

MINUTES
Scientific and Statistical Committee

Pacific Fishery Management Council
The Riverside Hotel
Cinnabar Room
2900 Chinden Boulevard
Boise, Idaho 83714
Telephone: 208-343-1871
September 14-15, 2016

Members in Attendance

Dr. Aaron Berger, National Marine Fisheries Service Northwest Fisheries Science Center, Newport, OR
Dr. Evelyn Brown, Lummi Nation, Bellingham, WA
Mr. John Budrick, California Department of Fish and Wildlife, Belmont, CA
Mr. Alan Byrne, Idaho Department of Fish and Game, Boise, ID
Dr. Martin Dorn, National Marine Fisheries Service Alaska Fisheries Science Center, Seattle, WA
Dr. John Field, National Marine Fisheries Service Southwest Fisheries Science Center, Santa Cruz, CA
Dr. Owen Hamel, National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA
Dr. Michael Harte, Oregon Department of Fish and Wildlife, Newport, OR
Dr. Dan Holland, National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA
Dr. Galen Johnson, Northwest Indian Fisheries Commission, Olympia, WA
Dr. Kevin Piner, National Marine Fisheries Service Southwest Fisheries Science Center, La Jolla, CA
Dr. David Sampson, Oregon Department of Fish and Wildlife, Newport, OR
Dr. William Satterthwaite, SSC Chair, National Marine Fisheries Service Southwest Fisheries Science Center, Santa Cruz, CA
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

Members Absent

Dr. Peter Lawson, National Marine Fisheries Service Northwest Fisheries Science Center, Newport, OR
Dr. André Punt, University of Washington, Seattle, WA

SSC Recusals for the September 2016 Meeting		
SSC Member	Issue	Reason
Dr. Dan Holland	D.1 Fishery Ecosystem Plan Coordinated Ecosystem Indicator Review Initiative	Dr. Holland supervises the primary analyst for the community vulnerability indices.
Dr. Owen Hamel	F.8 Mid-biennium Annual Catch Limit Adjustment and Rebuilding Harvest Rate Adjustment Policies	Dr. Hamel did the Pacific ocean perch rebuilding projections
Dr. Galen Johnson	H.2 Salmon Methodology Review	Dr. Johnson contributed to the FRAM analysis
Dr. Will Satterthwaite	H.2 Salmon Methodology Review	Dr. Satterthwaite's supervisor contributed to the Sacramento Winter Chinook analysis

A. Call to Order

Chairman Will Satterthwaite called the meeting to order at 8 a.m. Mr. Chuck Tracy provided the agenda overview.

Dr. Sampson provided an overview of the plan for the November Historical Catch Reconstruction Workshop.

Dr. Dorn provided an overview of the plan for the December Productivity Workshop.

Dr. Satterthwaite discussed plans for the next National SSC meeting, which PFMC is hosting. Dr. Satterthwaite reached out to the other SSCs regarding topics to be discussed at the meeting. He polled the PFMC SSC for topic suggestions. Dr. Dorn recommended a topic on how to set harvest specifications in a changing climate/ecosystem.

Dr. Sampson said he is planning to produce a best practices for stock assessments document. This will be a “living document” that will be posted on the Council web site.

The SSC then went into closed session to discuss the merits and credentials of nominees to Council technical/management teams (HMSMT and STT).

D. Ecosystem Management

1. Fishery Ecosystem Plan Coordinated Ecosystem Indicator Review Initiative

Dr. Martin Dorn, Chair of the SSC Ecosystem Subcommittee (SSCES), presented a summary of the Joint SSCES and California Current Integrated Ecosystem Assessment (CCIEA) Team meeting to review ecosystem indicators that was held September 12 and 13, 2016. The purpose of the joint meeting was 1) to conduct a technical review of proposed indicators and methods for the next CCIEA annual report, 2) to review risk assessments for the California Current ecosystem, and 3) to review ongoing work to evaluate environmental drivers of sablefish recruitment. The SSCES

will provide a full report of the meeting to the CCIEA team. The SSC highlights the following recommendations.

The SSCES reviewed the use of MARSS models (Multivariate Autoregressive State Space Models) in the development of CCIEA time series indicators. The SSC notes that these models have not yet been used in a CCIEA report, but in the future it may be appropriate to use these models to combine time series and to quantify observational error in some of the indices. The SSCES will provide additional guidance to the IEA indicators team on which indices may benefit most from MARSS modeling.

The physical and biological indicators underlying the salmon "stoplight" indicators included in recent California Current Integrated Assessment (CCIEA) reports were reviewed. The SSC finds that these indicators, taken collectively, provide a useful qualitative guide to the present state of the ocean environment when Columbia River salmon smolts, especially fall Chinook, enter the ocean. This is not a quantitative forecasting tool nor has its applicability to other stocks been reviewed. Promising directions for future research include the development of similar indices for different stocks (or species), such as a salmon stock in the southern part of the California Current, and testing hypotheses for the mechanisms underlying relationships between indicators and stocks of interest.

The Coastal Community Vulnerability Indices for the CCIEA provide useful human dimension indicators. The SSC continues to support the general approach used to assess community vulnerability and recommends that it be further developed to provide information about other human dimension aspects within the CCIEA. The SSC recommends looking at whether significant tribal catch data were missed when calculating indices of fishery dependence and whether this problem could be resolved by acquiring data from the tribes. The SSC further notes the need for the development of indicators that measure community dependence on ecosystem services other than commercial fisheries, in particular recreational fisheries.

For habitat indicators, the SSC recommends that the development of spatially-resolved habitat indicators for multiple life cycle stages of salmon be prioritized. The snow water equivalent trend representing riverine habitat quality, which was presented in the March 2016 ecosystem report, is an important start, but the SSC recommends that this analysis be done at a more finely resolved spatial scale than the proposed coastwide scale. Indicators for the quality of estuarine/nearshore and off-shore habitat for salmon need to be developed. The SSC identified salmon habitat indicators as a priority because of the vulnerability of salmon stocks (especially those listed under the ESA) to climate change, and because of the greater availability of information on salmon habitats.

The SSC recognizes the potential contribution that the risk assessment approaches used in the CCIEA can make to our understanding of ecosystem level processes and their implications for fisheries management. The SSC supports CCIEA efforts to integrate ecological, social and economic risks within a risk assessment framework. The SSC recommends that additional consideration be given to risk assessments that have an ecosystem or FMP focus rather than a species focus to increase the relevance of CCIEA risk assessments to Council deliberations.

An update on ongoing work to evaluate environmental factors affecting sablefish recruitment was presented to the SSCES. Progress has been made on a preliminary model for relating environmental variables (derived from a Regional Ocean Modelling Systems (ROMS) model) to

sablefish recruitment. The SSCES recommended technical refinements to the preliminary model to the modeling team and the SSC anticipates reviewing a revised model of sablefish recruitment at the March 2017 Council meeting. The SSC encourages continuing the collaborative work with Alaska Fisheries Science Center and Canadian scientists to evaluate the stock structure of sablefish. Research into aspects such as stock structure and extending the temporal coverage of the ROMS model are likely to require additional time beyond March 2017.

SSC Notes:

Joint SSC-Ecosystem Subcommittee and California Current Integrated Ecosystem Assessment (CCIEA) Team meeting to review ecosystem indicators

The SSC Ecosystem-based Management Subcommittee (SSCES) met with members of California Current Integrated Ecosystem Assessment (CCIEA) Team on September 12-13, 2016. The purpose of the meeting was 1) to conduct a technical review of proposed indicators for the next CCIEA annual report, 2) to review risk assessments for the California Current ecosystem, and 3) to review ongoing work to evaluate environmental drivers of sablefish recruitment and to address stock structure issues. Both the SSCES and the CCIEA team members continue to find these meetings useful, and recommend that a similar meeting be held associated with the September Council meeting next year. The SSCES notes that indicator development and review should be regarded as an ongoing adaptive process as new indicators are added to address new concerns, and indicators that have not been found to be useful are dropped. This report is a (relatively) short report to the SSC concerning meeting outcomes. A full report of the meeting will be available for approval by the SSC in November and made available to the IEA team.

Multivariate autoregressive state-space (MARSS) models

Dr. Nick Tolimieri presented a talk to the SSCES titled “MARSS Models for CCIEA indicator time-series.” MARSS models (Multivariate Autoregressive State Space Models) are not a novel approach, rather they are widely used class of models for filtering observational error from multiple time-series to detect underlying patterns. The MARSS software package, developed by NWFSC researchers, is a flexible and robust tool for conducting analyses that include time series from multiple sources, and estimate the associated process and observation error. MARSS models are likely to be most useful when no estimate of observational error is available or when the observational error is known to be large.

The analysts provided several example applications, which led to discussions about how the model performs, and what useful questions the models could address, such as the appropriate spatial scales at which to report indicators (based on whether or not the data support separate trends in different regions). Both the analysts and SSCES agreed that the MARSS modeling would be a useful tool for indicator development in the IEA and the annual ecosystem report, but a key point is that application of these models is not an automated process. Choices about how to structure the model need to be evaluated and documented, as well as what alternative models were considered and rejected. Good candidates for indicators currently in the annual ecosystem report where the MARSS models may be useful include aragonite saturation and dissolved oxygen indices, the northern copepod biomass anomalies, various forage indices, the indicators in the salmon “stoplight,” and the crab:finfish ratios reported from the NWFSC bottom trawl survey.

Stoplight salmon indicators and zooplankton sampling in the northern California Current

Drs. Bill Peterson and Brian Burke (NWFSC) gave a presentation on the physical and biological indicators underlying the salmon "stoplight" indicators included in recent California Current Integrated Assessment (CCIEA) reports. These indicators were selected based on mechanistic hypotheses relating currents and planktonic communities to the food supply available to juvenile Columbia River Chinook salmon upon ocean entry. The SSC Ecosystem-Based Management Subcommittee (SSCES) agrees that these indicators, taken collectively, provide a useful qualitative guide to the present state of the ocean environment as it relates to Columbia River salmon, especially fall Chinook. The "stoplight" indicators are not intended to provide quantitative stock forecasts for use in salmon management process. It is also important to realize that these indicators do not reflect freshwater conditions, and have not been evaluated for stocks occupying different ocean areas. Promising directions for future research include the development of similar indices for different stocks (or species), such as a salmon stock in the southern part of the California Current, testing hypotheses for the mechanisms underlying relationships between indicators and stocks of interest, and developing and testing new quantitative methods for incorporating environmental information into stock forecast models. A stoplight chart developed for different stocks or species would likely have some differences in the metrics included.

Coastal Community Vulnerability Indices for the CCIEA

Dr. Karma Norman (NWFSC) presented a description of Coastal Community Vulnerability Indices for the CCIEA. These indicators provide community level of human well-being. The approach in the CCIEA constructs indicators of community vulnerability which is defined as "a pre-existing condition that affects a community's (social system's) ability to prepare for and recover from a disruptive event". These measures were first developed and applied in the Gulf of Mexico and the East Coast by Michael Jepson and Lisa Colburn. The indices are constructed using secondary data the US Census Bureau's American Community Survey (ACS) and Fishery landing and revenue data from PacFIN. The analysis uses factor analysis to identify single factor solutions representing different aspects of community vulnerability and fishery dependence. The two fishery dependence indices are "engagement" which reflects total levels of landings, revenue, etc. and "reliance" which reflect per capita involvement in fisheries. Radar plots are used to show communities with high scores on multiple indices that fall outside 1 standard deviation.

The SSCES continues to be supportive of the general approach used to assess community vulnerability and recommends that it be further developed and possibly expanded to other human dimension aspects within the CCIEA. The subcommittee suggests that it important to report the fishery engagement and reliance indices separately rather than as a composite index. It would be useful to find good ways to aggregate or find commonalities in communities to deal with problem of having so many communities to report on, but the subcommittee did not have any firm recommendations on how to do this. There in interest in seeing indicators that measure community dependence on other ecosystem services other than commercial fisheries, in particular recreational fisheries.

Finally, the subcommittee recommends looking into whether there is significant tribal catch data missing when calculating indices of fishery dependence and whether this problem could be resolved by acquiring data from the tribes. The subcommittee also notes that the economic value of fish retained for subsistence and ceremonial use in tribal communities is not reflected in the

current fishery engagement and reliance indicators so that these indicators may suggest a lower level of reliance and engagement than actually exists.

Risk assessments relevant to the Council process

Drs. Jameal Samhoury (NWFSC) and Elliott Hazen (SWFSC) presented on the use of risk assessment within the California Current IEA process and sought the SSC Ecosystem Subcommittee's input on its broader applicability to the Council process. The presentation began with an overview of risk assessment and then demonstrated its use with three examples: Catch share impacts on diversification in the West Coast groundfish fisheries; bycatch avoidance; and climate vulnerability of species in the California Current Large Marine Ecosystem. The risk assessment approach used within the CCIEA considers risk to be the chance, within a timeframe, of an adverse event of specific consequences. Exposure, sensitivity and adaptive capacity in ecosystems produce a measure of overall ecological vulnerability which can then be used to assess socioeconomic vulnerability of fisheries. Expressed in this way risk assessment is a precursor to Management Strategy Evaluation. Risk assessments are also scaled to decision timelines.

The SSC Ecosystem Subcommittee recognizes the potential contribution that risk assessment approaches used in the CCIEA can make to our understanding of ecosystem level processes and their implications for fisheries management. The Subcommittee is encouraged by efforts to integrate ecological, social and economic risks within a risk assessment framework. There was concern the risk assessments that have been primarily focused on each stock individually may miss the larger picture. Therefore the SSCES recommends that consideration be given to risk assessments that have an ecosystem or fishery focus. The Subcommittee highlights the potential benefits of a hierarchical risk assessment approaches that moves from a comprehensive qualitative analyses (level 1) to a narrower, semi-quantitative analysis (level 2) and to a defined fully quantitative analysis (level 3). Less clear to the SSCES is what guidance it can currently give on how to effectively integrate the CCIEA approach to risk assessment with the management issues currently facing the Council and the appropriate time horizon for risk assessments that would be of most benefit to the Council. Clearly this is a complex issue that requires additional input from the IEA team and additional work by the SSCES and other advisory bodies.

Sablefish time-series and assessment

Dr. Melissa Haltuch and Dr. Nick Tolimieri presented an update on their ongoing work on evaluating environment factors affecting sablefish recruitment. This work is a response to a Council request at the September 2015 meeting that "the NOAA Integrated Ecosystem Assessment Team work with sablefish assessment scientists and members of the Scientific and Statistical Committee to initiate a comprehensive review of the sablefish stock throughout its range and to explore potential relationships between stock status and ecosystem changes that could help inform the next assessment." The Council's primary concern is that sablefish have continued to decline despite being assessed using best practices, and harvested according to a harvest control that is intended to result in sustainable fishery.

A preliminary model for relating environmental variable to recruitment based on sablefish life stages was presented. The model was a GLM (generalized linear model) that included spawning stock biomass, and several ROMS-model measures of cross-shelf transport and along-shelf transport. The SSCES recommended that the analysis use the stock-recruit log residuals instead

of log recruitment in the analysis, and that an attempt be made to extend the ROMS model both forward and backwards in time. The SSCES also encouraged continuation of the collaborative work with AFSC scientists to evaluate the stock structure of sablefish. Attempts to obtain Canadian data should continue. It would be reasonable to expect that a revised analysis relating environmental variables to recruitment could be presented to the Council and its advisory bodies in March 2016, but other aspects of this research., such as the stock structure evaluation and the temporal extension of the ROMS model, are likely to require additional time.

Update on Habitat Indicators

Dr. Chris Harvey (NWFSC) gave an update on the development of habitat indicators for use in the IEA and in the annual ecosystem report. To assist the IEA team moving forward, the SSCES recommends the development of spatially-resolved habitat indicators for life cycle stages of salmon be prioritized. The snow water equivalent trend representing riverine habitat quality, which was presented in the March 2016 ecosystem report, is an important start, but the SSCES recommends that this analysis be done by broad geographic regions, rather than on a coastwide basis. Indicators for the quality of estuarine/nearshore and off-shore habitat for salmon need to be developed. Salmon habitat indicators were considered a good place to start by the SSCES because of the vulnerability of salmon stocks (especially those listed under the ESA) to climate change, and because of the greater availability on information on salmon habitats.

2. Ecosystem-Based Fishery Management Roadmap

The SSC reviewed the August 17, 2016 draft of the NOAA NMFS Ecosystem-Based Fisheries Management (EBFM) Road Map (Agenda Item D.2, Attachment 2) and received a presentation from Ms. Heather Sagar (Senior Policy Advisor, NOAA Fisheries). Many of the initiatives in the Road Map are reasonable, tractable, and worthwhile. The Council and the California Current Integrated Ecosystem Assessment team have made substantial progress in developing or implementing many of these activities, such as developing a Fisheries Ecosystem Plan and implementing an annual process to produce an ecosystem status report.

It is important that the Road Map clearly define how NOAA will identify and engage with partners such as states, tribes, industry, and NGOs. Engagement should include participation in planning, determining objectives, sharing data, knowledge, and other aspects of implementation.

Some of the road map initiatives do not directly involve the Council except as a recipient of the work. Others would require implementation of management measures under Magnuson Act authority, which would necessarily involve the Council and its advisory bodies. This may substantially increase workload on some committees. There may also be a need to add additional members with expertise in ecosystem science to Council advisory bodies including the SSC.

The concept of “risk” needs to be more clearly defined and differentiated from impacts.

Identification of appropriate tools for EBFM is overly prescriptive in the Road Map. For example, the establishment of ecological reference points and thresholds may not be warranted for all ecosystems or needed to achieve EBFM objectives.

Several of the Road Map initiatives are likely to involve complex analytical techniques that have not yet been well documented in the scientific literature. It would be valuable to prepare a

Technical Memorandum in conjunction with the Road Map that provides guidance on how to 1) implement an ecosystem level risk assessment, 2) establish ecosystem level reference points, and 3) conduct a tradeoff analysis, which presumably would involve an ecosystem-level management strategy evaluation.

SSC Notes:

The main purpose of the road map is to provide implementation strategy for EBFM policy released earlier by NOAA Fisheries. The road map builds on the 6 guiding principle included in the policy and defines actions associated each principle. This draft was received after several other councils and groups provided comments; these comments have been folded into this current draft. Heather provided a brief summary of comments received to date by the following categories: 1) defining existing resources available to execute the work, 2) potentially significant additions to current workloads and impacts on current programs, 3) extending the review period, 4) data collection efforts that may be required, 5) defining partners invited to review EBFMs, 6) wording changes to the current drafts, and 6) stakeholder support for a particular action. Details of these comments are available. Comments from this body are due October 15, 2016.

E. Coastal Pelagic Species Management

1. Minimum Stock Size Thresholds Report

The SSC received a presentation by Dr. Kevin Hill (SWFSC) and reviewed the report “Review and Re-evaluation of Minimum Stock Size Thresholds for Finfish in the Coastal Pelagic Species Fishery Management Plan for the U.S. West Coast” (Agenda Item E.1.a, Supplemental NMFS Report). This report was not received by the SSC until September 6, after the two-week deadline set in COP4, which hindered a thorough review. The report presents options, but not recommendations, regarding alternative methods and values for Minimum Stock Size Thresholds (MSST) for coastal pelagic species (CPS). The SSC concluded that basing MSST on spawning biomass rather than age 1+ biomass is more appropriate for estimating MSST for the two actively managed CPS stocks. The SSC also concluded that some of the means of estimating MSST described in the report hold promise, but would require additional analysis, documentation and review.

The SSC discussion focused on a review of six discussion points provided by Dr. Hill, and this report is structured around SSC findings regarding these questions. The comments and recommendations of the SSC should be used to guide any additional analysis to develop alternatives for future review.

1) Are fixed v. frame-worked MSSTs more appropriate for coastal pelagic species?

Currently defined MSSTs in the CPS FMP are fixed quantities, however other FMPs often set MSSTs on frame-worked metrics (e.g., the SSB producing 25% of the unfished spawning output) that are updated based on the most recent stock assessment. Due to the dynamic nature of coastal pelagic populations and assessments, a framework approach would be more appropriate for coastal pelagic species. This would assure that management decisions were made based on current knowledge, rather than outdated historical estimates.

2) Should MSST be based on Spawning Stock Biomass (SSB) or age 1-plus Biomass?

Dr. Hill pointed out that these two metrics were relatively similar for sardine, but diverged more substantially for Pacific mackerel. The SSC concluded that MSSTs based on SSB are more consistent with National Standard guidance when such estimates are available, because they directly relate to reproductive potential.

3) Should MSST be based on SSB_{MSY} or a proxy (depletion)?

The SSC agreed that when the spawner-recruit relationship is not well estimated, MSY is also difficult to estimate, and therefore it is difficult to derive an MSST based on the estimated MSY value. Additional information is needed before the SSC can make a recommendation.

4) In the case of depletion-based MSSTs: are equilibrium SSB_0 or $SSB_{0current}$ estimates more appropriate?

The SSC does not have a definitive answer to this question. The SSC agreed that $SSB_{0current}$ (the “dynamic B_0 ” estimate that is developed by forward projection of stock assessment model parameters in the absence of fishing) has considerable potential, but would require some additional analysis and ideally a simulation study to better evaluate the performance of this approach. For example, it was noted that the “dynamic B_0 ” estimate developed in the SWFSC Report was based on forward projection of observed recruitment values. An alternative means of defining a dynamic B_0 would incorporate the effect of spawning stock size on total recruitment. This could be done by using the base model's estimated recruitment deviations rather than absolute recruitment estimates, thus incorporating the effect of larger stock size on total recruitment in the unfished population. This approach would reduce the potential for MSST based on dynamic B_0 to simply track stock declines at low abundance levels. The SSC also suggests exploring the potential to combine a dynamic B_0 approach to determining MSST with a minimum threshold value for MSST.

5) In the case of depletion-based MSSTs, what is the most appropriate depletion level?

The SWFSC Report used depletion level of 20% of the unfished (either static or dynamic) spawning stock biomass, which is a commonly used standard.

6) If $SSB_{0current}$ is used, what is the best time window to defining “current”?

The SWFSC Report explored two options for Pacific sardine and Pacific mackerel, based on the mean estimated unfished spawning biomass levels over the past one or two generation times. The SSC noted that other similar analyses have defined periods with a variety of base periods or used the current (terminal year) estimate of unfished SSB, and this approach is also worth exploring in defining “current.”

Although Dr. Hill suggested that in the absence of additional data, potential MSSTs could not be developed for the northern subpopulation of Northern anchovy, the SSC noted that the 2010 OFL determination for this stock used two prior biomass estimates. The SSC also expressed concern about basing reference points based on highly dated information.

SSC Notes:

Dr. Hill described the state of knowledge regarding long-term variability in CPS, including paleoecological studies that demonstrate low frequency variability in the abundance of Pacific sardine and Northern anchovy over the past 1700 years, and studies demonstrating the extent to which equilibrium unfished biomass levels for Pacific sardine appear to be highly dependent on ocean temperatures. Dr. Hill then provided a synthesis of the report evaluating alternative means of developing MSSTs and summaries of estimated potential MSSTs for several of the coastal pelagic species based on these methods.

Re: Discussion point 2 (Should MSST be based on Spawning Stock Biomass (SSB) or age 1-plus Biomass). The SSC also noted that the control rule for Pacific mackerel is based on 1+ biomass.

Re: Discussion point 4 (In the case of depletion-based MSSTs: are equilibrium SSB_0 or $SSB_{0current}$ estimates more appropriate?). A dynamic B_0 approach was generally agreed to have considerable potential for many CPS species, although there was concern that this approach could allow a stock to drop too low under some circumstances, particularly if estimated recruitment, rather than recruitment deviations, were the basis for determining the unfished biomass level. The idea of a minimum “full stop” threshold might be appropriate in addition to a dynamic approach. There were also concerns regarding whether a dynamic B_0 estimate could fall below a detectability threshold for survey data. Simulation studies could also be beneficial in evaluating the performance of various dynamic B_0 estimation methods.

With respect to defining a dynamic B_0 that uses the base model's estimated recruitment deviations rather than absolute recruitment estimates, the SSC considered this approach more robust for reducing the potential to simply track stock declines at low abundance levels. This is because by utilizing both the spawner–recruit relationship as well as recruitment variability the dynamic B_0 estimate, the “unfished” population trajectory would not decline as rapidly as the fished trajectory, reflecting the cumulative influence of fishing on the stock dynamics that would essentially be lost after 1-2 mean generation times in the recruitment-only simulation.

Re: Discussion point 5 (In the case of depletion-based MSSTs, what is the most appropriate depletion level?)

The SWFSC Report used depletion level of 20% of the unfished (either static or dynamic) spawning stock biomass, which is a commonly used standard. This value could be reexamined if a future analysis or MSE explores a greater range of alternatives.

Re: Discussion point 6 (If $SSB_{0current}$ is used, what is the best time window to defining “current”?). The SSC noted that various alternative means of defining base periods for $SSB_{0current}$ have included environmental trend or time periods, as well as recruitment patterns. Under such a scenario, the SSC also discussed an “upper limit” to any dynamic B_0 based MSST, that could be appropriate during transitional periods between high and low productivity regimes.

Re: The northern subpopulation of Northern anchovy, the SSC noted that the 2010 Northern Anchovy OFL is based on two biomass estimates, a larval abundance survey conducted in the 1970s and an acoustic survey conducted in 2008.

SSC discussed that in the long term, a dynamic B_0 approach might be appropriate for optimizing management objectives through the HCR rather than MSST determination. The realized effect of any MSST will depend on the value of, or process, for determining cutoff.

3. Anchovy Management Update

Ms. Lorna Wargo presented the CPSMT Report on Anchovy Management Update (Agenda Item E.3.a, CPSMT Report), which provides the Council with information on general pathways for management within the CPS FMP and timeframes needed for considering changes to anchovy management. While the report is focused on the central subpopulation of northern anchovy, it applies in general to other CPS stocks.

It is not necessary to transition a stock from Monitored to Active management in order to establish an ACT, or to modify an ACL based upon new or updated information. If a currently monitored stock is considered for active management, a logical next step would be to conduct a workshop, with substantial SSC involvement, to consider alternative Harvest Control Rules (HCRs) given available data and assessment approaches. If the current HCR framework is adopted, values or rules for Cutoff, Fraction and Distribution would need to be determined.

SSC Notes:

Options for currently monitored stocks could retain monitored status and harvest specifications could be amended based upon new information or methods. Alternatively, could use a default control rule – need cutoff and fraction, or could use a new specific control rule, which could be completely different – such as effort control rule, or matrix control approach as used for some salmon stocks.

An ACT could be established for the CSNA as for the NSNA. Likewise, the ACL could be modified, while the stock remains under monitored status.

For 2016, Oregon and Washington are approaching 4500 mt of NSNA – Columbia River – Oregon. Much more than the 1500 mt ACT.

H. Salmon Management

2. Salmon Methodology Review

Mr. Mike Burner briefed the Scientific and Statistical Committee (SSC) on the current list of proposed topics for the 2016 Salmon Methodology Review tentatively scheduled for October 18-20 in Portland, Oregon. The following items were identified for potential review this fall, and the lead entity for each work product is identified at the end of each item.

1. Chinook Fishery Regulation Assessment Model (FRAM) base period update, including documentation and comparison with the current base period (Model Evaluation Workgroup, MEW).
2. Chinook FRAM documentation including FRAM algorithms and a user's manual (MEW).

3. Forecast model for Sacramento River Winter Chinook (Sacramento River Winter Chinook Workgroup).

The SSC is unclear on whether policy requires a review of the FRAM base period update. Review of the base period update, or any other application of FRAM in the future, without complete and thorough documentation is not possible. Documentation for the FRAM user interface is not required, but the underlying calculations and manipulations of the data need to be documented sufficiently to reproduce them.

The SSC anticipates reviewing the Sacramento River Winter Chinook forecast model, if complete documentation is available.

Materials submitted for review should be technically sound, comprehensive, clearly documented, and identified by author. Materials to be reviewed should be submitted no later than October 3 to Mike Burner. If this deadline cannot be met, it is the responsibility of the author to contact Mike Burner, the SSC Salmon Subcommittee Chair, and the SSC Chair prior to the deadline, so appropriate arrangements, rescheduling, and cancellations can be made in a timely and cost-effective manner. The SSC plans to review reports on these topics at the November meeting.

SSC Notes:

Explore the Groundfish and CPS Assessment Terms of Reference for useful language clarifying documentation requirements.

F. Groundfish Management

2. Methodology Review Preliminary Topic Selection

The Scientific and Statistical Committee (SSC) met with the Groundfish Management Team (GMT) to discuss possible methodology review topics for models used to develop regulatory specifications for the 2019-2020 biennium. In addition, the SSC discussed methodologies to be reviewed.

The GMT proposed these methodologies for review:

- Sablefish and lingcod Individual Fishery Quota discard mortality rates.
- Commercial nearshore discard mortality rates for cowcod, yelloweye, and canary rockfish.
- Review of the nearshore catch projection model improvements.
- Review non-nearshore catch projection model improvements.

Methods identified by the SSC for review are provided below:

- Development of new catch per unit effort standardization methods.
- Evaluation of the effects of autocorrelation in recruitment for the steepness prior (h).
- Updating of the prior on natural mortality (M).
- Evaluation of applying Dirichlet multinomial weighting of length and age composition data as well as other select changes to the Stock Synthesis model.
- Adjustments to sigma.

Methodologies related to productivity may be identified at the productivity workshop to be held in December 2016. The SSC groundfish subcommittee can discuss the workload and timing of review meetings at the November Council meeting.

Review of models employed by the GMT in regulatory specification development can take place later in the year, though estimates of discard mortality used in both the projection models and stock assessments should take place before March to facilitate timely application prior to review of the assessments themselves in spring and summer of 2017. The timing of review will be better assessed at the November Council meeting.

Materials will need to be submitted at least two weeks in advance of the review, and a primary analyst should be present at the reviews to facilitate a thorough review.

SSC Notes:

Items identified by the GMT:

- *Sablefish and lingcod Individual Fishery Quota (IFQ) discard mortality rates. The West Coast Groundfish Observer program applies mortality rates in estimates for the IFQ fisheries, but the mortality rates are not applied in estimates applied to the IFQ quota.*
- *Commercial nearshore discard mortality rates for canary, yelloweye, and cowcod. John Budrick will discuss the economy of producing mortality estimates for surface release for more species and considering application to the recreational fishery with the GMT while pursuing this undertaking. Also better to do all species since cowcod was derived using guild based analysis of the deeper demersal rockfish guild proxy requiring data for the other species in the guild. Discard mortality rates reflecting surface release were established for 2009-2010, but revisions to the methods are under consideration. Discard mortality rates reflecting the use of descending devices have been adopted for use in the recreational fishery, but additional analysis is needed to determine whether application to the nearshore commercial fishery is appropriate. Update to surface release mortality rates for all rockfish species for application to the recreational and commercial fisheries may be more advantageous given that work applies to recreational and commercial. The scope of the analysis GMT consideration was that review time frame is March and April, which may limit what the GMT can accomplish in this time frame.*
- *Review nearshore catch projection model:*
 - *Bycatch rate (WCGOP) X GMT projected landings*
 - *Point estimates poor predictors (limits ability to meet goals)*
 - *Point estimates may never be (due to high variation)*
 - *Re-examine overall discard mortality rates*
 - *Address uncertainty (use CV's or bootstrap?)*
 - *Improved use for management*
 - *Additional area strata?*
 - *Species-specific bycatch rates*

The GMT will be meeting with the observer program in October and additional details will be forthcoming at the November meeting. Discard mortality rates are used in inseason projections, spex modeling, WCGOP estimates and stock assessment and whether they are appropriate or whether new rates should be applied are under consideration. Discard mortality rates used in

assessment and management may require some coordination. New rates will also go through the next spex process and will be reviewed in the course of the spex process, though the rates would need to be integrated into stock assessments prior to review of the spex. NEPA is not required to revise the rates, but they will be needed for the assessment, pushing up the timeline.

Review non-nearshore catch projection model with revised bycatch rates, revised CV estimation methods, estimates south of 36° and other improvements to model performance.

- *Bycatch rates (WCGOP) x sablefish projections by strata = point estimates*
- *Model performance and issues to address*
- *Potential new CV methodology by WCGOP*
- *Estimates south of 36°*
- *Remaining issues from last review*
- *Running average vs. grand mean*
- *Evidence of highgrading*

Analysis was last conducted for the 2015-2016 cycle.

- *Review of economic models may be a consideration IOPAC, cost-earnings data is to be updated, but that may not require review. The GMT did not hear of any other new changes to economic models.*
- *COP 25 covers what merits review, adding data or changes to data ranges do not require review unless the SSC considers review necessary.*
- *For trawl IFQ impact projection models, historical data was examined and ad hoc analysis was mad to examine what might occur for rebuilding stocks i.e., canary, darkblotched and bocaccio. Steps have already been approved but will be run with the new model.*
- *5 year review and STAR panel process will take a lot of time and March and April will be the time to review GMT models. SSC economics subcommittee and groundfish subcommittees will meet regarding 5 year review in June, which may require some time.*
- *A table of when it was last reviewed and what is proposed will be forthcoming from the GMT to provide guidance.*

Stock assessment methods identified for review by the SSC and those responsible, are provided below:

- *Development of CPUE standardization methods. Note this is intended to replace Stevens McCall filter for co-occurring species used to standardize effort (JT)*
- *Development of Spatial GLMM. Note this is intended to further develop the geospatial standardization methods pursued previously (JT)*
- *Evaluation of autocorrelation in h prior (Owen and others? work with Kelli) Updating of the rockfish h steepness prior and consideration of the implications of autocorrelation of recruitment for h and accounting for the effect of ageing error on autocorrelation.*

- *Updates of the prior on natural mortality (M) (Owen) Updating of the natural mortality prior for rockfish with results of studies by Owen in 2015 and another using maximum age data. Methodology would have to be reviewed so it can be approved. Could be reviewed at the productivity workshop, though tangentially related to the primary thrust of the workshop. Updating of steepness could also be done at the productivity workshop.*
 - *Evaluation of applying Dirichlet multinomial weighting for length and age composition data (JT) Methods for data weighting feature in SS with length or age comps to be reviewed. The three parameter productivity method SS also needs to be reviewed although additional changes may be suggested and this may occur at the productivity workshop. A status report regarding what may be in the new version of SS would be helpful to determine what needs to be reviewed. Likelihood option would also need review for consideration.*
 - *Review of any new or revised methods in the most up to date version of stock synthesis - (Ian, Theresa, Rick)*
 - *Consideration of adjustments to Sigma and/or P-star to address increasing uncertainty as a stock assessment ages given the widening of confidence intervals on forward projections with time.*
 - *Using MLE for data moderate assessment is of interest in the future, but is a low priority for this cycle since no data- moderate assessments are being considered.*
8. Mid-biennium Annual Catch Limit Adjustment and Rebuilding Harvest Rate Adjustment Policies

The Scientific and Statistical Committee (SSC) reviewed a report (Agenda Item F.8, Attachment 1) by Ms. Chantel Wetzel and Dr. Owen Hamel (NWFSC) evaluating the implementation of a rebuilding harvest control rule revision to the rebuilding plans for Pacific ocean perch and yelloweye rockfish. Both stocks were below the minimum stock size threshold (MSST) and projections were run that replaced the current rebuilding harvest strategy with a hybrid strategy that used a 40-10 harvest control rule when spawning biomass was projected to increase above the MSST. The SSC endorses the analysis as the best available science to determine the effects of implementing the hybrid rebuilding strategies on rebuilding timing for Pacific ocean perch and yelloweye rockfish. Pacific ocean perch time to rebuild is expected to increase by 79 years and yelloweye rockfish by 98 years under the hybrid rebuilding strategy relative to the current rebuilding approach.

No analysis was presented to the SSC regarding the mid-biennium annual catch limit adjustment. The SSC emphasizes that in assessment years the planning priority should focus on producing the best assessment science and that it not be compromised to accommodate a mid-biennium policy.

SSC Notes:

Discussion on Mid-biennium

Nothing was presented to review, although several suggestions were made that examining effects of mid-biennium corrections using historical stock assessment results may be useful. The SSC was concerned that assessment science is not compromised to accommodate mid-biennium policy. This concern was primarily that assessment review panels could be pushed earlier in the year when all data and analyses may not be complete. It was also noted that the current acceptance of only a red light policy is not risk neutral, and a green light policy may be warranted.

Discussion on ramp up strategy and Attachment 1

The SSC note unusual biomass trajectories in Figure 4. It was clarified that this was due to including actual catches for the first years. It was also noted that the simulation does not include the potential to switch from 40-10 back to rebuilding SPR's if stock fell again below the MSST. The SSC also noted that the documentation of methods was sparse, but it was subsequently pointed out that additional information was available in the original rebuilding plan documentation.

5. 5-Year Catch Share Program and Intersector Allocation Review Update

Mr. John DeVore (Council Staff) presented a proposed alternative catch share program review schedule to the SSC. The original approved schedule required SSC review of the draft program review document in September 2017 and final approval of the Program Review by the Council in April 2018. The proposed alternative is an accelerated schedule that would require SSC review of the draft document in June 2017 and final approval by the Council in November 2017.

The proposed alternative schedule for the catch share program review presents workload challenges to the SSC. The accelerated alternative schedule would require intensive review of the draft document by the SSC's Economics and Groundfish Subcommittees followed by a joint meeting prior to the June 2017 Council meeting. This timeline is problematic for two reasons. First, the Groundfish Subcommittee already has a June meeting scheduled because it must review four groundfish update assessments and the cowcod catch report. In addition, several Groundfish Subcommittee members will likely be involved in various stock assessment activities in June. Second, a NOAA Fisheries Science Program Review for economics and social science will occur in early- to mid-2017. Two of the five economics subcommittee members (including the chair) will be involved in the NOAA Fisheries Program Review in the run-up to the proposed June 2017 SSC review of the draft catch share document. Given these workload constraints, the SSC prefers the original approved review schedule, which includes SSC review of the draft document in September 2017 and final Council approval of the Program Review in April 2018.

SSC Notes:

In order to review the public review draft document, the SSC's Economics and Groundfish subcommittees would likely conduct a half-day webinar to view presentations by the Catch Share Review Project Coordinating Team followed by a compressed full-day discussion at a joint subcommittees meeting immediately before the SSCs regularly scheduled meeting. In the accelerated alternative schedule the webinar would occur in mid-May and the joint subcommittees meeting would occur in conjunction with the June 2017 Council meeting. The full SSC would then have the opportunity to endorse the report at its June 2017 meeting. In the case of the original approved schedule, the webinar would occur at approximately October 2017 and the joint subcommittees meeting would occur in conjunction with the November 2017 Council meeting.

SSC Subcommittee Assignments, September 2016

Salmon	Groundfish	Coastal Pelagic Species	Highly Migratory Species	Economics	Ecosystem-Based Management
Galen Johnson	David Sampson	André Punt	Kevin Piner	Cameron Speir	Martin Dorn
John Budrick	Aaron Berger	Aaron Berger	Aaron Berger	Michael Harte	Evelyn Brown
Alan Byrne	Evelyn Brown	Evelyn Brown	John Field	Dan Holland	John Field
Owen Hamel	John Budrick	John Budrick	Michael Harte	André Punt	Michael Harte
Michael Harte	Martin Dorn	Alan Byrne	Dan Holland	David Sampson	Dan Holland
Will Satterthwaite	John Field	John Field	André Punt		Galen Johnson
Cameron Speir	Owen Hamel	Owen Hamel	David Sampson		Kevin Piner
	André Punt	Will Satterthwaite			André Punt
	Tien-Shui Tsou	Tien-Shui Tsou			Will Satterthwaite
					Tien-Shui Tsou

Bold denotes Subcommittee Chairperson

DRAFT Tentative Council and SSC Meeting Dates for 2017

Council Meeting Dates	Location	Likely SSC Mtg Dates	Major Topics
<p>March 7-14, 2017 Advisory Bodies may begin Tue, March 7 Council Session may begin Wed, March 8</p>	<p>Hilton Vancouver Washington 301 W. Sixth Street Vancouver, WA 98660 USA Phone: 360-993-4500</p>	<p>Two-day SSC Session Tue, March 7 – Wed, March 8</p>	<p>Identify Salmon Management Objectives (possible test fishery alternatives) Salmon Review/Pre I Stock Prod., Hist. Catch Recon. WS Reports CA Current IEA Report Sablefish Ecosystem Indicators Identify New FEP Initiatives</p>
<p>April 6-12, 2017 Advisory Bodies may begin Thurs, April 6 Council Session may begin Fri, April 7</p>	<p>DoubleTree by Hilton Sacramento 2001 Point West Way Sacramento, CA 95815 Phone: 916-929-8855 or 1-800-686-3775</p>	<p>One-day SSC CPS Subcm Session Wed, April 5 Two-day SSC Session Thu, April 6 – Fri, April 7</p>	<p>Pacific Sardine Assessment Trawl Cost Recovery Report Salmon Methodology Topic Selection</p>
<p>June 7-14, 2017 Advisory Bodies may begin Wed, June 7 Council Session may begin Thurs, June 8</p>	<p>DoubleTree by Hilton Spokane City Center 322 N. Spokane Falls Court Spokane, WA 99201 Phone: 509-455-9600</p>	<p>One-day SSC GF Subcm Session Sun, June 4 Two-day SSC GF & Econ Subcms Session Mon, June 5 – Tue, June 6 Two-day SSC Session Wed, June 7 – Thu, June 8</p>	<p>Pacific Mackerel Assessment Groundfish Update Assessments & Cowcod Catch Report 5-year IFQ Program Review 2019-2020 Groundfish Spex Planning CCC Meeting Update</p>
<p>September 11-18, 2017 Advisory Bodies may begin Mon, Sept 11 Council Session may begin Tues, Sept 12</p>	<p>The Riverside Hotel 2900 Chinden Blvd Boise, ID 83714 Phone: 208-343-1871</p>	<p>Two-day SSC Ecosystem Subcommittee Session Sat, Sept 9 - Sun, Sep 10 Two-day SSC Session Mon, Sept 11 – Tue, Sept 12</p>	<p>Groundfish Assessments Review 2019-2020 Groundfish Spex Groundfish Stock Assessment Methodology Review Topic Selection Off-year Science Improvements Salmon Methodology Topic Priorities</p>

<p>November 13-20, 2017 Advisory Bodies may begin Mon, Nov 13 Council Session may begin Tues, Nov 14</p>	<p><u>Hilton Orange County/Costa Mesa</u> 3050 Bristol Street Costa Mesa, CA 92626 Phone: 714-540-7000</p>	<p>Two-day SSC Session Mon, Nov 13 – Tue, Nov 14</p>	<p>CPS Methodology Topic Selection CPS SAFE Groundfish Stock Assessments (if needed) & Rebuilding Analyses 2019-2020 Groundfish Spex Groundfish Stock Assessment Methodology Topic Priorities Salmon Methodology Review</p>
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SSC meeting dates and durations are tentative and are subject to change in response to Council meeting dates, agendas, workload, etc.

Proposed Workshops and SSC Subcommittee Meetings for 2017

Tentative – Depended on funding, dates subject to change

☐– Prep. Work Underway, Scheduled to Occur; ▣– Status of Supporting Analyses Uncertain, Remains a Priority;

▨– Setbacks exist, Questionable; ■– Funding or Prep. Not Avail, likely to be canceled or postponed

Workshop/Meeting		Potential Dates	Sponsor/ Tentative Location	SSC Reps.	Additional Reviewers	AB Reps.	Council Staff
1	Sardine Assessment Review	Feb. 21-24	Council/ La Jolla, CA	SSC Chair TBD	2 CIE + 1	CPSMT CPSAS	Griffin
2	P. Mackerel Update Review	Apr. 5?	Council/ Sacramento, CA	CPS Subcommittee	None	CPSMT CPSAS	Griffin
3	CPS Methodology Review?	TBD	TBD	CPS Subcommittee	None	CPSMT CPSAS	Griffin
4	Groundfish Methodology Reviews	TBD	TBD	GF Subcommittee	None	GMT GAP	DeVore
5	5-year IFQ Program Webinar	Mid-May?	online	GF & Economics Subcommittees	None	GMT GAP	Seeger?
6	Groundfish Update Assessments & Cowcod Catch Report Review	June 4	Council/ Spokane, WA	GF Subcommittee	None	GMT GAP	DeVore
7	5-year IFQ Program Review	June 5-6	Council/ Spokane, WA	GF & Economics Subcommittees	None	GMT GAP	Seeger?
8	Lingcod & Yelloweye STAR Panel	June 26-30	Council/ Seattle, WA	SSC Chair TBD	2 CIE + 1	GMT GAP	DeVore

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▨– Setbacks exist, Questionable; ■– Funding or Prep. Not Avail, likely to be canceled or postponed

	Workshop/Meeting	Potential Dates	Sponsor/ Tentative Location	SSC Reps.	Additional Reviewers	AB Reps.	Council Staff
9	Yellowtail RF & POP STAR Panel	July 10-14	Council/ Seattle, WA	SSC Chair TBD	2 CIE + 1	GMT GAP	DeVore
109	Blue/Deacon RF & CA Scorp. STAR Panel	July 24-28	Council/ Santa Cruz, CA	SSC Chair TBD	2 CIE + 1	GMT GAP	DeVore
11	IEA Indicator Review	Sep 9-10	Council/ Boise, ID	Ecosystem Subcommittee	None	None	Dahl
12	Salmon Methodology Review	Oct. TBD	Council/ Portland, OR	Salmon Subcommittee	None	STT SAS MEW	TBD
13	National SSC Meeting	Nov 17 – Feb 18? TBD	Council & NMFS/ TBD	TBD, likely 4 total	TBD	None	DeVore Others? TBD
14	Transboundary Groundfish Stocks	?	Council	2 TBD?	?	GMT GAP	DeVore