MINUTES
Scientific and Statistical Committee
Pacific Fishery Management Council
Doubletree by Hilton Mission Valley
Brickstones Room
7450 Hazard Center Drive
San Diego, California 92108
Telephone: 619-297-5466

June 19-20, 2019

Members in Attendance

Dr. Aaron Berger, National Marine Fisheries Service Northwest Fisheries Science Center, Newport, OR

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. Owen Hamel, 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. David Sampson, Oregon Department of Fish and Wildlife, Newport, OR

Dr. William Satterthwaite, National Marine Fisheries Service Southwest Fisheries Science Center, Santa Cruz, CA

Dr. Jason Schaffler, Muckelshoot Indian Tribe, Auburn, WA

Dr. Rishi Sharma, National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA

Dr. Ole Shelton, National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA

Dr. Tien-Shui Tsou, Washington Department of Fish and Wildlife, Olympia, WA

Members Absent

Dr. Michael Harte, Oregon State University, Corvallis, OR

Dr. Dan Holland, National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA

Dr. Cameron Speir, National Marine Fisheries Service Southwest Fisheries Science Center, Santa Cruz, CA

SSC Recusals for the June 2019 Meeting		
SSC Member	**Issue**	**Reason**
Dr. Will Satterthwaite	G.1 - Rebuilding Plans	Dr. Satterthwaite contributed to the salmon rebuilding projection model

A. Call to Order-SSC Administrative Matters

John Field called the meeting to order at 0800. A round of introductions was made to introduce the new members (Drs. Garcia-Reyes, Marshall, and Schaffler) to the SSC. Chuck Tracy briefed the SSC on the latest Council Coordination Committee meeting and the Scientific Coordination Subcommittee (SCS) 7 meeting to be hosted by the NPFMC in Sitka next year. The SCS6 proceedings should be out at the end of July. The various subgroups who are recommending changes to the NS1 guidelines have been busy and there should be an update on their work soon. The Southern Resident Killer Whales task force is working to develop analyses that will be available for SSC review soon. Chuck explained Council staff are developing a contract to develop a research and data needs database. He asked the SSC for their ideas and recommendations on how to proceed.

Chuck then briefed the SSC on their agenda and underscored their tasks for this meeting. John Field presented a PowerPoint summarizing SSC members' duties and protocols. The agenda was approved with the addition of a discussion on a sigma reconsideration proposed by Dave Sampson and a response to the public comment on the 2017 Pacific ocean perch assessment by Dr. Don Gunderson. The new members volunteered for subcommittee assignments (see table below). John DeVore briefed the SSC on the development of the new groundfish specifications database housed on the PacFIN web site. SSC members will be able to review the new proposed 2021-22 specifications directly in that database. He offered to set up a webinar to brief SSC members on the new database and SSC members thought that would be helpful. A request to set up a Google calendar detailing SSC workload and future meetings was made and John DeVore agreed to set that up.

F. Coastal Pelagic Species Management

2. Stock Assessment Prioritization Process

The Scientific and Statistical Committee (SSC) discussed two tasks assigned by the Council in November 2018: 1) develop a stock assessment prioritization process for coastal pelagic species (CPS) finfish stocks and 2) review and evaluate the quantity and quality of data available to conduct a stock assessment of the central subpopulation of northern anchovy (CSNA).

1. Process for Determining CPS Stock Assessment Priorities

Mr. Alan Sarich (CPSMT chair) presented a report from the CPSMT (Agenda Item F.2.a, Supplemental Revised CPSMT Report 1) on a proposed approach for determining CPS stock assessment priorities. The CPSMT's approach for CPS is broadly similar to the prioritization

process currently used for groundfish species. The CPSMT's approach involves scoring each species with metrics that fall into four categories: fisheries importance, stock status, ecosystem importance, and assessment information. Metrics contributing to the prioritization score include qualitative metrics that require expert opinion as well as more quantitative metrics. The SSC supports this general approach for prioritization and suggests the CPSMT perform scoring to ensure that the scoring structure and weightings have desirable characteristics. For example, the scoring system should ensure that a single stock is not always prioritized. The SSC suggests potentially including additional ecosystem-level indicators in the scoring process and that the Integrated Ecosystem Assessment team at the Northwest and Southwest Fisheries Science Centers should be contacted as potential sources for CPS indicators.

The SSC agrees with the CPSMT on a biennial schedule for the stock prioritization process. However, the SSC suggests that the prioritization could be revised in the intervening year given new information because CPS are subject to rapid fluctuations in abundance and fisheries catch.

The CPSMT report suggests that currently implemented surveys may change in response to the stock assessment prioritization process. The SSC warns that changing the survey design in response to near-term stock assessment concerns may compromise the long-term integrity and value of resulting abundance indices. However, sustained improvements to survey design are encouraged (e.g., improving nearshore coverage).

2. Discuss the Quantity and Quality of Available Data for Conducting an Assessment for the Central Subpopulation of Northern Anchovy

The SSC reviewed potential data sources and concluded that there is likely sufficient fishery-dependent and fishery-independent information available to support an integrated stock assessment for the CSNA.

The SSC acknowledges that an assessment for the CSNA will have a range of data and modeling challenges; however, these do not preclude conducting a model-based assessment. The biology of the CSNA and available data suggest that alternative stock assessment approaches may be appropriate for the CSNA (e.g., a length-based assessment). Importantly, limited recent age information does not preclude developing a model-based assessment. Therefore, if the Stock Assessment Team would benefit from feedback midway through developing the assessment, the SSC is willing to provide support in refining model structure and data prior to the STAR panel. The SWFSC has proposed developing a management approach using information on stock status directly derived from biomass calculated from the acoustic trawl (AT) survey. The SSC supports consideration of such a survey-based management approach but emphasizes that a management strategy evaluation would be necessary to evaluate such a management system (see the AT methodology review panel report - Agenda Item C.3, Attachment 2, April 2018).

SSC Notes:

Prioritization notes:
Minimal data on Mexican fisheries seem to present a complicating factor for anchovy stocks. Changes to the available data from Mexico seem unlikely to change any time in the near future

and so data limitation will likely continue. Loss of staff who do aging and histology will have consequences for the auxiliary information that feed into integrated assessments.

Note that the Nov. 2013 and Nov. 2010 in the [staff summary](#) are actually referencing NSNA not CSNA.

The STAR panel from the Pacific Mackerel Assessment recommends the potential for annual updates when stocks are near reference points or when fishing pressure raises a management concern.

There were some questions about the different scoring ranges for various factors. Why do the different metrics have different ranges? For example, for rebuilding status why are there only two categories (0,1), while other metrics range from 0 to 5 or 1 to 5.

Notes on stock assessments for CSNA:
Data gaps are a major concern for a short-lived species like anchovy. There is virtually no data from the mid-1980s to the 2000s.

An AT survey-derived analysis is not an assessment.

Comment on path for survey in the future: It is very important to make the survey comparable from year to year. There are warts with the AT survey but this style of survey is the status quo for many pelagic stocks world-wide.

The CPS Subcommittee is planning to meet in September or October to respond to the Council request to review am inshore correction for CPS and the white paper written by André on the approach for estimating OFLs. These are both related and relevant to the topic at hand but not directly informative to the results.

3. Pacific Mackerel Assessment, Harvest Specifications and Management Measures – Final Action

Dr. Paul Crone (Southwest Fisheries Science Center) and Dr. Juan Zwolinski (UC Santa Cruz) presented the results of the Pacific mackerel stock assessment, and Dr. Owen Hamel of the Scientific and Statistical Committee (SSC) presented a report on the Pacific mackerel Stock Assessment Review (STAR) Panel.

The Stock Assessment Team's (STAT's) preferred assessment model differs from the model used in the previous catch-only projection assessment in 2017. The Commercial Passenger Fishing Vessel logbook catch per unit effort index, which had been used previously, was removed from the preferred assessment model. An index of abundance from the acoustic-trawl (AT) survey and associated composition data were added to the assessment. Among other changes, the start year of the assessment was changed from 1983 to 2008, natural mortality was estimated with a prior rather than fixed, steepness was fixed rather than estimated, and a prior was developed for AT survey catchability (q). The preferred model includes commercial fishery age composition data as well as abundance indices and composition data collected in the AT survey. There was tension between the fit to the AT survey indices and composition data and the commercial fishery

composition data. Removal of the fishery composition data was explored, but they were included in the final base model, though they were down-weighted.

The SSC endorses the STAT-preferred assessment model as the best available scientific information for management of Pacific mackerel. The SSC further endorses the overfishing limits of 14,931 mt for 2019-20 and 11,772 mt for 2020-21. The 2020-21 overfishing limit could be recalculated if the acceptable biological catch (ABC) for 2019-20 is less than the harvest guideline for that year. This assessment is assigned to category 2d because of high uncertainty regarding the scale of the biomass, great sensitivity to assumptions, and the fact that much of the biomass derives from the most recent year-class that is currently poorly sampled. The ABC should therefore be based upon the category 2 sigma of 1.0 for the 2019-20 fishing season and 1.075 for the 2020-21 season. The higher sigma for the 2020-21 season reflects increasing uncertainty with time since the previous assessment. The final ABCs depend on the Council's risk tolerance as reflected in the choice of P*.

Several critical data and research needs remain for this stock. In particular, there is almost no information on AT catchability (particularly its lower bound) and hence the scale of estimated biomass given the data, except that contained in the prior for catchability, which is itself based on limited information. The likelihood profile is nearly flat over a broad range of plausible values for catchability, thus in the absence of the prior on catchability, the variance of biomass estimates are likely to be much higher, indicating there is little else in the model informing the scale of the biomass. This poses particular concern for the suitability of management based exclusively on a "survey-based assessment" for this stock given the lack of sampling in Mexican waters and the absence of a strong justification for an informed prior on catchability. The SSC agrees with the STAT and STAR panel recommendations to support coordination with Mexico to conduct the AT survey in Mexican waters to address uncertainty in the catchability given its influence on the scale of the assessment and to start to quantify the variability of the proportion of the stock in U.S. waters. Furthermore, efforts should be made to coordinate with researchers in Mexico to incorporate length and age composition data from the Mexican fishery in the assessment. There should be better coordination between State and Federal ageing laboratories in standardizing ageing methods and accounting for ageing bias, to facilitate ageing of samples from the fishery and the AT survey for future assessments.

SSC Notes:

Natural mortality and catchability were the major sources of uncertainty. The estimation of natural mortality using a prior based on a meta-analysis is an improvement on the previous method. Development of a prior for catchability based on life history, catch, larval density and the current distribution parameter in the harvest control rule provided a means of estimating this highly uncertain parameter. Catchability almost certainly varies among years but is assumed to be constant in the assessment, and the basis in the observed data may not provide a well specified value. Further sampling by the AT survey in Mexico as recommended by the STAT and STAR panel is supported by the SSC.

The total likelihood does not respond to differing values of AT survey q (Table 12), although biomass estimates vary greatly over the range of q values analyzed, which was too narrow to fully

quantify uncertainty in the biomass estimates. There is some question about how extreme the values of q would have to be to result in a significant change in likelihood consistent with a 95% confidence interval since the maximum q value analyzed was 0.85 and no appreciable change was observed over the range of q evaluated. Without the prior on q, the variance on estimates of biomass is likely to be much higher since there is little other information on scale in the model. The SSC requests completion of the likelihood profile for q over a broad range of q values for which a change in negative total log likelihood of at least two units relative to the local minimum is observed or until q = 3. The standard error for the 2019 spawning biomass estimate should be reported in the assessment document for the sensitivity run that estimated the AT survey q with no prior to confirm that the value is less than the default sigma for a category-2 assessment.

The poor fit to the AT survey index of abundance and composition data were explored time-varying AT selectivity for age 0, removing fishery age compositions, time blocking of age zero selectivity and penalties to constrain age zero selectivity. There was a great deal of difficulty in fitting the 2012 and 2017 index values. The proportion of the age 0 biomass in the survey area may affect index values or recruitment may drive index values, but these two can be confounded. Despite best efforts, only limited improvements in fit were achieved and further exploration of methods to improve the survey design (e.g., sampling in Mexico) and fits to the survey index and composition data is recommended.

Variability in recruitment deviations have large effects on the management metrics, i.e., the 2018 recruitment from the survey length (age) composition indicated strong recruitment that translates to projection of higher 2019 biomass estimates. In some instances, the apparent recruitment of age 0 fish were not observed years in the future making the apparent age 0 abundance more uncertain than other estimates of age-0 abundance, resulting uncertainty in the terminal year biomass estimates. Between 80-90% of the biomass is in the age 0 to age 2 age classes, making this an important concern.

There is concern that there is very little information to inform scale in the assessment model other than the prior on catchability, subject to uncertainty and variability. Given the lack of scale information without the prior on q, the SSC had concern about using a survey only assessment. The estimate of natural mortality from the model may be biased high to better track the variability in the index values as a result of varying availability of year classes. The large shifts in distribution for this stock make use of a strictly ATM based biomass estimate an issue without having sampled in Mexican waters to capture the remainder of the stock's range. Application of a survey-only biomass estimate would also require evaluation of new harvest control rules with an MSE.

Additional research on the selectivity of the AT trawl gear for various species of CPS would improve our understanding of the potential bias associated with daytime estimates of biomass from the backscatter and application of species/age/length composition from the trawl component of the survey.

Use of an age-length key from the fishery to assign lengths from the AT survey to approximate age composition is not optimal and efforts should be made to coordinate ageing efforts between laboratories to directly age samples from both the fishery and the AT survey.

The SSC notes that while the Council's selection of an appropriate P* value reflects the probability of overfishing, it does not reflect the potential impact if overfishing is occurring, which can be significant for short-lived stocks with variable abundance given the higher target fishing mortality rates associated with species with higher natural mortality.

Data from the time period used to derive the reference points for this stock were excluded from the stock assessment since it now starts in 2008, thus the application of the harvest control rules based on these data should be called into question. Future efforts to conduct an MSE could help inform harvest control rules with the contemporary data.

G. Salmon Management

1. Rebuilding Plans

Dr. Michael O'Farrell (Southwest Fisheries Science Center) and Dr. Jim Seger briefed the Scientific and Statistical Committee (SSC) about the salmon rebuilding plans. The only changes to the Chinook rebuilding plans were editorial in nature. The SSC focused its discussion on the coho rebuilding projections and the coho economic analysis. The SSC endorses the future abundance projections and the economic analysis in the three coho rebuilding plans and supports releasing these plans for public review.

The model structure used to simulate pre-fishery coho ocean abundance is the same as that used for Klamath River and Sacramento River Fall Chinook. There was little difference in the time to rebuild between the status quo (Alternative 1) and a reduced exploitation rate (Alternative 2). The Queets and Snohomish coho are expected to rebuild at a 50% probability under both alternatives in two and three years, respectively. The Strait of Juan de Fuca coho rebuild times at a 50% probability were six years for Alternative 1 and five years for Alternate 2.

The SSC Economics Subcommittee held a webinar on June 4, 2019 to discuss the economic analysis presented in the three coho plans (the Economics Subcommittee report is appended to this report). The methods for projecting economic impacts are the same for all three plans. It is important to note that impacts are not additive across stocks as the impact in any given year depends on the most constraining salmon stock(s). Overall, the approach taken to estimate and discuss potential economic impacts is sufficient for the purpose of these rebuilding plans.

SSC Notes:

None of the economists on the SSC were present at the June meeting, hence the members in attendance supported using the Economics Subcommittee report from the June 4, 2019 webinar as the basis for our economic comments to the Council.

The SSC Economics Subcommittee made three recommendations to add in the final coho plans (see the SSC Economics subcommittee report). Jim Seger reported that these will be incorporated in the final coho plans.

The choice of exploitation rate for coho differs from how it was done in chinook plans. Chinook have a defined control rule for exploitation rates.

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The model used for pre-fishery ocean abundance was the same in all five plans, however the auto correlation coefficient was set to zero in the Strait of Juan de Fuca coho plan.

REPORT OF THE SSC ECONOMICS SUBCOMMITTEE ON
SOCIOECONOMIC IMPACT OF MANAGEMENT STRATEGY ALTERNATIVES IN
THREE DRAFT COHO REBUILDING PLANS

The Scientific and Statistical Committee's (SSC) Economics Subcommittee held a webinar on June 4, 2019 to review the analysis of socioeconomic impacts in three draft coho salmon rebuilding plans. The discussion focused primarily on Section 5 (Socioeconomic Impact of Management Strategy Alternatives) in each of the draft rebuilding plans for three coho salmon stocks: Strait of Juan de Fuca Natural Coho, Snohomish River Natural Coho, and Queets River Natural Coho. Michael O'Farrell (Salmon Technical Team Chair) briefly described the management alternatives and reviewed the projection models that informed the socioeconomic analysis. Jim Seger (Pacific Fishery Management Council staff) presented the socioeconomic analysis. This report is intended to provide recommendations to the analysts as they revise the draft rebuilding plans and inform the SSC's discussion as it reviews the full rebuilding plans at its June 2019 meeting.

The methods for projecting economic impacts are the same for each of three plans. The average personal income impacts from 2004-2016 for port areas north of Cape Falcon (taken from the Review of 2017 Ocean Salmon Fisheries) are used as a "benchmark" value. The impact of each of the two rebuilding alternatives and the T_{MIN} scenario is assumed to be directly proportional to the change in projected average exploitation rate in each case. The change in exploitation rate is calculated as the percentage change from the average exploitation rate from 2004-2016 to the projected exploitation rate from the rebuilding analysis Section 4. The dollar impacts per year are then summed across the number of years the fishery is expected to be affected by the rebuilding plan. The length of this time period for each of the two rebuilding alternatives and the T_{MIN} scenario is the number of years until the probability of achieving rebuilt status (three year geometric mean escapement $>S_{MSY}$) exceeds 0.5. It is important to note that these estimates include impacts on ocean recreation and non-tribal commercial fisheries only. It is also important to note that the impacts are not additive across stocks. Total impacts in any given year would be equal to the impacts associated with the most constraining stocks (e.g. with the greatest required reduction in exploitation rate).

The quantitative estimates are put into context by additional qualitative analysis, including discussion of constraining stock status from 2004-2019, possible fishery and employment substitution patterns by fishers affected by reduced fishing opportunity, and possible effects in in-river and non-tribal fisheries that were not quantified. A number of caveats that could cause the projected economic impacts to be under- or over-estimated were discussed. Perhaps the most important of these is the probability that the fishery will be constrained by a stock other than the focal stock such that no change in economic impacts could be attributed to the rebuilding plan. The probability that the focal stock is constraining appears higher for the Queets River stock than the Juan de Fuca or Snohomish Rivers stocks based on recent experience. The probability that one of the three stocks subject to rebuilding is constraining would be higher and this should be addressed in the cumulative analysis.

Overall, the approach taken to estimate and discuss potential economic impacts is sufficient for the purposes of these rebuilding plans. The subcommittee has the following recommendations for changes to the report.

1. The quantitative and qualitative portions of the analysis should be more distinct. The current draft of the document combines these two portions in a way that makes it difficult to follow the methods used. One option is to describe the quantitative analysis (i.e., historical "benchmark" personal income reduced by the forecasted percentage change in exploitation rates) then list specific qualifiers to the analysis, including how each factor might be expected to adjust the impacts up or down, in the concluding section.

2. The clarity and transparency of Section 5 can be improved. It would be helpful to add a table showing allowed historical exploitation rate, the projected exploitation rate under Alternative II, and the percent difference so that it is clear how the quantitative impact estimates are calculated. This table could be similar to Table 5.3.a in the Sacramento River Fall Chinook rebuilding plan (Agenda Item G.1, Attachment 2, June 2019). Also, the table summarizing economic impacts of the rebuilding alternatives and the T_{MIN} scenario (Table 5.5.a) should include only the quantitative results. Text qualifiers should be moved to the summary text and discussed. The table should include estimated rebuilding time, the probability that rebuilding occurs at the end of the estimated rebuilding time, economic impacts per year, and total economic impacts across the entire rebuilding period for each rebuilding alternative and the T_{MIN} scenario.

3. The discussion of uncertainty in the quantitative impact estimates should be expanded. These are derived from differences in average values. However, these values are unlikely to be observed in any given year. It would be useful to develop some way of reporting the uncertainty around the estimated impacts. One way would be to generate upper and low bounds around the values. Lower bounds would likely be zero since the any given stock may not be the constraining stock in any year. Upper bounds would be the maximum reduction in exploitation rate under the new control rule.

The SSC should take note of the following additional points.

1. The estimated impacts of the three coho plans are not cumulative. Only a limited subset of stocks will be constraining in any given year. The limiting stocks for a particular year may not include the focal stock for a given rebuilding plan, or even any of the rebuilding stocks, though it is more likely the rebuilding stocks will be constraining in the near future. So, for example, it is possible that the strongest constraint will be due to Puget Sound Chinook as appears to have been the case in 2019 (see Table 5.3.a in the Juan de Fuca rebuilding plan Agenda Item G.1, Attachment 3, June 2019). The allowable exploitation rate due to constraining stocks will determine the total economic impacts to the salmon fishery.

2. Only ocean recreation and non-tribal commercial impacts are estimated quantitatively.

J. Highly Migratory Species Management

   3. Yellowfin Tuna Overfishing Response

The Scientific and Statistical Committee (SSC) received a presentation from Dr. Carolina Minte-Vera (Inter-American Tropical Tuna Commission, IATTC) highlighting the main research and data needs to improve Eastern Pacific Ocean yellowfin tuna assessments. Dr. Minte-Vera also described a work plan developed by the IATTC staff to address several of the key issues before

the upcoming yellowfin tuna benchmark assessment in 2020. The SSC reviewed the merits of the proposed work plan and offered guidance on additional analyses.

The SSC considers the tasks laid out in the work plan useful for addressing many of the key assessment issues including spatial stock structure, the development of fishery-dependent indices of abundance, growth estimation, natural mortality, and fleet selectivity. In particular, the IATTC should identify specific tasks in the work plan that will help better understand the sensitivity of the yellowfin tuna model to the addition of the 2018 southern longline catch per unit of effort index of abundance, which lead to a large change in stock status in the 2019 update assessment relative to the 2018 assessment.

The SSC recommends that the Council work with the IATTC to obtain raw (rather than spatially aggregated) catch and effort data from nations operating longline fleets, which will allow the incorporation of fleet behavior (e.g., vessel effects) and expand the capability of the spatio-temporal analytical methods used for index development.

SSC Notes:

The SSC did not conduct a full technical review of the 2018 or 2019 yellowfin tuna update stock assessments themselves, because the process for determining best scientific information available (BSIA) is outside of the PFMC process. Rather, the main data and modeling issues associated with these assessments were considered in order to provide guidance on 1) the scientific merit of the proposed work plan and 2) the expected improvement to the assessment upon addressing individual issues relative to others.

The 2018 yellowfin tuna update assessment (update of the 2017 full, or benchmark, assessment) was determined as BSIA for use in management.

The 2019 update assessment BSIA determination has not been made at the time of this meeting, but several key uncertainties, including large changes in indices with the addition of one year of data leading to sizeable changes to management quantities, were noted with the assessment at the IATTC Scientific Committee meeting in May 2019.

Analyses that could be helpful for understanding model sensitivity to the addition of a single year of southern longline index data include, but are not limited to:
- *Evaluating the consistency of the southern longline CPUE index as a representative source of information on relative abundance over time given declining effort, reduced spatial coverage, and larger and more variable average size in recent years associated with this fleet;*
- *Evaluating the sensitivity of model results to weighting southern longline composition data relative to the index data;*
- *Conducting a retrospective bridging analysis (sequentially adding one additional data point at a time over several years) across recent years to investigate whether this type of model behavior is a systematic property of updating the CPUE time series and size composition data in different years;*

- *Plotting mean weight and length across the whole EPO and investigating how the southern longline area corresponds (or not) to that; and*
- *Considering seasonality in CPUE indices of abundance given the consistent quarterly patterns in CPUE through time.*

Many of the highlighted issues are the same as those in other tuna Regional Fisheries Management Organizations (RFMOs), so new and continued collaborations on approaches will be useful.

6. Deep-Set Buoy Gear Authorization

The Scientific and Statistical Committee (SSC) reviewed the "National Marine Fisheries Service (NMFS) Report on Deep-Set Buoy Gear (DSBG) Authorization" (Agenda Item J.6.a, NMFS Report 1), which presents a preliminary analysis of data from observed sets for DSBG exempted fishing permits operations from 2015 through February 2019. The SSC also received a briefing from the authors of the report, Dr. Stephen Stohs (NMFS SWFSC) and Mr. Karter Harmon (NMFS contractor). The analyses conducted to date have been limited to standard DSBG, but the analyses supporting the preliminary version of the Draft Environmental Impact Statement that will be developed for the September 2019 Council meeting will also include data from linked buoy gear. The analysis employs a Bayesian approach similar to one that the SSC reviewed previously in connection with "Swordfish Management and Monitoring Plan Hardcaps" (Agenda Item E.3.a, Supplemental SSC Report, June 2015).

The SSC, which is generally supportive of the approach used in the analysis, notes the following:
- The underlying Poisson probability model assumes that catch events are fully independent, which would not be the case for species that tend to occur in aggregations.
- Although the report provided predictions from the Bayesian analysis, it did not include fits to the observed data or diagnostics to support the assumed probability model.
- Predictions from the model may not apply in the future if there are changes in fishing behavior.
- The current analysis makes rigid assumptions about fishing effort (Table 3). If these assumptions were represented as probability distributions, uncertainty regarding future effort could be incorporated into the resulting model predictions.
- Data from observed sets of linked buoy gear, which have not yet been analyzed, may be limited and have characteristics that are different from the standard DSBG. It is not clear how best to analyze data from the linked buoy gear, e.g., whether or not to pool them with the standard DSBG.

SSC Notes:

- *The methodology employed in the Report is based on the 2015 paper "Bayesian inference and assessment for rare‐event bycatch in marine fisheries: a drift gillnet fishery case study" by Martin, Stohs, and Moore. The report should provide the full citation to this paper and clarify exactly which model from the paper was applied for the analyses given in the report.*
- *The paper should clearly indicate what units are provided in Table 1.*

D. Council Administrative Matters, Continued

10. Future Council Meeting Agenda and Workload Planning

The Scientific and Statistical Committee (SSC) discussed future workload planning and has the following updates and recommendations.

In addition to the August 20-21st Groundfish Subcommittee meeting currently scheduled to review stock assessment updates (including catch-only updates) and benchmark assessments from recent and upcoming Stock Assessment Review (STAR) panels, the SSC recommends a one day webinar at a date to be determined in late August to discuss and review the 2021-22 groundfish harvest specifications database currently under development, and associated overfishing limit (OFL) and acceptable biological catch (ABC) recommendations for stocks that are not being assessed or updated in the 2019 assessment cycle. Due to workload obligations associated with ongoing STAR panels and the preparation of update assessments, SSC review of the 2021-2022 OFL and ABC recommendations will, by necessity, happen after the advanced briefing materials are submitted to the September 2019 briefing book.

The SSC recommends that the September Council meeting include a three-day SSC meeting, to enable one full day to be devoted to the review of California Current Integrated Ecosystem Assessment (CCIEA) products, including drivers of albacore distribution and availability to fisheries, spatial indicators of bottom contact by trawl gear and fixed gear, and salmon forecasts and stoplight indicators that were presented in the CCIEA Supplementary Materials early in 2019. The rationale for a full SSC meeting for the CCIEA review is that the associated subcommittees that should be involved (Ecosystem, Highly Migratory Species, and Salmon) collectively and include all current SSC members.

The SSC continues to recommend that a Groundfish mop-up review panel be held, if needed, from September 30 to October 4, 2019 in Seattle.

The Council has tasked the Coastal Pelagic Species Subcommittee, the Coastal Pelagic Species Management Team, the Coastal Pelagic Species Advisory Subpanel, and the Southwest Fisheries Science Center with holding a workshop to evaluate several issues, including; 1) the nearshore estimation methodologies necessary to complement the acoustic trawl survey abundance estimates; 2) discussing the potential to more fully develop Dr. André Punt's illustrative example of the tradeoffs associated with alternative frequencies of revisiting OFLs and ABCs for central subpopulation of northern anchovy; and 3) develop alternatives for accountability measures that would be triggered at specific stock levels. Meeting dates have not yet been settled, but several dates in early October are under consideration for a two-day meeting. Results of the meeting should be reported at the November 2019 Council meeting.

The SSC recommends that a salmon methodology review be held in October of 2019, most likely in Portland, OR, with final topics to be decided in September.

The SSC recommends a "Groundfish STAR Process Review" (aka, "post-mortem") workshop take

place in December of 2019, to include all Stock Assessors Team leads, STAR Panel chairs, advisory body representatives, and other reviewers and participants as appropriate.

The SSC recommends that the Remotely Operated Vehicle (ROV) survey methodology review be rescheduled for early 2020. The SSC recommends early February of 2020, likely February 3-7.

The SSC recommends that the Pacific sardine stock assessment be reviewed in a week long STAR Panel, in late winter (presumably February), to be held in La Jolla.

SSC Notes:

There is a need to begin thinking about the data poor methodology workshop- is there sufficient interest by NWFSC or other entities (e.g., Tom Carruthers) in presenting and considering new methods for data limited assessments. The SSC likely needs one or several members to lead discussions among interested parties in scoping out the format and timing of such a workshop.

With respect to OFL and ABC values for groundfish assessments greater than 10 years old (such as greenspotted rockfish), the SSC statement in April 2019 on science improvement and methodology review (Agenda Item G.5.a, Supplemental SSC Report 1) stated "Long-term projections are not advised, and the SSC-preferred approach in such cases would be to set the OFL using an equilibrium MSY or a data-poor approach."

	Proposed Workshops and SSC Subcommittee Meetings for 2019 and 2020						
	Workshop/Meeting	**Potential Dates**	**Sponsor/ Tentative Location**	**SSC Reps.**	**Additional Reviewers**	**AB Reps.**	**Council Staff**
1	Review of Proposed 2021-22 Groundfish Harvest Specifications	1 day webinar between Aug. 15 and Sep. 11 (TBD)	Council/ Webinar	GF Subcommittee members	NA	None	DeVore
2	Ecosystem Indicators Review, Including Review of Analyses of Drivers of Albacore Distribution and Availability to Fisheries in the California Current	Sep. 11	Council/ Boise, ID	HMS, Salmon, & Ecosystem Subcommittees	TBD	None	Dahl DeVore
3	Groundfish Mop-Up Review Panel, if needed	Sep. 30 – Oct. 4	Council/ Seattle, WA	GF Subcommittee members	Cook (CIE)	GMT GAP	DeVore
4	Salmon Methodology Review	Oct. TBD	Council/ TBD	Salmon Subcommittee members	NA	STT MEW	Ehlke
5	CSNA Assessment and Modelling Workshop	Oct. 3-4? TBD	Council/ TBD	CPS Subcommittee members	NA	CPSMT CPSAS	Griffin
6	Groundfish STAR Process Review	Fall 2019/Winter 2020 TBD	Council/ TBD	STAR Chairs and Reviewers	Cook (CIE)	GMT GAP	DeVore Phillips
7	Review of Nearshore ROV Survey Designs and Methodologies	Feb. 3-7	Council/ Santa Cruz, CA	Hamel (Chair), Shelton, Tsou, Sharma, Berger, Field	CIE	None	DeVore

	Proposed Workshops and SSC Subcommittee Meetings for 2019 and 2020						
	Workshop/Meeting	**Potential Dates**	**Sponsor/ Tentative Location**	**SSC Reps.**	**Additional Reviewers**	**AB Reps.**	**Council Staff**
8	Pacific Sardine STAR Panel	Winter 2020 TBD	Council/ La Jolla, CA	CPS Subcommittee members (Punt – chair)	CIE	CPSMT CPSAS	Griffin
9	Data-Limited Methodology Workshop	2020 - TBD	Council/ TBD	GF & CPS Subcommittee members	TBD	TBD	DeVore

A. SSC Administrative Matters, Continued

Further Discussion on the New Sigma Values

Dr. David Sampson shared his updated thinking regarding the time-varying aspect of sigma values and catch projection uncertainty, expressing concerns that the current approach does not appropriately account for differences in the annual rate of increase in uncertainty among stocks. Specifically, it was suggested that the SSC did not thoroughly investigate the consequences of getting sigma wrong – especially given the range of the time-varying sigmas varies non-trivially among stock assessments- so it is quite easy to apply a sigma that may be twice, or half, as big as it should be. He provided a presentation that included graphical comparisons for the 21 stocks used in the meta-analysis that was reviewed during the March 2019 SSC meeting ("Accounting for increased uncertainty in setting precautionary harvest limits from past assessments", Agenda Item G.3, Supplemental REVISED Attachment 3, March 2019). The comparisons indicated there were an appreciable number of individual stocks for which the year-10 value of sigma was more than two or three times the aggregate (median) value (0.075^{-y}) that the SSC recommended to the Council in March. For such stocks the buffer for scientific uncertainty needed to achieve a P* of 0.45 is much larger than the buffer projections based on the aggregate value (see Table 1 below). Dr. Sampson recommended that stock assessment-specific values for the ratio of the sigma in a projection year to that for the base year based on the ratio between the stock biomass under base and low states of nature be used for all stocks.

There was substantial SSC discussion on the methods for the sigma annual rate of increase on a stock-specific level, including acknowledgement that there are several peculiarities in the analysis that provided the basis for the annual rate of sigma increase (0.075^{-y}). However, there were also concerns raised previously on the appropriateness of stock-specific values, notably that some of the individual scenarios might be considered implausible (a reason for using the median among stocks). There was also recognition that there would be value in having stock- or guild-specific sigma values, given that natural mortality and other life history factors do appear to lead to intuitive and interpretable differences among both stocks and more broadly defined guilds (e.g., rockfish, flatfish) of groundfish and coastal pelagic species, but replication within guilds was viewed as inadequate (Agenda Item G.3.a, SSC Groundfish and CPS Subcommittees Report 1, March 2019). There was discussion that this is a consequence of the increase in sigma being largely driven by fishing mortality rate proxies, which are in turn largely a function of catch relative to biomass, which are in turn largely a function of natural mortality rates. Dr. Hamel noted that Council has given guidance directing the SSC and the Science Centers to engage in efforts to evaluate the potential for (and to develop if feasible) stock- or guild- specific sigma values, potentially based on hierarchical analyses, for future consideration in management.

Several members of the SSC expressed reluctance to adopt stock-specific sigma values, citing the implausibility of some of the results, the advantages of a more simple, and more easily interpretable meta-analytic result, and the technical challenges that would be associated with recommending stock-specific sigma values (such as the large number of past stock assessments that would require a very substantial effort to develop sigmas for, in a short time frame, to meet upcoming management cycle needs, the decisions and analysis that would be necessary to consider how sigma values for tier 2 assessments would be addressed, and other technical challenges). The SSC recognized that it may be necessary to clarify that the adopted approach infers that a given

P value should be more appropriately interpreted as applying to the average stock, rather any individual stock, given the challenges associated with applying that level of precision to the uncertainty estimates in any given stock.*

Other technical details were discussed, and questions raised and addressed, including the need for greater clarity in the technical details related to the overall sigma rate of increase analysis. Ultimately, there was general agreement not to alter the SSC recommendation previously adopted by the Council, but to continue to investigate the potential for guild- or stock-specific approaches, and to continue efforts to improve documentation of the methodology and rationale for the adopted approaches for sigma determination (such documentation has been requested to be provided to the Council by the September Council meeting). There was some discussion about how the SSC might want to interact with analysts who are actively working on this problem (in Science Centers and Academia) over the next few years, noting that regular interactions with the analysts would greatly benefit transparency and robustness of future approaches for refining sigma values.

Table 1. Sigma Projections: Implications of getting sigma wrong. The values in the table assume a base-sigma of 0.5 and a P*of 0.45.

	Aggreg.	Actual Sigma too small			Actual Sigma too large		
		x 1/4	*x 1/3*	*x 1/2*	*x 2*	*x 3*	*x 4*
Year-10 Sigma =	0.83750	0.20938	0.27917	0.41875	1.67500	2.51250	3.35000
Aggregate P* Z-value =	-0.10524						
Aggregate ACL Buffer =	9.99%						
Pr(Aggregate P* Z-value) =	0.45	0.3076	0.3531	0.4008	0.4750	0.4833	0.4875
Stock-specific P* Z-value =		-0.02631	-0.03508	-0.05262	-0.21048	-0.31572	-0.42097
Stock-specific ACL Buffer =		2.60%	3.45%	5.13%	18.98%	27.07%	34.36%

SSC Subcommittee Assignments, June 2019

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

Bold denotes Subcommittee Chairperson

Council Meeting Dates	Location	Likely SSC Mtg Dates	Major Topics
September 11-18, 2019 Proposed Subcommittees may meet Wed, Sept 11 Advisory Bodies may begin Thur, Sept 12 Council Session may begin Fri, Sept 13	The Riverside Hotel 2900 Chinden Blvd Boise, ID 83714 Phone: 208-343-1871	Three-day SSC Session **Wed, Sep 11 – Fri, Sep 13**	Climate & Communities Initiative FEP 5 –yr review Groundfish Assessments Review Phased-in HCRs 2021-2022 Groundfish Spex Groundfish Stock Assessment Methodology Review Topic Selection Off-year Science Improvements Salmon Methodology Topic Priorities
November 13-20, 2019 Proposed Subcommittees may meet Wed, Nov 13 Advisory Bodies may begin Thur, Nov 14 Council Session may begin Fri, Nov 15	Hilton Orange County/Costa Mesa 3050 Bristol Street Costa Mesa, CA 92626 Phone: 714-540-7000	Two-day SSC Session **Thu, Nov 14 – Fri, Nov 15**	CPS Methodology Topic Selection CPS SAFE Groundfish Stock Assessments & Cowcod Rebuilding Analysis (if needed) 2021-2022 Groundfish Spex Groundfish Stock Assessment Methodology Topic Priorities Salmon Methodology Review
March 3-9, 2020 Proposed Advisory Bodies may begin Tue, Mar 3 Council Session may begin Wed, Mar 4	DoubleTree by Hilton Sonoma One Doubletree Drive Rohnert Park, CA 94928 Phone: 707-584-5466	Two-day SSC Session **Tue, Mar 3 – Wed, Mar 4**	Identify Salmon Management Objectives (possible test fishery alternatives) Salmon Review/Pre I CA Current IEA Report Climate and Communities Initiative Identify New FEP Initiatives Groundfish Stock Assessment Priorities

April 3-10, 2020 Proposed Subcommittees may meet Fri, Apr 3 Advisory Bodies may begin Sat, Apr 4 Council Session may begin Sun, Apr 5	Hilton Vancouver Washington 301 W. Sixth Street Vancouver, WA 98660 USA Phone: 360-993-4500	Two-day SSC Session **Sat, Apr 4 – Sun, Apr 5**	Pacific Sardine Assessment and Management Measures CPS Methodology Review Topic Selection Groundfish Science Improvement WS Reports Salmon Methodology Review Topic Selection
June 11-18, 2020 Proposed Subcommittees may meet Tues, June 11 Advisory Bodies may begin Wed, June 12 Council Session may begin Thur, June 13	DoubleTree by Hilton San Diego – Mission Valley 7450 Hazard Center Drive San Diego, CA 92108 Phone: 619-297-5466	Two-day SSC Session **Wed, June 12 – Thu, June 13**	Final groundfish stock assessment plan and Terms of Reference DGN bycatch performance report

	Proposed Workshops and SSC Subcommittee Meetings for 2019 and 2020						
	Workshop/Meeting	**Potential Dates**	**Sponsor/ Tentative Location**	**SSC Reps.**	**Additional Reviewers**	**AB Reps.**	**Council Staff**
1	Review of new full and update groundfish stock assessments and catch-only updates	Aug. 20-21	Council/ Seattle	GF Subcommittee members	NA	GMT GAP	DeVore
2	Review of Proposed 2021-22 Groundfish Harvest Specifications	1 day webinar between Aug. 15 and Sep. 11 (TBD)	Council/ Webinar	GF Subcommittee members	NA	None	DeVore
3	Ecosystem Indicators Review, Including Review of Analyses of Drivers of Albacore Distribution and Availability to Fisheries in the California Current	Sep. 11	Council/ Boise, ID	Full SSC	TBD	None	Dahl DeVore
4	Groundfish Mop-Up Review Panel, if needed	Sep. 30 – Oct. 4	Council/ Seattle, WA	GF Subcommittee members	Cook (CIE)	GMT GAP	DeVore
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