SCIENTIFIC COMMITTEE
FIFTEENTH REGULAR SESSION
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SC15 Recommendations under Agenda Item 5.1.2 and 5.1.3

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Secretariat
(Paragraph numbers are from SC15 Summary Report)

5.1.2 Target Reference Points

Yellowfin and bigeye tuna

370. SC15 reviewed information on what would be the minimum setting for a candidate spawning-biomass-depletion-based TRP (or maximum fishing-mortality-based TRP) for yellowfin and bigeye tuna that avoids breaching the LRP with a specified level of probability under the current uncertainty framework (SC15-MI-WP-01).

- While SC15 noted that the main biological consideration for a TRP is that it should be sufficiently above the LRP, SC15 also noted that the choice of a TRP can be based on a combination of biological, ecological and socioeconomic considerations.
- In this regard consideration of other factors (such as CPUE and the financial performance of typical vessels) in the selection of candidate TRPs would be welcome.

371. SC15 welcomed the consideration of multi-species impacts based on the selection of a minimum TRP based on a given risk of exceeding the LRP for a given species, and whilst desirable noted the difficulty in extending this analysis to include the impact on South Pacific albacore.

372. SC15 recommends that the Scientific Services Provider update the analysis to incorporate the updated assessment for skipjack, and that WCPFC16 take note of these results when identifying appropriate TRPs for yellowfin tuna and bigeye tuna in 2019 as scheduled in the Harvest Strategy Work Plan. In so doing WCPFC16 should clarify the management objectives for these species.

South Pacific albacore tuna

386. SC15 reviewed information on alternative catch trajectories to achieve the South Pacific albacore interim TRP within no later than 20 years (SC15-MI-WP-02). SC15 noted the historical status and the projections have a greater uncertainty in spawning stock depletion for South Pacific albacore than observed for bigeye and yellowfin tuna because South Pacific albacore has a different grid which incorporates natural mortality and growth and this gives a wider spread of uncertainty. SC15 noted that the recovery target can be achieved through many different approaches with the assumed long-term recruitments. However, catch (and effort) reductions from the 2014-16 average (of 60,000 mt) are required under all scenarios, and the

resulting stock trajectories have different consequences for the associated fisheries. For example, if catch reductions are insufficient, or management action is delayed, the stock declines in the short term, with the consequence that management interventions may then need to be greater to achieve the interim TRP within 20 years, as stock recovery will be from a lower biomass level. Delays in the introduction of the reduction of catch may also increase the risk (12% in 2022 under 2014-2016 average catch levels) of breaching the LRP in the short term.

387. Several CCMs expressed a preference for a recovery time shorter than 20 years, while one CCM stated that the introduction of legally-binding catch quotas would be needed to order to implement a re-building strategy.

388. SC15 also noted that constant catch scenarios may mask declines in catch rates and associated economic conditions and requested that the Scientific Services Provider undertake a similar set of analyses based on fishing effort-based projections. SC15 recommends that WCPFC16 take note of both sets of results in consideration of rebuilding the South Pacific albacore stock to the interim TRP within 20 years.

5.1.3 Progress on the development of Harvest Control Rules and Management Strategy Evaluation

Review of harvest control rules for skipjack tuna

389. SC15 reviewed several papers related to ongoing work which is being undertaken by the Scientific Services Provider as specified in the Harvest Strategy Work Plan on the management strategy evaluation (MSE) framework for skipjack.

390. First, SC15 reviewed information on the outputs for the skipjack harvest strategy and the work undertaken to test candidate MPs based upon the latest MSE framework (SC15-MI-WP-05), noting that the technical details of the evaluation framework that underpins the results are documented in a separate information paper (SC15-MI-IP-02). SC15 welcomed the progress on this issue and noted the following:

- The estimation model is model-based as the use of purse-seine CPUE as an index of abundance is problematic due to effort creep associated with technological developments (e.g. acoustic FADs);
- Further work is required so that Performance Indicator 5 (the impact of harvest strategies on Small Island Developing States) can be included;
- Work is progressing on identifying specific El-Nino and La-Nina distribution models so that non-stationary movement can be estimated and help account for possible climate change related impacts.

391. Second, SC15 reviewed information on the range of uncertainty which will need to be considered in the modelling framework when testing a management procedure (MP) (SC15-MI-WP-06). In particular, SC15 reviewed the Reference set of uncertainties (considered to reflect the most plausible hypotheses) which is the primary basis against which all candidate HCRs should be evaluated, and the Robustness set of uncertainties (comprising hypotheses that are considered less likely but still plausible) against which a final sub-set of candidate HCRs would be evaluated in order to determine the 'best' management strategy.

392. SC15 also noted that as part of the monitoring strategy it will be necessary to define 'exceptional circumstances' to identify those situations that fall outside of the range of scenarios against which the implemented MP has been tested. SC15 again welcomed the progress on these issues and in reviewing the Reference set of uncertainties used in the MSE noted that these expand on the set of uncertainties included in the structural grid used in the stock assessment. SC15 recommended that an expanded set of diagnostics be provided so that the plausibility of the fit of each operating model used in the Reference set could be

investigated. SC15 also recommended that the Scientific Services Provider conduct appropriate inter-sessional consultation with CCMs on the conditioning of the operating model and other relevant issues to ensure greater inclusiveness for MSE process.

393. Third, noting that stakeholder engagement is a key component of the harvest strategy approach, SC15 reviewed information on a tool (Performance Indicators and Management Procedures Explorer, PIMPLE) for exploring and comparing the relative performance of alternative candidate MPs and the included HCRs (SC15-MI-WP-09). SC15 noted that PIMPLE was a useful tool and recommends it to mangers and WCPC16 so that they can understand the performance of various MPs for achieving management objectives. CCMs and participants were also encouraged to develop their own HCRs and make them available to the Scientific Services Provider for possible evaluation and inclusion in PIMPLE.

394. SC15 recommends that WCPFC16 note the progress on the development of the MSE being undertaken under the Harvest Strategy Work Plan for skipjack tuna and provide additional elements, if any, as specified in the Harvest Strategy Work Plan to further progress this work against the scheduled time-lines noted in this Work-Plan. SC15 also requested the Secretariat create a webpage under the current "Harvest Strategy" tab that compiles the latest information of MSE development so that stakeholders can find the relevant information easily.

Review of harvest control rules for South Pacific albacore

441. SC15 reviewed several papers related to ongoing work which is being undertaken by the Scientific Services Provider as specified in the Harvest Strategy Work Plan on the MSE framework for South Pacific albacore.

442. First, noting that the initial work on the development of harvest strategies for South Pacific albacore has focused on developing an empirical MP that uses standardised CPUE as the primary indicator of stock status, SC15 reviewed information on alternative sources of CPUE data and standardisation approaches to inform this process (SC15-MI-WP-07). SC15 endorsed the use of both the traditional GLM and the geostatistical modelling approaches for standardizing CPUE and their use in the Reference Set of uncertainties. Furthermore, noting difficulties associated with the use of the daily set-by-set data (currently used in the assessment) within the MSE framework, SC15 also endorsed the use of the aggregated catch/effort data set. However, SC15 also noted some small differences in the resulting biomass indicators based on these two different data sets, and requested that the Scientific Services Provider undertake some additional analyses to clarify any consequences on the performance of candidate HCRs which may be used to achieve management objectives.

443. Second, SC15 reviewed a demonstration set of southern longline fishery performance indicators (PIs, taken from the list of prioritized indicators identified at WCPFC14) for evaluating the relative performance of candidate MPs South Pacific albacore, noting that the lack of inclusion of a PI, at this stage, does not imply it has reduced priority in the framework (SC15-MI-WP-03). SC15 noted that the utility of many economic indicators is currently limited by the unavailability of specific fleet-based economic data with the consequence that less informative proxies have to be used. CCMs also noted that several of the PIs are similar and perhaps redundant. Several CCMs also noted that a number of important PIs are currently not included in the demonstration set (often due to a difficulty in calculation due to a lack of information) but expressed a willingness to work with the Scientific Services Provider and other CCMs on providing more information for improving the calculation of these proposed PIs. SC15 recommends that WCPFC16 take note of this demonstration set of PIs and provide feedback to the Scientific Services Provider as needed.

444. Third, SC15 reviewed the current status of the MSE framework for South Pacific albacore and the details of some illustrative analyses that have been completed (SC15-MI-WP-08). SC15 made a number of

suggestions aimed at clarifying and improving aspects of the analyses, such as being able to see retrospective analysis of the CPUE generated from the operating model, incorporating the DWFN index in the HCR, and including a density dependence/hyperstability option and recruitment autocorrelation in the Reference Set of the uncertainty grid. One CCM also suggested inclusion of an additional flux of South Pacific albacore from the IATTC convention area as an additional axis of uncertainty, but it was noted that this would be difficult. CCMs were also invited to suggest possible HCRs for testing in this MSE framework for South Pacific albacore. SC15 recommends that WCPFC16 note the current status of the MSE framework for South Pacific albacore and provide feedback to the Scientific Services Provider as needed.

445. SC15 recommends that WCPFC16 note the progress on the development of the MSE being undertaken under the Harvest Strategy Work Plan for South Pacific albacore tuna and provide additional elements, if any, as specified in the Harvest Strategy Work Plan to further progress this work against the scheduled time-lines noted in this Work Plan.

Multi-species modeling framework

455. Given that the main target species in the WCPO are caught by an overlapping mix of fisheries, an important consideration when developing harvest strategies is how to account for mixed fishery interactions. Towards this end, SC15 reviewed two potential approaches for modeling mixed fisheries in the WCPO harvest strategy evaluations (SC15-MI-WP-04). Noting the challenges in developing a multi-species modeling framework, and the difficulties and time required to develop a fully integrated multispecies-based operating model, SC15 endorsed the use of a hierarchical approach based on single species operating models.

456. However, SC15 also noted the possible need for the inclusion of PIs from interacting fisheries/stocks in the development of MPs for any single species within such a hierarchical approach. Further consideration was also needed on the framework of MPs within this approach and what species may need to be given a priority, as MPs for healthy stocks may give unintended negative impacts on unhealthy stocks. One CCM suggested that priority may need to be given based on stock status relative to respective reference points. This CCM also emphasized that an MP for bigeye tuna should include control of purse seine fisheries, as currently almost half of the bigeye tuna catch is made by the fleet. One CCM also noted the need for management controls to be applied to all managed species due to the potential of target switching and resource substitution if one or more are left unregulated.

457. SC15 recommends that WCPFC16 note the approaches outlined in the above paper, and the possible implications of the challenges in developing a multi-species modelling framework on this item within the schedule of the Harvest Strategy Work Plan.