SUMMARY MINUTES

Scientific and Statistical Committee

Pacific Fishery Management Council
Via Webinar
March 2 and 3, 2021

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. Fabio Caltabellotta, Oregon State University, Corvallis, OR
Dr. John Field, 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, SSC Chair, 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 March 2021 Meeting		
SSC Member	**Issue**	**Reason**
Dr. Jason Schaffler	E.3 Review of 2020 Fisheries and Summary of 2021 Stock Forecasts	Dr. Schaffler developed some of the Puget Sound stock forecasts.
Dr. Dan Holland	I.1 California Current Ecosystem and Integrated Ecosystem Assessment (IEA) Report and Science Review Topics	Dr. Holland is the author CCIEA report 6.2 Diversification of Fishery Revenues. Dr. Holland also supervises Dr. Karma Norman, who is the author of CCIEA report 6.1 Social Vulnerability.
Dr. Will Satterthwaite	I.1 California Current Ecosystem and Integrated Ecosystem Assessment (IEA) Report and Science Review Topics	Dr. Satterthwaite is the author of one of the topics proposed for SSC review in September (Satterthwaite et al. 2020).
Dr. Melissa Haltuch	Discussion of The Regional Best Scientific Information Available Framework	Dr. Haltuch contributed to the draft regional policy for deciding best scientific information available.
Dr. Owen Hamel	Discussion of The Regional Best Scientific Information Available Framework	Dr. Hamel supervises Dr. Melissa Haltuch.
Dr. Will Satterthwaite	Discussion of The Regional Best Scientific Information Available Framework	Dr. Satterthwaite contributed to the draft regional policy for deciding best scientific information available.

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 the Pacific Fishery Management Council's (Council's or PFMC's) expectations for the items on the SSC agenda.

H. Highly Migratory Species Management

5. Biennial Harvest Specifications and Management Measures

The Scientific and Statistical Committee (SSC) reviewed the alternative approaches to derive proxies for status determination criteria (SDC) for bigeye and yellowfin tunas as set forth in Joint SWFSC-WCR NMFS Report 1. This review was necessitated by the adoption of new modeling approaches by the Inter-American Tropical Tuna Commission for bigeye and yellowfin tuna. These new "probabilistic" assessments involve using an ensemble of alternative models and parameterizations that are weighted based on a set of criteria including model fit and the plausibility of the results. The SSC Highly Migratory Species (HMS) Subcommittee met on February 4th, 2021, via webinar to discuss (A) the new probabilistic assessments for these species, (B) Best Scientific Information Available determinations, and (C) best practices for determining Management Limit Reference Points and SDC using results of these probabilistic assessments. The SSC, while discussing all three, focused on the last of these.

Ms. Sarah Shoffler (Southwest Fisheries Science Center [SWFSC]) and Ms. Amber Rhodes (West Coast Region [WCR]) provided context for the SSC discussion and answered questions. The SSC agrees that applying the proxy for the Maximum Fishing Mortality Threshold outlined in Joint SWFSC-WCR NMFS Report 1 is a reasonable approach for these assessments. For the Minimum Stock Size Threshold (MSST), the SSC agrees that the second example under alternative 3 is appropriate whenever the central values of natural mortality rate (M; either a fixed value or the median of a distribution for each individual model) are greater than 0.5 for all models in the ensemble. Option 1, whereby the assessment results include reference levels consistent with domestic SDC, is preferred in cases where some or all of these M central values are below 0.5 (including when M is age-dependent and this is true for a subset of ages). If only a small minority of the models have M central values below 0.5, the above proxy for MSST may still be acceptable.

As mentioned previously (Agenda Item J.3.a, Supplemental SSC Report 1, November 2018), it should not be necessary for the SSC to routinely review HMS status determinations. However, the SSC would be willing to review the application of the HMS SDC for other species or for future assessments as needed.

SSC Notes:

The next version of Stock Synthesis (SS4) should output the value of $S_{CUR}/(S_{MSY}(1-M))$ to enable status determination for the yellowfin and bigeye tuna to be calculated more efficiently.

Alternative 3 (second example) involves applying a proxy such that a stock is determined to be overfished if $P(S_{CUR}<0.5*S_{MSY}) > 50\%$.

The proxy for the Maximum Fishing Mortality Threshold is such that a stock is determined to be subject to overfishing if $P(F_{CUR}>F_{MSY}) > 50\%$.

While "distribution" is correct, it does represent an approximation of the posterior for the natural mortality rate.

I. Ecosystem Management

1. California Current Ecosystem and Integrated Ecosystem Assessment (IEA) Report and Science Review Topics

The Scientific and Statistical Committee (SSC) met with representatives of the California Current Integrated Ecosystem Assessment (CCIEA) team, Drs. Toby Garfield (Southwest Fisheries Science Center) and Chris Harvey (Northwest Fisheries Science Center). The SSC's discussion with the CCIEA team encompassed three topics: 1) the 2021 CCIEA Ecosystem Status Report (IEA Team Reports 1 and 2), 2) the report of the January 2021 SSC Ecosystem Subcommittee (SSCES) meeting, including consideration of the COVID-19 related impacts on the 2021 CCIEA Report (appended to the end of this statement), and 3) topics/analyses for the CCIEA team to present for review at the September 2021 SSCES meeting (Supplemental IEA Team Report 3).

Review of the 2021 CCIEA Ecosystem Status Report

The Ecosystem Status Report provides important information on environmental, biological, social, and economic indicators and provides an ecosystem perspective on West Coast fish stocks, fisheries, and coastal communities for the Council process. The SSC commends the CCIEA team's openness and responsiveness to Council and SSC questions and recommendations, and their continuing efforts to improve the Status Report each year.

One important finding in this year's Ecosystem Status Report is that although oceanographic and climate indicators are coming back to neutral condition after the 2013-2016 Marine Heatwave, the California Current Ecosystem is still experiencing episodes of warm conditions that are not associated with El Niño as they were in the past. In addition, the North Pacific Gyre Oscillation (NPGO) index is at its most negative values ever recorded. These indicators are giving contradictory signals about productivity. We may have to wait a few years to see how these conditions affect ecological outcomes.

The SSC discussed several issues that could affect the interpretation of the indicators in the report including:

- The characterization of salmon escapement numbers as "high" or "low" requires some further elaboration (Figure 4.3.1, page 11). Currently the "high" or "low" designation is based on an average of recent years relative to the long-term average of the time series. These designations are sensitive to the length of the time series used. It is not clear that "high" and "low" are the best descriptors to apply to this comparison. It may be better to base designations on reference points that characterize biologically healthy stocks (e.g., Endangered Species Act listing status or minimum stock size thresholds).

- The discussion of trends in salmon escapement (Section 4.3) is unclear about whether the term "natural" refers specifically to natural-origin fish or to fish counted as spawning in natural areas. Reporting natural-origin abundances when available would be a useful addition to the report and necessary to evaluate the performance of the naturally produced Central Valley Fall Chinook indicator.

- The 2021 report includes a new indicator of groundfish availability at the port level (Section 4.4, p. 13). While the indicator reflects the spatial abundance and distribution of groundfish species, market and social factors will influence the ability of individual communities to utilize specific resources (e.g., physical infrastructure, labor market conditions, prices). Therefore, this may not be a good indicator of social or economic conditions in a port.

- The interpretation of the fisheries participation networks can be confusing (Figure 6.4.1). The size of nodes in the figure are described as being proportional to revenue from a given fishery. However, node size does not relate to overall revenues at those ports for those species. Node size reflects the median percent of individuals' total revenue accounted for by that species for participants in that fishery and port group. Thus, if most participants get most of their revenue from that fishery, the node size can be large even if the absolute revenue for individual participants and in total is small.

Outcomes of the January 2021 SSCES Meeting

The SSCES assessed the effect of COVID-19 on data sources used in the CCIEA report and provided technical comments on two new analyses in this year's report. Data collections for forage indicators were most affected by cancellations, delays, or changes to ocean surveys in 2020 as a consequence of the COVID-19 pandemic (more details on the affected surveys are available in the SSCES report, appended to this statement). The CCIEA report handles the issue of missing or limited data for 2020 appropriately. The SSC recommends that future reports should continue to document the limited data in 2020 since it may affect the calculation of indicator trends. The SSC commends the CCIEA team for their efforts to address data deficiencies and other difficulties this year.

Proposed Review Topics for September 2021

The CCIEA team has proposed two potential topics for review in September 2021 (Supplemental IEA Team Report 3):

1) Threshold relationships between environmental drivers and performance of salmon preseason abundance forecasts. Investigating how environmental indices reported by the CCIEA may indicate conditions that are associated with bias in forecasts could be of value to Pacific Fishery Management Council salmon management and may represent an opportunity for an ecosystem approach to fisheries management.

2) Year class strength and distribution of small groundfish. This analysis is based on recently published work that estimates spatial and temporal patterns of abundance of young age classes of 13 groundfish species. This may provide a leading indicator of incoming strong year classes

relative to when those species recruit into the fishery, as well as locating potential hotspots of valuable juvenile groundfish habitat that may be useful in essential fish habitat determinations.

The SSC agrees with the importance of both proposed topics and recommends they be reviewed at the September SSCES meeting. The SSC also recommends three additional topics for possible review. The first topic is a general review of salmon-related indicators. This topic could include validation of the stoplight indicators and further exploration of the salmon-related issues raised by the SSC at this meeting. The second topic is further development of the krill-based indicators used in the CCIEA report. The interpretation of mean size data in the absence of relative abundance data can be nuanced, although recent publications provide some guidance that may help evaluate the findings provided in the annual CCIEA report. The third topic would be additional review of port-level linkages between fisheries using network analysis that was included in the 2021 CCIEA report.

For the three additional topics for possible review, the CCIEA team and the SSC would need to confirm that analysts are available to develop this work prior to the September meeting. The SSC suggests the SSCES and CCIEA team participate in a non-noticed workload planning meeting in advance of the September review meeting. Consideration of these topics for future (e.g., 2022) reviews is also a reasonable option.

SSC Notes:

Oceanographic indicators

Oceanographic conditions in the past few years have been anomalous and contradictory. Relative trends between indicators are changing and how we interpret the indicators may need to change. There is not full understanding of the mechanisms behind these changes and we will have to wait a few years to see how these conditions play out in ecological conditions.

In the past ONI/PDO and NPGO indices tracked inversely (Figure 3.1.1, page 3). But PDO and NPGO are now tracking together. This means they are providing contradictory signals about expected productivity since the PDO suggests higher productivity while the NPGO suggests lower productivity when both are low as they are now.

There is a north/south split in conditions. Since 2013 (MHW/ENSO) conditions in NE Pacific have not followed the same historical patterns. Are we seeing a de-coupling from the ENSO index? If yes, why? This is something to examine over the next few years.

Salmon issues

Definitions and justification for the boundaries between stoplight categories (i.e., red, orange, yellow, green) (Tables 4.3.1 and 4.3.2) should be made clear in the report.

Some considerations for how to define high/low population sizes in Figure 4.3.1.

- *Length of time series*
- *ESA recovery abundances (should stocks be separated by ESA listing status?)*

- *Agency escapement goals*

Consider using 3-year geometric means to calculate current abundance since this is typically used for status determinations.

Central Valley Fall Chinook Natural Production indicator (Table 4.3.2)

- *This year, the Central Valley Fall Chinook Natural Production indicator and the SI forecast are both giving similar "mixed" outlooks. This contrasts with last year when the SI forecast was relatively high but the CV Fall Natural Indicator outlook was poor. The SI was over-forecast in 2020, but not by an atypically large amount.*
- *We can't directly evaluate the performance of the Central Valley Fall Chinook Natural Indicator unless/until agencies start reporting escapement of hatchery- versus natural-origin fish separately, which would be a valuable addition to the report.*
- *Is meeting the combined hatchery + natural escapement goal sufficient to determine that escapement was "good" for natural production? Natural production depends on natural area escapement, but the FMP escapement goal is for hatchery and natural area returns combined.*

<u>Other Feedback on the Report</u>

The standard errors presented for the HCI (Figure 3.2.1) are misleading. The error envelopes in this are 1 standard error, but everywhere else in the report it is a 95% confidence interval. Further, habitat indices are coming out of a (deterministic) ROMS model. The standard error reflects variability in daily values summed to season values. This is not statistical error (it is some form of model error)

Regarding Figure 3.2.1, the blue line is not "relative to" the data, as stated in the caption. Replace "relative" with 'and" to clarify.

During the presentation, the slide describing sea lion pup data uses a non-linear modeling approach to formally identify threshold response in the slides. However, other places in the report (hypoxia, temperature threshold in Habitat Compression Index) use the term threshold without the same formal treatment.

The groundfish availability indicator is calculated based on absolute biomass. However, it is not clear that this translates into higher commercial catch per unit effort and thus a viable fishing opportunity. It might be useful to explore whether and how this measure relates to commercial CPUE.

<u>COVID effects</u>

Nearly all oceanographic indices were unaffected by COVID (derived from satellites, models, or drones). The CCIEA team notes that they are transitioning to a greater dependence on gliders.

The CalCOFI spring cruise was canceled, which has a big impact on observations in the Southern California Bight. Sampling and data issues are most problematic for forage indicators.

The SSC has no concerns with how the CCIEA team handled gaps in sampling.

Northern juvenile salmon survey data became available after the ES meeting and some of this data made it into the report.

The calculation of some indicators is based on a(n) (intended) feature of MARSS models. If the data for 2020 are more uncertain (higher CV), the effect of the change in the point estimate of the indicator based on the data will be downweighted. The analysts should be aware of this effect of the (intended) using MARSS models.

Topic Selection

Threshold relationships between environmental drivers and performance of salmon preseason abundance forecasts

- *Satterthwaite et al. (2020) found that some environmental indices reported by the CCIEA may indicate conditions that are associated with bias in forecasts. Flagging the risk of over- or underestimating returns could be of value to PFMC salmon management and may represent an opportunity for an ecosystem approach to fisheries management.*
- *Note that this analysis is not about what drives abundance, but what drives errors in forecast.*
- *Satterthwaite, W.H., Andrews, K.S., Burke, B.J., Gosselin, J.L., Greene, C.M., Harvey, C.J., Munsch, S.H., O'Farrell, M.R., Samhouri, J.F. and Sobocinski, K.L., 2020. Ecological thresholds in forecast performance for key United States West Coast Chinook salmon stocks. ICES Journal of Marine Science, 77(4), pp.1503-1515.*

Year class strength and distribution of post-settled groundfish

- *A key objective of this review topic would be validation of the analysis as a leading indicator.*
- *Sablefish validation has occurred (i.e., an index of ~ age zero fish reflects year class size estimated within the stock assessment). The models for other species have not been validated.*
- *A survey index of age zero fish could be a source of information in years where we don't have assessment estimates of recruitment? This may be a separate topic.*
- *Tolimieri, N., Wallace, J. and Haltuch, M., 2020. Spatio-temporal patterns in juvenile habitat for 13 groundfishes in the California Current Ecosystem. PloS one, 15(8), p.e0237996.*

Fishery participation networks

- *This work is based on recently published work by Fuller et al (2017) and Fisher et al. (2020).*
- *Further work based on recommendations made at the SSCES meeting in January could help validate the indicators and improve their presentation.*

Krill

- *Shaw, C.T., Bi, H., Feinberg, L.R. and Peterson, W.T., 2021. Cohort analysis of Euphausia pacifica from the Northeast Pacific population using a Gaussian mixture model. Progress in Oceanography, 191, p.102495.*

Most of the analysts who would work in the additional salmon topic did not attend the SSC meeting so it's unclear if there is capacity to do this. NWFSC will develop priorities for salmon research, which will hopefully include salmon indicators.

SCIENTIFIC AND STATISTICAL COMMITTEE'S
ECOSYSTEM SUBCOMMITTEE REPORT

Pacific Fishery Management Council
Via Webinar

January 12, 2021

The Scientific and Statistical Committee's Ecosystem Subcommittee (SSCES) met via webinar January 12 to consult with the National Marine Fisheries Service (NMFS) California Current Integrated Ecosystem Assessment (CCIEA) team on how COVID-19 impacts may affect its annual ecosystem status report to the Council (hereafter CCIEA report). The SSCES reviewed three topics: adjustments to forage time series (A), an expanded analysis of threshold detection in relationships between environmental pressure and biological responses (B), and groundfish availability to ports and impacts to catch portfolios (C). Dr. Kristin Marshall chaired the meeting. Meeting participants are listed in Appendix A.

A. Adjustments to Forage Time Series Analyses to Ensure Consistency with Previous Years' Data

The SSCES received presentations from Drs. Brian Burke (NMFS/NWFSC), Jarrod Santora (NMFS/SWFSC), and Andrew Thompson (NMFS/SWFSC) summarizing the consequences of the COVID-19 pandemic for ocean surveys in 2020 and the impact of survey changes on forage indicators presented in the CCIEA report in 2021. Four surveys were discussed: 1) Newport Hydrographic Line survey, 2) Juvenile Salmon and Ocean Ecosystem Survey, 3) Rockfish Recruitment and Ecosystem Assessment Survey, and 4) CalCOFI Larval Fish Survey.

All of the surveys were delayed or reduced in scope due to the pandemic, though some were affected more than others. When surveys were able to be conducted, National Oceanic and Atmospheric Association (NOAA) scientists were generally unable to be present shipboard and were therefore unable to process samples as they were collected. A consequence of this is that many samples were frozen for later examination in the lab and many samples from 2020 are still being processed at the NWFSC and SWFSC. Reduced sampling and sample processing will result in increased uncertainty about the state of the California Current ecosystem in 2020 in comparison to previous years.

The SSCES commends the CCIEA team for their efforts to provide consistent indicator time series, where possible, and agrees with the approaches outlined by the analysts to present more limited data and explore new methods and data sources to bolster sampling limited by the pandemic in 2020. A brief summary of the four surveys and their 2020 impacts are below.

Newport Hydrographic Line (Dr. Brian Burke)

The Newport hydrographic line provides bi-weekly surveys of ichthyoplankton and copepods across the continental shelf off Newport, Oregon. These surveys contribute to the annual CCIEA Ecosystem Status Report as a component of the salmon stoplight chart and as time-series indices for copepod communities and winter ichthyoplankton. In 2020, only two of the bi-weekly surveys were not conducted, making this the least affected survey. Previous years had also missed similar numbers of survey dates, and so no 2020-specific modifications to the time series are expected in future years.

Juvenile Salmon and Ocean Ecosystem Survey (Dr. Brian Burke)

This survey is typically conducted in Oregon and Washington waters during May and June. It provides information about juvenile salmon abundance and distribution as well as other pelagic forage species including squid. This survey contributes to salmon forecasts, the salmon stoplight chart, and forage time-series indicators in the CCIEA report.

In 2020, the May survey was cancelled and the June survey was conducted without NOAA scientists aboard. Collected samples were frozen and transported to the lab for later analysis. Due to subsequent difficulty delaying sample processing, salmon catch per unit of effort (CPUE) data are not available at present but are expected to be fully processed in 2021. Most non-salmonid species (e.g., squid) have been completely processed and will be represented in the CCIEA report.

Rockfish Recruitment and Ecosystem Assessment Survey (Dr. Jarrod Santora)

This trawl survey targets the pelagic fish community in California waters between April and June. It provides information on rockfish young-of-year, pelagic fish (e.g., anchovies, young-of-year hake, myctophids), and important invertebrate species (e.g., krill, market squid). These indices contribute to stock assessments and ecosystem indicators presented in the CCIEA report.

The 2020 survey began later than usual (June as opposed to late April or early May), was limited to the central California core survey area (Monterey to San Francisco Bay), and sampling within this limited area was further limited to just 15 trawls (approximately 25 percent of the trawls conducted in a typical year). This limited sampling resulted in the SWFSC spending substantial effort developing new model-based indicators for 8 species in the core sampling area, using methodology similar to that already applied to other groundfish surveys. SWFSC staff also developed methods to understand how limited sampling will affect uncertainty bounds for target species, and how historical survey results relate to other data sources. Specifically, they compared survey results with seabird diet data from the Farallon Island and krill data with a krill distribution model developed with oceanographic variables. Each of these analyses provide additional context for the survey, which can support the use of such limited survey effort in describing the pelagic ecosystem. These analyses will not be used to interpolate survey results from other data sources but to find multiple alternative sources of data that qualitatively support assessment of the ecosystem.

California Cooperative Oceanic Fisheries Investigations (CalCOFI) Surveys (Dr. Andrew Thompson)

The CalCOFI surveys sample larval fish communities in southern California and central California. This survey provides indices of spawning stock biomass for a wide range of forage fishes in the CCIEA.

The 2020 CalCOFI winter survey occurred but there was no spring survey due to the pandemic. Data from spring surveys are typically used in the CCIEA report, but analyses based on winter surveys will be used in this year's CCIEA report. Two-thirds of the analyzed forage species have higher abundances in spring than winter, but all species spawn in both winter and spring. The pandemic also limited the ability to process collected samples from the winter surveys. To date, only data from two of the six core survey lines have been processed and data from the remaining survey lines will likely not be available until late 2021. These two survey lines are considered representative of the core area.

B. Environmental Driver: Biological Response Threshold Analysis

Dr. Mary Hunsicker (NMFS/NWFSC) presented an analysis on detecting thresholds in biological responses to environmental drivers. This research is a continuation and expansion of previous material the SSCES reviewed in September 2017 (Samhouri et al., 2017). Several new time series (biological and environmental) and analyses beyond those included in Samhouri et al. 2017 are being considered for inclusion in the 2021 CCIEA report. The CCIEA team is also exploring the potential to use this approach to help fill in information about biological time series that may have missing data in 2020 or 2021 due to restricted sampling caused by the pandemic.

Threshold detection approaches may be useful for identifying ecosystem reference points and developing quantitative risk assessments, based on environmental pressures. The threshold detection approach uses generalized additive models (GAM/GAMM) to identify non-linear relationships between biological states and environmental pressures, and subsequently can identify the value or range of values in pressure variable where the shape of the relationship between the pressure and the biological state shifts. Dr. Hunsicker's

analysis expanded the number of environmental pressure time series from 2 to 9, and the biological response time series from 4 to 18, including new data from the Central California Current. Linear and non-linear relationships were found and examples of thresholds of environmental pressures on biology were presented for sardines and sea lion pups.

Many of the recommendations from the SSCES review in 2017 have been addressed in the new analysis. Areas of discussion with the SSCES included potential ways to increase the robustness of the analysis, given concerns about the number of pairwise comparisons (>500) leading to potentially spurious relationships. The SSCES also discussed that using environmental pressures with finer spatial resolution may lead to identifying more proximate drivers and mechanistic relationships. However, the magnitude of the concerns about spurious correlations and the scale of the environmental pressures depends on how the results of this analysis are used. The SSCES suggests this approach is most appropriately applied as a screening tool to identify potential relationships and focus for future finer-scale research.

Recommendations from the SSCES included:

- Explore resampling or randomization tests to address the concern about spurious correlations in the analysis, as well as testing the robustness of relationships by quantifying prediction errors as timeseries length changes. Testing for relationships at implausible lags or for geographically disparate locations (i.e., "placebos") might also provide a sense of the false positive rate. Removing outliers was also suggested, but this might be difficult since the non-linear relationships might depend on some of the more extreme values or skewed distributions.

- Investigating the performance of thresholds during historical cases of ecosystem state change could also validate observed thresholds if the length of the time series allows.

- Consider simplifying the results by reducing the number of environmental variables analyzed, since some are not independent (Pacific decadal oscillation and sea surface temperature, for example).

The SSCES recommends caution in using the relationships fitted using these methods to draw conclusions about ecosystem status in this year's CCIEA report. In particular, using environmental pressures to predict missing biological response data would necessitate more exploration, quantification, and communication of uncertainties in the data and the method (GAM/GAMM), and acknowledging that these relationships are statistical, not mechanistic. The SSCES suggests that combining indicator times series with model predictions in a single figure may cause confusion, and that more qualitative use of any predictions is more appropriate at this time.

C. Groundfish Distribution, Port Availability Shifts, and Impacts to Catch Portfolios

The SSCES received two presentations under this agenda item: 1) "Availability of stock biomass to ports" from Dr. Nick Tolimieri (NMFS/NWFSC) on a method for estimating the distribution of several groundfish species and 2) "Understanding fishing communities through participation networks" from Dr. Jameal Samhouri (NMFS/NWFSC) on linkages between fisheries at the port level. While this agenda item is less directly related to COVID-19 impacts to fishing, expanding stock availability metrics to more species and including participation networks may create opportunities to better track impacts to west coast fisheries from large-scale perturbations (which could include a pandemic).

The method for estimating biomass distribution described by Dr. Tolimieri is based on a recently published paper by Selden et al. (2020). Observations from NMFS shelf-slope trawl surveys from 1980-2017 are used by the VAST model (Thorson 2019) to calculate a spatial distribution index for each stock. This index is then scaled by the Spawning Stock Biomass (SSB) from the latest assessment for each species to calculate an estimated biomass within specified areas. In this case, the areas are circles centered on each port considered in the analysis. This quantity is the biomass available to each port.

Selden et al. (2020) found no relationship between the biomass available and observed landings per fish ticket at specific ports. However, the analysts indicated that this work is useful as an indicator of stock distribution capable of highlighting distributional changes. The analysts also suggested that this port-level stock availability is one measure of ports' capacity or potential to access the resource and may be informative in questions of how to allocate catch.

Much of the discussion focused on the "settings" used to apply the VAST model when generating a spatial biomass distribution index. In the analysis presented here (based on Selden et al 2020), the inputs used in the VAST model differ from how VAST is implemented in PFMC stock assessments (e.g., the time span of the input data, distributional assumptions, units over which catchability is specified, functional form of the model intercept, and size of the cells in the map grid). The SSCES recommends that the analysts use the same settings as the latest stock assessment, which can be implemented using the VASTWestCoast wrapper package written by Kelli Johnson at the NWFSC. Output from VAST can be sensitive to the specified settings and the assessment group will continue to evaluate those sensitivities and maintain and update VASTWestCoast into the future. Therefore, future implementations of the analysis for the CCIEA report can remain consistent with recent stock assessments.

The SSCES also offered input on which species to evaluate. The analysis may not be well-suited for species that primarily utilize rocky habitats since the trawl survey does not sample those habitats effectively. Lingcod, in particular, may not be a good species to include for this reason. The percentage of positive tows by species may be a good metric to use to decide whether to include/exclude particular species.

The SSCES also recommended specifying the port biomass availability as a relative index, rather than in terms of absolute biomass. Not scaling the spatial index by assessment-estimated SSB keeps the result closer to the results estimated from the survey data. Also, there may be issues with scaling the index by SSB in cases with dome shaped selectivity or where recent assessments are not available.

The analysis finds no relationship between the estimated port biomass availability quantity and observed landings per fish ticket at specific ports. The SSCES recommends that this result be investigated further. The work to date does not control for non-biomass factors that may affect catch levels, especially prices, regulations, and technical production relationships between species. Also, the analysis could calculate the change in distribution relative to changes in CPUE or catch, rather than simply reporting the change in port availability in absolute terms. Future work could use observer or logbook data to calculate catch per tow/set, which may be a more appropriate standardization than catch per fish ticket which is likely to be impacted by average vessel size, trip length and other factors.

The analysis of linkages between fisheries presented by Dr. Samhouri is based on recently published work by Fuller et al (2017) and Fisher et al. (2020). The analysis uses methods from social network analysis and graph theory to develop figures and metrics that measure diversity in fishery participation at the port level. During the discussion of this topic, the SSCES offered the following recommendations and feedback:

- The analysis is a good visualization of participation in fisheries and inter-regional differences in the combinations of fisheries available and complement the diversification indices in the report which use the same fishery definitions.

- It is not clear that the network metrics presented are good indicators of concepts like community vulnerability or resilience. More validation of how these concepts relate to these metrics is needed before the results can be discussed in these terms.

- The CCIEA report, if this work is to be included, could present results for each individual port. If this is not feasible, pick ports where large changes in the network metrics were observed over some time period.

- The results should be shown over time to get a sense of how fishing patterns have changed and to get some context about the observed range of results.

This is a topic to consider for inclusion in the annual CCIEA report. The SSCES recommends discussing this further with the CCIEA team during the March 2021 meeting for consideration at the SSCES meeting in September.

References

Fisher, M.C., Moore, S.K., Jardine, S.L., Watson, J.R. and Samhouri, J.F., 2020. Climate shock effects and mediation in fisheries. *Proceedings of the National Academy of Sciences*, *118*(2).

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SSC Notes:

For the salmon stoplight chart and missing data, consider future work exploring model-based predictions, perhaps similar to the approach taken this year by SWFSC for their survey.

K. Marshall is a coauthor on the Samhouri et al. (2017) paper presented as background material for item B., and W. Satterthwaite also used the same approach in another manuscript with several coauthors of the presented paper.

Dr. Hunsicker commented that the prominence of indicators at 39° N lat. on biological indices at other latitudes raised questions, but since strongest upwelling occurs at 39° N lat., this might influence the region. It is also possible that variability in upwelling is more prominent and visible there.

SWFSC juvenile rockfish survey samples young-of-year sardine reasonably well. Threshold analyses using those data are appropriate. Not so for adult sardine.

Adding density dependence to the threshold analysis was not advised. Instead, consider time series approaches with autocorrelation.

In the analysis of availability of groundfish to ports, investigating the locations of processing plants was not seen as high priority in the next year.

Appendix A. Meeting Participants

SSC Ecosystem Subcommittee Members Present

Dr. Kristin Marshall (Subcommittee Chair), National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA
Dr. John Field, 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. Michael Harte, Oregon State University, Corvallis, OR
Dr. Dan Holland, National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA
Dr. Galen Johnson, SSC Chair, Northwest Indian Fisheries Commission, Olympia, WA
Dr. Will Satterthwaite, National Marine Fisheries Service Southwest Fisheries Science Center, Santa Cruz, CA
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

CCIEA Team Members Present

Dr. Brian Burke, National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA
Dr. Toby Garfield, National Marine Fisheries Service Southwest Fisheries Science Center, La Jolla, CA
Dr. Chris Harvey, National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA
Dr. Mary Hunsicker, National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA
Dr. Jameal Samhouri, National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA
Dr. Jarrod Santora, National Marine Fisheries Service Southwest Fisheries Science Center, La Jolla, CA
Dr. Andrew Thompson, National Marine Fisheries Service Southwest Fisheries Science Center, La Jolla, CA
Dr. Nick Tolimieri, National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA

Others Present

Dr. Jim Anderson, University of Washington, Seattle, WA
Mr. Kelly Andrews, National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA
Dr. Kit Dahl, Pacific Fishery Management Council, Portland, OR
Ms. Yvonne de Reynier, National Marine Fisheries Service West Coast Region, Seattle, WA
Mr. John DeVore, Pacific Fishery Management Council, Portland, OR
Ms. Jaime Diamond, Stardust Sportfishing, Santa Barbara, CA
Dr. Michael Drexler, Ocean Conservancy, St. Petersburg, FL
Dr. Michael Harte, Oregon State University, Corvallis, OR
Ms. Theresa Labriola, Wild Oceans, Hood River, OR
Ms. Corey Ridings, Ocean Conservancy, Santa Cruz, CA
Dr. Tanya Rogers, National Marine Fisheries Service Southwest Fisheries Science Center, Santa Cruz, CA
Dr. Tien-Shui Tsou, Washington Department of Fish and Wildlife, Olympia, WA
Mr. Greg Williams, National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA

E. Salmon Management

3. Review of 2020 Fisheries and Summary of 2021 Stock Forecasts

The Scientific and Statistical Committee (SSC) discussed the Review of 2020 Ocean Salmon Fisheries and Preseason Report I for 2021. Dr. Michael O'Farrell (Southwest Fisheries Science

Center, Salmon Technical Team (STT) Chair) provided a brief summary of the reports and members of the STT were available to answer questions. The SSC received Preseason Report I less than one day before the SSC meeting and a full review of the document was not possible.

The SSC appreciates the work of the STT in compiling the reports and notes the addition of a section briefly describing the impact of COVID-19 in the beginning of each report. Impacts of the pandemic were widespread on both fisheries and data collection. For data collection, impacts ranged from reduced commercial and recreational fisheries sampling in California to a loss of coho smolt outmigration sampling from some rivers in Washington state.

The Council is tasked with specifying annual catch limits (ACLs) for Sacramento River fall Chinook (indicator stock for the Central Valley fall Chinook complex), Klamath River fall Chinook (indicator stock for the Southern Oregon/Northern California Chinook complex), and Willapa Bay coho. Preseason Report I presents ACLs for these three stocks (Table V-4). The forecasts for Sacramento River fall Chinook and Klamath River fall Chinook are derived from forecast models that have been reviewed and approved by the SSC in previous years, although new methods were required to impute small amounts of input data that were missing due to sampling challenges posed by COVID-19. The Willapa Bay coho forecast for 2021 was derived from a model endorsed by the SSC for one time use in 2020 due to insufficient time to address issues raised during the 2020 review. The SSC recommends completing the 2020 review of the Willapa Bay coho forecast as a salmon methodology review topic for this year. The SSC found the calculations of the acceptable biological catches (ABCs) and corresponding ACLs correct based on the forecasts. Due to insufficient time to review the materials, the SSC neither endorses nor rejects the forecasts as the best scientific information available for 2021 salmon management to set ABCs.

Five salmon stocks had rebuilding plans adopted in 2019. We briefly summarize the current status of each:

- Sacramento River fall Chinook. The three-year geometric mean abundance of hatchery and natural spawning adults is 133,549 which exceeds the minimum stock size threshold (MSST) of 91,500 and the stock size of maximum sustained yield (S_{MSY}) of 122,000. The stock meets the criteria for rebuilt status.
- Klamath River fall Chinook. The three-year geometric mean natural area spawning abundance is 30,167 which is below the MSST of 30,525. The stock meets the criteria for overfished status.
- Queets River coho. The three-year geometric mean adult spawning escapement is 2,395 which is below the MSST of 4,350. The stock meets the criteria for overfished status.
- Juan de Fuca coho. The three-year geometric mean adult spawning escapement is 5,391 which is below the MSST of 7,000. The stock meets the criteria for overfished status.
- Snohomish River coho. The three-year geometric mean adult spawning escapement is 48,385 which is above the MSST of 31,000, but below the S_{MSY} of 50,000. The stock meets the criteria for not overfished / rebuilding status.

While none of the stocks were determined to be subject to overfishing, we note that exploitation rates for stocks other than Sacramento River fall Chinook, Klamath River fall Chinook, and Oregon coast coho did not have estimated exploitation rates for 2020. However, preliminary analyses do not suggest that harvest rates exceeded the maximum fishing mortality threshold.

Klamath River fall Chinook along with Queets, Strait of Juan de Fuca, and Hood Canal natural coho meet the criteria for being at risk of approaching an overfished condition. In addition to the above stocks, for Hoh and Skagit coho, the spawning escapements for 2018 and 2019 were below MSST or S_{MSY} but data for 2020 are not yet available. For Chinook stocks, the Southern Oregon, Quillayute spring/summer, Hoh spring/summer, and Grays Harbor spring all had three-year geometric mean escapements (2018-2020) that were between MSST and S_{MSY}.

The SSC notes that disruptions due to the COVID-19 pandemic to data streams should logically lead to increased uncertainty in abundances, harvest rates, and forecasts. However, all of the results presented in Preseason Report I are point estimates and associated uncertainties are unquantified or quantified and not reported. This has the unfortunate consequence of creating the illusion that forecasts for 2021 are as precise as previous years when they are not. Therefore, the SSC reiterates its strong recommendation that PFMC salmon reports provide and incorporate appropriate measures of uncertainty as is currently done for groundfish, coastal pelagic species, and highly migratory species.

The SSC discussed forecasting methodologies used for salmon stocks in Preseason Report I and noted that it is unclear if and how forecasting methodologies have changed from previous years. The SSC recommends that the STT develop a database or appendix for their report where changes to forecasting methodologies for each stock can be described and archived.

In reviewing the salmon fishery management plan (FMP), the SSC identified two issues relevant to status determination criteria:

1. The FMP indicates that the intent of fisheries management in California is to "maximize natural production" (p. 48), but the Sacramento River fall Chinook escapement goal is for combined hatchery and natural returns.

2. North Lewis River fall Chinook is listed under the Endangered Species Act, but nevertheless has a maximum fishing mortality threshold specified (see p. 22). At present, exploitation rate calculations are not presented for this stock, so there is nothing to compare against the maximum fishing mortality threshold. The SSC would like guidance to determine if it should be included.

SSC Notes:

The SSC identified some small errors in Preseason Report I:

Page 54: The forecasted abundance used in the S_{OFL} and S_{ABC} calculations for Willapa Bay coho should be 36,908 rather than 32,868. The end product of the calculation is correct.

Question to the STT: Will there be a FRAM base period calibration this year? There was no clear answer, but the suggestion was that this will probably not occur this year.

Specific sampling gaps from California:

- *Certain time-area missing sampling*
- *Commercial (not sampled in May)*

- *Charter boats (not sampled in May)*
- *Skiff fisheries no sampling in May or June*

California used imputation to fill in sample gaps. CWT information was borrowed from adjacent months. When catch was missing, it was based on preseason model predictions adjusted by ratios of preseason projections to postseason estimates for adjacent months as well. There was no evidence that the results were sensitive to the data imputation. When compared to data collected since 2011, imputation was used for approximately 10% of the annual data.

There were limited sampling problems for ocean fisheries for WA & OR.

The STT did not anticipate any sampling issues associated with COVID in 2021.

Willapa Bay forecast

> *There was considerable concern about the Willapa Bay forecasts. Chehalis coho data is suitable for use in a forecast for Willapa Bay but Chehalis data is not used for the Chehalis river forecast.*
>
> *There is a lot of discussion about how to improve Willapa through data with WDFW (smolt monitoring, other data adjustments).*

There was a long discussion about changes to forecast methods in Preseason report I.

> *The two California chinook forecasts haven't changed.*
>
> *Juan de Fuca forecast didn't seem to have changed.*
>
> *Queets coho changed; New model uses GAM with environmental covariates.*
>
> *Snohomish coho definitely changed (no sampling of outmigrating smolts). A 5-year average of smolt production was used in its place.*
>
> *Skagit coho forecast was missing data for some environmental covariates typically included .*

OPIH coho made a "minor" change in 2008 that does not seem to have been reviewed, and overall it is hard to follow the path of changes to methods.

OPIH forecast is extremely high and seems like an outlier forecast.

OPIH was examined extensively by ODFW and judged by them to be appropriate.

Mike O'Farrell noted for the SSC that there will be several substantial changes to the data used in the harvest models for CA Chinook fisheries. This was motivated by the underprediction of ocean harvest rate for Klamath 4 year old fish in recent years but applies to both Central Valley and Klamath Chinook.

The Proposal is to increase encounter rate per unit effort across space using only recent years instead of the entire time-series. Analysis suggests that data from 2013 and later for the Klamath model and 2014 and later for the SI model will be used to parameterize the encounter and harvest rates. The result of this change will be higher estimated harvest rates going forward. This information will be included as a data change in PFMC salmon report 2 for 2021.

C. Administrative Matters (continued)

6. Future Council Meeting Agenda and Workload Planning

The Scientific and Statistical Committee (SSC) met March 2 and 3, 2021, and discussed future Council meeting agenda items and workload planning.

As mentioned in the SSC statement under the California Current Integrated Ecosystem Assessment (CCIEA) topic, the SSC proposes a meeting of the CCIEA team and the SSC Ecosystem Subcommittee in September 2021 to review work related to the annual report to the Council. It may be beneficial for additional SSC subcommittees to attend if there are topics related to their focus.

For groundfish and coastal pelagic species, the attached table shows the proposed schedule for the 2021 STAR panels, as well as SSC Groundfish Subcommittee reviews of Update and Data-limited assessments, and of the overall assessment process.

In response to a question from National Marine Fisheries Service Northwest Fisheries Science Center members to the SSC related to the upcoming lingcod stock assessment, the SSC addressed the question of what is expected for stock assessment bridging analyses when the spatial structure of an assessment is changed from that of the previous assessment. The current Stock Assessment Terms of Reference requirement is conditioned on new benchmark assessments using the same spatial structure as the previous assessment. The SSC suggests building a model with the new spatial structure, then truncating the time series of data to those years used in the previous assessment, making as few changes to the model structure (e.g., selectivity, growth) as possible. If there are large changes from the previous assessment, Stock Assessment Teams should provide model runs that focus on the most influential data set(s) driving changes in model estimates of spawning biomass and stock status. Age- and length-composition data can be prepared using the current year's data and methods.

The SSC supports the Sablefish Management Strategy Evaluation (MSE) team's plan to engage with Council stakeholders in a workshop on April 27-29, 2021, at which the team will facilitate discussions with stakeholders to identify objectives and performance metrics. Broad stakeholder participation early in a MSE process is helpful to ensure its success.

SSC Notes:

Bridging analysis makes a lot less sense with changing spatial structure, but some things could be learned. Could point to whether changes in status were due to spatial structure, or other data. Good to attempt to meet the spirit of why we do this. AP: Take the current model and impose the new spatial structure, then do bridging analysis from that model structure. This will allow consequences of just changing spatial structure. Future GF TOR revisions will capture guidance on bridging analyses that focuses on identifying the largest drivers of change in model estimates of spawning biomass and stock status.

Groundfish/Economics Subcommittee meeting—work on predicting gear-switching behavior in the sablefish fishery should be ready for review by the SSC Economics and Groundfish

Subcommittees. Discussion at the April meeting by the Council will determine whether this review needs to take place.

Bring ROV Survey up in September to make sure there is still support.

Proposed Workshops and SSC Subcommittee Meetings for 2021							
Workshop/Meeting		**Potential Dates**	**Sponsor/ Tentative Location**	**SSC Reps.**	**Additional Reviewers**	**AB Reps.**	**Council Staff**
1	Pre-assessment Workshop for Lingcod and Vermilion/Sunset Rockfishes	March 29	Council/Webinar	All invited	NA	GMT GAP	DeVore
2	Sablefish MSE Workshop	April 27-29	Council/Webinar	Haltuch +	PSTAT	GMT GAP	DeVore
3	Groundfish STAR Panel 1 Dover Sole & Data-Moderate Assessment of Spiny Dogfish	May 3-7	Council/Webinar	Tsou (Chair) Caltabellotta	2 CIE	Roberts Richter	DeVore Phillips
4	SSC Groundfish Subcommittee Review of Sablefish Update & and Data Moderate Assessments of Copper Rockfish, Quillback Rockfish, & Squarespot Rockfish	June 21-22?	Council/Webinar	Groundfish Subcommittee Members (Marshall and Haltuch - Chairs)	NA	Mandrup & Roberts Richter	DeVore
5	SSC Economics and Groundfish Subcommittees	June or July, TBD	Council/Webinar	Economics and Groundfish Subcommittee Members	NA	GMT GAP	DeVore Seger
6	Groundfish STAR Panel 2 Lingcod	July 12-16	Council/Webinar	Field (Chair) White	2 CIE	Mattes Richter	DeVore Phillips
7	Groundfish STAR Panel 3 Vermilion & Sunset Rockfishes	July 26-30	Council/Webinar	Budrick (Chair) TBD	2 CIE	Mandrup Richter	DeVore Phillips

8	SSC Groundfish Subcommittee Review of Assessments and Prioritizing Mop-up Tasks	Aug. TBD	Council/Webinar	Groundfish Subcommittee Members	NA	GMT Richter	DeVore
9	7th National Meeting of the Scientific Coordination Subcommittee of the Council Coordination Committee	2021 or 2022?	NPFMC/ Sitka, AK	4 TBD	NA	NA	DeVore
10	SSC Ecosystem Subcommittee	September 8?	Council/ Spokane, WA?	SSC Ecosystem & Salmon Subcommittee Members	CCIEA Team	EWG EAS	DeVore Dahl
11	Groundfish Mop-up STAR Panel, if needed	September 27-October 1	Council/TBD	TBD	2 CIE	GMT Richter	DeVore
12	Salmon Methodology Review	October TBD	Council/TBD	Salmon Subcommittee members	NA	STT MEW	Ehlke
13	CSNA STAR Panel	Nov. 30 – Dec. 3	Council/TBD	Punt (Chair) & CPS Subcommittee Members TBD	2 CIE	CPSMT CPSAS	Griffin DeVore
14	Proposed Workshop for Conducting Nearshore ROV Surveys	TBD	Council/TBD	TBD	TBD	GMT GAP	DeVore
15	Post-mortem Review of the Groundfish Assessment Process	Fall/Winter 2021 After Assessment Cycle, TBD	Council/TBD	Groundfish Subcommittee Members	TBD	GMT Richter	DeVore

SSC Administrative Matters (continued)

8. Discussion of The Regional Best Scientific Information Available Framework

The Scientific and Statistical Committee (SSC) received a presentation from Ms. Sarah Shoffler (National Marine Fisheries Service - Southwest Fisheries Science Center) and Dr. James Hastie (National Marine Fisheries Service - Northwest Fisheries Science Center) discussing the regional Best Scientific Information Available (BSIA) Framework. The presentation described the ongoing development of the regional BSIA framework needed to meet the requirements established in the NMFS procedural directive intended to clarify and increase transparency in how BSIA determinations, consistent with National Standard 2, are made for stock status determinations and catch specifications.

NMFS Northwest and Southwest Fisheries Science Centers provided a draft of an annotated outline of the BSIA Framework for groundfish, coastal pelagic species and highly migratory species. This annotated outline provides information on how the West Coast Science Centers will select POCs for BSIA, and a strawman approach for dealing with disagreements between the Science Centers and the SSC. The BSIA Framework document provides an opportunity for discussion and initial feedback, questions, and clarifications. The information in this document is intended to capture the general existing processes for determining BSIA, which could be applied even when timelines shift. The document largely outlines processes already in place, with some exceptions that are noted. It is anticipated that the processes will differ between FMPs. The SSC will have additional opportunities to provide feedback on the BSIA Framework.

Note that salmon will be addressed separately in a future meeting. The inclusion of additional products in the BSIA framework are under internal discussions (e.g., total mortality estimates and third party science products).

Ms. Shoffler and Dr. Hastie request that the SSC provide high-level feedback on the BSIA Framework. Specifically, are the processes described in the draft document an accurate characterization of the current processes with respect to items that come under SSC review?

The SSC discussed a number of BSIA issues:

- *The groundfish component of the document is accurate. However, the document pools CPS and groundfish and some items do not apply to CPS. Consider keeping a generic initial section and then separate components for specific items with respect to groundfish and CPS. For example, rebuilding, data-moderate and data-poor methods are specific to groundfish. One way forward is to keep the existing basic structure then add a table that explains which factors apply to each FMP, CPS or groundfish. This table could also include HMS stocks that are not managed via international agreements (e.g., thresher shark).*

- *For HMS species and Pacific hake, assessment reviews are conducted at international level, these reviews are generally viewed as adequate. The SSC reviews selection of proxies for HMS species.*

- *Do we need to include how ABCs are calculated after OFLs are identified? The SSC suggests adding a section to include specifics of these calculations for CPS and groundfish.*

- *The Atlantis model was reviewed by the SSC to justify use of the default control rules for OFL calculations. Is there a need or interest in including Atlantis in BSIA determinations? This is not a routine science product. The purpose of the current framework is to document a process for routine science products that are used as the basis for BSIA determinations. This Atlantis model likely does not fall under the current BSIA directive. The SSC suggests clarification on where is the line for methodologies that can inform catch specifications but are not routine products and are one-off analyses?*

- *Issues around Conflicts of Interest (COI). There may be a COI with the NMFS Science Center director serving as arbiter for Center staff that are working on the assessment. NMFS staff that are also SSC representatives presenting arguments could be a COI for federal staff. The goal is not to tell SSC who should present arguments, the SSC would select its own (likely non-federal) member present such a case.*

- *Is the Arbitration Panel composed of both Center directors, or just the Center in which the assessment originates? At present, the proposed Arbitration Panel includes both.*

- *The timing on the arbitration is specific, this process could run past September so a more general timeline may be needed. Also note that CPS would have a different timeline.*

- *The Arbitration Panel is set up to settle scientific issues with people that serve primarily in Administrative positions. Is this appropriate? What about a panel of outside experts? This may be too time consuming. It may be worth setting the Arbitration Panel up with the ability to appoint experts to the panel. Criteria for finalizing a resolution by the Arbitration Panel need to be defined (e.g., consensus, majority vote, etc.).*

- *NS2 criteria can help guide scientific work and arbitration of disagreements.*

- *Note that the Center POCs would not be SSC members. If there is not a good mechanism for identifying the POC there is flexibility in how to proceed in the Procedural Directive.*

- *Dealing with disagreements can be more complicated for salmon.*

SSC Subcommittee Assignments, March 2021

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	Fabio Caltabellotta	John Budrick	Fabio Caltabellotta	Michael Harte	John Field
Owen Hamel	John Field	Alan Byrne	John Field	Dan Holland	Marisol Garcia-Reyes
Michael Harte	Melissa Haltuch	John Field	Marisol Garcia-Reyes	André Punt	Melissa Haltuch
Galen Johnson	Owen Hamel	Marisol Garcia-Reyes	Dan Holland		Michael Harte
Will Satterthwaite	Kristin Marshall	Owen Hamel	Kristin Marshall		Dan Holland
Jason Schaffler	André Punt	Will Satterthwaite	André Punt		Galen Johnson
Ole Shelton	Jason Schaffler	Tien-Shui Tsou			André Punt
Cameron Speir	Tien-Shui Tsou	Will White			Will Satterthwaite
Tien-Shui Tsou	Will White				Ole Shelton
					Cameron Speir

Bold denotes Subcommittee Chairperson.

ADJOURN

PFMC
03/23/21