

MINUTES
Scientific and Statistical Committee

Pacific Fishery Management Council

Hotel Murano

Pavilion F Room

1320 Broadway Plaza

Tacoma, Washington 98402

Telephone: 253-238-8000

June 22-23, 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. 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. André Punt, University of Washington, Seattle, WA

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. John Field, National Marine Fisheries Service Southwest Fisheries Science Center, Santa Cruz, CA

Dr. Peter Lawson, National Marine Fisheries Service Northwest Fisheries Science Center, Newport, OR

SSC Recusals for the June 2016 Meeting		
SSC Member	Issue	Reason
Dr. Martin Dorn	F.5 Membership Appointments and Council Operating Procedures	Martin was the subject of the SSC's report on transitioning the AFSC seat on the SSC
Dr. Dan Holland	G.5 Preliminary Plan for West Coast Trawl Catch Share Program Review	Dan contributed to the quota share market analysis

A. Call to Order

Chairman Will Satterthwaite called the meeting to order at 8 a.m. Mr. Chuck Tracy provided the agenda overview. Chuck briefed the SSC on the recent CCC meeting. One of the topics was best available science. Recently, NMFS has overruled an SSC (two different times). There will be a white paper available this fall on this subject which the SSC will review.

The PFMC SSC will be hosting the next National SSC meeting next year with the main topic expected to be MSE. PFMC has budgeted for 12 non-Federal participants including SSC members to attend the productivity workshop.

Chuck talked about the plan to remove the AFSC seat from the SSC. There will be an opportunity to amend COP4 to consider changes to SSC seat designations.

There was a brief discussion on the proposal to remove the AFSC seat. Martin is recommending a 2-3 year transition. The SSC will have follow-up discussions on this and may prepare a statement under agenda item F.5 with a transition proposal.

G. Groundfish Management

5. Preliminary Plan for West Coast Trawl Catch Share Program Review

The SSC received a presentation from Council and NMFS staff regarding preparations for the trawl rationalization and intersector allocation five-year review process. Jim Seger (Council staff) presented an overview of the five-year review process and schedule and Abigail Hartley (NMFS West Coast Region) presented a proposed outline for the review document.

Marie Guldin (NWFSC) presented a proposed method for disaggregating joint costs incurred by first receivers and shorebased processors in the groundfish fishery. This step is necessary to allocate costs to specific fisheries to calculate economic indicators that will be used in the catch share review, such as processors' net revenue. The SSC supports the use of the proposed method and offered technical comments to improve the analysis as it moves forward. Also, the SSC recommends that the analysis be updated with 2015 data as soon as they become available and prior to completion of the review.

Dr. Lisa Pfeiffer (NWFSC) presented proposed economic performance metrics to be used in the catch share review. The SSC offered additional technical comments on the methods and data used.

The SSC notes that an important component of the review will be to provide context for observed changes in indicator values before and after catch share implementation.

The SSC will provide a review of the initial progress of the five-year review analysis at a two-day meeting of the SSC's Economics and Groundfish subcommittees prior to the November 2016 Council meeting. At that meeting the SSC will work with the project team to identify appropriate metrics and provide additional review of methods and data to be used in the analysis. The SSC recommends that the next iteration of the review documents contain a more focused discussion of explicit links between economic performance indices and specific objectives of the catch share program. The SSC also recommends that the review project team coordinate closely with the chairs of the SSC Economics and Groundfish subcommittees prior to the November 2016 meeting in order to identify the most important topics for discussion and to provide for a focused review.

Mr. Seger proposed that the SSC provide a final review of the five-year review document at the November 2017 Council meeting. The SSC has the expertise to provide a thorough review of the catch share program five-year review. If there is a desire to include additional outside perspectives, a review process could be modeled on the Council's Stock Assessment Review (STAR) panels and could consist of representatives from the SSC's Economics and Groundfish subcommittees as well as independent experts. This panel could conduct a multi-day review of the final five-year review document.

SSC Notes:

Outline (Abigail Hartley)

Abigail Hartley presented a proposed outline for the review document. The primary purpose of the review is to evaluate progress towards the stated goals of the west coast trawl catch share program, as defined by Amendment 20 to the groundfish fishery management plan, the Magnuson-Stevens Act and NMFS LAPP guidance. The proposed outline for the review draws on the NMFS draft guidance for conducting reviews of catch share programs. The proposed outline also attempts to match specific goals with indicators that can be used in the analysis.

- Utilization goals may conflict with consolidation goals. This may require some explanation or analysis.*
- There is some confusion regarding how specific chapters and indicators are mapped to specific stated goals. Expect this will improve as the draft and analysis evolves.*
- Does the review cover both Amendment 20 and 21? It sounds like the documents will be split, but how the joint scoping process will proceed is unclear.*
- Consider breaking out social/community impacts as a separate section, not just section under Socio-econ impacts. Indicators need to be further developed and mapped to stated objectives.*
- Some concern expressed over how the effects of the catch share program will be evaluated. Authors note it is difficult to assign causality, but the context for observed indicator values before and after catch shares must be thoroughly explored and explained to users.*

Cost Disaggregation (Marie Guldin)

- Include 2015 data (or even 2016) if it is available by the time the review is due.*

- *Present results of the regression used to select the disaggregation method by cost category. That is, report the RSS values in the documentation so the magnitude of the differences in model fit can be evaluated.*
- *In cases where the disaggregation method is chosen a priori, what is the criteria for these “informed” choices? It would be useful to compare RSS differences in cases where the informed and empirical method choice agree to RSS differences in cases where it doesn’t. This could be the basis for a sensitivity analysis that is “mixed vs. mixed” rather than the current “mixed vs. uniform”.*
- *The value added method of cost disaggregation is not based on physical units so the allocated costs will change with relative prices. Therefore, the amount allocated to each fishery will change even if costs don’t change. This is a disadvantage of the method. One alternative to mitigate this may be to use some kind of fixed historical average prices to calculate value added, rather than current year prices.*
- *Graphs - make note of average per firm values, include n on graph.*
- *Talk to companies to see how they allocate these costs themselves.*
- *Do some processors take fish from AK? Could some costs be misattributed to WC fisheries?*

Economic Performance Metrics (Lisa Pfeiffer)

- *Fleet is broken into two categories (whiting only, non-whiting only), why not split out the third mixed category?*
- *The analysis currently provides disaggregated results for the catcher vessels that land whiting (grouping together vessels that land whiting only and a mix of whiting and non-whiting species) and catcher vessels that land exclusively non-whiting species. The SSC recommends that the review include additional analysis separating out the portion of this fleet that lands both whiting and non-whiting species.*
- *These mixed fishery vessels may not be homogeneous – might be interesting to see data on share of whiting/non-whiting revenue per vessel. The distribution of revenue proportions may be informative – more vessels may get a larger/smaller share of revenue after catch share implementation.*
- *Relatedly, it may be useful to exclude catcher vessels associated with motherships or analyze separately.*
- *Graphs show +/- 1 SD. Suggest ½ SD (Sampson), use percentiles not SD (Punt).*
- *Some data is pretty dubious to use for measuring before/after change. For example, TCNR on p. 33 fluctuates.*
- *Qualifiers and context are critical components of the review – can’t attribute these things to catch shares in all cases.*
- *An overview of the FishEye data portal for economic data was also presented.*

8. Final Stock Assessment Plan and Terms of Reference (TOR) For Groundfish and Coastal Pelagic Species

Dr. Jim Hastie and Ms. Kristan Blackhart briefed the SSC at the March, April, and June meetings on progress toward implementation of a stock assessment prioritization process for Pacific Coast Groundfish (Agenda Item G.8 Attachment 1). The June discussion focused on the addition of

survey trends within the prioritization process, the quantity/quality of data available for priority species, and the recommendation of species for and timing of 2017 STAR Panels.

Final Stock Assessment Prioritization for West Coast Groundfish

The SSC agreed that blue/deacon rockfish (for OR and CA waters), lingcod, yelloweye rockfish, yellowtail rockfish, California scorpionfish, and Pacific ocean perch are good candidates for full assessments in the 2017 cycle. In discussion with Dr. Hastie, six full assessments were deemed to be feasible given current resources. These assessments could best be organized into three STAR panels as follows:

- blue/deacon rockfish and CA scorpionfish;
- lingcod and yelloweye rockfish; and
- yellowtail rockfish and Pacific ocean perch.

The three STAR panels were suggested to occur the weeks of June 26, July 10 and July 24 to balance considerations of data availability, internal review deadlines, STAR panel distribution deadlines, and the briefing book deadline for the September 2017 Council meeting.

Dr. Hastie indicated that a maximum of three update assessments would be possible with the selection of six full assessments. The SSC agreed that bocaccio and darkblotched rockfish should be update assessments in the 2017 cycle. In addition, the SSC suggested that either arrowtooth flounder or blackgill rockfish could also be an update assessment in 2017. Revisions to catch and an extension of the survey time-series are available for both species and both fit the criteria for update assessments. Although the most recent SSC recommendation for arrowtooth flounder was to conduct a full assessment, this new catch and survey data address two major uncertainties highlighted in the 2007 STAR panel report. There are data issues that remain (e.g., challenges with ageing and ageing methods) for a blackgill rockfish update.

A catch report should be produced for cowcod.

Revisions to the Terms of Reference

The SSC continued discussions on necessary revisions to the groundfish and coastal pelagic species terms of reference (TOR) for stock assessments and methodology reviews (Agenda Item G.8, Attachments 3 and 5) and rebuilding analyses (groundfish only; Agenda Item G.8, Attachment 4). The SSC endorses the changes in these attachments, bringing the following changes to the Council's attention:

- general housekeeping language in the stock assessment TOR, including the removal of the appendix for best practice stock assessment guidelines (these guidelines will now be a standalone document, applicable to groundfish, completed by the groundfish sub-committee for review at the November 2016 meeting);
- an explicit framework for proposing new methodologies for SSC review; and
- additional criteria relevant to methodology review proponents.

The SSC made three additional modifications to the stock assessment TOR not reflected in Attachment 3 (inserted text quoted below). They are:

- criteria for selecting STAR panel chairs;

“Groundfish and CPS STAR panels include a chair appointed by the SSC and three other experienced stock assessment analysts knowledgeable of the specific modeling approaches being reviewed.” [Section 4.2]

- discussion of the benefits of and potential need for data workshops, particularly when new stocks are assessed or new data sources are used;

“STATs should coordinate early in the process with state representatives and other data stewards to ensure timely availability of data. For some assessments it may be beneficial for the STAT to hold a data workshop with state representatives and other data stewards and interested parties to discuss which data will be used and which will be excluded, and how the assessment model will use the data. Data workshops might be needed for assessments of stocks that had not previously been assessed or stocks for which the STAT planned to use a data source not used in a previous assessment. The relevant SSC Subcommittee will recommend whether a data workshop will be needed for a stock assessment.” [Section 4.3]

- clarification of the responsibilities for GMT representatives and Council staff during the development of projections for groundfish assessments.

“For reviews of groundfish assessments Council staff is responsible for providing the STAT with the information needed to conduct projections, including the default harvest control rules and the multipliers needed to buffer for scientific uncertainty for the default projections.” [Section 4.5]

“For reviews of groundfish assessments the GMT representative is responsible for providing the STAT with catch streams needed to conduct projections.” [Section 4.6]

SSC Notes:

Stock Assessment Prioritization

The SSC discussed that future survey trend analyses that go into the prioritization worksheet could use the same GLMM structure as that used in assessments (noting that there will be a significant increase in analytical time required). Assessment and survey trends would ideally include measures of uncertainty and subsequent regression analyses could include this uncertainty as a time-step weighting factor.

The last cabezon STAR panel report indicated that there should not be another full assessment until there are improvements in the understanding of stock structure, mortality and growth parameters.

The SSC queried Dr. Melissa Monk about the possibility of creating a recreational on-board observer based-index for CA scorpionfish and she mentioned that given available data it would likely be possible.

The SSC noted that the last few recommendations for arrowtooth flounder rockfish were to conduct a full assessment but, given current resources and new catch and survey data, it could be done as

(and fits the criteria for) an update assessment, as revised catch and an extension of survey time-series data could address two major uncertainties highlighted in the STAR Panel report..

It is noted that the previous yelloweye rockfish assessment was a single model with three areas rather than three area-specific models.

9. Changes to Trawl Catch Share Program Gear Regulation Management Lines – Final Action

The Scientific and Statistical Committee (SSC) was briefed by Mr. Jim Seger on the information provided under Agenda Item G.9. A third alternative (G3) for fishing in multiple IFQ management areas on the same trip was added to the prior range of alternatives. The new alternative would allow fishing in multiple IFQ management areas on the same trip without sorting retained fish. Under alternative G3 three options are proposed to account for catch from different management areas. Option 1 would assign the catch to the more restrictive or conservative harvest limits. Option 2 would prorate catch based on some measure of the percentage of effort or total catch on each side of the management line. Option 3 would assign catch based on the port of landing.

The SSC discussed the NMFS report on this alternative. The SSC does not anticipate that any of the proposed alternatives that allow fishing in multiple areas would create substantial problems for stock assessments in the foreseeable future. In particular, none of the three options proposed under alternative G3 is expected to create a substantial problem for data used in stock assessments or have substantial adverse biological impacts on the stocks themselves. However, the number of trips in multiple areas should be monitored. If in the future there is an unexpected increase in the number of trips fishing in multiple areas, it may be necessary to reassess whether this could undermine catch data quality.

Options 2 and 3 for assigning catch from multiple areas can in some cases create incentives for fishermen to fish in one area and land catch in another where availability of quota pounds for that species may be less constraining or the quota pounds less valuable. An example would be catching sablefish north of 36° N latitude and landing it south of 36° N latitude. Although the SSC is not concerned that this would undermine data quality for assessments or have adverse biological impacts, it does have the potential to undermine the integrity of the IFQ management system which is based on individual accountability for catch of specific species in specific areas. Shifting of catch across management areas can be monitored (if logbooks and VMS are available) and the incentive to shift catch would be substantially lower under option 2 with catch assigned pro-rata based on effort in each area.

SSC Notes:

The SSC noted that there was an earlier version of the NMFS report uploaded to the briefing book which was withdrawn and replaced with a modified document. The new report was not labeled as revised or supplemental, and this created confusion. If a report or attachment is included in the briefing materials and then withdrawn or revised the new document should be labeled as a revised supplement and an email notification should be issued.

The SSC heard public comments from members of the Groundfish Advisory Subpanel that suggested a more restrictive measure that would allow multiple area trips only across the 40°10'

N latitude management line and only with trawl gear. However, this option has not been formally proposed and the SSC comments only address concerns with the currently proposed alternative that would allow fishing across all the IFQ management areas and gears on the same trip without sorting and reporting of catch by management area.

The SSC notes that prior to implementation of the IFQ program, catch from multiple areas was assigned based on port of landing. Assigning IFQ catch from multiple areas based on port of landing, a proposed option under alternative G3, is therefore not expected to reduce data quality for assessments relative to prior practice.

A question was raised regarding the availability of logbooks by IFQ fishermen using fixed gears, which could be used determine if catch in one area was landed in another area. While it is understood there is a Federal requirement to submit logbooks regardless of the gear used in the IFQ fishery, the SSC also understands not all logbooks by IFQ fishermen who opt to switch gears are being submitted to the states and PacFIN. If fixed gear vessels fishing in the IFQ do not submit logbooks some alternative might be needed to determine if catch from one area was being landed in another.

4. Final Action to Adopt Management Measures for 2017-2018 Fisheries

The SSC reviewed the proposed changes to Chapter 4 of the Groundfish FMP (highlighted in Agenda Item G.4, Attachment 6). Mr. John DeVore was present to answer questions regarding the proposed changes. No major issues were identified with those changes. A number of minor changes were suggested by the SSC, including the following:

- The default approach to project future recruitments in rebuilding analyses is to draw them off of the stock-recruitment curve (as opposed to using recent average recruitments, as currently stated in the FMP).
- Although options for 25% and 50% buffers remain in the FMP, since implementation of Amendment 23, only the P* approach has been used.

The SSC provided Council Staff with other clarifying edits to Chapter 4.

SSC Notes:

A version incorporating these edits will be provided to the SSC via email.

F. Council Administrative Matters

5. Membership Appointments and Council Operating Procedures

The Scientific and Statistical Committee (SSC) discussed the proposal to vacate the Alaska Fisheries Science Center (AFSC) seat on the SSC ([Agenda Item F.5.a, Supplemental NMFS Report](#)). The SSC identified considerable value in the AFSC seat in fostering a diversity of backgrounds and perspectives on the SSC, avoiding conflicts of interest, and sharing information and experiences across regions. This proposed change would also have significant impacts on the SSC's capacity relative to its workload, especially in the short term.

In discussing this item, SSC members emphasized the value of diverse backgrounds and perspectives in providing thorough reviews. The SSC also noted that the west coast and Alaska Center scientists, as well as Pacific and North Pacific Councils, address similar issues with respect to groundfish, ecosystem based management, and catch share programs. As a result, there is considerable value to the exchange of ideas facilitated by SSC participation across regions.

SSC members from outside the Northwest Fisheries Science Center and Southwest Fisheries Science Center are also of particular value as reviewers and STAR panel chairs because supervisors must be recused from reviewing work produced by scientists they supervise. This has been an issue recently with groundfish stock assessments and could become an issue with California Current Integrated Ecosystem Assessment products as well. The current AFSC representative, Dr. Martin Dorn, also brings a great deal of institutional knowledge thanks to his long history of involvement with the Council process and current chairmanship of the SSC's Ecosystem Subcommittee.

In the past year, the SSC lost three members with experience chairing Stock Assessment Review panels. As a result, there would be great value in maintaining the AFSC seat at least until the end of the current groundfish assessment cycle (i.e., through November 2017) to allow for the possibility of one or more assessments being sent to the mop-up panel. The SSC therefore encourages the Council to contact the AFSC expressing the benefits (potentially mutual) of interactions across regions and working together to facilitate a gradual transition if the AFSC seat must be phased out.

The SSC wishes to express its appreciation to Dr. Dorn for his outstanding service and to AFSC for their long support of providing scientific advice to the Council process.

Coastal Pelagic Species Management

Report of the Coastal Pelagic Species Assessment Workshop

Dr André Punt presented the report of the CPS assessment workshop held at the SWFSC on May 2-5, 2016 (Informational Report 1, June 2016). The main objective of the workshop was to evaluate assessment approaches for coastal pelagic species (CPS) in other parts of the world for potential application to the central subpopulation of northern anchovy (CSNA) and other CPS stocks. Assessments and management procedures from the U.S. Atlantic, Europe, South Africa, South America, and Australia were considered. Many of the assessment methods used in other parts of the world are similar to those used for West Coast CPS. The workshop made a number of longer term recommendations that will be helpful for improving the assessment of CPS. The SSC endorses these long-term recommendations.

Improvements to CPS assessments are likely to depend primarily on improving assessment surveys for CPS, which include the acoustic trawl survey as well as ichthyoplankton surveys that form the basis for the Daily Egg Production Method (DEPM). Recommended improvements to the DEPM surveys include improved collection of biological data from adults, increased inshore sampling, and use of geostatistical methods to estimate abundance. Recommended improvements to the acoustic trawl survey include quantification of the proportion of the stock that is not surveyed,

including the proportion of the stock nearshore of survey transects, the proportion of the stock too close to the surface to be effectively surveyed using acoustic technology, and the proportion of the stock outside the geographic boundaries of the survey.

The immediate issue dealt with by the workshop was the best way to move forward with an evaluation of abundance trends of CSNA. CSNA is a monitored stock in the CPS FMP. The management approach for monitored stocks is not to conduct periodic assessments, but rather to obtain an initial estimate of MSY, considered as a constant quantity that represents the average catch that can be taken from the stock, and to set the ABC far below the MSY level, which takes into account the unchanging nature of the estimate and its associated uncertainty. The CPSMT evaluates information on monitored stocks such as annual catches and survey trends if available to determine if there are concerns regarding stock status. Periodic stock assessments, or periodic adjustments to target harvest levels are not done for monitored stocks.

The report describes two options for evaluating abundance trends for CSNA. The SSC agrees with the workshop report that the best long-term option for assessment of CSNA would be to develop an integrated stock assessment model, which would use abundance indices based on historical DEPM estimates, ichthyoplankton indices, recent acoustic trawl surveys, and other information. However, the SSC cautions that the development of an integrated assessment may not be as straightforward as implied by the workshop report. CPS have highly variable population dynamics and biological characteristics that present difficulties for assessment. Assessment models may need to be developed specifically for northern anchovy rather than relying on standard assessment software such as Stock Synthesis. This assessment would need to be reviewed by a STAR Panel, and there may also need to be a methodology review if data from the acoustic trawl survey are used in the assessment. Overall the SSC viewed this option as a worthwhile long-term objective for CSNA, but something that may not be available for several years.

The second option for evaluating trends is the so-called “DEPM-light” approach, which would use the long-term CALCOFI time series of egg and larvae to develop a relative abundance trend. The SSC supports the workshop recommendations to refine this abundance index, such as comparing unadjusted estimates with estimates corrected for various biases in the estimation of egg and larval density, followed by back calculation to age zero, and the use of geostatistical approaches to construct the index. A further step in the analysis would be to confirm that the historical DEPM estimates were calculated using approved methods, and then to calibrate the egg and larvae density estimates to provide an absolute biomass time series. These estimates would have additional uncertainty due to variance in the calibration factor, and thus would be subject to additional caveats compared to relative abundance estimates. In addition the absolute biomass time series would have a negative bias because the ichthyoplankton survey does not cover the full range of CSNA.

The advantages to the “DEPM-light” approach are that it is a simple and intuitive approach that should be possible to complete by November 2016. The SSC anticipates that both relative and absolute results from the “DEPM-light” approach would be used by CPSMT as additional information to evaluate the monitored status of CSNA. If the decision is to move forward with a “DEPM-light” analysis, the SSC recommends that the methodology and results be reviewed at a meeting of the CPS SSC subcommittee at a one-day meeting prior to the November Council meeting.

SSC Subcommittee Assignments, June 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
Pete Lawson	John Field	John Field	André Punt		Galen Johnson
Will Satterthwaite	Owen Hamel	Owen Hamel	David Sampson		Pete Lawson
Cameron Speir	André Punt	Will Satterthwaite			Kevin Piner
	Tien-Shui Tsou	Tien-Shui Tsou			André Punt
					Will Satterthwaite
					Tien-Shui Tsou

Bold denotes Subcommittee Chairperson

DRAFT Tentative Council and SSC Meeting Dates for 2016

Council Meeting Dates	Location	Likely SSC Mtg Dates	Major Topics
<p>March 8-14, 2016 Advisory Bodies may begin Tue, March 8 Council Session begins Wed, March 9</p>	<p>DoubleTree by Hilton Hotel Sacramento 2001 Point West Way Sacramento, CA 95815 Phone: 916-929-8855</p>	<p>Two-day SSC Session Tue, March 8 – Wed, March 9 One-day CPS Subcm Session Thu, March 10</p>	<p>Chinook FRAM base period co-manager update Identify salmon management objectives Salmon review/Pre I CA current & IEA report FEP indicators and climate shift initiatives update Groundfish gear changes</p>
<p>April 8-14, 2016 Advisory Bodies may begin Fri, Apr 8 Council Session begins Sat, Apr 9</p>	<p>Hilton Vancouver Washington 301 W. Sixth Street Vancouver, WA 98660 USA Phone: 360-993-4500</p>	<p>One-day SSC Session Sat, April 9</p>	<p>Pacific sardine assessment and management measures Groundfish initial stock assessment plan and Terms of Reference Salmon methodology topic selection</p>
<p>June 22-28, 2016 Advisory Bodies may begin Wed, June 22 Council Session begins Thu, June 23</p>	<p>Hotel Murano 1320 Broadway Plaza Tacoma, WA 98402 Phone: 253-627-3167</p>	<p>Two-day SSC Session Wed, June 22 – Thu, June 23</p>	<p>HMS biennial management measures, SDC, and ref. pts. Groundfish final stock assessment plan and Terms of Reference Sablefish ecosystem indicators 5-year IFQ program review</p>
<p>September 14-20, 2016 Advisory Bodies may begin Wed, Sept 14 Council Session begins Thu, Sept 15</p>	<p>The Riverside Hotel 2900 Chinden Blvd Boise, ID 83714 Phone: 208-343-1871</p>	<p>Two-day Ecosystem Subcm Session Mon, Sept 12 – Tue, Sept. 13 Two-day SSC Session Wed, Sept 14 – Thu Sept 15</p>	<p>Anchovy assessment workshop report CPS MSST report Anchovy active management alts. Salmon methodology topic priorities SRWC control rule recommendations Groundfish EFH-RCA amendment PPA FEP indicators initiative FPA</p>

<p>November 15-21, 2016 Advisory Bodies may begin Tue, Nov 15 Council Session begins Wed, Nov 16</p>	<p><u>Hyatt Regency Orange County</u> 11999 Harbor Blvd. Garden Grove, CA 92840 Phone: 714-750-1234</p>	<p>One day Groundfish and Economics Subcmts Session Mon, Nov 14 Two-day SSC Session Tue, Nov 15 – Wed, Nov 16</p>	<p>CPS methodology topic selection Anchovy stock assessment CPS SAFE Groundfish stock assessment methodology topic priorities 5-year IFQ program review Sablefish ecosystem indicators 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 2016

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	CPS Assessment Workshop	May 2-5	SWFSC/ La Jolla, CA	2-3 CPS Subcommittee members	Outside experts	CPSMT CPSAS	Griffin
2	Anchovy Assessment Review	Oct. 11	Council/ La Jolla, CA	CPS Subcommittee	None	CPSMT CPSAS	Griffin
3	Salmon Methodology Review	Oct. 18-20?	Council/ Portland, OR	Salmon Subcommittee	None	STT SAS MEW	Burner
4	Groundfish Historical Catch Reconstruction Workshop	Nov. 1-3	Council/ Portland, OR	TBD	TBD	GMT GAP	DeVore
5	Evaluation of Stock Productivity Methodological Approaches/B _{MSY} Workshop	Dec. 6-8	Council & NWFSC/ Seattle, WA	TBD	TBD	None	DeVore
6	PICES/ICES Meeting on Small Pelagics	Nov. 1-13	PICES/ICES/ San Diego	TBD	TBD	TBD	TBD
7	Recreational CPUE Standardization Workshop	TBD	PFMC/ TBD	GF Subcommittee	TBD	GMT GAP	DeVore
8	Methods for Data Reweighting Workshop	TBD	NWFSC/ Council	GF & CPS Subcommittees	TBD	GMT GAP	DeVore

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Workshop/Meeting	Potential Dates	Sponsor/ Tentative Location	SSC Reps.	Additional Reviewers	AB Reps.	Council Staff
<div style="display: flex; align-items: center;"> <div style="width: 20px; height: 20px; background: repeating-linear-gradient(45deg, transparent, transparent 2px, black 2px, black 4px); margin-right: 5px;"></div> <div>Transboundary Groundfish Stocks</div> </div>	?	Council	2 TBD?	?	GMT GAP	DeVore

DRAFT SUMMARY MINUTES
Scientific and Statistical Committee

Pacific Fishery Management Council

Online Webinar

Telephone: 503-820-2280

August 2, 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
Dr. Martin Dorn, National Marine Fisheries Service Alaska Fisheries Science Center, Seattle, WA
Dr. Owen Hamel, National Marine Fisheries Service Northwest Fisheries Science Center, Seattle, WA
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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

Members Absent

Mr. Alan Byrne, Idaho Department of Fish and Game, Boise, ID
Dr. John Field, National Marine Fisheries Service Southwest Fisheries Science Center, Santa Cruz, CA
Dr. Galen Johnson, Northwest Indian Fisheries Commission, Olympia, WA
Dr. Peter Lawson, National Marine Fisheries Service Northwest Fisheries Science Center, Newport, OR
Dr. Tien-Shui Tsou, Washington Department of Fish and Wildlife, Olympia, WA

Others in Attendance

Mr. John DeVore, Pacific Fishery Management Council, Portland, OR
Dr. Carmel Finley, Oregon State University, Corvallis, OR
Ms. Gretchen Hanshew, National Marine Fisheries Service West Coast Region, Seattle, WA
Ms. Morgan Ivens-Duran, California Department of Fish and Wildlife, Sacramento, CA

Ms. Sandra Krause, Pacific Fishery Management Council, Portland, OR
Ms. Lynn Mattes, Oregon Department of Fish and Wildlife, Newport, OR
Ms. Maggie Sommer, Oregon Department of Fish and Wildlife, Newport, OR

A. Call to Order

Dr. Will Satterthwaite called the webinar to order at 2 p.m. He walked the participants through the agenda. Dr. Owen Hamel was recused from the decision to endorse the updated POP rebuilding analysis because he performed the analysis.

B. Review the New Catch-Only Update of the 2011 Pacific Ocean Perch Rebuilding Analysis

Dr. David Sampson asked if accepting the catch stream that affects the new proposed Pacific ocean perch (POP) OFLs would require an FMP amendment and Mr. DeVore said no. The charge is for the SSC to endorse the methods used to develop these OFLs and to endorse the OFLs themselves. The process is set up such that the new SSC-endorsed OFLs will be in the proposed rule for 2017 and 2018 harvest specifications as well as the new SAFE document.

Dr. Hamel provided an overview of the updated POP rebuilding analysis (see the appendix A to these minutes).

Dr. Martin Dorn asked why the 2016 ACL does not change across all these scenarios and Dr. Hamel explained this is the ACL in regulation and that is the assumed magnitude of removals this year.

Dr. Dorn asked for the basis of the 2017 and 2018 ACL of 281 mt. Mr. DeVore said the basis for the 281 mt ACL was that it is a level of harvest calculated to relieve the at-sea sectors of their POP bycatch problems under the formal sector allocations. The SSC discussed issues related to setting the ACL in 2017 and 2018 in excess of the catch stream associated with the adopted rebuilding SPR. Even if the entire ACL is caught in 2017 and 2018, which is unlikely given past fishery performance, the projected rebuilding times do not change by more than a year, indicating that there is little adverse impact on stock rebuilding. Nevertheless, if catches consistently exceed those associated with the rebuilding SPR, the stock will be unlikely to rebuild by the target year.

The group refocused their discussion on the task at hand, i.e., consideration of endorsing the new OFLs based on Dr. Hamel's updated rebuilding analysis projections. The group agreed the projections were done correctly and the new OFLs (i.e., 964 mt and 984 mt in 2017 and 2018, respectively) were endorsed.

However, there was concern that this was an ad hoc approach to deal with an immediate problem in how the ACL is allocated to sectors, and that a more stable, frameworked process should be considered in the future, i.e., when SSC discussion of the upcoming spex process starts in June 2017. Mr. DeVore agreed and said it would be meaningful to discuss process improvements. He also noted that longer term solutions such as making POP a set-aside species for the at-sea sectors are being contemplated in a separate Council decision-making process. The group understood, but emphasized the approach used here is a suboptimal, short-term solution and such short-term solutions should not be regularly contemplated for overfished species.

Dr. André Punt recalled there was some analysis informing rebuilding revision rules where there were simulations showing outcomes when overfished species' impacts are less than specified ACLs. He suggested expanding that analysis might help determine "best" practices for catch-only updates. Mr. DeVore said the issue is broader than revising rebuilding plans and that best practices for catch-only updates of assessments as well as rebuilding analyses should be evaluated. The worst case scenario is that all older assessments and rebuilding analyses could be updated every two years and the capacity does not exist to do that. It was recommended these best practices be developed before the start of the next spex cycle at the end of next year. The Groundfish Subcommittee could be tasked with initiating a suitable analysis to explore options.

Dr. Dan Holland said this issue points to a need for some type of adaptive management we currently don't have. Perhaps a mechanism where sectors are permitted to carry over some portion of their unused allocation to the following year could be explored. This may require a management strategy evaluation (MSE). Dr. Punt observed that is essentially what the Council's action this year did, since past years' unused yield is being utilized (for POP) in the next two years. Dr. Holland said the concept he was proposing would be some simulations done in advance to inform a new mechanism where some unused yield is allowed to be carried over to subsequent years automatically. The group agreed it would be useful to explore this idea using an MSE. Mr. DeVore thought there would be interest by the Council to revisit rebuilding revision rules after Ms. Chantel Wetzel finishes her MSE and defends her PhD thesis.

C. Discuss Plans for Two Upcoming Workshops

1. Progress to Date in Planning the Productivity/ B_{MSY} Workshop

Dr. Martin Dorn explained the progress to date in planning the upcoming Productivity/ B_{MSY} Workshop. The proposed dates are December 6-8, 2016, and he has tentatively reserved the Traynor Room at the Alaska Fisheries Science Center in Seattle, WA for the workshop. Dr. Dorn distributed a list of proposed talks and presenters for the workshop (Appendix B). In addition to several NMFS scientists involved in Pacific Coast assessments, Dr. Marc Mangel (UC Santa Cruz) and Dr. Mark Maunder (IATTC) both agreed to attend the workshop and present papers on the subject. Other potential productivity experts that live near Seattle that could be invited are Dr. William Clark, Dr. Alec MacCall, and IPHC scientists (i.e., Drs. Ian Stewart and Allan Hicks).

Dr. Sampson asked whether participants could attend the workshop via webinar. The group discouraged this for speakers or those who wished to ask questions, but did say that it might be reasonable to set up a one-way, listen-only webinar connection.

Dr. Punt said he is still keen on publishing papers presented at the workshop in a special issue of the journal *Fisheries Research*. Dr. Dorn wasn't sure there would be an adequate number of papers for a publication and Dr. Punt thought a special publication could be done with 12 papers. Dr. Dorn said he would keep that in mind and advise whether an adequate number of papers will likely be presented. Dr. Dorn also said he will contact scientists from other NOAA science centers around the country to gauge their interest. Dr. Rick Methot and Dr. Jon Brodziak were also proposed as workshop participants. Mr. DeVore asked for a list of invited participants by September. He will then send out a formal invitation to Federal and non-Federal participants. The

Council has the budget to pay travel expenses for up to 12 non-Federal participants.

Dr. Sampson noted some new methodologies for modelling productivity may be proposed at the workshop. He noted that these methodologies will have to be evaluated and endorsed by the SSC before they can be used in stock assessments. Mr. DeVore reminded the group that methodology review topics for assessment and impact analyses will be decided at the September and November Council meetings. Dr. Sampson asked whether new methodologies that are not proposed in September, can still be considered for addition later, and Mr. DeVore said the timing for deciding new methodologies for review is governed by a Council Operating Procedure and, with good rationale, that timing can be altered. Dr. Sampson asked if interested parties are aware of the September and November process to identify methodology review topics and Mr. DeVore said he notified the Science Centers, stock assessment scientists, and the Groundfish Management Team of that process via a recent email. Dr. Hamel said we should set up the process to allow methodologies emerging from the productivity workshop to be eligible for methodology reviews next year. This led to the suggestion of a "placeholder" item during the preliminary topic selection in September. Analysts presenting new assessment methods at the productivity workshop should be clear whether these methods are sufficiently developed for review in time for 2017 assessments, or whether the proposed methodology is still a work in progress.

2. Progress to Date in Planning the Historical Catch Reconstruction Workshop

Dr. Sampson explained the progress to date in planning the upcoming Historical Catch Reconstruction Workshop. He has communicated with all three states that would be involved. He has also talked with Dr. Jason Cope, who is helping WDFW conduct their historical catch reconstructions, and he indicated they would be ready in time for the workshop. Mr. Patrick Mirick, who will be a key analyst of Oregon catch data, is preparing a recreational data reconstruction and documentation of assumptions or data borrowing rules for reconstructing older historical catch data. One idea is to conduct a reconstruction of historical catches for a recently-assessed stock during the workshop and compare the historical time series of catches in the assessment with the newly reconstructed catches. Mr. DeVore asked if the key workshop product will be "best" practices guide for conducting catch reconstruction and Dr. Sampson said he thought at best the workshop "product" will be a work in progress. Another major objective of the workshop is to characterize the uncertainty in historical catch estimates.

The Historical Catch Reconstruction workshop is tentatively scheduled for November 1-3, 2016, in Portland, OR. Key participants for the workshop are the state data stewards, the Groundfish Subcommittee of the SSC, Dr. Jason Cope, and scientists from the Southwest Fisheries Science Center such as Mr. Don Pearson who has helped develop CalCOMM and the CA historical catch reconstruction. Mr. DeVore said one topic for resolution at this workshop is to reconcile any differences in the CA commercial catch data between PacFIN and CalCOMM, and the group agreed.

Mr. DeVore said he would start working on his end to reserve a venue in Portland for the workshop. He asked if the workshop would be scheduled for three full days and Dr. Sampson said he thought we should start after lunch on day one to allow travel that morning. Mr. DeVore asked how many participants should be anticipated and the thought was it would be about the same size as last year's

nearshore assessment and data workshop. Dr. Sampson and Mr. DeVore said they would start coordinating with the states to line out all the key participants that should be invited.

Appendix A: West Coast Pacific ocean perch projections from the rebuilding analysis with estimated catch in 2011-2014 or 2015, and ACL in 2016.

Owen Hamel, NWFSC, July 11, 2016

This document contains results from rebuilding analyses based upon the 2011 West Coast POP stock assessment with alternative historical and projected catch streams under alternative rebuilding SPRs. Each of the three rebuilding tables include results from early rebuilding runs under the currently adopted rebuilding SPR (0.864), including the 2011 rebuilding analysis.

The alternative catch streams are shown in Table 1, including those assumed in the runs presented at the November, 2015 Council meeting (Agenda Item I.4, Attachment 7:

http://www.pcouncil.org/wp-content/uploads/2015/10/14_Att7_POPrebuild2015_Nov2015BB.pdf), also included here in Table 2. Updated catch estimates for 2014 and 2015 were obtained in June, 2016, from the NOAA report Estimated Discard and Catch of Groundfish Species in the 2014 US West Coast Fisheries for 2014 catches, and for 2015 catches, from the IFQ website (<https://www.webapps.nwfsc.noaa.gov/ifq/>) with auxiliary information for hake fisheries from Council staff and with tribal and pink shrimp fishery and research catch assumed equal to twice that in 2014, given no current information (since these sectors represent only a small portion of the overall catch, this choice makes no essentially no difference in the results of the analysis). 2016 catch is assumed equal to the ACL. The results from a smaller set of key runs with the updated catch stream are shown in Table 3.

Due to allocations issues that cannot be addressed in time for the next management cycle, the Council set ACLs of 281 mt in 2017 and 2018, with a plan to return to SPR-based ACL determination in 2019. Runs reflecting this choice are shown in Table 4. The OFLs for 2017 and 2018 are 964 and 984 mt under this scenario. With management based upon SPR = 0.864 in years following 2018, POP is predicted to rebuild with 50% probability in 2051, the same year as under the 2011 rebuilding plan.

Table 1. Catch values used in the updated rebuilding analyses for 2011 – 2016 or 2017, the latter when 2017 and 2018 ACLs are set to 281 mt.

Year	ACL	Estimated or Assumed Catch Fall 2015	Estimated or Assumed Catch June 2016	Estimated or Assumed Catch 281 mt ACLs
2011	180	62	62	62
2012	183	56	56	56
2013	150	58	58	58
2014	153	71	56	56
2015	158	158	80	80
2016	164	164	164	164
2017	*	*	*	281
2018	*	*	*	281

Table 2. Updated rebuilding runs with the Fall 2015 catch stream for 2011-2016. When RUN is a year, it represents the lowest SPR that will result in a 50% probability of rebuilding by that year. 2011 rebuilding analysis ACL and OFL projections with SPR=0.864 are included for comparison. These results are from runs completed by October 7, 2015.

Case	1		2		3		<i>4 from 2011 RA</i>		4		5		6		7		8		9		10		11		12	
RUN	F=0		2045		SPR for ACTs		SPR for ACLs		SPR for ACTs		SPR from ACLs		2055		2060		2065		2071		40-10		OFL			
SPR	1		0.942		0.880		0.864		0.864		0.858		0.839		0.818		0.782		0.752		0.730		≥0.500		0.500	
T50%	2043		2045		2050		2051		2051		2051		2053		2055		2060		2065		2071		*		*	
P2045	57.0%		50.0%		41.2%		38.7%		39.4%		38.9%		36.9%		34.7%		31.5%		29.6%		28.4%		25.1%		25.1%	
P2071	85.4%		80.9%		75.4%		73.2%		73.6%		72.9%		70.6%		67.1%		61.8%		55.5%		50.0%		25.4%		25.2%	
	ACL	OFL	ACL	OFL	ACL	OFL	ACL	OFL	ACL	OFL	ACL	OFL	ACL	OFL	ACL	OFL	ACL	OFL	ACL	OFL	ACL	OFL	ACL	OFL	ACL=OFL	
2017	0	961	68	961	149	961	169	948	171	961	180	961	208	961	239	961	297	961	348	961	389	961	717	961	961	
2018	0	991	70	989	153	986	173	972	176	985	184	985	212	984	245	983	303	981	354	979	396	978	720	966	958	
2019	0	1017	71	1013	156	1007	177	993	179	1006	188	1005	217	1003	249	1001	308	997	360	993	401	990	719	968	951	
2020	0	1041	73	1034	159	1025	180	1010	182	1023	191	1022	220	1019	253	1016	312	1010	364	1004	405	1000	715	967	943	
2021	0	1064	74	1055	162	1044	183	1028	185	1040	194	1039	224	1035	257	1031	316	1023	368	1016	409	1010	717	967	936	
2022	0	1089	76	1077	165	1063	187	1047	189	1059	198	1057	227	1053	261	1047	320	1037	373	1029	414	1022	721	969	930	
2023	0	1115	78	1101	168	1084			192	1079	202	1077	231	1072	265	1065	325	1053	378	1043	419	1035	729	972	927	
2024	0	1137	79	1121	171	1101			195	1096	205	1094	235	1087	269	1080	329	1066	382	1054	423	1045	733	973	922	
2025	0	1165	81	1146	174	1123			199	1117	209	1115	239	1107	273	1099	334	1083	387	1070	429	1059	739	978	922	
2026	0	1194	83	1172	178	1147			203	1140	213	1137	244	1129	278	1119	340	1101	393	1086	435	1074	744	983	922	

Table 3. A smaller set of updated rebuilding runs with the June 2016 catch stream for 2011-2016. ACL and OFL projections from the 2011 and Fall 2015 POP rebuilding analyses with SPR=0.864 are included for comparison.

Case	1		3		4 from 2011 RA		4 from 2015 RA		4		5		6		11		12
RUN	F=0		SPR for ACTs		SPR for ACLs		SPR for ACLs		SPR for ACLs		SPR from ACTs		SPR from ACLs		40-10		OFL
SPR	1		0.880		0.864		0.864		0.864		0.858		0.839		≥0.500		0.500
T50%	2043		2050		2051		2051		2051		2051		2053		*		*
P2045	57.2%		41.6%		38.7%		39.4%		39.6%		39.0%		37.0%		25.1%		25.1%
P2071	85.4%		75.5%		73.2%		73.6%		73.8%		73.1%		70.7%		25.4%		25.2%
	ACL	OFL	ACL	OFL	ACL	OFL	ACL	OFL	ACL	OFL	ACL	OFL	ACL	OFL	ACL	OFL	ACL=OFL
2017	0	964	149	964	169	948	171	961	172	964	180	964	208	964	721	964	964
2018	0	994	153	989	173	972	176	985	176	988	185	988	213	987	724	969	961
2019	0	1020	157	1010	177	993	179	1006	180	1009	189	1008	217	1006	722	971	954
2020	0	1044	159	1028	180	1010	182	1023	183	1026	192	1025	221	1022	719	970	945
2021	0	1067	162	1046	183	1028	185	1040	186	1043	195	1042	224	1038	720	970	938
2022	0	1092	165	1066	187	1047	189	1059	189	1062	198	1060	228	1055	724	971	932
2023	0	1118	168	1086			192	1079	193	1082	202	1080	232	1074	732	974	929
2024	0	1140	171	1104			195	1096	196	1098	205	1096	235	1090	736	975	925
2025	0	1167	174	1126			199	1117	200	1120	209	1117	240	1110	741	980	924
2026	0	1196	178	1149			203	1140	204	1143	213	1140	244	1131	746	985	924

Table 4. The smaller set of updated rebuilding runs with the June 2016 catch stream for 2011-2016 and assuming a catch of 281 mt in 2017 and 2018 (the ACL for every run is 281 for 2017 and 2018), with the rebuilding SPR determining the ACL in 2019 and beyond. ACL and OFL projections from the 2011, Fall 2015, and June 2016 rebuilding analyses with SPR=0.864 are included for comparison.

Case	1		3		4 from 2011 RA		4 from 2015 RA		4 from 2016 RA		4		5		6		11		12			
RUN	F=0		SPR for ACTs		SPR for ACLs		SPR for ACLs		SPR for ACLs		SPR for ACLs		SPR from ACTs		SPR from ACLs		40-10		OFL			
SPR	1		0.880		0.864		0.864		0.864		0.864		0.858		0.839		≥0.500		0.500			
T50%	2044		2050		2051		2051		2051		2051		2052		2053		*		*			
P2045	55.8%		40.9%		38.7%		39.4%		39.6%		39.3%		38.7%		36.8%		25.1%		25.1%			
P2071	84.6%		75.0%		73.2%		73.6%		73.8%		73.2%		72.7%		70.4%		25.4%		25.3%			
	ACL	OFL	ACL	OFL	ACL	OFL	ACL	OFL	ACL	OFL	ACL	OFL	ACL	OFL	ACL	OFL	ACL	OFL	ACL	OFL	ACL=OFL	
2017	281	964	281	964	169	948	171	961	172	964	281	964	281	964	281	964	281	964	281	964	281	964
2018	281	984	281	984	173	972	176	985	176	988	281	984	281	984	281	984	281	984	281	984	281	984
2019	0	1001	155	1001	177	993	179	1006	180	1009	178	1001	187	1001	216	1001	763	1001	1001			
2020	0	1025	158	1019	180	1010	182	1023	183	1026	182	1018	191	1018	220	1017	757	998	990			
2021	0	1049	161	1038	183	1028	185	1040	186	1043	185	1036	194	1036	223	1034	756	996	980			
2022	0	1074	164	1057	187	1047	189	1059	189	1062	188	1055	197	1054	227	1051	758	995	972			
2023	0	1100	167	1078			192	1079	193	1082	192	1075	201	1074	231	1070	763	997	966			
2024	0	1123	170	1096			195	1096	196	1098	195	1092	204	1090	234	1086	765	996	959			
2025	0	1150	173	1118			199	1117	200	1120	198	1113	208	1112	239	1106	769	1001	958			
2026	0	1180	177	1142			203	1140	204	1143	203	1137	212	1134	243	1127	774	1004	956			

**Appendix B: Proposed productivity workshop talks: A PFMC-sponsored workshop
Seattle, Dec. 6-8, 2016.**

Marc Mangel. Density dependence, the theory of harvesting, and the practice of stock assessment: a perspective on steepness and its implications.

Mark Maunder. TBD.

Steve Munch. Meta-analysis comparing parametric and non-parametric stock recruit models.

Andre Punt. Continuing work comparing 3-parameter stock-recruit relationships with 2-parameter curves

Martin Dorn. Allowing for more flexible S-R relationships in a proposed system of reference points and proxies for use in West Coast groundfish fisheries management (tentative)

E.J. Dick. Bias in estimation of biological reference points when 3-parameter stock-recruit relationships are considered appropriate, an extension of the results of Mangel et al. 2013.

Xi He. Simulation/estimation study on the influence of recruitment variance (σ_R) on estimates of stock-recruit steepness.

Aaron Berger, Ian Taylor, and Melissa Haltuch. Use of dynamic Bzero calculations for status determination for West Coast groundfish

Jim Thorson. Autocorrelation in recruitment and its effect on estimation of stock recruit parameters.

Jim Thorson. Something concerning a comparison of 2-parameter and 3-parameter stock-recruit relationships.

Steve Teo. Exploration of the 3-parameter stock recruit relationship in stock synthesis

Josh Nowlis: A management strategy evaluation of stock recruitment proxies

John Wallace: SPR vs. Fmsy in assessment models

Abstracts

Marc Mangel. Density Dependence, The Theory of Harvesting, and the Practice of Stock Assessment: A Perspective On Steepness and Its Implications.

Density dependence, which in fisheries is usually understood as a nonlinear relationship between mature individuals (spawners) and the number or biomass of offspring produced (recruitment), is key for sustainable fisheries. I will first briefly review density dependence as it applies to fishery management and then introduce the concept of steepness, which is commonly defined as the fraction of unfished recruitment obtained when biomass is 20% of its unfished level. In order to

provide a perspective on steepness, I will then discuss i) the statistical ecology of steepness (in both the 20th and 21st centuries), ii) the evolutionary ecology of steepness, and iii) the reproductive ecology of steepness (illustrated with Bluefin tuna as a test case). I will then turn to the management implications of steepness and show that fixing steepness in the practice of stock assessment can have many unintended consequences, most of which are poorly appreciated. I will show that using three parameter stock-recruitment relationships (such as the Shepherd/Maynard Smith) rather than the standard two parameter ones due to Beverton & Holt and Ricker allows us a way forward.