

**SCIENTIFIC AND STATISTICAL COMMITTEE REPORT ON
FUTURE COUNCIL MEETING AGENDA AND WORKLOAD PLANNING**

The Scientific and Statistical Committee (SSC) discussed future workload planning and has the following updates to our April 2021 statement under this agenda item.

The SSC recommends a one day SSC Ecosystem Subcommittee meeting on September 8, 2021, to be devoted to the review of California Current Integrated Ecosystem Assessment (CCIEA) products, including threshold relationships between environmental drivers and performance of salmon preseason abundance forecasts, year class strength and distribution of small groundfish, krill-based indicators, and possibly additional review of port-level linkages between fisheries using network analysis. Review of the first item would benefit from the involvement of SSC Salmon Subcommittee (SSCSS) members, as well as interested Salmon Technical Team members.

Salmon Science Review

The SSCSS convened an online meeting on June 4, 2021, to discuss the SSC's role in reviewing salmon forecast methodologies and other analyses that inform Pacific Fishery Management Council (PFMC or Council) decisions. The primary goal of this meeting was to reduce confusion and ambiguity about the role of the SSC for reviewing salmon science.

During the meeting, the SSCSS reviewed the Pacific Coast Salmon Fishery Management Plan (FMP) and Council Operating Procedure (COP) 15 and highlighted areas where the SSC has a role in scientific review. The SSCSS report (attached) from the meeting identifies a number of specific cases where this role is unclear or where current practices may contradict what is written in the salmon FMP or COP 15. Much of the discussion involved ambiguity in the SSC's role to initiate a review of topics and how frequently particular models and reference points should be updated.

The SSC has three major requests of the Council that would help standardize the review process for science to inform salmon management.

1. Clarify the definition of "major stocks." COP 15 provides details on the process for conducting salmon methodology reviews and states that "forecasting methods for major PFMC stocks" is an issue that could merit a full review but does not define "major". The SSC proposes that the Council explicitly define which stocks are 'major'.
2. Establish a database that describes the forecast methodology used for each "major" stock, when that method was adopted, and when it was last reviewed. Ideally the history of all forecast methods and reviews for each stock would be included. The performance of the forecast should be evaluated and reported on each year in Pre-1 and in the database.

3. Establish a process that outlines how and when reference points and conservation objectives are reviewed and updated as appropriate.

The first request can be implemented with feedback from the Council. The second and third requests could be implemented as salmon methodology review topics in 2021 and will relate to the Council's discussion of the Best Scientific Information Available.

Proposed Workshops and SSC Subcommittee Meetings for 2021							
	Workshop/Meeting	Potential Dates	Sponsor/Tentative Location	SSC Reps.	Additional Reviewers	AB Reps.	Council Staff
1	Groundfish STAR Panel 2 Lingcod	July 12-16	Council/Webinar	Field (Chair) White	2 CIE (Cieri, Dichmont)	Mattes Richter	Phillips DeVore
2	Groundfish STAR Panel 3 Vermilion & Sunset Rockfishes	July 26-30	Council/Webinar	Budrick (Chair)	2 CIE (Cieri, Medley), Hicks	Mandrup Richter	DeVore Phillips
3	SSC Groundfish Subcommittee Review of Assessments and Prioritizing Mop-up Tasks	August 17	Council/Webinar	Groundfish Subcommittee Members	NA	GMT Richter	DeVore
4	SSC Ecosystem Subcommittee	September 8	Council/ Spokane, WA	SSC Ecosystem & Salmon Subcommittee Members	CCIEA Team	EWG EAS	DeVore Dahl
5	Groundfish Mop-up STAR Panel, if needed	September 27- October 1	Council/TBD	TBD	2 CIE	GMT Richter	DeVore
6	Salmon Methodology Review	October TBD	Council/TBD	Salmon Subcommittee members	NA	STT MEW	Ehlke
7	CSNA STAR Panel	November 30 – December 3	Council/TBD	Punt (Chair), Hamel (tentative), & Other CPS Subcommittee Members TBD	2 CIE	CPSMT CPSAS	Griffin DeVore

8	Proposed Workshop for Conducting Nearshore ROV Surveys	TBD	Council/TBD	TBD	TBD	GMT GAP	DeVore
9	Post-mortem Review of the Groundfish Assessment Process	Fall/Winter 2021 After Assessment Cycle, TBD	Council/TBD	Groundfish Subcommittee Members	TBD	GMT Richter	DeVore
10	7 th National Meeting of the Scientific Coordination Subcommittee of the Council Coordination Committee	2022 TBD	NPFMC/ TBD, AK	4 TBD	NA	NA	DeVore

SCIENTIFIC AND STATISTICAL COMMITTEE'S
SALMON SUBCOMMITTEE REPORT

Pacific Fishery Management Council
Via Webinar

June 4, 2021

The Scientific and Statistical Committee's Salmon Subcommittee (SSCSS) convened an online meeting on June 4, 2021 to discuss the Scientific and Statistical Committee's (SSC) role in reviewing salmon forecast methodologies and other analyses that inform the Pacific Fishery Management Council (PFMC or Council) decisions as specified in the Pacific Coast Salmon Fishery Management Plan (FMP) and Council Operating Procedure 15 (COP) 15. The primary goal of this meeting was to reduce confusion and ambiguity about the role of the SSC for reviewing salmon science. Four management categories are used for salmon stocks managed by the PFMC. The Magnuson-Stevens Act (MSA) applies to all however, each category has different requirements of the PFMC and SSC under the FMP. The four categories are 1) salmon stocks for which the PFMC has management authority, including setting the acceptable biological catch (ABC) and annual catch limit (ACL), via the MSA; 2) salmon stocks that are managed under the MSA but fall under an international treaty exception--primarily the Pacific Salmon Treaty (PST); 3) salmon stocks that are managed under the MSA but fall under the ESA exception; and 4) salmon stocks of exclusively hatchery origin. The SSCSS received presentations on each of these categories of stocks except stocks that are exclusively hatchery origin and followed up these presentations with a discussion of areas where the SSC has a clearly defined role in salmon science while noting areas where the role was ambiguous.

Dr. Will Satterthwaite (SWFSC) presented on salmon stocks for which the PFMC has management authority, including setting the ABC and ACL, via the MSA. The three primary stocks that fall under this category with specified ABCs are the Sacramento River Fall Chinook (SRFC), Klamath River Fall Chinook (KRFC), and Willapa Bay natural coho. Two of these stocks (SRFC and KRFC) are considered indicator stocks for stock complexes which contain additional stocks that are not actively managed, on the assumption that managing the indicator stocks suffices. There are a number of tasks specifically assigned to the SSC which include specification of the ABC and the ABC control rule, review of forecasts, review of reference points and conservation objectives, methodology reviews, and changes to stock complex composition. However, among these tasks there is often ambiguity in who initiates the review or changes and on what schedule. There is also ambiguity in the SSC's role reviewing annual values (e.g., year-specific forecasts or exploitation rates) versus the methods used to generate them. There is no specific SSC role spelled out in the FMP or COP 15 for annual status determinations or rebuilding plans, although the SSC is routinely asked to weigh in on both.

Dr. Galen Johnson (NWIFC) presented on salmon stocks managed under the MSA but falling under the PST exception. Stocks subject to the PST are those stocks that originate in the waters of one Party and are 1) subject to interception by the other Party, 2) affect the management of stocks of the other Party, or 3) affect biologically the stocks of the other Party. The SSC does not need to

specify ABCs or associated reference points for these stocks. The SSC is tasked with reviewing forecasts to determine if they represent the best scientific information available (BSIA), and can review forecast methodology changes, status determination criteria, conservation objectives, or harvest control rules through a similar review process as other stocks managed through the PFMC. However, there is considerable uncertainty who initiates these reviews and how to proceed if it was determined best scientific information available was not used. It was further noted that insufficient time is generally available to review these forecasts during the March PFMC meeting.

Dr. Ole Shelton (NWFSC) presented on salmon stocks that are managed under the MSA but fall under the ESA exception. The National Marine Fisheries Service (NMFS) conducts ESA consultations with respect to the effects of PFMC managed fisheries on listed salmon stocks to issue a jeopardy or no jeopardy ruling. Where the consultation results in a no jeopardy opinion, NMFS issues an incidental take statement that authorizes take of the listed species which would otherwise be prohibited. If the consultation results in a jeopardy opinion, NMFS develops reasonable and prudent alternatives to the proposed action which authorizes limited take. ESA consultations are a form of a fishery control rule that is deemed sufficient to meet the intention of the MSA overfishing provisions.

Following the three presentations, the SSCSS had a discussion of the SSC's role in reviewing salmon science. The SSCSS identified a number of specific cases where this role was unclear or where current practices may contradict what is written in the salmon FMP or COP 15. Specific cases we identified are summarized in the Table 1. The major topics discussed at the SSCSS meeting are summarized below.

Major Ambiguities

Much of the discussion involved ambiguity in the SSC's role to initiate a review of topics and how frequently particular models and outputs should be updated. There are cases described in the FMP where the SSC reviews certain items. However, it is unclear how these reviews should be initiated and by what entity.

Reference points and conservation objectives

Salmon FMP sections 3.1.7 and 3.2.2 state that modifications to reference points and conservation objectives may be made after a comprehensive technical review. It is not clear how such a review should be initiated. Further, it is not clear whether or how often reference points or conservation objectives should be periodically updated (or at least assessed for the need to update). For example, the Sacramento River Fall Chinook SMSY reference point and conservation objective are based on a report published in 1984 that was based on data from the 1950's. Several Washington coastal stocks have conservation objectives derived from reports published in 1979 or 1984 (FMP Table 3-1).

Abundance forecasts

The SSC reviews abundance forecast methods and is tasked with reviewing annual abundance forecasts outputs provided to the Council for pre-season rulemaking. The abundance forecasts are used to calculate Acceptable Biological Catch for non-treaty, non-listed indicator stocks (Klamath River Fall Chinook, Sacramento River Fall Chinook, and Willapa Bay coho). It is unclear whether the SSC is implicitly endorsing forecast methods each year (without a review) when it endorses

forecast outputs. In these cases, it may be that the SSC is forced to conclude that the forecasts reflect the BSIA simply because no alternative information is available.

It is unclear whether and how the SSC should evaluate and address concerns about forecast methods when past forecast performance is unsatisfactory. Further, should the SSC propose forecast performance metrics that would trigger a review of the forecast methods if performance standards were not met? Could the SSC initiate a review in this case without a proposal for a change to the methods?

COP 15 provides details on the process for conducting salmon methodology reviews and states that “forecasting methods for major PFMC stocks” is an issue that could merit a full review. However, there is not definition of what constitutes a “major stock”. Further, the COP 15 does not indicate whether methods should be reviewed annually, at some frequency, or only when changed. The relevant sentence in the COP 15 refers only to methods, not changes in methods, but elsewhere in the FMP and COP 15 it is implied that methods are only reviewed when changed or a change is proposed.

Frequency and initiation of reviews

The Council clearly has the authority to initiate review of abundance forecasts methods or reference points. There is ambiguity around whether the SSC on its own can initiate such a review. This has occurred in cases involving other FMPs. For example, the SSC updated sigmas for use in setting groundfish harvest limits without specific direction from the Council. In the salmon FMP, section 3.3.3 suggests that part of the SSC’s role may be to initiate reviews of forecast methods and other elements of ABC specification on its own (p. 28): “The SSC will have an ongoing role in evaluating ABCs through their annual review of stock abundance forecasts and their prerogative to initiate re-evaluation of the ABC control rule. Abundance forecast methods are periodically revised and these revisions are evaluated by the SSC through the salmon methodology review process. The SSC could revisit the ABC control rule as needed during the salmon methodology review.”

The utility of periodic review came up repeatedly, and there would seem to be great value in a structured process for periodically revisiting established reference points and methodologies to verify that recent performance of models has been acceptable and that old analyses are still robust in the face of new data and current accepted practices for analysis. Forecast models are perhaps the highest priority for periodic model assessment, but harvest models, economic models, the composition of stock complexes and identification of indicator stocks, and other management models would benefit from periodic assessment. Emerging scientific approaches like genetic stock identification (GSI) that have the potential to inform salmon management could warrant a review. Workload constraints mean that the approach to periodic review would need to be carefully structured, as reviewing all relevant analyses for all stocks every year is not feasible.

Escapement, rebuilding plans, and reference points

It was noted that the SSC generally does not review escapement estimation methods (though exceptions including a 1988 SSC review of Washington coho escapement estimates and a 2012 SSC comment made after the fact on changes in Sacramento River Fall Chinook escapement

methodology were noted), although escapement estimates are required for overfishing status determinations and to evaluate the performance of forecasts that the SSC is tasked with reviewing.

There is some ambiguity surrounding the SSC's role in development and review of rebuilding plans. The salmon FMP section 3.1.4 indicates that the Salmon Technical Team (STT) should develop and recommend rebuilding plans to the Council for overfished stocks. No role for the SSC is specified in the FMP or COP 15, but the SSC typically reviews the STT's rebuilding analysis prior to adoption of the plan by the Council. The most recent example of this is the rebuilding plans for SRFC, KRFC, and three coho stocks that were adopted in 2019. Further, MSA National Standard 1 states that "SSCs ... shall provide recommendations for achieving rebuilding targets".

The SSCSS also discussed the question of, how consistent does the process for reviewing salmon methods and reference points need to be with the process used to manage other FMP's? Could the SSCSS and STT draw lessons from scientific review process for CPS and groundfish? One aspect of salmon management that is very different from other FMP's is that many management activities are conducted by other entities (e.g., tribes, the Pacific Salmon Commission, and the states) or driven by other requirements (court decisions, ESA, Pacific Salmon Treaty). Therefore, it may not be possible to make salmon scientific review fully consistent with other FMP's. However, it is important for salmon management to meet requirements of BSIA. Since there is a great deal of information and exchange between the Council and other management agencies, SSC reviews should be done with the cooperation of all parties. Rigorous and timely review of Council products can help catch and prevent the perpetuation of mistakes.

Recommendations

1. Much of the ambiguity concerned the lack of a definition for "major" stock. The SSCSS suggests that 'major' stocks be defined as those salmon stocks for which the PFMC specifies ABCs (SRFC, KRFC, Willapa Bay natural coho), all Chinook and coho stocks considered a fishery target stock in Tables 1-1 and 1-2 of the FMP, and all stocks with harvest control rules.
2. Establish a database that describes the forecast methodology used for each "major" stock, when that method was adopted, and when it was last reviewed. Ideally the history of all forecast methods and reviews for each stock would be included. The performance of the forecast should be evaluated and reported on each year in Pre-1 and in the database.
3. A process should be established that outlines how and when reference points and conservation objectives are reviewed and updated as appropriate.

Table 1. Summary of SSC role as described in the FMP and COP 15, applicable stocks, and unresolved questions that need clarification.

SSC role is ambiguous and not specifically described by the FMP and COP 15	Applicable stocks	Unresolved questions:
Review of annual values (especially of preseason abundance forecasts, of escapement estimates, and of exploitation rates) versus underlying methodologies responsible for generating the annual estimates.	Potentially all stocks reported on in the Review of Ocean Fisheries and/or Preseason Report 1.	Some inconsistent language with respect to the SSC reviewing forecasts, forecast methods, or changes in forecast methods. Similarly, it is not clear how intensively the SSC is expected to review annual SAFE documents.
Development and review of rebuilding plans (nothing mentioned in FMP or COP 15, but SSC role in rebuilding analyses is described in MSA NS1).	Stocks newly declared overfished (so would exclude hatchery stocks and ESA stocks without MSSTs, could conceivably apply for any other stock in the future).	Should the SSC's role with respect to rebuilding be defined in the FMP and/or COP 15?

Review of escapement estimation methodology.	Any stock with an MSST that escapements are compared to, and potentially any stock forecast the SSC is expected to review. Additionally, some stocks like OCN use parent spawner abundance as an input to the harvest control rule.	Can the SSC endorse preseason abundance forecasts or the underlying forecast methods without endorsing the methods used to generate the postseason estimated abundances they are compared against to evaluate performance? Can the SSC endorse overfished designations without knowing how the escapement estimates driving the determinations are derived?
Review of "algorithm changes" in models developed and used external to the Council process, but also providing inputs to the Council process (e.g., PSC's CTC exploitation rate analysis models).	Chinook stocks where overfishing determinations are based on the output of CTC exploitation rate analyses	COP 15 implies all algorithm changes should be reviewed. Does this include algorithms in models that are developed and (presumably) reviewed outside of the Council process?
Extent of review expected for Preseason Report 1, given its length and very late availability to SSC.	Stocks reported on in Preseason Report 1.	The SSC often has only a few days (in 2021, zero full days) to review Preseason Report 1. How can it be expected to do anything more than a very superficial review unless this timeline is changed?

Analyses related to ESA listed stocks, e.g., MSEs and PVAs that the SSC has been asked to review in the past.	ESA-listed stocks.	Should the SSC's role with respect to listed stocks be defined in the FMP and/or COP 15?
Responsible party for developing stock-specific management approaches for listed ESUs within 5 years of listing (p. 38)	ESA-listed stocks.	There are ESUs listed over 5 years ago for which there is not stock-specific management. Who should be developing and/or reviewing the required approaches?
Where is the line between "algorithm changes" that require review and "data changes" that do not?	All stocks that models are applied to.	For example, would changing the covariates included in a multiple regression be a model change or a data change? Does it depend on whether there is a documented and reviewed approach for variable selection?
<u>Economic analyses.</u>		
Assigned to the SSC, but there are questions regarding details or applicable stocks:	Applicable Stocks:	Unresolved questions:
Review changes to stock complexes, including identification of indicators and "in the fishery" versus EC stocks (p 5)	Any stock proposed for change in stock complex assignment.	Regular process for review? Who initiates periodic or unscheduled review?
Review new/changed reference points for status determination (p 18)	All stocks except[?] ESA-listed or purely hatchery stocks that lack SDC.	Who initiates? Process for regular updating?

Review new/changed conservation objectives (p 19)	All stocks. Natural stocks should go through methodology review process, hatchery stocks can be expedited. NMFS may dictate for ESA stocks.	Who initiates? Process for regular updating?
Endorse forecasts for ABC stocks (p 28)	Currently Klamath River Fall Chinook, Sacramento River Fall Chinook, Willapa Bay coho. ABCs could be designated for additional stocks in the future, as information becomes available for current non-indicators (p. 5, 18).	SSC role in reviewing annual values versus just the methods used? Role initiating review or changes in a particular year given concerns about past performance? Establish threshold of performance that would trigger review/consideration of alternative methods?
Review changes to reference points in control rules (p 37)	Stocks with control rules, not entirely clear if this would apply to all stocks with control rules or only a subset. Clearly applies to control rules for KRFC and SRFC (p. 31-32) since they are ABC stocks. Not clear if this applies to control rules for PST stocks (p. 32-34), Puget Sound coho (p. 33-34), OCN coho (p. 34-36) and/or Sacramento River Winter Chinook (control rule not described in FMP, but recently adopted).	Who can initiate proposed change? What is process for updating control rules? How would this apply for internationally-managed or listed stocks where the control rule is not the sole purview of the Council?

Review new model algorithms (COP 15)	Clearly applies to FRAM stocks (FRAM), KRFC (KOHM), SRFC (SHM), SRWC (WRHM), possibly anything with an MSE or PVA, possibly economic impact models, possibly much more.	Does this apply to models used/developed by PSC technical bodies?
Review forecasting methods for "major" stocks (COP 15)	Major stocks	Which stocks are "major", and are methods to be reviewed annually, at some frequency, or only when changed? The relevant sentence in the COP 15 refers only to methods, not changes in methods, but elsewhere in the FMP and COP 15 it is implied that methods are only reviewed when changed or a change is proposed. Role initiating review or changes in a particular year given concerns about past performance? Establish threshold of performance that would trigger review/consideration of alternative methods?

Review methods for incorporating base data into models (COP 15)	FRAM stocks, maybe more?	Is this referring to FRAM base period updates, and/or some broader selection of data used in models? What does "base data" mean?
Review experimental design of proposed experimental fisheries (COP 15)	Relevant stocks would depend on proposed fisheries	How do things like GSI sampling proposals fit in here?
Review procedures used to determine allowable harvest via methodology reviews (p 47)	Harvested stocks	"Procedures" seems like a broad catch all. Is this adding any tasks or review topics not identified more specifically elsewhere?
Assigned to the SSC, with applicable stocks clearly defined and no outstanding questions:		
Specification of ABCs (p 28)	<p>Applicable stocks:</p> <p>Currently Klamath River Fall Chinook, Sacramento River Fall Chinook, Willapa Bay coho. ABCs could be designated for additional stocks in the future, as information becomes available for current non-indicators (p. 5, 18).</p>	
Initiate re-evaluation of ABC control rule as appropriate (p 28)	<p>Currently Klamath River Fall Chinook, Sacramento River Fall Chinook, Willapa Bay coho. ABCs could be designated for additional stocks in the future, as information becomes available for current non-indicators (p. 5, 18).</p>	

Review changes to models used to estimate bycatch (p 41)	Bycatch
Review methods used for estimating ocean abundance of OPI-area coho stocks (p 50)	OPI-area coho stocks
Review the Review of Ocean Fisheries report (p 71)	All stocks contained in Review of Ocean Fisheries

Tasks that are not the purview of the SSC

Allocation

Updating existing datasets in models

Changing CWT representation of modeled stocks

Adding new stocks to existing models

Changing data ranges used to estimate parameters in models

PFMC

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