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Summary Report from the 2024 SPC Pre-assessment Workshop

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Report from the SPC Pre-assessment Workshop (PAW), March 25-28th 2024

Pre-assessment Workshop Overview

To help guide stock assessment and related modelling work and analyses for the Western and Central Pacific Fisheries Commission (WCPFC), the Oceanic Fisheries Programme (OFP) of the Pacific Community (SPC) has sought input from regional stock assessment scientists, consultants and representatives from regional fisheries organisations that are part of the WCPFC, through the SPC pre-assessment workshop (PAW) process. The sixteenth PAW was held from the 25th – 28th March 2024. The meeting was held under a hybrid format, with 23 external fisheries scientist and consultants travelling to Noumea, 20 SPC staff and a further approximately 25 people joining online. Sixteen organisations were represented, from across at least 12 countries.

Paul Hamer (OFP, SPC) chaired the meeting. The meeting agenda focused primarily on:

- Approaches for the 2024 stock assessments of south Pacific albacore, southwest Pacific striped marlin, Western and Central Pacific Ocean (WCPO) silky shark (phase 2) and WCPO oceanic whitetip shark (phase 1),
- Technical developments in Management Strategy Evaluation (MSE), focussing on challenges with development of MSE and an MP for south Pacific albacore,
- Developments to the MULTIFAN-CL modelling framework in 2023 and the 2024 workplan,
- WCPFC Project 123: scoping study for the next stock assessment platform for WCPFC tuna assessments,
- WCPFC Project 122: scoping study on longline effort creep in the WCPO,
- WCPFC Project 113b: developing a stock status and management advice template for consistent reporting of stock assessment outcomes, uncertainties and risk,
- WCPFC project 90: length weight conversions,
- Progress of the Close Kin Mark Recapture (CKMR) project for south Pacific albacore and an overview of the sampling design work and considerations for CKMR work, and;
- Developments in age validation work and SPC's enhanced capacity in fish aging validation using bomb radiocarbon.

The planned agenda is in Appendix 1, and list of attendees is in Appendix 2.

Presentations were invited from all participants, with the majority made by SPC staff or consultants working with SPC. Six external presentations were provided. The meeting operated under the terms of reference provided in Appendix 3.

This report describes the various presentations made, issues discussed by participants, and suggestions made. The report does not attribute comments to countries or individuals except for those that provided presentations and where the comment related to the agreement to provide data or to undertake particular analyses. The relevant stock assessment scientists will consider the recommendations and ideas from PAW as they develop the assessments and other research activities

    - improving stochastic projection efficiency (estimator model evaluation)
    - stochastic projection functionality for: terminal numbers, recruitments with autocorrelation, selectivity deviates
- Catch-conditioned model:
    - enable estimation of selectivity deviate coefficients
    - review the operation of existing control phase routines
    - apply fml_effort_rltnshp estimation conditional on a fish_flags(fi)
    - testing with multi-sex example
    - generation of simulation pseudo-observations of tagging data
- Extend von Bertalanffy st.dev correction to Richards curve, and multi-species/sex instances
- Correct discrepancy between Frecent/FMSY in variance report and Fmult in plot.rep.

Nick also noted work that remains on the list from the recent yellowfin assessment peer review, including:

- Extend MULTIFAN-CL so that variability in weight-at-length can be taken into account.
- Extend MULTIFAN-CL so that it is possible to specify the number of spline knots when defining selectivity and where they are located with respect to age (length) as the current approach means that the selectivity for some knots is constrained to zero.
- Extend MULTIFAN-CL so that account can be taken of age-reading error when fitting to conditional age-at-length data.
- Add the ability to specify overdispersion in CPUE as an additive rather than multiplicative factor.
- Integrate the calculation of M-at-age from the sex-ratio data into MULTIFAN-CL unless a sex-specific assessment is used.

(Note: since PAW a new benchmark tested version of MFCL has been released Vers. 2.2.6.0)

Arni Magnusson then presented an overview of the WCPFC Project 123: Scoping the next stock assessment platform. He covered:

- Project P123: objectives, background, terms of reference
- Software Platforms: operational, current and future development
- Road Ahead: assessments, workshops, collaboration, adaptive plan
- Possible Outcomes: level of funding, partnerships

Arni emphasized the need to start working towards a successor for MFCL given the recent retirement of Dave Fournier and the retirements of John Hampton and Nick Davies expected in the not too distant future. Project 123 was supported by the WCPFC to the extent of 50,000 USD per year (plus a 10,000 USD additional contribution for ISSF), with a 3 year window. The funds will provide support for SPC staff to start driving a process of transition which will require building collaborations, workshops, and scoping of what will be required from future tuna stock assessment software, and trialing alternative software platforms on tuna data. Also noting the ADMB project is now finished, and models are moving to TMB.

Arni outlined the workplan:

2024

1. Review and identify important model features for tuna assessments
2. Identify existing platforms that have these features or can be extended
3. Reach out to and initiate collaboration with model developers
4. Conduct two workshops in 2024, one online and one in person

2025-2026

5. Conduct simulation studies
6. Determine which platforms can be considered viable candidates
7. If a viable platform has been identified, plan transition
8. If no viable platform is identified, extend a platform or create a new one

A number of existing software packages were discussed, along with several that would be considered in as in ongoing development.

- Stock Synthesis (nearing end of life)
- Casal2 (still being developed)
- Gadget (still being developed)
- SAM fitted to length comps (Colin Millar, Anders Nielsen) (still being developed)
- WHAM fitted to length comps (Giancarlo Correa, Tim Miller) (still being developed)
- ALSCL (Fan Zhang, Noel Cadigan) (research model – could be developed further)
- CCSBT (D'Arcy Webber, Rich Hillary) (still being developed)
- FIMS (NOAA project) (major model development project to superseded Stock Synthesis)

The push for developing State Space Models with length and age structure, spatial partitioning and ultimately the capacity to model tagging data and incorporate CKMR data was noted.

Options to consider how to progress this transition were discussed: in particular, should we just roll the handle on the next MFCL assessments and devote resources to implementing the assessments in other software. It was noted that this transitioning and testing of alternative software is also not a 'hobby' project and will require full-time dedicated staff resources. A strawman was proposed to guide the transitional workflow (Figure 5).

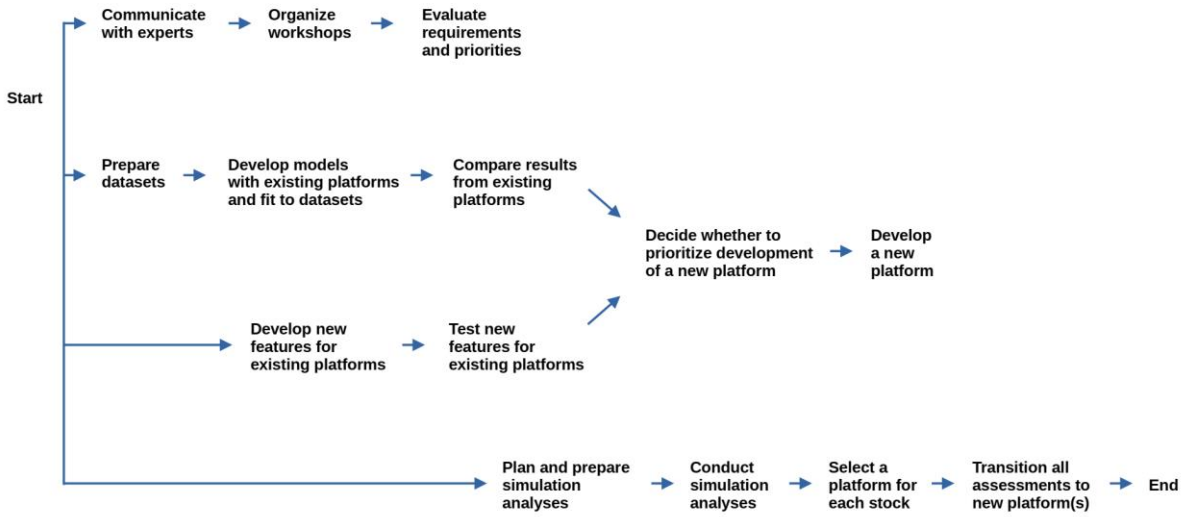

Figure 5. Workflow strawman pathways for the transition from MFCL to a successor stock assessment platform.

Arni noted the risk that continuing with a small allocation of funds each year will likely lead to limited real progress as the work will be a side project. We will continue to make smaller improvements to MFCL, try other software that will not do everything we need, have a workshop and repeat this, rather than devoting a fulltime resource to the work, have a clear plan with a target to be implementing an MCFL successor within X years. For the latter, we would be likely requiring a fulltime two-person team for 5 years. The importance of collaboration was emphasized, this is not something that SPC would want to go alone on.

The PAW noted the need to reach out to other RFMOs for collaboration and the need for a well formulated proposal if planning on asking for greater contributions from WCPFC members through SC/WCPFC contributions.

The PAW noted the step involving identifying what features and capabilities are desired is a really key step. Noting that the list of software mentioned did not include SEAPODYM, and that we need to be looking at these types of models and fully exploring the features and capabilities, including the incorporation of the environmental data. Develop a comprehensive wish list and take it to the groups actively developed stock assessment software and see if they can build in these features. SEAPODYM was never really considered a stock assessment tool, but with its ongoing development, perhaps it can be added to the stock assessment list and considered is an option in this context.

The PAW noted that the CAPAM next generation stock assessment model meeting in 2019 came to a point where there was general support that developing a collaborative general modeling framework or suite of models that can serve needs across very many users and contexts was the way forward. However, this has not eventuated, and different groups have tended to go back to working on their own models, the global collaboration has not happened. This project may end up being just another solo effort, which seems an inefficient use of time and resources. The PAW emphasized to not go down a SILO path, but to make strong effort to build the broader collaborations.

The PAW noted the benefits of having a large/moderate user base for whatever succeeds MFCL – both for resilience to staff turnover but also detecting bugs. Also, the SC really needs to have a conversation on where and what roles they see that stock assessments will play in the future as MSE and management procedures are becoming the main drivers of management decisions. This may factor into refining the focus of these types of model development projects, and this discussion probably needs to happen before going to the commission for large amounts of funding. The PAW noted that collaboration will be promoted if all the RFMOs chipped in resources so that their scientists have an incentive and are supported to collaborate and contribute work.

The next presentation was provided by **Phil Neubauer on WCPFC Project 113b: Standardised stock assessment reporting framework.** The project is contracted directly from the WCPFC secretariat to DragonFly data science. The presentation outlined the terms of reference and scope of the work. The first part of the work will be to conduct a survey of managers across the WCPFC membership, with feedback expected by May and then follow-up with stock assessment scientists. A draft report would be expected to be shared with CCM heads of delegations in June, and then revised and updated for consideration at SC20.

Rob Scott from (SPC-OFP) then provided an update on the south Pacific albacore harvest strategy development, with a focus on the MSE development. Rob noted the WCPFC workplan aims to adopt a management procedure for south Pacific albacore in 2024, and to achieve that, there is a lot of technical work on MSE that will be required this year. Rob noted the implication of the new assessment, and the interim TRP adopted by WCPFC 2023. The presentation outlined the history of the albacore MSE work, and the approaches to the stock status estimation methods, noting simpler empirical approaches failed and have moved to model based estimation methods, exploring various forms or surplus production models. So far, the MSE framework, operating models etc. have been based on the 2021 assessment, but considerable pressure to update everything to the 2024 assessment, which places some serious workflow and time challenges if an MP is to be adopted in 2024.

In terms of the HCR component of the MP to start testing, the form used for the skipjack MP is being used as the basis. The OM grid currently includes steepness, movement, size data weighting, growth, recruitment distribution, CPUE hyperstability, effort creep, and is considering options to dealing with the recent big dip in stock status (depends on new assessment), scenarios regarding options for how to manage the EPO stock component and climate change. Noting these would all be reviewed pending the 2024 assessment. Rob noted the retrospective issues with the previous assessment models and the improvements presented in the new assessment models, plus the problematic issue of the big dipper for the MSE projections, and that moving to the 2024 model might be desirable, especially if it is an improvement on the 2021 model with respect to these issues. Rob discussed the issue of the bigger dipper and the evidence in the size composition that recent recruitment failure and continued high catches was driving the recent dip.

Rob showed some comparisons of the overlap in the depletion trajectories of the 2018, 2021 and some preliminary 2024 models – indicating the early signs are that the 2024 assessment would be relatively consistent (overlap the ranges) with previous assessments. Rob discussed the things that would need to be worked through to update to the 2024 model spatial and fishery (areas and fleets) structures. He also noted the simplified spatial structure for the 2024 assessment may limit the