MINUTES
Scientific and Statistical Committee

Pacific Fishery Management Council
Doubletree by Hilton Sonoma
Salon II Room
One Doubletree Drive
Rohnert Park, California 94928
Telephone: 707-584-5466
April 10-11, 2019

Members in Attendance

Dr. John Budrick, California Department of Fish and Wildlife, Belmont, CA
Mr. Alan Byrne, Idaho Department of Fish and Game, Boise, ID
Dr. John Field, SSC Chair, National Marine Fisheries Service Southwest Fisheries Science Center, Santa Cruz, CA
Dr. Owen Hamel, National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA
Dr. Michael Harte, Oregon State University, Corvallis, OR
Dr. Dan Holland, National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA
Dr. Galen Johnson, Northwest Indian Fisheries Commission, Olympia, WA
Dr. 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. 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. 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. Aaron Berger, National Marine Fisheries Service Northwest Fisheries Science Center, Newport, OR

SSC Recusals for the April 2019 Meeting		
SSC Member	**Issue**	**Reason**
Dr. André Punt	E.4 - Central Subpopulation of Northern Anchovy Management Update	Dr. Punt provided the E_{MSY} and assessment frequency analyses
Dr. Will Satterthwaite	F.5 - Salmon Rebuilding Plan Update	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. Chuck Tracy briefed the SSC on their agenda.

E. Coastal Pelagic Species Management

2. 2019 Exempted Fishing Permits (EFPs) – Final Approval

The Scientific and Statistical Committee (SSC) reviewed two coastal pelagic species (CPS) exempted fishing permit (EFP) proposals submitted by the California Wetfish Producers Association (CWPA) and the West Coast Pelagic Conservation Group (Agenda Item E.2, Attachments 1 and 2). Ms. Diane Pleschner-Steele and Mr. Mike Okoniewski were available to answer questions.

One of the objectives of the CWPA proposal (Agenda Item E.2, Attachment 1) is to provide a bias correction factor for the aerial survey for Monterey area – central California coast. The SSC recommends a survey design to support testing the hypothesis that the correction factor for central California is the same as it is for southern California. The SSC also recommends updating table A1 to include information collected since 2010, and reporting more details in the progress report (Agenda Item E.2, Supplemental Attachment 3). These details were communicated to the applicants.

The SSC supports the two EFPs moving forward and commends the applicants for their dedication to the continued research needed to improve biomass and variance estimates for CPS.

SSC Notes:

- *The EFP progress report should summarize information by season and area, and include raw data from point sets.*
- *A correction factor for 4,000 mt is not feasible.*

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

Dr. Kevin Hill (SWFSC) presented the 2019 sardine update assessment (Agenda Item E.3, Supplemental REVISED Attachment 1) to the Scientific and Statistical Committee (SSC). As

with the 2017 full assessment (Agenda Item G.5.a, Stock Assessment Report, April 2017) and the 2018 update assessment (Agenda Item C.5, Attachment 1, April 2018), the Stock Assessment Team (STAT) provided a model-based (ALT) and an acoustic-trawl survey-based (AT) assessment approach in the 2019 update assessment document. The ALT assessment model was the approach used in the 2017 full assessment and the 2018 update assessment to inform management, and therefore the 2019 update of the ALT approach was evaluated for use to inform management for the upcoming fishing year (2019/20). The SSC Coastal Pelagic Species Subcommittee (CPSSC) reviewed a draft of the 2019 update assessment on March 28, 2019 (report appended). The CPSSC and the SSC review focused on two main questions:

1) Does the assessment meet the criteria of a stock assessment update?
2) Can the results of the update assessment form the basis of Council decision making?

The SSC agreed that the 2019 update to the sardine assessment satisfies the Terms of Reference for Update Assessments. The results are consistent with the previous assessment given the new data, and hence represent the best available science for management of the northern subpopulation of Pacific sardine.

The projected stock biomass for the 2019/20 management period is 27,547 mt for July 2019, which is below the minimum stock size threshold (MSST) of 50,000 mt. As in 2018, the update assessment is designated as a category 2d assessment, for 2019 this would be associated with a sigma of 1.0 for calculating the ABC buffer. This assignment was due to the following major uncertainties:

- recent recruitment estimates show a strong retrospective pattern, although this is reflective of new data updating estimates of recruitment based on the stock-recruitment relationship in the presence of declining (and below average) recruitment;
- the most recent recruitment is taken from the stock-recruitment curve rather than being estimated;
- the population age structure is particularly uncertain because a large proportion of the estimated population is composed of recent recruits; and
- the lack of recent fishery age composition data now spanning four years.

The SSC endorses the 2019/20 Pacific sardine OFL of 5,816 mt, which is shown in Table 15 of the assessment document.

The 2020 assessment will be a full assessment, and the SSC provided the STAT with suggestions for its development.

SSC Notes:

The 2020 benchmark assessment should:

- *Examine information on the attribution of catch and biomass between the northern and southern subpopulations. It would be desirable to determine if there are data to more accurately split the recent catches off Ensenada between the northern and southern subpopulations. If the methodology used to conduct this split is substantially different from the current approach, it will be necessary to conduct a Methodology Review*
- *Conduct sensitivity to the catches off Mexico given the uncertainties regarding the split to subpopulation, including that the exploitation rate off Mexico has been relative constant.*
- *Attempt to use all available age and length composition data, including data for the live bait fishery or from CPS fisheries with incidental take of sardine sampled by the CDFW.*
- *Update Stock Synthesis to report the CV of 1+ biomass – at present the CV for 1+ biomass is set to the CV for spawning biomass.*
- *Clarify that spawning biomass is computed on 1 January and 1+ biomass is computed on 1 July in the assessment document.*
- *Modify the biomass indices to account for the biomass estimated inshore of the survey grid. It will be necessary to make corrections to all of the biomass estimates that are likely to be substantially increased by an inshore correction factor.*

There may be new information on the relationship between recruitment success and environmental variables. If requested, the SSC can examine whether the new information is such to redefine the way E_{MSY} *is calculated.*

The MSST is currently constant (50,000 mt) – the SSC could review proposed alternatives that allow MSST to change over time in response to updated assessments and/or changing environmental regimes.

SSC CPS Subcommittee Report to the SSC on the 2019 Assessment of the Northern Subpopulation of Pacific Sardine

General

Drs. Kevin Hill (SWFSC), Paul Crone (SWFSC), and Juan Zwolinski (UCSC) presented the 2019 update assessment of the Northern Subpopulation (NSP) of Pacific Sardine to the SSC CPS subcommittee on March 28th, 2019, via webinar. As with the 2017 full assessment (Agenda Item G.5.a, Stock Assessment Report, April 2017) and the 2018 update assessment (Agenda Item C.5, Attachment 1, Stock Assessment Report, April 2018), the STAT provided a model-based (ALT) and an acoustic-trawl survey-based (AT) assessment approach in the 2019 update assessment document. The ALT assessment model was the approach used in the 2017 full assessment to inform management, and therefore the update of the ALT approach was evaluated for use to inform management for the upcoming fishing year (2019-20). The SSC CPS subcommittee expresses appreciation to the STAT for a complete and well-documented update assessment.

New data included in the 2019 update proposed by the STAT include: 1) updated landings data for 2017, with preliminary landings data for model year 2018 (which includes catch data for the second half of calendar year 2018); and 2) a corrected acoustic trawl method (ATM) biomass index and associated age composition for summer 2017 and a new ATM biomass index and associated age composition from the summer 2018 survey. There was no spring survey (or associated spring abundance estimate) for sardine during 2018. The methodology used to calculate acoustic-trawl survey biomass in 2018 was the same as in the 2017 full assessment. The 2017 summer ATM biomass index originally was calculated without restriction to the depth range where sardine were present. This error was discovered after the completion of the 2018 update assessment and its use for management, and did not occur with any other survey analyses.

There were no fishery age-composition data for 2017 or 2018 in the update assessment because no directed fishery took place in those years, and the composition data from the live bait fishery or from CPS fisheries with incidental take of sardine sampled by the California Department of Fish and Wildlife (CDFW) were not included in the 2017 full assessment and thus including them within an update assessment would not be within the Terms of Reference.

Changes to model structure were within the Terms of Reference for update assessments, and included estimating one additional recruitment deviation and updating the recruitment bias ramp, both as a direct result of the additional year of data. The habitat model was also re-run to partition total 2018 landings to the northern subpopulation.

Total catch has generally been low in recent years, with the exception of relatively large estimated catches (~10,000 mt per year in 2017 and 2018) of NSP sardine off Mexico. This catch is partitioned from catches of SSP sardine using the environment-based approach described by Demer and Zwolinski (2014), from the Ensenada portion of the MexCal fleet during early 2017 and 2018. The corrected 2017 ATM survey biomass index was 24,349 mt (CV = 0.37, SE(ln(index)) = 0.36), while the summer 2018 ATM survey produced a biomass index of 35,501 mt (CV = 0.73, SE(ln(index)) = 0.65). Projected age-1+ stock biomass for the 2019/20 management period is 27,547 mt for July 2019, with an estimated CV of 0.617 (σ=0.57; based on estimated spawning stock biomass).

Recruitment
Retrospective patterns in estimated annual recruitment deviations continue to be apparent in the 2019 update assessment, as observed in previous sardine assessments, with recruitment proving to have been overestimated based on subsequent information. However, there is a larger pattern in the model estimated recruitment deviations, showing eight years of positive recruitment deviations followed by seven years of negative (or zero) deviations. This is more indicative of climate regimes or some other driver in recruitment rather than systematic retrospective patterns within the assessment. During the forecast period (2019-20), recruitment was taken from the stock-recruitment relationship. The SSC supports this approach, noting that the retrospective pattern can be attributed to the model estimate of recruitment for the last year being updated given additional data; the first estimate of a recruitment is based on very little data.

Sensitivity analyses and areas for exploration during the 2020 benchmark assessment
The SSC CPSSC requested two additional model runs to inform on the potential magnitude of sensitivity in assessment outcomes associated with some of the key uncertainties. Other issues that should be examined during the 2020 benchmark assessment are listed in the notes.

1. Catchability
AT survey catchability (q) is estimated to be 1.17 in the 2019 update assessment (up from 1.15 in the 2018 assessment update). Although there are various factors, including acoustic target strength, that are uncertain and could cause q to be greater than 1.0, it is also true that the survey misses some portion of the sardine population, notably inshore of the survey area. In order to explore the sensitivity of the model to q, the CPSSC requested a model run with q fixed at 1.0 (Table 1; Figure 1).

2. Recent Catches of Northern Subpopulation of Pacific Sardine
Catch in the Ensenada (ENS) area of Mexico is apportioned to the NSP and the SSP based on the location of the port of landing and the oceanography at the time, indicating the likely geographic boundary between the two stocks. However, evidence suggests that vessels often fish far south of the northern Mexican ports, and therefore the partitioning by location of port of landing may not be correct. The very high exploitation rates estimated for the ENS fleets in the past two years (23-35%) are ten times the mean rates during 2005-2014 (2.8%; 2015 and 2016 had 0.0% exploitation rates). In addition, in forecasts, the 2019 and 2020 catches are assumed equal to those estimated for 2018. The CPSSC requested a run with estimated catches in ENS from 2017 and 2018 (and in forecasts) multiplied by 0.1, to reflect exploitation rates more consistent with those estimated in the recent past. Results of a run with 2017/2018 catches in the MexCal fleet multiplied by 0.1 (which achieves the aim of the sensitivity examination, since over 98% of estimated NSP landings by the MexCal fleet were from ENS in both 2017 and 2018) are shown in Table 1 and Figure 1.

Conclusion
The SSC CPSSC agreed that the 2019 update to the 2017 sardine assessment satisfies the Terms of Reference for Update Assessments. The results are consistent with the previous assessment and 2018 update given the new data, and hence represent the best scientific information available for management of the northern subpopulation of Pacific sardine. The biomass estimate and management quantities for this model are shown in Table 15 of the assessment document. The SSC CPSSC recommends endorsing the 2019/20 Pacific sardine OFL of 5,816 mt in that table. If the assessment is considered to be a category 1 assessment, a sigma of 0.57 should be used to

calculate the ABC buffer because the model-estimated uncertainty associated with the January 2020 spawning stock biomass estimate (middle of the fishing year; sigma = 0.57) is higher than the category 1 default (sigma = 0.50).

CPSSC Notes:

Italic comments related to the 2020 benchmark assessment:

- *An additional 35,000 mt of sardine was observed by the AT survey in the Southern California Bight and attributed to the Southern Subpopulation (SSP). This highlights the need for the 2020 assessment to review the basis for the habitat model and perhaps refine estimates of both the catch and biomass attributable to the NSP and SSP.*
- *The next assessment should attempt to use all available age and length composition data, including data for the live bait fishery or from CPS fisheries with incidental take of sardine sampled by the CDFW. These data may provide additional information on the age and length composition of the stock to better inform recruitment deviation. Similarly, the 2020 full assessment should consider use of any length composition data for the Mexican fishery.*
- *The California Department of Fish and Wildlife reported aerial survey estimated 13,473 mt of sardine in the only 79 miles of coastline sampled south of Monterey due logistical constraints compared to a revised coastwide AT estimate of 35,501 mt 94% of which was estimated to have been found from Willapa Bay, Washington to Cape Mendocino, California. In 2017, 18,118 mt of sardine were observed by the aerial survey inshore of the AT survey in 300 miles of coastline from Point Arena to Morro Bay, California, compared to a revised coastwide AT estimate of 24,349 mt. A q of one may not fully account for unsampled areas in the nearshore and the upper 10 m of the water column. Accounting for the biomass shoreward of the AT survey through a separate surveys was highlighted by the 2017 AT review. This is would be preferable to adjusting an estimated q to reflect the unsampled waters given uncertainty in the proportion of biomass omitted.*
- *Consider alternative selectivity patterns for the AT survey.*

Italics comments for discussion at the SSC:

- *The SSC should discuss (a) why the model does not pass through the (very imprecise) 2018 abundance estimate and (b) hence why the model indicates a decline in 1+ biomass from 2017 to 2018 rather than an increase.*

Table 1. Results of two sensitivities requested by the CPSSC. **Alt 2019 q=1** fixed AT survey q to 1.0. **Alt 2019 Recent Catch x 0.1** reduced estimated MexCal NSP catches in 2017, 2018 and forecasts by a factor of 0.1.

	MODEL		
ESTIMATES	**ALT 2019**	**ALT 2019 q=1**	**ALT 2019 Recent Catch x 0.1**
Stock-recruitment ($\ln R_0$)	13.8649	13.9622	13.8119
Stock-recruitment steepness (h)	0.304	0.313	0.302
Spawning stock biomass 2017 (mt)	39,848	35,612	**32,819**
Recruitment 2017 (billions of fish)	0.446	0.522	0.429
Spawning stock biomass 2018 (mt)	**28,481**	**27,532**	**31,368**
Recruitment 2018 (billions of fish)	**0.851**	**1.021**	**0.947**
Stock biomass peak (mt)	1,760,640	1,871,090	1,768,000
Stock (1+) biomass 2018 (mt)	**25,642**	**33,945**	**39,657**
Stock biomass (1+) 2019 (mt)	**27,547**	**37,727**	**51,370**

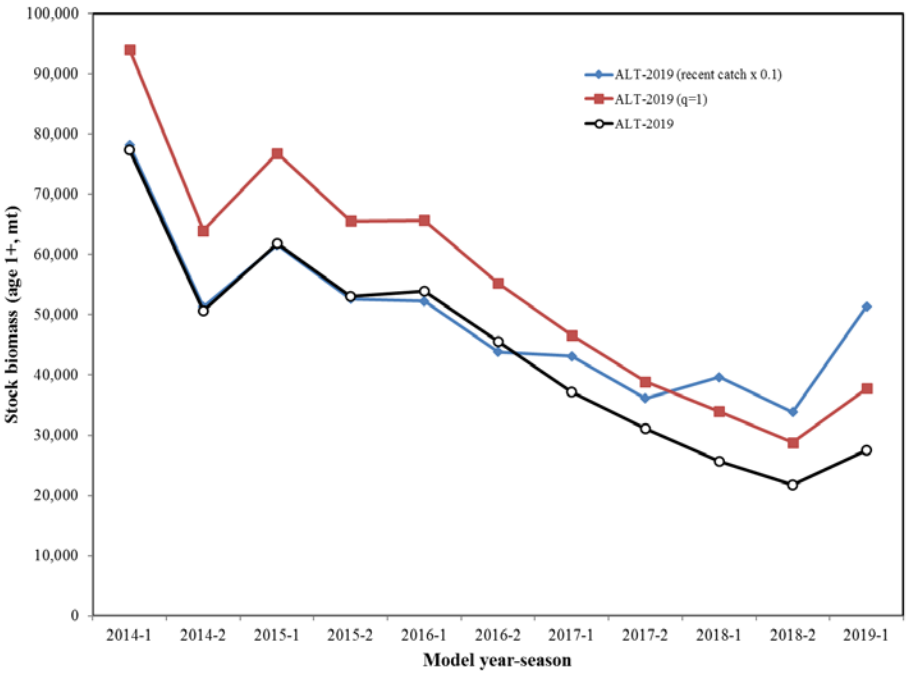

Figure 1. Results of two sensitivities requested by the CPSSC. **Alt 2019 q=1** fixed AT survey q to 1.0. **Alt 2019 Recent Catch x 0.1** reduced estimated MexCal NSP catches in 2017, 2018 and forecasts by a factor of 0.1.

4. Central Subpopulation of Northern Anchovy Management Update

The Scientific and Statistical Committee (SSC) discussed the three tasks associated with this agenda item, which were assigned to the SSC and the National Marine Fisheries Service Southwest Fisheries Science Center (SWFSC) by the Council in April 2018. These tasks are all related to the overall goal of calculating overfishing limits (OFLs) and acceptable biological catches (ABCs) for the central subpopulation of northern anchovy (CSNA). This requires estimates of Biomass and E_{MSY} (the exploitation rate associated with maximum sustainable yield), and a method to estimate the uncertainty of the resultant OFL.

1. Determine a method to estimate the nearshore component of the stock not sampled by the Acoustic Trawl (AT) Methodology.

The biomass in the areas inshore of the acoustic survey grid can be estimated by surveying that area (the SSC preferred approach) or by extrapolating from the AT survey. Dr. Juan Zwolinski (University of California, Santa Cruz) presented information on small vessel and sail drone acoustic surveys that have been conducted inshore of the AT survey grid. Mr. Kirk Lynn (CDFW) was available to answer questions regarding the California Aerial Survey.

Three survey platforms have been used to survey areas inshore of the AT survey for various portions of the coast in recent years. These include an acoustic survey conducted using a small vessel, conducted concurrently with the AT survey in areas off portions of Oregon and Washington in 2017; a sail drone survey conducted concurrently with the AT survey in Central California in 2018; and an aerial survey off of California conducted over varying portions of the coast since 2012. The first two surveys, being concurrent with the AT survey, can be used to augment the information from the AT survey for those years and areas they cover. The SSC has not reviewed a methodology to expand the aerial survey to unsampled areas, and emphasizes the need for any survey to be synchronous with the AT survey. Ideally, the combined AT and inshore surveys would also be synoptic and synchronous, which would eliminate the need for extrapolations.

Extrapolations from the end of the AT survey transects to the 5 m isobath have been made by assuming the same density as observed in the equivalent length of the inshore end of the survey transect. This approach could be evaluated by comparing equivalent lengths at the end of the AT survey with sail drone or vessel data where it exists inshore of the AT survey.

2. Determine the timeline and process necessary to conduct the near-term establishment of an OFL for the CSNA stock using the methods described in the SSC report (Agenda Item C.4.a, Supplemental SSC Report 1, April 2018)

The SSC discussed the document prepared by Dr. André Punt entitled An Approach for Computing E_{MSY}, B_{MSY}, and MSY for the CSNA (Agenda Item E.4, Attachment 1). This document builds on the MSST report (Agenda Item E.1.a, Supplemental NMFS Report, September 2016), performing a Bayesian analysis to fit alternative formulations of the stock-recruit relationship (Ricker or Beverton-Holt, with or without autocorrelation) to the assessment estimates of recruitment and spawning biomass and assumed life history and selectivity parameters reported in the Jacobson et al. (1995) assessment. The SSC recommends use of the posterior median as the point estimate for

E_{MSY}. Accepted practice is to use the posterior median to determine OFLs from Bayesian assessments.

E_{MSY} estimates arising from the above approach would be applied to CSNA biomass estimates to determine OFLs. The SSC endorses the approach used, with alternative assumptions potentially forming the basis for a decision table analysis. While the use of output from an assessment as data input to this analysis is not ideal, no better approach is immediately available.

3. Scope the process for recommending the frequency of revisions to OFLs and ABCs based on the potential impacts of changing reference points less frequently against potentially increased risk associated with not basing reference points on the most recent data.

The SSC discussed the document prepared by Dr. André Punt entitled Whitepaper on Frequency of Assessments and Updates to OFLs, ABCs, and annual catch limits (ACLs) for the CSNA (Agenda Item E.4, Attachment 2). This document provides a simple illustrative example of the tradeoffs involved in different frequencies of updating OFL specifications based on new biomass estimates, assuming that E_{MSY} and MSY are known. The analysis also evaluates the tradeoff between catch stability and larger buffers required to maintain a given risk of overfishing when updates are less frequent. It also describes how a management strategy evaluation (MSE) or MSE-lite (a simplified MSE that does not incorporate as full a range of uncertainty or management objectives as a full MSE) could be used to further assess the value of different frequencies of new assessments (allowing updates to reference points such as E_{MSY} and B_{MSY} in addition to updating biomass) and the required timeline for such analyses. The SSC endorsed the conceptual illustration, proposed approaches, and approximate timelines. This includes six months for an MSE-lite and one year for a full MSE (assuming full time staff were available). The SSC notes that the time required for an MSE increases with the amount of stakeholder involvement desired.

Prior to conducting an MSE, a scoping meeting should take place including the CPSSC, CPSAS, CPSMT and the SWFSC to determine candidate control rules and management objectives.

Review of new analyses for determining the OFL for CSNA, including E_{MSY}, biomass estimation, or results of an MSE, should take place at a CPS subcommittee meeting, with the CPSAS, CPSMT and the SWFSC.

SSC Notes:

1.
The extent of inshore extrapolation necessary varies depending on how close the AT survey approaches the coast, which is to some extent dependent upon who is captaining the survey vessels. Inshore surveys include the 2017 nearshore survey with twice the density of AT transects from Newport OR to southern WA using transducer on Lisa Marie, getting as close to coast as possible. In recent years, the biomass found or extrapolated inshore of the AT survey has represented a variable portion of the overall observed biomass of CSNA. The biomass inshore could, in some years, represent a very large portion of the overall biomass, especially in years of low overall biomass (i.e., density dependent), and may be influenced by environmental factors and the age-

composition of the population.

2018 sail drone estimate of 6,939 mt compared to AT survey of 716,887 mt, so only an additional 1% for area surveyed. 4,110 mt from extrapolations to nearshore for CSNA in areas not surveyed by sail drone for 2018 Kirk Lynn indicated that about 1/3rd of fish observed by aerial survey inshore of 7m so could be missing a substantial portion by not extrapolating within 5m.

The biomass is extrapolated by transect using equivalent length at the end of the actual transect. A pseudo-validation could be done by assuming a different end point (or assume no sail drone) and see what how well the extrapolations match the data that is available. For the aerial survey values, should either explain why you shouldn't use the estimates or describe how to use them. The main issue is synchrony. Timing is all important given movement of anchovy to different locations across the year plus they are different sizes/ages. If this could be coordinated, could be used. Seasonal movements: there is compression and movement north in summer. Not clear what drives extreme compression with anchovy piling up against shore or how often it occurs. Could be partially age or size driven, but also appears variable.

2019 sail drone entire coast sail with bio-sampling by industry in NW. It would be good to be synchronous with aerial.

Process and Schedule as to what is needed to get reasonable science to come up with an OFL – details needed.

Sail drone in Monterey Bay in 2018 – same transect 4 days in a row – very different. The question is, is this just imprecision or is there bias due to some aspect of sail drone operations such as diel movement of the fish? Need to evaluate what the biases might be and what they might imply might be useful in an MSE context, but first need to estimate OFL.

2.
Account for estimation uncertainty through Bayesian analysis, including that the estimate from the survey is uncertain. Also account for stochasticity in recruitment. Still based on Jacobson et al. assessment. Jacobson, L. D., N. C. H. Lo, S. F. Herrick, Jr., and T. Bishop. 1995. Spawning biomass of the northern anchovy in 1995 and status of the coastal pelagic fishery during 1994. NMFS, SWFSC Admin. Rep. LJ-95-11. 52 p.

Logic used in assigning buffers against the OFL starts from a baseline 50% probability of overfishing.

SSC would prefer a new full assessment, but absent that, this is best available platform to do this. Using biological parameters from the MSST report. These should also be updated.

Given h is assumed equal to 1, even with a large sigma, the recruitments would regress towards the mean and flatten a bit. Therefore, recruitment might be more variable for an actual Beverton-Holt SRR than estimated using this method. The impact would be more complex for a Ricker SRR. If M has increased recently than maybe worthwhile to use a new M for forecast and old M for assessment, but is R0, h parameterization the best way to do this? Reasonable at any rate.

Should not compare SSB and 1+ biomass as being the same.

Issue with using model output as data.

Decision table using these models as alternative states of nature could be used for informing management.

3.
Straightforward calculations, salmon-level MSE. Not hugely sophisticated, but probably quite informative. Taking a model and projecting forward under simple alternatives.

Alternative would be to refit assessment with alternative parameters, M, etc. along with stakeholder input, etc., and potentially impact of this on forage. This could have various levels of complexity including predator dynamics.

Number of years between assessments. What is presented here is a very simple analysis assuming white noise in recruitment/productivity rather than periodicity or correlation among years. The latter would exacerbate the negative impacts of less frequent assessments. While currently the results for 1 and 2 years look fine, this is illustrative rather than reliable results.

Do not take probabilities as reasonable results, rather illustrative of what sort of analyses could be done. This work is overly simplistic to be used.

André found that the motion was a complicated and vague request. It would have been helpful to have a subcommittee meeting to set up the approach rather than trying to communicate over email and get guidance that way. Should improve the process next time around.

Italics – for MSE lite or full – one factor would be number of years – more between 2 and 5 years, etc.

To get OFL – need 1. Biomass, 2. E_{MSY}. 3. Sigma – based on uncertainty in both E_{MSY} and Biomass.

In person meeting with science center folks, CPS subcommittee, etc. 2 days. This work then reviewed by SSC.

Longevity of estimate we come up with. MSE time would depend upon complexity.

5. Central Subpopulation of Northern Anchovy Litigation Response

The Scientific and Statistical Committee (SSC) received the Proposed Rule: Multi-Year Harvest Specifications for the Central Subpopulation of Northern Anchovy on April 5th, 2019 and had very limited time to review the proposed rule for setting multi-year harvest specifications for the Central Subpopulation of Northern Anchovy (CSNA).

The SSC notes that the proposed rule draws its E_{MSY} (exploitation rate at maximum sustainable yield) proxy of 0.239 from the September 2016 Southwest Fisheries Science Center report on the

review and re-evaluation of Minimum Stock Size Thresholds (MSST) for coastal pelagic species (CPS). Although there may be more technically robust approaches available, such that described in Agenda Item E.4, Attachment 1 - *E_{MSY} Methodology*, any improvement in the estimation of E_{MSY} is likely to be small compared to the uncertainty inherent in the data informing the stock-recruit analysis, assumptions inherent in the assessment, and in biomass estimates for the CSNA.

The SSC recommends that long-term biomass estimates be included in the calculation of the overfishing limit (OFL) in the proposed rule. Specifically, an acoustic trawl (AT) estimate for the spring of 2017 is available and does not suffer from the lack of spatial coverage that led to exclusion of the summer 2017 estimate. Inshore extrapolations for the 2017 and 2018 AT estimates are available, and the methodology could be extended to the 2016 estimate. Consideration should also be given to including the 2015 AT survey and earlier biomass estimates.

The buffer used in the proposed rule is the standard buffer for monitored stocks. If the OFL was updated regularly, a different value of the buffer may be more appropriate.

SSC Notes:

E_{MSY} should be calculated and applied using the same units as the biomass estimates (e.g., age 1+ versus spawning biomass).

When converting from F to E account must be taken of selectivity and annual versus instantaneous rate. The analyst reported to the SSC that these factors were taken into account when converting F_{MSY} from the 2016 SWFSC MSST report to E_{MSY} for the proposed rule.

The SSC discussed whether an average or weighted biomass estimate would be the most appropriate for setting an OFL for the CSNA. An average biomass estimate is more appropriate if the rule is expected to be in place for several years. If only in place for a short period, recent biomass estimates should be upweighted.

If the rule is to be updated regularly, a different (smaller) buffer may be warranted. If the OFL is to be set for several years and not updated, the current approach (using a buffer of 0.25) appears warranted.

The SSC briefly considered whether the buffer for CSNA should be chosen by analogy to a Category 3 stock.

In November of 2018 the SSC reported that we did not see the need for Active and Monitored Categories for CPS given that other FMPs operate without this structure (Agenda Item E.5.a, Supplemental SSC Report 1).

F. Salmon Management

4. Methodology Review Preliminary Topic Selection

The Scientific and Statistical Committee (SSC) met with the Salmon Technical Team (STT) represented by Dr. Michael O'Farrell (SWFSC) to discuss possible methodology review topics for 2019.

The SSC reiterates its annual request for documentation of the Fisheries Regulation Assessment Model (FRAM). The most recent FRAM documentation published on the Council website is dated October 2008. The Model Evaluation Workgroup (MEW) plans to update the FRAM documentation to reflect changes that have been incorporated into the model.

Items for possible review are listed below with the responsible party listed in parentheses:

1. FRAM documentation including FRAM algorithms and a user's manual. (MEW)
2. Evaluation of FRAM performance. This may include description of methods currently used to assess FRAM performance and proposals for how to compare pre-season forecasts to outcomes. (MEW)
3. Technical analysis to inform a change of the salmon management boundary line from 40°05' N. latitude (Horse Mt.) five miles north to 40°10' N. latitude. (STT)
4. Willapa Bay coho forecast. The SSC is tasked with endorsing acceptable biological catch (ABC) and overfishing limit (OFL) values for Willapa Bay coho. The SSC has reviewed F_{MSY} and S_{MSY} reference points for these stocks, but the SSC has not reviewed the forecast methods that are also part of determining the ABC/OFL. (STT)

It may also be necessary to review the Upper Columbia River Summer Chinook exploitation rate. However, the MEW and Council staff should determine whether this issue requires a change in methodology or is a data error that can be corrected without review (MEW and Council staff).

SSC Notes:

Forecast methods: At the March meeting, the ecosystem indicators report presented to the SSC contained escapement forecasts for several Columbia River stocks that used environmental covariates. These forecasts are not the same as presented by the STT and used for management. These forecasts are for a different point in time and define stocks differently. The SSC has proposed to review these forecasts at the September SSCES meeting. The STT may participate.

Natural mortality in FRAM including Southern Resident Killer Whales: FRAM uses fixed mortality rates by age class. These are old assumptions and may be low. FRAM is not sensitive to M because FRAM estimates exploitation rates. Using FRAM to estimate area-specific pre-harvest abundance is not advisable. The existing documentation cautions against using FRAM for this purpose and a different tool is needed. There is new research on estimating M from CWT returns. Looking at this research would be better than trying to use FRAM.

5. Salmon Rebuilding Plan Update

Dr. Michael O'Farrell (National Marine Fisheries Service [NMFS] Southwest Fisheries Science Center [SWFSC]), along with other members of the Salmon Technical Team (STT), and Dr. Jim Seger (PFMC) joined the Scientific and Statistical Committee (SSC) to answer questions about the two Chinook salmon rebuilding plans (Agenda Item F.5, Attachments 1 and 2).

The SSC discussion focused on the projection of future abundance (Section 4.6 and Appendix B in both documents) and on the economic analysis (Section 5 in both documents). Substantive changes in the projection of future abundance since the last SSC review include adding escapement

data through 2018 and the inclusion of autocorrelation in the draws of abundance. Together, these changes resulted in a slightly more optimistic outlook for Klamath River Fall Chinook and a slightly more pessimistic outlook for Sacramento River Fall Chinook in terms of rebuilding time. The SSC appreciates the responsiveness of the STT to suggested model changes and supports the current analyses for both Chinook salmon rebuilding plans.

The SSC concurred with the advice of Dr. Seger that, with such potentially short time frames of rebuilding, the Council may be more interested in looking at the dispersion of economic impacts rather than the average over the rebuilding time. The SSC found the analysis appropriate for these rebuilding plans and had suggestions for some minor changes to the text, which were delivered directly to the STT.

The SSC endorses the future abundance projections and the economic analyses for the Klamath River Fall Chinook and Sacramento River Fall Chinook rebuilding plans, and plans to review the three coho rebuilding plans at the June meeting.

SSC Notes:

We recommend using the same format as Table 4.6a to present the results of all the analyses that are presented graphically—it is informative and helpful.

The constraining stock discussion in the economic section could be pared down substantially and still get the same message across.

Although all the rebuilding plans are separate and analysis is done separately, obviously there could be interactive effects—decisions made for one stock impacting others.

There is not really a biological basis for the proposed Harvest Control Rule in Alternative 2. There are potential means to adjust the HCR or forecasts to correct for bias, if desired.

The length of rebuilding time will interact with economic impacts—smaller populations would lead to smaller impacts over a long period of time vs. potentially large but short-term effects.

Note to STT: remember to fix Appendix D graphs in JDF coho rebuilding plan that show negative smolts.

G. Groundfish Management

5. Science Improvements and Methodology Review Report

Four items were discussed by the Scientific and Statistical Committee (SSC): 1) Rockfish Steepness Prior Update, 2) Accepted Practices Guidelines for Groundfish Stock Assessments, 3) Further Sigma Considerations, and 4) Recent Groundfish Workshops.

1. Rockfish Steepness Prior Update

At the March Council meeting, Dr. Chantel Wetzel (NWFSC) presented an update of the meta-analysis used to derive a prior distribution for steepness (recruitment productivity) of West Coast rockfish stocks. This was an update to previous analyses by Dr. Martin Dorn, Dr. Jim Thorson, and Dr. Wetzel and followed Dr. Wetzel's presentation to the Groundfish Subcommittee in November 2018. The SSC identified several concerns with the statistical behavior of sequential updates to the analysis and with some of the assumptions underlying the meta-analytical approach. There was a discussion about various technical aspects of the meta-analysis. Of particular note was the implausible result that showed a very high estimated posterior predictive mean steepness for rockfish (> 0.9). This estimated value is notably larger than estimates from previous meta-analyses (estimated steepness of 0.72 in 2017; 0.58 in 2007) and appears to conflict with the fundamental biology of long-lived, live-bearing rockfish species. The changes in estimated steepness are concerning to the SSC as they are not consistent with the expected statistical behavior of estimators with increasing amounts of information.

A further concern was that there is non-independence among rockfish stocks in recruitment. Rockfish appear to share good and bad years of recruitment and, as such, the assumption of independence of rockfish included in the analysis is likely inappropriate. The effect of such non-independence for inference about steepness is unclear.

As a result of these concerns, the SSC does not endorse the updated analysis as best available science. Therefore in the near term (i.e., for the 2019 assessment cycle) the SSC recommends using the same prior distribution and default values as were endorsed for use in the 2017 assessment cycle (steepness = 0.72(0.16); mean(se)). The SSC also identified potential improvements that should be investigated further to inform the 2021 assessment cycle.

2. Accepted Practices Guidelines for Groundfish Stock Assessments

The 2019 Accepted Practices Guidelines were discussed by the Groundfish Subcommittee via webinar in December 2018 and subsequently in March 2019. The full SSC provided modifications to the Accepted Practices Guidelines revised in March during the pre-assessment workshop. These guidelines will be posted on the Council website.

3. Further Sigma Considerations

The SSC discussed issues of category 2 sigmas exceeding the static category 3 sigmas. Long-term projections are not advised, and the SSC-preferred approach in such cases would be to set the overfishing limit using an equilibrium maximum sustained yield or a data-poor approach. However, buffers in Table 1 apply if long-term projections are undertaken. The SSC highlighted for groundfish assessments conducted in 2019, the baseline sigma would theoretically apply in 2020 if the groundfish management cycle was annual rather than biennial. However, for the first year of application (2021) the sigma will be 7.5% larger and the resulting buffer will increase accordingly (e.g., to 6.5% rather than 6.1%) (Tables 1 and 2). Therefore, under the biennial groundfish management cycle, these sigmas will apply in year 2 (2021) onwards.

4. Recent Groundfish Workshops

The SSC was briefed on the pre-assessment and skates catch reconstruction workshops by Dr. Dave Sampson, who served as the chair of these workshops held in March 2019. Workshop reports will be available and posted on the Council website soon.

SSC Notes:

Steepness Notes:

The last few years of data have resulted in a dramatic increase in estimated steepness for multiple species of rockfish on the West Coast, radically changing their estimated productivity over the past decade. Of particular note is the high precision of estimated steepness at the bound of 1 for several species which are disproportionately influential in determining the results of the meta-analysis. An increased estimated steepness has dramatic consequences for perception of stock productivity and status determinations, understanding the origins of the changing steepness estimates are of paramount importance.

The SSC had discussions about the shape and precision of the likelihood profiles that feed into the meta-analysis. In particular, the large number of profiles that identified the upper bound (1) as the most likely value were concerning. Several of these likelihood profiles imply high precision of the steepness. The SSC discussed possible causes for this behavior - e.g., do these attributes suggest substantial mis-specification in the broader stock-assessment model(s)? - and the downstream consequences of using such results.

Examination of the estimated likelihood profiles for individual rockfish species from successive assessments revealed that the estimated steepness for individual species could vary dramatically among assessments. For example, estimate for yelloweye rockfish shifted from an MLE of about 0.4 to an estimate of 1.0 between the assessments in 2009 and 2017. Such dramatic changes occurred in a several species. This suggests a relatively small number of years of additional recruitment information radically altered the estimated steepness. Given the similarity of model structure among assessments, and the longevity of most rockfish, such behavior is statistically unsavory.

Given the SSC's concerns about the meta-analysis, Dr. Owen Hamel provided a number of options for choosing a steepness prior for use in groundfish assessments. Options considered include reverting to the value used during the previous assessment cycle (steepness = 0.72), using a value consistent with established proxies the PFMC uses for F_{MSY} and B_{MSY}/B_0 (steepness = 0.6), or the new meta-analysis (steepness = 0.93). No options below the prior distribution mean of 0.6 were considered. This cycle the assessors will not be doing type C analyses.

Proposals that were discussed without being fully fleshed out:

- *Scale likelihood profiles such that the optima identified by later analyses are generally within ~2LL units of the optima identified by early analyses; i.e., if the location of the negLL minimum moves around a lot as data accumulate for a single stock, the likelihood profile should be shallow enough that all of the later values for the optima would have appeared plausible based on the earlier likelihood profiles.*
- *Using the Mangel et al. (2010) method for determining steepness based on life-history characteristics.*
- *Include results from multiple assessments for a single species in a single model structure?*
- *Mixture distribution for posterior?*

Sigma Notes:

Due to long term projections in Cat 1 or 2 Assessments, an evaluation whether equilibrium MSY or the current OFL is warranted. Catch only updates would not be adequate for assessments that are greater than 10 years old; a new assessment should occur at that point.

In general in assessments older than 8-10 years, equilibrium MSY maybe preferred. Note, the catch only data poor methods give you a sustainable yield and not the largest sustainable yield. This would be context specific, and be revisited for the TOR next year.

Table1: Scientific Uncertainty Buffers (years in parentheses indicate appropriate application for groundfish assessments conducted in 2019).

	Category 1 (baseline σ = 0.5)						Category 2 (baseline σ = 1.0)				
Year since assessment P*	0.45	0.40	0.35	0.30	0.25	Year P*	0.45	0.40	0.35	0.30	0.25
1 (2020)	6.1%	11.9%	17.5%	23.1%	28.6%	1	11.8%	22.4%	32.0%	40.8%	49.1%
2 (2021)	6.5%	12.7%	18.7%	24.6%	30.4%	2	12.6%	23.8%	33.9%	43.1%	51.6%
3 (2022)	7.0%	13.6%	19.9%	26.0%	32.1%	3	13.5%	25.3%	35.8%	45.3%	54.0%
4 (2023)	7.4%	14.4%	21.0%	27.5%	33.8%	4	14.3%	26.7%	37.6%	47.4%	56.2%
5 (2024)	7.8%	15.2%	22.2%	28.9%	35.5%	5	15.1%	28.1%	39.4%	49.4%	58.4%
6 (2025)	8.3%	16.0%	23.3%	30.3%	37.1%	6	15.9%	29.4%	41.1%	51.4%	60.4%
7 (2026)	8.7%	16.8%	24.4%	31.6%	38.7%	7	16.7%	30.7%	42.8%	53.3%	62.4%
8 (2027)	9.1%	17.6%	25.5%	33.0%	40.2%	8	17.4%	32.0%	44.4%	55.1%	64.2%
9 (2028)	9.6%	18.3%	26.5%	34.3%	41.7%	9	18.2%	33.3%	46.0%	56.8%	66.0%
10 (2029)	10.0%	19.1%	27.6%	35.5%	43.2%	10	19.0%	34.6%	47.6%	58.5%	67.7%
11 (2030)	10.4%	19.9%	28.6%	36.8%	44.6%	11	19.7%	35.8%	49.0%	60.1%	69.3%
12 (2031)	10.8%	20.6%	29.6%	38.0%	46.0%	12	20.5%	37.0%	50.5%	61.6%	70.8%
13 (2032)	11.3%	21.4%	30.7%	39.2%	47.3%	13	21.2%	38.2%	51.9%	63.1%	72.2%
14 (2033)	11.7%	22.1%	31.6%	40.4%	48.6%	14	22.0%	39.4%	53.3%	64.5%	73.6%
15 (2034)	12.1%	22.9%	32.6%	41.6%	49.9%	15	22.7%	40.5%	54.6%	65.9%	74.9%

	Category 3 (constant σ = 2.0)				
P*	0.45	0.40	0.35	0.30	0.25
	22.2%	39.8%	53.7%	65.0%	74.0%

Table 2: Multiplicative factors for implementing buffers (years in parentheses indicate appropriate application for groundfish assessments conducted in 2019).

		Category 1 (baseline σ = 0.5)							Category 2 (baseline σ = 1.0)				
Year since assessment	P*	0.45	0.40	0.35	0.30	0.25	Year	P*	0.45	0.40	0.35	0.30	0.25
1 (2020)		0.939	0.881	0.825	0.769	0.714	1		0.882	0.776	0.680	0.592	0.509
2 (2021)		0.935	0.873	0.813	0.754	0.696	2		0.874	0.762	0.661	0.569	0.484
3 (2022)		0.930	0.864	0.801	0.740	0.679	3		0.865	0.747	0.642	0.547	0.460
4 (2023)		0.926	0.856	0.790	0.725	0.662	4		0.857	0.733	0.624	0.526	0.438
5 (2024)		0.922	0.848	0.778	0.711	0.645	5		0.849	0.719	0.606	0.506	0.416
6 (2025)		0.917	0.840	0.767	0.697	0.629	6		0.841	0.706	0.589	0.486	0.396
7 (2026)		0.913	0.832	0.756	0.684	0.613	7		0.833	0.693	0.572	0.467	0.376
8 (2027)		0.909	0.824	0.745	0.670	0.598	8		0.826	0.680	0.556	0.449	0.358
9 (2028)		0.904	0.817	0.735	0.657	0.583	9		0.818	0.667	0.540	0.432	0.340
10 (2029)		0.900	0.809	0.724	0.645	0.568	10		0.810	0.654	0.524	0.415	0.323
11 (2030)		0.896	0.801	0.714	0.632	0.554	11		0.803	0.642	0.510	0.399	0.307
12 (2031)		0.892	0.794	0.704	0.620	0.540	12		0.795	0.630	0.495	0.384	0.292
13 (2032)		0.887	0.786	0.693	0.608	0.527	13		0.788	0.618	0.481	0.369	0.278
14 (2033)		0.883	0.779	0.684	0.596	0.514	14		0.780	0.606	0.467	0.355	0.264
15 (2034)		0.879	0.771	0.674	0.584	0.501	15		0.773	0.595	0.454	0.341	0.251
		Category 3 (constant σ = 2.0)											
P*		0.45	0.40	0.35	0.30	0.25							
		0.778	0.602	0.463	0.350	0.260							

D. Council Administrative Matters

7. 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 March, the SSC recommended that the reviews for update stock assessments for widow rockfish and petrale sole be postponed to the August Groundfish Subcommittee meeting to allow for additional age composition data for these assessments. Thus, a June Groundfish Subcommittee meeting is not necessary. To facilitate that review, the SSC recommends that the August groundfish subcommittee meeting be a two-day meeting in either Portland, OR or Seattle on August 20-21.

As reported in the SSC report on future meeting planning in March, the SSC recommends that the SSC Ecosystem (SSCES) and Highly Migratory Species (SSCHMS) subcommittees review drivers of albacore distribution and availability to fisheries, and that the SSCES review spatial indicators of bottom contact by trawl gear and fixed gear. The SSCES also proposes reviewing the salmon forecasts and the stoplight indicators that were presented in the California Current Integrated Ecosystem Assessment (CCIEA) Supplementary Materials, pending availability of IEA team members. If either of the salmon items are reviewed, the meeting would benefit from joint review with the SSC Salmon Subcommittee.

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

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 that the Remotely Operated Vehicle (ROV) survey methodology review be rescheduled for early 2020. The SSC will notify the Council of likely dates by September.

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	Pacific Mackerel STAR Panel	Apr. 23 – 25	Council/ La Jolla, CA	Hamel (Chair), Shelton, Budrick	CIE	CPSMT CPSAS	Griffin
2	Cabezon STAR Panel	May 6-10	Council/ Newport, OR	Sharma (Chair)	Cook (CIE) Cadigan (CIE) White (OSU)	Mirick (GMT) Richter (GAP)	DeVore Phillips
3	Longnose and Big Skates STAR Panel	June 3-7	Council/ Seattle, WA	Sampson (Chair)	Cook (CIE), Sparholt (CIE) Szulwalski (AFSC)	Doerpinghaus (GMT) Richter (GAP)	DeVore
4	Sablefish STAR Panel	July 8-12	Council/ Seattle, WA	Field (Chair)	Cook (CIE) Chen (CIE) Ianelli (AFSC)	Mirick (GMT) Richter (GAP)	DeVore Phillips
5	Gopher/Black-and-Yellow RF and Cowcod STAR Panel	July 22-26	Council/ Santa Cruz, CA	Hamel (Chair), Satterthwaite	Cook (CIE) Kupschus (CIE) Botsford (U.C. Davis)	Mandrup (GMT) Richter (GAP)	DeVore(?) Phillips
6	Review of STAR Panel Reviews to Develop the Mop-Up Review, if needed; Review of full and update GF assessments	Aug. 20-21	Council/ Portland, OR or Seattle, WA	GF Subcommittee	NA	GMT GAP	DeVore
7	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

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	Groundfish Mop-Up Review Panel, if needed	Sep. 30 – Oct. 4	Council/ Seattle, WA	GF Subcommittee members	Cook (CIE)	GMT GAP	DeVore
9	Salmon Methodology Review	Oct. TBD	Council/ TBD	Salmon Subcommittee members	NA	STT MEW	Ehlke
10	Review of Nearshore ROV Survey Designs and Methodologies	Winter 2020 TBD	Council/ Santa Cruz, CA	Hamel (Chair?), Shelton, Tsou, Sharma, Berger, Field	CIE	None	DeVore
11	Groundfish STAR Process Review	Fall 2019/Winter 2020 TBD	Council/ TBD	STAR Chairs and Reviewers	Cook (CIE)	GMT/GAP	DeVore Phillips
12	Data-Limited Methodology Workshop	2020 - TBD	Council/ TBD	GF & CPS Subcommittee members	TBD	TBD	DeVore

SSC Subcommittee Assignments, March 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	Michael Harte	Dan Holland	Michael Harte
Michael Harte	John Field	Alan Byrne	Dan Holland	André Punt	Galen Johnson
Galen Johnson	Owen Hamel	John Field	André Punt	David Sampson	André Punt
Will Satterthwaite	André Punt	Owen Hamel	David Sampson		Will Satterthwaite
Rishi Sharma	Rishi Sharma	Will Satterthwaite	Rishi Sharma		Ole Shelton
Ole Shelton	Tien-Shui Tsou	Tien-Shui Tsou			Cameron Speir
Cameron Speir					Tien-Shui Tsou

Bold denotes Subcommittee Chairperson

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	~~Cabezon STAR Panel~~	~~May 6-10~~	~~Council/ Newport, OR~~	~~Sharma (Chair)~~	~~CIE (Cook, Cadigan) White~~	~~Mirick (GMT) Richter (GAP)~~	~~DeVore~~
2	Longnose and Big Skates STAR Panel	June 3-7	Council/ Seattle, WA	Sampson (Chair)	CIE (Cook, Sparholt) Szulwalski	Doerpinghaus (GMT) Richter (GAP)	DeVore
3	Sablefish STAR Panel	July 8-12	Council/ Seattle, WA	Field (Chair)	CIE (Cook, Chen) Ianelli	Mirick (GMT) Richter (GAP)	DeVore
4	Gopher/Black-and-Yellow RF and Cowcod STAR Panel	July 22-26	Council/ Santa Cruz, CA	Hamel (Chair),	CIE (Cook, Kupschus) Botsford	Mandrup (GMT) Richter (GAP)	Phillips
5	Review of STAR Panel Reviews to Develop the Mop-Up Review, if needed; Review of update GF assessments	Aug. 20-21	Council/ Portland, OR or Seattle, WA	GF Subcommittee	NA	GMT GAP	DeVore
6	Ecosystem Indicators Review, Including Review of Analyses of Drivers of Albacore Distribution and Availability to Fisheries in the California Current	Sept. 11	Council/ Boise, ID	HMS, Salmon, & Ecosystem Subcommittees	TBD	None	Dahl 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**
7	Groundfish Mop-Up Review Panel, if needed	Sept. 30 – Oct. 4	Council/ Seattle, WA	GF Subcommittee members	CIE	GMT GAP	DeVore
8	Salmon Methodology Review	Oct. TBD	Council/ TBD	Salmon Subcommittee members	NA	STT MEW	Ehlke
9	Review of Nearshore ROV Survey Designs and Methodologies	Feb. 3-7, 2020	Council/ Santa Cruz, CA	Hamel (Chair), Shelton, Tsou, Sharma, Berger (?), Field	CIE	None	DeVore
10	Data-Limited Methodology Workshop	2020 - TBD	Council/ TBD	GF & CPS Subcommittee members	TBD	TBD	DeVore