bigeye tuna: Yes US Small PS UoA: Pacific bluefin tuna: Yes	TUNACONS all set types Skipjack tuna: Yes Bigeye tuna: No US Small PS UoA: Pacific bluefin tuna: No	TUNACONS all set types Skipjack tuna: No Bigeye tuna: Not scored US Small PS UoA: Pacific bluefin tuna: Not scored
Rationale				
TUNACONS UoA: Skipjack tuna is designated as a primary main species in both the free school and FAD fisheries. Bigeye tuna is designated as a primary main species in the FAD fishery. <u>*Skipjack Tuna (all set types)*</u>: There is no analytical stock assessment for skipjack tuna in the EPO due to its innate biological characteristics that include rapid and variable growth, high natural mortality, and high and very variable recruitment (Maunder 2019). Additionally, there is no age compositional data for this species. Consequently, no estimates of MSY-related reference points are available, and stock status determinations relative to exploitation levels are not				

estimable. The assessment team determined that although analytical stock assessments are not available for this species, there is evidence that an empirical approach using stock status indicators (SSIs) (i.e. CPUE relative biomass) allows for inferences about stock status without drawing on mathematical model-based techniques, and, as skipjack is not considered data-deficient, the use of RBF is not considered necessary at this time.

The methods used previously to compute the SSIs have been revised to mitigate possible bias introduced in the allocation of fishing effort among purse-seine set types. The new SSIs: (a) include measures of catch, effort, CPUE, and average length of the fish in the retained catch; (b) begin in 2000, the first year of species composition sampling for the purse-seine fishery and shortly after the major offshore expansion of the floating-object fishery; and (c) have reference levels set at the 10% and 90% percentiles (IATTC 2020). The situation in 2020 based on the floating-object fishery can be summarized as follows:

- fishing mortality has increased, mainly due to the increase in the number of floating-object sets;
- the catch of skipjack has increased since 2005 resulting from the increase in the number of floating-object sets;
- catch-per-set and average length of skipjack has declined over time.

Consistent with the previous interpretation of skipjack SSIs described in Maunder (2019), inconsistencies between some of the current SSIs persist and do not support the interpretation that fishing mortality has increased as a result of an increase in the number of floating-object sets (IATTC 2020) (Figure 14- Figure 18). In addition, IATTC staff note that catch-per-set for the floating-object fishery may not be a reliable indicator of skipjack abundance. However, IATTC scientists note that there is concern over the substantial increase in number of sets on floating objects in recent years. The low average weight may be an indicator of overexploitation, but may also be caused by recent recruitments being greater than past recruitments or expansion of the fishery into areas occupied by smaller skipjack (see Figure 14- Figure 18).

Overall, the SSIs have yet to detect any adverse impacts of the fishery and given the resilient life history characteristics of skipjack tuna, IATTC scientists have indicated there is “no concern with EPO skipjack tuna” (IATTC SAC 2020). Given available information it is highly likely that the stock is above the PRI, meeting SG80.

The lack of a recent full stock assessment means that it is not possible to determine with a high degree of certainty that the stock is above the PRI with high certainty, so SG100 is not met.

Bigeye Tuna (FAD sets)

IATTC Resolution C-16-02 defines target and limit reference points, in terms of biomass and fishing mortality. The *S*LIMIT adopted as interim by the IATTC (in the 87th meeting) is the spawning biomass that produces half of the virgin recruitment ($SB=0.5R_0$) given that the stock-recruitment relationship follows the Beverton-Holt function with a steepness of 0.75. This spawning biomass is equal to 0.077 of the equilibrium virgin spawning biomass (Maunder and Deriso (2014)

The limit reference point of fishing mortality (FLIMIT) is the fishing mortality threshold that should be avoided because fishing harder could endanger the sustainability of the stock. The FLIMIT adopted as interim by the IATTC (in its 87th meeting) is the fishing mortality rate that, under equilibrium conditions, maintains the spawning population level at SLIMIT.

Two sources of information inform the status assessment of EPO bigeye tuna – the 2020 benchmark stock assessment (Xu et al. 2020) and the stock status indicators (SSIs) that were developed to monitor the bigeye tuna stock (IATTC-SAC 11-05, 2020). The recent benchmark stock assessment status relative to a reference point was calculated as a weighted average of the point estimates of the ratio from each of the alternative stock assessment models (N=44; 12 model configurations with four steepness (h) values (0.7, 0.8, 0.9, 1.0) associated

with each configuration were test, four models did not converge), with weights equal to the relative model probabilities (equal to the expected value under the normal distribution assumption made for each model). The probability of exceeding a reference point was calculated using the cumulative distribution functions (CDFs) for the ratios of F_{cur} and S_{cur} relative to the reference points for each of the alternative models, which are then combined using the model probabilities.

The combined distribution of F_{cur}/F_{LIMIT} from the 44 models tested is bimodal, due to the substantial differences in the estimates between the "short-term models" which are more pessimistic (Fcur/FMSY mostly above 1), and the "medium-term" models that do not assume the recruitment shift (R) is real, which are more optimistic (Fcur/FMSY mostly below 1). For the combined distribution, Fcur is at about 60% of FLIMIT and the probability of (Fcur > FLIMIT is 5%. The probability distribution for S_{cur}/S_{LIMIT} is also bimodal. The combined ratio of Scur/SLIMIT is estimated at approximately 3.07 and the probability of $S_{cur} < S_{LIMIT} = 6\%$.

Estimates of relative annual recruitment are not sensitive to the value of steepness. During the 1980s recruitment was generally below the long-term average, increasing to average levels through 2005, before declining to levels below average through 2015. In recent years recruitment was variable with large confidence intervals. Recruitment was variable throughout the approximate 40-year time series of recruitment, the magnitude and timing of the recruitment shifts depending on the reference model.

IATTC has established Stock Status Indicators (SSIs) for bigeye tuna to be used for historical comparisons to identify trends and can provide information that may be useful for stock management. These indicators do not provide information on the state of the stock relative to the PRI but do provide additional information for consideration. The purse-seine-based indicators include the number of sets, by set type, closure-adjusted capacity, catch by set type, catch-per-set by set type, and average length of the fish in the retained catch, by set type. Current trajectories of SSIs show an increasing trend in the number of purse seine floating object sets over time, a decrease in catch per set of bigeye in the floating object fishery since 2000, and a decline in average length of bigeye in both the unassociated (free school) and floating object fisheries (IATTC-SAC-11-05, 2020). Declines in catch were also observed in the longline fishery since 2000, as was a declining trend in bigeye CPUE over time. These results suggest an increase in fishing mortality for bigeye tuna, resulting from the observed increase in the number of floating object sets. The benchmark assessment and risk analysis indicate that is likely that Scurrent is above the PRI, meeting SG60 requirements.

The principal management measures for tropical tuna in the EPO is a purse seine temporal closure period of 72 days and Aires-da-Silva et al. (2020) examined the utility of various closure periods (0, 36, 70, 72, 88, and 100 days). However, if the pessimistic models for bigeye tuna represents the true state of nature the risk of exceeding FLIMIT under the current closure at 72 days is 10%. which is the upper threshold above which additional management would be required as specified in Res. C-16-02. Therefore, any reduction of the 72-day closure would exceed the limit under the combined pessimistic models. However, the risk analysis to determine the utility of different temporal closure periods assumed no uncertainty, which could significantly impact the outcome. Also, given there are multiple fisheries catching bigeye tuna in the EPO, several of them being MSC certified, and all subject to IATTC management measures, there does not appear to be a verifiable strategy in place across all MSC fisheries that would ensure they do not hinder recovery of bigeye tuna if the stock is below PRI. Based on this information SG 80 is not met.

SG100 is not scored as not all SG80 requirements are met (see MSC interpretation https://mscportal.force.com/interpret/s/article/Scoring-SG100-if-not-all-SG80-met-7-10-5-3-1527262010218).

US Small PS UoA

Pacific bluefin tuna

Pacific bluefin tuna is categorized a main primary species. No biological reference points have been established for Pacific bluefin tuna. The 2016 stock assessment concluded that spawning biomass had been reduced to 2.4%

of unfished levels and based on an evaluation of stock status relative common reference points (F_{max}, $F_{0.1}$, F_{med}, $SPR_{10\%}$, $SPR_{20\%}$, $SPR_{30\%}$, and $SPR_{40\%}$) the stock was considered overfished and subject to overfishing (ISC 2016). Results from the 2020 stock assessment determined that spawning biomass had increased to 4.5% of unfished levels and fishing mortality had decreased (ISC 2020). As there are still no established biological reference points stock status was again evaluated relative to common reference points indicating the stock is likely overfished and subject to overfishing (ISC 2020). . Based on this information the assessment team considers the stock to be below the PRI.

As a result of the low spawning biomass levels voluntary domestic management measures were introduced by Japan in 2011 to reduce fishing mortality. In 2016 a Pacific bluefin tuna rebuilding plan, with both targets and catch limits, was implemented collaboratively by IATTC and WCPFC. The rebuilding plan was based on simulation modelling that used the 2016 stock assessment model to project stock outcomes under varying reductions in catch while assuming low and average recruitment to the population (ISC 2016). Based on results of the simulation modelling exercise a rebuilding plan with two spawning biomass targets was established: (1) by 2024 rebuild spawning biomass to 6.7%$SSB_{F=0}$ (the median SSB estimated for the period 1952 through 2014) with at least 60% probability and (2) rebuild spawning biomass to 20%$SSB_{F=0}$ with at least 96% probability 10 years after the achievement of the initial rebuilding target or by 2034, whichever is earlier. All simulations were initiated assuming low recruitment to the population, switching to average recruitment beginning in the year after achieving the initial rebuilding target. Based on the simulation results the goal of meeting the first rebuilding target with at least 60% probability by 2024 was achieved under all tested scenarios, assuming all CMMs are fully implemented and there is a low magnitude of discards. Based on the spawning biomass targets established by the rebuilding plan the assessment team considers PRI to be equivalent to 20%$SSB_{F=0}$, the second rebuilding target.

As part of 2020 stock assessment, population projections conducted during the 2016 stock assessment were undated and expanded to assess impacts to the rebuilding target stemming from increases in allowable catch levels. The projection analysis also examined the potential population benefits of allowing increases in allowable catch to be based on the size of fish (small ≤30 kg. and large > 30 kg.). Given the spawning locations and migration route of Pacific bluefin tuna implementation of size-based management measures is possible. Given the increase in spawning biomass indicated in the 2020 assessment the projection analyses concluded that increases in catch were possible while still meeting the established recovery plan targets. It was also determined that the population would benefit if the increase was limited to larger fish. Based on reviews of the 2020 stock assessment and associated population projections that indicated a 100% chance of meeting the rebuilding target by 2024, scientific committees of the WCPFC and IATTC endorsed a Pacific-wide increase in allowable catch. The IATTC approved a 15 percent increase in the catch limit for adults (over 30 kilograms) and no change for juveniles in 2021.

There are measures in place, as part of a rebuilding plan with targets and catch limits, which were implemented collaboratively by IATTC and WCPFC beginning in 2011 (voluntary) and becoming stricter in 2013 (IATTC Resolution C-13-02), 2016 (IATTC Resolution C-16-08), 2018 (IATTC Resolution C-18-01 and C-18-02), and 2020 (IATTC Resolution C-20-02. These resolutions provided clarification to management measures and set catch allocations based on changes in stock status. IATTC Resolutions C-21-01 adopted in 2021 amended Resolution C-18-02 and updated the long-term management framework for the conservation and management of Pacific bluefin tuna in the EPO. IATTC Resolution C-21-05, also adopted in 2021, specified measures for the conservation and management of Pacific bluefin tuna in the EPO consistent with the approved 15% increase in allowable catch levels.

In the US, NOAA Fisheries implemented strong management measures for the EPO in 2019 consistent with IATTC Resolutions C-18-01 and C-18-02, capping the total allowable annual commercial catch of Pacific bluefin tuna at 300 t. In 2022 NOAA Fisheries published a proposed rule (87 FR 12409) regarding domestic implementation of IATTC Resolution C-21-05 which includes catch limits that would apply to U.S. commercial vessels that fish for Pacific bluefin tuna in the EPO during 2022-2024. The catch limits may differ in each year

and NOAA Fisheries would impose an initial trip limit, an intermediate trip limit, and a lower trip limit on individual fishing vessels that reduce as catch thresholds are met throughout the year.

Noting that (1) measures implemented by IATTC and NOAA Fisheries are in place and updated regularly, (2) the 2020 stock assessment indicates a continual recovery and rebuilding of the stock, (3) recent projection analyses indicate that the adopted 15% increase in catch levels for the EPO will not hinder recovery and rebuilding of the stock as specified in the rebuilding plan, and (4) the catch of Pacific bluefin tuna by the UoA relative to the total Pacific-wide catch is extremely small (≈ 1.5% between 2015 and 2020), the assessment team considers the UoA has measures in place that are expected to ensure that the UoA does not hinder recovery and rebuilding of Pacific bluefin tuna, thus meeting the SG60 level.

Recognizing there have been continuing improvements to the population of Pacific bluefin tuna over time (increasing spawning biomass, reductions in F) which could be interpreted as potentially meeting the SG 80 requirements, we note the first rebuilding target has not been met and that will not be known until at least the next stock assessment currently scheduled for 2022, and allowable caches have recently been increased. While the IUCN recently upgraded the "status" of Pacific bluefin tuna from Vulnerable to Near Threatened based on the observed recovery of the stock, spawning biomass is still at low levels. Based on a lack of evidence indicating that the first rebuilding target has been met the assessment team invoked a precautionary approach and does not consider there yet to be clear evidence of a recovery; SG 80 is not met.

SG100 is not scored as not all SG80 requirements are met (see MSC interpretation https://mscportal.force.com/interpret/s/article/Scoring-SG100-if-not-all-SG80-met-7-10-5-3-1527262010218).

b	Minor primary species stock status≈			
	Guide post			Minor primary species are highly likely to be above the PRI. OR If below the PRI, there is evidence that the UoA does not hinder the recovery and rebuilding of minor primary species.
	Met?			TUNACONS all set types Bigeye tuna: No US Small PS UoA: No
Rationale				

TUNACONSs Free school set UoA:
Bigeye Tuna
Bigeye tuna is the only designated minor primary species categorized in the TUNACONS fishery and it is associated with the free school fishery.

The rationale above in SIa applies here.

TUNACONS FAD set UoA :

As there are no primary minor species for this UoA. As stated in MSC Interpretation Log (P2-species-outcome-PIs-scoring-when-no-main-or-no-minor-or-both-PI-2-1-1-1527262009344), scoring issue (b) does not apply when there are no minor species. Using this guidance, a score of NA has been applied. US Small PS UoA Based on provided logbook data for this UoA no species have been classified as primary minor species. The assessment team employed qualitative methods during the site visit to confirm that there are no primary minor species. Nonetheless, given the limited information available the team took a more precautionary approach, as per G7.10.2.e, the SG100 is not met.
References
ISC Pacific Tuna Working Group 2018, ISC 2019, ISC 2020, Maunder 2019

Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	TUNACONS all set types: 60-79 US Small PS UoA: 60-79
Information gap indicator	No additional information is required

Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	TUNACONS All set types: 70 US Small PS UoA: 60
Condition number (if relevant)	2-1 and 2-2

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?	TUNACONS all set types Skipjack tuna: Yes Bigeye tuna: Yes US Small PS UoA: Pacific bluefin tuna: Yes	TUNACONS all set types Skipjack tuna: Yes Bigeye tuna: Yes US Small PS UoA: Pacific bluefin tuna: Yes	TUNACONS all set types Skipjack tuna: No Bigeye tuna: No US Small PS UoA: Pacific bluefin tuna: No

Rationale

TUNACONS UoAs:

Skipjack and Bigeye

Skipjack and bigeye tuna are the only designated primary species categorized in the TUNACONS fishery; skipjack tuna is designated as main primary species in the FAD and free school UoAs, while bigeye tuna is designated as main primary species in the FAD UoA and minor primary species in the free school UoA. Bigeye and skipjack tuna are subject to a suite of IATTC management actions adopted as Resolutions, supported by regular assessments of stock status and an extensive monitoring and review framework. The Resolutions provide a range of measures specific to management of tropical tuna in the EPO, including yellowfin, skipjack, and bigeye tuna, and are summarized below:

- Resolution C-03-05 (Data Provision) requires that pertinent data are provided annually, including total catch in numbers, and weight if available, as well as fishing effort.
- Resolution C-14-02 (Vessel Monitoring System (VMS) replaces C-04-06) requires tuna-fishing vessels >24 m operating in the EPO shall have an operational VMS that collects positional information at least once every 6 hours.
- Resolution C-16-02 (Harvest Control Rule - for tropical tuna in the EPO) adopts an interim limit reference point of F0.5R0 and S0.5R0 assuming steepness h = 0.75 and interim target reference points that should be achieved and maintained as SMSY and FMSY, and establishes HCRs to restore the stocks in the greater of two generations or five years, and confirms that efforts will be made to ensure compatibility with WCPFC management of these species.
- Resolution C-17-02 (Tuna Conservation in the EPO 2018-2020 and Amendment to Resolution C-17-01) specifies that purse seine vessels must stop fishing in the Convention area for a period of 72 days

annually, establishes the 'corralito' closed area [to the west of the Galapagos Islands], and requires that all skipjack tuna, bigeye tuna and yellowfin tuna are retained except where they are deemed unfit for human consumption or where there is insufficient well space available on the final set of a trip. Additionally, this Resolution specifies the design of FADs, limits the number that may be used, and requires that Class 6 purse seiners recover a number of FADs equal to the number deployed during the same period.

- Resolution C-19-07 (Management Strategy Evaluation Workshops) specifies the Terms of Reference (ToR) for management strategy evaluation workshops, including the priority species (bigeye, yellowfin and skipjack tunas), as well as establishing goals and objectives for the management strategy evaluation process and a process for proposing and reviewing management objectives.
- Resolution C-19-01 (Amendment to Resolution C-18-05 on the Collection and Analyses of Data on Fish-Aggregating Devices – also amends Resolutions 16-01,15-03, and 13-04) requires observers to collect data on FADs and specifies design criteria for FADs.
- Resolution C-21-04 (Conservation Measures for Tropical Tunas in the Eastern Pacific Ocean During 2022-2024) specifies that purse seine vessels must stop fishing in the Convention area for a period of 72 days annually, establishes the 'corralito' closed area [to the west of the Galapagos Islands], and requires that all skipjack tuna, bigeye tuna and yellowfin tuna are retained except where they are deemed unfit for human consumption or where there is insufficient well space available on the final set of a trip. Additionally, this resolution specifies decreasing limits on the number of active FADs deployed on all purse seine vessels (Class 1-6), penalties for exceeding allowable purse seine and longline catches of bigeye tuna, strengthening the monitoring and control system for tuna catches, including reporting requirements for active FADs, and specifies the design of FADs.

In addition to the measures outlined above, TUNACONS has spearheaded a number of voluntary research activities to mitigate bycatch and impacts of gear loss, including development and testing of sorting grids and non-entangling FADs to reduce bycatch of non-target species, and development of biodegradable FADs to minimize habitat/ecological impacts from lost or derelict FADs. In addition, the UoA has adopted good practices for handling bycatch at sea that should increase survival of released non-target species, codified IATTC Resolutions C-99-07, C-16-01, and C-17-02 as part of the Ecuadorian regulatory framework, implemented 100% observer coverage of trips taken by small purse seine vessels (classes 3-5), and proposed a FAD management plan aimed at maintaining the operational efficiency of the tuna purse seine fleet through the implementation of standards, actions, and novel technologies (Garcia 2016).

Noting that skipjack tuna and bigeye tuna are both likely to be above PRI indicates that the measures together, including the decreasing limits on the number of active FADs deployed on all purse seine vessels (Class 1-6) operating in the IATTC Convention area, comprise a partial strategy that is in place for the UoA for managing main primary species. On this basis SG 60 and SG 80 are met.. However, it is not clear if the strategy in place is cohesive and effective given that the recent bigeye stock assessment and skipjack assessment suggests that the stocks could be less than BMSY. SG100 is not met.

US Small PS UoA

Pacific bluefin tuna:

Based on results of the 2016 Pacific bluefin tuna stock assessment which indicated extremely low spawning biomass levels the stock is considered overfished and experiencing overfishing, and a Pacific bluefin tuna rebuilding plan with targets and acceptable risk levels was put in place. The management strategy (rebuilding plan), proposed and adopted at the joint WCPFC NC-IATTC WG meetings in 2016/2017 were guided by projections conducted by the ISC to provide catch reduction options that would achieve the initial rebuilding target of 6.5%$SSB_{F=0}$ with at least 60% probability by 2024 and a second rebuilding target with at least 96% probability by 2034 of achieving 20%$SSB_{F=0}$. Projections were also conducted to provide relevant information for a potential increase in catch if the probability of achieving the initial rebuilding target exceeds 75% by 2024 (ISC 2017).

The projections, conducted using the base-case model from the 2016 stock assessment that mimicked the current management measures by the WCPFC (CMM 2017-08) and IATTC (C-16-08) under the low recruitment scenario, resulted in an estimated 98% probability of achieving the initial rebuilding target by 2024. This estimated probability is above the threshold (60% or above in 2024) prescribed by the harvest strategy. The low recruitment scenario is more precautionary than the recent 10 years recruitment scenario. In the harvest strategy, the recruitment scenario is switched from the low recruitment to the average recruitment scenario beginning in the year after achieving the initial rebuilding target. The estimated probability of achieving the second rebuilding target 10 years after the achievement of the initial rebuilding target or by 2034, whichever is earlier, is 96%. This estimate is above the threshold (60% or above in 2034) prescribed by the harvest strategy (ISC 2017).

The change in recruitment was reviewed by scientific staff of the two Pacific tuna RFMOs, determined to be a direct response to the expected increase in spawning stock biomass (SSB), and adopted. Note the SSB of Pacific Bluefin Tuna has steadily increased in the last 8 years (2011-2018) (see Table 3 in ISC 2020) and these changes in biomass coincide with a decline in fishing mortality over the last decade (see Figure 8 in ISC 2020).

As part of 2020 stock assessment, population projections conducted during the 2016 stock assessment were undated and expanded to assess impacts to the rebuilding target stemming from increases in allowable catch levels. The projection analysis also examined the potential population benefits of allowing increases in allowable catch to be based on the size of fish (small ≤30 kg. and large > 30 kg.). Given the spawning locations and migration route of Pacific bluefin tuna implementation of size-based management measures is possible. Given the increase in spawning biomass indicated in the 2020 assessment the projection analyses concluded that increases in catch were possible while still meeting the established recovery plan targets. It was also determined that the population would benefit if the increase was limited to larger fish. Based on reviews of the 2020 stock assessment and associated population projections that indicated a 100% chance of meeting the rebuilding target by 2024, scientific committees of the WCPFC and IATTC endorsed a Pacific-wide increase in allowable catch. The IATTC approved a 15 percent increase in the catch limit for adults (over 30 kilograms) and no change for juveniles in 2021.

There are measures in place, as part of a rebuilding plan with targets and catch limits, which were implemented collaboratively by IATTC and WCPFC beginning in 2011 (voluntary in Japan) and becoming progressively stricter in 2013 (IATTC Resolution C-13-02), 2016 (IATTC Resolution C-16-08), 2018 (IATTC Resolution C-18-01 and C-18-02), and 2020 (IATTC Resolution C-20-02. These resolutions provided clarification to management measures and set catch allocations based on changes in stock status. IATTC Resolutions C-21-01 adopted in 2021 amended Resolution C-18-02 and updated the long-term management framework for the conservation and management of Pacific bluefin tuna in the EPO. IATTC Resolution C-21-05, also adopted in 2021, specified measures for the conservation and management of Pacific bluefin tuna in the EPO consistent with the approved 15% increase in allowable catch levels.

In the US, NOAA Fisheries implemented strong management measures for the EPO in 2019 consistent with IATTC Resolutions C-18-01 and C-18-02, capping the total allowable annual commercial catch of Pacific bluefin tuna at 300 t. In 2022 NOAA Fisheries published a proposed rule (87 FR 12409) regarding domestic implementation of IATTC Resolution C-21-05 which includes catch limits that would apply to U.S. commercial vessels that fish for Pacific bluefin tuna in the EPO during 2022-2024. The catch limits may differ in each year and NOAA Fisheries would impose an initial trip limit, an intermediate trip limit, and a lower trip limit on individual fishing vessels that reduce as catch thresholds are met throughout the year. On this basis there are measures in place for the UoA 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; SG60 is met.

Noting that (1) measures implemented by IATTC and NOAA Fisheries are in place and updated regularly, (2) the 2020 stock assessment indicates a continual recovery and rebuilding of the stock (increasing spawning biomass and decreasing fishing mortality), (3) recent projection analyses indicate that the adopted 15% increase in catch levels for the EPO will not hinder recovery and rebuilding of the stock as specified in the rebuilding plan, (4) the

projection assumptions (e.g., recruitment scenarios) is scientifically sound, (5) the catch of Pacific bluefin tuna by the UoA relative to the total Pacific-wide catch is extremely small (≈ 1.5% between 2015 and 2020), and (6) catch monitoring programs have been established for the UoA (logbooks and port monitoring), the assessment team considers there is a partial strategy in place (rebuilding plan) that is expected to not hinder rebuilding of the Pacific bluefin tuna to levels which are highly likely to be above the PRI. On this basis SG 80 is met.

The assessment team does not consider there to be a strategy in place for the UoA for managing main and minor primary species. The lack of comprehensive logbooks and at sea observers for the UoA are issues that imped a higher score. On this basis SG 100 is not met.

b	Management strategy evaluation			
	Guide post	The measures are considered likely to work, based on plausible argument (e.g., general experience, theory or comparison with similar fisheries/species).	There is some objective basis for confidence that the measures/partial strategy will work, based on some information directly about the fishery and/or species involved.	Testing supports high confidence that the partial strategy/strategy will work, based on information directly about the fishery and/or species involved.
	Met?	TUNACONS all set types Skipjack tuna: Yes Bigeye tuna: Yes US Small PS UoA: Pacific bluefin tuna: Yes	TUNACONS all set types Skipjack tuna: Yes Bigeye tuna: Yes US Small PS UoA: Pacific bluefin tuna: Yes	TUNACONS all set types Skipjack tuna: No Bigeye tuna: No US Small PS UoA: Pacific bluefin tuna: No

Rationale

TUNACONS UoAs:

Bigeye Tuna

Building on the measures and partial strategy described above in Sia, the major measures in place for bigeye tuna include MSY-based limit and target reference points based on a conservative assumption on stock-recruitment steepness (0.75). The harvest strategy, as specified by C-16-02, is implemented by preventing the fishing mortality rate (F) from exceeding the best estimate of the rate corresponding to the maximum sustainable yield (FMSY) for the species that requires the strictest management. This provides the framework for implementing measures based on stock conditions that are regularly determined through stock assessments. Resolution C-17-02, the management measure for tropical tunas currently in force, states that "In order to evaluate progress towards the objectives of these measures, in each year the IATTC scientific staff will analyze the effects on the stocks of the implementation of these measures, and previous conservation and management measures, and will propose, if necessary, appropriate measures to be applied in future years." Based on this information and given the history of measures already in place provides some objective basis for confidence that the partial strategy will work; SG 60 and SG 80 is met.

The bigeye tuna assessment (Xu et al. 2020) determined that the stock is below MSY and there is uncertainty in its true status. Analyses assessing the utility of various closure periods determined that the current 72-day closure is the minimum threshold and any reductions in the number of days would increase risk to the stock. Given that the underlying closure analyses assumed no uncertainty in the relationship between fishing mortality and effort the results could be overly optimistic. On this basis SG 100 is not met.

Skipjack tuna

At the SG 60 level, the SI requires that the measures are likely to work based on prior experience or plausible argument. The current measures restrict fishing effort of the entire fishery on the basis of stock status determinations from stock assessments and/or stock status indicators for SKJ, YFT and BET, and the indicators

used to assess change are those that are generally incorporated into traditional stock assessment models. IATTC Resolution C-16-02 provides a rebuilding framework should recovery of the stock be warranted based on stock status determinations from regularly conducted stock assessments and/or stock status indicator analyses. Therefore, the requirements for SG 60 are met.

Temporal purse seine closures are the main tool of the strategy, controlling exploitation rates through effort controls; utilizing as input the F multiplier parameter representing the change in effort needed to keep stocks at Fmsy or below Fmsy (IATTC 2007). The measures also ensure that the stock fluctuates around MSY by maintaining F at a rate corresponding to the maximum sustainable yield (FMSY) for the species that requires the strictest management, in this case bigeye tuna. This approach is precautionary in that stricter management measures would be applied then if management was based on the less vulnerable species, skipjack tuna. The harvest strategy has not been fully tested but has been partially tested (Maunder et al, 2015) through the use of MSE applied to bigeye tuna. On this basis SG 80 is met.

The measures have not been fully tested within an MSE framework and the IATTC has prioritized this research in their current research plan. On this basis SG100 is not met.

US Small PS UoA
Pacific bluefin tuna:
As explained above in SI(a), in 2016/2017 a rebuilding plan was adopted and implemented to rebuild Pacific bluefin tuna based on results of the 2016 stock assessment and population projections tested under a suite of management scenarios. In all cases the rebuilding targets were met A benchmark assessment with updated projections was conducted in 2020 and results indicted an increase in spawning biomass, likely due to the catch limits and size restrictions in place, and that allowable catches of Pacific bluefin tuna could be increased without affecting the goals of the two rebuilding targets established in the rebuilding plan. Due to the recovery of the stock between 2016 and 2020 (albeit small) the probability of meeting the first rebuilding target by 2024 was now estimated at 100%. This finding provides an objective basis for confidence that the measures/partial strategy will work, based on information directly about the species involved; SG60 and SG80 are met.

While testing was conducted in the form of projections, the assessment team contends that testing within an MSE framework is necessary to provide the rigour to support a determination of high confidence. On this basis SG 100 is not met. While the ISC has been tasked with completing an MSE by 2024 it is unlikely to meet this goal given the inherent complexities of the species, fisheries, management bodies, and stakeholders. Required complexity to account for the spatial structure and fisheries due to the it is unlikely to be completed given the nuances surrounding this species.

c	Management strategy implementation			
	Guide post		There is some evidence that the measures/partial strategy is being implemented successfully.	There is clear evidence that the partial strategy/strategy is being implemented successfully and is achieving its overall objective as set out in scoring issue (a).
	Met?		TUNACONS all set types: Yes US Small PS UoA: Yes	TUNACONS all set typesa: No US Small PS UoA: No
Rationale				
TUNACONS free and FAD set UoAs:				

Skipjack and Bigeye tuna

The IATTC requires an observer coverage rate of 100% on all purse seine fishing activities, and TUNACONS has committed to achieving this through its Code of Good Practices (Garcia, 2016). In addition, TUNACONS has implemented 100% observer coverage of trips taken by small purse seine vessels (classes 3-5) which currently have no requirement to carry observers. Vessels are also required to operate with an operational VMS to aid in monitoring fishing activity during closure periods and catch data is submitted to the IATTC annually. Some evidence that the strategy is being implemented successfully is indicated through the submission of catch data from all vessel sectors of the TUNACONS fishery and the regular assessments of stock status. On this basis SG 60 and SG 80 is met.

At the SG 100 level there must be clear evidence the strategy is being implemented successfully and that the overall objective set out in scoring issue (a) is achieved which we interpret to be healthy stocks with sustainable levels of production. The bigeye tuna assessment (Xu et al. 2020) determined that the stock is below MSY and there is uncertainty in its true status. Noting there is no stock assessment for skipjack tuna, the SSIs for average length and catch-per-set have been below the 2000-2019 average values since 2007 and in recent years are at their lower bounds. Based on this information there is no clear evidence that the strategy is achieving its intended objective; SG 100 is not met.

US Small PS UoA

Pacific bluefin tuna:

Update assessments by the ISC have shown slight increases in biomass since the adoption of the rebuilding plan (ISC 2020). Additionally, the relative number and average size of Pacific bluefin tuna appear to be increasing. Thus there is some evidence that the measures/partial strategy is being implemented successfully; SG80 is met.

While there is some evidence that the partial strategy is being implemented successfully, the assessment team does not consider it to constitute clear evidence as noted in the scoring for Si-a; SG100 is not met.

d	Shark finning			
	Guide post	It is likely that shark finning is not taking place.	It is highly likely that shark finning is not taking place.	There is a high degree of certainty that shark finning is not taking place.
	Met?	NA	NA	NA
Rationale				
Not scored. No primary species in the UoAs are sharks.				
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?	TUNACONS all set types NA US Small PS UoA: NA	TUNACONS all set types NA US Small PS UoA: NA	TUNACONS all set types NA US Small PS UoA: NA

Rationale
TUNACONS free and FAD set UoAs: *Skipjack and Bigeye tuna:* Resolution C-17-02 (and its predecessors) requires that "all purse-seine vessels to first retain on board and then land all bigeye, skipjack, and yellowfin tuna caught, except fish considered unfit for human consumption for reasons other than size". A single exception is specified for when there is insufficient well space remaining to accommodate all the tuna caught in the final set of a trip. Consistent with GSA 3.5.3 the IATTC rules in place indicate that this scoring issue is not relevant to the UoA, as there is no unwanted catch of primary species. US Small PS UoA *Pacific bluefin tuna:* Bluefin tuna is the only main primary species and all catch is retained. This information was verified via qualitative methods during the site visit. Thus, there is no unwanted catch and the 'review of alternative measures' scoring issue e is not scored.
References
ISC 2017, Garcia 2016,

Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	TUNACONS all set types >80 US Small PS UoA > 80
Information gap indicator	No additional information is required.
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	TUNACONS all set types:80 US Small PS UoA: 80
Condition number (if relevant)	

PI 2.1.3 – Primary species information

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

Skipjack and bigeye tuna are the only designated primary species categorized in the TUNACONS fishery; skipjack tuna is designated as main primary species in the FAD and free school UoAs, while bigeye tuna is designated as main primary species in the FAD UoA and minor primary species in the free school UoA. Pacific bluefin tuna is designated as a main primary species in the US small purse seine UoA.

TUNACONS UoA:
Skipjack and Bigeye tuna:
Quantitative information from the TUNACONS fishery is collected via the observer programs at a high level of coverage and catch statistics submitted annually as required. The information is considered adequate as specified by SA3.6.3.2 because it is quantitative, and the data deemed verifiable, comprehensive and representative, extending across all vessel sectors (Category 3-6) for five years. Assessments are routinely conducted and capable of assessing the impact of the UoA on skipjack and bigeye tuna (Maunder 2019, Xu et al., 2020). Under Resolution C-17-02 (and its predecessors), purse seine vessels must "first retain on board and then land all bigeye, skipjack, and yellowfin tuna caught, except fish considered unfit for human consumption for reasons other than size". The exception is for when insufficient well space remaining to accommodate all the tuna caught in the final set of a trip exists. Therefore, the level of unobserved direct mortality is considered negligible. On this basis some quantitative information is available and is adequate to assess the impact of the UoA of the main primary species with respect to status; SG 60 and SG 80 is met.

The bigeye tuna assessment determined that the stock is below MSY and there is uncertainty in its true status (Xu et al. 2020). Also, current bigeye tuna SSIs suggest an increase in fishing mortality for bigeye tuna, resulting from the observed increase in the number of floating object sets which may contribute to the observed uncertainty. Noting there is no stock assessment for skipjack tuna, the SSIs for average length and catch-per-set have been below the 2000-2019 average values since 2007 and in recent years are at their lower bounds regardless of set type (or UoA). On this basis SG 100 is not met.

US Small PS UoA

Pacific bluefin tuna:

Catch reporting of Pacific bluefin tuna is mandatory in both WCPFC and IATTC. RFMO member are required to submit annual catch statistics to the Joint WCPFC-IATTC Bluefin Tuna Working Group, as well as the ISC. Reporting of catch statistics from domestic fisheries in Japan, Chinese Taipei, Korea, Mexico, and the US, are also mandatory, and all catch data, including those of the UoA, are routinely incorporated into the stock assessment and projections. On this basis some quantitative information is available and is adequate to assess the impact of the UoA on Pacific bluefin tuna with respect to status; SG 60 and SG 80 are met.

Size-at-catch information is routinely collected from all fisheries landing Pacific bluefin tuna, including the UoA, and these data are incorporated into the stock assessment. Size-at-catch data tend to reduce uncertainty in stock assessment. Since 2017 Pacific bluefin tuna tissue samples were collected from all fisheries to facilitate Close-Kin analyses which allows for an independent estimate of spawning biomass. Based on the totality of available information, and noting that the UoA accounts for approximately 1.5% of the total Pacific-wide catch of Pacific bluefin tuna, available quantitative information is adequate to assess with a high degree of certainty the impact of the UoA on Pacific bluefin tuna with respect to status; SG 100 is met.

While the UoA is not actively monitored by observers and only logbook data from two of the three UoA vessels was available to monitor catches and identify primary species according to MSC guidelines, the CDFW conducts port inspections of all three vessels to check fish tickets for accuracy of catch and take fish samples for scientific purposes. Noting that the three UoA vessels operate cooperatively in the same area and conduct similar fishing operations, we are confident that the available logbook data is sufficient to understand catch composition. Evidence of visits to the port by CDFW staff has been provided and the vessels maintain an open-door policy regarding information requests and access. We also note that NOAA has authorized CDFW staff to enforce federal laws and regulations as described within the Cooperative Enforcement Program which aims to increase living marine resource conservation, endangered species protection, and critical habitat enforcement while strengthening state and territorial enforcement resources (https://www.fisheries.noaa.gov/topic/enforcement/cooperative-enforcement). Evidence of a Cooperative Enforcement Agreement between NOAA and CDFW, particularly as it relates to shark finning prohibition measures, was provided in the form of correspondence between NOAA and CDFW. Noting the port sampling measures in place and that no catch reporting infractions have been reported the Assessment Team contends that the logbooks are sufficient to identify main primary species and can assess with a high degree of certainty the impact of the UoA on main primary species with respect to status thus providing further evidence to support the SG100 score.

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?			TUNACONS all set types: Yes US Small PS UoA: No

Rationale

TUNACONS UoA:
Bigeye tuna:
Bigeye tuna is the only designated minor primary species and is associated with TUNACONS free school set fishery. There is 100% observer coverage in the TUNACONS fleet. Since the concern of unobserved mortalities of bigeye does not exist for the free school sets, SG100 is met here. The same is true for any potential minor species in the FAD fishery.

US Small PS UoA
No primary minor species were identified in the US Small PS fleet in logbook data. This was confirmed during the site visit. Nonetheless, as observer data are not collected in this UoA quantitative data would not be adequate to estimate any changes in catch composition, and thus would not be adequate to estimate the impact of the UoA on any potential minor primary species with respect to status. The SG 100 level is not 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?	TUNACONS all set types: Yes US Small PS UoA: Yes	TUNACONS all set types: Yes US Small PS UoA: Yes	TUNACONS all set types: No US Small PS UoA: No

Rationale

Skipjack and bigeye tuna are the only designated primary species categorized in the TUNACONS fishery; skipjack tuna is designated as main primary species in the FAD and free school UoAs, while bigeye tuna is designated as main primary species in the FAD UoA and minor primary species in the free school UoA.

TUNACONS UoAs:
Catch data are submitted annually to IATTC and all vessel sectors of the TUNACONS fishery are observed, thus providing a high level of detail on catches. Biological and ecological data is available from a wide range of studies and TUNACONS actively participates in research programs both domestically and with IATTC scientists. Vessels are tracked with VMS, while all landings are subject to dockside monitoring; 100% of all Ecuadorian vessels landing catches within Ecuador are monitored and 10% of foreign vessels landing catches at Ecuadorian ports are monitored. These data inform assessments of stock status and it is considered that information is adequate to support at least a partial strategy to manage primary species. On this basis SG 60 and SG 80 are met.
Given the uncertainties with the recent bigeye tuna stock assessment (Xu et al., 2020) and trajectories of skipjack tuna SSIs (Maunder 2019) it cannot be clearly stated that 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. On this basis SG 100 is not met.

US Small PS UoA

Mandatory catch monitoring of Pacific bluefin tuna in the EPO began in 2013 (IATTC Resolution C-13-02), and was sequentially modified in 2016 (IATTC Resolution C-16-08), 2018 (IATTC Resolution C-18-01 and C-18-02), 2020 (IATTC Resolution C-20-02), and 2021 (IATTC Resolutions C-21-01 and C-21-05). NOAA Fisheries established mandatory catch monitoring (logbooks) of Pacific bluefin tuna in all domestic fisheries in 2004, including the US small purse seine UoA, under the Fishery Management Plan for West Coast Fisheries for Highly Migratory Species. In 2019 NOAA Fisheries implemented additional management measures for the EPO consistent with IATTC Resolutions C-18-01 and C-18-02, capping the total allowable annual commercial catch of Pacific bluefin tuna at 300 t. In 2022 NOAA Fisheries published a proposed rule (87 FR 12409) regarding domestic implementation of IATTC Resolution C-21-05 which includes catch limits that would apply to U.S. commercial vessels that fish for Pacific bluefin tuna in the EPO during 2022-2024. The catch limits may differ in each year and NOAA Fisheries would impose an initial trip limit, an intermediate trip limit, and a lower trip limit on individual fishing vessels that reduce as catch thresholds are met throughout the year. Port sampling of the commercial bluefin tuna catch by US vessels, including those in the UoA, is conducted by NOAA Fisheries. Electronic landing receipts that include bluefin tuna landing in California are required to be submitted within 24 hours of landing. This submission deadline is intended to assist NOAA Fisheries in monitoring the catch limits and anticipate when these limits will be reached. As this fishery uses spotter planes to find and direct fishing activities, the fishery targets larger bluefin tuna, and bluefin tuna generally school by size, discarding of bluefin tuna is likely minimal. On this basis the assessment team considers available information adequate to support measures to manage Pacific bluefin tuna; SG 60 is met.

Bluefin tuna size sampling programs have been established for all fisheries, as well as programs to provide independent measures of abundance (Close-Kin) to advance the assessments. A recruitment monitoring program is ongoing and studies to assess exchange rates between the WCPO and EPO have been implemented. Stock assessments (benchmark and updates) are routinely conducted using available data to assess achievement of objectives and stock status. On this basis the assessment team considers available information to be adequate to support a partial strategy to manage Pacific bluefin tuna; SG 80 is met.

However, as the UoA vessels are not required to carry observers and current logbooks do not necessarily record the catch of non-tuna species, there is a potential that other species caught could be designated as primary if data were available. The assessment team considers this potential to be minimal at best given how fishing by UoA vessels is conducted (using spotter planes) and the absence of other primary main and minor species being verified by interviews with stakeholders during the site visit. Nonetheless, without quantitative evidence the team concluded that the available information is not adequate to support a strategy to manage all primary species, in particular minor primary species. On this basis SG100 is not met.

References
Xu et al., 2020; Maunder 2019

Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	TUNACONS all set types: ≥ 80 US Small PS UoA: 60-79
Information gap indicator	

Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	TUNACONS all set types: 85 US Small PS UoA: 85

Condition number (if relevant)	

PI 2.2.1 – Secondary species outcome

PI 2.2.1		The UoA aims to maintain secondary species above a biologically based limit and does not hinder recovery of secondary species if they are below a biological based limit		
Scoring Issue		SG 60	SG 80	SG 100
a	Main secondary species stock status			
	Guide post	Main secondary species are likely to be above biologically based limits. OR If below biologically based limits, there are measures in place expected to ensure that the UoA does not hinder recovery and rebuilding.	Main secondary species are highly likely to be above biologically based limits. OR If below biologically based limits, there is either evidence of recovery or a demonstrably effective partial strategy in place such that the UoA does not hinder recovery and rebuilding. AND Where catches of a main secondary species outside of biological limits are considerable, there is either evidence of recovery or a, demonstrably effective strategy in place between those MSC UoAs that have considerable catches of the species, to ensure that they collectively do not hinder recovery and rebuilding.	There is a high degree of certainty that main secondary species are above biologically based limits.
	Met?	TUNACONS all set types US Small PS UoA: Yes	TUNACONS all set types US Small PS UoA: Yes	TUNACONS all set types US Small PS UoA: No

Rationale

TUNACONS UoAs:
Based on provided observer data for these UoAs no species are classified as secondary main. As stated in MSC Interpretation Log (P2-species-outcome-PIs-scoring-when-no-main-or-no-minor-or-both-PI-2-1-1-1527262009344), scoring issue (a) does not apply when there are no main species. Using this guidance, a score of NA has been applied.

US Small PS UoA

Eastern Pacific and Striped Bonito:
Eastern Pacific and striped bonito tuna were identified as main secondary species for this fleet. The catch of Eastern Pacific and striped bonito from free school sets has represented approximately 12% of the total catch on average from 2014 to 2017. The status of bonitos has not been assessed by the IATTC but they are short-lived and productive species and are classified by the IUCN as being of least concern. They are therefore likely to be within biologically based limits but, in the absence of any formal assessment, and given potential complexity in stock structuring and probable relatively high susceptibility, this status could not be asserted to be highly likely. The Risk Based Framework was employed, and a productivity-susceptibility analysis (PSA) was carried out to assess their status (See Annex 8.9: Risk-Based Framework outputs). The output of the RBF table for Eastern Pacific Bonito and Stiped Bonito was 95, thus meeting the SG80.

b	Minor secondary species stock status			
	Guide post			Minor secondary species are highly likely to be above biologically based limits. OR If below biologically based limits', there is evidence that the UoA does not hinder the recovery and rebuilding of secondary species
	Met?			TUNACONS all set types: No US Small PS UoA: No

Rationale

TUNACONS (All set types) UoAs:
FADs and Free School Sets: There is a wide range of secondary-minor species that are caught in small numbers (< 1%) regardless of fishing strategy (FAD or free school). For a list of all secondary minor species, please refer to Tables 33 and 34.

MSC notes that when large numbers of species have been categorized as minor under P2 teams can use an 'all or none' approach to scoring all minor species[2]. Following this interpretation, all minor species automatically achieve at least SG80. To determine if all minor species achieve a score of SG 100, minor species have been grouped and Pacific blue marlin chosen to represent the group. While the 2021 Pacific blue marlin stock assessment indicated that under current conditions the stock is not overfished and not subject to overfishing relative to MSY-based reference points (ISC 2021), there are no adopted target or limit reference points for this stock in either the WCPFC or IATTC and the assessment team could not conclude that the stock of Pacific blue marlin is highly likely to be above limit and target reference points. On this basis it cannot be concluded that all secondary minor species are highly likely to be above biologically based limits; SG 100 is not met.

[2] https://mscportal.force.com/interpret/s/article/Minor-species-and-scoring-element-approach-at-SG100-7-10-7-1527586956233

US Small PS UoA There are no minor secondary species currently reported for this fleet. However, observer data is not available from these vessels and current logbooks do not collect such data. The assessment team employed a qualitative information-gathering process during the site visit to determine whether there are any secondary species unaccounted for in the logbooks. No minor secondary species were identified during the site visit. However, given the limited quantitative information on minor secondary species, the team took a precautionary approach and concluded the SG100 is not met.
References
IATTC 2019

Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	TUNACONS all set types >80 US Small PS UoA: ≥80
Information gap indicator	Qualitative information to be collected on any other potential secondary species during site visit
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	TUNACONS all set types: 80 US Small PS UoA: 80
Condition number (if relevant)	

PI 2.2.2 – Secondary species management strategy

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

Rationale

TUNACONS (All set types) UoAs:
Based on observer data from 2015-2018 there are no designated main secondary species in the TUNACONS UoA purse seine fisheries. Therefore, following the explanation of the term 'if necessary' in Table GSA3, and response in the MSC Fisheries and Standard interpretation log (https://mscportal.force.com/interpret/s/article/Use-of-if-necessary-in-P2-management-PIs-2-1-2-2-2-2-2-4-2-2-5-2-PI-2-1-2-1527262011402), no measures or partial strategies are considered necessary; SG 60 and SG 80 are met. The MSC's intent is that the 'if necessary' in scoring issue (a) also pertains to scoring issues (b) and (c).

Resolution C-04-05 (Rev 3) (IATTC 2019) is considered to represent a strategy that is in place to manage the impact of the fishery on bycatch and to maintain the current very low level of impact. It contains the requirements (among others)

- Require fishermen on purse-seine vessels to promptly release unharmed, to the extent practicable, all sharks, billfishes, rays, dorado, and other non-target species and
- Encourage fishermen to develop and use techniques and equipment to facilitate the rapid and safe release of any such animals.

Additionally, provisions in Resolution C-19-01 call for the design and deployment of non-entangling and biodegradable FADs (EcoFADs) to reduce the entanglement of non-target species and ecological impact. TUNACONS has voluntarily conducted research in these areas and is committed to replacing traditional FADs with EcoFADs in their fleet. TUNACONS has also spearheaded research to minimize the catch of non-target species during purse seining activities through development and placement of sorting grids in the nets and implemented a program requiring 100% observer coverage of all trips taken by small purse seine vessels in the fleet (classes 3-5).
These strategies have been designed to address impacts on bycatch and there is ongoing monitoring of bycatch levels through the observer programs. Also, due to uncertainties in the tropical tuna stock assessments, limits on the number of active FADs deployed at any time on purse seine vessels (vessel classes 3-6) operating in the EPO have been adopted (Resolution C-17-02). While not necessarily directed at secondary species, this measure will result in catch reductions of all species, including secondary species. However, to achieve SG 100 there

needs to be specific strategies in place that addresses secondary minor, and apart from the measures outlined in C-04-05 there are no such strategies in place; SG 100 is not met.

US Small PS UoA

Eastern Pacific and striped bonito tuna:

There are no measures adopted by the IATTC that are specifically directed at bonito tunas, and current knowledge of their status is insufficient to determine whether any are required. There are measures directed at tropical tunas that have been adopted by the IATTC, however these measures generally apply to the high seas area, which is outside the area fished by the UoA. The catch of bonito tuna by the UoA is sporadic, and from 2016 to 2018 approximately 243 mt were landed which equates to an estimated annual catch of 81 mt. Given that the annual catch of bonito tuna by the UoA represents 2% of the total reported catch of bonito tuna in the EPO between 2016 and 2018, it is inconceivable that the UoA catch would hinder their recovery if required. The process for regular updates of catches, overviews of fishery developments and the adoption of Resolutions for species by the IATTC is indicative of a partial strategy that would be responsive and lead to appropriate measures if they became required for bonito tunas. On this basis, SG 60 and SG 80 are met.

To achieve SG 100 there needs to be specific strategies in place that addresses *all* secondary species, and currently there are no such strategies in place; SG 100 is not met.

b	Management strategy evaluation			
	Guide post	The measures are considered likely to work, based on plausible argument (e.g. general experience, theory or comparison with similar UoAs/species).	There is some objective basis for confidence that the measures/partial strategy will work, based on some information directly about the UoA and/or species involved.	Testing supports high confidence that the partial strategy/strategy will work, based on information directly about the UoA and/or species involved.
	Met?	TUNACONS all set types: Yes US Small PS UoA: Yes	TUNACONS all set types: Yes US Small PS UoA: Yes	TUNACONS all set types: No US Small PS UoA: No

Rationale

TUNACONS (All set types) UoAs:

None of the bycatch species have been considered to be 'main' and therefore a strategy for main secondary species is not necessary to meet SG60 and SG80 requirements which are met by default.

There is some objective basis for confidence that the strategy that is in place will work from the large amount of information that has been collected showing that there is minimal catch of minor secondary species. Also, preliminary results of the sorting grid research and development of non-entangling FADs show promise but additional research is required. There has been no formal testing of the strategy, however, and in particular no evaluation of the post-release survival of the discarded component of the catch. On this basis, requirements at the SG100 level are not met.

US Small PS UoA

Eastern Pacific and striped bonito tuna: The strategy identified for bonito tunas is the IATTC monitoring and assessment framework that is considered to be able to identify the need for measures should they be required and lead to their implementation. Experience with other tuna conservation measures in the EPO provides some objective basis for confidence that this would work. This meets the requirements of the SG 60 and SG 80 levels.

As there has been no testing of partial strategies 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?		TUNACONS all set types: Yes US Small PS UoA: Yes	TUNACONS all set types: No US Small PS UoA: No

Rationale

TUNACONS (All set types) UoAs:

None of the bycatch species have been considered to be 'main' and therefore a strategy for main secondary species is not necessary to meet SG60 and SG80 requirements which are met by default.
FADs and Free School: Resolution C-04-05 (Rev 3) (IATTC 2019) is considered to represent a strategy that is in place to manage the impact of the fishery on bycatch and to maintain the current very low level of impact. It contains the requirements (among others):

- Require fishermen on purse-seine vessels to promptly release unharmed, to the extent practicable, all sharks, billfishes, rays, dorado, and other non-target species and
- Encourage fishermen to develop and use techniques and equipment to facilitate the rapid and safe release of any such animals.

While data from the observer programs demonstrate the catch of minor secondary species is low (<1%), a significant portion of the catch is retained regardless of flag (Ecuador, Panama, and US) or set type (FAD and free school). For FAD sets, 95% of billfish caught are retained, while 78% and 7% of large fish and small fish caught, respectively, are retained. Dolphinfish and wahoo comprise the majority of large fish retained, while filefish and triggerfish comprise the majority of small fish retained. For free school sets, 88% of billfish caught are retained, while 80% of large fish and 36% of small fish caught, respectively, are retained.
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).
At the moment there is no clear evidence that the partial strategy/strategy to manage minor secondary species (including sorting grid research and non-entangling FADs) are being implemented successfully, as there is no research output available, thus the SG100 is not met.

US Small PS UoA
The strategy outlined above to manage the impact of the fishery on bycatch, and to maintain the current very low level of impact, apply to this UoA. While the catches are relatively small, totalling approximately 248 ST from between 2016 and 2018, based on the logbooks provided, 100% of the catch is retained. On this basis, requirements at the SG80 level are met.

Given the limited information available on catches of the fleet, there is no clear evidence that the partial strategy/strategy is being implemented successfully for both main secondary bonito species and for all minor secondary species, the SG100 is not met.

d	Shark finning			
	Guide post	It is likely that shark finning is not taking place.	It is highly likely that shark finning is not taking place.	There is a high degree of certainty that shark finning is not taking place.
	Met?	TUNACONS UoAs (all set types) *Ecuador UoA:*Yes	TUNACONS UoAs (all set types) *Ecuador UoA:* Yes	TUNACONS UoAs (all set types) *Ecuador UoA:* No

		Panama UoA: Yes *USA UoA:* Yes US Small PS UoA: Yes	*Panama UoA:* Yes *USA UoA:* Yes US Small PS UoA: No	*Panama UoA:* No *USA UoA:* No US Small PS UoA: Not scored
Rationale				
TUNACONS (All set types) UoAs: Data available to the assessment team on the level of shark finning comes from observer programs, submitted logbooks, port sampling, and reports of the Committee for the Review of Implementation of Measures Adopted by the Commission (IATTC). The TUNACONS UoA is comprised of 33 large purse seine vessels (Vessel class 6) flagged to Ecuador, Panama, and the USA, and 10 smaller purse seine vessels (Vessel classes 3-5) flagged to Ecuador. As required, there is 100% observer coverage of large purse seine vessels, and these data were provided to the assessment team. While IATTC does not require observers on the smaller purse seine vessels, TUNACONS monitored 100% of fishing activities on nine small purse seine UoA vessels and these data were provided to the assessment team. The assessment team assumed that catches in the one unobserved vessel would be similar to catches in the observed vessels. Also, as catch comparisons between large and small UoA vessels were similar the assessment team pooled data across vessel classes. In all cases observers are required to record any instances of shark finning and these data are archived in the databases held by IATTC and annually documented in reports of the Committee for the Review of Implementation of Measures Adopted by the Commission. While MSC does not specify a particular level of external validation to demonstrate that shark finning is not occurring, it does provided guidance on levels of external validation (e.g., observer coverage) required to demonstrate the likelihood that shark finning is not taking place (GSA2.4.5). To meet SG 60 “some external validation should be in-place and understood to indicate a validation level equivalent to a nominal observer coverage of 5% of effort, although the CAB may accept other rates and alternative measures/evidence (e.g., dockside monitoring) with sufficient justification that the same scientific outcome (likely confidence that finning is not taking place) is delivered. To meet SG 80 ”good external validation should be in-place and understood to indicate a validation level equivalent to a nominal observer coverage of 20% of effort, although the CAB may accept other rates and alternative measures/evidence with sufficient justification that the same scientific outcome (highly likely confidence that finning is not taking place) is delivered. To meet the SG 100 scoring level, requirements outlined for the SG 80 scoring level must be met, as well as imposed port measures and port inspections to address shark finning. MSC Guidance also states that “the assessment team should use their expert judgement concerning the actual validation methods available and their ability to confirm the likelihood that shark finning in not taking place”. Historical information on shark finning in the IATTC Convention area collected by at-sea observers document significant shark finning incidents in 2006 (N=4526) followed by a precipitous decline (96%) through 2009 (IATTC-COR, 2009) (see Figure 24). In 2009 a total of 184 shark finning incidents on 14 fishing trips were reported in the IATTC Convention area, of which 70 finning incidents were reported during 2 fishing trips on Ecuadorian fishing vessels. In 2016 a single finning event was reported in the IATTC Convention area aboard a Peruvian fishing vessel (IATTC-COR, 2017) and in recent years there appears to be a single reported finning event in 2018 and no finning events in 2019 and 2020. As observers are required to report the occurrence of shark finning on all observed fishing trips and IATTC requires 100% observer coverage of all purse seine fishing trips in the EPO, the occurrence of finning on purse seine in the IATTC Convention area is extremely low and approaching zero. Noting flag states may have different policies regarding shark finning, including monitoring and enforcement, this Si is scored by flag for the TUNACONS UoA and separately for the US small purse seine UoA.				

Ecuador

While there is historical evidence of shark finning on Ecuadorian vessels, recent observer data (2015-2018) reported no shark finning events. Of the 33 Ecuadorian flagged vessels 23 are Class-6 purse seiners, requiring 100% observer coverage of all fishing trips. The remaining 10 vessels are smaller purse seine vessels (vessel classes 3-5) and not obligated to carry observers. However, TUNACONS has voluntarily required 100% observer coverage of these vessels and observer data was provided for 9 of the 10 trips from 2015-2018. On this basis SG 60 is met.
Further evidence to assess the extent of shark finning on Ecuadorian fishing vessels operating in the IATTC Convention area provided in reports of the Committee for the Review of Implementation of Measures Adopted by the Commission, In the 2010 report shark finning was observed on 3% of IATTC observed trips in 2009, resulting in 184 sharks being finned, including 70 sharks finned on 2 trips by Ecuadorian-flagged vessels. Since 2009 the number of observed finning incidents by fishing vessels operating in the EPO has dropped significantly and in 2016 a single incident aboard a Peruvian vessel was observed (IATTC COR, 2017). Since 2017 observed finning incident on fishing vessels operating in the IATTC Convention area have remained low with only a single incident reported in 2018. The assessment team verified that the only observed finning incident in recent years occurred in 2018 and that it did not occur on vessels from the UoA (Ecuador, Panama, and US).

Other evidence to detect the occurrence of shark finning is gathered through port sampling programs. All foreign vessels off-loading catch at Ecuadorian ports are inspected following established protocols to monitor the overall catch and look for evidence of shark finning. Officers physically board the vessel and use blueprints of the vessel to identify potential areas/holds to check for shark fins. A similar program has been established for Ecuadorian vessels off-loading at domestic port, but only 10% of vessels are randomly inspected. No evidence of finning was detected in either port sampling program, thus providing an additional independent measure of shark finning incidence.

Domestically, Ecuador has banned fishing for sharks in all Ecuadorian waters, but sharks caught outside of their EEZ may be landed if caught incidentally (bycatch). However, if a shark is landed it must have all fins attached. The requirement for 100% observer coverage can be used to verify where landed sharks were captured and compliance with shark finning regulations and port sampling provides additional measures to verify compliance regulations on shark finning.

The team considered that the 100% observer coverage of large purse seine vessels (class size 6) and 100% observer coverage of smaller purse seine vessels (class size 3-5), provides a level of good external validation to demonstrate that shark finning is not occurring and reports of the Committee for the Review of Implementation of Measures Adopted by the Commission provide supporting evidence. Additionally, there are regulations in place requiring the landing of all sharks with fins naturally attached (MSC FCP v2.1 GSA2.4.5 – GSA2.4.7) and established port sampling programs provide an additional measure to quantify shark finning incidents. Based on the totality of the information and evidence the assessment team considers requirements at the SG 80 level to be met.

While 10% of domestic vessels are inspected annually as part of Ecuador's port sampling program, the statistical power of the sampling program, which impacts detection rates, is presently unknown. On this basis the assessment team does not consider there to be a high degree of certainty that shark finning is not taking place; SG 100 is not met.

Panama

There is no historical evidence of shark finning on Panamanian vessels, and the 2015-2018 observer data based on 100% observer coverage of 4 Panamanian large purse seine vessels (vessel class 6) did not report any shark finning activity. The assessment team considered that the 100% observer coverage of large purse seine vessels

(class size 6), provides some external validation to demonstrate that shark finning is likely not taking place; SG 60 is met.

As noted above, further evidence to assess the extent of shark finning on Panamanian fishing vessels operating in the IATTC Convention area is described in reports of the Committee for the Review of Implementation of Measures Adopted by the Commission. Since 2016 observed finning incident on fishing vessels operating in the IATTC Convention area has remained low with only a single incident reported in 2016 and 2018, and in both cases the finning incidents did not occur aboard Panamanian fishing vessels (IATTC COR, 2017). We verified that the only observed finning incident in recent years occurred in 2018 and that it did not occur on vessels from the UoA (Ecuador, Panama, and US).

Domestic regulations in Panama prohibit shark fishing in all Panamanian waters, while industrial fishers operating outside their EEZ must land all sharks with fins attached naturally. Artisanal fishers may land the fins separately, but the weight ratio must be no more than 5% fins to whole weight of sharks. While we note there does not appear to be a domestic port sampling program in place, Panamanian vessels landing catches at ports in Ecuador are subject to vessel inspections.

Based on the totality of the information, 100% observer coverage of large purse seine vessels (class size 6), evidence provided by the reports of the Committee for the Review of Implementation of Measures Adopted by the Commission, domestic regulations, and international port inspections, the assessment team considers it is highly likely that shark finning is not taking place; SG 80 is met.

The apparent lack of a port sampling program precludes the assessment team from concluding there is a high degree of certainty that shark finning is not taking place. On this basis SG 100 is not met.

US

There is no historical evidence of shark finning on US vessels, and contemporary (2015-2018) observer data based on 100% observer coverage does not indicate shark finning activities. The assessment team considered that the 100% observer coverage of large purse seine vessels (class size 6), provides some external validation to demonstrate that shark finning is likely not taking place; SG 60 is met.

As noted above, further evidence to assess the extent of shark finning on US fishing vessels operating in the IATTC Convention area is described in reports of the Committee for the Review of Implementation of Measures Adopted by the Commission. Since 2016 observed finning incident on fishing vessels operating in the IATTC Convention area has remained low with only a single incident reported in 2016 and 2018, and in both cases the finning incidents did not occur aboard US fishing vessels (IATTC COR, 2017). We verified that the only observed finning incident in recent years occurred in 2018 and that it did not occur on vessels from the UoA (Ecuador, Panama, and US).

Domestic regulations apply to US vessels in the UoA, and provisions enforced through the Shark Finning Prohibition Act of 2000 prohibit shark finning in the United States. The Shark Conservation Act of 2010 requires all sharks in the United States, with the exception of smooth dogfish in the Atlantic Ocean, to be brought to shore with their fins naturally attached. Additionally, we note US vessels landing catches at ports in the US or Ecuador are subject to vessel inspections as outlined in the Shark Conservation Act.

Based on the totality of the information, 100% observer coverage of large purse seine vessels (class size 6), evidence provided by the reports of the Committee for the Review of Implementation of Measures Adopted by the Commission, domestic regulations, and port sampling, the assessment team considers it is highly likely that shark finning is not taking place; SG 80 is met.

While US vessels are subject to inspection through port sampling measures the statistical power of the sampling program, which impacts detection rates, is presently unknown. On this basis the assessment team does not consider there to be a high degree of certainty that shark finning is not taking place; SG 100 is not met.

US Small PS UoA

While observer coverage of this class of UoA vessels (vessel class 1) is not required by IATTC, as well as the US due to safety reasons, MSC guidance (GSA2.4.5) allows the assessment team to use their expert judgement concerning the actual validation method used to confirm the likelihood that shark finning is not taking place. The US small purse seine UoA is comprised of three vessels targeting tuna schools in coastal waters adjacent to Long Beach, California, and relies on spotter planes to direct fishing activities. Only schools with a low probability that fishing will interact with non-tuna species are recommended to vessel captains (Tri-Marine, per. comm.).

In the United States, shark finning has been prohibited since 2000 (Shark Finning Prohibition Act) and in 2011 the Shark Conservation Act further improved domestic and international shark conservation measures, including additional measures against shark finning. In addition, as of 2011 California prohibited the possession, sale, trade, or distribution of shark fins. Additionally, the California Department of Land and Natural Resources, in conjunction with NOAA Fisheries, conducts inspections if necessary of catches from US small purse seine vessel and there are no reports of UoA vessels conducting shark finning activities. Pursuant to the Shark Finning Prohibition Act, NOAA Fisheries is required to regularly report on domestic and international finning activities and there are no reports of these UoA vessels conducting finning activities. As NOAA Office of Law Enforcement deems all infractions with current U.S. laws/statutes to be confidential, obtaining detailed information was not possible. Nonetheless, NOAA Fisheries confirmed there were no finning activities by UoA vessels during subsequent interviews to gather information on ETP interactions and fishing activities. We also note that NOAA has authorized CDFW staff to enforce federal laws and regulations as described within the Cooperative Enforcement Program which aims to increase living marine resource conservation, endangered species protection, and critical habitat enforcement while strengthening state and territorial enforcement resources (https://www.fisheries.noaa.gov/topic/enforcement/cooperative-enforcement). Evidence of a Cooperative Enforcement Agreement between NOAA and CDFW, as it relates to shark finning prohibition measures was provided in the form of correspondence between NOAA and CDFW and no finning infractions have been reported. Also, during interviews with Tri Marine and UoA vessel captains it was reported that shark finning is not occurring on any of the UoA vessels. Given the absence of records of any retention of shark species in this fleet, combined with evidence of CDFW personnel regularly visiting the company receiving product from vessels in the assessment team considers the totality of these activities, measures, and statements provides sufficient justification that finning is likely not taking place and SG 60 is met. Because there is no observer data the SG 80 level is not met.

SG100 is not scored as not all SG80 requirements are met (see MSC interpretation https://mscportal.force.com/interpret/s/article/Scoring-SG100-if-not-all-SG80-met-7-10-5-3-1527262010218).

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?	TUNACONS all set types: Yes US Small PS UoA: Yes	TUNACONS all set types: Yes US Small PS UoA: Yes	TUNACONS all set types: No US Small PS UoA: No
Rationale				

TUNACONS (All set types) UoAs:
FADS and Free School: None of the bycatch species have been considered to be 'main' and therefore there are no unwanted catch of main secondary species. SG60 and SG80 are met by default.

The IATTC Working Group on Bycatch meets annually to discuss results of ongoing bycatch mitigation research conducted by CPCs, improvements in monitoring, and perspectives for future research. The working group also provides recommendations to the SAC and Commission based on research findings.

IATTC staff and CPCs annually develop and update multi-year research plans that cover a variety of projects aimed at reducing UoA related mortality of unwanted catch. Key projects include the development and testing of sorting grids to reduce catches of juvenile bigeye tuna and other small fish, as well as the development and testing of non-entangling and biodegradable FADs. TUNACONS recently entered into a strategic alliance with IATTC for scientific and technical cooperation in projects that strengthen the sustainable management of tuna populations in the EPO and for the implementation of a pilot test project of FADs built with degradable materials.

To build capacity, promote communication, and review protocols to minimize mortality of unwanted catch, TUNACONS hosts training workshops with fishers about the IATTC regulations, proper handling of bycatch, and how to test the EcoFAD prototypes. The workshops provide a mechanism to gather input from fishers on EcoFAD design and testing protocols. TUNACONS also hosts focused workshops to exchange experiences and advance research, the most recent being the International Workshop On Experiences Of The Use Of The Sorting Grid in April 2018.

The ISSF routinely host Skipper Workshops as a platform for scientists and fishers to openly discuss fishing operations and for scientists to pass on information about best practices. Since the first workshop in 2009, skippers and fisheries scientists have been engaging through workshops to improve the sustainability standards in tropical tuna purse seine fisheries across the world. Over 100 workshops have taken place in 5 continents, covering vessels from more than 25 flag states. Ecuador hosted its first workshop in 2010, and since 2012 hosted workshops annually. The 2019 workshop attracted 173 participants, 70 skippers, 96 crew members, and 7 fleet representatives/managers.

Similarly, TUNACONS hosts workshops with industry representative and vessels captains/crew to discuss new international measures (IATTC, FAO, UN) or domestic policy that affect fishing operations. The workshops also provide a platform for training as needed.

While there are regular reviews of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch, a score of SG 100 requires that the alternative measures also be implemented as appropriate. While key research activities identified in the IATTC research plans to reduce the catch of unwanted secondary species (sorting grids and EcoFADs) are moving forward, recommended research to estimate post release mortality of secondary species is not conducted. On this basis the SG 100 level is not met.

US Small PS UoA

Bonito tuna is the only main secondary species and based on logbook data the total catch is retained. This species is opportunistically targeted and subject to a quasi-minimum size requirement when landing catches in the State of California; no bonito "less than 24 inches fork length or 5 pounds in weight may be taken or possessed except a load of bonito taken by a round haul net may contain 18 percent or less by number of

bonito smaller than the size limit". As this fishery employs spotter planes to direct fishing operations (find tuna schools, identify the species, and determine the approximate size of fish), and the accuracy of spotter plane pilots constantly validated, there is generally no unwanted catch. The assessment team views the validation of spotter pilots as a regular review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of bonito; SG 60 and SG 80 are met. As there is no biennial review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of unwanted catch of all secondary species SG 100 is not met.
References
IATTC-COR 2010, IATTC-COR 2012, IATTC-COR 2013, IATTC-COR 2014, IATTC-COR 2015, IATTC-COR 2016, IATTC-COR2017, IATTC-COR 2018, IATTC-COR 2019, IATTC 2006, Hinton et al. 2014

Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	TUNACONS all set types Ecuador - 60-79 Panama - 60-79 US – ≥80 US Small PS UoA - 60-79
Information gap indicator	Provide documentation supporting compliance with shark finning regulations, including Most recent report on compliance with IATTC measures in 2020-2021 Alternative measures to minimise UoA-related mortality of unwanted catch of main secondary species for the US-based fleet

Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	TUNACONS all set types: 80 US Small PS UoA: 75
Condition number (if relevant)	Condition 2-3

PI 2.2.3 – Secondary species information

PI 2.2.3		Information on the nature and amount of secondary species taken is adequate to determine the risk posed by the UoA and the effectiveness of the strategy to manage secondary species		
Scoring Issue		SG 60	SG 80	SG 100
a	Information adequacy for assessment of impacts on main secondary species			
	Guide post	Qualitative information is adequate to estimate the impact of the UoA on the main secondary species with respect to status. OR If RBF is used to score PI 2.2.1 for the UoA: Qualitative information is adequate to estimate productivity and susceptibility attributes for main secondary species.	Some quantitative information is available and adequate to assess the impact of the UoA on main secondary species with respect to status. OR If RBF is used to score PI 2.2.1 for the UoA: Some quantitative information is adequate to assess productivity and susceptibility attributes for main secondary species.	Quantitative information is available and adequate to assess with a high degree of certainty the impact of the UoA on main secondary species with respect to status.
	Met?	TUNACONS all set types: Yes US Small PS UoA: Yes	TUNACONS all set types: Yes US Small PS UoA: Yes	TUNACONS all set types: Yes US Small PS UoA: No
Rationale				
TUNACONS (All set types) UoAs: There are no main secondary species but following SA3.3.1 the scoring issue is still required to be scored. There is good information from the high level of observer coverage on vessels in the UoA (requirement is for 100% observer coverage), and comprehensive catch data from logbooks and landings records. This provides quantitative data, that should there be a change in catch composition that leads to main secondary species being identified in the future, it would be adequate to assess, with a high degree of certainty, the impact of the UoA on them. Therefore, the requirements of SG 60, SG 80, and SG 100 levels are met. US Small PS UoA Eastern Pacific and striped bonito: The catch of Eastern Pacific and striped bonito is recorded in logbooks so some quantitative information is available. There is adequate information to assess productivity and susceptibility attributes for bonito tuna (see Appendix 8.9: Risk-Based Framework outputs). Much of the information is summarized in recent publications (Ortega-Garcia and Jakes-Cota, 2019 and CDFG, 2010) as well as on Fishbase (http://www.fishbase.de/summary/114). This meets the requirements of the SG 60 and SG 80 levels. As there is no stock assessment for bonito the assessment team was unable to assess with a high degree of certainty the impact of the UoA on main secondary species with respect to status; SG 100 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?			TUNACONS all set types: Yes US Small PS UoA: No

Rationale

TUNACONS (All set types) UoAs:
FADs and Free School: The TUNACONS UoA is comprised of 33 large purse seine vessels (Vessel class 6) flagged to Ecuador, Panama, and the USA, and 10 smaller purse seine vessels (Vessel classes 3-5) flagged to Ecuador. As required, there is 100% observer coverage of large purse seine vessels, and these data were provided to the assessment team. While IATTC does not require observers on the smaller purse seine vessels, TUNACONS monitored 100% of fishing activities on nine small purse seine UoA vessels and these data were provided to the assessment team. The assessment team assumed that catches in the one unobserved vessel would be similar to catches on the observed vessels. Catch information also comes from logbooks and landings records, and when combined with observer data provides quantitative catch data for FAD and free school sets. Noting the high level of observer coverage in the TUNACONS UoA the assessment team considers some quantitative information is both available and adequate to estimate the impact of the UoA on minor secondary species with respect to status. Therefore, the SG100 requirements are met.

US Small PS UoA
No at-sea information is collected for this fishery. Therefore, it cannot be said that some quantitative information is adequate to estimate the impact of the UoA on minor secondary species with respect to status. SG100 is not met.

c	Information adequacy for management strategy			
	Guide post	Information is adequate to support measures to manage main secondary species.	Information is adequate to support a partial strategy to manage main secondary species.	Information is adequate to support a strategy to manage all secondary species, and evaluate with a high degree of certainty whether the strategy is achieving its objective.
	Met?	TUNACONS all set types: Yes US Small PS UoA: Yes	TUNACONS all set types: Yes US Small PS UoA: Yes	TUNACONS all set types: No US Small PS UoA: No

Rationale

TUNACONS (All set types) UoAs:

There is good information from the high level of observer coverage on vessels in the UoA (requirement is for 100% observer coverage on larger purse seine vessels and TUNACONS monitors 100% of the fishing effort associated with the smaller purse seine vessels), and comprehensive catch data from logbooks and landings records. This provides adequate information to support a partial strategy to manage main secondary species: SG 60 and SG 80 are met.

Information on post release mortality of released secondary species is not available. On this basis, requirements at the SG 100 level are not met.

US Small PS UoA
Bonito tuna is the only main secondary species in this UoA. While observer data is not collected from these vessels (exempt due to vessel size), catch data from logbooks and landings records are available to support existing management measures (minimum legal size). On this basis SG 60 is met.

Ortega-Garcia and Jakes-Cota (2019) conducted an exploratory analysis of available data on Pacific bonito (Sarda chiliensis lineolata) in the North Pacific Ocean. While a number of uncertainties in available data were identified and information required for formal stock assessment models is not available, the authors did conclude that information to support development of simple indicators of stock status can proceed. The assessment team views the development of stock status indicators, which has yet to proceed, as a necessary step to support a partial strategy to manage bonito. The development and implementation of stock status indicators provides a basis for determining the utility of current management measures (i.e., minimum size limit) and need for additional measures. On this basis the SG80 is met.

References
IATTC 2019 Ortega-Garcia and Jakes-Cota 2019 (https://www.iattc.org/Meetings/Meetings2019/SAC-10/INF/_English/SAC-10-INF-J_Pacific%20bonito.pdf

Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	TUNACONS all set types >80 US Small PS UoA: 60-79
Information gap indicator	More information on observer coverage rates of small purse seine vessels is sought. Additionally, information describing the observer program is required. RBF will be used to assess scores for US small PS.

Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	TUNACONS all set types: 95 US Small PS UoA: 80
Condition number (if relevant)	

PI 2.3.1 – ETP species outcome

PI 2.3.1		The UoA meets national and international requirements for the protection of ETP species The UoA does not hinder recovery of ETP species		
Scoring Issue		SG 60	SG 80	SG 100
a	Effects of the UoA on population/stock within national or international limits, where applicable			
	Guide post	Where national and/or international requirements set limits for ETP species, the effects of the UoA on the population/ stock are known and likely to be within these limits.	Where national and/or international requirements set limits for ETP species, the combined effects of the MSC UoAs on the population /stock are known and highly likely to be within these limits.	Where national and/or international requirements set limits for ETP species, there is a high degree of certainty that the combined effects of the MSC UoAs are within these limits.
	Met?	Tunacons All set types: NA US Small PS UoA: NA	Tunacons All set types: NA US Small PS UoA: NA	Tunacons All set types: NA US Small PS UoA: NA
Rationale				
Tunacons (All set types) UoAs: Limits have not been established for ETP species caught by UoA vessels. IATTC has international requirements for set limits regarding dolphin species in the RFMO. Based on observer data no dolphins were caught by the UoAs. During the site visit it was verified by both IATTC and TUNACONS that the UoAs meet the 100% observer coverage requirement and the provided observer data is correct, confirming there are no marine mammal (dolphin) interactions. Based on this information Si-a is considered not applicable. US Small PS UoA There are no limits established for ETP species.				
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?	TUNACONS all set types: *Sea Turtles:* Yes *Sharks:* Yes *Mobulid Rays:* Yes US Small PS UoA: Yes	TUNACONS all set types: *Sea Turtles:* Yes *Sharks: Yes* *Mobulid Rays:* Yes US Small PS UoA: Yes	TUNACONS all set types: *Sea Turtles:* No *Sharks:* No *Mobulid Rays:* No US Small PS UoA: No
Rationale				
TUNACONS UoAs				

For the purposes of scoring, ETP species in the TUNACONS UoAs are those protected by IATTC resolutions (and U.S. mandates for U.S. flagged vessels) and interacting with the UoA, including 5 species of sea turtles (green, olive ridley, loggerhead, leatherback and hawksbill turtles), 4 species of sharks (silky shark, scalloped hammerhead shark, whale shark, and oceanic whitetip shark), and 5 species of mobulid rays (giant manta ray, Chilean devil ray, spinetail devil ray, smoothtail devil ray, and Munk's devil ray). As no marine mammals or seabird interactions were reported by UoA vessels from 2015 – 2018, scoring will only focus on sharks, rays, and turtles. The reported catch of all ETP species by UoA vessels was consistently low, each species accounting for < 0.1% of the total UoA catch.

Sea Turtles:
TUNACONS all set types
The waters of the eastern Pacific are important feeding and nesting areas for four sea turtle species: the leatherback, the green turtle, the hawksbill, and the olive ridley. In addition, a fifth species, the loggerhead turtle, feeds in the northern- and southern-limits of the eastern tropical Pacific, but nests on distant beaches in the western Pacific. While the current knowledge regarding conservation, movements, and habitat use for each of these five species was updated in 2017 (IAC Habitat Use Working Group, 2017) the status of turtles encountered by fisheries in the EPO have not been specifically examined by IATTC. Currently it is estimated that approximately 116,000 nesting female green turtle occur in the Pacific Ocean (Seminoff et al., 2015). Approximately 11,725 nesting female hawksbill turtles occur in the Pacific Ocean (NMFS and FWS, 2013). It is estimated that approximately 9,200 nesting female loggerhead turtles (https://www.fisheries.noaa.gov/species/loggerhead-turtle), and 4,000 nesting female leatherback turtles (Benson et al., 2015) occur in the Pacific Ocean.

All sea turtle species are currently listed as vulnerable, endangered, or critically endangered by the International Union for Conservation of Nature (IUCN). Green, loggerhead, leatherback, hawksbill, and olive ridley turtles are also listed as endangered under the U.S. Endangered Species Act (ESA), and recovery plans developed. While the U.S. ESA generally prohibits the take of endangered and threatened species, incidental takes are permitted provided such taking is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species.

While UoA FAD sets and free school sets interacted with all 5 species, more interactions were observed in FAD sets (N=689) compared with and free school sets (N=148). Regardless of set type, approximately 50% of interactions involved green turtles, olive ridley turtles, and loggerhead turtles, while 45% of the interactions were not identified to the species level. Interactions with FAD sets resulted in 9 mortalities (1 green turtle, 1 leatherback turtle, 2 loggerhead turtles, 3 olive ridley, and 2 unidentified sea turtles) and interactions with free school sets resulted in 4 mortalities (2 olive ridley turtles and 2 unidentified sea turtles).

Based on the observer data the potential effects of the fishery are considered known for all species and the mortalities of one green turtle and two loggerhead turtles are likely not to hinder their recovery, meeting the SG60. Green turtle nesting trends in the EPO have been increasing since the early 1990s, while nesting trends for loggerhead in the Pacific Ocean have been relatively stable since the 1990s. Olive ridley turtles are the most abundant sea turtle species in the EPO (> 6,000,000 animals; IATTC SAC-08-INF C (2017)) and the mortalities of 5 olive ridley turtles is likely not to hinder their "recovery". Leatherback turtles are classified as critically endangered on the IUCN Red List and while all nesting beach trends (number of nesting females) have similar declining patterns since 2002, current abundance levels are low and vary by rookery (ranging from 20 to 150). The mortality of one leatherback by the UoA over 4 years is likely not to hinder the recovery of this species. Therefore, it cannot be said that direct effects are highly unlikely to hinder impacts of ETP species. On this basis, the SG 60 and SG 80 levels are met.

We note there is the potential for sea turtles to be entangled in FADs and data to quantify this source of mortality was not provided. The assessment team was unable to conclude there is a high degree of confidence that there are no significant detrimental direct effects of the UoA on sea turtle species. SG 100 is not met.

Silky Shark

TUNACONS (all set types)
A stock assessment for silky shark in the EPO has not been conducted. Silky shark stock status indicators based on bycatch-per-set data from EPO purse seine sets on floating objects was developed although confidence in the assessment is somewhat limited because the size-category of released sharks may be estimated poorly (Lennert-Cody et al. 2019).

Clarke et al. (2018) undertook a Pacific-wide stock assessment for silky shark and estimated the total catch of silky shark based on trade-based catch records to be around 38,000 t, annually. In comparison, average annual catch in the UoA FAD fishery was estimated at approximately 21, 000 individuals in FAD sets, roughly equivalent to 350 tons[3] or 0.009% of the total catch. In the free school fishery average annual catch was estimated at approximately 683 individuals (30 t) or 0.0008% of the total catch. Information was not provided on the level of post release mortality, taking a more precautionary approach the team assumed all catches to be equal to 100% mortality.

Based on the quantitative information on catch of the UoA the team concludes that the negligible catches of the UoA provide confidence that known direct/direct effects of the UoA are likely (70th percentile)/highly likely (80th percentile) to not hinder recovery of silky shark if required; SG 60 and SG80 are met.

There is a risk of unobserved mortality due to animals entangled in FADs, this risk is based on information of entanglement of silky sharks in other ocean basins. The magnitude of FAD entanglement mortality in the EPO has not been assessed. During the site visit the assessment team received anecdotal information from IATTC staff indicating that the risk of entanglement in FADs is negligible in the EPO, however there is no quantitative or scientific evidence to support this observation. Measure C 19-01 requires the use of low-entanglement FADs in all purse seine fisheries, beginning in January 2019. The majority of the TUNACONS fleet is employing low-entanglement FADs. Low-entanglement FADs greatly reduce the likelihood of entanglement, but do not eliminate unobserved mortality entirely. Given that there is no formal stock assessment for silky sharks in the EPO and there is no scientific evidence to support the low risk of entanglements in FADs, there is not a high degree of confidence that there are no significant detrimental direct effects of the UoA on silky sharks, thus the SG100 is not met.

Oceanic Whitetip Shark

TUNACONS (all set types)
There is no direct estimate of stock status for oceanic whitetip shark in the EPO. Assessments have been conducted in the WCPO (Tremblay-Boyer et al. 2019). Considering this species has a clear preference for open ocean environments (Rice and Harley, 2012) we consider it to be plausible that there is movement between the WCPO and EPO and that the status of oceanic whitetip in the EPO can be inferred from their status in the WCPO. We note there are no definitive movement studies demonstrating migration between the EPO and WCPO.

[3] The team only received information in number of indiviuals. During 2006-2011, the average length of silky sharks caught by purse seines sets on floating objects (ranged from 113 to 126 cm), in unassociated sets the average length was 170 cm (Aires-da-Silva, et al, 2014). Length-weight relationships for silky sharks indicate that on average silky sharks in FAD sets would be approximately 15 kg, while silky sharks caught in free school sets would be close to 40 kg in weight (https://www.iattc.org/Meetings/Meetings2013/SAC-04/Presentations/_English/SAC-04-PRES_Silky%20shark.pdf)

The most recent assessment of WCPO oceanic whitetip shark was conducted in 2019 and all model runs predicted depletion, SB/SB_0,to be below 0.1, and most runs below 0.05 (Tremblay-Boyer et al. 2019). F/FMSY is predicted to have declined by more than half from 6.12 to 2.67 (median) for the last year of the assessment (2016) following the adoption of conservation measures to protect oceanic whitetip shark (CMM 2011-04).

The total catch of oceanic whitetip shark in all WCPO fisheries is estimated to range from a few thousand to several hundreds of thousands of individuals (Tremblay-Boyer et al. 2019) and comparing this to the catch by TUNACONS (N=11 in the free school fishery and N=104 in the FAD fishery) provides confidence that known direct and direct effects of the UoA are likely/highly likely to not hinder recovery of oceanic whitetip shark if required: SG60 and SG80 are met.

As with silky sharks, there is a risk of unobserved mortality due to animals entangled in FADs, this risk is based on information of entanglement of silky sharks in other ocean basins. The magnitude of FAD entanglement mortality in the EPO has not been assessed. During the site visit the assessment team received anecdotal information from IATTC staff indicating that the risk of entanglement in FADs is negligible in the EPO, however there is no quantitative or scientific evidence to support this observation. Measure C 19-01 requires the use of low-entanglement FADs in all purse seine fisheries, beginning in January 2019. The majority of the TUNACONS fleet is employing low-entanglement FADs. Low-entanglement FADs greatly reduce the likelihood of entanglement, but do not eliminate unobserved mortality entirely. Given that there is no stock assessment for oceanic whitetip sharks in the EPO and there is no scientific evidence to support the low risk of entanglements in FADs, there is not a high degree of confidence that there are no significant detrimental direct effects of the UoA on silky sharks, thus the SG100 is not met.

Whale Shark

TUNACONS (all set types)

Stock status for the Indo-Pacific whale shark was assessed by Rice and Harley (2012) and recently by Neubauer et al. (2018) in a risk-based framework based on information from all purse seine fisheries in the Pacific Ocean. Results from the risk-based analysis indicated that the risk of exceeding three F-based limit reference points was generally less than 20% since 2009 and concluded that the risk from Pacific Ocean purse seine fisheries in aggregate is moderate to low, with the risk posed to whale sharks from purse seine vessels operating in the EPO being lower in comparison to those operating in the WCPO.

Between 2015 and 2018 a total of eight whale sharks were caught in TUNACONS FAD fishery and similarly eight whale sharks were caught in the free school fishery. Average annual whale shark interactions in the TUNACONS FAD and free school fisheries are relatively small, two sharks per year and all but one shark , during this time period, were discarded alive. The impact of the TUNACONS fisheries on the Indo-Pacific whale shark population is therefore considered to be negligible and requirements at the SG 60 SG 80, and SG 100 levels are met for both set types.

Scalloped Hammerhead Sharks

TUNACONS (all set types)

The Scalloped Hammerhead Shark is a coastal and semi-oceanic pelagic shark, found over continental and insular shelves and nearby deep water, ranging from the intertidal and surface waters to 275 m depth, though has been recorded to 1,043 m (Moore and Gates 2015). Adults spend most of the time offshore in midwater and females migrate to the coastal areas to pup (Stevens and Lyle 1989). Two distinct population have been identified in the Pacific Ocean, the Eastern Pacific DPS and the Indo-West Pacific DPS, and there are no data available on population size The IUCN lists the species as critically endangered.

Based on observer data from 2015-2018, 263 Scalloped Hammerhead Shark was caught in the TUNACONS FAD fishery, accounting for 0.004% of the total catch volume over the four years. In the free school fishery 19 sharks were caught, accounting for < 0.001% of the total catch volume.

Considering the low level of interaction with Scalloped Hammerhead Sharks, and measures in place to minimize the risk posed by these fisheries, including safe handling and release protocols, catch reporting requirements, and workplan for completing a full stock assessment (Resolution C-16-05), as well as measures requiring all FADs to be low-entanglement FADs (Resolutions C-18-05 and C-19-01), provides confidence that known direct/direct effects of the UoA are likely/highly likely to not hinder recovery of scalloped hammerhead shark if required: SG 60 and SG80 are met.

In the absence of more information on population status of Scalloped Hammerhead Sharks, the SG100 is not met.

Mobulid Rays

TUNACONS (all set types)

The population size of the giant manta rays and devil rays is difficult to assess, but abundance trajectories have been estimated based on long time series of sightings at diving sites. Locally, abundance varies substantially and may be based on food availability and the degree that they were, or are currently, being fished (https://www.iucnredlist.org/species/198921/68632946#threats). In most regions, Giant Manta Ray population sizes appear to be small ranging from 100 to 1,500 individuals (https://www.fisheries.noaa.gov/species/giant-manta-ray). Photo-identification studies at specific aggregation sites have yielded minimum estimates of 42 to 500 individuals over almost a decade of monitoring in most locations, including: Mozambique, Thailand, Myanmar, Indonesia (Holmberg and Marshall 2018), Japan (Kashiwagi et al. 2010), Brazil (Luiz et al. 2008), and Mexico (Rubin 2002). A 6-year study has catalogued more than 2,000 individuals in a single site, off mainland Ecuador (Holmberg and Marshall 2018). The trend of the number of individuals varies widely across the range of the Giant Manta Ray, but trends appear stable where they are protected and declining rapidly where fishing pressure is greater (Ward-Paige et al. 2013; Holmberg and Marshall 2018).

Devil rays are a bycatch component of many small and large-scale fisheries, and in some cases catch aggregated and reported as Mobula spp. Based on a combination of declining sightings-per-unit-effort (SPUE) data from monitored populations, catch landings data, and evidence of depletions, significant population declines have been inferred (Fernando and Stevens 2011, Couturier et al. 2012, Hall and Roman 2013, Ward-Paige et al. 2013, Lewis et al. 2015, Croll et al. 2016, Rohner et al. 2017). In areas where catch data is available population declines of 50-99% over the last three generations (38 years; from 1980-2018) has been inferred, with a further population reduction suspected over the next three generation lengths (2018–2056).

Based on observer data from 2015 to 2018 five species of mobulid rays were caught by the fishery: Giant Manta Ray (Mobula birostris), Smoothtail Devil Ray (M. thurstoni), Spinetail Devil Ray (M. japonica), Chilean Devil Ray (M. tarapacana), and Munk's Devil Ray (M. munkiana). While the total catch of mobulid rays by set type was similar (145 vs 147), numbers caught at the species level differed significantly between set types. Catches of mobula in free school sets comprised fifty-four M. birostris (12.85 mt), three M. tarapacana (0.27 mt), twenty-three M. japonica (1.41 mt), three M. thurstoni (0.06 mt), and sixty-two unidentified mobula and mantas (3.33 mt). Catches of mobula in FAD sets over the four years comprised seven M. birostris (1.67 mt), three M. tarapacana (0.27 mt), thirty-two M. japonica (1.97 mt), nine M. munkiana (0.17 mt), and ninety-five unidentified mobula and mantas (5.66 mt).

Based on observer data from large purse seine vessels (Vessel class 6) operating in the EPO between 1993 and 2014, approximately 2,545 mobulid rays were captured annually. In comparison, approximately 73 mobulid rays were captured annually based on observer data collected from the UoA between 2015 and 2018, Assuming similar annual capture levels by the IATTC large purse seine fleet between 2015 and 2018 (N=2,545 animals),

the UoA accounts for approximately 3% of the total catch. The proportion attributed to the UoA would be less since the UoA data also includes data from smaller purse seine vessels (Vessel classes 3-5) which are not included in the IATTC fleet estimate. Thus, the annual catch of mobulid rays by the UoA is likely insignificant compared to the overall IATTC purse seine catch.

Regardless of set type the catch of mobulid rays by the UoA over the four-year period represents a small portion of the total catch volume, 0.01% for free school sets and 0.002% for FADs sets. While all mobulid were returned to the water, post-release survival rates of mobulids from commercial purse seine gear are not publicly available. Given the size and shape of mobulids there is likely a very low risk to mobulids from ghost fishing or entanglement in FADs.

Considering the low level of UoA interactions with Mobulid rays based on observer coverage rates approaching 100% and measures in place to minimize the risk posed by these fisheries, including safe handling and release protocols and catch reporting requirements (Resolution C-15-04), as well as research collaborations between TUNACONS and Manta Trust to advance knowledge on the biology, ecology, and conservation of Mobulid rays in the Galapagos Island region, this provides confidence that known direct effects of the UoA are highly likely to not hinder recovery of all Mobulid rays if required: SG 60 and SG 80 are met for both set types. The fishery provided improved information on the fate of mobulid rays, however, there are still some mobulid rays for which information was not provided at the species level. This issue is addressed in PI 2.3.3 SIb

Noting that accurate population estimates of Mobulid rays are not readily available there is not a high degree of confidence that there are no significant detrimental direct effects of the UoA on Mobulid rays. Also, while the assessment team does not consider ghost fishing or entanglement in FADs to pose a serious risk to Mobulid rays due to their size and body shape, there is no evidence to corroborate this assumption. On this basis SG 100 is not met.

US Small PS UoA

Observers are not required on UoA vessels and logbooks only record catches of tuna species. To gather request information on direct effects, questionnaires were circulated to NGOs and UoA vessel captains to determine the potential for ETP interactions. Follow-up interviews were conducted to review the results and finalize the potential for direct effects. Results from the interviews indicated that due to the unique fishing strategies employed by the UoA fishery there are no interactions with ETP species. As fishing operations in the US small purse seine fishery rely on spotter planes to determine where and when fishing is conducted, only tuna schools with no observable ETP species are fished. In many ways this is like a move-on-rule aimed at limiting interactions with ETP species.

We also note that NOAA Fisheries requires vessel captains to record all interactions with ETP as part of the mandatory logbook program and the fishery is currently designated as a Category III fishery, indicating that the annual mortality and serious injury of an ETP stock in a given fishery is less than or equal to 1% of its PBR level (i.e., there is a remote likelihood of or no known incidental mortality and serious injury of marine mammals). In the absence of reliable information indicating the frequency of incidental mortality and serious injury of marine mammals by a commercial fishery, NOAA Fisheries will determine whether the incidental mortality or serious injury is “occasional” by evaluating other factors such as fishing techniques, gear used, methods used to deter marine mammals, target species, seasons and areas fished, qualitative data from logbooks or fishermen reports, stranding data, and the species and distribution of marine mammals in the area. For the US small purse seine UoA there are no known interactions https://www.fisheries.noaa.gov/national/marine-mammal-protection/list-fisheries-summary-tables#table-1-category-iii). NOAA Fisheries periodically updates fishey categories through collaborations with California Department of Fish and Wildlife and Pacific Fishery Management Council. While observers are not required to monitor the US small purse seine UoA due to safety issue, there are domestic measures in place to conclude that the direct effects of the UoA are highly likely to not hinder recovery of ETP species.

Based on the totality of the information the assessment team concludes SG 60 and SG 80 are met as direct effects of the UoA are known and highly likely to not hinder recovery of ETP Species. Without observer data we cannot assert with a high degree of confidence that there are no significant impacts, thus the SG100 is not met.

c	Indirect effects			
	Guide post		Indirect effects have been considered for the UoA and are thought to be highly likely to not create unacceptable impacts.	There is a high degree of confidence that there are no significant detrimental indirect effects of the UoA on ETP species.
	Met?		TUNACONS all set types: *Sea Turtles:* Yes *Sharks:* Yes *Mobulid Rays:* Yes US Small PS UoA: Yes	TUNACONS all set types: *Sea Turtles:* No *Sharks:* No *Mobulid Rays:* No US Small PS UoA: No

Rationale

Tunacons (All set types) UoAs and US Small PS UoA
Indirect trophic effects of fishing for tuna on the tropical pelagic ecosystem have been considered through a variety of modelling approaches (Kitchell et al. 1999, Sibert et al. 2006, Allain et al. 2007, Allain et al. 2015, Lehodey et al. 2014) and, although the impacts are not negligible, they have not been considered irreversible and no particular impacts on ETP species have been identified.

The warm pool ecosystem was found to be resistant to considerable perturbation (e.g. large changes in the harvest of the surface fish community) a feature apparently related to the high diversity of predators in the food web that consume a wide range of prey (Allain et al. 2015). The effect of fishing on the eastern tropical Pacific Ocean ecosystem and species at different trophic levels has been investigated by Olson & Watters (2003), Watters et al. (2003), Fernández-Álamo & Färber-Lorda (2006), Gerrodette et al. (2012), and Griffiths and Fuller (2019). The results indicate that although the purse seine fishing in the EPO, including that conducted by the TUNACONS, does impact the relative biomass of species at different trophic levels through direct mechanisms (i.e., catching) and indirect mechanisms (i.e., catches at one trophic level affect species at other trophic levels through changing predator-prey abundance), changes have been moderate thus far and are reversible (Griffiths and Fuller 2019).

Overall, indirect effects have thus been considered for the UoA and given the congruency between results from the various studies, which is considered to be consistent with meeting an 80% confidence level, are thought to be highly likely to not create unacceptable impacts; SG80 is met.

Recent data on the Indo-Pacific Warm Pool suggests it is expanding and the impact of this (expansion) on marine resources is unknown (https://www.climate.gov/news-features/featured-images/warm-pool-indo-pacific-ocean-has-almost-doubled-sizechanging-Global). The RFMOs have agreed to revisit the earlier modelling work of Allain et al (2015) but it's unclear when results will be available. On this basis, until updated modelling results are available the assessment team concluded there is not a high degree of confidence that there are no significant detrimental indirect effects of the UoA on ETP species; SG100 is not met.

References

Griffiths and Fuller 2019; Olson and Watters 2003; Watters et al. 2003; Fernández-Álamo and Färber-Lorda 2006; Gerrodette et al. 2012; Allain et al. 2007; Allain et al. 2015; Lehodey et al. 2014; Kitchell et al. 1999; Sibert et al. 2006; Rice and Harley 2012; Neubauer et al. 2018; Román et al. 2018; Tremblay-Boyer et al. 2019; Clarke

et al. 2018; Hutchinson et al. 2015; Lennert-Cody et al. 2019 ; Clarke et al. 2018 ; Miller 2013 ; Griffiths et al. 2018 ; Aires-da-Silva et al. 2014

Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	TUNACONS all set types: 60-79 Sea Turtles ≥80, Sharks 60-79, Mobuid 69-70US Small PS UoA: ≥80
Information gap indicator	TUNACONS UoA: More information sought on protected species training requirements, quality assurance/quality control protocols for observer data, and shark retention policies.
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	TUNACONS all set types: 80 (Sea Turtles = 80, Sharks 80, Mobulid Rays 80) US Small PS UoA: 80
Condition number (if relevant)	

PI 2.3.1 Scoring Calculation-FAD Sets

UoA	Element	SI a	SI b	SI c	Element score	PI score
TUNACONS all set types	**Sharks**					
	Whale shark	N/A	100	80	90	**80**
	Silky shark	N/A	80	80	80	
	Oceanic whitetip shark	N/A	80	80	80	
	Scalloped hammerhead shark	N/A	80	80	80	
	Mobula					
	Giant Manta Ray	N/A	80	80	80	
	Chilean Devil Ray	N/A	80	80	80	
	Spinetail Devil Ray	N/A	80	80	80	
	Smoothtail Devil Ray	N/A	80	80	80	
	Marine turtles					
	Green turtles	N/A	80	80	80	
	Loggerhead turtle	N/A	80	80	80	
	Olive ridley turtle	N/A	80	80	80	
	Hawksbill turtle	N/A	80	80	80	
	Leatherback turtle	N/A	80	80	80	

PI 2.3.2 – ETP species management strategy

PI 2.3.2		The UoA has in place precautionary management strategies designed to: - meet national and international requirements; - ensure the UoA does not hinder recovery of ETP species. Also, the UoA regularly reviews and implements measures, as appropriate, to minimise the mortality of ETP species		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place (national and international requirements)			
	Guide post	There are measures in place that minimise the UoA-related mortality of ETP species, and are expected to be highly likely to achieve national and international requirements for the protection of ETP species.	There is a strategy in place for managing the UoA's impact on ETP species, including measures to minimise mortality, which is designed to be highly likely to achieve national and international requirements for the protection of ETP species.	There is a comprehensive strategy in place for managing the UoA's impact on ETP species, including measures to minimise mortality, which is designed to achieve above national and international requirements for the protection of ETP species.
	Met?	TUNACONS all set types: *Sea Turtles:* NA *Sharks:* NA *Mobulid Rays:* NA US Small PS UoA: NA	TUNACONS all set types: *Sea Turtles:* NA *Sharks:* NA *Mobulid Rays:* NA US Small PS UoA: NA	TUNACONS all set types: *Sea Turtles:* NA *Sharks:* NA *Mobulid Rays:* NA US Small PS UoA: NA
Rationale				
Limits have not been established for ETP species caught by either the large purse-seine fleet or the small US purse-seine fleet.				
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?	TUNACONS all set types: *Sea Turtles:* Yes *Sharks:* Yes *Mobulid Rays:* Yes US Small PS UoA: Yes	TUNACONS all set types: *Sea Turtles:* Yes *Sharks:* Yes *Mobulid Rays:* Yes US Small PS UoA: Yes	TUNACONS all set types: *Sea Turtles: No* *Sharks:* No *Mobulid Rays:* No US Small PS UoA: No
Rationale				
Tunacons (All set types) UoAs:				

There are a range of established measures within IATTC that form a strategy for managing the fishery's impact on sharks, rays, turtles, sea birds and marine mammals. These measures include non-retention policies, 100% observer coverage (on Class 6 vessels and class 1-5 vessels for the Tunacons fleet), skipper training, detailed release procedures, requirements for the carriage and use of specific equipment to aid release, and formal reporting requirement. Also, limits on the number of active FADs that can be deployed at any one time have been established based on vessel size.

Also, US-flagged vessels, regardless of fishing location, are strictly required to follow all measures and reporting requirements associated with the Endangered Species Act (ESA), Marine Mammal Protection Act (MMPA), and binding seabird agreements. Vessel captains are required to report the interactions and fate of all animals falling under the purview of the ESA, MMPA, and binding seabird agreements in logbooks and NOAA Fisheries requires all captains/crew to regularly attend protected species workshop to discuss current and proposed management measures and bycatch mitigation measures. The US has designated scalloped hammerhead sharks as endangered, sea turtles and cetaceans fall under the purview of the MMPA, and there numerous seabird agreements generally include all seabirds.

The IATTC measures include:

Sea Turtles: IATTC Resolutions C-19-04, C-04-05 (Rev 3) and C-07-03 are designed to mitigate the impact of tuna fishing vessels on sea turtles by requiring CPCs to implement a range of measures to reduce the incidental catch and promote the survival of those that were caught.

Sharks: IATTC Resolutions C-21-06, C-19-05, C-19-06, C-16-04, C-11-10, and C-05-03 are designed to mitigate the impact of tuna fishing vessels on sharks by requiring CPCs to implement a range of measures to reduce the incidental catch, restrict retention and finning, collect scientific data, and promote the survival of those that were caught.

Mobulid Rays: IATTC Resolution C-15-04 is designed to mitigate the impact of tuna fishing vessels on mobulid rays by requiring CPCs to implement a range of measures to reduce the incidental catch, restrict retention, collect scientific data, and promote the survival of those that were caught.

The activities and measures outlined in the resolutions specific to sea turtles, sharks, and mobulid rays, as well as the US policy, constitute a strategy designed to provide protection consistent with national and international requirements, while at the same time advancing our understanding of fishery interactions and ecological requirements of ETP species. This meets the requirements of the SG 60 and SG80 levels. Evidence of testing of the strategy was not provided thus the SG100 is not met.

US Small PS UoA
Measures outlined above for the TUNACONS UoA apply here when fishing in the IATTC Commission area. In addition, UoA vessels are required to follow measures established through the NMFS in accordance with the MMPA, MSA, and ESA (if applicable). Observers are not required on the UoA vessels and there is no information of ETP interactions. Logbooks only record catches of tuna species and are insufficient to assess interactions with non-tuna species. Based on interviews with NGOs and vessel captains it was determined that the fishery does not interact with ETP species due to how the fishery operates; spotter planes direct all fishing activities. The team considered the fishing operations and activities as well as measures outlined in the Resolutions constitute a strategy that is expected to ensure the UoA does not hinder the recovery of ETP species if necessary; the SG60 and SG 80 are met. Evidence of testing of the strategy was not provided thus the SG 100 is not met.

c	Management strategy evaluation			
	Guide post	The measures are considered likely to work, based on plausible argument	There is an objective basis for confidence that the measures/strategy will work,	The strategy/comprehensive strategy is mainly based on information directly about

		(e.g., general experience, theory or comparison with similar fisheries/species).	based on information directly about the fishery and/or the species involved.	the fishery and/or species involved, and a quantitative analysis supports high confidence that the strategy will work.
	Met?	TUNACONS all set types: *Sea Turtles:* Yes *Sharks:* Yes *Mobulid Rays:* Yes US Small PS UoA: Yes	TUNACONS all set types: *Sea Turtles: Yes* *Sharks:* Yes *Mobulid Rays:* Yes US Small PS UoA: Yes	TUNACONS all set types: *Sea Turtles: No* *Sharks: Not scored* *Mobulid Rays:* No US Small PS UoA: No

Rationale

Tunacons (All set types) UoAs:
Established measures within the IATTC have been applied directly to the UoA, including non-retention policies, 100% observer coverage (on Class 6 vessels and Class 1-5 vessels), skipper training and workshops, detailed release procedures, requirements for the carriage and use of specific equipment to aid release of ETP species, and formal reporting requirement. In addition, limits on the number of active FADs that can be deployed at any one time have been established based on vessel size and applied to the UoA. To reduce the entanglement of sharks, sea turtles or any other species, as of 1 January 2019 CPCs shall ensure that the design and deployment of FADs are based on the principles set out in Annex II of IATTC Resolution C-18-05.

Silky shark and oceanic whitetip shark

Information from observers and logbooks, and the IATTC Resolution measures detailed above in SIb that are based on best practices and understanding of what works for the particular species and is practicable within the constraints of purse seine operations constitute a series of measures considered likely to work, meeting the SG60.

The quantitative analysis of Pacific-wide silky shark stock status (Clarke et al., 2018 and Clarke et al., 2018b), which is based on information directly about the fishery and the species involved, provided some confidence that previous fishing has not greatly depleted the stock. Furthermore, there evidence of compliance of vessels in the UoA with Tunacons and ISSF voluntary code of conduct, as reported in the ISSF PVR - ProActive Vessel Register.
We note that Resolution C-21-04 continues to require spatiotemporal purse seine closures and increased reporting, additional reductions in the number of FADs deployed at any one time have been implemented in all vessel classes which will reduce F on silky sharks. Conservation measures for oceanic whitetip shark are contained in Resolution C-11-10 which was adopted in 2011. While they have yet to be revised, measures adopted in Resolutions C-21-04 and C-21-06 will reduce F on oceanic whitetip sharks.

As noted by MSC Guidance, “objective basis for confidence”, refers to the levels of information required to evaluate the likelihood that the management partial strategy will work”, and to meet the SG80 level” expert knowledge augmented by some information collected in the area of the UoA and about the specific component(s) and/or UoA”, is required. The measures in place are likely to work, based on information collected from the fishery via observer program, meeting the SG80.

The total catch of the UoA is relatively small for the entire catch of the silky sharks. Clarke et al. 2018 estimates around one million landings of individual silky sharks in the EPO annually since 2007. The observer records indicate that on average the UoA interacts with 5,000 silky sharks annually. The total annual catch of silky sharks in the Tunacons UoA is estimated to be around 0.5% of the total EPO catch. Likewise for oceanic whitetip the UoA catch is on average 30 individuals per year, which is considered to have no impact. Given the scale and

intensity of impact of the limited number of vessels in the UoA, the specific information gathered is considered appropriate to meet the SG80.

However, there is no quantitative analysis on the effectiveness of the strategy in place through either a stock assessment or stock indicators, the SG100 is not met for both silky and oceanic whitetip sharks.

Scalloped Hammerhead Shark and Whale Shark
Information from observers and logbooks, and the Resolution measures detailed above in SIb that are based on best practice and understanding of what works for the particular species and is practicable within the constraints of purse seine operations, provides an objective basis for confidence that the strategy in place for this shark species will be effective. This meets the requirements of the SG 60 and SG 80 levels. However, there has not been a quantitative analysis supporting high confidence that the strategy will work; SG100 is not met.

Mobula and Sea Turtles
Information from observers and logbooks, and the Resolution measures detailed above in SIb that are based on best practice and understanding of what works for the particular species and is practicable within the constraints of purse seine operations, provides an objective basis for confidence that the strategies in place will be effective. This meets the requirements of the SG 60 and SG 80 levels. However, there has not been a quantitative analysis supporting high confidence that the strategy will work; SG100 is not met.

US Small PS UoA
Conservation measures aimed at reducing ETP interactions with fisheries and ensuring their survival upon release have been adopted internationally by all tuna RFMOs and form the basis for US policies. Reducing the removal of animals from populations generally benefits the population and is the rationale behind many of the conservation measures. These measures are considered likely to work based on theory, as well as past experience; requirements for the SG60 level are met.

Noting that no protected species interactions were recorded in the logbooks provided for the years 2014-2018 and reporting of ETP species is mandatory, the assessment team sought independent verification of the potential for zero interactions through interviews with NGOs (PEW and Monterey Bay Aquarium), vessel captains fishery scientists, and fishery management organizations NOAA Fisheries and Pacific Fisheries Management Council), and it was determined that the fishery likely does not interact with ETP species due to how the fishery operates (e.g., spotter planes) and where the fishery operates (CA Bight). Pilots direct all fishing activities and steer vessels away from fish schools with protected species present or other unwanted catch.

Additionally, the US Marine Mammal Protection Act mandates that all commercial fisheries be classified by the level of incidental marine mammal death and serious injury. The level of marine mammal death and serious injury that occurs incidental to each fishery is reported in the annual Marine Mammal Stock Assessment Reports for each stock. Fishery classifications are based on observer/logbook data, information on fishing operations, and other information deemed relevant, and NOAA Fisheries lists this UoA as a Category III fishery with no reported interactions. Based on the totality of the information 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; SG80 is met.

Evidence of testing of the strategy was not provided thus the SG 100 is not met.

d	Management strategy implementation			
	Guide post		There is some evidence that the measures/strategy is being implemented successfully.	There is clear evidence that the strategy/comprehensive strategy is being implemented successfully and is achieving its objective

				as set out in scoring issue (a) or (b).
	Met?		TUNACONS all set types: *Sea Turtles:* Yes *Sharks:* Yes *Mobulid Rays:* Yes US Small PS UoA: Yes	TUNACONS all set types: *Sea Turtles: No* *Sharks: No* *Mobulid Rays:* No US Small PS UoA: No
Rationale				
Tunacons (All set types) UoAs: Sea Turtles, Sharks, and Mobulid Rays: Evidence that *some* elements of the strategy are being implemented successfully includes the collection and submission of observer records from all large purse seine vessel (class 6) trips and some trips associated with smaller purse seine vessels (class 3-5), as well as participation by UoA vessel captains and crew at skipper workshops conducted annually in Ecuador by ISSF, and adoption of best practices by the UoA. On this basis SG 80 is met. Limited documentation was provided by the client as evidence that *all* measures and elements of the strategy are being implemented successfully. Numerous infractions have been noted for Ecuador purse seine vessels and discussed during meetings of the International Review Panel. These reports are no longer available which speaks to the lack of transparency. In its 2017 Report to Congress, National Marine Fisheries Service (NMFS) identified Ecuador as having been engaged in IUU fishing based on reported violations of international conservation and management measures during 2014, 2015, and 2016. In its 2019 report to Congress, NMFS identified Ecuador as undermining the effectiveness of conservation and management measures required by IATTC by failing to comply with its measures. We note that during the 98th Meeting of the IATTC in October 2021, Ecuador, as well as other CPCs, agreed to provide IATTC with requisite information and data to ensure compliance with established measures. We further note that CPCs also agreed to additional measures aimed at strengthening existing FAD management measures. While the submission of these data and agreements to strengthen FAD management in the IATTC Convention asea should provide clear evidence that the comprehensive strategy is being implemented successfully there is no evidence at this time to determine compliance. On this basis SG100 is not met. US Small PS UoA Results of the interviews with NGOs (PEW and Monterey Bay Aquarium), vessel captains fishery scientists, and fishery management organizations NOAA Fisheries and Pacific Fisheries Management Council)which determined the fishery likely does not interact with ETP species provides some evidence that the measures/strategy is being implemented successfully: SG 80 is met. The assessment team does not consider current practices to represent a comprehensive strategy. For example, how would the fishery operate if spotter planes were not involved. On this basis SG 100 is not met.				
e	Review of alternative measures to minimize mortality of ETP species			
	Guide post	There is a review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of ETP species.	There is a regular review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of ETP species and they are implemented as appropriate.	There is a biennial review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality ETP species, and they are implemented, as appropriate.
	Met?	TUNACONS all set types:	TUNACONS all set types:	TUNACONS all set types:

		Sea Turtles: Yes *Sharks:* Yes *Mobulid Rays:* Yes US Small PS UoA: Yes	*Sea Turtles:* Yes *Sharks:* Yes *Mobulid Rays:* Yes US Small PS UoA: Yes	*Sea Turtles:* No *Sharks:* No *Mobulid Rays:* No US Small PS UoA: No

Rationale

Based on guidance provided in SA 3.5.3.2, "regular review" shall mean at least once every 5 years. Biennial review means occurring every other year.

Tunacons (All set types) UoAs:

Sharks and Marine turtles
There is an ongoing IATTC research program to improve understanding of the interactions and implications of the different EPO fisheries on non-target species. Ecosystem considerations is a standing item on the agenda of the IATTC's Science Advisory Committee (e.g. Griffiths & Fuller 2019b) and there is an annual meeting of the IATTC Working Group on Bycatch (e.g., IATTC 2019f) to review and discuss the utility of ongoing bycatch mitigation measures. Also, US flagged vessels also discusses actions and activities through regular meetings of the U.S. Protected Species Workshops. On this basis SG60 and SG80 are met.

As there are no biennial review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of ETP species, SG100 is not met.

Mobulas
There are no research programs for mobulas and mantas in the IATTC that is comparable to that for sharks. There is ongoing attention to areas where interactions are considered a problem, such as the required prohibition of setting on setting on mobula and manta rays as well as protocols for their release, and data on interactions are collected by observers on all trips and presented annually to the relevant meetings. Bycatch is a standing item on the agenda of the IATTC Science Advisory Committee and there is an annual meeting of the IATTC Working Group on Bycatch to review and discuss the utility of ongoing bycatch mitigation measures. On this basis SG60 and SG80 are met.

However, completed there is no biennial review of the (potential) effectiveness and practicality of alternative measures to minimize UoA-related mortality of mobula and manta ray species. On this basis SG100 is not met.

<u>US Small PS UoA</u>
The same processes described above for the TUNACONS UoA apply here. Additionally, regular reviews are conducted within the US Government to assess utility and implementation requirements of alternative measures; SG 60 and SG 80 are met.

As there are no biennial review of the potential effectiveness and practicality of alternative measures to minimise UoA-related mortality of ETP species, SG100 is not met.

References

IATTC Resolution C-18-05.
Observer Data

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

Draft scoring range	Tunacons All set types: ≥ 80 US Small PS UoA: ≥80

Information gap indicator	Both UoAs: More information is sought on the procedures and policies regarding infractions. Also, protocols for the observer program and coverage rates are requested.
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	TUNACONS all set types: 80 US Small PS UoA: 80
Condition number (if relevant)	

PI 2.3.2 Scoring Calculation – all set types

UoA	Element	SI a	SI b	SI c	SI d	SI e	Element score	PI score
TUNACONS all set types	**Sharks**							
	Whale shark	N/A	80	80	80	80	80	**80**
	Silky shark	N/A	80	80	80	80	80	
	Oceanic whitetip shark	N/A	80	80	80	80	80	
	Scalloped hammerhead shark	N/A	80	80	80	80	80	
	Mobula							
	Giant Manta Ray	N/A	80	80	80	80	80	
	Chilean Devil Ray	N/A	80	80	80	80	80	
	Spinetail Devil Ray	N/A	80	80	80	80	80	
	Smoothtail Devil Ray	N/A	80	80	80	80	80	
	Marine turtles							
	Green turtles	N/A	80	80	80	80	80	
	Loggerhead turtle	N/A	80	80	80	80	80	
	Olive ridley turtle	N/A	80	80	80	80	80	
	Hawksbill turtle	N/A	80	80	80	80	80	
	Leatherback turtle	N/A	80	80	80	80	80	

PI 2.3.3 – ETP species information

PI 2.3.3		Relevant information is collected to support the management of UoA impacts on ETP species, including: - Information for the development of the management strategy; - Information to assess the effectiveness of the management strategy; and - Information to determine the outcome status of ETP species		
Scoring Issue		SG 60	SG 80	SG 100
a	Information adequacy for assessment of impacts			
	Guide post	Qualitative information is adequate to estimate the UoA related mortality on ETP species. OR If RBF is used to score PI 2.3.1 for the UoA: Qualitative information is adequate to estimate productivity and susceptibility attributes for ETP species.	Some quantitative information is adequate to assess the UoA related mortality and impact and to determine whether the UoA may be a threat to protection and recovery of the ETP species. OR If RBF is used to score PI 2.3.1 for the UoA: Some quantitative information is adequate to assess productivity and susceptibility attributes for ETP species.	Quantitative information is available to assess with a high degree of certainty the magnitude of UoA-related impacts, mortalities and injuries and the consequences for the status of ETP species.
	Met?	TUNACONS all set types: *Sea Turtles:* Yes *Sharks:* Yes *Mobulid Rays:* Yes US Small PS UoA: Yes	TUNACONS all set types: *Sea Turtles:* Yes *Sharks:* Yes *Mobulid Rays:* Yes US Small PS UoA: No	TUNACONS all set types: *Sea Turtles: No* *Sharks: No* *Mobulid Rays:* No US Small PS UoA: Not scored
Rationale				

Tunacons (All set types) UoAs:
Sea Turtles, Sharks, and Mobulid Rays: The information collected on ETP species from logbooks and by 100% observer coverage of both set types from large purse seine vessels (Class 6) and observer data from small purse seine (class 1-5) vessels is sufficient to assess the UoA related mortality and impact to sea turtles, sharks, and mobulid ray, and to determine whether the UoA may be a threat to protection and recovery of the ETP species. On this basis, requirements for SG60 and SG80 are met.

While the UoA has adopt the use of lesser entangling FADs, supporting evidence has not been provided to validate full adoption and implementation. Also, post release mortality estimates for released ETP species are not available for the UoA; we note such estimates are generally fishery specific. On this basis available quantitative information is not considered adequate to assess with a high degree of certainty the magnitude of UoA-related impacts, mortalities and injuries, and consequences to the status of ETP species; SG100 is not met.

<u>US Small PS UoA</u>

Due to the small size (length) of vessels in this UoA and potential at-sea safety issues, observer coverage is not required by either IATTC or NOAA Fisheries. Based on interviews with NGOs and vessel captains it was determined that the fishery does not interact with ETP species due to how the fishery operates; spotter plane pilots direct all fishing activities with the goal of steering fishing operations away from schools with ETP species present. Therefore, some qualitative information was provided, which is considered 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, This meets SG 60. However, the assessment team did not receive quantitative information to assess the UoA related mortality and impact, thus the SG80 is not met.

SG100 is not scored as not all SG80 requirements are met (see MSC interpretation https://mscportal.force.com/interpret/s/article/Scoring-SG100-if-not-all-SG80-met-7-10-5-3-1527262010218).

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?	TUNACONS all set types: *Sea Turtles:* Yes *Sharks:* Yes *Mobulid Rays:* Yes US Small PS UoA: Yes	TUNACONS all set types: *Sea Turtles: No* *Sharks:* Yes *Mobulid Rays:* No US Small PS UoA: Yes	TUNACONS all set types: *Sea Turtles: No* *Sharks: No* *Mobulid Rays:* No US Small PS UoA: No

Rationale

TUNACONS (All set types) UoA

Sharks

Catch data by species is collected by observers through the observer programs following established data collection protocols. There is a requirement for 100% observer coverage on purse seine vessels and based on published information non-compliance with observer coverage requirements has not been raised against UoA vessels operating in the EPO. The assessment team considers there is confidence in the representativeness of the EPO catch data for sharks and that information is adequate to support measures to manage the impacts on ETP shark species; SG 60 is met.

There are established IATTC annual data reporting “requirements” on bycatch, including the number caught, discarded (dead/injured/alive) and retained (dead only) at the species level. Observer data for the TUNACONS UoA includes the number of ETP sharks caught, as well their fate (discarded or retained), at the species level, and these data are considered adequate to measure trends and support a strategy to manage impacts on these ETP species. We also note there is an established shark research plan in the IATTC to advance information adequacy in the convention area, measures to minimize the catch of sharks (modifications to gear), and best handling and release practices, all aimed at advancing and supporting strategies to manage impacts on ETP shark species. On this basis SG80 is met.

As there is no information on post release mortality for released sharks from the UoA or the potential for entanglement in FADs, information is not considered adequate to support a comprehensive strategy to manage impacts, minimize mortality and injury of ETP shark species, and evaluate with a high degree of certainty whether a strategy is achieving its objectives; SG100 is not met.

Mobulid Rays and Sea Turtles

Catch data for mobulid rays and sea turtles is collected by observers through the observer programs following established data collection protocols. There is a requirement for 100% observer coverage on purse seine vessels and based on published information non-compliance with observer coverage requirements has not been raised against UoA vessels operating in the EPO. The assessment team considers there is confidence in the representativeness of the EPO catch data for mobulid rays and sea turtles and that information is adequate to support measures to manage the impacts on these ETP species; SG 60 is met.

While trends can be developed for mobulid rays and sea turtles based on available information, a number of individuals in both species' groups caught by the UoA are not identified to the species level, precluding the development of species-specific trends. For mobulid rays, 55% of the animals caught are unidentified and for sea turtles 45% of caught animals are unidentified (Table 15 and 16). On this basis, the assessment team does not consider current information to be adequate to measure trends and support a strategy to manage impacts on these ETP groups at the species level. While discussions within the IATTC have noted the need for an established long-term research plan for mobulid rays and sea turtles (similar to that for sharks) to advance information adequacy, research plans under the umbrella of IATTC do not appear to be in place at this time. The recently established research collaborations with mobulid ray research groups in the Galapagos region will likely advance the adequacy of the information for managing rays but the research is in the initial phases and the full utility of the data has yet to be assessed. Based on the totality of the information SG 80 is not met for both set types.

SG100 is not scored for sea turtles and mobulid rays as not all SG80 requirements are met (see MSC interpretation https://mscportal.force.com/interpret/s/article/Scoring-SG100-if-not-all-SG80-met-7-10-5-3-1527262010218). We note that advancing the scoring of this Si to SG 100 will require information on post release mortality for released mobulid rays and sea turtles from the UoA and the extent and impact of entanglement in FADs.

US Small PS UoA

Due to the small size (length) of vessels in this UoA, IATTC and NOAA Fisheries do not require vessels to carry observers. NOAA Fisheries requires all vessels to submit logbooks and to report all protected species (ETP) interactions within the logbooks (per 50 CFR 229.6). There have been no reported noncompliance on the reporting requirements. On this basis information is adequate to support measures to manage the impacts on ETP species: SG60 is met.

Noting that no protected species interactions were recorded in the logbooks provided for the years 2014-2018 the assessment team sought independent verification of the potential for zero interactions through interviews with NGOs (PEW and Monterey Bay Aquarium), vessel captains fishery scientists, and fishery management organizations NOAA Fisheries and Pacific Fisheries Management Council), and it was determined that the fishery likely does not interact with ETP species due to how the fishery operates (e.g., spotter planes) and where the fishery operates (CA Bight). Pilots direct all fishing activities and steer vessels away from fish schools with protected species present.

Additionally, the US Marine Mammal Protection Act mandates that all commercial fisheries be classified by the level of incidental marine mammal death and serious injury. The level of marine mammal death and serious injury that occurs incidental to each fishery is reported in the annual Marine Mammal Stock Assessment Reports for each stock. Fishery classifications are based on observer/logbook data, information on fishing operations,

and other information deemed relevant, and NOAA Fisheries lists this UoA as a Category III fishery with no reported interactions. Based on the totality of the information there is adequate evidence to measure trends and support a strategy to manage impacts on ETP species if necessary: SG80 is met. As observers are not required to monitor the UoA, the assessment team does not consider the available quantitative information 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. On this basis SG 100 is not met
References

Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	Tunacons All set types: 60-79 US Small PS UoA: ≥80
Information gap indicator	TUNACONS UoA: More information is sought on the observer program---administration, protocols, coverage, vessel selection, training, etc.
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	TUNACONS all set types: 75 US Small PS UoA: 70
Condition number (if relevant)	 Condition 2-4 (Tunacons) Condition 2-5 (US Small PS UoA)

PI 2.3.3 Scoring calculations – all set types

UoA	Element	SI a	SI b	Element score	PI score
TUNACONS all set types	**Sharks**				**75**
	Whale shark	80	80	80	
	Silky shark	80	80	80	
	Oceanic whitetip shark	80	80	80	
	Scalloped hammerhead shark (USA only)	80	80	80	
	Mobula				
	Giant Manta Ray	80	60	70	
	Chilean Devil Ray	80	60	70	
	Spinetail Devil Ray	80	60	70	
	Smoothtail Devil Ray	80	60	70	
	Marine turtles				
	Green turtles	80	60	70	
	Loggerhead turtle	80	60	70	
	Olive ridley turtle	80	60	70	
	Hawksbill turtle	80	60	70	
	Leatherback turtle	80	60	70	

PI 2.4.1 – Habitats outcome

PI 2.4.1		The UoA does not cause serious or irreversible harm to habitat structure and function, considered on the basis of the area covered by the governance body(s) responsible for fisheries management in the area(s) where the UoA operates		
Scoring Issue		SG 60	SG 80	SG 100
a	Commonly encountered habitat status			
	Guide post	The UoA is unlikely to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm.	The UoA is highly unlikely to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm.	There is evidence that the UoA is highly unlikely to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm.
	Met?	TUNACONS UoA: Yes US Small PS UoA: Yes	TUNACONS UoA: Yes US Small PS UoA: Yes	TUNACONS UoA: No US Small PS UoA: No
Rationale				

Two purse seine fishing strategies are employed by UoA vessels when fishing for tuna in the EPO, setting on free schools and FADs. Therefore, as required by MSC FCPV2.1 GSA 3.13.1, the assessment team must assess the effects of purse seine fishing activities by the UoA on the structure and function of commonly encountered, VMEs, and minor habitats. For this assessment the shallow pelagic environment is the commonly encountered habitat and the deep-sea or demersal habitat, encompassing continental shelves and slopes, abyssal plains, seamounts, canyons, and trenches, is the minor habitat. Following the FAO Guidelines (FAO 2009), coral reefs and MPAs are considered VMEs. Justification for the designation of commonly encountered, minor, and VME habitats is described in section 7.3.1.7. The potential for the UoA to cause serious or irreversible harm to habitat structure and function of the commonly encountered habitat (shallow pelagic environment) follows.

TUNACONS UoA

UoA purse seine vessels fishing on the high seas operate in deep oceanic waters and do not physically contact the seafloor during their operations. Any impacts of the fishery will therefore be confined to direct or indirect effects on the surface waters (shallow pelagic environment) where the fishery operates. This habitat is essentially open ocean waters whose ability to support the target fish populations is related to temperature, salinity and nutrient levels which determines the productivity of the lower trophic levels. These are primarily driven by variations in basin wide weather patterns through their effect on the frequency, location and strength of upwelling events, eddy systems and thermal fronts. On this basis free school and FAD purse seine fishing operations are not considered capable of affecting these key habitat drivers of the commonly encountered habitat at both broad and local scales. Therefore, the UoA is highly unlikely to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm; SG60 and SG80 are met.

To achieve SG100 for this scoring element evidence that the UoA is highly unlikely to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm is required. While the assessment team does not consider the UoA to impact the designated commonly encountered habitat there is no available evidence. On this basis requirements at the SG100 level for free school and FAD sets is not met.

US Small PS UoA
There is no possibility that this UoA, which only fishes free school sets in deep open oceanic waters, would cause serious or irreversible harm to the shallow pelagic environment, designated as the commonly encountered habitat. Again, the ability of this habitat to support target fish populations is related to temperature, salinity and nutrient levels which determines the productivity of the system. On this basis free school purse seine fishing operations by the UoA are not considered capable of affecting the commonly encountered habitat at both broad and local scales. Therefore, the UoA is highly unlikely to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm; SG60 and SG80 are met.

To achieve SG100 for this scoring element evidence that the UoA is highly unlikely to reduce structure and function of the commonly encountered habitats to a point where there would be serious or irreversible harm is required. While the assessment team does not consider the UoA to impact the designated commonly encountered habitat there is no available evidence. On this basis requirements at the SG100 level for free school sets is not 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 ir reversible harm.
	Met?	TUNACONS UoA: Yes US Small PS UoA: NA	TUNACONS UoA: No US Small PS UoA: NA	TUNACONS UoA: No US Small PS UoA: NA

Rationale

The potential for the UoA to cause serious or irreversible harm to habitat structure and function of VME habitats (coral reefs and MPAs) follows.

<u>TUNACONS UoA</u>
FADs: There is the potential for lost or derelict FADs becoming beached on coral reefs or drifting into marine protected areas/marine reserves, both considered to be VMEs. The spatial footprint of FAD fisheries in the EPO surrounds the Galapagos National Park and Marine Reserve, and also operate in the vicinity of other protected areas and coral reefs (Figure 32Figure 32, Figure 33, and Figure 34). Annual FAD deployments and retrievals recorded by observers up to 2017 in the EPO indicate a large increase in 2017 to well over 20,000. The number of FADs recovered has increased, but not in direct proportion to the increase in deployments, so the difference between deployments and recoveries has also grown significantly (Figure 35). This gap reflects a variety of situations: lost FADs, abandoned FADs, active FADs (including those entering the Western Pacific). While the exact number of lost FADs is unknown, the potential for them ending up in interacting with VMEs exists. hese could be expected to cause some local damage at beaching sites, but these numbers would be unlikely to reduce structure complexity, fragility, and function of any coral reefs to a point where there would be serious or irreversible harm (meaning it would be unable to recover to at least 80% of its unimpacted structure, biological diversity and function within 5-20 years, if the impact were to cease entirely). Nevertheless, this issue has not been well studied, so evidence about the impact is minimal. Cumulative impacts over many years is a concern for which there is also insufficient information, thus it cannot be said that it is highly unlikely that the UoA will reduce structure and function of the VME habitats to a point where there would be serious or irreversible harm.

This meets the requirements of the SG 60 level but not of the SG 80 level.

Free School: No VMEs are affected by Free school sets so this is scored as NA.

US Small PS UoA

As this UoA only makes free school sets and deployed purse seine nets do not make contact with the benthos, no VMEs are encountered and this is scored as not applicable NA

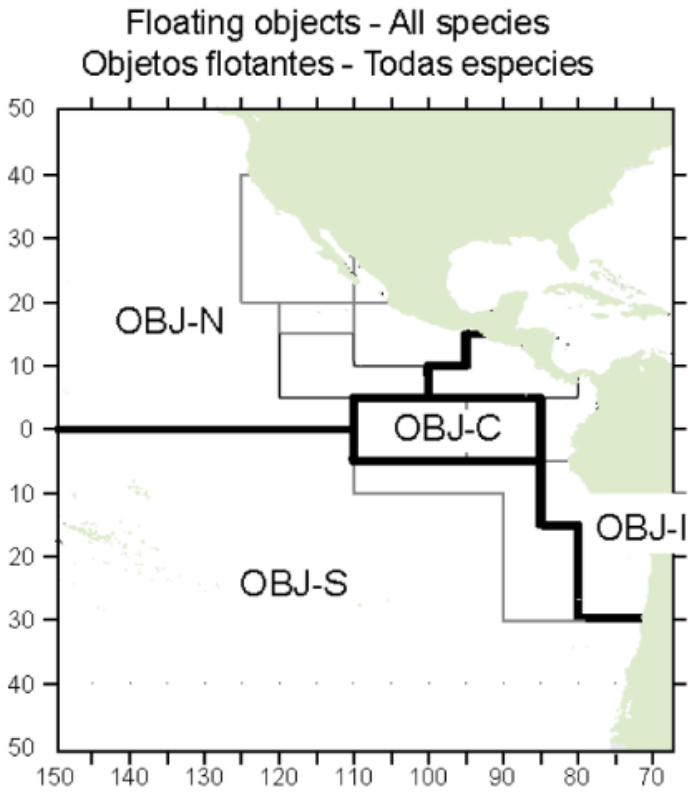

Figure 13. The floating object fisheries (OBJ) defined by the IATTC staff for analyses of yellowfin, skipjack, and bigeye in the EPO. The thin lines indicate the boundaries of the 13 length-frequency sampling areas, and the bold lines the boundaries of the fisheries. OBJ-N is the northern floating object fishery, OBJ-S is the southern floating object fishery, OBJ-C is the central floating object fishery, and OBJ-I is the inshore floating object fishery.

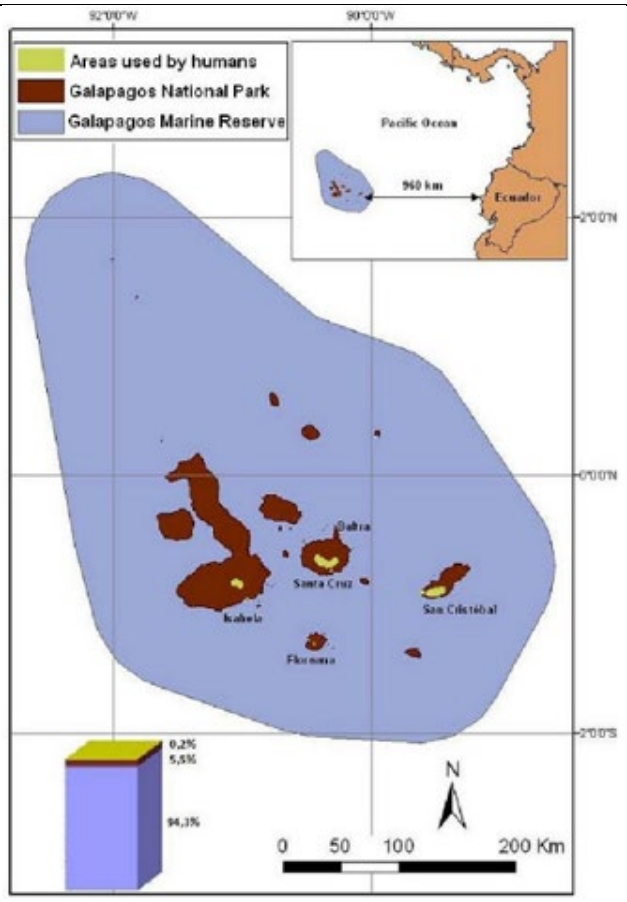

Figure 14. Map of the location of the Galapagos Islands, showing protected areas and areas used by humans (mostly agricultural zones).

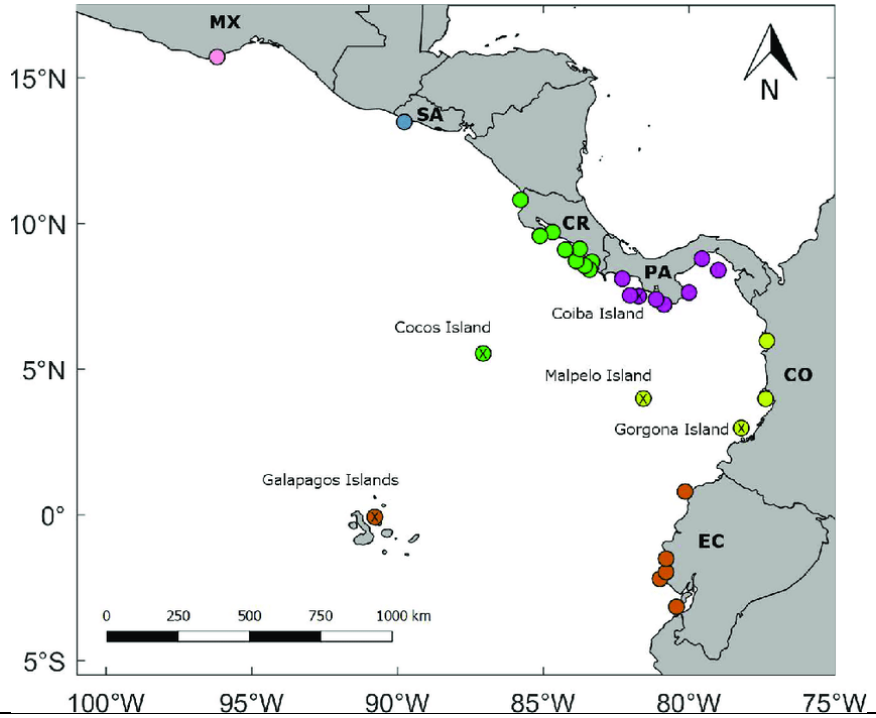

Figure 15. Marine protected areas (MPAs) with coral reef in the equatorial eastern Pacific region. MPAs color-coded by country. MPAs are marked with a cross inside the circle.

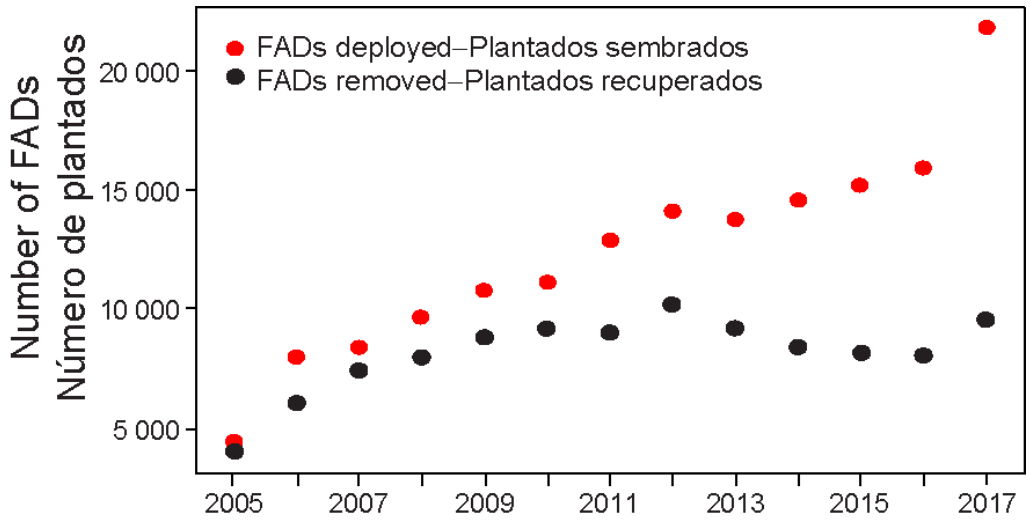

Figure 16. Number of FADs observed and retrieved annually in the EPO, 2005-2017 (Hall and Roman 2019).

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?			TUNACONS UoA: No US Small PS UoA: Yes

Rationale

<u>The potential for the UoA to cause serious or irreversible harm to habitat structure and function of the minor habitat (deep-sea or demersal environment) follows.</u>

As fishing occurs in deep-water habitats there is no possibility that the purse seine gear in use in the fishery would routinely contact the minor habitat, deep-sea or demersal habitat. However, the assessment team recognizes that lost FADs may drift away from the fishing grounds and sink in deeper waters in either the EPO or WCPO, potentially encountering the deep sea or benthic habitat. As noted by GSA3.13.2, if a benthic habitat is being assessed, the team shall recognize habitat categories based on the following habitat characteristics:

- Substratum- sediment type
- Geomorphology – seafloor topography

- Biota – characteristic floral and/or faunal groups

Scoring relative to each of the habitat characteristics follows.

Geomorphology

Harris et al. (2014) mapped the geomorphology of the Pacific Ocean, identifying various features throughout the region:

Ocean	Shelf (km^2)	Slope (km^2)	Abyssal + Hadal (km^2)	Seamount + Ridge + Guyot (km^2)	Canyon + Trough + Trench (km^2)
North Pacific	6,145,000	4,752,000	71,017,000	6,471,000	2,214,000
South Pacific	2,547,000	3,201,000	81,394,000	5,135,000	2,557,000
Total	8,692,000	7,953,000	152,411,000	11,606,000	4,772,000

Given the total area of the geological features in the North Pacific and South Pacific are estimated at 90,599,000 km^2 and 94,834,000 km^2, respectively, that the fishery only interacts with these habitats if the FADs sink and noting the relative scale of potential interaction between sunk gear and the deep-sea habitat (a fraction of a percent of the area), it is highly unlikely (< 30%; MSC Table SA9) that the UoA could reduce structure and function of the minor habitats to a point where there would be serious or irreversible harm. However, there is no evidence to support this and on this basis SG100 is not met.

Biota

Much of the information on biota in the demersal environment comes from ROV surveys in shallower environments (continental shelves, continental ridges and seamounts) and deep-sea submersible dives in deeper environments. However, information on biota and community structure in the demersal environments is scant. For example, it is very rare that more than two or three ROV dives are conducted on any one seamount, so variation in community composition based on depth (water mass characteristics), orientation to principle current regime, and effects of species interactions are generally not known. Seamounts with multiple dives on the summit and flanks include Davidson (McClain et al., 2010) and Cobb (Du Preez et al., 2016) in the Northeast Pacific and Necker Ridge (Morgan et al., 2015) in the Central Pacific. Moreover, fewer than 300 out of 200,000 existing seamounts have been explored (IUCN 2021).

As there is a potential for FADs to interact with the demersal environment, given the relative scale of potential interactions between sunk gear and the deep-sea habitat it is not considered to be significant. Note FAO and IUCN identify deep-sea bottom fishing (e.g., bottom longlines, bottom trawling, etc.) and deep-sea mining as major threats to the demersal habitat. Based on this information the assessment team considers it is highly unlikely (< 30%; MSC Table SA9) that the UoA could reduce structure and function of the minor habitats to a point where there would be serious or irreversible harm. However, there is no evidence to support this and, on this basis, SG100 is not met.

Substratum- sediment type

There has been some seafloor mapping of shallower regions (shelf areas) of the demersal environment, including the categorization of sediment type. However, for the majority of the demersal environment's information on sediment type is lacking. Therefore, evidence to support this Si is not available and SG100 is not met.

As there is no evidence that the UoA fishing FADs is highly unlikely to reduce structure and function of the minor habitat, the demersal environment, to a point where there would be serious or irreversible harm SG100 is not met. As FADs are not used when fishing on free schools there is no potential for the free school portion of the UoA to interact with the designated minor habitat. On this basis free school meets requirements at the SG100 level.

US Small PS UoA
As the US small PS UoA only targets free schools and does not use FADs, there is no possibility that this UoA interacts with the demersal environment, the designated minor habitat. On this basis the SG100 requirements are met.

References
Hall and Roman (2019), McClain et al. (2010), Du Preez et al. (2016), Brown 2016, Harris et al. (2014), Morgan et al. (2015)

Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	TUNACONS UoA: 60-79 US Small PS UoA >80
Information gap indicator	Information on the number of FADs used, lost, and their fates by the TUNACONS UoA is requested.

Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	TUNACONS UoA: 75 US Small PS UoA - 90
Condition number (if relevant)	Condition 2-6

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?	TUNACONS UoA: Commonly Encountered Habitat All set types: Yes VME Habitat All set types: Yes Minor Habitat: All set types: Yes US Small PS UoA: Yes	TUNACONS UoA: Commonly Encountered Habitat All set types: Yes VME Habitat All set types: No Minor Habitat All set types: Yes US Small PS UoA: Yes	TUNACONS UoA: Commonly Encountered Habitat All set types: No VME Habitat All set types: No Minor Habitat All set types: No US Small PS UoA: No

Rationale

AS noted in Section 7.3.1.7 the commonly encountered habitat is considered to be the EPO shallow pelagic environment, shallow coral reefs and MPAs areVME habitats and the demersal environment the minor habitat.

UoA purse seine vessels fishing on the high seas operate in deep oceanic waters and do not physically contact the seafloor during their operations. This habitat is essentially open ocean waters whose ability to support the target fish populations is related to temperature, salinity and nutrient levels which determines the productivity of trophic levels. These attributes are primarily driven by variations in basin wide weather patterns through their effect on the frequency, location and strength of upwelling events, eddy systems and thermal fronts. Based on this information there is no potential for FAD or free school purse seine fishing operations conducted by the TUNACONS UoA to impact the commonly encountered habitat and this provides the basis for the SG80 score reflected in PI2.4.1. Therefore, following the explanation of the term 'if necessary' in Table GSA3and response in the MSC Fisheries and Standard interpretation log (https://mscportal.force.com/interpret/s/article/Use-of-if-necessary-in-P2-management-PIs-2-1-2-2-2-2-2-4-2-2-5-2-PI-2-1-2-1527262011402), a management strategy is not be required at SG60 or SG80 and no specific rationale need be given in order to achieve the SG60 and SG80 levels. As the assessment team does not know if there is a strategy in place for managing the impact of all MSC UoAs/non-MSC fisheries on commonly encountered habitats SG100 is not met.

There is the potential for lost or derelict FADs becoming beached on coral reefs or drifting into marine protected areas/marine reserves, both considered to be VMEs. A number of resolutions have been adopted by the IATTC to address the conservation of tropical tuna in the EPO that implement measures directed at FAD fishing.

Resolution C-19-01 (amendment to Resolution C-18-05 on the collection and analyses of data on fish-aggregating devices) requirements include the following:

- Specifies that, from 1st January 2020, where observers are present they shall be responsible for collecting data on FADs.
- Require the analysis of FAD data and the development of region-wide measures to manage FADs and fishing on FADs to limit impacts on target and non-target species.
- Points to the requirements to use non-entangling FAD designs (equivalent to 'lower-entanglement risk' designs as defined by ISSF 2019) as presented in Annex II of the Resolution.

Resolution C-20-06 (Resolution on the Conservation Measures for Tropical Tunas in the Eastern Pacific Ocean During 2021 Pursuant to Resolution C-20-05) requirements include the following:

- Limits the number of FADs that may be used by purse seiners – Class 6 (≥1,200 m^3 hold capacity) = 450 FADs, Class 5 (<1,200 m^3 hold capacity) = 300 FADs, Class 4-5 = 120 FADs, Class 1-2 = 70 FADs.
- Require that FADs are only activated aboard a purse seine vessel, where 'activated' means deployed or starts transmitting its location.
- Requires that, within 15 days prior to the start of a closure period, all Class 6 purse seiners recover a number of FADs equal to the number deployed during the same period.

Resolution C-21-04 (Conservation Measures for Tropical Tunas in the Eastern Pacific Ocean During 2022-2024) requirements include those outlined in Resolution C-20-06, as well as reductions in the number of allowable active FADs deployed for each class of purse seine vessels, information on the location of deactivated FADs, and daily reporting of the location of active FADs. We note these resolutions, in particular the measures recently adopted in Resolution C-21-04, provide measures that are expected to achieve the Habitat Outcome 80 level of performance. However, as Resolution C-21-04 is recently adopted and no information is available to determine the utility; SG60 is met and SG 80 is not met.

As the impact of FADs on the minor habitat (demersal environment) was scored at SG80 in PI2.4.1 following the explanation of the term 'if necessary' in Table GSA3 and response in the MSC Fisheries and Standard interpretation log (https://mscportal.force.com/interpret/s/article/Use-of-if-necessary-in-P2-management-PIs-2-1-2-2-2-2-2-4-2-2-5-2-PI-2-1-2-1527262011402), a management strategy is not required at SG60 or SG80 and no specific rationale need be given in order to achieve the SG60 and SG80 levels. As the assessment team does not know if there is a strategy in place for managing the impact of all MSC UoAs/non-MSC fisheries, including gear loss, on minor commonly habitats SG100 is not met.

<u>US Small PS UoA</u>

The UoA only fishes free school sets. There is no possibility that the fishery would routinely contact demersal habitats and no potential for serious or irreversible harm to the commonly encountered habitat habitat. However, given that the Habitat Outcome PI only meets the SG80 requirements, the SG80 score is met here by default following the explanation of the term 'if necessary' in Table GSA3 and response in the MSC Fisheries and Standard interpretation log (https://mscportal.force.com/interpret/s/article/Use-of-if-necessary-in-P2-management-PIs-2-1-2-2-2-2-2-4-2-2-5-2-PI-2-1-2-1527262011402), a management strategy is not required at SG60 or SG80 and no specific rationale need be given in order to achieve the SG60 and SG80 levels. As the assessment team does not know if there is a strategy in place for managing the impact of all MSC UoAs/non-MSC fisheries, including gear loss, on minor commonly habitats SG100 is not met.
and a higher score is not possible.

b	Management strategy evaluation			
	Guide post	The measures are considered likely to work, based on plausible argument (e.g. general experience, theory or	There is some objective basis for confidence that the measures/partial strategy will work, based on information directly about	Testing supports high confidence that the partial strategy/strategy will work, based on information directly

		comparison with similar UoAs/habitats).	the UoA and/or habitats involved.	about the UoA and/or habitats involved.
	Met?	TUNACONS UoA: Commonly Encountered Habitats All set types: Yes VME Habitats All set types: Yes Minor Habitat All set types: Yes US Small PS UoA: Yes	TUNACONS UoA: Commonly Encountered Habitats All set types: Yes VME Habitats All set types: Yes Minor Habitat All set types: Yes US Small PS UoA: Yes	TUNACONS UoA: Commonly Encountered Habitat All set types: Yes VME Habitats All set types: No Minor Habitat All set types: No US Small PS UoA: No

Rationale

<u>TUNACONS UoA</u>

Commonly Encountered and Minor Habitats

Given the location of fishing (high-seas deep-ocean environment) there is no evidence that the shallow pelagic environment (commonly encountered habitat) is impacted by purse seine gear and given the location of fishing (high-seas deep-ocean habitat) there is no possibility that the purse seine gear itself would come into contact with the demersal habitat (minor habitat). While FADs from the UoA may become lost and sink the impact would be minimal given the size of the fleet relative to the WCPFC purse seine fleet (≈ 3%) and the area of the deep-ocean habitat, approximately 80,000,000 km^2. As purse seine gear is expensive and held up with buoys, there is very low possibility of gear loss. This information provides an objective basis for confidence that the partial strategy will work, based on information directly about the UoA and the habitats involved. On this basis SG 60 and SG 80 are met. As there has not been 'testing' of the partial strategy the SG 100 is not met.

VME Habitats

FADs

The team evaluated the measures in place described in SI a of this PI (gear type, temporal and spatial closures on purse seine fishing, use of lesser-entangling FAD design and limits to the number of active FADs deployed).

The measures in place are likely to work based on plausible argument:

- Purse seine fishing nets would not come in contact with coral reefs given the location of fishing activities in the EPO (high-seas deep-ocean habitat). As noted above purse seine gear is expensive so there is little chance for the gear to drift ashore and impact coral reef habitats.
- Use of lesser-entangling FADs, spatial and temporal restrictions on purse seine fishing, and limits on the number of 'active' FADs (N=300) are in place and implemented.
- There are measures in place to collect information on FADs observed at sea by both observers and vessel captains, and CPCs are required to provide daily information on active FADs to the IATTC Secretariat. In addition, the UoA has voluntarily agreed to provide position data once a day to IATTC. This information provides requisite data to model FAD trajectories to determine encounters rates with coral reefs and potential impacts. While FAD movement models have yet to be developed, drift trajectories of FADs deployed on either side of the equator in the eastern WCPO are generally westward (being entrained in the North and South Equatorial Currents), and the potential for dFADs impacting coral reefs occurs in areas around French Polynesia and in the WCPO region (Banks & Zaharia, 2020; Escalle et al. 2019). The low number of vessels in the UoA (N=7) provides a plausible argument that that given the negligible impact of the UoA on coral reefs, that measures in place are likely to work, thus the SG60 is met.

However, as noted in SI a of this PI, the assessment team determined a partial strategy is not in place, the following objective evidence is missing for the SG80 to be met:

- The limits on active FADs, do not directly limit the number of deployed FADs, only the number of 'active' FADs
- The FAD tracking program has yet to be fully developed in the IATTC Convention Area
- There is little evidence that lesser entangling FADs reduce impact on VMEs
- There is no evidence of progress on lesser-entangling FADs implementation.

Free school
Knowledge in relation to the way purse seine fishing gear is used as well as the sea areas where the fleet operates (open ocean, deep waters) is sufficient to discount any significant impacts on seabed habitats from the operation of the fishing gear and free school purse seine sets are not considered capable of affecting the epipelagic habitat. The IATTC adopted measures for 100% coverage of large purse seine vessels and the UoA places observers on smaller purse seine vessels. This enables monitoring of the reporting of catches by set type, providing confidence on information from the fishery. On this basis SG 60 and SG 80 are met. As no testing has been conducted SG 100 is not met.

US Small PS UoA
The UoA only fishes free school sets. Knowledge in relation to the way purse seine fishing gear is used as well as the sea areas where the fleet operates (open ocean, deep waters) is sufficient to discount any significant impacts on seabed habitats from the operation of the fishing gear and free school purse seine sets are not considered capable of affecting the epipelagic habitat. This meets requirements at the SG 60 level and SG80 as there is some objective basis for confidence that the measures/partial strategy will work, based on information directly about the UoA and/or habitats involved. As no testing was conducted SG 100 is not met.

c	Management strategy implementation			
	Guide post		There is some quantitative evidence that the measures/partial strategy is being implemented successfully.	There is clear quantitative evidence that the partial strategy/strategy is being implemented successfully and is achieving its objective, as outlined in scoring issue (a).
	Met?		TUNACONS UoA: Commonly Encountered Habitats All set types: Yes VME Habitats All set types: Yes Minor Habitat All set types: Yes US Small PS UoA: Yes	TUNACONS UoA: Commonly Encountered Habitats All set types: No VME Habitats All set types: No Minor Habitat All set types: No US Small PS UoA: No
Rationale				

TUNACONS UoA-All elements

FADs
Information on the spatial extent and on the timing and location of use of the purse-seine fishing gear is collected by at-sea observers and by VMS (100% coverage), and thus there is accurate monitoring that provides quantitative evidence of successful implementation in that all purse seine sets are correctly classified and

required data are reported. Measures were passed requiring use of Lesser Entangling FADs (Resolution C-18-05 in the IATTC), and the UoA has provided evidence that they comply with this requirement. The ROPs have established collection protocols to ensure compliance with the use and deployment of low-entanglement-risk FADs and this information is currently being collected. The commitment to use low-entanglement-risk FADs is reviewed annually by the UoA. On this basis there is some quantitative evidence that the existing measures/partial strategy is being implemented successfully and SG80 is met. There has not been a definitive study to determine if the implemented strategy is achieving objectives outlined in Sia. On this basis SG100 is not met.

Free School
Purse seine free school sets do not interact with any seafloor habitat during fishing operations and free school purse seine sets are not considered capable of affecting the epipelagic habitat. Information on the spatial extent and on the timing and location of use of the purse-seine fishing gear is collected by at-sea observers (100% Observer coverage) and by VMS (100% coverage), and thus there is accurate monitoring that provides quantitative evidence of successful implementation in that all purse seine sets are correctly classified and required data are reported. However, there has not been a definitive study to determine if the implemented strategy is achieving objectives outlined in Sia. On this basis SG100 is not met.

US Small PS UoA
The UoA only fishes free school sets. Knowledge in relation to the way purse seine fishing gear is used as well as the sea areas where the fleet operates (open ocean, deep waters) is sufficient to discount any significant impacts on seabed habitats from the operation of the fishing gear and free school purse seine sets are not considered capable of affecting the epipelagic habitat. Given that the purse-seine gear is known to not make contact with the sea floor, it can be considered that some quantitative evidence to assess if the measures are being implemented successfully; SG 80 is met. However, there has not been a definitive study to determine if the implemented strategy is achieving objectives outlined in Sia. On this basis SG100 is not met.

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

Rationale

TUNACONS UoA
The only potential impacts from the UoA on VMEs is from lost FADs beaching on coral reefs.

The assessment team did not find evidence of protection measures afforded to coral reefs from impacts of FADs, thus the focus of the assessment of this PI is on UoA compliance with its management requirements that

may indirectly mitigate impact of FADs on coral reefs. There is qualitative and some quantitative evidence that the UoA complies with these management requirements: ▪ UoA vessels comply with IATTC time-area closures and because purse seine fishing gear does not interact with the benthos, move on rules have not been established. ▪ The UoA is complying with the use of lesser-entanglement -risk FAD, as evidenced by the ISSF audit reports. ▪ Compliance with existing Resolutions and National regulations (if relevant (e.g., Galapagos Islands Reserve) are monitored regularly. On this basis the SG60 and SG80 levels are met. There is no 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. On this basis SG100 is not met.
References
FAD Management Plan-Ecuador (http://iattc.org/Meetings/Meetings2018/IATTC-93/Presentations/_English/FAD-03b-PRES_Ecuador%20FADs%20Management%20Plan.pdf), IATTC 2018 (https://www.iattc.org/Meetings/Meetings2018/IATTC-93/Docs/_English/IATTC-93-MINS_93rd-Meeting-of-the-IATTC.pdf), Burke et al. 2011; Burke et al. 2012 ; Escalle et al. 2018

Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	TUNACONS UoA all set types: 60-79 US Small PS UoA: ≥80
Information gap indicator	TUNACONS UoA: Provide information explaining why requested information on FADs was not provided to the IATTC. Provide documentation indicating the status of Ecuadors FAD management plan and how TUNACONS supporting and complying with the plan. If available provide documentation and evidence that TUNACONS complies with requirements to protect VMEs.
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	TUNACONS UoA all set types: 75 US Small PS UoA - 85
Condition number (if relevant)	Condition 2-7

PI 2.4.2 Scoring Calculation – all set types

Element	SI a	SI b	SI c	SI d	Element score	PI Score
Commonly encountered Habitat	80	80	80	NA	80	75
VME	60	60	80	80	70	
Minor	80	80	80	NA	80	

PI 2.4.3 – Habitats information

PI 2.4.3		Information is adequate to determine the risk posed to the habitat by the UoA and the effectiveness of the strategy to manage impacts on the habitat		
Scoring Issue		SG 60	SG 80	SG 100
a	Information quality			
	Guide post	The types and distribution of the main habitats are broadly understood. OR If CSA is used to score PI 2.4.1 for the UoA: Qualitative information is adequate to estimate the types and distribution of the main habitats.	The nature, distribution and vulnerability of the main habitats in the UoA area are known at a level of detail relevant to the scale and intensity of the UoA. OR If CSA is used to score PI 2.4.1 for the UoA: Some quantitative information is available and is adequate to estimate the types and distribution of the main habitats.	The distribution of all habitats is known over their range, with particular attention to the occurrence of vulnerable habitats.
	Met?	TUNACONS UoA: Commonly Encountered Habitats All set types: Yes VME Habitats All set types: Yes US Small PS UoA: Yes	TUNACONS UoA: Commonly Encountered Habitats All set types: Yes VME Habitat All set types: Yes US Small PS UoA: Yes	TUNACONS UoA: Commonly Encountered Habitats All set types: No VME Habitat All set types: Yes Minor Habitats All set types: No US Small PS UoA: Yes

Rationale

For this assessment the commonly encountered habitat is considered to be the pelagic region and shallow coral reefs is considered to be a VME habitat in the WCPO and EPO; following GSA3.13.3 both are considered main. The deep-sea or demersal environment is considered to be the minor habitat. The North and South Pacific Oceans have been mapped, and the distribution of reef and deep-sea habitats are known (UNEP-WCMC, WorldFish Centre, WRI and TNC 2018).

<u>TUNACONS UoA</u>

Commonly encountered habitats
FAD sets take place in the epipelagic habitat and so purse seines themselves do not interact with benthic habitat during their operation. The distribution of the pelagic habitat is known over the spatial range within which the fishery operates from widely available sea charts and bathymetric maps of the Eastern Pacific Ocean. There are no vulnerable pelagic habitats.

On this basis, requirements of the SG 60, SG 80, and SG 100 levels are met.

VMEs
As described above, derelict FADs potentially impact coral reefs. However, coral reefs are vulnerable to a wide range of potential threats. As outlined in PI 2.4.1, the vulnerability specifically to derelict FADs can be estimated at a level that is appropriate to limited scale of the likely impact. The nature, distribution and vulnerability of the main habitats including coral reefs in the UoA area are known at a level of detail relevant to the scale and intensity of the UoA. On this basis SG80 is met.

However, the distribution of all habitats that might be impacted by the FAD fishery is not well known. Given that the spatial distribution and resolution of potentially impacted VMEs can occur at small scales (10s of meters), far less than scales of main reefs (100 of meters), finer resolution maps of VMEs would be required to understand the distribution of all vulnerable habitats and potential impacts. On this basis SG100 is not met

Free school
Free school sets take place in the epipelagic habitat and so do not interact with benthic habitat during their operation. The distribution of the pelagic habitat is known over the spatial range within which the fishery operates from widely available sea charts and bathymetric maps of the Eastern Pacific Ocean. There are no vulnerable pelagic habitats.

On this basis, requirements of the SG 60, SG 80, and SG 100 levels are met.

Minor Habitats
As FAD sets take place in the epipelagic habitat, purse seines themselves do not interact with demersal environment during their operation. FADs can potentially impact the demersal environment when they sink and encounter the benthos. While the distribution of the demersal environment is known the occurrence of small-scale vulnerable habitats (e.g., deep sea coral beds) are not explicitly known. On this basis SG100 is not met.

Free school
Free school sets take place in the epipelagic habitat and so do not interact with benthic habitat during their operation. Thus there is no vulnerable habitat and SG100 is met.

US Small PS UoA
The UoA only fishes free school sets. Free school sets take place in the epipelagic habitat and so do not interact with benthic habitat during their operation. The distribution of the pelagic habitat is known over the spatial range within which the fishery operates from widely available sea charts and bathymetric maps of the Eastern Pacific Ocean. There are no vulnerable pelagic habitats.

On this basis, requirements of the SG 60, SG 80, and SG 100 levels are met.

b	Information adequacy for assessment of impacts			
	Guide post	Information is adequate to broadly understand the nature of the main impacts of gear use on the main habitats, including spatial overlap of habitat with fishing gear. OR If CSA is used to score PI 2.4.1 for the UoA:	Information is adequate to allow for identification of the main impacts of the UoA on the main habitats, and there is reliable information on the spatial extent of interaction and on the timing and location of use of the fishing gear. OR	The physical impacts of the gear on all habitats have been quantified fully.

		Qualitative information is adequate to estimate the consequence and spatial attributes of the main habitats.	If CSA is used to score PI 2.4.1 for the UoA: Some quantitative information is available and is adequate to estimate the consequence and spatial attributes of the main habitats.	
	Met?	TUNACONS UoA: Commonly Encountered Habitats All set types: Yes VME Habitats All set types: Yes US Small PS UoA: Yes	TUNACONS UoA: Commonly Encountered Habitats All set types: Yes VME Habitats FADs:No All set types: Yes US Small PS UoA: Yes	TUNACONS UoA: Commonly Encountered Habitats All set types: No VME Habitats All set types: No Minor Habitats All set types: No US Small PS UoA:Yes

Rationale

Commonly Encountered Habitats

All set types

Information on the spatial extent and on the timing and location of use of the purse seine fishing gear is collected by at-sea observers and by VMS (100% coverage) and thus there is accurate, near real-time monitoring of the spatial extent of potential interactions, and the timing and location of use of the fishing gear. FAD purse seine sets are not considered capable of affecting the epipelagic habitat and does not interact with benthic habitat during its operation; SG60 and SG80 are met.

As the physical impacts of the gear on all habitats have not been quantified fully SG100 is not met.

VMEs

FAD Sets
In the EPO FADs deployed above and below the equator move westward potentially becoming beached on reefs of French Polynesia or drift into the WCPO area. The potential impacts of such beaching are also broadly understood, and the impacts of other marine debris (that would have similar impacts) has been incorporated in an analysis of risks to coral reefs (Burke et al. 2012). There is reliable information on the spatial locations of fishing, but there is still uncertainty on the number of active FADs per vessel per month, the number of new FADs deployed per year, locations of FADs that are lost and become beached. This limited reliable information on the spatial extent, timing, and location of FAD interactions with coral reefs hinders a full understanding of the nature of the impacts of the gear on these habitats.

This meets the requirements of the SG 60 level but not of the SG 80 level.

Free school

Information on the spatial extent and on the timing and location of use of the purse seine fishing gear is collected by at-sea observers (100% Observer coverage of large purse seine vessels and observer coverage of smaller purse seine vessels) and by VMS (100% coverage) and thus there is accurate, near real-time monitoring of the spatial extent of interaction, and the timing and location of use of the fishing gear. Free school purse

seine sets are not considered capable of affecting the epipelagic habitat and does not interact with benthic habitat during its operation.

This set type meets the requirements of the SG 60 and SG 80. However, the physical impacts of the gear on all habitats have been quantified fully, SG100 is not met.

Minor Habitats
As the physical impacts of FAD and free school fishing on the demersal habitat has not been fully quantified SG100 for FAD and free school sets is not met.

US Small PS UoA
The UoA only fishes free school sets. Free school sets take place in the epipelagic habitat and so do not interact with benthic habitat during their operation. The distribution of the pelagic habitat is known over the spatial range within which the fishery operates from widely available sea charts and bathymetric maps of the Eastern Pacific Ocean. Free school purse seine sets are not considered capable of affecting the epipelagic habitat. This information is adequate to allow for identification of the main impacts of the UoA on the main habitats and SG 60, SG80, and SG100 are 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?		TUNACONS UoA: Commonly Encountered Habitats All set types: Yes VME Habitats All set types: Yes US Small PS UoA: Yes	TUNACONS UoA: Commonly Encountered Habitats All set types: No VME Habitats All set types: No Minor Habitats All set types: No US Small PS UoA: Yes
Rationale				

TUNACONS UoA

Commonly Encountered and VME Habitats

All Set Types

Information collected by observers and through VMS can be used to detect changes in risk to the main habitats (commonly encountered and VME habitats). Collecting VMS information eliminates the possibility that fishing could occur in an area where the purse seine gear might contact the seabed or in closed areas, and observers limit the potential for vessels to operate more than the maximum of 450 FADs with activated instrument buoys. The new requirement to report the daily position of active FADs also provides a level of validation on the number of FADS in use as well as the requisite data to model the trajectory and FATE of derelict FADs. Performance against the TUNACONS Good Practice Guide including the use of lesser entangling FADS (or other FAD construction requirements) provides a basis to assess changes in risk to the main habitats. On this basis

adequate information continues to be collected to detect any increase in risk to the main habitats and SG80 is met.

Changes in all habitat distributions is not monitored, thus the SG100 is not met.

Minor habitats

As changes in all habitat distributions are not monitored, thus the SG100 is not met for both FAD and free school sets.

US Small PS UoA

The client vessels all operate under a VMS scheme and thus there is accurate, near real-time monitoring of the spatial extent, timing, and of use of the fishing gear to eliminate the possibility that fishing could occur in an area where the purse seine gear might contact the seabed or in closed areas. On this basis adequate information continues to be collected to detect any increase in risk to the main habitats; SG 80 is met.

As changes in all habitat distributions is not monitored, thus the SG100 is not met.

References
Burke et al. 2012, IATTC 2019

Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	TUNACONS all set types: 60-79 US Small PS UoA: ≥ 80
Information gap indicator	Provide documentation regarding compliance of C-18-05. Provide documentation on compliance with Ecuadors FAD management plan. Provide documentation on observer coverage for vessel class 3-5 vessels of the UoA from 2015-2018. Document the number of “lost” FADs by vessel class and geographic zone from 2015-2018.
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	TUNACONS UoA all set types: 75 US Small PS UoA - 95
Condition number (if relevant)	Condition 2-8

PI 2.4.3. Scoring Calculation

All Set Types

Element	SI a	SI b	SI c	Element score	PI Score
Commonly encountered Habitat	80	80	80	80	75
VME	80	60	80	70	
Minor	80	80	80	85	

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?	EPO: Yes – All elements	EPO: Yes - All elements	EPO: Yes - Oceanographic element No – Food web

Rationale

The MSC defines 'key ecosystem elements' as "the features of an ecosystem considered as being most crucial to giving the ecosystem its characteristic nature and dynamics and are considered relative to the scale and intensity of the UoA. They are features most crucial to maintaining the integrity of its structure and functions and the key determinants of the ecosystem resilience and productivity" (SA3.16.3).

Further MSC guidance states that "key ecosystem elements may include trophic structure and function (in particular key prey, predators, and competitors), community composition, productivity pattern (e.g. upwelling or spring bloom, abyssal, etc.), and characteristics of biodiversity" (GSA3.18.1).

The UoA fishery occurs primarily in the equatorial region of the EPO in the warm pool-cold tongue oceanographic feature. The interface (convergence zone) between the of the warm pool and cold tongue is found in the WCPO, while the cold tongue extends throughout the EPO. Allain et al. (2007) describe the warm pool as an oligotrophic system characterized by low salinity, low nitrates, high temperature, deep thermocline, low surface chlorophyll and maximum chlorophyll located at 90m depth. The cold tongue in the equatorial region of the EPO is described as an upwelling system with high salinity, high nitrates, low temperature, shallow thermocline, high surface chlorophyll and maximum chlorophyll at the surface.

The trophic structure of the warm pool-cold tongue ecosystem has been characterised using Ecopath and Ecosim models based on diet data (Allain et al. 2007). Skipjack tuna occupied a central position in the system as a key predator and prey species, with high biomass, high production, and high consumption and cannibalism. Juvenile skipjack tuna was a major source of food for all the top predators. The trophic structure of the cold tongue ecosystem has also been characterized using Ecopath and Ecosim models first by Olson and Watters (2003) and more recently updated by Griffiths et al (2021) using new time series of catch data to calculate updated values for a range of ecological indicators as a means of assessing the historic and recent (2018) status of the ecosystem.

The hypothesis that the extensive use of FADs acts as an ecological trap based on three related steps (aggregation of small tunas under FADs is fast and consistent; FADs alter the migratory patterns of tunas and other species; FADs negatively impact the growth and mortality of small tunas) has been reviewed and in-situ studies to test the hypothesis proposed but the logistics and feasibility to conduct such studies is daunting and likely would require

an international research program (Marsac et al., 2000). Hallier and Gaertner (2008) reported that tunas associated with FADs eat less than those in free schools, resulting in differences in growth rates and condition (fitness) due to the consequence of altered feeding patterns potentially related to the concept of the ecological trap. However, the authors noted the provisions nature of the results and underlying uncertainties need for additional studies to investigate the long-term effect of FADs on the entire life cycle of tunas to better understand the mechanisms underlying the relationship between fitness and preference. Dagron et al (2012) reviewed issues surrounding the ecological trap theory and noted that FAD sets in the WCPO were typically undertaken in areas where log sets were also undertaken and that deployed FADs essentially increased the density of floating objects rather than creating an entirely new habitat. Wang et al. (2019) considered habitat quality as a factor contributing to the concept of the ecological trap but found no particular adverse effects between tuna caught in free school and FAD sets. However, the authors noted that the habitat quality metric used did not consider important biological factors, including foraging behavior, attraction to floating objects depending on food availability, and body condition. The assessment team carefully considered the evidence presented on FAD networks contributing to the concept of the ecological trap and concluded there is no unequivocal evidence of irreversible harm to ecosystem structure and function. As a result, this was not included as a key element of the underlying ecosystem in which the UoA operates. We note that ongoing research using FADs equipped with echosounders to estimate FAD colonization rates and tuna residence time is occurring in the Indian Ocean (Orue et al., 2019). While this work will contribute to the understanding of the fine and mesoscale ecology and behaviour of target and non-target species around FADs the application of results to other ocean basins remains a challenge.

For this assessment, the ecosystem in the EPO is defined as the cold tongue pelagic ecosystem. The key ecosystem elements are then defined as 1) the EPO cold tongue pelagic ecosystem and the factors driving productivity, and 2) trophic structure and function of the cold tongue pelagic food web as it relates to tropical tuna.

EPO Pelagic ecosystem physical features

The ocean environment changes on a variety of time scales, from seasonal to inter-annual, decadal, and longer. The dominant source of variability in the upper layers of the EPO is the El Niño-Southern Oscillation (ENSO), an irregular fluctuation involving the entire tropical Pacific Ocean and the world's atmosphere (Fiedler 2002). El Niño events occur at two- to seven-year intervals, and are characterized by weaker trade winds, deeper thermoclines, and higher sea-surface temperatures (SSTs) in the equatorial EPO. El Niño's opposite phase, commonly called La Niña, is characterized by stronger trade winds, shallower thermoclines, and lower SSTs. The changes in the biogeochemical environment caused by ENSO have an impact on the biological productivity, feeding, and reproduction of fishes, seabirds, and marine mammals (Fiedler 2002), as well as the availability of commercially important tunas for capture.

Noting that the warm pool-cold tongue pelagic ecosystem comprises a large oceanographic feature, the UoA fishery would not disrupt the physical factors driving ecosystem productivity in the EPO cold tongue pelagic ecosystem to a point where there would be a serious or irreversible harm. For these elements, requirements at the SG 60, SG 80, and SG 100 levels are met.

EPO - Trophic structure and function of the cold tongue pelagic food web

Since 2017, the Ecopath-Ecosim modelling platform has been used to identify changes in the structure and internal dynamics of the EPO ecosystem through the development of seven ecological indicators that are updated annually, and the outcomes reported in the IATTC *Ecosystem Considerations* report. The indicators include mean trophic level of the catch (TLc), the Marine Trophic Index (MTI), the Fishing in Balance (FIB) index, Shannon's index, and the mean trophic level of the modelled community (TL_{MC})for trophic levels 2.0–3.25 (TL2.0), ≥3.25–4.0 (TL3.5), and >4.0 (TL4.0). Note that the indicators TLc, MTI, and Shannon's Index generally describe changes in the exploited components of the ecosystem, while the community biomass indicators (TL_{MC}) describe changes in the structure of the ecosystem once biomass has been removed due to fishing. Additionally, simulations were updated and rebalanced in as part of the research conducted in 2021 to assess potential impacts of the FAD fishery on the structure of the ecosystem (Griffiths et al., 2021). Significant changes to the re-classification of

catch data were implemented as part of the updated modelling in 2021 resulting in a greater influence of longline catches on ecosystem dynamics.

Ecological indicators showed that values for TLc and MTI decreased from their peak of 4.77 and 4.83 in 1991 to 4.64 and 4.65 in 2018, respectively, as the purse-seine fishing effort on FADs significantly increased along with the catches of higher trophic level bycatch species (e.g., sharks, billfish, wahoo and dorado) that generally aggregate around floating objects. TLc peaked in 1991 and since then has declined by 0.05 of a trophic level in the subsequent 28 years, or 0.04 trophic levels per decade. The expansion of the FAD fishery is also seen in the FIB index that exceeds zero after 1990, as well as the continual change in the evenness of biomass of the community indicated by Shannon's index. The biomass of the $TL_{MC4.0}$ community was at one of its highest values (4.493) in 1986 but has continued to decline to 4.470 in 2018. As a result of changes in predation pressure on lower trophic levels, between 1993 and 2018 the biomass of the $TL_{MC3.25}$ community increased from 3.801 to 3.829, while interestingly, the biomass of the $TL_{MC2.0}$ community also increased from 3.092 to 3.107.

Together, these indicators show that the ecosystem structure has likely changed over the 40-year analysis period. The reductions in TLc, MIT and TLmc4.0 since the early 1990s were not considered detrimental, and Griffith and Fulller (2019) concluded that limiting the number of purse seine floating-object (FAD) and free school sets to the 2016-2018 average would maintain the ecosystem structure in its present state and slightly increase the biomass of most target tuna species. It was noted that a significant reduction in both purse-seine and longline fishing effort would be needed to restore the EPO ecosystem to its state prior to the expansion of the FAD fishery.

Based on observer data from 2015-2018 the UoA catch of yellowfin, bigeye, and skipjack tuna, as well as billfishes amounted to less than 8% of the total catch of each species/group in the EPO, which results in a minor impact to the cold tongue food web. (https://www.iattc.org/Meetings/Meetings2021/SAC-12/Docs/_English/SAC-12-03_The%20tuna%20fishery%20in%20the%20Eastern%20Pacific%20Ocean%20in%202020.pdf). This is not surprising considering the UoA is comprised of only 43 vessels which amounts to approximately 3% of all purse seine and longline vessels registered to fish in the in the EPO.

Based on the totality of the information there is evidence that changes in trophic structure and function resulting from all fishing activities have not been detrimental, and that recovery of ecosystem structure to its pre-FAD condition is plausible although significant reductions in purse seine and longline fishing effort would be required. Also, given the negligible catches of the key species (tropical tunas and billfishes) by the UoA it is highly unlikely (< 30th percentile probability – MSC Table SA9) to disrupt the key elements underlying ecosystem structure and function to a point where there would be a serious or irreversible harm. On this basis SG60 and SG80 are met.

As there is no 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, SG100 is not met. Note that derivation of the ecological indicators is based on stomach content data from fish collected in 1992–1994; clearly more contemporary data are required. Also, there are other approaches that could be explored (i.e., stable isotope analysis) to assess fishing impacts on the pelagic food web.

References

Allain et al. 2007; Griffiths et al. 2019 ; Griffiths et al. 2021 ; Fiedler 2002; Olson and Watters 2003

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	90
Condition number (if relevant)	

PI 2.5.2 – Ecosystem management strategy

PI 2.5.2		There are measures in place to ensure the UoA does not pose a risk of serious or irreversible harm to ecosystem structure and function		
Scoring Issue		SG 60	SG 80	SG 100
a	Management strategy in place			
	Guide post	There are measures in place, if necessary which take into account the potential impacts of the UoA on key elements of the ecosystem.	There is a partial strategy in place, if necessary, which takes into account available information and is expected to restrain impacts of the UoA on the ecosystem so as to achieve the Ecosystem Outcome 80 level of performance.	There is a strategy that consists of a plan, in place which contains measures to address all main impacts of the UoA on the ecosystem, and at least some of these measures are in place.
	Met?	EPO: Yes - Oceanographic element Yes – Food web	EPO: Yes - Oceanographic element Yes – Food web	EPO: No - Oceanographic element No – Food web
Rationale				

EPO Pelagic ecosystem physical features

Noting that the warm pool-cold tongue pelagic ecosystem comprises a large oceanographic feature, the UoA fishery would not impact the physical factors driving ecosystem productivity in EPO cold tongue pelagic ecosystem. On this basis a partial strategy to mitigate impacts of the UoA are not necessary, and SG60 and SG80 are met. To meet SG100 requires a strategy, that consists of a plan, be in place, and that is not the case; SG100 is not met.

EPO - Trophic structure and function of the cold tongue pelagic food web

At the regional level, the 1995 FAO Code of Conduct for Responsible Fisheries is used as the framework for sustainable fisheries for an "Ecosystem Approach to Fisheries Management (EAFM)". Tuna are important predatory species in the Pacific Ocean. The IATTC's application of the FAO code extends to the highly migratory fish species including tuna through Conservation and Management Measures such as Resolution C-20-06 on the management of tropical tuna (bigeye, yellowfin and skipjack tuna), as well as to the management of non-target species, in particular through Resolution C-03-08 on Bycatch and Resolutions to improve the protection of sharks.

Managing fishing impacts on different components within the ecosystem is recognized in Articles of the Antigua Convention (IATTC 2010), including:

Article IV (Application of the Precautionary Approach)

- Where the status of target stocks or non-target or associated or dependent species is of concern, the members of the Commission shall subject such stocks and species to enhanced monitoring in order to review their status and the efficacy of conservation and management measures. They shall revise those measures regularly in the light of new scientific information available;

Article VII (Functioning of the Commission)

- 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;
- Adopt appropriate measures to avoid, reduce and minimize waste, discards, catch by lost or discarded gear, catch of non-target species (both fish and non-fish species) and impacts on associated or dependent species, in particular endangered species;

Tuna fisheries are thought to exert major influences on pelagic food webs and in the Pacific Ocean these fisheries generally target tropical tuna including, yellowfin, bigeye and skipjack tuna. In the EPO these stocks are managed through Resolution C-20-06 using a suite of temporal, spatial, and technical controls, as well as regular reviews of stock status (stock assessments) that is focused on maintaining F at FMSY. To support the development of effective management measures and stock assessment research, data collection and monitoring programs have been established to collect biological and physical data. Since 2017, the IATTC has annually published Ecosystem Considerations reports that tracks the status of 7 ecological indicators. Findings are discussed during regular meeting of the IATTC SAC and Commission.

The UoA also engages in practices to minimize ecosystem impacts through the use of lesser entangling FADs as stipulated in Resolution C-19-01, as well as the mandatory conservation measures for sharks (C-11-10, C-19-05, C-19-06), rays (C-15-04), turtles (C-19-04), and non-target species (Resolution C-03-08), which includes using best handling and release protocols for released animals.

Collectively these measures manage fishery impacts on trophic structure and function and are considered to constitute a partial strategy which considers 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; SG60 and SG80 are met.

Following the definition of a strategy outlined in Table SA8, the assessment team does not consider a strategy to be in place to specifically address ecosystem impacts and on this basis SG100 is not met.

b	Management strategy evaluation			
	Guide post	The measures are considered likely to work, based on plausible argument (e.g., general	There is some objective basis for confidence that the measures/ partial strategy will work, based	Testing supports high confidence that the partial strategy/ strategy will work, based on

		experience, theory or comparison with similar UoAs/ ecosystems).	on some information directly about the UoA and/or the ecosystem involved.	information directly about the UoA and/or ecosystem involved.
	Met?	EPO: Yes - Oceanographic element Yes – Food web	EPO: Yes - Oceanographic element Yes – Food web	EPO: No - Oceanographic element No – Food web

Rationale

EPO Pelagic ecosystem physical features

Noting that the warm pool-cold tongue pelagic ecosystem comprises a large oceanographic feature, the UoA fishery would not impact the physical factors driving ecosystem productivity in the EPO cold tongue pelagic ecosystem. On this basis a partial strategy to mitigate impacts of the UoA is not necessary, and SG60 and SG80 are met. To meet SG100 requires testing of the partial strategy/strategy and since there is no partial strategy in place testing cannot conducted; SG100 is not met.

EPO - Trophic structure and function of the cold tongue pelagic food web

Modelling of the Eastern Tropical Pacific pelagic food web by Olson and Watters (2003) laid the foundation for assessing impacts of large-scale tuna fisheries operating in the pelagic ecosystem of the Eastern Tropical Pacific Ocean. Recent updates by Griffiths and Fuller (2019) and Griffiths et al. (2021) extended the seminal work of Olson and Watters (2003) through the development of 7 ecosystem indicators to assess impacts and recalibration of longline catch data back to 2003 and incorporation of these data into the model. Additionally, the model was restructured to contain multi-stanza delay-difference models for small and large sizes of 10 taxa, and biological parameters of functional groups were updated where possible and the model rebalanced to ensure the model was thermodynamically stable. Finally, a simulation module was added to the current model to forecast potential consequences of increasing and decreasing fishing effort on FADs over the next 10 years on the biomass of target tuna species, bycatch species, and the structural integrity of the ecosystem.

Griffiths & Fuller (2019) demonstrated that the pelagic ecosystem has been impacted by increasing levels of purse seine effort and FAD fishing since 1993, and that the ecosystem condition was not significantly impacted and would be relatively stable at current levels of effort. Griffiths et al (2021) demonstrated that with the recalculation and incorporation of longline there has likely been a change in the ecosystem structure over the 40-year analysis period. The consistent patterns of change in each ecological indicator, particularly in the mean trophic level of the communities since 1993, were consistent with increases in FAD fishing effort since 1993. Testing of various management measures indicated that the ecosystem would stabilize following significant reductions in purse seine and longline fishing effort. As results of the 2021 analysis are considered preliminary the assessment team considers the results of Griffiths and Fuller (2019) to indicate there is some objective basis for confidence that the measures/ partial strategy will work; SG60 and SG80 are met. As a result of the differences in outcomes between the two recent analyses the assessment team considers testing to be inadequate to support high confidence that the partial strategy/strategy will work; 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?		EPO: Yes - Oceanographic element Yes – Food web	EPO: No - Oceanographic element No – Food web

Rationale

EPO Pelagic ecosystem physical features

Noting that the warm pool-cold tongue pelagic ecosystem comprises a large oceanographic feature, the UoA fishery would not impact the physical factors driving ecosystem productivity in the EPO cold tongue pelagic ecosystem. On this basis a partial strategy to mitigate impacts of the UoA is not necessary, and SG80 is met. As there is no partial strategy in place SG100 cannot be met.

EPO - Trophic structure and function of the cold tongue pelagic food web

The IATTC requires 100% observer coverage for large purse seine vessels (Vessel Class 6) operating in the EPO and all UoA vessels classified as Vessel Class 6 are monitored. Additionally the UoA fished 10 smaller purse seine vessels (Vessel Class 3-5) and all fishing activities (100%) on these vessels is voluntarily monitored. Compliance with required observer coverage rates is accomplished through regular participation of UoA vessels in U.S. Protected Species Workshops (for U.S. flagged vessels), as well as VMS tracking data. The assessment team is not aware of any UoA noncompliance matters associated with measures and regulations of the IATTC.

Recent ecosystem modelling by Griffiths and Fuller (2019) demonstrated that the EPO pelagic ecosystem has been impacted since 1993 due to increasing FAD fishing effort, but that the ecosystem was not significantly impacted and was relatively stable under current levels of fishing effort. Thus, there is some evidence that the measures/partial strategy is being implemented successfully; SG80 is met. Even though the results of Griffiths et al (2021) are considered preliminary and require additional scrutiny the assessment team could not conclude 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); SG100 is not met.

References

Griffiths and Fuller 2019Griffiths et al., 2021; Olson and Waters 2003

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

Draft scoring range	EPO: ≥80
Information gap indicator	Information is sufficient to score PI
Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	80
Condition number (if relevant)	

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?	EPO: Yes - Oceanographic element Yes – Food web	EPO: Yes - Oceanographic element Yes – Food web	

Rationale

A number of organizations are collecting data to improve the knowledge of the structure of the Pacific Ocean pelagic ecosystem. This occurs through observer programs (e.g. bycatch composition and quantities), trophic analyses (e.g. stomach contents, stable isotopes), movement studies, mid-trophic level sampling (e.g. acoustics and net sampling of micronekton and zooplankton), ecosystem modelling, and stock assessments on non-target species. The adoption of 100% observer coverage for the purse seine fleet provides relevant catch or removal data. However, trophic analyses, movement studies, ecosystem modelling, and mid-trophic level sampling are conducted on a project-by-project basis and are not continuous in space and time.

For this assessment, the ecosystem in the ecosystem in the EPO is defined as the cold tongue pelagic ecosystem. The key ecosystem elements are then defined as 1) the EPO cold tongue pelagic ecosystem and the factors driving productivity, and 2) trophic structure and function of the cold tongue pelagic food web as it relates to tropical tuna.

EPO - Pelagic ecosystem physical features

The cold tongue in the equatorial region of the EPO is described as an upwelling system with high salinity, high nitrates, low temperature, shallow thermocline, high surface chlorophyll and maximum chlorophyll at the surface. The dominant source of variability in the upper layers of the EPO is the El Niño-Southern Oscillation (ENSO), an irregular fluctuation involving the entire tropical Pacific Ocean and the world's atmosphere (Fiedler 2002). El Niño events occur at two- to seven-year intervals, and are characterized by weaker trade winds, deeper thermoclines, and higher sea-surface temperatures (SSTs) in the equatorial EPO. El Niño's opposite phase, commonly called La Niña, is characterized by stronger trade winds, shallower thermoclines, and lower SSTs. The changes in the biogeochemical environment caused by ENSO have an impact on the biological productivity, feeding, and reproduction of fishes, seabirds, and marine mammals (Fiedler 2002), as well as the availability of commercially important tunas for capture.

There has been considerable research effort focused on understanding changes in ocean temperature, salinity, stratification, circulation and production (e.g., Lehodey et al. 2003, Watters et al. 2003, Fiedler & Talley 2006) and on potential future changes in response to global climate change (e.g., Miller 2007, An et al. 2012, Ganachaud et al. 2012, Tascheto et al. 2014). The assessment team considers information is adequate to broadly understand this key element of the ecosystem; SG60 and SG80 are met.

EPO - Trophic structure and function of the cold tongue pelagic food web

Initial modelling of trophic dynamics in the EPO were conducted by Watters et al. (2003) and Olson and Watters (2003). Watters et al. (2003) concluded that physical effects on predator recruitment were the dominant source

of interannual variability in pelagic ecosystems, and that these effects likely dampen top-down control of fisheries. Olson and Watters (2003) concluded that changes in two species groups, cephalopods (squids) and Auxis spp. (bullet and frigate tunas), exerted the greatest influence on the pelagic ecosystem of the eastern tropical Pacific. Griffiths and Fuller (2019) and Griffiths et al. (2021) extended the research using an Ecopath-Ecosim model platform to explore the potential ecological impacts of the EPO tuna fishery on the structure and function of the Eastern Tropical Pacific Ocean since 1970 through use of 7 ecosystem indicators, and to simulate the potential effects on the biomass of target and key non-target species to increasing and decreasing levels of fishing effort on FADs. Information is considered adequate to broadly understand the key elements of the ecosystem and SG80 is met.

b	Investigation of UoA impacts			
	Guide post	Main impacts of the UoA on these key ecosystem elements can be inferred from existing information, but have not been investigated in detail.	Main impacts of the UoA on these key ecosystem elements can be inferred from existing information, and some have been investigated in detail.	Main interactions between the UoA and these ecosystem elements can be inferred from existing information, and have been investigated in detail.
	Met?	EPO: Yes - Oceanographic element Yes – Food web	EPO: Yes - Oceanographic element Yes – Food web	EPO: Yes - Oceanographic element No – Food web

Rationale

EPO - Pelagic ecosystem physical features

There does not appear to be any main interactions between the UoA and physical factors influencing ecosystem productivity in the EPO cold tongue ecosystem. On this basis SG60 and SG80 are met. Impacts of the UoA on this key ecosystem element can be inferred from existing information and some have been investigated in detail; SG100 requirements are met.

EPO - Trophic structure and function of the cold tongue pelagic food web

Watters et al. (2003) and recent studies by Griffiths and Fuller 2019 and Griffiths et al. (2021) explored the potential ecological impacts of the EPO tuna fishery on the structure and function of the Eastern Tropical Pacific Ocean since 1970 through use of 7 ecosystem indicators and simulated the potential effects on the biomass of target and key non-target species to varying levels of FAD fishing effort. It is considered that impacts of the UoA on this key ecosystem element can be inferred from existing information, and some have been investigated in detail. On this basis SG60 and SG80 are met. While some main interactions between the UoA and ecosystem elements can be inferred from existing information, say managing the effect of the UoA on the ecosystem, other elements have not been investigated in detail and 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	The impacts of the UoA on P1 target species, primary,

			ETP species and Habitats) in the ecosystem are known.	secondary and ETP species and Habitats are identified and the main functions of these components in the ecosystem are understood.
	Met?		EPO: Yes - Oceanographic element Yes – Food web	EPO: Yes - Oceanographic element Yes – Food web
Rationale				
EPO Tuna fishing in the EPO is a large-scale fishery and as such considerable research is conducted annually to understand drivers of the warm pool-cold tongue ecosystem and the consequences of fishing. Main functions of the target species (yellowfin, skipjack, and bigeye tuna), primary species (bigeye tuna), secondary species (billfish), ETP species (sharks, rays, cetaceans, turtles, and seabirds), and habitats (pelagic, coastal, and reef) are understood and known. On this basis SG80 and SG100 are met.				
d	Information relevance			
	Guide post		Adequate information is available on the impacts of the UoA on these components to allow some of the main consequences for the ecosystem to be inferred.	Adequate information is available on the impacts of the UoA on the components and elements to allow the main consequences for the ecosystem to be inferred.
	Met?		EPO: Yes - Oceanographic element Yes – Food web	EPO: Yes - Oceanographic element Yes – Food web
Rationale				
EPO As detailed in SIa, considerable research has been conducted to understand the physical drivers of the cold tongue pelagic ecosystem within the EPO, as well as complex modelling (Lehodey et al. 2003, Olson & Watters 2003, Watters et al. 2003, Fiedler & Talley 2006, Miller 2007, An et al. 2012, Ganachaud et al. 2012, Tascheto et al. 2014, Griffiths & Fuller 2019, Griffiths et al., 2021) to understand the consequences of fishing and allow the main consequences for the ecosystem to be inferred. On this basis SG 80 and SG 100 are met.				

e	Monitoring			
	Guide post		Adequate data continue to be collected to detect any increase in risk level.	Information is adequate to support the development of strategies to manage ecosystem impacts.
	Met?		EPO: Yes - Oceanographic element Yes – Food web	EPO: Yes - Oceanographic element Yes – Food web
Rationale				
EPO Within the EPO extensive data (logbooks, observer programs, and independent research) continue to be collected that allow an increase in risk to be detected. On this basis SG 80 is met Tuna fishing in the EPO is extensive and as such there is an ongoing research program to improve understanding of the interactions and implications of the different EPO fisheries on target species, and ecosystem considerations is a standing item on the agenda of the IATTC's annual meeting of the Science Advisory Committee. There is also an annual meeting of the IATTC Working Group on Bycatch where bycatch mitigation is considered explicitly. The utility of data and sampling programs (i.e., stomach analysis) to support and advance ecosystem modelling in the EPO are routinely discussed during the Scientific Advisory Committee and Bycatch Working Group meetings. As such, information is adequate to support the development of strategies to manage ecosystem impacts; SG100 is met				
References				
Griffiths and Fuller 2019; Allain et al. 2007; Allain et al. 2015; Lehodey et al. 2014; (Lehodey et al. 2003, Olson and Watters 2003, Watters et al. 2003, Fiedler and Talley 2006, Miller 2007, An et al. 2012, Ganachaud et al. 2012, Tascheto et al. 2014; Lehodey 2001; Lehodey et al., 2013Lehodey et al., 1997; Griffiths et al., 2021				

Draft scoring range and information gap indicator added at Announcement Comment Draft Report	
Draft scoring range	EPO: ≥80
Information gap indicator	Information is sufficient to score PI

Overall Performance Indicator scores added from Client and Peer Review Draft Report	
Overall Performance Indicator score	95
Condition number (if relevant)	

14. Appendices

1.17 Assessment information

1.18 Evaluation processes and techniques

1.18.1 Site visits

Information will be included at the client and peer review draft report stage.

Table 13. Audit Plan: Key Meetings and Locations

1.18.2.1 Documentation and Information Gathering

One of the most critical aspects of the MSC certification process is ensuring that the assessment team gets a complete and thorough grounding in all aspects of the fishery under evaluation. In even the smallest fishery, the assessment team typically needs documentation in all areas of the fishery from the status of stocks to ecosystem impacts, through management processes and procedures.

Under the MSC program, it is the responsibility of the applying organizations or individuals to provide the information required proving the fishery or fisheries comply with the MSC standards. It is also the responsibility of the applicants to ensure that the assessment team has access to any and all scientists, managers, and fishers that the assessment team identifies as necessary to interview in its effort to properly understand the functions associated with the management of the fishery. Last, it is the responsibility of the assessment team to make contact with stakeholders that are known to be interested or actively engaged in issues associated with fisheries in the same geographic location.

1.18.2.2 Scoring and Report Development Process

ACDR: The Announcement Comment Draft Report was completed on June 27, 2024. The client decided to continue with the full assessment.

Following MSC guidance published in the interpretation request log (https://mscportal.force.com/interpret/s/article/Contacting-stakeholders-stakeholder-consultation-and-registered-stakeholders) SCS did not contact any stakeholders at the PCDR publication stage, as there were no registered stakeholders and SCS conducted a robust stakeholder registration process allowing stakeholders to either opt in or opt out of communications regarding the assessment.

1.18.2.3 Scoring Methodology

The assessment team followed guidelines in MSC FCP v2.2 Section 7.10 "Scoring the fishery". Scoring in the MSC system occurs via an Analytical Hierarchy Process and uses decision rules and weighted averages to produce Principle Level scores. There are 28 Performance Indicators (PIs), each with one or more Scoring Issues (SIs). Each of the scoring issues is considered at the 60, 80, and 100 scoring guidepost levels. The decision rule described in Table 17 determines the Performance Indicator score, which must always be in an increment of 5. If there are multiple 'elements4' under consideration (e.g. multiple main primary species), each element is scored individually for each relevant PI, then a single PI score is generated using the same set of decision rules described in Table 14.

Table 14. Decision Rule for Calculating Performance Indicator Scores based on Scoring Issues, and for Calculating Performance Indicator Scores in Cases of Multiple Scoring Elements. (Adapted from MSC FCPV2.2 Table 4)

Score	Combination of individual SIs at the PI level, and/or combining multiple element PI scores into a single PI score.
<60	Any scoring element/SI within a PI which fails to reach SG60 shall not be assigned a score as this is a pre-condition to certification.
60	All elements (as scored at the PI level) or SIs meet SG60 and only SG60.
65	All elements/SIs meet SG60; a few achieve higher performance, at or exceeding SG80, but most do not meet SG80.
70	All elements/SIs meet SG60; half* achieve higher performance, at or exceeding SG80, but some do not meet SG80 and require intervention action to make sure they get there.
75	All elements/SIs meet SG60; most achieve higher performance, at or exceeding SG80; only a few fail to achieve SG80 and require intervention action.
80	All elements/SIs meet SG80, and only SG80.
85	All elements/SIs meet SG80; a few achieve higher performance, but most do not meet SG100.
90	All elements/SIs meet SG80; half achieve higher performance at SG100, but some do not.
95	All elements/SIs meet SG80; most achieve higher performance at SG100, and only a few fail to achieve SG100.
100	All elements/SIs meet SG100.

**MSC FCPV2.2 uses the word 'some' instead of half. SCS considers 'half' a clearer description of the methodology utilized.*

When calculating the Principle Indicator scores based on the results of the Scoring Issues (SI), SCS interprets the terms in Table 2 as follows:

- **Few:** Less than half. Ex: if there are a total of three SIs, one SI out of 3 is considered few.
- **Some:** Equal to half. Ex: if there are a total of four SIs, two SIs out of 4 is considered some.

4 MSC FCPV2.1 7.10.7: In Principle 1 or 2, the team shall score PIs comprised of differing scoring elements (species or habitats) that comprise part of a component affected by the UoA.

- **Most:** More than half. Ex: if there are a total of three SIs, two SIs out of 3 is considered most.

1.18.3 Evaluation techniques

1.19 Peer Review reports

To be drafted at Public Comment Draft Report stage

1.20 Stakeholder input

To be included at the Client and Peer Review Draft Stage. Stakeholder input at the ACDR stage will be posted on the MSC database.

Table 15. Summary of Stakeholder Submissions

1.21 Conditions

1.21.1 New Conditions

To be drafted at Client and Peer Review Draft Report stage

The table below is a status of past and current conditions attached to this certificate.

Condition number	Condition	Performance Indicator (PI)	Status	PI original score	PI revised score
1-0	Tunacons UoA: By the fifth (2028) surveillance the client shall demonstrate that the HCRs for skipjack are likely to be robust to the main uncertainties.	1.2.2 Si b	Opened Year 1 Surveillance (2024)	TUNACONS UoA: 75	Not revised, New Condition
2-1	Tunacons UoAs: By year 4th surveillance bigeye is highly likely to be above the PRI. OR If Bigeye 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.	2.1.1 SIa	Closed on Year 1 Surveillance	TUNACONS UoA: 70	80
2-2	US Small PS UoA: By year 4th surveillance Pacific bluefin tuna is highly likely to be above the PRI. OR If Pacific bluefin tuna 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.	2.1.1 SI a	On target	US Small PS UoA: 60	Not revised
2-3	US Small PS UoA: By the 4th annual surveillance audit, provide evidence that it is highly likely that shark finning is not taking place	PI 2.2.2 SI d	On target	US Small PS UoA: 75	Not revised
2-4	Tunacons UoA: By the fourth surveillance, provide evidence that information is adequate to measure trends and support a strategy to manage impacts on mobulas and sea turtles	PI 2.3.3 (b)	On target	TUNACONS UoA: 75	Not revised
2-5	US Small PS UoA: By the fourth surveillance, provide evidence to demonstrate that some quantitative information is adequate to assess	PI 2.3.3 (a)	On target	US Small PS UoA: 70	Not revised

	the US Small PS UoA related mortality and impact on ETP species.				
2-6	Tunacons FAD UoA: By the fourth surveillance audit provide evidence that FAD sets by the UoA are highly unlikely to reduce the structure and function of the VME habitats (coral reefs and protected areas) to a point where there would be serious or irreversible harm.	2.4.1 (b)	On target	TUNACONS UoA: 75	Not revised
2-7	Tunacons FAD UoA: By the fourth year surveillance audit, provide evidence that 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.	PI 2.4.2 (a) and (b)	On target	TUNACONS UoA: 75	Not revised
2-8	Tunacons UoA FADs: By the third surveillance audit, provide evidence that available 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	PI 2.4.3	On target	TUNACONS UoA: 75	Not revised
3-1	Panama: By the fourth year surveillance the client provides evidence to show that 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.	3.2.3 SI a	Ahead of target	Panama: 70	Not revised
3-2	Panama: By the fourth year surveillance the fishery client shall present evidence to demonstrate that sanctions to deal with non-compliance exist, are consistently applied and thought to provide effective deterrence.	3.2.3 SI b	On target	Panama: 70	Not revised
3-3	Ecuador: By the fourth year surveillance the fishery client shall present evidence to demonstrate that sanctions to deal with non-compliance exist, are consistently applied and thought to provide effective deterrence.	3.2.3 SI b	On target	Ecuador: 75	Not revised

1.22 Client Action Plan

To be drafted at Public Comment Draft Report stage.

1.23 Surveillance

To be drafted at Client and Peer Review Draft Report stage

Table 16. Fishery surveillance audit

Table 17. Timing of surveillance audit

Table 18. Surveillance level justification

1.24 Harmonised fishery assessments

Table 19. Overlapping Units of Assessment

Fishery name	Unit of Assessment	Certification status	Certification date	Performance Indicators to harmonise
AGAC four oceans integral purse seine tropical tuna fishery	Bigeye, skipjack, and yellowfin tuna	In progress	To be determined	1.1.1, 1.1.2, 1.2.1, 1.2.2, 1.2.3, 1.2.4
Eastern Pacific Ocean tropical tuna - purse seine (TUNACONS) fishery	Bigeye, skipjack, and yellowfin tuna	In progress	To be determined	1.1.1, 1.1.2, 1.2.1, 1.2.2, 1.2.3, 1.2.4
Hawaii longline swordfish, bigeye and yellowfin tuna fishery	Swordfish, bigeye, and yellowfin tuna	Certified	September 2022	1.1.1, 1.1.2, 1.2.1, 1.2.2, 1.2.3, 1.2.4
Western Pacific Ocean longline tuna and swordfish fishery	Swordfish, albacore, yellowfin, and bigeye tuna	Suspended	N/A	1.1.1, 1.1.2, 1.2.1, 1.2.2, 1.2.3, 1.2.4
Sajo WCPO and PO bigeye, yellowfin, and albacore tuna longline fishery	Bigeye, yellowfin, and albacore tuna	In progress	To be determined	1.1.1, 1.1.2, 1.2.1, 1.2.2, 1.2.3, 1.2.4
Pacific longline albacore, bigeye and yellowfin tuna fishery	Albacore, bigeye, and yellowfin	In progress	To be determined	1.1.1, 1.1.2, 1.2.1, 1.2.2, 1.2.3, 1.2.4
Dae Hae Pacific yellowfin, bigeye, albacore, and swordfish longline fishery	Swordfish, yellowfin, albacore, and bigeye tuna	In progress	To be determined	1.1.1, 1.1.2, 1.2.1, 1.2.2, 1.2.3, 1.2.4

Table 20. Overlapping Units of Assessment

Supporting information	
Due to new research on BET reported by the IATTC in May 2023 existing fisheries catching BET in the EPO applied for a scope extension and for new fisheries targeting BET MSC certification is being sought. These events initially triggered harmonization discussions from October 18-26, 2023, between CABs representing overlapping fisheries, CU, LRQA, and DNV. While a tentative agreement was reached it was not finalized. Harmonization discussions were again resumed from January 26-30, 2024, between CABs representing overlapping fisheries, CU, LRQA, DNV, and SCS. There was agreement on scores for all PIs except PI1.2.1, where some CABs scored Si-b at 60-79 and others at >= 80. Further harmonization discussions occurred in February 2024 (via email) and in March 2024 scoring on PI1.2.1 Si-b was harmonized via email. The new BET benchmark assessment scheduled for completion in May 2024 will form the basis of the next harmonization discussion.	
Has there been an Annual Harmonisation meeting of which the results will be adopted?	Yes
Date of annual harmonisation meeting	October 18-26, 2023; January 26-30; February 2024; March 2024
If applicable, describe the meeting outcome	
There was agreement on all PIs.	

Table 21. Scoring differences

Fishery Name	CAB	Report Version	1.1.1. Overall score	1.1.2 Overall score	1.2.1 Overall score	1.2.2 Overall score	1.2.3 Overall score	1.2.4 Overall score
AGAC four oceans Integral Purse Seine Tropical Tuna Fishery	LRQA	ACDR Jan 2024	≥80	NA	60-79	≥80	≥80	≥80
Eastern Pacific Ocean tropical tuna - purse seine (TUNACONS) fishery EPO Scope Ext.	SCS Global Services	ACDR March 2024	≥80	NA	60-79	≥80	≥80	≥80
Hawaii longline swordfish, bigeye and yellowfin tuna fishery	Control Union	PCR Oct 2022	60	60	60	75	80	90
Sajo WCPO and EPO bigeye, yellowfin, and albacore tuna longline	DNV	ACDR April 2023	≥80	NA	60-79	≥80	≥80	≥80
Fortuna Pacific longline albacore, bigeye and yellowfin tuna fishery	Control Union	Final Report May 2024	80	NA	80	80	80	80
Dae Hae Pacific Yellowfin, Bigeye, Albacore, and Swordfish Longline	LRQA	ACDR April 2023	≥80	NA	60-79	≥80	≥80	≥80

Table 22. Rationale for scoring differences

If exceptional circumstances apply, outline the situation and whether there is agreement between or among teams on this determination (FCP v3.0 PB1.3.2.1).
N/A
If applicable, explain and justify any difference in scoring and rationale for the relevant Performance Indicators (FCP v3.0 Annex PB1.3.2.2).
A harmonization meeting was held on January 2024, SCS was not invited to participate in the harmonization meeting as SCS had not announced a fishery at this point. SCS has not formally received the results/scores of the harmonization discussion, and will engage in harmonization discussions once this fishery is formally announced.

1.25 Peer reviewers – summary of qualifications and competencies

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

1.26 Assessment Team

Please see fishery announcement for this information.

1.27 Objection

To be added at Public Certification Report stage

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Principle 2

Please see the initial assessment for this fishery located here: https://fisheries.msc.org/en/fisheries/eastern-pacific-ocean-tropical-tuna-purse-seine-tunacons-fishery/@@view

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