Groundfish Stock Assessment Process Review
Pacific Fishery Management Council
Scientific and Statistical Committee's Groundfish Subcommittee
and Other 2019 Stock Assessment Review Process Participants

Online Webinar, December 13, 2019

The SSC Groundfish Subcommittee met via webinar with representatives from the Groundfish Management Team (GMT), Groundfish Advisory Subpanel (GAP), Stock Assessment Team (STAT) representatives and other interested parties on December 13, 2019 to review the 2019 groundfish stock assessment and stock assessment review (STAR) Panel process. The focus was on recommending improvements for future groundfish stock assessments, STAR Panel meetings, including the Terms of Reference and the Accepted Practices document for groundfish stock assessments. Recommendations are listed at the end of the report. The webinar agenda is attached as Appendix A, and a list of participants is attached as Appendix B.

Perspectives on the 2019 Stock Assessment Process

Center for Independent Experts (CIE)

Robin Cook reported that from his perspective (as the CIE reviewer who participated in all four STAR panels) the documentation for the process and the stock assessments is robust. He supported the practice of having two CIE reviewers at each panel, with one of those reviewers present at all the STAR Panels for continuity. He agreed that it is also desirable to have that expertise balanced by local experts. He was sympathetic to many of the concerns raised by STATs in advance of the meeting, agreeing that the current process risks having too much input ("scientific self-indulgence") from the STAR Panels. He suggested that Panels should try to bring iterations to a close at an earlier stage, and perhaps consider alternative review processes in which Panels formulated a set of recommendations which could be responded to by the STAT after the STAR meeting. He raised concerns regarding whether all the extra work conducted during a typical STAR Panel is cost effective.

Technical issues raised by Robin included his noting that the focus on Stock Synthesis as (almost) the only tool in the toolbox is constraining, and that both the assessment and the review process would benefit from more innovative thinking. Logistically, he noted that as the last two STAR Panel meetings were very close together (separated by only a week), he did not have sufficient time to immediately complete his report, as required by the CIE for the next to last STAR meeting, as well as study the assessment documents for the last STAR meeting. Although this is an issue that is most constraining to the CIE continuity reviewer, it is nevertheless an important scheduling detail to address in future assessment cycles. Finally, Robin noted that he had no contractual obligation with the CIE to participate in the post-assessment webinar, and in fact had to pay the costs for an international phone call to connect to the webinar. While he was willing to do so, this detail should be addressed in future CIE contracts.

It was noted that these views reflected Robin's experience, but that there would be benefit in getting feedback from other CIE reviewers. Alternatively, for future post-assessment cycle workshops, one or more people should be tasked with carefully reviewing all the CIE reviewer reports and providing a summary of any process-related comments offered by any of the CIE reviewers. There was some general discussion about Robin Cook's suggestion that the STAR Panel should only identify weaknesses and recommend future work, noting that the question of who would be responsible for the final review would have to be addressed, which could extend the review process and timeline for adoption. It was noted that longer term research (relative to immediate) is typically identified in the current STAR Panel report process. One potential improvement is for the reviewers to provide the STATs with a list of issues that the STATs will need to address prior to the STAR meeting, although this would require substantive alterations of timelines.

Groundfish Management Team (GMT)

Patrick Mirick reported that from the perspective of the Groundfish Management Team, the process was generally smoother than in previous stock assessment cycles. Patrick noted that in the future the GMT will need to assign someone to the coordinator role (e.g., assembling catch streams for projections and passing them to the STATs, fielding questions from the STATs about management) that he did for the 2019 cycle. Other GMT members agreed with this assessment of the process. There was recognition that for update assessments, the data source to be used for removals (e.g., Groundfish Expanded Mortality Multi-year, GEMM or other sources) needs to be clearly identified and agreed upon.

Groundfish Advisory SubPanel (GAP)

Gerry Richter was the GAP representative for all the STAR meetings, and was impressed with how well the meetings went this year. He had some concerns that the pre-assessment data workshop did not deliver as much clarity as GAP members had expected. There was some agreement that the utility of the pre-assessment data workshop has been limited.

STAR Panel Chairs

Rishi Sharma was the chair of the first STAR Panel (for Cabezon), but was unable to attend the webinar. David Sampson chaired the second STAR Panel, for assessments of Longnose Skate and Big Skate, and considered the Panel to be very productive, commending the STATs for rising to the challenge of doing significant explorations of the data and the models during the STAR meeting. David also chaired the August Groundfish Subcommittee (GFSC) meeting that reviewed the two update assessments and numerous catch-only projections. He noted that for the review of update assessments, there was insufficient time to provide the STATs with any requests for modifications to the assessments prior to the September SSC meeting when the assessments received their final review and adoption. It was noted that the late timing of the update assessment review was a consequence of the government shutdown, which delayed age reading efforts.

John Field discussed the sablefish assessment STAR Panel, noting that the sablefish STAT had made non-trivial changes to the assessment model after turning in the pre-STAR draft assessment document, which led to the panel's initial requests focusing on documenting those changes

sequentially to help them understand the causes and effects. There was a suggestion that the Terms of Reference should be revised to indicate that any major pre-STAR models changes should be documented (including a sequential analysis of model changes) and presented at the start of the STAR Panel. A more unique characteristic of this Panel was that a single assessment was reviewed, which made the process very intensive, with unusually high time-pressure on the STAT to address the STAR Panel's requests. In subsequent discussion with the STAT there was general agreement that a one-assessment week-long review is too onerous on the STAT. Another issue was fixing "nuisance parameters" to help shorten run-times and assist with model convergence, a particularly challenging issue for sablefish, which was a very complex model with long run times. Guidance on conditions under which it is acceptable to fix parameters, or other suggestions on approaches to speed up run-times and overcome convergence problems is desired.

Owen Hamel chaired the STAR Panel that reviewed the assessments for Cowcod and the complex composed of Gopher Rockfish & Black-and-Yellow Rockfish. A challenge for this panel was losing one of the panelists just two weeks prior to the review, although fortunately another reviewer (Chantel Wetzel) was able to join the panel with short notice. Recommendations based on this panel included providing STATs with editorial and model comments prior to the STAR Panel itself, including improved preparation and guidance for constructing decision tables. There was agreement from the workshop that the content of decision tables could be improved, to present the information in a more useful format. While the GMT has the role of translating the decision tables, it was noted that it would also be helpful if the STATs provided better narratives regarding the meaning (implications) of the decision tables (e.g., the basis or bases for the major axis of uncertainty).

Stock Assessment Teams

Stock Assessment Team leads emphasized the need for a more efficient means of identifying and separating issues that are feasible to address within the week of review (or, more generally within the assessment cycle) from those that will require longer-term work. Concerns were raised about the level of effort expended by STAT teams, and some assessment leads indicated that the current STAR Process is not sustainable. However, other webinar participants indicated that neither the process nor workload have changed substantially over the past decade. It was widely agreed that future STAR Panels should not focus on a single stock assessment, due to the burden that such intensive focus put on the STATs. Melissa Monk suggested that guidance or "best practices" for dealing with species complexes and also for handling discards in nearshore stocks (e.g., use a retention function or a separate discard fleet) would be very helpful for future assessments, and it was noted that the next assessment cycle would likely also include a species complex (vermillion and sunset rockfish), such that guidance along these lines would be very helpful in the near term.

Chantel Wetzel, lead for the update assessment for petrale sole, suggested that the review of the update assessments should occur much earlier in the cycle and recommended reconsidering what information should be included in update assessment documents, which can often be as large as a full assessment document. It was noted that the late (August) update review that happened this past year was undesirable but largely a consequence of the government shutdown in December of 2019 and January of 2020. Additionally, the requirements for documentation in updates should be revisited (and simplified), particularly if having more update assessments in the future was desirable, and the same was true of catch only projections. Patrick Mirick indicated that the

Council is likely to request more catch-only projections in future cycles, and thanked the team of NWFSC analysts and UW students and helpers who conducted the numerous catch-only projections this past year.

Council Staff

John DeVore and Todd Phillips reported that from their perspective the STAR Panel process went well this year, representing a tremendous amount of work, and that there was a good record of vetting the pre-STAR draft assessment documents. They recommended continuing to consider issues related to workloads, and that leaner documents – and perhaps a leaner process- would be beneficial, as would any ability to "front-load" more of the work and analyses.

Recommendations for Improving the Stock Assessment Process

Pre-Assessment Planning

The workshop generally agreed that PacFIN and RecFIN should be the sole source of commercial and recreational fisheries catch data for assessments (at least, in the period for which such data are hosted on these data servers), acknowledging that the efficiency of data processing methods depends on a standardized format in PacFIN and RecFIN. However, STATs often continue to be asked to use data that are not in these databases. A desired goal is to create unified data warehouses for each data source (e.g., PacFIN, RecFIN) where extracted data are provided using consistent data fields across states, recognizing that the underlying treatment and expansion of the data can be state specific. The PFMC has been working on "one stop shopping" for data needs, and the PacFIN BDS is now tied into CALCOM data, although work remains necessary to link historical compositions for BDS. It was also observed that RecFIN improvements in generating length composition data is ongoing, and "assessment ready weighted comps" will be available in the near future as well. State representatives noted that they should be informed and involved in the progress for expansion of composition data that are applied for each state.

There was some discussion of the process for setting aging priorities, recognizing that this depends on who is funding age readers, and that responsible agencies should be coordinating these priorities. There is widespread recognition that age determination efforts and capacity has been limited and continues to decline across all agencies and centers. There was discussion about the need to better coordinate management and storage of otolith collections among the agencies and entities (e.g., PSMFC) responsible for sample collection and age reading. It was also noted that coordination of age determination efforts for the 2021 stock assessment cycle should happen early in 2020 to address age determination gaps and priorities.

Pre-Assessment Data Workshops

STATs noted that the pre-assessment workshop process could be more constructive, as well as that it is nearly impossible for a single meeting to serve all assessments and panels well as a consequence of STAR Panels stretching from May through July. Participants reiterated that the goal of these workshops is to allow stakeholders to discuss the available data, the potential data gaps, and have the STAT teams lead discussions regarding the anticipated foundational

assumptions/issues and their treatment within the assessment (e.g., modeled stock structure). However, stakeholder participation in most pre-assessment data workshops has typically been limited. Suggestions for how to improve the process included soliciting feedback from individuals who have participated in prior pre-assessment data meetings to identify their expectations for those meetings and what would they like to see occur in the future.

It was also suggested that each assessment team (or review panel) hold their own webinar to discuss data issues with stakeholders, allowing for the meeting to be better aligned with the timing of the STAR panel and providing the flexibility for STAT teams to hold meetings far in advance. It was noted that STATs could use GAP and GMT assistance in finding the right people to contact and invite, and also getting the word out. An alternative could be to couple in-person workshops with Council meetings (e.g., March or April in the assessment year or even November meeting prior to the assessment year) to facilitate in-person discussions and increased attendance. Such meetings could even be joint GAP/GMT agenda items at these meetings. The GMT representative noted that while pre-assessment workshops are valuable, data issues can arise at multiple times throughout the process, and soliciting input from state and GMT representatives to address emerging issues should be expected. PFMC staff expressed a willingness to be more responsible for facilitating the process,

STATs also noted that when records with errors or incorrect field values are identified in PacFIN or other databases, there is no clear process for permanently correcting these records. Instead, the current approach is often for one-off corrections via code by individual assessment authors or STATs, which may not resolve or prevent future inclusion of such errors. A process for requesting corrections to the database in question, and allow for tracking whether corrections have been made, would greatly improve data management and stock assessment processes. One potential solution would be to develop a spreadsheet shared among assessment authors and agency data stewards to log records with data errors and provide a record of the timing of the error detection and resolution. The PSMFC would be a likely logical host of such a spreadsheet, and one recommendation is to suggest this at the next PacFIN annual meeting (or add this recommendation to the list of action items to be discussed prior to the annual meeting).

Another data related issue that arose during catch only projection runs was with respect to the exact source of recent catch-removal data, specifically whether the most recent catch estimates and removal assumptions should come from PacFIN or GEMM. There was some discussion that the GEMM values are likely the most appropriate source for recent removals, although in discussions it was also noted that the spatial resolution of assessments may not match the spatial resolution of the GEMM. Finally, recognition that GEMM reports are typically published in August, but the optimal timing for reviewing and approving catch only updates is the June meeting could lead to challenges in using GEMM products, as model runs must be conducted and models documented well before June. There was some discussion of the relative significance of final year of data, noting that projections typically make assumptions regarding future catches, but also recognizing that the reason for doing catch-only updates is to actually account for the realized difference between such projections and realized catches. It was also discussed that the GMT would provide the assumed removals and allocations by fleet during the projection period. Patrick Mirick pointed out that more clearly defining fleets in stock assessments would help this process, as there are times when the GMT had problems interpreting fleet structure.

Some other data issues were discussed regarding tribal catches of Pacific hake, sablefish and petrale sole, as entry of these data to PacFIN is often delayed, resulting in the need to obtain data directly from the states. There was discussion that tribal data should ideally be entered into PacFIN in a timely fashion, and the idea of developing a data flag to identify mismatches in tribal catch records was discussed. There was agreement to discuss this issue again in the fall of 2020 in preparation for the 2021 assessment cycle.

Roles of Stock Assessment Coordinators

The NWFSC reported that they no longer have an assessment coordinator, rather they will be dispersing roles among assessment analysts. John DeVore requested that contacts for the activities previously done by the coordinators be shared well in advance of the next assessment cycle.

Collaboration and Planning Between Science Centers

There was some discussion of the merits of combining stock assessment teams across science centers, which has worked out well in the past for stocks such as China and blue/deacon rockfish. It was noted that if the vermillion/sunset rockfish complex is assessed in 2021, there will be multiple regions, and a multicenter assessment team might be beneficial. It was noted that this approach does require considerable overhead in communication.

Stock Assessment Reviews

The question of whether to "formalize" responses to recommendations from the Pre-assessment data workshops was discussed. There was general agreement that no formal process is necessary, but the TOR should make clear that the STAR Panel chair should ensure that pre-assessment data workshop concerns are documented and addressed within the final stock assessment document.

The idea of a repository of documentation on the data and how data are processed so that each assessment document can refer to it by reference was discussed, however no formal recommendation was made.

As discussed earlier, there was agreement that future reviews of stock assessment updates and catch only projections should happen earlier than August, likely in association with the June Council meeting. The idea of waiving the two week distribution rule for catch only updates was raised, given how simple future requirements for those documents should be, to facilitate receipt of catch estimates in time for a June review. However, it was noted that some of the data limited assessment methods, which are done in a Bayesian framework, take quite a bit of time and effort to run and compile results.

Recommendations for the Stock Assessment Terms of Reference

Simplifying Requirements and Development of a Template for Catch-Only Projections

There was agreement that reporting in the form of the content provided in the executive summary of a full or update assessment resulted in more work than was necessary to document the results of the catch-only projections. The key required documentation is of the catch data used at the level of stratification used in the original assessment, and the resulting OFL, ABC, ACL, spawning

biomass and depletion projections. Some means of ensuring that the historical estimates of spawning output and depletion from the update and the previous assessment should be included to ensure no errors were made in the update process.

There was discussion of how to address changes to catch estimates from previous assessments, noting that the reasons for the changes, as well as the consequences to assessment outputs (e.g., depletion, biomass and likelihood), to allow for consideration of whether an actual update should be conducted in the future in lieu of a catch-only projection. It was agreed that modest changes can be accommodated, but in instances where systematic changes to historical catch estimates have resulted in substantial differences in model outputs or estimates, a benchmark or assessment update may be desirable. It was agreed that full attainment should be assumed in the absence of a strong rationale from the GMT that an alternative assumption is appropriate.

Recommended Changes to Required Elements in Benchmark and Update Assessments

The basis for the current request to include biomass-at-age and numbers-at-age in assessment documents was discussed, participants agreed that electronic appendices (the report file and R4SS file with standard tables and figures) should reduce the need for many previously included tables and figures. It was noted that if another assessment platform is used, these values should be provided in an appendix.

The observation was made that most assessments include very little with respect to ecosystem considerations. Minimum expectations should include trophic (predator and prey) interactions, but it was acknowledged that such investigations should not be onerous if time is limited by assessment authors. Future collaboration with the Integrated Ecosystem Assessment (IEA) teams could facilitate more robust inclusion of ecosystem considerations in assessments, as was done for sablefish in the 2019 assessment cycle.

Changes to the TOR or Assessment Process Suggested by NWFSC

The NWFSC recommended decreasing the length of assessment documents by excluding information not relevant to those who use the documents. There was recognition by the workshop that while many of the Figures and Tables can be provided as electronic appendices, such information is often lost over time. The suggestion was made to solicit input by the Council and advisory bodies regarding the most useful information to document in assessments, recognizing that information in the executive summary is often redundant with information provided in the main body of the document. It was also recognized that figures that document the raw (unfitted) data (e.g., indices or compositional data) may not be needed in the main document, particularly when model fits to data are included and the raw data (tabular and as figures) are included in electronic appendices. There was agreement that inclusion of report and R4SS output files as electronic appendices should meet many documentation requirements.

The NWFSC also recommended that the SSC solicit input on changes to the TOR from outside of the Council, noting that greater engagement of the STAT members in the review of the proposed changes to the TOR would improve the process. It was recognized that the planned timeline in the last cycle should have allowed for more time to review and solicit feedback, but the timeline was

not met, leading to changes to the TOR during summer 2018.

The NWFSC also asked that future assessment cycles work towards a process that results in a more reasonable workload for the STAT team during the week of the STAR panel. Concerns were raised that some of the exploratory analyses requested by the STAR panel were in excess of what is reasonable given the time available, and the scope or requests were sometimes beyond evaluation of the proposed methods. Recommendations included additional reminders that STAR Panels are not workshops, greater management of workloads to STATs by STAR Panel chairs, and greater clarification to CIE and other reviewers to minimize exploratory requests not directly related to the assessment under review. There was recognition that more explicit criteria to apply to requests of the STAT could be helpful in managing workloads.

Concerns continue to be expressed regarding delays in obtaining the most recent data. As a result, earlier data deadlines and greater coordination with data providers would be helpful. Alternatively, if data are not available by deadlines, omitting late data is within the prerogative of the analysts.

The workshop discussed the possibility of a multi-meeting process similar to the SEDAR, which would allow for more time between each phase (i.e., data review, initial feedback, final review). Another alternative would be to encouraging the STAR Panel to provide comments prior to the assessment review, to allow for some time for the STAT to respond to concerns. However, this would extend the time period between document distribution and the panel to as much as a month, which might not be considered optimal for some analysts. Moreover, such desk review documents would also become part of the public record. An alternative may be asking the reviewers to simply provide the STAR chair with an informal list of issues to the STAT a week ahead of time, to provide the STAT with some time to address initial questions and concerns. Either approach would require the additional step to be included in in the scope of work for the CIE and in the TOR. The potential to simply have the review represent strictly a matter of approval or rejection given the model brought for review was also raised.

Beyond major changes in the review process, the suggestion was also made to restructure the agendas of the STAR panels to facilitate analysis early in the week of the review and allow time for analysis during the meeting by alternating review of stocks. There was general agreement that the sablefish star panel experience (a single model being reviewed) resulted in an inefficient and overly demanding process, and should be avoided in the future. Conversely, when there are two or more stocks (and associated models), it may take until the end of the second day, or later, for questions, issues and requests to be developed, limiting the time available to both STATs to respond to issues. In the absence of a mechanism to convey concerns to the STAT in advance of the panel, it may be more efficient to begin the meeting with a brief presentation of issues identified by the reviewers from the draft documents, to allow the STATs for all of the assessments being reviewed to begin addressing concerns early in the review process.

STAT teams also recommended reconsideration of the nature of the SSC Groundfish Subcommittee review of stock assessments that typically follows the STAR panel reviews (and in advance of the full SSC reviews). Specifically, they recommended the review focus on the findings of the panel lead by the respective Chair of each panel rather than a secondary review of

the assessment, noting that the focus of the review by the subcommittee has generally been to determine if the subcommittee concurs with the results of the review, or if there are unaddressed concerns (as described on page 22 and 23 of the TOR). In some instances, the Subcommittee has determine that despite the Panel recommendation, an assessment should go through secondary review (the "mop-up" panel), or has identified issues that were missed by the STAR Panel. It is also possible that an assessment unapproved by a review panel could be accepted by the Groundfish Subcommittee, and subsequently by the full SSC. The potential for an increased role of the Chair in the presentation of the results of the STAR panel review may be accommodated in the TOR to reduce burdens posed to the STAT, noting that the STAT should still be present at the meeting to answer questions.

The workshop discussed the possibility of training on how to run an efficient scientific discussion for STAR Panel chairs, as well as implicit bias training for STAR panel reviewers. Such training can be recommended, but not required. Training options may be proposed by the NWFSC.

Other issues discussed included the requirement to provide bridging models that show changes from the previous model to the current assessment model, some STATs noted that the means of doing so is unclear, and that it is difficult to create a figure that shows every step in model changes. It was recognized that often model changes are not sequential, and that requiring a linear analysis results in additional work by the assessment author. Recommendations were to revise the TOR to provide increased flexibility in how the bridging should be presented in assessment documents, such that this section could provide a clear understanding of the key changes between assessments but eliminate the need to document and track each individual change, particularly those that did not generate significant changes in model fits or estimates.

The issue of the stock assessment categories was discussed, as some participants felt that the Category 2 currently feels like a catch-all category (noting that the age-based model for Pacific Ocean perch was treated equivalent to data-moderate assessments in the categorization). There was discussion of more carefully evaluating the outcomes of the categorization process to ensure that the uncertainty buffering is appropriate, however no explicit recommendations were developed.

E. Recommendations for the Accepted Practices Guidelines for Groundfish Stock Assessments

Many of this year's assessments explored the Dirichlet Multinomial data-weighting for compositional (length and age) data, and some of the results raised questions that would benefit from additional research. Two key issues were model convergence and estimated effective weights that were at or near the upper bound of 1 (when transposed into real space). The estimated weight that can be applied to a data-set is linked to the input sample sizes which serves as an upper bound for the Dirichlet Multinomial approach. The method for calculating input sample sizes varied by the data-set (e.g., survey versus commercial data) and across assessments. Given the linkage between the input sample size and the Dirichlet Multinomial data-weighting approach, future research should be conducted which could providing improved future guidance.

An additional issue that was identified in this year's assessments related to data-weighting was the inability to weight the discard and retained composition data independently. Currently, a single

data weight is applied to all length or age composition samples from a single fishery. It would be beneficial for future versions of Stock Synthesis to allow observation type specific data weighting within a fleet.

During the August SSC groundfish sub-committee meeting there was a lack of clarity about how assessment uncertainty should be calculated and reported. Prior to 2019, US West Coast groundfish stock assessments calculated uncertainty around the final year spawning biomass estimate which corresponded to the Ralston et al., 2011 approach for estimating within and among assessment uncertainty (sigma) for category 1 stocks. In 2019 the SSC approved a new approach and value for category 1 stock assessments based on an examination of uncertainty in the Overfishing Level, and it was agreed that this approach should be carried forward (Privitera-Johnson and Punt, 2019).

There were multiple suggestions made during the meeting about future issues to consider when creating decision tables. The first suggestion was that future assessments could explore categorizing uncertainty by using the model estimated uncertainty, sigma, or the default category sigma value if greater than the model estimate to create the low and high alternative states of nature. This approach could be an improved representation of the total uncertainty in the model, rather than the uncertainty within a specific model parameter. Secondly, the uncertainty expressed through the decision table is often symmetric. However, the actual uncertainty of a parameter or the spawning biomass is often not symmetric. The development of future decision tables should consider non-symmetric uncertainty in parameter and model uncertainty, provided that more detailed guidance on how to do so is included into the Terms of Reference.

The final suggestion made during the meeting was that groundfish assessments could do more to explore uncertainty in a probabilistic fashion, akin to what is currently being provided in the Pacific whiting assessment report through the use of MCMC runs. Expressing the probability of future population states based on alternative harvest levels could be an informative tool for the Council and advisory bodies. The ability to conduct MCMC runs for West Coast groundfish stock assessment historically has been a limitation in providing this type of advice, but additional approaches for expressing future risks should be explored.

F. Other Business

There was general agreement among the group that the holding the post mortem meeting by webinar worked well. However, an in-person meeting may be the more appropriate approach if in the future specific large issues or challenges arise either within an assessment, STAR panel review, or the SSC groundfish sub-committee meeting.

Recommendations

Future STAR Panels should not review a single stock assessment model.

In future assessment cycles the review of update assessments should be held in June or July to allow adequate time for the STATs to respond to GFSC comments and suggestions.

Future assessment cycles should anticipate more than one pre-assessment data workshop, and input

on the type of venue (e.g., webinar, in person, jointly with PFMC) should be solicited by the Council, GAP and GMT based on their perceived needs and experiences.

Investigate a logical lead entity, potentially PSMFC, for developing a process and/or spreadsheet for tracking data errors detected during stock assessments (and other research activities), and the timing and outcome of their resolution.

A template for the TOR revisions to catch-only updates based on these comments will be reviewed and discussed by the SSC in March.

The GFSC and SSC should re-evaluate documentation expectations of update assessments in the TOR, in order to limit associated workload. It should be recognized that some structural changes could be accommodated while maintaining model stability, but where significant changes to either model structure or major shifts in perception based on model results occur, a full benchmark assessment is likely to be preferable.

Clarify in the TOR that models that undergo significant changes between the base model in the pre-STAR draft should track changes sequentially to document the decisions made at the review. This documentation should be as simple as possible as not to pose a disincentive to addressing issues in the course of the meeting as a result of undue burdens on the STAT, but should include step by step information regarding the impact (and model fit) of subsequent changes. Similarly, greater clarity on which diagnostics should be used to most effectively document the changes done to bridge the new assessment with the previous assessments would be useful to include in the TOR.

Direction should be provided in the TOR regarding the need for the STAT to provide a description of the decision table that clearly conveys the major considerations involving risk and uncertainty in the decision table to help inform decision making.

If formal requests are made at a pre-STAR data review meeting, then the specific recommendations should be provided to the authors in writing for the STAT to respond to. The STAR Panel Chair should work with the STAT to ensure that the issues raised are addressed. These responsibilities should be formalized in the TOR.

Revise the TOR to reflect greater flexibility by STATs in their documentation of the bridging between previous and current assessment models, in order to reduce the need to document and track those updates or changes of minor or trivial significance.

Uncertainty for future assessments should be based on the Overfishing Level (OFL) uncertainty, to correspond to the newly adopted approach for addressing scientific uncertainty.

Consider the suggestions from the webinar in revising the Terms of Reference with respect to Decision Tables.

Sources

Privitera-Johnson, K.M. and A.E. Punt. 2019. Leveraging scientific uncertainty in fisheries management for estimating among-assessment variation in overfishing limits. ICES Journal of

Marine Science fsz237, https://doi.org/10.1093/icesjms/fsz237.

Ralston, S., Punt, A.E., Hamel, O.S., DeVore, J.D. and R.J. Conser. 2011. A meta-analytic approach to quantifying scientific uncertainty in stock assessments. Fishery Bulletin 109: 217-231.

Appendix A: Webinar Agenda

A. Call to Order

B. Perspectives on the 2019 Stock Assessment Process

1. Center of Independent Experts — Robin Cook
2. Groundfish Management Team — Patrick Mirick, Lynn Mattes, and Mel Mandrup
3. Groundfish Advisory SubPanel — Gerry Richter
4. STAR Panel Chairs — Dave Sampson, John Field, and Owen Hamel
5. Stock Assessment Teams — Jason Cope, Aaron Berger, Vlada Gertseva, Ian Taylor, Melissa Haltuch, E.J. Dick, Melissa Monk, and Chantel Wetzel
6. Council Staff — John DeVore and Todd Phillips

C. Recommendations for Improving the Stock Assessment Process

1. Pre-Assessment Planning
   a. Improving Timely Data Delivery to STATs
   b. Discussion of Format, Process and Optimization of Pre-Assessment Data Workshops
   c. Discussion of Roles of Stock Assessment Coordinators
   d. Discuss Collaboration and Planning Between Science Centers
2. Stock Assessment Reviews
   a. How to Respond to Recommendations from Pre-Assessment Data Workshops?
   b. Discussion of Protocols for Addressing Base Model Changes Between the Pre-STAR Draft Assessments and Models Reviewed at STAR Panels
   c. Documenting How Assessment Data Are Processed
3. Scientific and Statistical Committee Reviews of Updates and Catch Only Projections

D. Recommendations for the Stock Assessment Terms of Reference

1. Discussion of Simplifying Requirements and Development of a Template for Catch-Only Projections
2. Recommended Changes to Required Elements in Benchmark and Update Assessments
   a. Report Biomass-at-age or Numbers-at-age?
   b. Improving Exploration of Ecosystem Considerations
   c. Use of Electronic Appendices (Archived with Model and Report Files)
3. Other Recommended Changes?

E. Recommendations for the Accepted Practices Guidelines for Groundfish Stock Assessments

1. Guidance on Developing Input N for Weighting Compositional Data, (Particularly for the Dirichlet Approach)
2. Recommended Approaches for Determining Stock-Specific Sigmas (Biomass- vs OFL-Based Approaches)
3. Recommended Approaches for Developing Decision Tables

F. Other Business?

Appendix B: Attendees and Their Affiliations

John Field, National Marine Fisheries Service, Southwest Fisheries Science Center, Chair
Aaron Berger, National Marine Fisheries Service Northwest Fisheries Science Center
John Budrick, California Department of Fish and Wildlife
Gary Burke, Burke and Son Enterprises
Robin Cook, Center of Independent Experts
Jason Cope, National Marine Fisheries Service Northwest Fisheries Science Center
John DeVore, Pacific Fishery Management Council
Edward Dick, National Marine Fisheries Service Southwest Fisheries Science Center
Jason Edwards, Pacific States Marine Fisheries Commission
Sheryl Flores, Oregon Department of Fish and Wildlife
Vlada Gertseva, National Marine Fisheries Service Northwest Fisheries Science Center
Jonathan Gonzalez, Pacific Seafoods
Owen Hamel, National Marine Fisheries Service Northwest Fisheries Science Center
Melissa Haltuch, National Marine Fisheries Service Northwest Fisheries Science Center
Xi He, National Marine Fisheries Service Southwest Fisheries Science Center
Kelli Johnson, National Marine Fisheries Service Northwest Fisheries Science Center
Jessica Kauser, Ocean Science Trust
Melissa Mandrup, California Department of Fish and Wildlife
Kristin Marshall, National Marine Fisheries Service Northwest Fisheries Science Center
Lynn Mattes, Oregon Department of Fish and Wildlife
Patrick Mirick, Oregon Department of Fish and Wildlife
Melissa Monk, National Marine Fisheries Service Southwest Fisheries Science Center
Corey Niles, Washington Department of Fish and Wildlife
Todd Phillips, Pacific Fishery Management Council
André Punt, University of Washington
Victoria Quennessen, Oregon State University
Gerry Richter, B&G Seafoods
Dave Sampson, Oregon State University
Will Satterthwaite, National Marine Fisheries Service Southwest Fisheries Science Center
Jason Schaffler, Muckleshoot Indian Tribe
Andi Stephens, National Marine Fisheries Service Northwest Fisheries Science Center
Daniel Studt, National Marine Fisheries Service West Coast Region
Ian Taylor, National Marine Fisheries Service Northwest Fisheries Science Center
Theresa Tsou, Washington Department of Fish and Wildlife
Kevan Urquhart, California Department of Fish and Wildlife
John Wallace, National Marine Fisheries Service Northwest Fisheries Science Center
Chantel Wetzel, National Marine Fisheries Service Northwest Fisheries Science Center
Ali Whitman, Oregon Department of Fish and Wildlife