INTER-AMERICAN TROPICAL TUNA COMMISSION

SCIENTIFIC ADVISORY COMMITTEE

15TH MEETING

La Jolla, California (USA)
10-14 June 2024

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1. OPENING OF THE MEETING

Dr. Arnulfo Franco, Director of the IATTC, opened the meeting in his capacity as the Chair of the Scientific Advisory Committee (SAC). He was accompanied by the Coordinator of Scientific Research, Dr. Alexandre Aires-da-Silva, and the Senior Policy Advisor, Amb. Jean-François Pulvenis. Dr. Franco welcomed the participants and gave the opportunity for the delegations to introduce themselves. The delegations of Belize, Canada, China, Colombia, Costa Rica, Korea, Ecuador, El Salvador, United States, Guatemala, Japan, Mexico, Nicaragua, Panama, Peru, Chinese Taipei and Venezuela were present in the room.

The Secretariat explained that the format of the meeting's work was modified and there would be presentations in the mornings and in-depth discussion of each topic in the afternoons, as well as the identification of recommendations for the Commission.

Japan requested that the list of documents on the SAC webpage reflects not only the dates when documents were posted by also when corrections and revisions are made to those documents. This will make sure that delegates are informed when changes on posted documents are made.

Guatemala noted that, as discussed in the Working Group meetings the previous week, some documents had not been posted 45 days in advance of the meeting, as required by the IATTC operating rules. Additionally, all documents prepared by the staff must be published in both of the Commission's official languages. Finally, efforts should be made to avoid posting documents in draft form. The **United States** acknowledged the established deadlines in the operating rules but pointed out that the large volume of scientific work produced by the staff, combined with limited translation resources, necessitates some flexibility. It proposed establishing an alternative but still firm deadline that is operationally feasible to implement. The Director recognized that, despite the staff's hard work, there is still room for improvement. He invited participants to share ideas on how to address this issue.

Guatemala requested for the presentations to be posted in advance to help illustrate and advance our understanding of the documents and the debates that will occur during the week.

2. Adoption of the agenda

The **European Union** proposed that the issue of improvements in the work of the SAC be discussed under other business (agenda item 10). This was approved by the Committee and with that proposal the work agenda was approved.

3. The Fishery in the EPO

a. The tuna fishery in 2023

Alexandre Aires-da-Silva presented a review of the tuna fishery in the EPO in 2023 (SAC-15-01), based on the most recent data available. Not all data are available in time for the SAC meeting; for example, CPCs are not required to submit longline data until 30 June, so longline catches for yellowfin and skipjack have been estimated based on 2022 figures.

Key Points:

- **Total EPO Catches by Species**: The retained catches for all the tuna species in the EPO were roughly 710,000 mt for the 10-year average and roughly 764,000 mt for 2023. The 10-year average catch proportions for each species were 44% Skipjack, 35% Yellowfin, 13% Bigeye, 6% Albacore, 1% Pacific Bluefin and 1% for all the other Tuna Species. In 2023 almost all the catch was by Purse seine and Longline vessels.
- **Total EPO Catches by Gear:** The 10-year average catch proportions for each gear type were 87% purse seine catches, 10% longline catches and 3 % by all other gears.
- **The total longline fishing effort in the EPO** has been stable or slightly declining over the recent years.
- **Purse seine fleet capacity:** The preliminary 2023 data for total well volume of purse seine vessels shows the current Purse seine fleet operating in the EPO is 261, 296 m^3. There was a 10% drop in the Purse seine capacity in 2020 associated with Covid-19 pandemic. A 5% increase in 2021 indicating we may be recovering to pre-pandemic levels now it is 1% below the average capacity levels operating during the status quo period (2017-2019).
- **Floating object sets trends**: The number of floating objects sets in 2020 dropped by almost 3,300 sets, which was a 21% increase over 2019. The number floating objects sets in 2021 increased by almost 3,000 sets, which was a 25% increase over 2020. The number of floating objects sets in 2022 increased by almost 2,530 sets, which was a 17% increase over 2021. The number of floating objects sets in 2023 decreased by 683 sets, which was a 4% decrease from 2022.
- **Yellowfin**: The 10-year average (2013-2022) for yellowfin tuna retained catches by all gears was 238,000 mt with 61% on dolphin sets, 23% on floating object sets, 11% on unassociated sets and the remaining 5% by other gears including longline vessels. The preliminary catch made in 2023 was 298,000 mt which was 25% higher than the 10 year average. There was a 49% increase in floating object sets from 2020 to 2021 (45,000 to 67,000 mt) and a 35% increase in floating object sets from 2021 to 2022 (67,000 to 90,000 mt) [Note: or could be 48% if 2021 bias corrected to an estimate of 61,00 mt is taken] and a 12% decrease in floating object sets from 2022 to 2023 (91,000 to 74,000 mt).
- **Skipjack:** The 10-year average (2013-2022) for skipjack tuna retained catches by all gears was 312,000 mt with 70% on floating object sets, 28% on unassociated sets and the remaining 2% on other sets which include all other gears and dolphin sets. In 2023 the total catch was 390,000 mt which was 25% higher than the 10-year average.

- **Bigeye:** The 10-year average (2013-2022) for bigeye tuna retained catches by all gears was 93,000 mt and the catch for 2023 was 63,000 mt which is 32% lower than the 10-year average.

Discussion:

- **Mexico** noted that approximately 18,000 sets were made by the floating-object fishery in 2023, with around 5,000 of those made by lower-class (1-5) purse-seine vessels. A request was made to provide a breakdown of the number of sets and catch of tunas by vessel class for class 1-5 purse-seiners. While this information is not currently available in Table A-7 of SAC-15-01, it could be provided in the future. Mexico also recalled a previous request for staff to provide available data on sorting grids used for small tunas, including observer-recorded data on their use by certain fleets. In response, Alexandre Aires-da-Silva stated that a summary of the available information on sorting grids would be presented at this meeting (see section x). Finally, Mexico inquired whether changes in fishing behavior had contributed to the observed reduction in bigeye catches. Da-Silva confirmed that there is evidence linking the Individual Vessel Threshold (IVT) scheme to reduce bigeye catches with behavioral changes in fishing practices, and these findings will be presented in Document INF-K (see section 5.a.i).

- The **United States** noted the reduced fishing effort and the contraction of spatial coverage in the Japanese longline CPUE index in the EPO. As the staff pointed out, this is concerning, given that the Japanese CPUE serves as the primary index of abundance in the bigeye tuna stock assessment. There is an urgent need to improve the longline abundance indices used in the bigeye assessment—for example, through enhanced data provision from longline fisheries and continued collaboration between the staff and scientists from longline CPCs. Alex da Silva responded that the staff continues to collaborate with scientists from Asian nations, who remain strongly supportive of research efforts to improve longline indices of abundance despite domestic data-sharing limitations. The staff is recommending that high-resolution, set-by-set longline data be made available as part of the data provision resolution. However, it is prudent to explore alternative methods for obtaining abundance indices for tropical tunas in the EPO, to be developed in parallel with improvements to longline data. Specifically, the staff has recently developed a spatiotemporal modeling approach capable of producing both relative and absolute indices of abundance from tagging data. This method has already proven successful for skipjack in the EPO and could be expanded to other species, including bigeye and yellowfin (Document SAC-15 INF-G). As a result, the staff recommends continuing the tropical tuna tagging program in the EPO.

- **Ecuador** commented that it would be useful to report longline effort (measured by number of hooks) with some geographical stratification to better capture effort directed at South Pacific albacore. Additionally, alongside Figure A-4 in the fishery report—which presents the geographical distribution of catches for bigeye and yellowfin—it would be beneficial to include a similar map for South Pacific albacore.

  Colombia noted the significant reduction in BET catches from floating-object sets during 2022 and 2023, which overlaps with the implementation of the Individual Vessel Threshold (IVT) aimed at reducing BET catches in the floating-objective fishery. It is important to determine whether this reduction is a direct result of the IVT program or reflects are decrease in BET abundance. Alexandre Aires-da-Silva noted that the bigeye benchmark assessment confirmed a recent decline in fishing mortality (F) and research shows that the IVT has contributed to the intended reduction in bigeye catches. These findings will be discussed in greater detail under agenda item 4.b (SAC-

15-02) on the bigeye benchmark stock assessment, and under agenda item 5.a.i (SAC-15 INF-K), which addresses the evaluation of the IVT program's impact on bigeye catches.

4. Tropical tunas: stock assessments

a. Stock Status indicators

Haikun Xu presented on stock status indicators for tropical tunas in the EPO (SAC-15 INF-F).

Key points:

- Some SSIs available for the floating-object fishery suggest that the fishing mortality (F) of all three species has increased, mainly due to the increase in the number of floating-object sets.
- The number of sets on floating objects resumed its general increasing trend and reached its maximum historical level in 2022, exceeding the *status quo* by 12%. The increasing trend did not continue in 2023 but the number of floating-object sets remained above the *status quo* (8%).
- Of all three tropical tuna species, the SSIs are particularly concerning for bigeye (BET). Bigeye is caught mainly in the floating-object fishery for which the catch per set and the average length have shown a consistent decline over time.
- In 2022 and 2023, both the catch in weight and catch-per-set for bigeye caught in floating-object sets were at the lowest levels since 2000, which may partly be a result of the introduction of the individual vessel threshold (IVT) scheme to provide incentives to reduce bigeye catches under Resolution C-21-04.

Discussion:

- **Guatemala** requested clarification on certain indicators, particularly those showing lower bigeye catches. Based on the research presented in Document INF-K (see section 5.a.i), this decline appears to be linked to a shift in fleet behavior following the implementation of the IVT scheme aimed at reducing bigeye catches. Therefore, rather than signaling a concern, the lower bigeye catches may simply reflect this behavioral change. Haikun Xu confirmed that results from the new benchmark assessment for bigeye (see section 4.b) indicate a clear reduction in fishing mortality for juvenile bigeye (younger than two years). The IVT scheme seems to have contributed to this decline by effectively reducing both fishing mortality and juvenile bigeye catches in recent years.

b. Bigeye (BET) benchmark assessment

Key points:

Dr. Haikun Xu presented on BET benchmark assessment (SAC-15-02).

- The reference models in this benchmark assessment show minor degrees of regime shift in recruitment. The degree of the regime shift in recruitment has significantly decreased from 140% (the base reference model in the last benchmark assessment) to only 20% (the base reference model in this benchmark assessment). Therefore, the regime shift hypothesis is no longer included as the overarching hypothesis in this benchmark assessment.
- Four models (the initial reference model (Fix), estimating growth (Gro), dome shape selectivity for all fisheries (Sel), and estimating natural mortality (Mrt)) are considered for the first level hypothesis, three rates of annual increase in longline catchability (0%, 1%, 2%) are considered for the second level hypothesis, and three values of steepness (1.0, 0.9, 0.8) are considered for the third level hypothesis. The combination of the three levels of hypotheses results in 36 reference

models, of which thirty-three are included in the risk analysis due to convergence issues with three models.

- The overall results of the risk analysis, based on the thirty-three converged reference models, show unimodal probability distributions for management quantities. The shift from a bimodal to unimodal pattern in the distributions likely results from resolving the regime shift in recruitment in this benchmark assessment. The risk analysis indicates:
    a. 46.6% probability that the spawning biomass at the beginning of 2024 is below the target reference point ($S_{MSY\ d}$);
    b. 24.7% probability that the fishing mortality in 2021-2023 is above the target reference point (F_{MSY});
    c. 58.5% probability that the fishing mortality in 2017-2019 (the *status quo* period) was above the target reference point (F_{MSY});
    d. 0.2% probability that the spawning biomass at the beginning of 2024 is below the limit reference point (S_{Limit});
    e. 0.1% probability that the fishing mortality in 2021-2023 is above the limit reference point (F_{Limit}).
- The weighted 10-year projection under the current fishing mortality suggests there is a 50% probability that the spawning biomass ratio at the beginning of 2034 will be above 0.27.

Discussion:

- Comments and questions by **Japan**:
    1. Adding a selectivity time block and using dome-shaped selectivity for the middle block greatly increases the scale of population abundance, so perhaps sensitivity analysis is needed to evaluate its impact. Haikun Xu replied that the length compositions were inspected separately for the three time blocks and no large BET were found in the middle block. The empirical selectivity diagnostics showed that assuming asymptotic selectivity in the middle block for longline fisheries is not appropriate. Related sensitivity analyses were presented during the latest extern review of the BET assessment. The length compositions were standardized using a spatiotemporal approach in the new BET benchmark assessment. The staff will consider further sensitivity analysis in the next benchmark assessment.
    2. The Age-structured Production Model (ASPM) diagnostic show different trajectories for different models which indicate that the length composition data have a significant impact on estimating biomass. A participant asked if whether the length composition data was used properly and if it is producing a strong effect on the estimated scale of biomass. Haikun Xu clarified that during the data weighting workshop it was concluded that rejecting models based on the ASPM diagnostic is not a good practice. However, the diagnostic indicates there may be data conflict between length frequency data and the index of relative abundance.
    3. The F-at-age show a big decline for juvenile BET and this coincides with the timing of implementation of the IVT (SAC-15 INF-K). Aires-da-Silva agreed and pointed out that the effect of the IVT on F reduction will be presented and discussed on item 5.1.i of the agenda.
- Comments/questions by **USA**:

1. Model convergence is important in the model ensemble. Three models were rejected due to lack of convergence, however those are models with low productivity. Perhaps more work on those rejected models could lead to a more complete ensemble in a risk analysis. A question was asked about the impact of including those models in the ensemble. Haikun Xu clarified that those 3 models were not included in the ensemble because they did not produce a Hessian matrix and Jittering was unstable. Perhaps more time would allow these models to be included in the risk analysis. However, their impact on the final model ensemble results is likely to be small since these are only 3 models.

- Comments/questions by **Ecuador**

1. A comment was made regarding the difficulty to interpret declines in Stock Status Indicators (SSIs). Priority should be given to results of formal benchmark assessments when available. Aires-da-Silva concurred and confirmed that management recommendations for BET this year are mainly based on the results of the benchmark assessment which are available. However, he also pointed out that SSIs can often provide valuable insights. The staff is open to an improved interpretation of the SSIs via a closer dialogue with stakeholders regarding potential reasons behind trends in SSIs.

c. Yellowfin (YFT) benchmark assessment

Key Points

Dr. Carolina Minte-Vera presented the exploratory assessment and spatial stock status indicators for the yellowfin tuna in the EPO.

- The previous benchmark assessment for yellowfin in the EPO was carried out in 2020 and the results were included in a risk analysis.
- Several uncertainties in the stock assessment remained including the spatial structure and fits to the composition data for the fisheries that are assumed to have asymptotic selectivity.
- Substantial research was conducted to improve the assessment: improvements were made to natural mortality, growth, and how fisheries are modelled.
- Uncertainty remains in the stock structure. An exploratory stock assessment was developed using these improvements that focus on data from the core area of the DEL fishery (east of 125°W, south of 20°N and north of 5°N).
- Sensitivity to the assumption about the stock structure and the presence of large fish were also carried out.
- To investigate the possibility of local depletion, stock status indicators were build based on the dolphin associated and longline fisheries.
- The yellowfin stock and the possible sub stocks are likely to be above the level that corresponds to MSY and not likely to have exceeded the limit reference point.
- These conclusions are uncertain, dependent on the assumed steepness of the Beverton-Holt stock-recruitment relationship.
- Areas outside the core area do not show indication of being more depleted than the core area.

- Further research and data collection is needed to produce reliable assessments and management advice in the future. The topics that are planned to be investigated by the staff were outlined.

Discussion:

- Various delegations inquired whether the staff is optimistic about resolving the assessment issues currently faced and producing a robust benchmark assessment for YFT in 2025. Alexandre Aires-da-Silva commented that the plan is for the staff to take the completion of YFT benchmark assessment as a top priority for the remainder of 2024 and 2025. However, the staff cannot guarantee that the challenges will be overcome as there are major uncertainties and data deficiencies that need to be addressed.
- The is uncertainty about the condition of the stock or sub-stock in southern area that is outside the core northern area. There is great need for a reliable index of abundance for the southern area in order for an assessment of this area to be possible. The continuation of the tagging program could potentially help to obtain indices of absolute/relative abundance for YFT using the spatiotemporal methodology recently applied to SKJ (SAC-15 INF-G). Also, some of the morphometric and biological data used in the tropical tuna assessments dates back to the 1960s and thus need to be urgently updated. The ongoing Enhanced Monitoring Program (EMP; SAC-15 INF-H) could offer the sampling platform to collect morphometric and biological information for tropical tunas.
- The **United States** commented that a large amount of the YFT catches are taken by the floating-object fishery. Both longline and dolphin fisheries catch large YFT. How is the small fish caught by the floating-object fishery connected with the large fish in the conceptual model? Carolina Minte-Vera commented that the floating-object fishery with large catches of juvenile YFT has a minor degree of overlap with the longline and dolphin fisheries, so it is challenging to ascertain the impact of the floating-object fishery on large YFT. However, the floating-object fisheries are contained in areas 1 and 2 which means that according to the conceptual model the main impact of the floating-object catches on large YFT will be on the southern areas.

d. Skipjack (SKJ) benchmark assessment

Key points:

- The first benchmark assessment for skipjack tuna in the EPO was conducted in 2024. This assessment represents a significant improvement from the *interim* assessment conducted in 2022.
- The benchmark assessment reflects major advancements in the assessment methodologies and incorporates new data sets, including an updated index of relative abundance based on recently developed echosounder buoy data, and an absolute biomass estimate derived from the tagging data collected under the Regional Tuna Tagging Program in the EPO.
- There is substantial uncertainty about several model assumptions and sensitivity analyses were conducted and determined that the management advice is robust to the uncertainty.
- The conclusion that the skipjack stock is healthy is generally robust to data usage and model assumption.

Discussion:

- **Japan** mentioned that one of the issues with modeling of tagging data is the mixing of the tags in the population. The staff clarified that the spatiotemporal model was designed to overcome problems with mixing by using a fine spatial and temporal scale. Also, Japan inquired about the causes for the conflict between the echo-sounder and tagging indices. The staff clarified that the tagging index covers a slightly different ate than then tagging index.
- **Venezuela** inquired about the recent record-high SKJ catches in 2023 and whether such levels could be sustained. The staff clarified that current fishing mortality is estimated to be below the target reference point. The large 2023 SKJ catches consist mainly of small fish, which could indicate strong recruitment. However, recent recruitment estimates remain uncertain, as the strength of a cohort can only be reliably assessed after it has fully passed through the fishery. Additionally, the high catches may be influenced by environmental factors (SAC-15 INF-M).
- The **United States** suggested the inclusion of a sensitivity model with a later starting year, or having the size composition data from the early period removed. This would allow checking the effect of including the early composition data in the scale of the population.

5. Tropical tuna: development of harvest strategies

a. Evaluation of current conservation and management measures

i. Investigation of the impact of the IVT program on BET catches (SAC-15 INF-K)

Dr. Dan Ovando presented on an investigation to evaluate the impact of the IVT program on BET catches (SAC-15 INF-K)

Key Points:

- The Individual Vessel Threshold (IVT) program, implemented in Resolution C-21-04 and in force in 2022 and 2023, adds additional closure days for vessels with annual catches > 1,200MT.
- We estimated the effect of the IVT program on catches of BET by separating vessels into two groups, one of which (highliners) were at higher risk of exceeding the IVT and another (non-highliners) that were not at risk of exceeding the IVT and were consistently monitored in the Enhanced Monitoring Program (EMP) but experienced the same broad environmental conditions as the highliner groups.
- Using this strategy, we estimated that the IVT caused on average a reduction of roughly 8,500 MT (23%) of BET among the highliner vessels in 2022 and 2023, controlling for potential confounders such as changes in total BET abundance.
- Policy evaluation is inherently uncertain, but multiple analyses and lines of evidence support the conclusion that the IVT and the EMP resulted in a meaningful reduction in catches of BET.

Discussion

- **Guatemala** asked what is the impact of the EMP in the results of this study? The presenter responded that the EMP and the IVT were included as a whole, it is not possible to differentiate what effects can be attributed to one or the other, but there is evidence that there is an effect as a whole. Guatemala also hypothesized that possible strategies to avoid BET may be the use of echosounder buoys and communication between captains with the intention to avoid extra closure days.

- **Japan** commented that the work presented is very useful and that it is evident that the IVT along with the EMP show positive results expressed as BET catch reductions as it was originally intended. These results should be reported to the Commission. It would be useful to collect and analyze additional years of fishery statistics under the IVT.
- **El Salvador** commented that the analysis does not incorporate finer operational variables like vessel communication and fishermen behavior and asked whether they could be incorporated into the model to improve model estimates and also help better understand what behavior of the fleet has changed. The presenter clarified the model controls for variables that are not part of the IVT but do affect catches, such as environmental factors. The staff is trying to find variables that do affect catches. Those variables can be incorporated into the model to understand why the catch was affected, but not to refine catch rates. Also, El Salvador requested clarification on whether the Enhanced Monitoring Program (EMP) contributed to incentivizing behavioral changes in the fleet to avoid bigeye tuna (BET) catches. The presenter explained that the IVT and EMP are two programs working in tandem, and it is not possible to statistically separate or quantify the individual influence of each program.
- **Ecuador** commented positively on this research and encouraged the staff to have a more direct interaction with the fishing industry to better understand the changes in fishing strategy of the fleet. The presenter commented that the staff is planning to prepare a survey on fishing strategies to be circulated among captains.
- The **United States** commented that the analysis is innovative and that there is clear evidence the IVT is effective, although the reasons for its effectiveness are not yet known.
- The **European Union** recommended the continuation of the IVT research. Echosounder buoys with double frequencies (discriminant buoys) can provide extensive information on vessel behavior in the BET fishery. This data should become widely available next year.
- **Colombia** asked whether the staff believes there has been a change in the catch strategy of vessels taking larger catches of bigeye tuna (BET). The presenter responded affirmatively, noting that this hypothesis most strongly explains the observed data in the fishery, as demonstrated by the IVT study.
- ISSF commented that highliners extensively communicate among themselves, sharing information on where bigeye tuna (BET) is and is not. Additionally, current echosounder technology does not appear capable of clearly discriminating between species, although some captains claim they are able to do so.

SAC-15 INF-M Impacts of the Corralito on the tuna fisheries and ecosystems of the EPO (SAC-15 INF-M)

Dr. Dan Ovando presented on an investigation to evaluate the impacts of the corralito on the tuna fisheries and ecosystems in the EPO (SAC-15 INF-K). The document was not originally planned to be presented according to the provisional agenda. However, the SAC requested for this INF paper to be presented.

Key Points:

- The spatial-temporal fishing closure known as the *corralito* has been in place in its current location since 2009, covering roughly the month of October with some changes over the years.
- Previous studies (IATTC-77-04 REV) predicted that the *corralito* was equivalent to three full days of closure of the purse seine fishery in the EPO. This study revisited this question and reached

similar conclusions that the *corralito* would be predicted to have the effect of on average roughly three days of closure, but with substantial year-to-year variability in this effect sizes, ranging from over ten days of closure in some years to several days of increased fishing in others.

- We found no empirical evidence of the effects of the *corralito* on numerous evaluated metrics related to catches of tropical tunas as well as other species of interest. We note though that this lack of clear empirical evidence is consistent with the expected effect sizes of the *corralito* relative to variation in the processes themselves, and as such should not be construed to mean that the *corralito* has had no effect.
- The potential of the *corralito* or other such area-based management measure in the EPO contributing towards global area-based management targets, such as those that may be enabled by the biodiversity beyond national jurisdiction (BBNJ) agreement warrants evaluation.

Discussion:

- **Guatemala** asked whether there is a *spillover* effect from the *corralito*. Also, there is a global trend towards area-based management (ABM) and the Commission needs to ensure that any spatial measures that are developed and implemented used (e.g. the *corralito*) meet desired outcomes of ABM. On the latter, the staff responded that spatial research is being conducted to evaluate the impacts of proposed ABM tools on EPO tuna fisheries and ecosystems. With respect to the *corralito*, the research conducted showed no clear signal of a spill-over effect regarding the tropical tuna.
- **Japan** inquired if whether the 3-day effect of the corralito was included in the original calculation of the 72 day closure. Related to this question by Japan, **Ecuador** noted that the reason behind the establishment of the *corralito* was to reduce the catches of juvenile bigeye tuna; however, the latest conservation measures also included individual vessel thresholds (IVT) on bigeye catches which were shown to be working effectively (SAC-16 INF-M). If the IVT is working well, could the Commission consider eliminating the corralito, and which measure is more effective, the corralito or the IVT? In response to both questions, the staff clarified that the *corralito* and IVT were adopted at different times for different purposes. The effect of the *corralito* corresponds to about 3 days of the EPO closure, on average. It was adopted so that the Commission only add to increase the purse-seine closure to 72 days (plus the *corralito* with added value of 3 days) instead of 75 days. The IVT program was later on included as an additional measure to prevent that fishing mortality on bigeye did not further increase thus compromising the effect of the 72-day closure (plus the *corralito*).
- **Ecuador** followed with a question regarding whether the effects of the corralito could be considered within the context of the BBNJ framework and its objectives. The staff clarified that the BBNJ framework primarily focuses on aspects of biodiversity that have not yet been addressed in the staff's research.

b. BET Management Strategy Evaluation (MSE)

Dr. Juan Valero presented an update on the ongoing MSE process at IATTC (**SAC-15-07**)

Key points:

- There is an ongoing MSE process for EPO tropical tunas, with an initial focus on bigeye tuna.
- The 2024 assessment has resolved many of the structural issues of previous BET assessments, so using that assessment for the operating models in the update of the MSE should result in a better strategy being selected.

- These changes, along with staff's evolving view on potential changes to target reference points for tropical tunas in the EPO, prompted the staff to revise the workplan for the bigeye tuna MSE work by replacing the original set of operating models with a new set of operating models derived from the 2024 bigeye tuna benchmark assessment, as well as incorporating proposed alternative HCRs and reference points.
- Challenges are ongoing with representation and high turnover of representatives in previous IATTC MSE workshops. Additional workshops are being planned and the establishment of a Science Management Dialogue Working Group is being considered by the Commission.
- The revised timeline includes bigeye MSE work during 2024 and 2025, with plans to expand the MSE work to the other tropical tunas (likely skipjack next and then yellowfin) now that funding has been secured for continuation of the MSE work for EPO tropical tunas.

Discussion:

- **Japan** commented that it should be the Commission owning the MSE process rather than the staff. The staff clarified that the Commission signaled a clear ownership of the process by supporting a MSE workplan as part of the staff activities. Also, the dialogue process has so far been facilitated and CPCs have sent their representatives. Finally, there are ongoing efforts to establish an IATTC Working Group on MSE.
- The **United States** commented that so far the only management action considered in the Harvest Control Rule (HCR) is controlling fishing mortality (*F*) through the duration of the fishing closure. What about the effect of the Individual Vessel Threshold program (IVT)? The staff clarified that the IVT should be included as a management action in the HCR. However, the relationship between the IVT and F is still not clear at this stage and more work needs to be done.

Revisiting target reference points for tropical tunas in the EPO (SAC-15-05)

Dr. Mark Maunder presented on revised target reference points for tropical tunas in the EPO.

Key points:

- Target and limit reference points are an important part of contemporary fisheries management.
- The Antigua Convention provides little guidance on reference points.
- However, the Antigua Convention commits the IATTC to applying the precautionary approach in accordance with the United Nations Fish Stocks Agreement (UNFSA), which offers some guidance on the definition and use of reference points.
- For tropical tuna in the EPO, IATTC Resolution C-16-02 formalized a harvest control rule with interim target and limit reference points, with target reference points corresponding to Maximum Sustainable Yield (MSY).
- The reference points have been used for yellowfin and bigeye tuna.
- This resolution was amended by IATTC Resolution C-23-06 to include the use of interim proxy target reference points.
- MSY based reference points are conditional on the size of the fish caught and this is a particular concern for bigeye tuna since the MSY target biomass reference point is estimated at a stock size that is highly depleted.

- A more global approach to defining MSY, which is designed to support a range of proportioning of catch among the fleets, supports a less depleted biomass (30%).

Discussion:

- **Mexico** agreed with the points made by the staff and commented that MSY changes with different mixes of selectivity are not shown on the Kobe plot.
- **United States** inquired if the final purpose of this research is its inclusion in the MSE. The staff clarified that this research is to be taken into consideration by the Commission when considering reference points. Keeping the population at levels that produce the MSY is the objective under the Antigua Convention, therefore the population should be maintained at a level that can produce MSY given the mix of fisheries. However, under the new bigeye benchmark assessment the biomass corresponding to the MSY (B_{MSY}), which is a function of biology and selectivity, has been estimated at low levels below 20% of virgin biomass. This level may be considered to close to the limit reference point (LRP). Although the MSE simulation framework does not evaluate the reference points, candidate reference points should be identified in the MSE dialogue process. Some suggest the use MSY as limit RP (lower quantile of the probability distribution of MSY), which may not be appropriate if MSY is used as TRP.
- **Ecuador** comment that the dialogue process should be extended to consider harmonization with measures at WCPFC. The staff clarified that the proposed 30% target biomass level is more aligned with WCPFC TRPs than the current B_{MSY} RPs.

c. Tropical tuna harvest strategies

- IATTC has adopted elements of a harvest strategy, some elements need further refining and specification to have a complexly specified strategy.
- Elements adopted include interim reference points, provisional harvest control rule, general management objectives. Target reference points have been revisited by staff for consideration of the Commission.
- Some elements may need to be refined (e.g., specificity of management objectives, probability of being above target reference points, performance metrics), other elements added (e.g., type, duration and derivation of management actions, exceptional circumstances) and agreed (e.g. data inputs required for strategy, duration of management cycles) in the development of harvest strategies for tropical tunas.
- Examples of recently adopted harvest strategies from other tuna RFMOs provide background for harvest strategy elements in need of further specification at IATTC.

Discussion:

- **Japan** expressed disappointment that the Commission is working under the assumption of having a candidate Harvest Strategy for bigeye next year and the introduction presented was very general. Japan also raised the multispecies aspects that need to be considered when developing a harvest strategy for the tropical tuna. One of the options is to develop a multispecies strategy, but that may not be practical as there could be conflicts. Also, it will be difficult to run 3 independent Management Procedures (MPs), one for each species. The staff commented that one alternative is to use the species that requires the strictest measures to define the strategy for all three species.

- **El Salvador** asked whether the current issues faced with the Japanese longline index of abundance could present challenges in the development of the harvest strategy. The staff clarified that although the challenges are real, there are some possible solutions. For example, developing a longline index with data from other fleets. Also, the use of an absolute index from tagging data as that developed for SKJ. However, these solutions depend on availability of improved longline data and a tagging program, respectively.
- The **European Union** commented that this process has been moving forward for a few years now. The Commission should own the plan as soon as possible.

The following sections of this report will be added shortly