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SC16 Recommendations under Agenda Item 4.1.2

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Secretariat
(Paragraph numbers are from SC16 Summary Report)

4.1.2 Performance indicators, monitoring strategy harvest control rules and management strategy evaluation (MSE)

228. P. Hamer presented SC16-MI-WP-03 Overview of recent developments and key decisions for harvest strategies for WCPFC stocks and fisheries with reference to SC16-MI-IP-01 Additional trajectories to achieve the South Pacific albacore interim TRP; SC16-MI-IP-02 Developing the monitoring strategy for the WCPFC harvest strategy for WCPO skipjack; SC16-MI-IP-03 Results of re-evaluations of management procedures for skipjack tuna in the WCPO; SC16-MI-IP-04 Retrospective CPUE forecasting of south Pacific albacore; SC16-MI-IP-05 HCR design considerations for south Pacific albacore; SC16-MI-IP-06 Further consideration of the mixed fishery management strategy evaluation framework for WCPO tuna stocks; SC16-MI-IP-07 Developing a set of diagnostics and outputs for MULTIFAN-CL stock assessments; SC16-MI-IP-08 Updating the WCPO skipjack operating models for the 2019 stock assessment; SC16-MI-IP-09 Developing management procedures for WCPO skipjack: The Estimation Model; SC16-MI-IP-10 Simulating future data for WCPO skipjack harvest strategy evaluations; SC16-MI-IP-11 Report on the second external MSE review: Developments in the South Pacific albacore MSE framework.

229. The presenter noted that the last year has seen significant progress in the technical aspects of the harvest strategy workplan. To facilitate discussions at the electronic SC16, this paper provides summaries of 10 harvest strategy related papers submitted to SC16 along with updates on progress with stakeholder engagement and capacity building activities and revisits the key decisions and advice topics that were raised in 2018 at SC14 (SC14-MI-WP-05).

230. The skipjack and South Pacific albacore MSE work is now progressing to the stage of evaluation studies. Elements of the South Pacific albacore MSE framework have also now received external expert review. While refinements to the modelling framework will continue to occur, greater input from managers and stakeholders will be important over the coming year to contribute to the design of more formal evaluation studies to inform the choice of management procedures for these two key tuna stocks in the WCPO, and support the WCPFC to meet its targets under the current WCPFC harvest strategy workplan.

231. To facilitate progress from technical MSE development and testing of management procedures, to adoption and eventual implementation of harvest strategies, will involve consideration of trade-offs among

management objectives. Science advice around these trade-offs will be important. To support continued progress of the harvest strategy workplan, mechanisms to allow scientific outputs to be reviewed by managers, and for managers to guide further work will be needed. We encourage the SC16 to consider providing advice on approaches to achieve this (e.g. the concept of a 'Science Management Dialogue' proposed at SC15; SC15-MI-IP-08).

232. Following recent developments in the MSE framework for skipjack and albacore, the technical team will look to develop the multispecies modelling framework, as endorsed at SC15. This presents various achievable challenges from a technical perspective.

233. COVID-19 has impacted the momentum with stakeholder engagement and capacity building that was gained through 2019 and early 2020, when the project had offered training on harvest strategies to approximately 170 fishery agency staff from 11 member countries. We are now pursuing approaches to online/remote workshops to continue this important aspect of the harvest strategy workplan, including increased engagement with all CCMs.

234. The authors invited SC16 to provide:

- advice on candidate HCR designs for both skipjack and SP albacore (SC16-MI-IP-03; SC16-MI-IP-05);
- feedback on the presentation of MSE results to assist decision making (SC16-MI-IP-03; SC16-MI-IP-05);
- recommendations for any additional diagnostics that should be included in the online tool developed to display OM (and stock assessment) diagnostics (the 'hierophant'; SC16-MI-IP-07);
- feedback on the specific requests regarding the calculation of performance indicators for the skipjack monitoring strategy (SC16-MI-IP-02).
- advice on the adequacy of the uncertainties (and their ranges) included in the skipjack and SP albacore MSE frameworks (SC16-MI-IP-03; SC16-MI-IP-05).

235. Further, to progress the development of harvest strategies for WCPO stocks and fisheries, the SC may wish to seek advice from the Commission on the following issues:

- Definition of fisheries and fishery controls within the harvest strategy (SC16-MI-IP-03; SC16-MI-IP-05);
- Procedures for selecting the 'best performing' MP (SC16-MI-IP-03).

Discussion

236. Samoa, on behalf of FFA members, thanked the SPC for a comprehensive update on the work on harvest strategies and noted the significant progress and fast pace at which progress has occurred. They encouraged all CCMs to try out the new apps (SPAMPLE and Hierophant) that were recently made available and provide feedback to SPC. They noted that the papers prepared for SC16 indicated work on harvest strategies is progressing at a fast pace, and FFA members suggested that SPC consider increasing the pace of capacity building to align with the rapid pace of work on harvest strategies as this will enable a full understanding on the harvest strategies and informed decision making

237. Japan noted the difficulties in structuring the discussions due to the electronic meeting format. Regarding the overall structure of the MSE for skipjack, Japan asked for clarity on how and when the elements of the operating model will be agreed and adopted — given that the model is continually being updated, when will this be finalised to allow testing of MPs under a final set of diagnostics? SPC stated that in 2020 the process for updating the framework for the related stock assessment was completed, with no

substantial changes between model outputs between 2016 and 2019. The range of uncertainty in the grid changes only a small amount, and results are comparable. In regards to the process for adoption of an operating model (OM) grid, this is a question to wider membership as well as for the SC. The OM grid that has been presented based on 2019 assessment has uncertainties and assumptions similar to the 2016 model, which was agreed to by the SC. The assessment is very similar to the 2016 one, with some components simplified. SPC asked SC to consider whether the current grid was acceptable for future evaluations?

238. The MI Theme Convener noted that the discussion illustrated the need for a science-management dialog.

239. Japan observed that the model grid was the same used for the current stock assessment, and the current MSE is simply simulating status quo, and involves no uncertainties outside the current stock assessment model. They suggested the MSE should involve other uncertainties than just those in the stock assessment itself. SPC stated that the stock assessment includes an uncertainty grid that covers major sources of uncertainty associated with the stock assessment. The new model conditioning did include an additional growth element that was not included in the previous model. The aim was to try to replicate the results of the stock assessment model based on the components previously agreed by SC. SPC is seeking to add elements such as effort creep. Regarding the spatial structure of the model they stated that suggestions for what should be added to the uncertainty grid are welcome, and asked whether other elements should be introduced to increase model robustness? Japan agreed that new scenarios might be needed, although what should be included would need to be further discussed. Japan stated that the performance indicator for impact on small scale fisheries is important for Japan's managers. Regarding the multi-fisheries MSE work, it was agreed to develop a skipjack MSE, but that does not necessarily imply adoption of a multi-species hierarchy for skipjack, with priority given to purse seine fisheries. SPC stated that it would be difficult to include small scale fisheries in the operating model without additional data pertaining to these fisheries to inform the model fit.

240. The MI Theme Convener noted that the current electronic meeting is not the most appropriate forum to discuss all these very technical papers, and suggested opening/extending the Online Discussion Forum to allow additional opportunity to provide feedback to SPC on issues related to these papers.

241. The USA observed that page 2 of SC16-MI-WP-03 states that the harvest strategies sit "below higher-level management and governance frameworks or policies that determine 'how' fishing opportunities are regulated (i.e. catch, gear, spatial/temporal closures, direct effort-based controls), and allocated.", but that the USA sees the in the opposite manner: the HS sets the highest-level objectives, under what is stated in the Convention, as it is a management plan. The on-water fishery controls implement the HS (e.g., through CMMs) and so are at a **lower** level than the HS. The paper discusses a science-management dialogue (on page 1), which the USA continues to support. SPC requested that the USA provide their comment regarding the harvest strategies on the online forum if it goes ahead to commence a further discussion on where HS sit within the management framework.

242. PNG supported Japan's statement that further discussion was required on some of these points. They stated their understanding that the MSE should be based on the current model, and that the discussion regarding new uncertainties and spatial structure is not what this work was supposed to focus on; instead, it was intended to ensure a standard is in place by which to monitor the fishery. If additional options are to be considered for this work, substantial additional capacity building would be needed during the remainder of 2020.

243. PNG also commented on behalf of the PNA, and aligned themselves with the comments made by Japan: that the MSE projections would be based on the current stock assessment model. These new elements of uncertainty, spatial structures and other specifications go well beyond their understanding of what the

management procedure would do. PNA members understood the operating model was to draw a line in the sand to continually assess the performance of the management of fish stocks from a fixed point. Changes to the operating model were only to be considered on the occurrence of exceptional circumstances. They stated that while they appreciated the time and work invested into progressing this work, these new elements go far beyond the understanding of PNA members on this work. PNG stated that speaking from the perspective of a CCM that may lack the technical capacity to digest the changes quickly, the capacity building alluded to in the presentation needs to be increased significantly. PNA members also expressed support for the FFA statement; thanked SPC for the ongoing MSE work and New Zealand for the funding support; and stated they were encouraged by the positive results reported regarding the skipjack management procedures and the south pacific albacore MSE framework.

244. Chinese Taipei commented regarding the length-based HCR included as a test; this was a new test, as previously only a CPUE HCR was used. They noted that length-based indicators are not a good measure of stock status due to inter-annual variations of recruitment and fleet selectivity, and the latitudinal variation in length for the South Pacific albacore. They questioned why a length-based indicator was used when the TRP is set on achieving an increase in CPUE, and stated caution should be exercised with respect to a length-based approach. SPC stated that the development of the length-based indicator was preliminary and had limitations, and that it was tested for exploring different approaches to an HCR using various empirical data.

245. EU thanked SPC for their comprehensive papers, and noted the difficulties in having an in-depth discussion on such technical matters, and the significant differences in understanding on key concepts. They supported the MI theme convener's suggestion to progress the discussion through an Online Discussion Forum and hoped CCMs would participate in carrying on the conversation.

246. The USA stated that one concern with using empirical CPUE-based HCRs is the high probability of effort efficiency creep (1.5%–3% per year) which can result in increasing fishing mortality with no change in CPUE simply because effort is more efficient. This is akin to hyperstability in CPUE which was not considered in the OM grid. One concern with empirical rules that are length based is that changes in the mean length reflect changes in the proportions at age when there is no density dependent growth and when recruitment is relatively constant. The trends are masked when there is density dependent growth. The signal in the change of mean length decelerates as the population declines and recruitment becomes proportional to spawning abundance. The ranges of steepness in the OM grid used should account for this. They suggested it might be worth exploring asymmetric rules for length-based rules. SPC stated that alternative indicators were included in the paper; for example, empirical MPs can be used that are not based on CPUE, to demonstrate the different type of HCRs that can continue to be developed. There are many caveats that apply to these. SPC stated that, as with skipjack OMs, it seeks input from members and welcomes advice on how the grid should be constructed. The paper demonstrates progress made on the albacore HS MSE framework, and the HCRs are examples of what can be done, noting SC's request to focus on empirical options. SPC stated that while SC agreed to empirical initially, SC had also noted in the past that analytical approaches might also be appropriate.

247. Tokelau, on behalf of the PNA raised concerns that some of the options being considered within the HCRs do not meet requirements of para 12 in CMM 2014-06 (Harvest Strategy CMM): *to avoid overfishing and not transfer a disproportionate burden to developing state parties and territories*. In their view, any discussion on proposed HCRs should consider whether it creates a disproportionate burden on SIDS. PNA members prefer to see indicator 5 included throughout the MSE frameworks to avoid the possibility that MSE work is invalid because the disproportionate burden has not been considered. They noted it may not be informative in the skipjack MSE but it is critical in the multispecies framework. They stated that there may need to be different indicators within the mixed species framework compared with single species, and inquired regarding SPC's view on the issue. SPC confirmed that this is the case, and

they are looking at how single stock MPs can affect stocks not included in that MP. SPC also agreed that mixed fisheries MPs could open the opportunity for CCMs to provide input on other potential indicators, and welcomed input from CCMs on alternative options to be included within the framework.

248. FSM commented on behalf of the PNA, stating it was clear that in the multi-species tropical fisheries, it will not usually be possible to achieve all the TRPs at the same time, and mixed fisheries harvest strategies will likely lead to one or two stocks being fished above or below the TRP. This tradeoff is not discussed in SC16-MI-IP-06 on mixed fisheries, but the presentation asked how tradeoffs will be dealt with. The PNA's view is that, ultimately, the models need to be able to evaluate mixed fishery harvest strategies of this kind in a way that directly addresses tradeoffs. Until they do, PNA expects that the Commission will make decisions involving the tradeoffs much as it does now. They asked SPC how the MSE frameworks will inform the discussion about tradeoffs and when models might be developed that can evaluate tradeoffs directly. SPC noted this point, stating that as work continues on developing the multi-species framework those kind of tradeoffs for different species TRP will be presented. It will be up to CCMs to determine how these tradeoffs should be resolved, but information to consider the impact of the different options will be presented from the mixed fishery framework to support discussion on these issues.

249. The MI theme convener acknowledged the work of SPC on the HS work plan and the question from Japan on when the elements of the OMs and MSE will be formally adopted. Currently the schedule is that these will be adopted in 2022, and he stated that hopefully SC17 would be ready to adopt the estimation and operating model to allow identification of a range of HCRs that can be formally tested in time for SC18. SPC raised concerns that a formal process to agree on things such as OM grids is lacking, stating that this needs to be agreed in time for the meeting in 2021, as formal evaluation of management procedures should be occurring at this point. The science-management dialogue was meant to provide such guidance. Feedback from SC to SPC is needed if additional uncertainty or other elements are to be added to the grid. The MI theme convener stated that in the absence of a science-management dialogue, a meeting could be held around the pre-assessment workshop in 2021 to enable SC scientists to discuss some of the more technical aspects of the model to progress this discussion and provide recommendations and advice for SPC to consider.

250. Japan stated that the point raised by SPC was very important, and an outstanding issue that is not clear in the process of the MSE development. They generally supported the suggestions of an Online Discussion Forum and a meeting around the pre-assessment workshop but noted that the workshop is not a formal meeting of the WCPFC; if that approach is used it needs to be clear that it will have highly technical aspects with formal decisions made at SC. What would be done in conjunction with the pre-assessment workshop would need to be clarified.

251. The MI theme convener noted the support voiced by various CCMs and stated that having an Online Discussion Forum open for a few months would allow the discussion to inform a meeting at the pre-assessment workshop, and enable SC to formulate recommendations for the Commission on elements of OMs, an estimation model, and a workplan for HCRs. He noted CCMs could make suggestions to SPC on alternative HCRs to consider, and that there was scope for different options to be put forward to be tested.

252. SPC noted and appreciated the suggestions for a forum and additional meetings to get the feedback they require.

253. In response to a query from Indonesia, SPC stated that initially it looked only at archipelagic waters around PNG and Solomon Islands. They now take into account Indonesian archipelagic waters as well; SPC noted that there are potentially archipelagic waters in the Philippines that also need to be considered.

Recommendations

254. **Noting the request by WCPFC16 to review the progress on the technical development of WCPFC harvest strategies for the key WCPO tuna stocks, SC16 reviewed SC16-MI-WP-03 and received a very brief summary of ten (10) related Information Papers (SC16-MI-IP-01 to SC16-MI-IP-10) and provides the following advice to the Commission:**

a) **SC16 noted the difficulties in structuring the discussions for this large amount of work due to the virtual nature of the meetings format.**

b) **SC16 also noted the constraints that COVID-19 has had on ongoing capacity building with the result that not all CCMs were as well placed as they would have liked to have been to provide feedback on all aspects of this work.**

c) **Despite these limitations, SC16 welcomed the work presented by the Science Service Provider on skipjack management procedures and the south pacific albacore MSE framework.**

d) **SC16 noted that the Operating Model for skipjack tuna had been updated to take account of the updated assessment presented in 2019 and that there were no substantial changes between the model outputs compared to those from the previous model.**

e) **In response to a question about how and when the elements of the Operating Models for skipjack and SP-albacore would be agreed and adopted to allow testing of Management Procedures (MPs) under a final set of diagnostics, SC16 noted that with further input from CCMs over the coming year (see recommendations below) that adoption of the Operating Models could be undertaken at SC17 with the review of a final suite of MPs to be undertaken by SC18. This would align with the schedule for the adoption of a MP for both skipjack and South Pacific albacore as outlined in the current Harvest Strategy Workplan.**

f) **SC16 noted that the current Operating Model for skipjack conditioning includes an additional growth element that was not included in the previous model, and there may be a need to expand the grid of uncertainties in relation to the occurrence of exceptional circumstances.**

g) **One CCM noted the need for Performance Indicators (PI) for the impact on small-scale fisheries, but SC16 was informed that currently it would be difficult to include these fisheries within the Operating Model and unless further information/data pertaining to these fisheries is provided the development of a PI (or a proxy) would also be difficult.**

h) **Several CCMs also noted the need for a PI to meet requirements of para 12 in CMM 2014-06 (Harvest Strategy CMM), specifically to avoid overfishing and not to transfer a disproportionate burden to developing state parties and territories. They also noted that while such a PI may not be informative in the skipjack MSE it was seen as critical in the multispecies framework. The Scientific Services Provider advised SC16 that input from members on alternative PI options to be included within the framework was welcome.**

i) **SC16 noted the inclusion of a length-based indicator in the suite of empirical Harvest Control Rules (HCRs) tested for South Pacific albacore and that this had been undertaken to explore different ways of constructing a HCR using empirical data approaches that are not based on CPUE. The limitations of such length-based indicators were noted. SC16 also noted that unless effort creep can be accounted for, the utility of empirical HCRs that are CPUE-based can also be compromised. SC16 noted that model-based approaches might also be appropriate.**

j) **In relation to the multispecies approach being developed, SC16 noted that it may not be possible to achieve all the TRPs at the same time, and mixed fisheries harvest strategies may lead to one or two stocks being fished above or below the TRP. The Scientific Services Provider advised SC16 that options to support discussion on such issues will be developed within the mixed fishery framework.**

255. **Noting the key findings and challenges summarised above, SC16 provides the following advice and recommendations to the Scientific Services Provider (SSP) and the Commission:**

a) **SC16 recommends that WCPFC17 note the progress on the development of the Harvest Strategy Workplan as outlined in SC16-MI-WP-03 (and related Information Papers) and provide additional elements, if any, as specified in the Harvest Strategy Workplan to further progress this work against the scheduled timelines noted in this Workplan.**

b) **Noting that the virtual SC16 meeting had not provided enough time to consider the ten information papers (SC16-MI-IP-01 to SC16-MI-IP-10) related to the progress of developing the WCPFC harvest strategy framework, and the ongoing needs of the SSP to get further feedback from CCMs on this work, SC16 agreed to continue discussions on these ten papers through the WCPFC Online Discussion Forum (ODF). The purpose of the ODF would be to:**

   i) **facilitate feedback on technical aspects related to the issues covered by the ten information papers presented to SC16;**
   ii) **enable CCMs to make suggestions to the SSP on alternative HCRs to consider;**
   iii) **get benefit from participant's feedback on the progress on the SSP's work;**
   iv) **assist with the mutual understanding of this work; and**
   v) **assist with capacity building of the participants.**

   The ODF should remain open for as long as required.

c) **SC16 noted that this ODF activity is outside of the Scientific Committee and any discussions on this ODF will not constitute formal recommendations to the Commission or the SSP.**

d) **SC16 also noted that given the large range of technical issues included in the ongoing development of the WCPFC harvest strategy framework, and limitations for the SC to undertake a thorough review of these issues, that progress on many of the technical aspects related to this framework would be enhanced through an intersessional workshop, which could be held in conjunction with the annual Pre-Assessment Workshop (PAW) hosted by the SSP. Like the PAW, the aim is for this workshop to be a technical meeting of scientists who have a common interest in providing feedback to the SSP on technical issues related to the development of the harvest strategy framework. The outcomes of the meeting would be documented, and the report of the meeting and other analyses would be submitted to the WCPFC Scientific Committee either as a stand-alone paper or within other relevant papers. SC16 requests the Commission to consider the utility of holding such a workshop.**

e) **Finally, noting that the development of the WCPFC harvest strategy framework is reaching a mature stage, and the increasing number of issues that require the attention of, and feedback from, managers in order to progress the Harvest Strategy Workplan, SC16 again reiterates its previous recommendations for a Science-Management Dialogue to be convened. In addition, SC16 calls attention to the importance of such a dialogue to ensure the input of managers and stakeholders to the MSE process and to ensure timely execution of the Commission's harvest strategies workplan.**