INTER-AMERICAN TROPICAL TUNA COMMISSION

98TH MEETING

(by videoconference)

23 – 27 August 2021

DOCUMENT IATTC-98 INF-H

RESPONSE TO OSPESCA'S LETTER DATED 4 AUGUST 2021

This document has been prepared by the IATTC staff in response to a letter sent by OSPESCA, dated 4 August 2021, which was circulated through memorandum Ref. 0309-410, dated 12 August 2021.

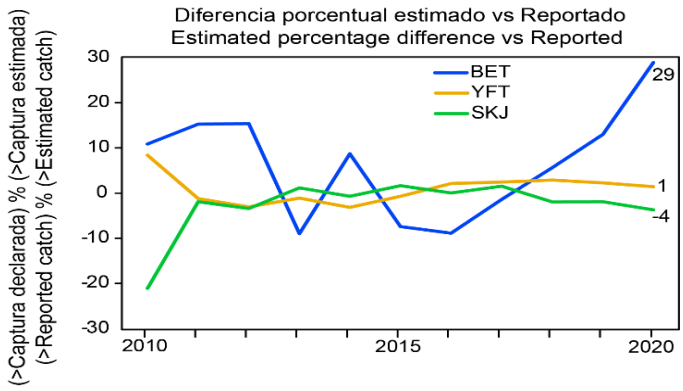
For the convenience of the reader, the original text of the questions is reproduced in the document followed by the corresponding response.

QUESTIONS ON DATA

Available data

Catch data for bigeye in 2020: According to document SAC-12-03, Table A-7, the bigeye (BET) catch estimated by the staff for 2020 was 74,981 metric tons. This number, which appears to be the best scientific estimate (BSE), is much higher than the catch information reported in logbooks and by observers (CAE), which is 53,328 metric tons. It follows that the CAE may be underestimating bigeye catch in 2020 by around 30%. If we look at the historical series, the differences between reported catch (CAE) and estimated catch (BSE) for bigeye remained around 10%, only reaching a maximum of 15% in 2012 (**Figure 1**), but even this is just half the difference recorded for 2020. By contrast, these differences remain stable and below 5% for yellowfin (YFT) and skipjack (SKJ), except in 2010 (**Figure 1**).

Figure 1. Percentage difference between reported catch (CAE) and best scientific estimate (BSE), by species and year (2010-2020)



Source: Figures taken from document SAC-12-03 and data provided by staff during the 97th Extraordinary Meeting of the IATTC (June 2021)

Question 1: Faced with this, we would like to receive clarification from the staff regarding the fluctuations in the estimates of bigeye catch over the years, as it seems inconsistent with what would be expected. It is our understanding that bigeye catch is generally underestimated in logbooks or by observers, and as a result one would expect this type of error to be systematic and not random, which is the interpretation drawn from the data available. It is also implausible that these fluctuations should occur in consecutive years, as is the case between 2013 and 2015 (**Figure 1**). Considering there appears to be no reason for variations to have occurred in such a short time frame with respect to reports of fleet catches, observers, and canneries, we believe the reasons for these fluctuations should be clarified.

Staff's response Q1: While the expectation is that observers and vessel personnel (logbooks) underestimate bigeye tuna catches, it is not expected that in every year the CAE estimate of bigeye catch will be smaller than the port-sampling estimate, and differences in sample sizes and sources of bias from year to year can lead to unexpected patterns in differences between the two times series. Although efforts are made to accurately and precisely estimate the species composition of the catch, each of these time series are susceptible to bias and error due to several factors and they are not necessarily susceptible to these factors in the same ways due to the differences in data collection and estimation methodologies. In the case of the CAE estimates, the estimation of species composition is made by observers and vessel personnel. Estimation of species composition on board a vessel by the observer is difficult because the observer cannot see each individual fish and does not take a sub-sample of fish to estimate the species composition. In some cases, the observer might confer with the vessel captain or crew to improve their estimates. The error in the observer estimates can be influenced by several factors, which may change over time, including: the size of the catch, the proportion of bigeye in the catch (which varies by set type), and observer skill. Due to the uncertainties in the observer estimates, the IATTC began conducting port sampling in 2000 to collect data for estimation of the species composition of the catch. Port-sampling data are only collected from wells that have catch from the same area, month and set type (descriptions of sampling protocol and estimation methodology can be found in IATTC Special Report 18, Stock Assessment Reports 2 and 4 and in Document WSBET-02-06 prepared for the 2019 BET External Review).

In general, the extent to which the port-sampling estimates of species composition in a given year could be biased will depend on how representative these samples are of the whole fleet because wells that have catch from different set type or sets from different areas or months may not be sampled. Moreover, the representativeness of the port-sampling data can be impacted by the level of sampling, and how that sampling effort is distributed among ports. The methodology used to estimate the catch composition from the port-sampling data is applied by strata. The species composition of the catch in strata without sample data must be based on sample data from other strata, and bias can occur when strata with samples have different characteristics than those without sample data. This is likely the reason for the large difference between the 2020 estimate for the CAE and the 2020 estimate based on port-sampling data. In 2020, the port sampling was impacted by COVID-19, but the impact was not evenly distributed across the ports. In fact, one of the largest ports for unloading of bigeye tuna catches had no sampling for a large portion of 2020 (and this issue persisted in early 2021). This resulted in a very low level of port-sampling data for 2020 (see slide 12 of 2020 fishery presentation). Therefore, the estimation methodology for the port-sampling data had to rely on data from sampled ports to estimate the species composition for the largest port that was unsampled, which may have led to a biased estimate of species composition in 2020. The estimation of species composition of the catch might be improved by developing new methodologies to estimate catch composition that simultaneously uses all data sources (observers, logbooks, port-sampling). The IATTC staff will be working to develop such new estimation methodology as part of its efforts to correct the 2020 and 2021 estimates of species composition (see staff's proposed work plan to investigate biases in Document IATTC-98 INF-D).

The IATTC staff wishes to stress that until the possible bias caused by very low levels of ports-sampling in 2020 and 2021 has been carefully investigated and corrected, the BSE catch estimates for 2020 and 2021

should not be used to evaluate the status of the bigeye stock or for other management or scientific purposes. Finally, the IATTC staff also wishes to point out that the CAE time series is not corrected for coverage of small vessels that did not carry an observer and did not submit a logbook, although it is not anticipated that the correction factor would be large.

Question 2: Furthermore, we understand that the differences between reported catch (CAE) and estimated catch (BSE) stem from adjustments made by the staff after gathering all information on catches, which includes data from logbooks, observers, and canneries on the one hand, and port-sampling data on the other. However, bearing in mind that the IATTC scientific staff has reiterated on a number of occasions that there are biases in the estimates for 2020, and also that the sampling coverage was more than halved due to the COVID-19 pandemic, we wish to request the following information for the purse-seine fleet, by purse-seine class:

1. Coverage of data from observers, logbooks, canneries, and sampling over the last 10 years (2011-2020), by purse-seine class.

Staff's response Q2.1: Data are provided in Figure 2.1 prepared by the staff (see end of document).

2. Extent of biases that may potentially have an impact on bigeye catch estimates for 2020, and CV/precision of tropical tuna catch estimates for the 2011-2020 period.

Staff's response Q2.2: Evaluation of the possible bias of the bigeye catch estimates requires extensive analysis and it is not possible before the August IATTC meeting. This task will likely require extensive exploratory analysis and complex statistical analysis (*e.g.* spatio-temporal models) to be conducted. The IATTC staff expects to present a preliminary analysis of possible biases and methodology to correct those biases at the SAC meeting in 2022 and the corrections for C_{BSE} will be available in time for any stock assessments to be presented at the 2023 SAC (see staff's proposed work plan to investigate biases in Document IATTC-98 INF-D). The 2022 SAC presentation will also provide a comprehensive evaluation coverage of the various data sources. The IATTC staff wishes to note the coverage for the port-sampling data can be viewed in several ways. The presentation of the fishery at the SAC meeting in 2021 gave one view of the level of coverage (see slide 12 of 2020 fishery presentation), which was the percentage of numbers of trips sampled by the port-sampling program. However, estimation of the port-sampling coverage in terms of wells is more complicated because the sampling protocol (see IATTC Special Report 18) stipulates that only wells with catch from the same set type, month and area are to be sampled. Thus, to obtain coverage in terms of wells it is necessary to estimate the total number of fleet wells that would be sampleable under the protocol.

Information relating to these two items is key to understanding the great discrepancy between the CSE and BSE for bigeye in 2020 and enabling the Commission to determine the viability of using the BSE for bigeye in 2020 in its deliberations and consideration of additional measures.

See staff's responses to Q2.1 and Q2.2 above.

QUESTIONS ON STOCK ASSESSMENTS

Stock assessment

In 2020, the staff introduced new assessment procedures for yellowfin and bigeye stocks based on a set of models with different representations for each stock and the weighting of results through a risk analysis. The staff concludes from the results of the risk analysis that there is no risk of exceeding the limit reference points for YFT or BET and therefore recommends maintaining the current measure, which mostly consists in a 72-day closure, the corralito and limits on active FADs for the purse-seine fishery, and catch limits on bigeye for some longline fisheries.

However, the staff indicates that the results of the risk analysis for bigeye follow a bimodal distribution, including scenarios that result in optimistic and pessimistic stock status outlooks. On the basis of these results and the interpretation of some of the indicators available for bigeye, the staff recommends that the Commission envisage adopting additional measures to preserve the *status quo*.

Once the arguments put forward have been examined, we wish to seek clarification from the IATTC scientific staff on the following concerns relating to the purse-seine fishery:

Indicators:

Question 3: ***Increase in bigeye catch in 2020:*** As indicated in the previous section, the IATTC scientific staff estimates bigeye catches 21,000 t above the reported values. These catches do not seem plausible, considering that the number of sets on FADs in 2020 decreased by about 30% from previous years, and capacity decreased by about 9%, a decrease attributable almost entirely to vessels without DMLs. Taking into account the IATTC scientific staff's statement that the estimates available for 2020 may be considerably biased, it is important to understand what the magnitude of these biases may be in order to determine whether the value of the estimated bigeye catch (BSE) for 2020 is plausible.

Staff's response Q3: See staff's response to Q2.2 above. Also see staff's proposed work plan to investigate biases in Document IATTC-98 INF-D.

Question 4: ***Trend in the number of sets on FADs:*** Both this indicator and the previous one are important, as they potentially reflect absolute values. For this reason, we believe it is important to understand what exactly the values represent, i.e. whether the number of sets on FADs simply represents the number reported by observers and in logbooks (CAE); or whether it represents the total number of sets on FADs estimated by the staff (e.g. using the proposed algorithm to adjust for unreported activity or misreporting).

Staff's response Q4: The number of floating-object (OBJ) sets are those reported in the Fishery Status Report, which are the numbers of OBJ sets reported by observers, and in logbooks, corrected for coverage of those two databases (*i.e.*, unreported activity), as necessary. No attempt has been made to correct for misreported set type.

Question 5: ***Standardization of other indicators:*** The staff has presented several documents that include indicators for tropical tuna stocks. In order to facilitate a better understanding of the staff's recommendations, we would like to receive clarification from the staff on the following issues:

a. Baseline data used to construct the indicators (CAE or BSE)
   Staff's response Q5.a: BSE is only used for the catch indicator.

b. Standardization processes used in the construction of indicators (e.g., weighting by purse-seine class, fishing area or period, etc.)
Staff's response Q5.b: The indices are not standardized except scaled to make their mean equal to one to be able to compare indices of differing magnitude/units.

c. Reason for using the 2000-2015 period as reference.

Staff's response Q5.c: The rationale for the reference period is described in IATTC Document SAC-11-05, 2000 is chosen as the first year because it is "the first year of species composition sampling for the purse-seine fishery and shortly after the major offshore expansion of the floating-object fishery". The indicators include the most recent year (*i.e.* 2020).

Question 6: Status of the bigeye stock: the staff recommends the adoption of additional measures for bigeye based on the results of the risk analysis, high catches recorded in 2020, and some of the indicators available for the stock. It is argued that if only pessimistic scenarios were considered, the probability of exceeding the limit reference point for bigeye would be 10% or a slightly higher value. Taking into account the uncertainty about the status of the bigeye stock in the eastern Pacific and that, on the other hand, there is a high probability that bigeye constitutes a single stock in the Pacific Ocean—with no arguments that favor other hypotheses—we believe that the Commission should be guided by the bigeye stock assessment in the WCPFC area, which concludes that the bigeye stock is not overfished nor subject to overfishing, with very high probabilities in both cases.

Staff's response Q6: Tagging data has shown that some juvenile bigeye tuna move from the central Pacific to the eastern Pacific, but the Pacific ocean is not one whole well mixed population. Therefore, the status of bigeye in the WCPO does not necessarily reflect the status of bigeye in the EPO. In addition, the estimated status of bigeye tuna in the Western and Central Pacific Ocean changed from unhealthy to healthy mainly due to changes in the assumptions about growth, which are controversial and subject to debate.

Question 7: Status of the skipjack stock: to date, the IATTC scientific staff has not conducted stock assessments for skipjack; the management advice has been based on the bigeye stock status and the indicators available for skipjack. The understanding of the IATTC scientific staff is that there are no worrying signs for the skipjack stock.

Staff's response Q7. First of all, the staff reiterates its perception of a healthy stock status for skipjack during the *status quo* period (2017-2019). As explained in section 1.1.2a of SAC-12-16, while a conventional skipjack assessment is not available (see skipjack assessment workplan), the staff continues to rely on the interim Productivity Susceptibility Analysis (PSA) rationale which implies that the status of skipjack should be more optimistic than bigeye and, as a result, the probability of exceeding the reference points for skipjack should be lower than for bigeye. Accordingly, it can be inferred from the PSA rationale that the probabilities of exceeding the target and limit reference points for skipjack are not of concern under the IATTC harvest control rule. However, the PSA based stock status inference for skipjack refers to the *status quo* period defined in the latest bigeye assessment (2017-2019). The PSA rationale can only remain valid is subsequent years in case that management measures are adopted to ensure that the bigeye stock will remain in a healthy status. For this purpose, the linkage regarding the PSA related inferences between the two stocks must not be broken (e.g., due to management changes or fisher behavior) and additional precautionary measures are needed to prevent fishing mortality from increasing beyond the *status quo* conditions (see section 1.1.2.c).

The above being said, the staff has clearly included skipjack in its concerns for the tropical tuna species. It is clearly stated in IATTC Documents SAC-11-05 and SAC-12-05: "*Most SSIs based on the floating-object*

fishery suggest that the fishing mortality of all three species has increased, mainly due to the increase in the number of floating-object sets." It is also clearly stated in IATTC Documents SAC-11-15 and SAC-12-16: *"As a supplementary means to monitor the stock status of tropical tunas, the staff has used stock status indicators (SSIs) to compare current and historical values of these indicators. The indicator values for 2020 were impacted by the COVID-19 pandemic, and therefore cannot be interpreted in the context of long-term trends. For skipjack in particular, the SSIs show recent catches at high historical levels, while catch per set and the average size of the fish in the catch are at low historical levels (SAC-12-05). The continuation of these recent trends raises concerns about increasing exploitation rates, which are mainly due to the increase in the number of floating-object sets (FAD-05 INF-D), and their future impact on the sustainability of the skipjack stock."*

Question 8: However, by conditioning its status to the status of bigeye, it is alleged that the true status of skipjack is unknown due to the uncertainty associated with the bigeye stock assessment. Considering that, in the worst-case scenario, the probability that the bigeye stock exceeds the limit reference point is close to 10%, we believe that it seems entirely implausible that the skipjack stock is at risk considering its high productivity—above that of bigeye—and a susceptibility similar to that of bigeye. It seems equally important to us that the assessment of the skipjack stock in the WCPFC area be taken into account since there is also a high probability that it constitutes a single stock. On the other hand, the results of the WCPFC bigeye and skipjack assessments can be a useful guide to determine the risk of the skipjack stock being subject to overfishing or overfished related to the bigeye status.

Staff's response Q8: Following up on the staff's comments above, the staff agrees that a healthy evaluation of the skipjack stock status under the IATTC harvest control rule still holds for the *status quo* period 2017-2019 even when the pessimistic group of models is considered. Amid the remaining uncertainties, the staff sees two immediate steps which will ensure the continuation of the *status quo* conditions which the best available science has shown to have led to a healthy stock status of the tropical tuna in in the EPO: 1) the adoption of a multiyear package which will ensure that these *status quo* conditions are maintained (including precautionary additional measures for the FAD fishery); 2) the conclusion of the staff's work plan to improve the stock assessments of tropical tunas and the work plan to develop a stock assessment for skipjack. See additional information on the assessment work plans (items 2) in the staff's response to questions 19 and 20 below.

Regarding the comment on considering the results of the WCPCF bigeye and skipjack stock assessment to evaluate the skipjack stock status in the EPO. There is limited data about the movement of skipjack between the EPO and the WCPO. Therefore, the relationship between the status of skipjack in the WCPO and the status of skipjack in the EPO is unknown. The fisheries for skipjack in the WCPO are quite different than the fisheries for skipjack in the EPO in terms of the proportion of sets on floating objects, anchored objects, and free-swimming schools, so the relationship between bigeye status and skipjack status is expected to be different in the WCPO and in the EPO. Stock Assessment Report 13 (pages 33-70) describe several attempts to determine the status of skipjack tuna including a Spatial Ecosystem and Population Dynamic Model (SEAPODYM) of the whole Pacific Ocean, but the report concludes that the reliability of the estimates are unknown. It should be noted that the reason that a stock assessment is possible in the WCPO is that there is substantial tagging data available. An IATTC Regional Tuna Tagging Program (2019-2022) is currently ongoing and provides the most promise for providing information to conduct a stock assessment for skipjack in the EPO.

Question 9: For this reason, we would like to request the opinion of the staff regarding the status of the skipjack stock, in particular if its condition may have significantly worsened in recent years, especially considering that in 2020 there was a significant decrease in effort and catch and that there is a very similar forecast in 2021.

Staff's response Q9: The views of the staff regarding stock status and management of skipjack in the EPO are summarized in Document IATTC-98 INF-G. Under the conditions specified in the IATTC harvest control rule and those based upon the PSA rationale described above on the response to Q7, the staff infers that the skipjack stock was in healthy status during the recent *status quo* period (2017-2019), even when the pessimistic group of models in the bigeye assessment is considered. In order to maintain a healthy stock status for all tropical tuna (bigeye, yellowfin and skipjack), the staff has recommended the adoption of precautionary additional measures for the FAD fishery. These will ensure that that fishing mortality does not exceed the *status quo* conditions which the best available science indicates to be associated with a healthy stock status for all three species despite existing uncertainties.

Regarding the possible benefits on the skipjack stock of the fishing years 2020 and 2021. The reduction in fishing effort during 2020 (and possibly 2021) due to COVID most likely reduced fishing mortality, which may have allowed the biomass of skipjack to increase. However, fishing mortality is expected to increase as COVID subsides unless additional measures are adopted to prevent such increases. The main point behind the staff's recommendation for additional precautionary measures is precisely aiming at this purpose: to prevent fishing mortality increases beyond the recent *status quo* levels that we know have lead the tropical tuna to a healthy stock status even when uncertainty is considered.

Question 10: Impact of the COVID pandemic on the status of the skipjack and bigeye stocks: there was a significant decrease in fishing effort during 2020, with a 30% drop in the number FAD sets. The situation in 2021 does not seem to have improved significantly. Moreover, in 2020, decreases in carrying capacity of more than 9% were recorded with respect to the average capacity in 2017-2019. These facts, while relevant, must have had positive consequences on the status of tropical tuna stocks by resulting in a noticeable decrease in fishing effort. Additionally, the consequences that the pandemic could have in the short or medium term are unknown since, according to the data submitted by the IATTC scientific staff, 21 purse-seine vessels did not operate during 2020 and the ability of these to rejoin the fishery in upcoming years is not clear. To illustrate, if we consider the reduction in capacity recorded in 2020 and that projected for 2021, when recalculating the closure days using the harvest control rule, the resulting closures would be 43 days in 2020 and 54 days in 2021, i.e., 29 and 18 days below the closure days actually implemented, respectively. While the impact that the reduction in fishing effort may have had on the stocks is unknown, the magnitude of this reduction represents in itself an indicator that should be taken into account when assessing the risk of short or medium-term overexploitation of tropical tuna stocks.

Staff's response Q10: Correct, these factors are important in determining the status of the tropical tuna stocks in the EPO. However, management is based on adjusting the days of closure to a level corresponding to the fishing mortality expected to produce MSY for the species with the fishing mortality that is highest relative to FMSY. It is difficult to predict how the fishing effort will change after the effects of the COVID-19 pandemic are reduced, and therefore we cannot set the future days of closure based on what happened in the COVID years. If COVID permanently reduces the effort, then the IATTC staff's proposed additional measures on limiting the number of sets will not cause additional limitations on vessel activity. The lasting effects of COVID can only be evaluated after the year 2022 has been completed and therefore an assessment before SAC 2023 is not useful for providing management advice and even in this case it will only be based on one year and will be imprecise.

QUESTIONS ON MANAGEMENT

Harvest control rule and management measures for tropical tunas

During the 97th extraordinary meeting of the IATTC (June 2021), the Commission reviewed proposals for management measures by Colombia/EU, Japan, USA, Ecuador, and Venezuela, each one proposing a

different management model. The following sections include a series of questions to the IATTC scientific staff aimed at assessing both the need to implement the additional measures proposed as well as the ability of members to establish efficient implementation and control if necessary. Comments regarding some of the measures are also added for consideration by other Members and cooperating parties of the IATTC.

Question 11: Measures based on catch control: the proposal submitted by Venezuela considers the establishment of a maximum catch of bigeye for the fleet or a maximum catch per vessel. However, if we take into account the information presented by the staff, real-time monitoring of bigeye catches would not be possible, in view of the divergence between reported catches (CAE) and the estimated catches (BSE), especially in the case of bigeye tuna. Therefore, considering that the control of bigeye catches for compliance purposes would imply the total enumeration of the bigeye catch in each landing, and that this control would be impossible without affecting the condition of the fish in the unloading, we consider that this measure is not appropriate unless an efficient catch control method is proposed.

Staff's response Q11: Considering the interest expressed by various Members regarding the implementation of an Individual Vessel Limit (IVL) scheme for bigeye catch in the EPO, the staff made a constructive effort to identify existing concerns mainly related to the monitoring of the IVL. If the Commission decides to move forward with the IVL scheme, the staff proposes to increase the port sampling on trips that are likely to catch large amounts of bigeye tuna to better evaluate the IVLs. The limits would be evaluated at the end of each trip and, if exceeded, subsequent trips in that year are proposed not be allowed to make OBJ sets (see Document IATTC-98 INF-A on general aspects related to IVLs and IATTC-98 INF-B on the implementation of an IVL scheme for BET catches). The staff would proceed with the estimation of the annual total catches for the tuna species as in previous years (i.e., using best scientific estimate sources, BSE), but with the advantage of being able to rely on additional port sampling data. The staff maintains its concerns regarding the reliability of the BSE of total annual catch estimates in 2020 and 2021 due to COVID's impacts on access to ports for sampling. These concerns and a work plan to address potential biases are addressed in Document IATTC-98 INF-D.

Question 12: Measures based on control of the number of sets: both the staff and the proposals by Japan and Ecuador consider an extension of the closure periods for fleet components that operate with FADs if the *status quo* conditions are exceeded, proposing different reference periods. Taking into account that in both cases a total number of sets on FADs is proposed based on information published by the staff, we would like to obtain confirmation that the number of sets represents the total estimated number (BSE), including unreported or misclassified sets in logbooks or by observers (estimated using the algorithm proposed by the staff or with other alternative mechanisms).

Staff's response Q12: The staff's proposal for the BSE for OBJ sets adjusts for both database coverage and misreporting of set type (see Document SAC-12-08 REV).

Question 13: However, even though the algorithm proposed by the staff could be used to establish a reference number, we do not consider it appropriate to base control of the number of FAD sets on an algorithm because of possible conflicts of interpretation that could arise between the alleged offender and the authority responsible for control. For this reason, we consider that an efficient control of this measure would only be possible in a scenario with 100% observer coverage, in which case the algorithm could be used to assist in solving possible conflicts that could arise but not as the only determinant of set type.

Staff's response Q13: The proposals are based on size Class-6 vessels, which have 100% observer coverage.

Question 14: Regarding the mechanism proposed by the staff, we understand that all available data (CAE) have been used to estimate the ratio between number of sets on FADs and closure days. If that is the case,

we consider it important to understand the coverage in terms of number of sets and bigeye catch that the information used represents, by purse-seine class. We understand that this information is important for the purpose of assessing the proposed mechanism since the contribution of each component of the purse-seine fleet to the total number of sets on FADs has changed substantially over time, and the continuation of this divergent trend in the future could invalidate the use of this tool.

Staff's response Q14: The relationship between number of sets and bigeye fishing mortality, and thus the required closure days, is stronger if only size Class-6 vessels are used. Small vessels catch small amounts of bigeye tuna. The proposals are based on size Class-6 vessels.

Question 15: At the same time, and at the implementation level, we consider that having two mechanisms for effort control acting in parallel may not be operational,

Staff's response Q15: It is not clear what the two mechanisms for effort control are. We assume it is number of sets and days of closure. There is also the capacity limits and the active FAD limits.

Question 16: … especially if scenarios such as the following arise: (i) a decrease in carrying capacity against an increase in the number of sets on FADs;

Staff's response Q16: These effects will be detected in the stock assessments estimates of fishing mortality relative to F_{MSY} and updated in future management measures.

Question 17: …(ii) fleets on which the weight of new measures will fall if the status of the yellowfin stock deteriorates, the implementation of which results in more closure days, after one or more years of activity restrictions for the FAD fleet, subject to more closure days than the DML fleet during that period.

Staff's response Q17: This is a consequence of having days of closure which are for the whole purse-seine fleet and unless more complex management is applied this will always be an issue. The current yellowfin assessment suggests that shifts of effort to yellowfin due to the limits on OBJ sets is not expected to change the stock status in the short term.

Question 18: Limit on the number of active FADs per vessel: Japan proposes the adoption of these limits based on the staff's recommendations. However, as previously expressed, and by some delegations during the meeting, it is considered premature to establish these limits considering that this information is only available for two years and is still incomplete. Moreover, the adoption of this measure would be equivalent to a distribution of fishing rights which is considered inappropriate. On the other hand, it is appropriate to know the number of purse-seine vessels for which there are no logbooks or that are not covered by observers, since it is not considered appropriate to use an algorithm to estimate the use of FADs for these purse-seine vessels for compliance purposes.

Staff's response Q18: Active FAD data are available for years 2018-2019, but not 2017 (i.e., the *status quo* reference years the staff is using for management advice are 2017-2019). However, there were no active FAD limits in place before 2018 and the 2018-2019 trends seem to be fairly similar so using those years to compute the IVL seem like a reasonable choice. Besides, reporting rates have been improving (i.e., see, for example, FAD-05-INF-A, FAD-05-INF-C and SAC-11-INF-M). A total of 156 vessels reported active FAD data, partially or continuously during 2018-2019, where about 75% of the vessels reported during at least 12 months and 50% reported during at least 20 months. Annually, vessels reporting buoy data accounted for more than 80% of the total number of sets on floating objects. Nevertheless, the staff is mindful of data reporting limitations and has proposed provisions to account for that. In the proposed approach, vessels reporting fewer than 12 individual months with active FAD data during 2018-2019, including zero reporting, could be requested to submit any missing data by a given date (e.g., 30 November

2021), when their respective daily limits would be computed. The staff considers that establishing annual individual vessel limits on the number of daily active FADs is the best way to guarantee that the *status quo* is not exceeded. Vessel-specific limits will prevent the total number of active FADs from increasing because each vessel will be limited to its level of FAD use over the last two years. Moreover, by limiting active FADs per vessel, the number of deployments would be indirectly limited to some extent, provided remote deactivation and activation does not occur or is not widespread (i.e., Resolution C-17-02/C-20-06 prohibits remote activations).

The distribution of fishing rights, that OSPESCA considers it inappropriate, is a valid point, but could be addressed through a discussion on a potential allocation scheme by the Commission, if appropriate. In that case, a more general estimate for the whole fleet would need to be computed for the discussions on allocation, considering, or not, a series of assumptions. The staff would like to note that new category-size limits, as established in the current Resolution, could not be as effective as IVL to guarantee that active FAD *status quo* levels are not exceeded, as a large fraction of the vessels are still very far from the virtual limits.

On the reporting rate of FAD logbooks and their use to estimate the FAD use levels for compliance, the staff would like to note that this information does not include any information on active FAD use. The FAD form is a logbook to be completed by the fishing crew when no observers are onboard, but only provides general information on FAD activities, such as deployments, sets or visits, and catch of target and main non-target species, but not information on active FAD use. The active FAD levels can only be estimated from the data provided by the buoy manufacturers to the IATTC staff or national verification entities (see guidelines of the ad hoc WG on FADs available on Basecamp).

QUESTIONS ON THE STAFF'S WORK PLAN

Staff Work Plan

Question 19: In its Work Plan, the IATTC scientific staff proposes to postpone the stock assessments for tropical tunas until 2024. Considering the uncertainty associated with the status of the bigeye stock and the lack of a skipjack assessment, we consider it imperative that an update of the bigeye stock assessment be conducted and the skipjack stock be assessed in 2022.

Staff's response Q19: The bimodal pattern seen in the bigeye risk analysis will not be resolved with an update assessment. This will require a benchmark assessment where extensive research is conducted to evaluate all the assumptions. Management is based on adjusting the days of closure to a level that will make the fishing mortality equal to that corresponding to MSY for the species with the fishing mortality that is highest relative to F_{MSY}. Changes in fishing mortality during the COVID years is likely to make those years different than future years. Therefore, despite the status of the stock being different in 2020 and 2021 compared to the *status quo* (2017-2019), an update assessment that estimates fishing mortality for 2020 and 2021 cannot be used to set management for future years. If the Commission decides to implement an IVL scheme for bigeye catches in 2022-2024, the staff proposes to present an update assessment for bigeye tuna at the 2023 SAC to evaluate the IVLs implemented in 2022 (see Document IATTC-98- INF-E). Also, since the IVLs will break the PSA link between skipjack and bigeye (see staff's response Q7), the staff proposes to conduct an interim assessment for skipjack in 2022 (see Document IATTC-98 INF-F). These assessments will not be needed if instead the Commission adopts a management package based on set limits (see Document IATTC-98 INF-C and INF-E).

Question 20: In this regard, it would be advisable for the staff to provide information on the additional resources, human or material, that might be required to carry out such assessments.

Staff's response Q20: No additional resources will be needed to present a bigeye update assessment at the 2023 SAC or a skipjack interim assessment at the 2022 SAC (see Documents IATTC-98 INF-E and IATTC-98 INF-F). However, some other projects may be delayed.

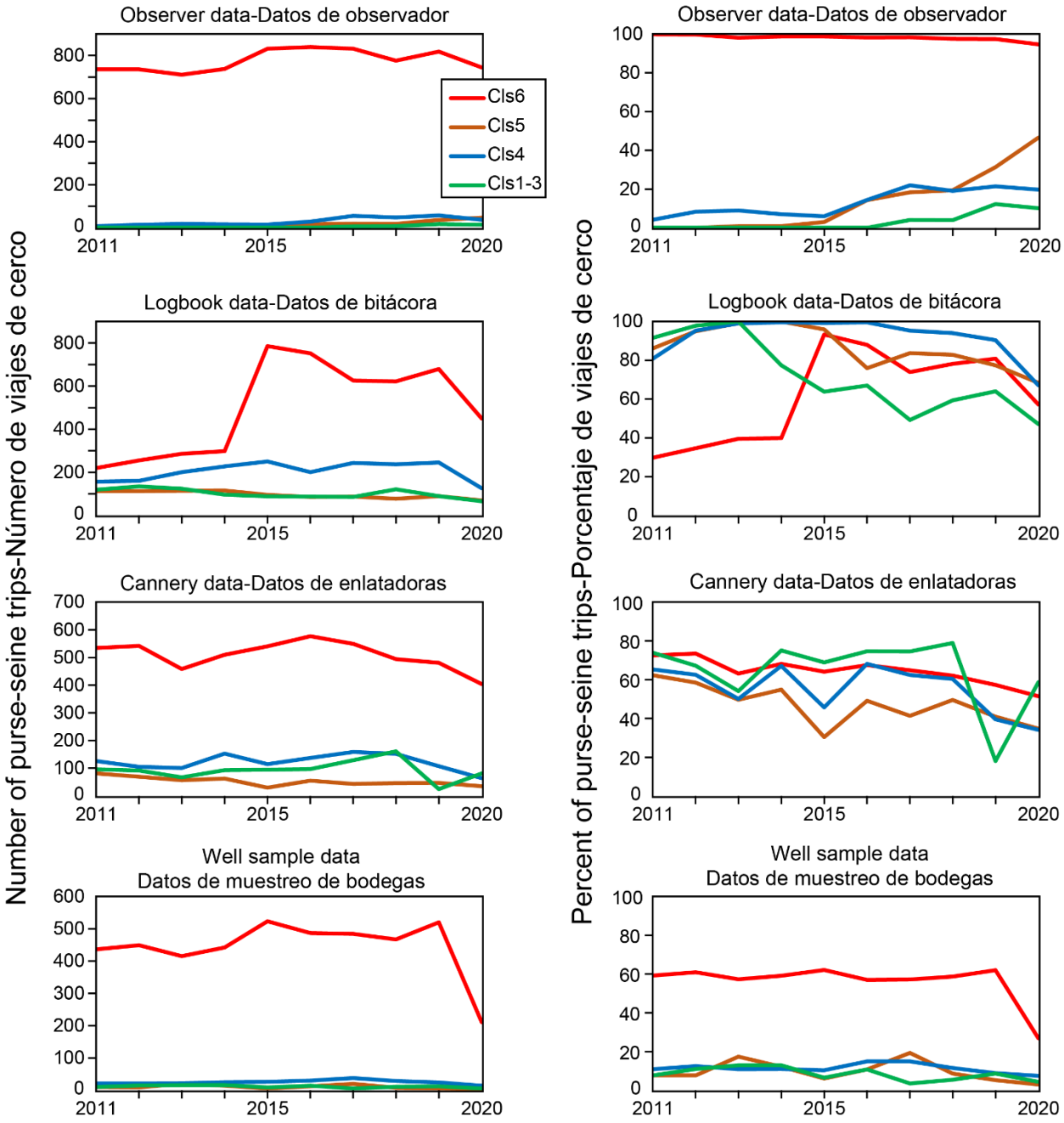


Figure 2.1. Data request from question 2.1.