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SCIENTIFIC ADVISORY COMMITTEE

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Document SAC-13 INF-G

IATTC STAFF'S COMMENTS ON THE WWF ASSESSMENT OF THE SKIPJACK FISHERY IN THE EASTERN PACIFIC OCEAN

SUMMARY OF STAFF'S COMMENTS

This document presents comments/views by the IATTC staff regarding the various questions scored in the WWF assessment of the skipjack fishery in the EPO (02/04/2020, version 4.0.1). It was prepared as a follow-up to a request made by stakeholders for a clarification by the staff about the overly pessimistic result of this WWF assessment which greatly contradicted the staff's views about the skipjack stock status.

In summary, the main comments offered by the staff are the following:

CATEGORY 1: Target stock

- The WWF evaluation has greatly penalized the EPO SKJ fishery by routing this assessment to Track B (data moderate). Instead, the staff believes that the PSA-risk analysis rationale should be considered as an available form of assessment for SKJ and this assessment be allowed to pursue onto Track A.
- Even if the WWF methodology could not consider the SKJ PSA-risk analysis as a form of stock assessment on Track A, then it should have not possibly be ignored as the best available science for stock status determination on Track B (instead of the fishery-dependent indicators which are problematic).
- Instead of focusing on the SKJ PSA-risk analysis assessment results, the WWF assessment focused on the fishery-dependent indicators which although are quite data rich and precise, most of them are not useful for assessment purposes due to the life-history of SKJ and certain technological aspects of the fishery (*e.g.,* unreliability of FAD indicators as indices of abundance). Such shortcomings of the fishery-dependent indicators were the reason, in the first place, behind the staff's efforts to develop the innovative PSA-risk analysis assessment approach for SKJ (SAC-11-08). The method was poorly accounted for and misunderstood in the WWF assessment. To the least, it should have been considered at the forefront of the WWF assessment when routed to Track B. In fact, "The available data (in this case the results of the SKJ PSA-risk analysis rationale) is detailed enough to allow for a solid and comprehensive description of the stock" (*i.e.*, risk statements for exceeding the target and reference points).
- In 2022, the IATTC staff developed an *interim* stock assessment for SKJ in the EPO (SAC-13-07). Although the assessment is termed *interim* by the staff, the staff considers it reliable for management advice. The term *interim* results from additional improvements being expected on

the skipjack assessment under the ongoing 2021-proposed methodology and workplan to develop a stock assessment for skipjack in the EPO that includes tagging data (SAC-13-08). The stock assessment reference model and most of the sensitivity analyses confirmed that the current biomass is above the target reference point and the fishing mortality is below the target fishing mortality.

CATEGORY 2: Ecological effects of the fishery

- In general, the assessor scores are reasonable given the rigidity of the WWF methodology.
- There is a substantial amount of progress to be mentioned at IATTC (*e.g.,* ongoing research projects under Theme 4 of the IATTC Strategic Science Plan, many of these on assessment of vulnerability, bycatch mitigation elements), adopted resolutions on full retention, sharks, whale sharks, Mobulids, etc. However, the effectiveness of these measures through scientific experimentation is not fully evaluated yet. Without completed and carefully designed scientific experiments to evaluate the effects of handing practices on post-release survivorship for most vulnerable species, the staff is not in a position to argue that the management measures in place are largely of fully effective at this stage. Therefore, most of the assessor scores on category 2 are reasonable.
- Regarding ecosystem changes, the staff periodically publishes an update of the ETP Ecopath model, and it shows the structure of the ecosystem has changed significantly since the early 1990s due to increased FAD effort. Although benchmark ecosystem reference points are not defined and hence any definition of what "negative changes" mean is arbitrary at this stage, ecosystem changes have been shown by ecosystem modeling research. However, it is interesting to note that despite this circumstantial evidence, the bycatch networks/communities under FADs and in unassociated tuna schools have remained fairly stable.
- The exception is Q9 which is probably overscored as more of an implicit weight to data from FAD sets seems to have been applied, which have smaller tunas and a higher diversity of bycatch. The staff suggests that the most appropriate score is number 2, as it cannot be denied that there is bycatch of tuna-like fishes and elasmobranchs across all set types, but generally this doesn't exceed 5%.

CATEGORY 3: Management

- In general, the assessor scores are reasonable.
- The exception is Q13, the staff believes that some of the scores given should be reconsidered.

STAFF COMMENTS

CATEGORY 1: TARGET STOCK

Depending on the available amount of information, there are 3 possible tracks on which the stock status is rated. Question 1 sets the course which track is applicable.

Q1 Are adequate* stock assessments of the target stock available?

A	○	Detailed fishery data is available AND a reliable quantitative stock assessment is conducted on a regular basis AND reference points are defined → **Track A** (QA2-A6)
B	◉	Substantial fishery data is available, but no reference points are defined OR reference points are defined but a recent quantitative stock assessment is lacking → **Track B** (QB2-B5)
C	○	Little or no fisheries data AND no stock assessment AND no reference points are available OR [*Bycatch*]: Species is not targeted directly - it is taken as bycatch which is retained/landed** → **Track C** (QC2-C5)

**Adequate = State of the art stock assessment not older than 3 years. If the current assessment is older than 3 years, go to Track B.*
***Bycatch species which are not appropriately managed in a species-specific manner. If fishery data is available, go to track A or B, respectively.*

From WWF report (Annotations):

Even though substantial fishery data is available for the EPO skipjack stock and reference points are defined on an interim basis, a recent quantitative stock assessment is still lacking. Track B

Staff's comments 1:

The highly productive life-history of skipjack (SKJ) makes the development of any conventional stock assessment very challenging. This results from marked fluctuations in abundance which are strongly tied to environmental conditions, and the inability to separate these effects from exploitation. Despite these challenges, and until another form of an assessment is possible (see ongoing workplan to develop a SKJ assessment), the IATTC staff has relied on a Productivity and Susceptibility Analysis (PSA) rationale to make inferences about the stock status of skipjack. Through this PSA assessment rationale, if bigeye (BET) is healthy then SKJ can be inferred to be healthy. More recently, the staff has combined the PSA rationale with the quantitative elements of the 2020 risk analysis for tropical tuna in the EPO (see section 1.1.2.a in Document IATTC-97-02). Probability statements for exceeding the target and limit reference points defined under Resolution C-16-02 are provided for the three tropical tuna species, and a probabilistic stock status evaluation is available for SKJ which indicates that the stock is in good health (see **Table A** below). The conclusion that there is no form of quantitative stock assessment for SKJ is misleading and has unreasonably penalized the SKJ fishery.

Table A. Stock status of yellowfin, bigeye, and skipjack tunas, expressed in terms of the probabilities of exceeding the reference points specified in the HCR.

	Probability (%) of exceeding RP		
Target RP	**Yellowfin**	**Bigeye**	**Skipjack[4]**
$F_{cur}>F_{MSY}$	9	50	<50
$S_{cur}<S_{MSY}$	12	53	<53
Limit RP			
$F_{cur}>F_{LIMIT}$	0	5	<5
$S_{cur}<S_{LIMIT}$	0	6	<6

Accordingly, the staff concludes the following:

- A single-species conventional quantitative assessment is not available for SKJ at this stage. However, the PSA approach that the IATTC relies on for its management advice, does not require a quantitative assessment for SKJ to provide adequate management advice. The PSA approach relies on a quantitative assessment for BET and therefore a "Custom" score might be appropriate to acknowledge that a quantitative assessment is used in the management of SKJ.
- The staff's PSA rationale coupled with the 2020 risk analysis for the tropical tuna (BET and YFT) in the EPO provides an assessment of the SKJ stock status in the EPO.
- Although a single-species conventional assessment is lacking for SKJ, the innovative PSA-risk analysis approach offers probability statements for exceeding the target and limit reference points (defined under Resolution C-16-02) for SKJ. In other words, a form of stock assessment is clearly available for SKJ and it cannot be stated that a quantitative measure of the stock status relative to the adopted reference points is lacking.
- According to the PSA-risk analysis assessment, SKJ is perceived to be in a healthy status relative to the adopted reference points (section 1.1.2.a in Document IATTC-97-02; see staff's response to QA2 below for additional details).
- The staff's PSA rationale coupled with the 2020 risk analysis for the tropical tuna in the EPO should be considered as a form of a "*stock assessment not older than 3 years*". Not doing so and routing this assessment towards Track B (instead of maintaining it on track A), has severely penalized this assessment and contributed to its overly pessimistic result.
- The overly pessimist outcomes of this WWF assessment are counter-intuitive and hard to conceptualize given the best available science and the management in place for the tropical tuna in the EPO. In particular, the strengthened conservation measures adopted by the IATTC in 2021 (Resolution C-21-04), as well as the positive steps taken by relevant stakeholders over recent years to fund the staff's research that is necessary to overcome the challenges to conduct a conventional stock assessment for SKJ (see staff's comments 2 below).
- If it remains the opinion that SKJ should fall within category B after taking the above comments into consideration, liberal use of the "Custom" score should be considered since the guidance under category B generally does not take into consideration the PSA approach used by the IATTC to provide management advice for SKJ (see staff's comments on questions in track B).

From WWF report (Annotations):

IATTC 2019 - SAC-10-09: *"The most recent assessment of skipjack in the EPO (Maunder and Harley 2005) is considered preliminary because it is not known whether the catch per day fished for purse-seine fisheries is proportional to abundance. Analysis of currently available tagging data is unlikely to improve the skipjack stock assessment (Maunder 2012a) and a fully length-structured model produced unrealistic estimates (Maunder 2012b). In addition to the problems listed above, the levels of age-specific natural mortality are uncertain, if not unknown, and current yield-per-recruit (YPR) calculations indicate that the YPR would be maximized by catching the youngest skipjack in the model (Maunder and Harley 2005). Therefore, neither the biomass- nor fishing mortality-based reference points, nor the indicators to which they are compared, are available for skipjack in the EPO."*

Staff's comments 2:

The information cited above from Document SAC-10-09 is from a review of historical assessments of SKJ. This does not take into consideration the PSA approach that is currently being used and uses "assessment" in a very narrow definition, based on historical age-structured model approaches. The most recent assessment, where "assessment" is more broadly defined and covers the variety of assessments used for different species around the world, is the PSA-risk analysis based assessment.

The staff's views presented in Document SAC-10-09 relied upon the best scientific information and resources available to the staff up until April 2019. Since then, important developments have taken place which should be considered in a review of this WWF assessment. In particular, the funding by IATTC of a multiyear tuna tagging program in the EPO (2019-2022) which is at the core of a new workplan to develop a stock assessment for SKJ (page 9, Document IATTC-98-02a). Two out of the three tagging cruises under the Regional Tuna Tagging Program in the EPO (RTTP-EPO) have been successfully completed (2019 and 2020). The third and final cruise is ongoing from March-May 2022. A new spatiotemporal modeling approach is under development by the staff and collaborators at the Technical University of Denmark (DTU). This tagging model will be incorporated into a stock assessment model to develop a benchmark assessment for SKJ (preliminary results to be presented at SAC-13 in May 2022, the final benchmark assessment to be presented at SAC-14 in May 2023). The staff's proposed new SKJ assessment methodology and summary results for the 2019 and 2020 tagging cruises can be found in Document SAC-12-06.

The developments above clearly show IATTC's determination in advancing the stock assessment science for SKJ in the EPO despite technical challenges imposed by the highly productive nature of the species and a clear indication from the PSA-risk analysis results that the stock is in good health. This responsible and proactive view is not consistent with the overly pessimistic score of this WWF assessment.

Finally, it should also be noted that the IATTC staff takes a more rigorous approach to the management of SKJ than other organizations might and therefore do not rely on quantitative approaches that are inappropriate to assess a species like skipjack. Just because there is an assessment that doesn't mean that this assessment is reliable.

From WWF report (Annotations):

IATTC Resolution C-16-02, Harvest Control Rules for Tropical Tunas (Yellowfin, Bigeye, and Skipjack):

"A target reference point is a management objective based on a level of spawning biomass (Starget) or a fishing mortality rate (Ftarget) that should be achieved and maintained. Smsy and Fmsy were adopted by the 87th meeting of the IATTC as interim target reference points for tropical tunas in the EPO."

Staff's comments 3:

IATTC Resolution C-16-02 was an important development since it established interim reference target and limit reference points for the tropical tuna in the EPO. The term *interim* implies that the Commission intends to go further towards a robust harvest strategy that needs to be tested through a rigorous management strategy evaluation (MSE) process. The MSE process for tropical tuna at the IATTC initiated in 2020 and is doing very good progress despite the negative impacts of the covid-19 pandemic. For more information about the IATTC MSE workplan see page 15 of the Staff Activities Report (Document IATTC-98-02a) and Document IATTC-98 INF-I.

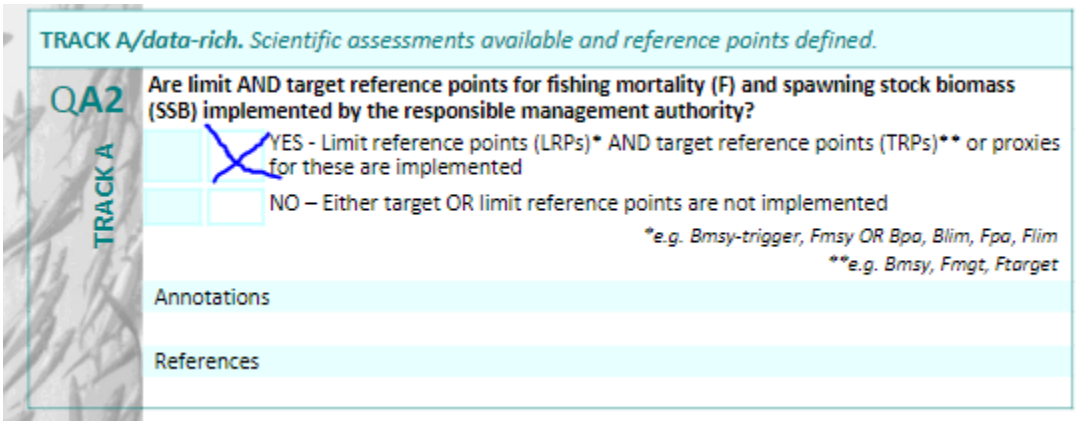
The overly pessimistic results of this WWF assessment for the SKJ fishery in the EPO are hard to reconcile with the above IATTC achievements as well as the healthy condition of the stock (see staff's comments 2).

TRACK A / data-rich

Staff's comments 4:

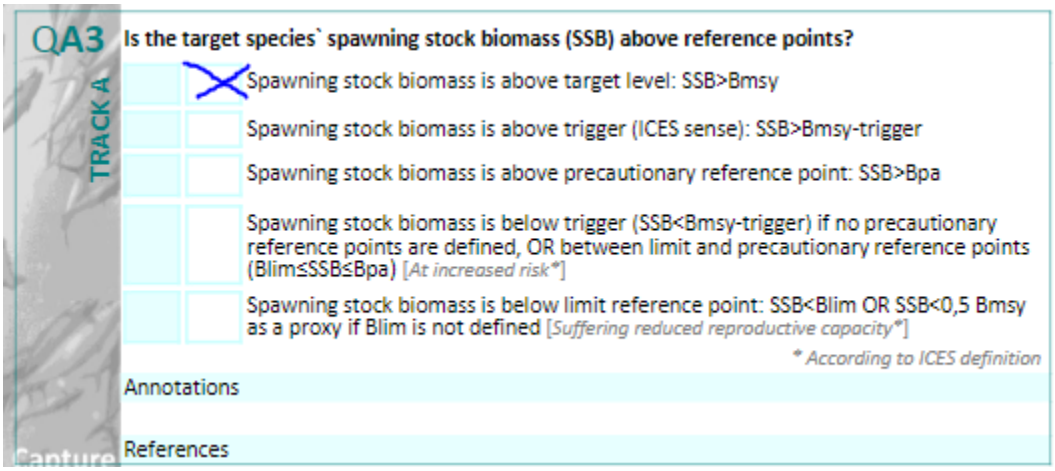
As explained above, the staff believes that this WWF evaluation has greatly penalized the EPO SKJ fishery by routing this assessment to Track B. Instead, the staff believes that the PSA-risk analysis rationale should be considered an available form of assessment for SKJ and this assessment be allowed to pursue on Track A.

Below are the staff's responses to the questions under Track A. While having missed the opportunity to be evaluated under Track A, critical elements related to the efficient management of the tropical tuna fishery in the EPO (including SKJ) have been greatly minimized in this assessment hence contributing to its overly pessimistic results.



Staff's comments on QA2: YES, IATTC Resolution C-16-02 adopted in 2016 establishes the harvest control rules for tropical tunas (YFT, SKJ and BET) in the EPO. The resolution defines reference points (target and limit) for both fishing mortality (*F*) and Spawning biomass (*S*). In addition, the IATTC has an ongoing

Management Strategy Evaluation (MSE) workplan in place for the tropical tuna in the EPO which continues to improve the HCR towards a fully tested and robust harvest strategy.



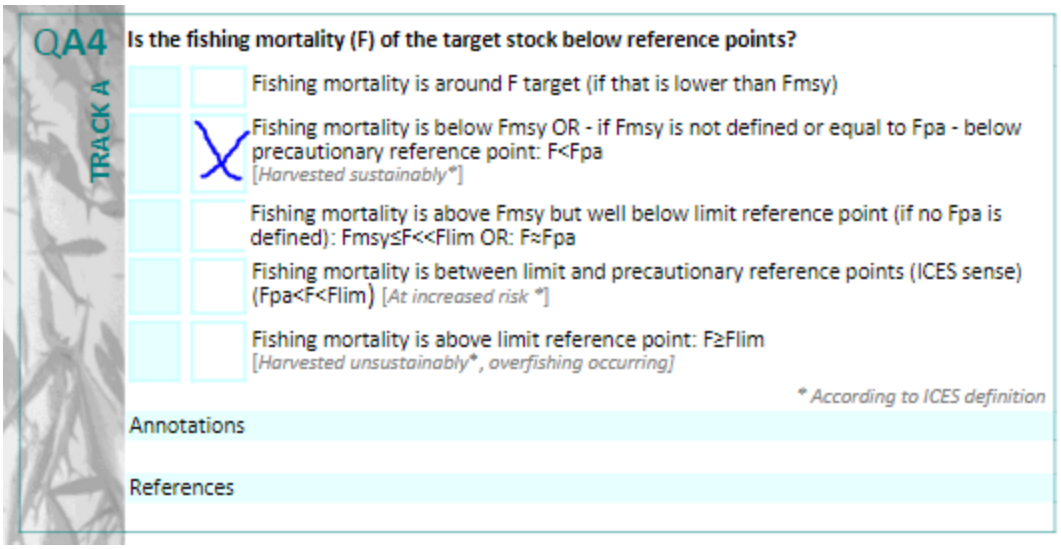
Staff's comments on QA3:

Through the SKJ PSA-risk analysis rationale, if BET is healthy then SKJ can be inferred to be healthy (see staff's comments 1 above). This inference was made based upon the results of the recent 2020 risk analysis for tropical tuna in the EPO. When the overall results of the risk analysis are considered, the staff concluded that there is less than 53% probability that *SSB* is below S_{MSY} (P(S<SMSY)<53%) (**Table A,** Document IATTC-97-02).

Table A. Stock status[2] of yellowfin, bigeye, and skipjack tunas, expressed in terms of the probabilities[3] of exceeding the reference points specified in the HCR.

	Probability (%) of exceeding RP		
Target RP	**Yellowfin**	**Bigeye**	**Skipjack[4]**
$F_{cur}>F_{MSY}$	9	50	<50
$S_{cur}<S_{MSY}$	12	53	<53
Limit RP			
$F_{cur}>F_{LIMIT}$	0	5	<5
$S_{cur}<S_{LIMIT}$	0	6	<6

Although Resolution C-16-02 does not specify the acceptable level of probability of exceeding the target reference points, these probabilities are at about a reasonable arbitrary reference level of 50%, considering that, at F_{MSY}, *SSB* will fluctuate around the target reference point (SSB_{MSY}) due to interannual recruitment fluctuations. As explained in the staff's response to QA4 below, *F* for bigeye is estimated to be fluctuating around F_{MSY} (hence *F* for SKJ is inferred to be fluctuating at or below F_{MSY}; **Table A**).



Staff's comments on QA4:

Through the PSA-risk analysis rationale, if BET is healthy then SKJ can be inferred to be healthy. Taking the 2020 risk analysis results for BET (Document SAC-11-08) as a basis to determine the status of the skipjack stock in the EPO, the staff inferred that there is less than 50% probability that F_{MSY} has been exceeded ($P(F>F_{MSY})$ < 50%) (**Table A,** Document SAC-11-08). Although Resolution C-16-02 does not specify the acceptable level of probability of exceeding the target reference points, these probabilities are at about a reasonable arbitrary reference level of 50%, considering that, at F_{MSY}, F will fluctuate around (*i.e.* with a probability of 50% of exceeding) the target reference point (F_{MSY}) under the days of closure management due to interannual fluctuations in catchability and distribution of purse-seine effort among set types.

Table A. Stock status[2] of yellowfin, bigeye, and skipjack tunas, expressed in terms of the probabilities[3] of exceeding the reference points specified in the HCR.

	Probability (%) of exceeding RP		
Target RP	**Yellowfin**	**Bigeye**	**Skipjack[4]**
$F_{cur}>F_{MSY}$	9	50	<50
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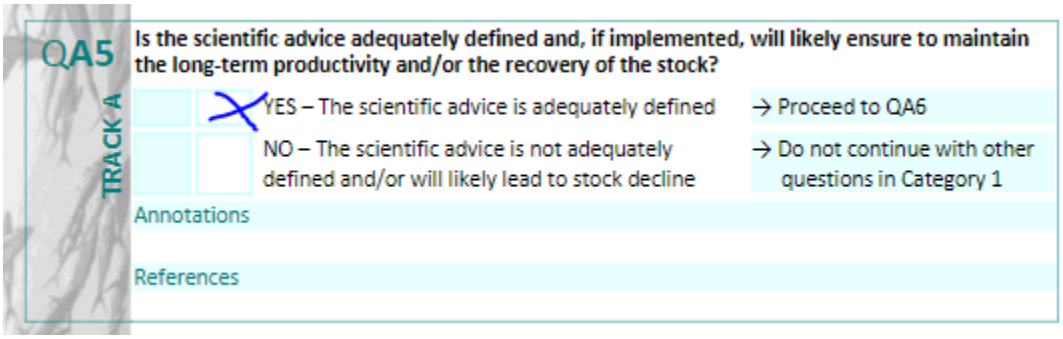
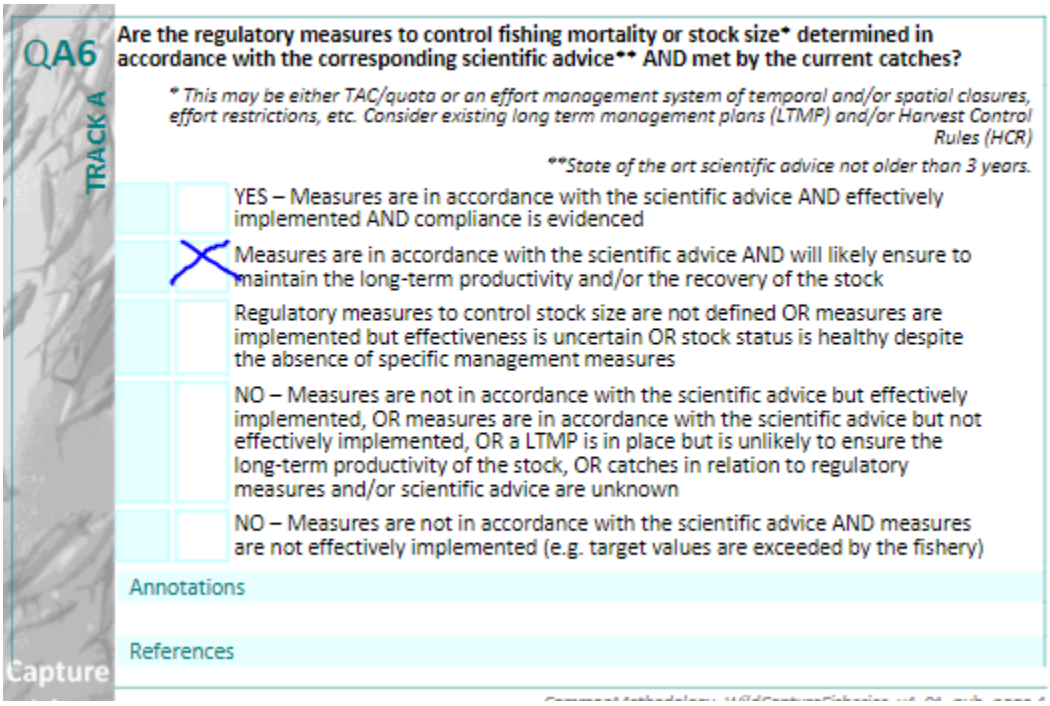


Staff's comments on QA5:

The 2020 risk analysis results (**Table A** above; see section 1.1.2.a in Document IATTC-97-02) indicated that all tropical tuna species are in good health and this status will not be compromised if the *status quo* fishing mortality conditions are not exceeded (*F* 2017-2019). For this reason, in 2021 the staff did not recommend changes in the number of closure days for the purse seine fishery affecting all three species.

However, the continuing increasing number of sets in the floating-object fishery, along with some other long-term trends in fishery indicators, shows that the reference points could potentially be exceeded in the near future as a result of increased fishing mortality. Therefore, the IATTC staff has recommended additional precautionary measures to keep the fishing mortality at the *status quo* level. To ensure that the *status quo* is maintained, the staff reiterated its previous recommendation for additional precautionary measures:

> The staff concluded that an extended temporal closure, based on the previous year's number of OBJ sets (only if the *status quo* is exceeded), combined with individual-vessel daily active FAD limits, would be the best option for maintaining the *status quo* and thus prevent an increase in *F* within the management cycle (Document SAC-12-08). The closure would be for both OBJ and unassociated (NOA) set types and apply to all purse-seine vessels.



Staff's comments on QA6:

A major recent management outcome that is missed in this WWF assessment is the strengthening of the IATTC conservation measures for the tropical tuna in 2021 which are defined in Resolution C-21-04. The new triennial (2022-2024) management package includes an Individual Vessel Limit (IVL) scheme for BET catches, reduced limits on active FADs, and improved data provision on FAD data which will strengthen conservation measures and science for all three species of tropical tuna species.

The question if whether “these measures are in accordance with the scientific advice” needs to be put into perspective. The question should really be "Are the measures taken supported by the science?". The Members can take different action than recommended by the staff. The staff recommended that an extended temporal closure, based on the previous year’s number of OBJ sets (only if the *status quo* is exceeded), combined with individual-vessel daily active FAD limits, would be the best option for maintaining the *status quo* and thus prevent an increase in *F* within the management cycle (Document SAC-12-08). The closure would be for both OBJ and unassociated (NOA) set types, and apply to all purse-seine vessels.

The staff’s recommendations for limiting NOA sets in addition to OBJ sets was to prevent increasing *F* for SKJ, however the Members adopted a different route: establish and Individual Vessel Limit (IVL) scheme for BET catches while not restricting NOA sets. The stock status of SKJ will continue to be monitored trough the interim assessment and any additional measures on SKJ will be considered if supported by the results of this assessment. Therefore, this approach can be supported by the science as long as a reliable assessment is available for SKJ.

The staff has put forward a workplan which will make sure that a stock assessment will remain available for SKJ until a conventional stock assessment is achieved. Since limits on unassociated sets (NOA) were not established, the PSA argument does no longer hold and the status of SKJ can only be determined based on an assessment for skipjack itself (*i.e.* the inference link between BET and SKJ was broken). The staff is currently developing a tagging-based skipjack benchmark assessment which will use the tagging data collecting under the Regional Tuna Tagging Program still underway until 2022 (Document SAC-12-06). This benchmark assessment will be presented to the SAC in 2023. The staff is also developing an alternative interim assessment method for skipjack that determines the current stock status relative to the 2017-2019 *status quo*, when the PSA rationale is known to be valid, to be used until the tagging-based assessment becomes available in 2023 (to be presented at the SAC in 2022).

The staff does not yet know if the new interim assessment will be reliable (to be discussed and determined at the SAC meeting in May 2022). For this reason, the staff cannot support that “Measures are in accordance with the scientific advice AND effectivity implemented AND compliance is evidence”. At this stage, the staff can support that “Measures are in accordance with the scientific advice AND will likely ensure to maintain the long-term productivity of the stock”.

TRACK B / data-moderate

In case that the assessment cannot re-consider the SKJ PSA-risk analysis on Track A, then this form of stock assessment should not possibly be ignored as the best available science for stock status determination on Track B (instead of the fishery-dependent indicators).

From WWF report (Annotations):

Landing and fishing effort data are available. However, the use of CPUE data for this fishery is problematic, and both age-composition data and abundance index are missing, all of which leads to a high level of uncertainty. Score 0.

Staff's comments on QB2:

In section A above, the staff concluded that the PSA rationale coupled with the 2020 risk analysis for the tropical tuna in the EPO should be considered in this WWF assessment as a reasonable form of a "state of the art stock assessment not older than 3 years". Not doing so and routing this assessment towards Track B (instead of evaluating the SKJ fishery under track A), has greatly penalized the SKJ fishery and contributed to its overly pessimistic result.

In case that the SKJ PSA-risk analysis rationale cannot qualify as a "state of the art stock assessment" and this WWF review remains routed on Track B, at the least the staff's SKJ PSA-risk analysis must be brought to the front stage of questions B. The staff's PSA rationale coupled with the 2020 risk analysis for the tropical tuna in the EPO provides a quantitative assessment of the SKJ stock status in the EPO. According to the PSA-risk analysis assessment, SKJ is assessed to be in a healthy status relative to the adopted reference points (section 1.1.2.a in Document IATTC-97-02; see staff's response to QA2 above for additional details). Therefore," the available data is detailed enough to allow for a solid and comprehensive description of the stock".

IATTC 2019 - SAC-10-09

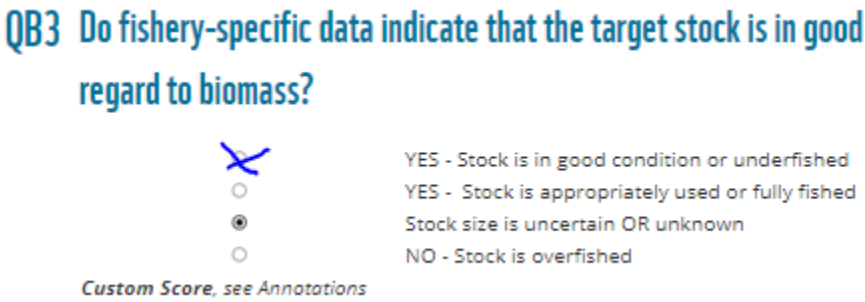
"Skipjack tuna is a notoriously difficult species to assess. Due to its high and variable productivity (i.e.annual recruitment is a large proportion of total biomass), it is difficult to detect the effect of fishing on the population with standard fisheries data and stock assessment methods. This is particularly true for the stock of the EPO, due to the lack of age-composition data, and especially tagging data, without which a conventional stock assessment of skipjack is not possible.

In addition to the problems listed above, the levels of age-specific natural mortality are uncertain, if not unknown, and current yield-per-recruit (YPR) calculations indicate that the YPR would be maximized bycatching the youngest skipjack in the model (Maunder and Harley 2005). Therefore, neither the biomass- nor fishing mortality-based reference points, nor the indicators to which they are compared, are available for skipjack in the EPO. One of the major problems mentioned above is the uncertainty as to whether the catch per unit of effort (CPUE) of the purse-seine fisheries is an appropriate index of abundance for

skipjack, particularly when the fish are associated with fish-aggregating devices (FADs). Purse-seine CPUE data are particularly problematic, because it is difficult to identify the appropriate unit of effort."

Staff's comments 4:

Instead of focusing on the SKJ PSA-risk analysis assessment results, this WWF assessment has focused on the fishery dependent indicators which although are quite data rich and precise, most of which are not very useful for assessment purposes due to the life-history of SKJ and certain technological aspects of the fishery (*e.g.,* unreliability of FAD indicators as indices of abundance). These shortcomings of the fishery-dependent indicators in the first place are the reason beyond the staff's efforts to develop the innovative PSA-risk analysis assessment approach for SKJ which was poorly accounted for and misunderstood in this WWF assessment. The latter should be at the forefront of this assessment if routed to Track B. "The available data (in this case the SKJ-PSA rationale) is detailed enough to allow for a solid and comprehensive description of the stock".



From WWF report (Annotations):

No reference points are available to determine the status of the stock. However, indicators of stock status are available from the fishery. The standardized effort in catch per day fished is increasing, which would indicate an increase in biomass. On the other hand, the number of sets per day fished is also increasing, and the catch per set is decreasing which would indicate a decreasing biomass. The catch per day fished can be assumed to be less reliable as an indicator of effort than the number of sets. Of specific concern is the decreasing average length and weight of the catch. The assumption, that this may represent an increase in recruitment may only be realistic if the overall CPUE is not decreasing - as long as no other indicators are available to strengthen this hypothesis one could assume that this is more likely an indicator of growth overfishing. Score is set to a precautionary -1.

Staff's comments on QB3:

In case that Route A cannot be considered under the WWF assessment methodology, the SKJ PSA-risk analysis assessment needs to be brought to the front stage of Route B instead of the fishery-dependent indicators. Although data-rich and precise, most of these indicators are problematic for stock assessment.

According to the PSA-risk analysis assessment, SKJ is assessed to be in a healthy status relative to the adopted reference points (section 1.1.2.a in Document IATTC-97-02; see staff's response to QA2 above for additional details).

IATTC 2019 - SAC-10-09

"The purse-seine catch started increasing substantially in the mid-1990s, and has been above average since 2003; during 2015-2017 it was above the upper reference level, but fell below it in 2018. The floating-object CPUE has generally been above average since the early 1990s, and was above the upper reference level in 2016. The unassociated CPUE has been increasing since the early 2000s; it has been above average since about 2003, and was above the upper reference level in 2017, but fell below it in2018. The standardized effort indicator of exploitation rate increased starting in the early 1990s, and has been above the average level since about 2000. The average weight of skipjack has been declining since 2000, and in 2015 and 2016 was below the lower reference level, but increased slightly to above that level in 2017, then fell back to the reference level in 2018.Both biomass and recruitment have been increasing over the past 20 years, and were above their respective upper reference levels in 2015 and 2016. The exploitation rate started increasing in the mid-1980s, and has fluctuated around the average since the mid-1990s. The number of sets by both large and small purse-seine vessels in the floating-object fishery has increased consistently for at least the past15 years (Figure 3), and at the same time the catch per set has fallen. The number of days fished has not increased at the same rate, and the increased number of sets is therefore likely the cause of the increased catch and catch per day fished (CPDF). The average weight was at or below its lower reference level during 2015-2017, which can be a consequence of overexploitation, but can also be caused by recent recruitments being greater than past recruitments or expansion of the fishery into areas occupied by smaller skipjack. The average length is less in the western part of the EPO, but it has been declining in all areas (Figure 3). The long-term pattern in reduced average weight is probably due to increasing fishing mortality resulting from the increasing number of sets. However, it is unknown if the current fishing mortality levels are appropriate because there are no reference points for skipjack tuna in the EPO; however, any continued decline in average length is a concern. Neither analyses of tagging data, nor various previous models (length-structured, A-SCALA, and SEAPODYM), indicate a credible risk to the skipjack stock(s) (Document SAC-07-05c). A conventional assessment of skipjack is necessary to ascertain the status of the stock, but, as noted above, this is not possible without much more extensive tagging data. The large-scale tagging program (Project E.4.a) that commenced in 2019 is therefore critical."

Staff's comments 5:

Again, the assessor puts exclusive focus on the interpretations of the fishery-dependent indicators, most of which problematic as pointed out by the staff. These trends were never put forward by the staff as a means to make any inferences about the SKJ stock status relative to reference points. Instead, the staff relied on some of these indicators as the ground for precautionary recommendations and these were followed by IATTC Members at its recent 98th Annual Meeting in October 2021 (see strengthened package of conservation measures adopted in Resolution C-21-06). For example, the long-term trend observed in the numbers of FAD sets, and a long-term decline in the mean length of SKJ in catches of floating objects. These two trends combined indicate a potential increase in fishing mortality, but alone they cannot be used to make inferences about stock status relative to the reference points. In case that this WWF assessment cannot re-consider the SKJ PSA-risk analysis under Track A, then this form of stock assessment should not possibly be ignored as the best available science for stock status determination under Track B (instead of the fishery-dependent indicators).

QB4 Do fishery-specific data indicate that the fishing rate is appropriate to sustain the long-term yield in the future?

- YES – Stock is fished at a rate likely to maintain stock at, or increase stock towards, good condition *[overfishing is not occurring]*
- (●) Stock is fished at a rate that risks maintaining stock at, or decreasing stock towards unsustainable levels *[at risk of overfishing]* OR fishing rate on the target stock is unknown
- ( ) NO – Stock is fished at a rate that is reducing stock to unsustainable levels, OR is preventing recovery of depleted stock *[overfishing is occurring]*

***Custom Score**, see Annotations*

From WWF report (Annotations):

Strictly, fishing mortality is unknown. Exploitation rates are high. Even though they seem to have stabilized in recent years, there has been a considerable increase in the last years. The average weight has declined considerably in 2015, which may be because of high recruitments in2015 and 2016, but may also indicate overfishing. Most likely, the Stock is fished at a rate that risks decreasing the stock towards unsustainable levels. Score -1.

Staff's comments 6:

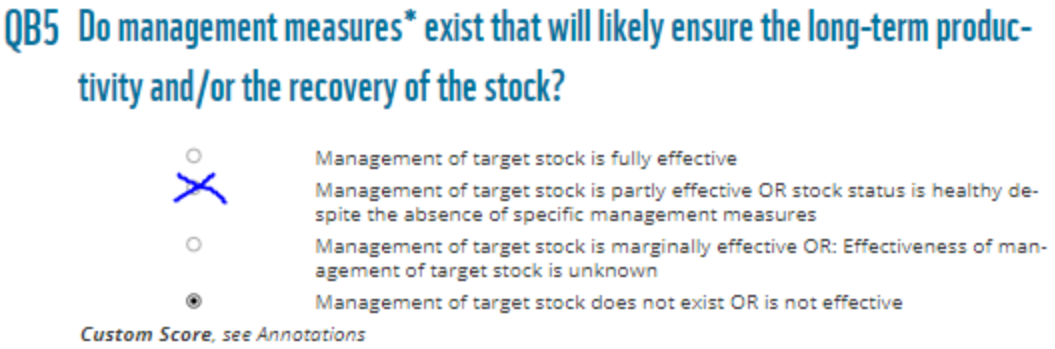
In case that the assessor cannot re-consider the SKJ PSA-risk analysis under Track A, then this form of stock assessment should not possibly be ignored as the best available science for stock status determination under Track B (instead of the fishery-dependent indicators). Its results are clear and presented in probabilistic statements related to the reference points (see Table A below).

Table A. Stock status[2] of yellowfin, bigeye, and skipjack tunas, expressed in terms of the probabilities[3] of exceeding the reference points specified in the HCR.

	Probability (%) of exceeding RP		
Target RP	**Yellowfin**	**Bigeye**	**Skipjack[4]**
$F_{cur}>F_{MSY}$	9	50	<50
$S_{cur}<S_{MSY}$	12	53	<53
Limit RP			
$F_{cur}>F_{LIMIT}$	0	5	<5
$S_{cur}<S_{LIMIT}$	0	6	<6

Although Resolution C-16-02 does not specify the acceptable level of probability of exceeding the target reference points, these probabilities are at about a reasonable arbitrary reference level of 50%, considering that, at F_{MSY}, *SSB* will fluctuate around the target reference point (SSB_{MSY}) due to interannual recruitment fluctuations. *F* for bigeye is estimated to be fluctuating around F_{MSY} (hence *F* for SKJ is inferred to be fluctuating at or below F_{MSY}).

SKJ is assessed to be in a healthy status relative to the adopted reference points (section 1.1.2.a in Document IATTC-97-02).



From WWF report (Annotations):

Tunas in the Pacific are not managed by output controls such as TACs/quotas. In 2016, IATTC adopted HCR for tropical tunas based on the interim target and limit reference points adopted in 2014 (Resolution C-16-02). The approved tropical tuna conservation measures for 2018-2020 include a 72-day fishery closure, consistent with the scientific advice to increase the closure time by 10 days to offset a recent increase in capacity. However, most of these management measures aim at bigeye tuna. The HCR for Skipjack would need reference points for taking any action to prevent overfishing, but those are not defined for skipjack. Keeping this in mind and with regard to the likely critical stock status of skipjack, management is not effective. Score -2.

Staff's comments on QB5:

Input controls are arguably more desirable for short lived highly variable stocks like tropical. The assessor seems to have missed the conservative approach taken by IATTC for management of the tropical tuna which is quite different compared to other tuna RFMOs. The management strategy is truly multi-species in nature since the three tropical tuna species (bigeye, yellowfin and skipjack) are managed as a single complex. The stock assessment results for the species in need of strictest measures (lower *F* multiplier) defines the duration of the temporal closure for the purse seine fishery which applies to all three species even if they are underfished.

Since BET has been the species in greatest need for conservation measures, the stock assessment results of this species has been applied to define the management measures for all three species, with YFT and SKJ inferred to be in a healthy condition (Table A below; see section 1.1.2.a in Document IATTC-97-02). Had SKJ (*e.g.*, through a higher susceptibility score in the PSA) or YFT become the species of highest concern, these would automatically become the drivers of management for all three species.

Table A. Stock status[2] of yellowfin, bigeye, and skipjack tunas, expressed in terms of the probabilities[3] of exceeding the reference points specified in the HCR.

	Probability (%) of exceeding RP		
Target RP	**Yellowfin**	**Bigeye**	**Skipjack[4]**
$F_{cur}>F_{MSY}$	9	50	<50
$S_{cur}<S_{MSY}$	12	53	<53
Limit RP			
$F_{cur}>F_{LIMIT}$	0	5	<5
$S_{cur}<S_{LIMIT}$	0	6	<6

Considering the 2020 risk analysis results (Table A above) and assuming that the *status quo* conditions are not exceeded (*F* 2017-2019), in 2021 the staff did not recommend changes in the number of closure days for the purse seine fishery affecting all three species, mainly for the following reason:

> The overall results of the 2020 risk analysis for bigeye tuna indicate a 50% probability that FMSY has been exceeded, and a 53% probability that Scur is below SMSY. Although Resolution C-16-02 does not specify the acceptable level of probability of exceeding the target reference points, these probabilities are at about a reasonable arbitrary reference level of 50%, considering that, at FMSY, S will fluctuate around the target reference point (SMSY) due to interannual recruitment fluctuations. F will also fluctuate around the target reference point (FMSY) under the days of closure management due to interannual fluctuations in catchability and distribution of purse-seine effort among set typos.

However, the continuing increasing number of sets in the floating-object fishery, along with some other long-term trends in fishery indicators, shows that the reference points could potentially be exceeded in the near future as a result of increased fishing mortality. Therefore, the IATTC staff has recommended additional precautionary measures to keep the fishing mortality at the *status quo* level. To ensure that the *status quo* is maintained, the staff reiterated its previous recommendation for additional precautionary measures:

> The staff concluded that an extended temporal closure, based on the previous year's number of OBJ sets (only if the status quo is exceeded), combined with individual-vessel daily active FAD limits, would be the best option for maintaining the status quo and thus prevent an increase in F within the management cycle (SAC-12-08). The closure would be for both OBJ and unassociated (NOA) set types, and apply to all purse-seine vessels.

A major management outcome that is missed in this WWF assessment is the strengthening of the IATTC conservation measures for the tropical tuna in 2021 which are defined in Resolution C-21-04. The new triennial management package (2022-2024) includes and Individual Vessel Limit (ILV) scheme for BET catches, reduced limits on active FADs, and improved data provision on FAD data which will strengthen management measures and science for all 3 species of tropical tuna species.

The new measures established under Resolution C-21-04 included only limits on floating-object sets. Since limits on unassociated sets were not established, the PSA argument does no longer hold and the status of SKJ can only be determined based on an assessment for SKJ itself. The staff is currently developing a tagging-based SKJ benchmark assessment which will use the tagging data collecting under the Regional Tuna Tagging Program still underway until 2022 (Document SAC-12-06). This benchmark assessment will

be presented to the SAC in 2023. The staff is also developing an alternative interim assessment method for SKJ that determines the current stock status relative to the 2017-2019 *status quo*, when the PSA rationale is known to be valid, to be used until the tagging-based assessment becomes available in 2023. This assessment will be presented to the SAC in May 2022.

At this stage, the staff cannot classify the SKJ management as fully effective. As mentioned above on QA6, the efficiency of the management of skipjack is conditional on the new assessment under development providing reliable management advice. The staff does not yet know if the new interim assessment will be reliable (to be discussed and determined at the SAC meeting in May 2022).

CATEGORY 2: ECOLOGICAL EFFECTS OF THE FISHERY

Q7 Does the fishery negatively impact* any species (fish and non-fish) that is listed** as threatened, endangered or protected (ETP) OR overfished OR biologically highly vulnerable***?

- ○ NO - The fishery under assessment does not cause significant damage to any listed, overfished, or highly vulnerable species
- ○ NO - The fishery under assessment is not likely to cause significant damage to any listed, overfished, or highly vulnerable species
- ○ There is no OR conflicting information concerning the effects on listed, overfished, or highly vulnerable species
- ◉ YES - The fishery under assessment is likely to cause significant damage to some listed, overfished, or highly vulnerable species
- ○ YES - The fishery under assessment causes significant damage to any listed, overfished, or highly vulnerable species

Custom Score, *see Annotations*

** Impacts only to be considered on population level*
*** List examples as of QC2*
**** Highly vulnerable species: e.g. selected species of elasmobranchs, demersal deep sea finfish (e.g. of the families Macrouridae, Sebastidae, Trachichthyidae)*

Staff's comments on Q7:

The assessor score seems reasonable considering the rigidity of the WWF methodology. The staff cannot state that there is no evidence to suggest the fishery does not have at least some impact on listed species. We know that these catches are very small, in particular compared to other fisheries, but we cannot evaluate/categorize the impact of even these small catches without population assessments being available for all these species. The management approach taken by IATTC is to mitigate any potential impacts of the fishery on ETP species mainly through the implementation of no retention policies and best handling practices for bycatch species. These are summarized below in some general comments and others that are more specific for ETP species or groups of species:

General comments:

- On data: the assessor seems to have missed that the IATTC is the only tuna RFMO having 100% observer coverage on its large purse seine vessels (class 6) which dominate the tuna catches (~90%). Some smaller vessels (class 1-5) also carry observers and all need to submit captain logbooks and be subject to port inspections. There is also the FAD form for all interactions on FADs, including groups of vulnerable bycatch species (not by species as this is a form to be filled by skippers).
- There are some new and key references that seem to be missing (*e.g.,* Ecosystem Considerations Reports, Lezama-Ochoa et al 2019 on mobulid catch dynamics, etc...).

Marine mammals:

- There are no recorded interactions on FAD and unassociated sets where skipjack are caught.

Mobulids:

- See Lezama et all (2019) for updated species-specific and group-specific catch rates of Mobulids for the tropical tuna fishery in the EPO.
  Lezama-Ochoa, N., M. Hall, M. Román and N. Vogel (2019). "Spatial and temporal distribution of mobulid ray species in the eastern Pacific Ocean ascertained from observer data from the tropical tuna purse-seine fishery." Environmental Biology of Fishes.

- One major unknown is the unidentified mobulids category, so it is conceivable that the catches of some species like *M. mobular* could be several times larger than what we report for individual species.
- IATTC Resolution C-15-04 establishes guidelines for best handling and release of Mobulid rays caught in association with fisheries in the IATTC Convention Area.
- Most of the Mobulids that are captured in the purse seine fishery are returned to the ocean alive (>80%) following the directions of Resolution C-15-04.
- Although a definite estimate on the post-release survival of Mobulids is still missing for the purse seine fishery, preliminary estimates indicate a post-release survival of 50-100% depending on the species (Project M.2.c; see Document IATTC-98-02a). Also, some companies (*e.g.,* OPAGAC and TUNACONS) are adopting voluntary best handing and releasing practices to mitigate post-release mortality.
- The WWF report quotes the IATTC *M. mobular* EASI-Fish assessment "Under the status quo scenario characterizing the fishery in 2016, F2016 and SSB2016 exceeded the F40% and SSB40% BRPs". As clearly stated in the paper, the assessment is NOT an assessment of stock status, because the estimate of fishing mortality (F) was defined as only a proxy for F given the major uncertainties in many parameter values used to derive F, such as the true extent of the species' distribution, encounterability of gear estimated from limited PSAT tag data, etc. We merely make the use of traditional biological reference points to quantitatively determine whether the vulnerability of the population changes under hypothetical CMMs, and explicitly state it's not to assess population status.

Sharks:

- Purse seine catch rates for shark species are very low compared to other fisheries operating in the EPO. An attempt to conduct a stock assessment for the silky shark in the eastern Pacific Ocean (1993-2010) showed that the purse seine bycatch of silky sharks represents only about 3-5% of the total catches taken by all fisheries combined (see Figure 2 in Document SAC-05 INF-F). Also, the order of magnitude of the shark catches taken by other fisheries is estimated to be far greater than that taken the purse seine fishery (*e.g.,* coastal artisanal fisheries; see Document SAC-11-13). Finally, any potential negative impacts on shark populations caused by the low purse seine catches on sharks are mitigated through the no retention policies and best handling practices. But at this stage there is no conclusive evidence from post-release mortality studies to make definite statements (see comments on Q19 for preliminary estimates on post-release survival studies).
- Whale sharks: The assessor mentions whale shark catches being significant. For whale shark, there is no particular post release survival study conducted in the EPO; however, WCPO and IO studies suggest very low post-release mortality. In addition, IATTC Resolution C-19-06 on the Conservation of Whale Sharks prohibits intentional sets on whale shark and rapid and safe liberation of the species.

Sea turtles:

- The assessor mentions sea turtle catches being significant. For sea turtles, no post-release survival studies have been conducted but the vast majority of animals do not show any apparent damage after the interaction with the vessel.

Q8 Does the fishery generate discards?

... by weight	<5%	5-15%	15-30%	>30%	unknown
...referenced in a scientific report as:	low	moderate	high	very high	unknown
High survival rate*	☐	☐	☐	☐	☐
Low** or unknown survival rate	☒	☐	☐	☐	☒

Average Score

***Custom Score**, see Annotations*

Note to assessor: Only use the categories "low", "moderate" or "high" when no other information is available

** High survival rate: over 75% of each discarded species survive*

*** Low survival rate: less than 75% of discarded species survive*

Staff's comments on Q9:

The WWF method/categories used for this score should be improved. In particular, the threshold of 75% of survival is used for both high and low survival rates. At least a medium (25-75% or whatever) category should be included.

Assuming that the WWF methodology cannot be changed, the score is probably reasonable. Resolution C-00-08 and subsequent renewals of that resolution have caused the proportion of discarded fish to decrease to extremely low levels for the tuna species (<1%). Survival rate of any finfish is likely to be very low (especially tunas), but their impacts on the population are negligible due to the low discard rates. This again points the need for improvements in this WWF scoring methodology (thresholds applied to categorize this as high/low survival rates).

Survival of bycatch species might be higher, but conclusive evidence from post-release mortality studies to make definite statements are still not available. Preliminary research with vulnerable species indicates:

1. Elasmobranchs: Hutchinson's work in the WCPO suggests elasmobranch survival from purse-seine might be quite high if the animals are retrieved early during sack up. Mortality may be quite high if best handling practices are not used. Note that all OPAGAC and TUNACONS vessels have voluntary best practices programs in place. Also note the shark CMMs in place, retention bans, etc. in the EPO.
    a. Mobulids: ongoing research, with participation of the IATTC, suggests that the post release survival is 50-100%, depending on the species.
    b. Sharks: unknown but at least 2 scientific cruises to be done in PS in 2022-2023, focused on post release survival studies of silky shark, the main shark bycatch species.
2. Sea turtles: the vast majority released alive. No proper study on post release mortality conducted yet but no evidence that suggest mortality is high.
3. Whale sharks: the vast majority released unharmed and alive. No proper study on post release survival conducted yet but no evidence that suggest mortality is high. CMM in place to prevent intentional setting on them and prompt and safe release.
4. Marine Mammals: no significant interactions with the part of the PS fishery fishing on SKJ.

Q9 Does the retained catch contain juveniles* or non-target species?

- ○ NO - The retained catch contains no (or <5%) juveniles AND no (or <5%) non-target species *[selective catch method]*
- ○ YES - The retained catch contains 5-30% juveniles AND no (or <5%) non-target species OR the landed catch contains 5-30% non-target species AND no (or <5%) juveniles
- ◉ YES - The retained catch contains 5-30% juveniles AND 5-30% non-target species OR there is not enough information for evaluation
- ○ YES - The retained catch contains >30% juveniles AND/OR non- target species *[non-selective catch method, e.g. trawling, dredging, FAD associated seine]*

***Custom Score**, see Annotations*

**Juveniles = individuals (target AND non-target species) which are smaller or younger than the length or age where 50% of the individuals of that specific stock are considered mature.*
Percentage of catch is by weight. Assessors should be conservative when looking at juveniles given low weight relative to adults.

Staff's comments on Q9:

The assessor may have overscored this one as more of an implicit weight to data from FAD sets seems to have been applied, which have smaller tunas and a higher diversity of bycatch. We would suggest the most appropriate score is number 2, as we cannot deny that there is bycatch of tuna-like fishes and elasmobranchs across all set types, but generally this doesn't exceed 5%.

Q10 Does the intensity of the fishery result in significant negative ecosystem changes*, such as cascade effects, major food chain effects, or community changes? [Ecosystem Effect]

- ○ NO - The fishery is not causing significant negative ecosystem changes
- ○ Negative ecosystem changes caused by the fishery are unlikely OR the likelihood of impact cannot be determined because there is conflicting, inconclusive, or insufficient information
- ◉ YES - Significant negative ecosystem changes are likely *[circumstantial evidence]*
- ○ YES - The fishery is causing significant negative ecosystem changes *[direct evidence]*

***Custom Score**, see Annotations*

**Examples of significant ecosystem changes: Significantly increased abundance of species with a low trophic level caused by depletion of predators. OR Depletion of top predators as a result of the decrease of key prey species. OR Truncated size composition of the ecological community. OR Major changes in the species biodiversity of the ecological community. OR Changes in the genetic diversity of a stock that lead to changes of e.g. growth or reproduction of the species. OR Destruction of key biogenic/habitat-forming species.*

Staff's comments on Q10: The score given by the assessor is reasonable. The staff periodically publishes an update of our ETP Ecopath model, and it shows the structure of the ecosystem has changed significantly since the early 1990s due to increased FAD effort. Although benchmark ecosystem reference points are not defined and hence any definition of what "negative changes" mean is arbitrary at this stage, ecosystem changes have been shown by ecosystem modeling research (see Document SAC-12-13). However, it is interesting to note that despite this circumstantial evidence, the bycatch networks/communities under FADs and in unassociated tuna schools have remained fairly stable.

Q11 Is the fishing method destructive to particular benthic habitats or habitat forming species within the benthic habitat? [Habitat Effect]

Habitat type	Sand/ gravel/ mud	Rocky	Biogenic reefs, sponge-beds, seagrass	Seamounts, cold water corals, hydrothermal vents
Capture method				
Pelagic (midwater) trawl, pelagic long-line, spear, harpoon, purse seine, midwater gillnet, pole & line, trolling, hook-and-line	☒	☒	☒	☐
Hand-picking	☐	☐	☐	☐
Hand raking	☐	☐	☐	☐
Pots, traps	☐	☐	☐	☐
Bottom long-line, bottom set gillnet	☐	☐	☐	☐
Danish seine, demersal seine, fly-shooting	☐	☐	☐	☐
Beam trawl/beam trawl rollers, demersal otter trawl	☐	☐	☐	☐
Beam trawl/tickler chains or chain mats	☐	☐	☐	☐
Dredge	☐	☐	☐	☐
Explosives, chemicals & other illegal operations	☐	☐	☐	☐

Average Score

***Custom Score**, see Annotations*

Notes to assessor: Provide references for definition of habitat type.
In case the habitat types are mixed, scores are to be averaged.
In case the fishing grounds are known to include at least one sensitive habitat, score accordingly.

Zoom

Annotations

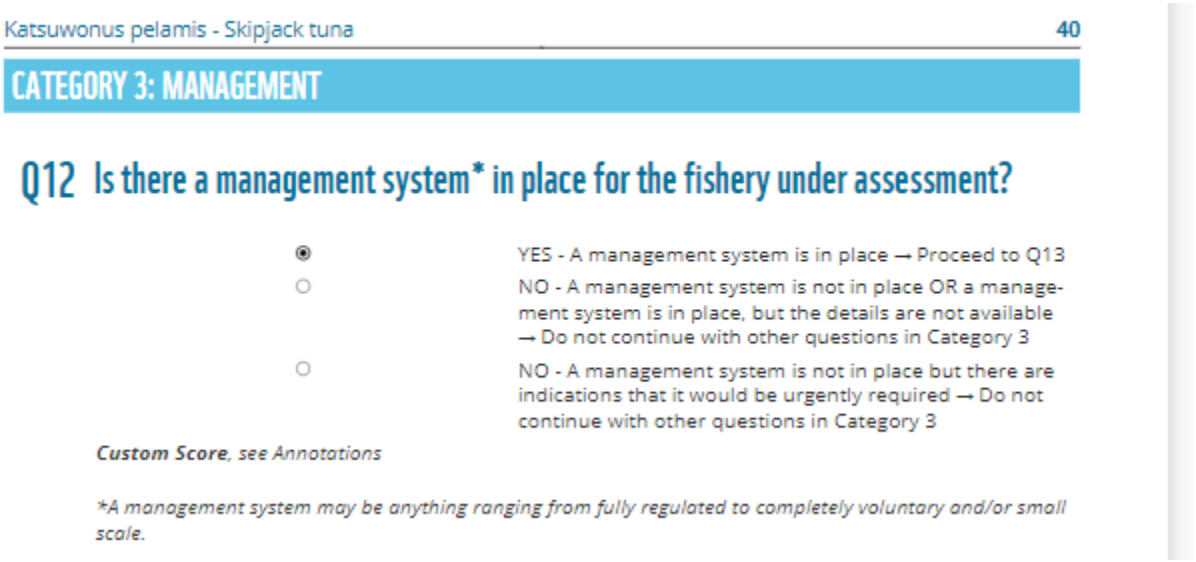
Katsuwonus pelamis - Skipjack tuna 39

Score 2: Fishery by purse seines as a surface fishing technique does not damage sensitive benthic habitats (Chuenpagdee et al. 2003)

Score identical to 2016 assessment

Staff's comments on Q11: The assessor score is reasonable. There is no evidence that pelagic gear has a negative impact on habitats when is use. Of course, the potential issues of ghost fishing (when gear is lost) and lost/abandoned FADs could be considered. Preliminary drifting simulation research does not indicate these potential sources of impact to be significant in terms of harm to the benthic ecosystem/stranding events, particularly in the EPO coastline. There are a few occurrences of some FAD stranding events in

Hawaii. However, it is unclear if these events originate from the EPO or the WCPO. Research is being conducted to identify potential spatial management options to mitigate these potential impacts, if deemed necessary. Also, the staff is collaborating with the industry in scientific experiments to reduce these potential impacts through biodegradability of the FADs (*e.g.*, BIOFAD project, where TUNACONS and OPAGAC are partners).



Katsuwonus pelamis - Skipjack tuna 40

CATEGORY 3: MANAGEMENT

Q12 Is there a management system* in place for the fishery under assessment?

- (●) YES - A management system is in place → Proceed to Q13
- ( ) NO - A management system is not in place OR a management system is in place, but the details are not available → Do not continue with other questions in Category 3
- ( ) NO - A management system is not in place but there are indications that it would be urgently required → Do not continue with other questions in Category 3

***Custom Score**, see Annotations*

**A management system may be anything ranging from fully regulated to completely voluntary and/or small scale.*

Q13 Are the established management measures for the fishery under assessment effective in maintaining the integrity of the habitat and ecosystem AND in maintaining the long-term productivity of all impacted species?

ISSUE	1. Relevance		2. Effectiveness				
	Is this issue relevant to the fishery under assessment?		Fully effective	Largely effective	Partly effective	Marginally effective OR effectiveness unknown	Not effective
	No	**Yes**	**100**	**75**	**50**	**25**	**0**
(Q no. relates to question above)	*[Do not continue in this row]*	*[Proceed to column 2]*					
ETP species* *(Q7)*	○	◉	○	○	◉	○	○
Discard *(Q8)*	○	◉	○	○	◉	○	○
Unwanted bycatch *(Q9)*	○	◉	○	○	○	◉	○
Ecosystem effect** *(Q10)*	○	◉	○	○	○	◉	○
Habitat effect*** *(Q11)*	◉	○	○	○	○	○	○
Monitoring/data availability****	○	◉	○	○	◉	○	○
Mixed fishery	◉	○	○	○	○	○	○
IUU, misreporting	○	◉	○	○	○	◉	○
Compliance, enforcement	○	◉	○	○	○	◉	○
Transparency, participation	○	◉	○	○	◉	○	○
Others (please specify)	◉	○	○	○	○	○	○

Procedure: Highlight the appropriate box for each issue. ***The points don´t go directly in the total assessment score****, but they are aggregated in the* ***"score" section*** *below.*

○	SCORE 90-100: Management is effective
○	SCORE 65-89: Management is largely effective
○	SCORE 40-64: Management is partly effective
◉	SCORE 15-39: Management is marginally effective OR there is insufficient information to a assess effectiveness
○	SCORE 0-14: Management is not effective

Average Score

Custom Score*, see Annotations*

**Endangered, threatened or protected OR overfished OR biologically highly vulnerable species*
***Ecosystem effect: refer to definition given in Q10*
****Habitat effect = Im[illegible]als*
*****Issue must be rate[illegible]*

Search for ... 0 of 0

Staff's comments on Q13: The staff agrees with many of the WWF scores to this question. Although the IATTC is mandated by the Antigua Convention to address ecosystem issues, there is space for improvement here. Currently, there are no binding resolutions in place to ensure that the integrity of the ecosystem does not change (*e.g.,* from its present state or some defined benchmark state in the past). Of course, this is not a trivial task and would require a reliable ecosystem model and reliable data from all fisheries, including artisanal and non-tuna fisheries. Even with our ERA work, the staff has been very proactive in conducting research to identify vulnerable species, but there are no pre-defined actions ("control rules") to specifically mitigate threats or manage those species to acceptable vulnerability levels

(*e.g.,* some defined "vulnerability reference points". As mentioned above on Q7, the IATTC deals with ecosystem issues mainly through bycatch mitigations practices (*e.g.,* retention prohibition, best handling practices). There is a large amount of progress here to be mentioned (*e.g.,* ongoing research projects under Theme 4 of the IATTC Strategic Science Plan, many of these on assessment of vulnerability, bycatch mitigation elements, adopted resolutions on full retention, sharks, whale sharks, Mobulids, etc. However, the effectiveness of these measures through scientific experimentation is not fully evaluated. Without completed and carefully designed scientific experiments to evaluate the effects of handing practices on post-release survivorship for most vulnerable species, the staff is not in a position to argue that the management measures in place are largely of fully effective. However, the staff believes that some of the scores should be reconsidered:

Monitoring data/availability is partially effective: The IATTC is the only among the five tuna RFMOs with 100% observer coverage on large purse seiners (class 6), including a Bycatch Data Collection Program. Submission of logbooks is mandatory for the smaller vessels and these vessels are also subject to port inspections. In addition, there is port sampling for size composition and submission of cannery data for the tuna species. Improvements can certainly be made (*e.g.,* logbooks of smaller vessels focus mainly on target species), but it is hard to conceptualize that the data monitoring at IATTC is only partially effective.

Management measures for Compliance/enforcement are marginally effective or effectiveness unknown: There are two compliance committees focusing on compliance for the tuna fishery in the EPO: The International Review Panel of the International Dolphin Conservation Program and the Committee for the Review of Implementation of Measures Adopted by the Commission of the IATTC.

Management measures for Transparency/Participation are marginally effective or effectiveness unknown: Observer participation is very active at IATTC meetings (*e.g.,* Scientific Advisory Meeting, Commission meetings, meetings of the FAD and Bycatch WGs). A good example of transparency and external participation at IATTC is the strong engagement of relevant stakeholders in the recent IATTC Workplan to Implement an Electronic Monitoring System in the EPO.

Q14 Is there an ecosystem-based management (EBM)* plan or approach in place?

○	YES - An EBM is implemented effectively
◉	YES - An EBM is currently at the state of implementation OR singular measures aiming specifically at the integrity of the ecosystem are in place and effective
○	NO - Steps have not been taken to implement an EBM

***Custom Score**, see Annotations*

** For the definition of EBM, please refer to the Guidance document.*

Staff's comments on Q14: This is a reasonable score. As mentioned in the staff's comments to Q13, there is still space for improvement with EBM at IATTC.