

MINUTES

Scientific and Statistical Committee

Pacific Fishery Management Council
Via Webinar

June 10 and 11, 2020

Members in Attendance

Dr. John Budrick, California Department of Fish and Wildlife, Belmont, CA
Mr. Alan Byrne, Idaho Department of Fish and Game, Boise, ID
Dr. John Field, SSC Chair, National Marine Fisheries Service Southwest Fisheries Science Center, Santa Cruz, CA
Dr. Marisol Garcia-Reyes, Farallon Institute, Petaluma, CA
Dr. Melissa Haltuch, National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA
Dr. Owen Hamel, National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA
Dr. Michael Harte, Oregon State University, Corvallis, OR
Dr. Dan Holland, National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA
Dr. Galen Johnson, Northwest Indian Fisheries Commission, Olympia, WA
Dr. Kristin Marshall, National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA
Dr. André Punt, University of Washington, Seattle, WA
Dr. William Satterthwaite, National Marine Fisheries Service Southwest Fisheries Science Center, Santa Cruz, CA
Dr. Jason Schaffler, Muckelshoot Indian Tribe, Auburn, WA
Dr. Ole Shelton, National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA
Dr. Cameron Speir, National Marine Fisheries Service Southwest Fisheries Science Center, Santa Cruz, CA
Dr. Tien-Shui Tsou, Washington Department of Fish and Wildlife, Olympia, WA
Dr. Will White, Oregon State University, Corvallis, Oregon

Members Absent

None.

SSC Recusals for the June 2020 Meeting		
SSC Member	Issue	Reason
None.		

A. Call to Order

Dr. Galen Johnson called the meeting to order at 0800. Mr. Chuck Tracy briefed the Scientific and Statistical Committee (SSC) on the meeting and new events. The Council Coordination Committee met last week, and the details are in the Executive Director’s report. One task is to determine a procedure to designate a change in stock status from known to unknown, with a July 1 deadline for comments. Mr. Tracy asked the SSC to report their recommendations under Agenda Item C.5 – Future Workload Planning. The NS1 subgroup recommendations will be coming to the Councils for review and the SSC should be prepared to do that. Another topic is standardized bycatch methodology. The task is to review FMPs to determine if they are in compliance with the procedural directive. The SSC will review these FMPs if any of the management teams recommend such a review and the Council tasks this to the SSC. The deadline for comment is February 2022. The SCS7 meeting in Sitka has been postponed.

Mr. Tracy noted the Pacific sardine rebuilding plan is scheduled for a final Council decision in September. He encouraged a thorough review of the rebuilding analysis by the SSC and SSC recommendations in September on the best scientific information available informing a rebuilding plan.

F. Groundfish Management

2. Stock Assessment Plan and Terms of Reference (TOR) – Final Action

The SSC discussed Agenda Item F.2, Stock Assessment Plan and Terms of Reference (TOR) – Final Action. Dr. James Hastie (National Marine Fisheries Service - Northwest Fisheries Science Center) presented the Northwest Fisheries Science Center groundfish stock assessment priorities, including data availability for species under consideration for 2021 and 2023 stock assessments, and a proposed schedule of 2021 Stock Assessment Review (STAR) panels. Dr. John Budrick provided an overview of the implications of endorsement of the length-based data-moderate stock assessment methodology by the review panel as well as other considerations for stock assessment prioritization and review of the TOR.

Should the Council adopt the length-based methods for use in management at the September Council meeting, they would be applicable to 2021 assessments allowing assessment of an additional two to four species. The SSC discussed making revisions and finalizing the data-moderate stock assessment section of the TOR (see the appended SSC Groundfish Subcommittee report) prior to the September Council meeting where review of the methods by the SSC and potential adoption is anticipated to take place. These assessments would be subject to more streamlined documentation requirements than full assessments and would be reviewed by the SSC's Groundfish Subcommittee. While these data-moderate assessments may conserve STAR capacity for review, these assessments will require additional effort from stock assessors and reviewers, especially in the first application of these methods.

The SSC is concerned with the capacity for stock assessment modeling and ageing capacity, as well as the capacity to review stock assessments, given the ongoing productivity impacts due to continuing dispersed work environments and the COVID-19 pandemic. While the Northwest and Southwest Fisheries Science Centers and state agencies work together to produce as many stock assessments as possible, the SSC requests that the Council prioritize stock assessments within each stock assessment category (full, data-moderate, and update). Prioritization is further necessary because many nearshore species have high levels of geographic population structure, thus requiring independent stock assessment models for each region with additional workload for authors and reviewers.

The SSC recommends holding three STAR panels, and one SSC Groundfish Subcommittee review of data-moderate stock assessments during the 2021 assessment cycle. A STAR panel held in May 2021 could be reviewed during the June 2021 Council meeting. The remaining two STAR panels could be held during June to July 2021 and reviewed during the September 2021 Council meeting.

Holding more than three STAR Panels is not feasible given the increased workload associated with region-specific models for more demographically complex species (i.e., lingcod, vermilion rockfish, brown rockfish, and copper rockfish), competing workload from new data-moderate assessments, and the productivity impacts of the pandemic. The mop-up panel will be scheduled during the end of September 2021.

The SSC recommends full stock assessments for vermilion/sunset rockfish, Dover sole, and lingcod. Vermilion/sunset rockfish will have three to four modeled areas and lingcod will have two to three modeled areas, thus requiring increased stock assessment modeling capacity compared to single area assessments like Dover sole. The SSC recommends data-moderate assessments in the following priority order: spiny dogfish, copper rockfish, brown rockfish, and, if stock assessment modeling capacity allows, squarespot rockfish. Copper rockfish will have two to three modeled areas, and brown rockfish may have multiple modeled areas. The SSC recommends conducting an update stock assessment for sablefish during 2021.

In addition to the species presented by Dr. Hastie as the subject of prospective assessments in 2023, the SSC identified additional stocks for consideration to facilitate prioritization of data collection before reconsideration of priorities in 2022. Redbanded rockfish was identified as a potential candidate for a full assessment. Cowcod, canary rockfish, and greenspotted rockfish were identified as potential candidates for update assessments. Treefish, olive rockfish, and speckled rockfish were identified as additional potential candidates for length-based data-moderate stock assessments.

The SSC endorses the final draft of the TOR for the Groundfish and Coastal Pelagic Species Stock Assessment Review Process for 2021-2022, with a correction to Appendix A that changes the current text that reads a “CPS catch-only projection review for the central subpopulation of northern anchovy” to a “CPS STAR Panel review of a full assessment for the central subpopulation of northern anchovy”. Additionally, the SSC will review and finalize the revised data-moderate stock assessment TOR language prior to the September Council meeting.

The SSC endorses the final draft of the terms of reference for the Methodology Review Process for Groundfish and Coastal Pelagic Species for 2021-2022, and final recommendations on TOR for the Groundfish Rebuilding Analysis for 2021-2022.

SSC Notes:

Data-moderate and update assessments will be reviewed by the SSC Groundfish Subcommittee, except for spiny dogfish. Spiny dogfish may be reviewed during a STAR Panel.

The SSC discussed the number of likely total modeled assessment areas for 2021 and the corresponding stock assessment capacity across the NWFSC and SWFSC because many of the assessments for 2021 have many modeled regions. Most of the SWFSC stock assessment effort will be focused on vermilion/sunset rockfish as this is a new nearshore assessment that is likely to be complex. The NWFSC has the equivalent of seven full time assessors and expects that each assessment will require two to three assessors, in addition to the hake assessment that requires two assessors. The overall conclusion was that the NWFSC and SWFSC do not have the assessment capacity to conduct all the full assessments in the NWFSC document provided under Agenda Item F.2. André Punt notes that University of Washington students are interested in working on the sablefish update stock assessment.

The SSC discussed the possibility of conducting a data-moderate assessment for Dover sole. However, the SSC concluded that Dover sole should remain a full assessment due to 1) the large number of survey ageing structures that are currently aged, 2) the prior recommendation of the SSC that the next assessment should be a full assessment that investigates separate estimation of natural mortality rates for males and females, 3) the interest in expanding the Dover sole fishery, and 4) the data-moderate TOR does not allow historical age data to be retained, which will be problematic for determining scale in a data-moderate assessment and the age data are highly informative in determining assessment scale. A full Dover sole assessment could be easily updated in the future.

While a full assessment would allow for a discussion of spiny dogfish reference points, the SSC did not support a full assessment for spiny dogfish, a data-moderate assessment is preferred. The

SSC discussed the unresolved issue of the wearing of spiny dogfish spines producing bias in the age data. This is a potential issue for growth estimation for the assessment.

The NWFSC currently lacks ageing capacity for spiny dogfish for the 2021 assessments; WDFW can work on spiny dogfish ageing. The NWFSC will focus on lingcod ageing.

Potential assessment regions for vermilion/sunset rockfish were discussed, with the possibility of one area north of 40°10' N lat. and uncertainty in the assessment area south of 40°10' N lat. being dependent on how big an area the hook and line survey represents. The SWFSC assessors will ultimately choose the south of 40°10' N lat. assessment region, with a minimum of two areas. Vermilion/sunset rockfish do not show structure to the north of 40°10' N lat. and have very limited data given the precipitous decline in abundance further north. There are two vermilion populations south of Point Conception in addition to sunset, and two vermilion populations to the north of Conception that overlap in their distributions and cannot be separated from each other. It may be better to do assessments north and south of Conception and just split the OFL with historical catch at 40°10' N lat. since the population is a relatively small proportion of the total.

The availability of new survey data for nearshore species during 2023 (for OR and WA) could be a reason to delay assessments for black and copper rockfishes until 2023. Copper rockfish could also be a data-moderate assessment.

The SSC discussed that the 2013 assessments for copper and brown rockfishes are becoming outdated. Data-moderate assessments for brown and copper rockfishes also allow for comparison with the results of the 2013 assessments. Quillback rockfish was also a concern due to high attainment and is a candidate for a 2021 data-moderate assessment. Concerns were raised with producing a data-moderate assessment for quillback rockfish because data are limited. Brown and copper rockfish have more data and should produce successful data-moderate assessments. The lack of ages for quillback rockfish will make growth estimation difficult.

Squarespot rockfish was discussed as a low priority for a 2021 data moderate assessment as it is mostly discarded, which may challenge application length-based Stock Synthesis. However, there was concern because of recent OFL overages for squarespot rockfish and the hook and line survey suggesting increases in abundance.

The SSC discussed 2023 full assessments, noting that data gaps need to be filled for some of the species on the list. Species discussed for 2023 full stock assessments include yellowtail rockfish (North and South), greenspotted rockfish, and redbanded rockfish. Species discussed for data-moderate assessments include treefish (there are recreational lengths, but ages will be needed for growth relationship), speckled rockfish, and olive rockfish. Ralph Larson may have some student work on treefish growth; John Budrick to investigate. Species discussed for update stock assessments include cowcod, canary, yellowtail (North) rockfishes.

A question was raised on the Appendix J flowchart, (third bullet point in the appended Groundfish Subcommittee report) asking what a reasonable sample size would be, and how the required 10 years of data was determined. Additional perspective will be provided during the review of the length-based methods and the panel report.

SSC GROUND FISH SUBCOMMITTEE REPORT ON STOCK ASSESSMENT PLAN AND TERMS OF REFERENCE (TOR) – FINAL ACTION

A stock assessment methodology review for length-based data-moderate stock assessments was held via webinar on May 12 to 14. The review focused on the application of Stock Synthesis incorporating catch and length data (SS-CL) as well as incorporating indices from research surveys (SS-CL-Index), which were both endorsed by the panel. The draft proposed language for the Terms of Reference (TOR) for length-based methods reflects the findings of the methodology review and suggestions from the panel. This language should be amended given feedback at the June Council meeting. If the Council adopts them for use in management after the full SSC and Council review under the Methodology Review agenda item at the September 2020 Council meeting, the proposed language should be incorporated into the TOR for 2021 stock assessments to facilitate application of the proposed methods. Adoption of length-based assessment methods will have implications for the species selected for assessment, the assessment methods applied to a given stock and the review process for 2021.

The panel review identified the following research to inform guidance in the TOR.

- The time lag between reproduction and recruitment of fish to the survey or fishery from which lengths are obtained may affect the ability to resolve recent recruitment and the potential for bias or increased uncertainty as is the case for any model estimating recruitment. Additional research would help inform which data sources might be most amenable to analysis.
- A formalized ensemble process is needed to integrate results from multiple model runs and, once developed, the process should be included in the TOR.
- Length-based selectivity curves are constrained to being asymptotic for at least one fleet to allow estimation of natural mortality, despite a lack of evidence from the data that the selectivity is in fact asymptotic, which is also the case for full assessments. Evaluation of dome-shaped curves for one or more of fleets should be the subject of future research that provides guidance on modeling selectivity.
- Considerations around modeling of discards should be identified. The question remains whether discards should be added to catches, as well as whether to add discarded lengths to retained compositions and adjust selectivity.

The following sections of the TOR for Stock Assessments ([Agenda Item F.2, Attachment 3, June 2020](#)) would be amended as noted in track changes below to incorporate length-based assessment methods:

Page 9:

4. Data-moderate assessment: A continuum of “**data-moderate assessment**” methods exist between data-poor methods relying on catch data alone to fully integrated stock assessments incorporating all available data including up to date age data. Council-approved methods for data-moderate assessments are limited in that they do not use age data, even if available, and have simplified population dynamics (deterministic recruitment), which makes such assessments less complicated and enables more expeditious review. Two methods have been developed to conduct data-moderate assessment with historical catch data and one or more indices of abundance (or biomass) (e.g., survey data or fishery catch per unit effort (CPUE) indices) referred to as extended DB-SRA (XDB-SRA) using stand-alone programming and extended Simple Stock

Synthesis (XSSS) using Stock Synthesis. In addition, length-based data-moderate stock assessment methods have been developed that incorporate only catch and length data in Stock Synthesis (SS-CL). Methods incorporating catches, lengths, and indices of relative abundance from fishery-independent surveys in Stock Synthesis have also been adopted by the Council for use in management (SS-CL+Index). Methods using length data do have the potential to estimate recruitment, thus adding more dynamics and complexity to the assessment and the review. Data-moderate assessments are reviewed by the relevant SSC Subcommittee (Groundfish or CPS) if an approved standard methodology is proposed to be used. They are reviewed by a STAR panel if a new or non-standard assessment methodology is proposed to be used.

Page 39:

9. Data-Moderate Assessments for Groundfish Species

Data-moderate assessments for groundfish species are a refinement over data-poor methods that result in category 3 assessments (described below) in that a data-moderate assessment includes length and/or abundance trend information in addition to the data informing a data-poor form of the assessment (catch series plus prior information on productivity and status). Data-moderate assessments can result in category 2 (catch and length or catch and index) or category 1 designations (possible when catches, lengths, and index data are incorporated). One defining distinction between category 2 and category 3 assessments is that the length and/or abundance trend information is incorporated in a category 2 assessment enabling an estimate of stock status (Appendix F).

Two index-based data-moderate assessment methods have been endorsed since the 2013-14 assessment cycle, XDB-SRA and XSSS. In both cases, abundance trend information (e.g., survey or fishery CPUE indices) is included in the assessment. The length-based data-moderate assessment method using only catches and lengths is SS-CL, while SS-CL+Index uses catches, lengths, and indices of abundance from fishery-independent surveys for which index derivation is well established. A flowchart describing the specific steps to take in conducting these assessments is provided in Appendix J. These specific applications provide assessments that are well understood enough to require only review by the SSC Groundfish Subcommittee. More complex data-moderate assessments within the SS framework incorporating fishery-dependent indices of abundance or use of age data are also possible and require review by a STAR panel review to address the added complexities of model fitting and index development.

The continuum of models should be accommodated to allow combinations of catch, lengths, ages and, indices to be applied to both new assessments and length-based extensions of existing benchmark assessments, though review processes may differ. A categorization of each assessment method is provided in Table 2, which defines the scope of each method in terms of data source and assessment type. The flow chart in Appendix J includes how to prepare catch estimates, length data, parameter estimation, model weighting, model convergence, and characterize uncertainty. The SS-CL+Index assessment method includes fishery-independent indices of abundance for which index development methods are well established. Implementation of assessments within the provided specifications allows for standardization and more streamlined review by the SSC Groundfish Subcommittee in May or June of odd years along with update assessments. The depth of potential reviews should increase with the estimation of more parameters. Review of one or more of length-based models that use an approved standard methodology can still be reviewed

within a STAR Panel setting, though Groundfish Subcommittee review is generally sufficient. Intermediate methods using fishery-dependent indices or age data are subject to review at a STAR panel to allow further evaluation of model fitting and tensions between data sources (see Table 2 for categorization of assessment types). Assessments conducted with data-moderate methods may be category 2 or category 1 depending on whether only catch and length or catch and index data were used resulting in a category 2 assessment or if catch, length and index data were used, which can result in a category 1 assessment.

Intermediate assessments picking up where past full stock assessments left off, that exclude new age and/or index data, but maintain index or age data included in the previous assessment while adding length and catch data are subject to STAR panel review. These types of intermediate methods may be applied to stocks that were formerly assessed with a full benchmark assessment, but for which attainment has been low or conducting a full or update assessment is not a priority despite the assessment becoming dated. Addition of new age data to either type of length-based Stock Synthesis assessment is discouraged to avoid confounding the nature of the assessment, reducing model tension arising from potential conflicts in age and length data, and increasing clarity in the related review process. Due to the complexities and potential data conflicts that can occur from fitting to age data in combination with indices and lengths, assessments that include current age data should be considered full benchmark assessments and reviewed in STAR panels.

Table 2. Model types, their data types and assessment type. All assume a known catch history.

Model	Lengths	Ages	Index	Assessment Type
DB-SRA/SSS	Ignore	Ignore	Ignore	Data-limited
XDB-SRA/XSS	Ignore	Ignore	Use	Data-moderate
SS-CL ¹	Use	Ignore	Ignore	Data-moderate
SS-CL+Index	Use	Ignore	Fishery-independent indices only (e.g., WCGBTS, H&L)	Data-moderate
SS (new config ²)-lite	Use	Ignore	Use	Likely Benchmark
SS (old config ³)	Use / update?	Use new / Ignore unread	Use / update?	Update
SS (new config ²)-heavy	Perhaps new data sources	Perhaps new data sources / Ignore unread	Perhaps new data sources	Benchmark

1: Flow chart for specifications related to fleets, life history parameters, selectivity etc.

2: New specifications for how the assessment is configured

3: Model specifications the same as the last assessment

Index-based Methods

The index-based method XSSS assumes that recruitment is related deterministically to the stock-recruitment relationship and allows index data to be used within a Bayesian framework. The Markov chain Monte Carlo (MCMC) or Sample Importance Resample (SIR) algorithm (perhaps implemented using Adaptive Importance Sampling) is used to quantify uncertainty for XSSS-based assessments. The XDB-SRA method is implemented within a Bayesian framework, with the priors for the parameters updated based on index data. The additional parameters in XDB-

SRA compared with DB-SRA include the catchability coefficient (q), and the extent of observation variance additional to that inferred from sampling error (a). The priors for these parameters are a weakly informative log-normal and a uniform distribution, respectively.

Comparison of alternative methods (XDB-SRA and XSSS) is encouraged, but it is acceptable to present an assessment using a single modeling approach. The SSC Groundfish Subcommittee can make requests of the Stock Assessment Teams (STATs) for additional runs but should not impose an alternative method if STATs consider this is not appropriate for the stock concerned. If more than one model is presented, the SSC Groundfish Subcommittee should recommend adoption of a preferred model, if one can be identified, for use in management.

Length-based Methods

Applying SS-CL and SS-CL-Index is very similar to conducting a standard Stock Synthesis (SS) assessment since SS-CL is conducted in Stock Synthesis, and all equations for the model can be found in the SS documentation (Appendix A of Methot and Wetzel, 2013). Like SS, the data for these methods can include many fleets, sexes, etc. as desired, catches are a full time series and assumed known and length compositions are assumed to be representative, with effective sample size treated in standard ways. Life history values (i.e., steepness, growth parameters (k , L_∞ , t_0), natural mortality, fecundity, maturity) are initially pre-specified (some degree of this does happen in many standard SS models), but estimation of some values may be possible. Recruitment can be estimated, and standard bias correction procedures are applied. Selectivity can is also typically estimated and can be fixed. If multiple fleets have length composition data, data weighting approaches would follow standard procedures as outlined in Appendix B Section H. The starter and forecast files are specified as in traditional SS assessments. The performance and stability of SS-CL was better with smaller model dimensions (e.g., fewer fleets) and is sensitive to errors in the fixed values for L_∞ and the coefficient of variation (CV) of length-at-age, which, if fixed, should be explored in sensitivity analyses.

The limited scope of SS-CL and SS-CL+Index allow for more limited documentation requirements, described in Appendix E. For more complex intermediate models beyond the scope of these focused methods, reporting requirements should be developed in an assessment-specific TOR developed by the Chair of the STAR panel to provide flexibility to cover the range of possible applications, while still providing appropriate specificity and thorough evaluation. The reviews are expected to take between a half day and two days depending on the number, type, and novelty of the assessments. It may be beneficial to hold a half day preliminary review during a virtual meeting prior the Groundfish Subcommittee at which the review will be conducted. The number of SS-CL or SS-CL+Index assessments that can be conducted at a given STAR panel or the Groundfish Subcommittee of the SSC in combination with update assessments, depends on the complexity of the models, spatial areas, and novelty of the methods. Between two and four assessments in a review may be reasonable, and flexibility should be provided to the SSC in determining how many assessments should be reviewed and the process for each review.

The critical modelling steps for SS-CL and SS-CL+Index are included in the methodology step flow chart in Appendix J in addition to the following guidance. Jittering and alternative phasing should be used given the difficulties encountered by the analysts during this review finding the global minimum of the objective function. If there is dimorphic growth, then sex-specific

information should be included. Fleet consolidation is recommended if selectivity is similar among sectors or surveys to reduce model conflict and confounding affects. If a survey is included in an SS-CL+Index assessment, the length-composition from that survey should also be included, as well as length-composition from other fishery-independent or fishery-dependent data sources. Application of dome-shaped selectivity should be investigated when plausible, in addition to asymptotic selectivity. It is recommended that the model be run with asymptotic selectivity for at least one fleet if natural mortality is being estimated. Simplifying model structure and spatial areas will reduce complexity in the assessments and workload in both the analysis and review.

References

Methot, R.D. and C.R. Wetzel. 2013. Stock Synthesis: A biological and statistical framework for fish stock assessment and fishery management. *Fisheries Research* 142: 86-99.

Page 54:

Appendix E: Template for a Data-Moderate or Data-Poor Assessment Document

1. Title page and list of preparers – the names and affiliations of the stock assessment team (STAT).
2. Introduction: Scientific name, distribution, basic biology (growth, longevity, ecology), the basis for the choice of stock unit(s) (no more than 1-2 paragraphs).
3. Development of indices (used and rejected). Novel approaches should be fully documented.
4. Treatment of length composition data (weighting, addressing discards, etc.).
5. Survey of other data available for assessment: data available to inform indices of abundance, sample sizes by year and source of lengths, and ages (read and unread)--in case there is interest in conducting a full assessment in the future.
6. Selection of method: length-based (SS-CL), index-based (XSSS or XDB-SRA; authors are “encouraged” to do both) or hybrid method (SS-CL+Index).
7. Assessment model
 - a. Specification of priors / production function (defaults are acceptable)
 - b. Initial runs using catch-only methods (DB-SRA or SSS (or both))
 - c. Diagnostics
 - i. Evaluation of convergence
 - ii. Residual plots
 - iii. Posterior predictive intervals (if Bayesian)
 - iv. Time-trajectories of biomass, depletion, etc.
 - v. Sensitivity analyses using alternative catch streams, alternative priors for depletion, etc.
7. Estimates of OFL (median of the distribution), and
8. Estimates of stock status where applicable.

Page 59.

Appendix J: Flow chart for SS-CL

- **Take the following steps in completing an SS-CL assessment: Prepare catch data**
- Catch treated as known. Use total mortality (landings + dead discards).
- **Prepare length composition**

- Determine length bins and frequency within bins across years. More than 10 years of data (with reasonable sample sizes) is recommended. Otherwise it is a category 3 assessment.
- This can be done for as many fleets as needed, but use the parsimony principle to define fleets, as model convergence may be more difficult with more fleets.
- Female, male, and unknown data can be used.
- Determine effective sample sizes following standard protocol.
- Combine length data from landings and discards (or reasonable assumptions for the latter if no data) appropriately.
 - **Define life history parameters**
- Natural Mortality: define using estimators (e.g., Hamel method (must include as a sensitivity at least, if an estimate of longevity/maximum age is available), Natural Mortality Tool (which includes the Hamel method)). Fix to central tendency (median value) and retain uncertainty for sensitivity analyses.
- Growth parameters. Externally fit the von Bertalanffy growth function and use point estimates to fix in model. Choose a fixed value for CV at length. Retain uncertainty for sensitivity analyses.
- Steepness defined either through meta-analysis or expert opinion. Retain uncertainty for sensitivity analyses.
- Recruitment variability also defined through meta-analysis or expert opinion. Retain uncertainty for sensitivity analyses.
- Life history parameters will generally be pre-specified, but consideration could be given to estimating these parameters (see Section 1.5.3).
 - **Parameter estimation**
- Estimate R_0 , recruitment deviations and selectivity parameters.
- Life history parameters if likelihood profiles show information.
- Selectivity can be logistic, dome-shaped, or whatever form is chosen in SS.
- Bias correction to recruitment deviations can subsequently be applied.
 - **Model weighting**
- Consider weighting the length compositions if multiple fleets.
 - **Model convergence**
- Length-only models may take additional jittering to find convergence and avoid local likelihood minima.
- Check model fits to length compositions.
- Determine whether selectivity shapes make sense.
- Review other parameters estimates for bounds and poor estimation (and whether they are reasonable).
 - **Characterize uncertainty**
- Likelihood profile over, at minimum, M , L_2 (preferably parameterized as L_∞ , though can also make the transformation for reporting) and k (retain correlation structure if possible), CV at length, and h .
- Sensitivity analysis should be conducted, either based on likelihood profile information or identified model specification.
- Ensemble modeling to quantify model specification error would be useful. This would need further discussion on how best to approach it.

G. Coastal Pelagic Species Management

1. Sardine Rebuilding Plan

Dr. Kevin Hill (National Marine Fisheries Service [NMFS] - Southwest Fisheries Science Center, Coastal Pelagic Species Management Team) spoke to the Scientific and Statistical Committee (SSC) via webinar about his plans to produce a Pacific sardine rebuilding analysis using the Rebuilder software that has been used for groundfish. NMFS notified the Pacific Fishery Management Council (Council) that the northern subpopulation of Pacific sardine was declared overfished in July 2019 and a rebuilding plan must be submitted to NMFS no later than October 2020. The SSC notes that this analysis must be completed in a short time frame and that a relatively simple approach is preferred. Pacific sardine productivity is highly variable and environmentally dependent. There has been almost no directed fishing in U.S. west coast waters for Pacific sardine since 2015, except for low levels of live bait and other minor directed fishing allowed per the Coastal Pelagic Species Fishery Management Plan.

The technical aspects of a rebuilding analysis relate to: (a) the target biomass (usually B_{MSY} or a proxy thereof), (b) how future recruitment is generated, (c) the future harvest scenarios, and (d) the way the parameters of the population model are set. The proposed rebuilding analysis will use output from the 2020 benchmark assessment to set the parameters of the population model. Dr. Hill proposed two time periods of recruitment to define the unfished biomass (SB_0) and hence B_{MSY} : 2005-2018, a period of high to low recruitment and 2010 – 2018, a period of low recruitment.

He also proposed to use these two time periods as the basis for generating future recruitment. At least two rebuilding alternatives will be explored: (1) a set of catches that is intended to represent the status quo, and (2) zero U.S. harvest (no live bait or incidental catch in the domestic fishery).

Under both alternatives, the models will assume recent Mexican catches; however, T_{MIN} (the biologically minimum time predicted for the stock to rebuild) will be calculated assuming no future Mexican or U.S. catch.

The SSC endorsed the use of the Rebuilder as the basis for the rebuilding analysis, setting the model parameters using the 2020 benchmark assessment, and calculating the B_{MSY} proxy by projecting forward under $E_{MSY} = 0.18 \text{ yr}^{-1}$. The SSC agreed the two time series of recruitment capture plausible future productivity scenarios. However, rather than sampling recruitments from each time series, the SSC recommends using a stock-recruitment relationship to generate future recruitment. There is considerable uncertainty regarding the steepness of the stock-recruitment relationship for Pacific sardine, and the rebuilding analyses should account for this uncertainty, as was the case for the cowcod and yelloweye rockfish rebuilding analyses.

The SSC briefly discussed the economic analysis that will be included in the rebuilding plan and offers the following suggestions. The relative economic impacts of the rebuilding alternatives on other fisheries that catch sardines incidentally could be important and should be compared across alternatives. In addition, if there are major differences in rebuilding time probabilities associated with different alternatives, the discounted value of differences in the future value of the fishery associated with the directed fishery under each alternative should be evaluated and discussed. The information on the recent use and value of sardine is focused almost solely on California and should be expanded to include the geographic range north of California when the population

supported fishing in the Pacific Northwest. A discussion of the ecosystem service value associated with sardine as a forage fish would be beneficial.

The SSC recommends that the SSC Coastal Pelagic Species Subcommittee meet to review the analysis in July or early August 2020.

SSC Notes:

More work and clarity are needed on how B_{MSY} is established and whether it would be updated or fixed once adopted. This should be addressed at a CPS Subcommittee meeting during summer.

It would be important to report the probability of reaching or exceeding the current CUTOFF value of 150,000 mt to determine if that biomass could be met under the two alternatives. This value was chosen since the current harvest control rule does not allow directed harvest when the stock biomass is less than 150,000 mt. The 150,000 mt cutoff value in the sardine HCR was set at that value, at least to some extent, due to ecosystem considerations, and therefore may be considered an important target by the Council. This could inform the Council when the current harvest control rule would allow directed fisheries.

When evaluating the discounted value of future values streams from the fishery under different rebuilding alternatives, it would be ideal to consider differences in net benefits, but at a minimum discounted expected gross revenue streams should be compared.

The Sacramento River Fall Chinook (SRFC) rebuilding analysis from 2019 may provide some guidance on presenting the social and economic effects analysis. That analysis used historical values as a baseline and compared estimated outcomes across alternatives.

C. Administrative Matters (continued)

5. Future Council Meeting Agenda and Workload Planning

The SSC would prefer to continue to have a remote participation option for members for the September 2020 meeting if it is held in Spokane. If the meeting were to be solely in-person, several members may not attend due to health concerns and/or uncertainty about schools/day care being open in the fall. In addition, the SSC has concerns about the mismatch between the Council meeting platform and restrictions on NOAA employees using that platform. While we were able to conduct this meeting smoothly, it could have been improved if NOAA employees could share their screens when presenting and view the screens of others sharing. There were also concerns from NOAA employees about the public display of their home phone numbers when they call in.

The SSC offers the following guidance on the future Council meeting agenda and workload planning agenda items, as well as a response to the Executive Director's request for comment on [Agenda Item A.3, Supplemental Attachment 4](#).

The SSC Groundfish Subcommittee, along with the states, Science Centers, ageing laboratories, and other interested Council advisory body representatives will hold a webinar this summer to discuss any changes to catch estimation methods and prioritize ageing efforts as described in the Terms of Reference for the Groundfish and Coastal Pelagic Species (CPS) Stock Assessment Review Process for 2021-2022. The SSC Groundfish Subcommittee may conduct a methodology review of the Elasmobranch Harvest Control Rule in the late fall or early winter.

The SSC CPS Subcommittee recommends holding a webinar in July or early August 2020, to review the work on the sardine rebuilding plan. There may also be a need to discuss possible responses in the event of a substantially modified or missing acoustic trawl method (ATM) survey for 2020, due to the restrictions to field work in response to COVID-19.

The SSC agreed that final SSC review and, if appropriate, adoption of the length-based stock assessment and remotely operated vehicles methodologies should be a high priority item for September. The SSC also gives high priority to the review of the ongoing Sablefish Management Strategy Evaluation (MSE), so that the analysts have time to be responsive to SSC and Council feedback. The analysts have time constraints for completion of the MSE, and stakeholder engagement is important throughout the process. Stakeholder engagement via the North Pacific Fishery Management Council and the Department of Fisheries and Oceans Canada is also being planned.

The SSC Ecosystem Subcommittee plans to meet for one day prior to the September SSC meeting to review items from the California Current Ecosystem Integrated Ecosystem Assessment Team, and notes, if this meeting is to be conducted as a webinar, there is flexibility with the timing as there will be no travel costs incurred.

The SSC discussed the procedural change proposed by NMFS in [Agenda Item A.3, Supplemental Attachment 4](#), to offer guidance on management responses to changing the status of a stock from known to unknown. The SSC recommends more clarity in the first paragraph in the approach section under c2 (Reject New Assessment, Use Previous Assessment Results with No New Data), as rejecting new data should only be done with good justification. If a clear problem with a specific subset of the data can be identified, it would likely be better to simply exclude the problematic subset of the new data and then proceed with the new assessment, or at minimum update the old assessment with the non-problematic subset of the new data (similar to c1). If a clear problem with the new data cannot be specifically identified, the conflict between the new data and the old model structure could indicate inappropriate assumptions in the previous assessment, and thus simply reverting to the output of the last assessment would be questionable (i.e., the situation described in c3).

A. Planning the Research and Data Needs Database

Mr. John DeVore briefed the SSC on progress made in developing the Research and Data Needs Database. The team recommended the database capture the Research and Data Needs priorities of each Council advisory body, the SSC, and the Council. Council staff would have administrative rights to add R&D projects to the database and set the advisory body priorities for those advisory bodies they staff. Likewise, it is recommended each SSC subcommittee chair would have administrative rights to add projects and suggest SSC priorities for the project relevant to each subcommittee. The following table displays the recommended database structure as it currently stands.

There was consensus the structure looked good; however, they recommended maintaining an "Area" field to distinguish area-specific projects (e.g., projects occurring in waters off one state or region).

The plan is to complete development of the database and populate it with the content of the [2018 Research and Data Needs document](#) this summer. Ms. Meisha Key will be contracted by the Council to populate the database.

Proposed structure of the PFMC Research and Data Needs database. Each record is a research project.

FMP	Title	Source Documentation	Related Council Action	Research Status	Council Priorities	SSC Priorities	PFMC Advisors					
							CPSMT Priorities	EWG Priorities	GMT Priorities	HC Priorities	HMSMT Priorities	STT Priorities
Coastal Pelagic Species Ecosystem Groundfish Highly Migratory Species Salmon	Descriptive title of the research project	Rich text field to enable hyperlinks to archived documents with context for the research or data need.	Analogous to Council Action in the NPFMC database with a drop down menu selection of the research project initiatives	Same fields as in NPFMC database	High, Medium, Low	Permissions to add research projects; Permissions to prioritize all projects	Permissions to prioritize CPS projects	Permissions to prioritize Ecosystem projects	Permissions to prioritize Groundfish and Ecosystem projects	Permissions to prioritize Habitat and Ecosystem projects	Permissions to prioritize CPS and Ecosystem projects	Permissions to prioritize Salmon and Ecosystem projects

SSC Subcommittee Assignments, June 2020

Salmon	Groundfish	Coastal Pelagic Species	Highly Migratory Species	Economics	Ecosystem-Based Management
Alan Byrne	John Budrick	André Punt	Michael Harte	Cameron Speir	Kristin Marshall
John Budrick	John Field	John Budrick	John Field	Michael Harte	John Field
Owen Hamel	Melissa Haltuch	Alan Byrne	Marisol Garcia-Reyes	Dan Holland	Marisol Garcia-Reyes
Michael Harte	Owen Hamel	John Field	Dan Holland	André Punt	Melissa Haltuch
Galen Johnson	Kristin Marshall	Marisol Garcia-Reyes	Kristin Marshall		Michael Harte
Will Satterthwaite	André Punt	Owen Hamel	André Punt		Dan Holland
Jason Schaffler	Jason Schaffler	Will Satterthwaite			Galen Johnson
Ole Shelton	Tien-Shui Tsou	Tien-Shui Tsou			André Punt
Cameron Speir	Will White				Will Satterthwaite
Tien-Shui Tsou					Ole Shelton
					Cameron Speir

Bold denotes Subcommittee Chairperson

ADJOURN