# MINUTES
# Scientific and Statistical Committee

Pacific Fishery Management Council
Hilton Orange County/Costa Mesa Hotel
Balboa Bay 2 Room
3050 Bristol Street
Costa Mesa, California 92626
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**November 2-3, 2012**

***Call to Order and Scientific and Statistical Committee (SSC) Administrative Matters***

The meeting was called to order at 8 a.m. on Friday, November 2, 2012. Council Executive Director, Dr. Donald McIsaac briefed the SSC on priority agenda items.

**Members in Attendance**

Dr. Louis Botsford, University of California, Davis, CA
Dr. Ramon Conser, National Marine Fisheries Service, La Jolla, CA
Mr. Robert Conrad, Northwest Indian Fisheries Commission, Olympia, WA
Dr. Martin Dorn, National Marine Fisheries Service, Seattle, WA
Dr. Carlos Garza, National Marine Fisheries Service, Santa Cruz, CA
Dr. Vladlena Gertseva, National Marine Fisheries Service, Seattle, WA
Dr. Owen Hamel, SSC Chair, National Marine Fisheries Service, Seattle, WA
Dr. Selina Heppell, Oregon State University, Corvallis, OR
Dr. Daniel Huppert, University of Washington, Seattle, WA
Dr. Peter Lawson, National Marine Fisheries Service, Newport, OR
Dr. Todd Lee, National Marine Fisheries Service, Seattle, WA
Dr. Charles Petrosky, Idaho Department of Fish and Game, Boise, ID
Dr. André Punt, University of Washington, Seattle, WA
Dr. David Sampson, Oregon Department of Fish and Wildlife, Newport, OR
Ms. Cindy Thomson, National Marine Fisheries Service, Santa Cruz, CA
Dr. Tien-Shui Tsou, Washington Department of Fish and Wildlife, Olympia, WA

**Members Absent**

Ms. Meisha Key, SSC Vice-Chair, California Department of Fish and Game, Santa Cruz, CA

| SSC Recusals for the November 2012 Meeting. | | |
|---|---|---|
| **SSC Member** | **Issue** | **Reason** |
| Mr. Robert Conrad | Examination of the potential bias in Coho Fishery Regulation Assessment Model (FRAM) from mark-selective fisheries. | Mr. Conrad was a principle investigator for this report. |

| **SSC members of External Review Panels for items considered at the November 2011 Meeting.**<br>*SSC members of external review panels are noted below for the record. SSC members of External Review Panels may participate in SSC deliberations, but they are expected to remain neutral if the SSC is being asked to arbitrate differences between review panels and technical teams.* | |
|---|---|
| **SSC Member** | **External Panel Membership** |
| Mr. Robert Conrad | Co-chaired the Salmon Methodology Review meeting. |
| Dr. Owen Hamel | Chaired the Update Review Panel for Pacific sardine. |
| Dr. Ramon Conser | Member of the Update Review Panel for Pacific sardine. |

**Scientific and Statistical Committee Comments to the Council**

The following is a compilation of November 2012 SSC reports to the Pacific Fishery Management Council (Council) in the order they were discussed by the SSC. (Related SSC discussion not included in written comment to the Council is provided in *italicized text*).

***Council Administrative Matters***

F.3. Membership Appointments and Council Operating Procedures (SSC Closed Session)

The non-at-large members of the SSC went into closed session to discuss the attributes of the candidates for the at-large SSC seats for the next three-year term. No written report on this item was presented to the Council. Dr. Hamel, SSC Chair, provided an oral report summarizing the SSC recommendations to the Council during their closed session.

F.4. Future Council Meeting Agenda and Workload Planning

In November 2011, the Council tasked its Executive Director with " … scheduling a timely workshop to review key fishery management parameters (for Pacific sardine) such as $F_{MSY}$, productivity regime shifts in $F_{MSY}$ application, and geographic distribution dynamics." In June 2012, the Scientific and Statistical Committee (SSC) presented a proposal entitled "*Management Strategy Evaluation Planning Workshop for Pacific Sardine*" to address the Council's request. Dr. André Punt reviewed the SSC's proposal highlighting the four key steps involved:

1. Identification of management objectives and quantification of these by means of performance statistics (e.g., average catch, probability the resource drops below a threshold biomass level over a 20-year projection period, impact of abundance of other ecosystem components).

2. Identification of a set of models of the system to be managed (referred to as operating models). This set of models needs to be selected to cover (to the extent possible and feasible given available data) the key uncertainties which may impact the performance of control rules.

3. Identification of candidate overfishing limit/acceptable biological catch/harvest guideline control rules.

4. Projection of the system as reflected in each operating model, given catch limits set by each candidate control rule.

The Coastal Pelagic Species Management Team (CPSMT) proposed an alternative, more narrowly-focused workshop to address the Council's November 2011 request, entitled "*Workshop to Re-evaluate Parameters of the Harvest Control Rule for Pacific Sardine*" (Agenda Item F.4.b, CPSMT Report). This workshop would focus primarily on the appropriateness of the temperature-recruitment relationship, as well as evaluation of other potential environment-recruit covariates. This reassessment of the environment-recruit relationship could suggest a change in the $F_{MSY}$ as used in the current harvest control rule.

The SSC recognizes the importance of the work proposed by the CPSMT. A better understanding of the environmental effects on Pacific sardine productivity is also an important prerequisite for conducting a management strategy evaluation (MSE) – specifically for carrying out Steps 2 and 4, above. The original simulation work carried out in the late 1990s (Amendment 8 of the Coastal Pelagic Species Fishery Management Plan (FMP)) used an MSE-like design to determine a harvest guideline (HG). This involved jointly identifying the parameters FRACTION (a temperature-dependent exploitation rate) and CUTOFF. The current management structure includes, in addition, the $F_{MSY}$-based OFL control rule. A new MSE, incorporating updated information on environmental correlates of productivity, could provide updated parameters $F_{MSY}$, FRACTION and CUTOFF (or parameters for alternative HG formulations) with a more comprehensive analysis than was possible given the computing power available when the analysis for Amendment 8 was conducted.

The SSC recognizes the considerable workload associated with conducting the proposed MSE. In order to make the effort more manageable and efficient and to provide some of the key results in the near term, a series of short workshops (2-3 days) is suggested:

1. **Environment-Productivity Relationship (February 2013)** Following the CPSMT proposal (Agenda Item F.4.b), the goal of this workshop is to evaluate the environment-productivity relationship, and to recommend which (if any) environmental covariates are important and how they should be modeled. Both oceanographers and biologists should participate.

2. **Operating Model (March 2013)** Using the management objectives from the previous MSE work (Amendment 8 of the FMP) and the recommendations from Workshop 1, above, the key attributes of the operating model will be agreed. Some aspects of the original biological modeling will be updated to take advantage of advances in computer technology. The goal of this workshop is to establish all the detailed aspects of the operating model in principle. The actual coding of the model and runs to re-estimate the parameters of the current control rule will most likely occur after the workshop.

3. **Feedback and Remaining Issues (Timing TBD)** Workshops 1 and 2, above, are designed to produce some key results in the near term by streamlining the process. However, they will not be able to consider all of the important issues, e.g. international management (portion of the stock in USA waters); key economic factors; and ecosystem considerations. After the work of Workshops 1 and 2 has been completed and based on the feedback from the Council and other stakeholders, a third workshop should be convened to scope out the remaining work.

Finally, the SSC notes that a properly done MSE is a considerable effort involving many players (scientists, fishery managers, and stakeholders). The SSC recommends an MSE be conducted within the next two years. However, while results and conclusions are often desired sooner rather than later, the nature of the process is such that delays are not uncommon, and are often necessary to do the job well.

***SSC Notes***

*The complete item from the November 2011 "Council Decisions" document was:*

*"Finally, the Council expressed strong support for the Southwest Fishery Science Center formal methodology review of the West Coast Vancouver Island trawl survey for potential inclusion in the next full Pacific sardine stock assessment, tentatively scheduled for Spring 2012, and tasked the Executive Director with scheduling a timely workshop to review key fishery management parameters such as $F_{MSY}$, productivity regime shifts in $F_{MSY}$ application, and geographic distribution dynamics".*

***Coastal Pelagic Species Management***

G.2. Exempted Fishing Permit (EFP) Process

The Scientific and Statistical Committee (SSC) reviewed the draft Council Operating Procedure (COP) "Exempted Fishing Permit (EFP) Process" for coastal pelagic species (Agenda Item G.2) which allows for EFPs to be issued by National Marine Fisheries Service. The following modifications to the COP are recommended by the SSC.

The Review and Approval Process section should include an evaluation of the justification for the amount of fish requested.

Recurring EFPs should be reviewed for scientific content every few years to determine whether the information produced by those projects prove useful in long-term improvement of fishery management.

A process needs to be developed to assure that "substantially similar" recurring EFP proposals are adequately similar to the previous year's research. To qualify for an expedited EFP, it should, at a minimum, be similar in sample design, methods for determining sample sizes, and sampling and quantitative methods. The Coastal Pelagic Species Management Team should take the lead on this evaluation.

## G.3. Pacific Sardine Assessment and Management for 2013, Including Preliminary EFP Proposals and Tribal Set-Aside

The Scientific and Statistical Committee (SSC) reviewed the 2012 update assessment of the northern subpopulation of Pacific sardine. Dr. Kevin Hill from the Southwest Fisheries Science Center (SWFSC) presented an overview of the assessment and discussed new data in the assessment, including the 2012 acoustic trawl (ATM), egg production (DEPM) and aerial surveys. The aerial survey used a slightly different methodology than used previously, with biomass estimates in the model derived from point sets pooled across years, with length data from 2012. The SWFSC conducted a spring DEPM survey and both spring (in California) and summer (from San Diego into Canada) ATM surveys. The estimate of spawning stock biomass in 2012 from the update assessment was 50 percent lower than the previous estimate for 2011, but higher than those for years 2008-10.

Several issues regarding the surveys were raised. The summer ATM survey found that trawls in the northern area had highly mixed species composition. There was a discrepancy between the biomass estimate in the northern (WA/OR) portion of the ATM survey area and the fishery landings (as well as the aerial survey estimate). Vessel avoidance and the acoustic transducer on the survey vessel missing fish on the surface were raised as possible explanations for this discrepancy. The aerial survey used the one complete set of transects (Set B) for school number and surface area estimates, while the point sets were taken after completion of the transects rather than concurrently. More problematically, only 14 acceptable point sets were conducted, and they were not spatially representative of the sardine schools photographed during the transects. Given this lack of spatial coverage of the point sets, and the highly mixed Coastal Pelagic Species found in the ATM trawls in the same area as many of the photographed schools, there are potential species composition problems with the estimates derived from the aerial photographs. However, the composition of photographed schools and ATM trawls are not directly relatable, as the former are taken during the day and the latter at night when CPS are dispersed.

Dr. Owen Hamel of the SSC presented a report of the review panel that was convened to review the update assessment. The panel endorsed a change to the model that involved the use of recruitment deviations estimated through end year-1 and rather than end year-2, as it provided better fit to the data, and recommended that a base model (X6e) that incorporated this change be used for management in 2013.

The SSC notes that the current Harvest Control Rule uses the biomass estimate on July 1, 2012 to determine an overfishing limit and harvest guideline for the 2013 calendar year, thereby ignoring any change in biomass from July 1 to December 31, 2012. This could be consequential for this assessment, given the declining trend in abundance. The SSC suggests that future evaluations of the harvest control rule consider basing the OFL and HG on the biomass at the start of the fishing year, as is the case for other Council-managed fisheries. The SSC again emphasizes that there is little time between when data are provided to the Stock Assessment
Team (STAT) and the deadline for assessment completion, which raises multiple challenges for completing the assessment and conducting a review. This problem could be addressed by changing the start of the fishing year.

The SSC endorses the update assessment (model X6e) as the best available science for management in 2013 and further endorses the OFL=103,284 mt, and the sigma value of 0.36. The SSC notes that the relationship between temperature and stock productivity has not yet been

clarified; using a constant $F_{MSY}$ proxy was recommended in November 2011 as an interim measure only. Re-evaluation of the science used in the Harvest Control Rule parameters should be of highest priority for next year's assessment (see Agenda Item F.4.b, Supplemental SSC Report).

Dr. André Punt of the SSC provided an overview of the Methodology Review Panel that reviewed possible use of the Vancouver Island swept area trawl survey in management. This trawl survey has been conducted by the Department of Fisheries and Oceans (Canada) since 2002, but there have been serious issues of consistency in and adequacy of survey methodology. The 2010 survey was the first that was sufficiently close to the recommendations of the Methodology Review Panel to be appropriate for use in management. When several additional years of standardized data collection have occurred, the survey should be evaluated by the STAT and a STAR panel for use in assessment and management. The SSC further noted that coordination with US surveys could potentially increase the value of the Canadian survey. The SSC endorses the report and emphasizes that a time series derived from several more years of standardized survey methodology is necessary before the survey may be useful for management.

The SSC noted that a letter of intent to apply for an exempted fishing permit to continue the Northwest aerial sardine survey in 2013 was submitted. The survey has consistently failed to achieve adequate point sets to meet objectives specified in the sampling plan. While this might be partially addressed by scheduling changes, the SSC recommends a formal review of the survey methodology, following up on the issues raised in the 2007 STAR panel.

***Salmon Management***

C.3. 2012 Salmon Methodology Review

The Scientific and Statistical Committee (SSC) reviewed the five salmon methodology topics identified at the September Council meeting. Presentations were made to the Salmon Subcommittee in a joint meeting with the Salmon Technical Team and the Model Evaluation Workgroup on October 10 and 11.

<u>Implementation and assessment of proposed bias-correction methods for mark-selective fisheries into the Fishery Regulation and Assessment Model (FRAM) for coho</u>

Ms. Angelika Hagen-Breaux presented an analysis of the effects of implementing bias-correction methods for mark-selective fisheries into Coho FRAM (Agenda Item C.3.a, Attachment 1). She demonstrated the degree of bias reduction achieved by implementing bias-corrected methods and discussed additional potential improvements.

The most difficult technical obstacle encountered while developing bias-correction algorithms in Coho FRAM was the need for a way to model multiple simultaneous fisheries. This has been resolved with algorithms that correctly account for multiple encounters of unmarked fish in mark-selective fisheries. Effects of these improved algorithms are relatively small but potentially significant; a few fisheries showed unbiased total exploitation rate increases of about 1.5 percent compared to the biased calculation.

Mark-recognition error is another source of bias in FRAM modeling of mark-selective fisheries. Although the magnitude of this bias is small, a method has been developed and implemented to properly account for its effects. Two other sources of bias -- drop-off mortality and mortality in non-retention fisheries -- are not easily addressed in FRAM, but have effects that will be very

small compared with other sources of uncertainty in the modeling. Efforts to further improve Coho FRAM would more usefully be directed to improving base-period data and run-size forecasts.

The bias testing reported to the SSC was done using simplified FRAM runs. A test with the final 2012 run comparing results with and without bias correction will provide a realistic assessment of the effects of this adjustment and help to verify that the model is running correctly. Pending the results of this comparison, the SSC recommends implementation of bias correction for multiple encounters and mark-recognition error in Coho FRAM for modeling 2013 fisheries.

Impacts of mark-selective ocean recreational fisheries on Washington Coast coho stocks

Dr. Robert Kope reported on the results of his examination of the impacts of mark-selective recreational fisheries in Washington Marine Catch Areas 1, 2, 3, and 4 on Washington Coastal natural coho salmon stocks (Agenda Item C.3.a, Attachment 2). Data from fishery years 2006 through 2010 were used for these analyses. Coded wire tag (CWT) recovery data from all ocean fisheries, pre-terminal fisheries, and escapement were available for hatchery coho stocks in the Gray's Harbor, Queets, and Quillayute watersheds and were used to estimate stock-specific fishery impacts. Exploitation rates for Hoh River natural coho were estimated as the average of the rates for the Queets and Quillayute stocks that were based on CWTs. This is a reasonable approach for estimating exploitation rates for the Hoh natural stock for which there are no hatchery CWT data.

Anglers intentionally release legal-size marked coho salmon in these recreational fisheries. Differences in the incentives for the charter and private boat sectors lead to differences in the release rates of legal-size marked coho, with private boat anglers releasing legal-size marked coho at a higher rate than charter boat anglers. Information from observer programs and voluntary trip reports were used to estimate these rates for the charter and private boat sectors, respectively. On average, charter boat anglers released fewer legal-size marked coho than private boat anglers. The impact analyses conducted properly accounted for these differences between the fleets plus the difference in angling success between the charter and private boat fleets.

The analyses estimated relatively small impacts on Washington Coastal natural coho salmon stocks by ocean mark-selective fisheries. Annual stock-specific impact rates ranged from 0.4 percent to 3.7 percent of the total impacts on the unmarked stocks. Average impacts across years for each stock were between 0.8 percent (Quillayute) to 1.7 percent (Queets). FRAM preseason predictions of impacts by the ocean recreational fisheries have been, on average, very close to the estimates based on CWTs for Grays Harbor and Quillayute coho stocks. Impacts by these fisheries on Queets natural coho have been consistently over-predicted by FRAM and impacts on Hoh natural coho have been over-predicted on average.

The SSC endorses the methods used for these analyses and the conclusions drawn in the report.

Technical revision to the Oregon Coastal Natural (OCN) coho work group harvest matrix

Mr. Erik Suring and Mr. Mark Lewis reported on the analyses supporting the document "2012 Technical Revision to the OCN [Oregon Coastal Natural] Coho Work Group Harvest Matrix" (Agenda Item C.3.a, Attachment 3). Maximum allowable harvest rates for OCN coho are annually specified using a two-dimensional matrix with five levels of Parent Spawner Status (spawning density relative to full seeding) and four levels of a Marine Survival Index. Currently, the Oregon Production Index Hatchery (OPIH) jack/smolt ratio is used as a proxy for predicting OCN coho

marine survival since data on wild adult coho salmon marine survival were unavailable when the matrix was developed. The authors of Amendment 13 to the PFMC Pacific Coast Salmon FMP recognized that this marine survival predictor was less than ideal and therefore stated explicitly that the methods for estimating the technical parameters of the matrix could be changed without plan amendment. The Council is currently using a modified matrix developed by Sharr et al. (2000) in their 2000 Review of Amendment 13 to the Pacific Coast Salmon Plan.

The document describes a proposed change in the basis for estimating the Marine Survival Index. A change is warranted due to the low correlation between the OPIH jack/smolt ratio and the observed OCN adult marine survival index measured at the Life Cycle Monitoring (LCM) sites from 1999 through 2011. The predicted Marine Survival Index category (i.e., the one used for management) has been different than the subsequent observed category in 10 of these 13 years (under-predicting nine times and over-predicting once).

The LCM adult trap on Mill Creek (Yaquina River) is the only LCM trap that currently captures all upstream migrating fish, including jacks. Thus Mill Creek provides the only natural jack/smolt ratio that could be used as a predictor of OCN marine survival. The LCM Mill Creek jack/smolt index has been a far better predictor of OCN marine survival over the past 13 years than the OPIH jack/smolt ratio. Had the Mill Creek index been in use, the predicted marine survival category would have been incorrect in only five of the 13 years (under-predicting four times and over-predicting once).

The SSC supports the proposed change to the OCN Harvest Matrix. However, the SSC notes that the use of a single site could be problematic if there is an event that causes this site to no longer be representative of OCN coho during a particular year. There should be a provision to revert to the OPIH jacks/smolt predictor if there are indications that the Mill Creek site might be unrepresentative in any particular year (for example, no jacks return). ODFW will investigate using other LCM sites to provide additional natural jack/smolt ratios.

In addition to Yaquina Mill Creek jacks there are other indexes that potentially could serve as marine survival estimates. In particular, the OCN abundance predictor adopted in 2011, while not a survival index, is based on a wide variety of environmental indices and is more representative of the entire stock. The SSC requests an analysis of methods that include the current OCN abundance predictor and other potential broad-scale indicators for review in October 2013. In the interim, the Yaquina Mill Creek jack/smolt ratio appears to perform substantially better than the OPIH jack/smolt ratio. The SSC approves the use of this index for setting OCN exploitation rates in 2013.

<u>Comparison of two methods for estimating coho salmon encounters and release mortalities in the ocean mark-selective fishery</u>

Mr. Robert Conrad presented an evaluation of two methods for estimating total encounters of legal-size coho salmon and release mortalities for legal-size marked and unmarked coho salmon in the ocean mark-selective recreational fisheries off the Washington coast (Washington Department of Fish and Wildlife [WDFW] Marine Catch Areas 1, 2, 3, and 4) (Agenda Item C.3.a, Attachment 4).

For estimating total encounters with legal-size coho salmon, the current method of estimation assumes:

- there is no release of legal-size marked coho salmon by anglers, and
- the proportion of marked and unmarked coho salmon in all legal-size encounters is the same for the charter boat and private boat fleets.

Data collected during the 2009, 2010, and 2011 charter boat observer and voluntary-trip report programs do not support these two key assumptions.

The proposed alternate method incorporates fleet-specific estimates of the release rate of legal-size marked coho salmon and estimates total encounters of legal-size marked and unmarked coho salmon separately for each fleet, and does not rely on either of these assumptions.

The evaluation indicated that the current methods consistently underestimate both the total encounters with legal-size coho salmon and the number of encounters with unmarked legal-size coho salmon. As a result, release mortalities for unmarked legal-size coho salmon were underestimated by about 10 percent to 15 percent in these fisheries during the years 2009 to 2011.

The SSC recommends using the proposed alternate method in 2013 to estimate total encounters of legal-size coho salmon, and release mortalities for legal-size marked and unmarked coho salmon by the ocean mark-selective recreational fisheries in WDFW Marine Catch Areas 1, 2, 3, and 4.

Review of modifications to Chinook FRAM size limit algorithms implemented to allow evaluation of size limit changes

Mr. Jim Packer presented a proposal for modifying the current size-limit algorithms in Chinook FRAM that are used to predict the number of sub-legal and legal encounters in a fishery (Agenda Item C.3.a, Attachment 5). A previous assessment evaluated a proposed change to a size limit in a recreational fishery and identified a serious problem with the way Chinook FRAM deals with size limit changes and subsequently projects total encounters. Specifically, it was determined that when a size limit different from the base period limit was entered for a FRAM fishery, the total number of encounters with a stock by the fishery with the changed size limit would increase or decrease - sometimes by a substantial amount. Obviously, this is not expected, as the total number of encounters should remain the same regardless of size limit. Only the proportion of total encounters classified as sublegal and legal should change.

The proposed modification to FRAM simply scales encounter rates to keep total encounters equal regardless of size limit. This propagates through the model to change exploitation rates in historical fisheries where size limits have changed. The changed exploitation rates are no more correct than the current rates. The fundamental problem is the lack of a valid method in the Chinook FRAM to model size at age. The SSC recommends no change to the current method until an acceptable alternative is developed. Effects of size limit changes should be evaluated outside of the FRAM model.

***Groundfish Management***

I.1. National Marine Fisheries Service Report

The (SSC) was asked to comment on the timing for implementation of discard mortality rates for longnose skate and spiny dogfish, adopted by the Council at the March 2012 meeting, in producing estimates for groundfish mortality reports.

Stock assessments for both species assume less than 100 percent discard mortality. At the March

2012 meeting, the SSC recommended that discard mortality assumptions be consistent between assessments and management. The assessment discard mortality assumptions are based on limited information, but they represent the best information available.

The SSC agrees that the best available scientific information should be used for catch accounting now. Moreover, ideally the recommended discard mortality rates should be applied retrospectively to longnose skate and spiny dogfish mortality estimates in groundfish mortality reports.

Review Terms of Reference for Data-moderate Stock Assessments and Review Process

The Council tasked Council staff in September to collaborate with the SSC to draft language in the groundfish and coastal pelagic species assessment and review terms of reference that provides the rules and procedures for conducting and reviewing data-moderate stock assessments for groundfish stocks. Council staff drafted language for SSC review and the SSC provided recommended edits to the draft language, all of which were incorporated in the terms of reference. This item was not on the Council agenda so no written SSC report was provided to the Council.

I.2. Amendment 24 (Improvements to the Groundfish Management Process)

The Scientific and Statistical Committee (SSC) reviewed the report of the Ad Hoc Amendment 24 Workgroup (Agenda Item I.2.a, Attachment 1), which was tasked by the Council to develop alternatives and recommendations on how to improve the process for setting groundfish biennial harvest specifications and associated management measures. Dr. Kit Dahl provided an overview of the report and was present to answer questions.

The Workgroup report proposed that National Environmental Policy Act (NEPA) requirements could be addressed more effectively and efficiently by developing a Tier 1 framework that specifies the Council's routine actions (e.g., setting annual catch limits [ACLs], adjusting routine management measures) and analyzes the impacts of those actions over an extended time period (e.g., 10 years). Biennial actions or adjustments to management measures would require less burdensome Tier 2 documents (Environmental Assessments or Supplemental Information Reports) if impacts of the actions or adjustments are within the range of outcomes previously analyzed in the Tier 1 NEPA document and could support a "finding of no significant impact." To implement this new harvest specification process, the Council's suite of routine actions and management measures would need to be fully detailed in either an amendment to the Groundfish Fishery Management Plan (FMP) or by means of revisions to the Council's Operating Procedure 9, which outlines the biennial process more completely than the FMP and which the Council can more easily change.

The SSC agrees that it would be advantageous to develop a set of default harvest specification policies. The SSC recommends that the process continue to include a biennial cycle of stock assessments to allow the regular infusion of new scientific information. A Tier 1 document could specify default P* values for deriving acceptable biological catches and a process for adjusting sigma based on additional information on scientific uncertainty. Developing a process and set of rules for the automatic revision of rebuilding plans for overfished stocks is more problematic. Given that assessment estimates are subject to considerable uncertainty, a new stock assessment of an overfished stock is likely to result in a changed estimate of the probability of rebuilding. Further, the pace of rebuilding will depend on the actual sequence of annual recruitment events,

whereas a previous rebuilding analysis will reflect the median trajectory of random recruitment events. How to automatically adjust a rebuilding plan when new stock assessment information becomes available is not clear at present and will require additional analyses to establish appropriate mechanisms to accommodate changes in rebuilding parameters that new stock assessments would be likely to generate. If the Council would like to take an automatic approach to making revisions to rebuilding plans, analyses should be conducted, similar to the ones conducted by Punt and Ralston (2007), to explore different options and the trade-offs that would likely be required.

Punt, A.E. and Ralston, S. (2007). A management strategy evaluation of rebuilding revision rules for overfished rockfish stocks. Pages 327- 351 in *Biology, Assessment, and Management of North Pacific Rockfishes*, Alaska Sea Grant College Program, AK-SG-07-01.

I.3. Progress Report on Using Descending Devices to Mitigate Barotrauma

Mr. John Budrick (California Department of Fish and Game), Ms. Heather Reed (Washington Department of Fish and Wildlife), and Ms. Lynn Mattes (Oregon Department of Fish and Wildlife) presented the current status of the GMT analysis of alternative rockfish mortality rates associated with the use of descending devices (Agenda Item I.3.b, GMT Report).

The GMT provided a review of the research informing alternative mortality rates associated with the use of descending devices to mitigate barotrauma effects on cowcod and yelloweye rockfish. Key uncertainties identified in the GMT's progress report include the effect of depth of capture, limited species-specific research on cowcod and yelloweye, the effect of time on deck, the effect of thermal shock (e.g., temperate gradient across the thermocline) and, significantly, long-term mortality and potential negative effects to reproduction and productivity. These uncertainties led the GMT to use proxy species to develop cowcod and yelloweye mortality rates and extrapolate empirical evidence spatially (e.g., to deeper depths) and temporally (i.e., presuming longer-term mortality rates from apparent survival for individuals at up to 10 days).

The SSC discussed the specific questions to the SSC in the GMT's progress report and offers the following recommendations.

1. Are the research results cited sufficient to develop mortality rates for cowcod and yelloweye released using descending devices at the depths provided in this progress report?

The SSC believes the available scientific evidence is sufficient to assume increased survival of cowcod and yelloweye released with descending devices in recreational fisheries. Given the large uncertainty in estimating long-term effects of barotrauma, the SSC recommends conservative buffers be considered in developing cowcod and yelloweye mortality rates associated with the use of descending devices. The SSC was unable at this time to recommend a particular methodology for determining appropriate mortality rates or how large a precautionary buffer should be given our limited understanding of barotrauma effects. The SSC recommends the GMT provide a more coherent analysis with better rationale for alternatives in the next iteration of their progress report. The GMT should identify a preferred methodology/alternative for SSC and Council consideration.

2. What are the research and data needs to better inform the development of mortality rates of cowcod and yelloweye using descending devices?

Ideally, species-specific research with longer-term studies of cowcod and yelloweye survival could reduce much of the current scientific uncertainty associated with the use of descending devices when releasing these species in recreational fisheries. While expensive, research using pop-up archival tags could improve our understanding of longer-term survival of rockfish when recompression occurs from the use of descending devices.

3. Given the uncertainty in mortality rates from barotrauma studies conducted to date, what level of precaution should be considered for applying a survival rate credit for anglers using descending devices?

A better characterization of the uncertainty in mortality rates from barotrauma studies conducted to date should include uncertainty in longer-term survival than the few fish observed for up to 10 days in the Wegner et al. study, depth of capture, the differential in temperature between the bottom and the surface, the time on deck, and the degree of rough handling by recreational anglers, which may be presumed to be greater for inexperienced anglers relative to that for researchers conducting barotrauma studies. Given that the uncertainty in barotrauma survival associated with the use of descending devices is relatively large, conservative buffers in applied mortality rates should be considered. This is especially important as greater fishing opportunities are considered based on applied "survival credit." Adequate precaution should be considered until population level effects and longer-term survival are better understood.

4. If survival credit is given, there will be necessary changes to recreational surveys to document the proportion of rockfish by species released using descending devices. Are the current sampling rates sufficient to gain a representative sample of the use of descending devices by fleet?

It will be important to gain a representative sample of the proportion of anglers using descending devices by mode and species to adjust catch and release mortality estimates. Proportional use by mode is important since it may be unrealistic to expect private boat anglers to have the same level of expertise as charter skippers and crew. Proportional use by species is important since research conducted to date indicates some species (e.g., blue and bank rockfish) may be more sensitive to barotrauma effects than others. Also, some species, such as shallow nearshore rockfish and yellowtail rockfish, may not require recompression upon release given their resilience to barotrauma, which could bias survey results if the surveys simply asked if descending devices were used in discarding all rockfish. Therefore, quantification of the overall effects of descending device use will require additional questions in surveys, which come at the cost of fewer individuals answering the surveys. Optimizing the length of the survey and obtaining information that can be used to effectively account the discard mortalities of released rockfish will be an important consideration in implementing this initiative. Careful account also needs to be taken of potential biases in survey responses.

The SSC encourages more research on the use of descending devices to mitigate barotrauma in rockfish released in west coast recreational fisheries. Until there is better information on long-term survival of cowcod, yelloweye, and other rockfish species released using these devices, conservative mortality rates should be assumed. Nevertheless, the SSC supports this initiative and agrees that rockfish survival benefits will accrue through the effective use of descending devices.

***Ecosystem Based Management***

K.1. Fishery Ecosystem Plan (FEP)

The Scientific and Statistical Committee (SSC) reviewed the draft Fishery Ecosystem Plan (FEP), which is scheduled for adoption at the March 2013 Council meeting. Mr. Mike Burner and Dr. John Field were available to answer questions. The SSC has reviewed most of this document at past meetings, and spent most of the discussion time at this meeting on new and revised sections of the FEP.

The Council has recommended the FEP serve as an advisory document. Many of the recent revisions to the FEP follow recommendations from Council advisory bodies, and the document continues to improve. The FEP provides the Council with the means to look at issues that are pertinent to fisheries management, but outside of traditional single-species management. It also provides a useful summary of system level information potentially pertinent to fisheries management. The SSC commends the efforts of the Ecosystem Plan Development Team (EPDT) and Ecosystem Advisory Subpanel (EAS) to make this document a valuable contribution to ecosystem-based management planning, and offers the following observations and suggestions:

1. Final editing should further emphasize how ecosystem-based information and cross-fishery management plan (FMP) issues should affect Council decision-making and process.

2. Section 7 would benefit from re-organization to emphasize the status of the different initiatives listed, which range from well-formulated plans to general proposals for future research. Prioritization of the initiatives would benefit upcoming efforts to review and utilize the tools that are provided by the California Current Integrated Ecosystem Assessment (Agenda Item K.2.c, Supplemental SSC Report).

3. Much of the basis for ecosystem-based management is an integration of ecosystem and fishery effects on species, habitats, and human communities, including cumulative effects. The connection that is relevant to Council operations is population resiliency and response to change. Many of the issues raised in the FEP can be framed in this way, which may help the Council and advisory bodies prioritize ecosystem-related initiatives.

4. Cross-FMP initiatives can integrate data from biological and socio-economic systems.

5. Many of the initiatives in Chapter 7 overlap with the Research and Data Needs document. The ecosystem section of the Research and Data Needs document should be modified to reflect the initiatives in chapter 7 of the FEP.

The SSC will forward detailed comments and recommendations for revisions to the FEP to the EPDT.

**SSC Notes**

*Specific issues raised by SSC members, which may be further addressed in our written comments:*

*Energy flow and ecosystem function may be important to consider, if reference points and indicators linked to those processes can be identified.*

*Considerable data exist on economic sectors and fishing behavior that can be fed into ecosystem models and bio-economic models of response to climate change. More detail and suggestions on this will be provided to "beef up" the socio-economic sections of Ch. 7.*

*Ocean acidification and climate change are being linked inappropriately in some documents – climate change does not cause acidification.*

*Still need to emphasize utility of models, advisory documents to Council operations. How will this additional information actually affect what the Council does?*

K.2. Integrated Ecosystem Assessment Implementation Report

Dr. Phil Levin (NWFSC) briefed the Scientific and Statistical Committee (SSC) on the current status of the Integrated Ecosystem Assessment (IEA), and emphasized that the IEA team wishes to makes its products more accessible and useful to the Council. He outlined plans for a series of workshops to identify IEA products that would be most useful to the Council and to review those products.

The IEA aims to provide scientific information for a wide audience. Products of potential interest to the Council include as ecosystem indicators and associated reference points, the impacts of fishing for forage species, and analyses of the cumulative impact of fisheries, among others.

The SSC supports holding an initial workshop with the following goals:

- list the products which are being developed as part of the IEA;
- identify which IEA products are likely of greatest interest to the Council, taking account of the priorities in the Council's Research and Data Needs document as well as any priorities for Fishery Ecosystem Plan initiatives identified during this meeting; and
- develop approaches to reviewing different IEA products.

The workshop would take place over two days, likely during Spring 2013. It would be chaired by the leaders of the IEA and include participation by members of the SSC ecosystem sub-committee. The workshop would produce a report addressing the three goals listed above, which would then be presented to the Council. The results of the workshop, and subsequent Council deliberation, would allow planning and initiation of the much more substantive process of reviewing those IEA products identified as of most interest to the Council.

K.3. California Current Ecosystem Report

The Scientific and Statistical Committee (SSC) reviewed the Draft Annual State of the California Current Ecosystem Report. Dr. John Field from the Southwest Fisheries Science Center answered SSC questions regarding the report.

The report is a succinct source of information on trends in climate indicators, fish and sea lion

abundance, non-fishing human activities, and major fisheries. The report is an important first step in providing the Council family with an ecosystem perspective on West Coast fish stocks, fisheries, and coastal communities. The Integrated Ecosystem Assessment (IEA) Workshop proposed under Agenda Item K.2.b will provide an opportunity to consider a broader range of IEA products that may warrant inclusion in future versions of the report. The report will likely evolve over time, depending on which indicators are available and best suited to addressing ecosystem concerns identified by the Council.

The SSC offers the following considerations for future iterations of the report, which may require a report that is longer than 20 pages:

- To make the report more accessible, the indicators should be explained in less technical language and further explanation should be provided regarding the relevance of each indicator.

- Section 4.1 provides useful information on major fisheries, including non-FMP fisheries that are commonly pursued in combination with FMP fisheries. In addition to the ecosystem-wide view in Figure 4.1, a landings breakdown by region and fishery would provide additional insight into geographic variation. Ex-vessel price trends should also be provided to help explain effort shifts among fisheries.

- Seafood demand is not a very informative indicator, as it pertains to the U.S. as a whole and demand is satisfied by imports as well as domestic fisheries.

- Non-fishing activities (e.g., aquaculture, benthic structures, shipping activity, and offshore oil/gas) should be described regionally to the extent possible. If shipping activity is being included as a source of habitat effects, then that indicator (volume of water disturbed) should be put in perspective (e.g., by comparing to water disturbance associated with storm activity). However, if it is intended to suggest risks to marine animals and fishing vessels posed by shipping, then the volume of shipping traffic would be a more appropriate indicator.

- To avoid confusion in interpretation, the most recent five years in the trend lines should be coded a different color from the green/yellow/red coding used in Figures 2.2 and 3.3.

**Adjournment**: The SSC adjourned at approximately 5:30 p.m., Saturday, November 3, 2012.

# SSC Subcommittee Assignments, November 2012

| Salmon | Groundfish | Coastal Pelagic Species | Highly Migratory Species | Economic | Ecosystem-Based Management |
|---|---|---|---|---|---|
| **Robert Conrad** | **Vlada Gertseva** | **André Punt** | **Ray Conser** | **Cindy Thomson** | **Loo Botsford** |
| Loo Botsford | Loo Botsford | Ray Conser | Robert Conrad | Vlada Gertseva | Ray Conser |
| Carlos Garza | Ray Conser | Carlos Garza | Selina Heppell | Dan Huppert | Martin Dorn |
| Owen Hamel | Martin Dorn | Owen Hamel | André Punt | Todd Lee | Vlada Gertseva |
| Meisha Key | Owen Hamel | Selina Heppell | | André Punt | Selina Heppell |
| Pete Lawson | André Punt | Dan Huppert | | David Sampson | Pete Lawson |
| Charlie Petrosky | David Sampson | Meisha Key | | | Todd Lee |
| | Tien-Shui Tsou | | | | André Punt |
| | | | | | Cindy Thomson |
| | | | | | Tien-Shui Tsou |

**Bold** denotes Subcommittee Chairperson

# DRAFT Tentative Council and SSC Meeting Dates for 2013

| Council Meeting Dates | Location | Likely SSC Mtg Dates | Major Topics |
|---|---|---|---|
| **March 6-11, 2013**<br>Advisory Bodies may begin Tue, March 5<br>Council Session begins Wed, March 6 | Hotel Murano<br>1320 Broadway Plaza<br>Tacoma, WA 98402<br>Phone: 1-888-862-3255 | Two Day SSC Session<br>**Wed, March 6 – Thur, March 7** | Final CPS EFP<br>Groundfish Am24 FPA<br>Policy for Data-Mod. Stock SDC<br>Salmon Review/Pre I<br>5 yr Research Plan |
| **April 6-11, 2013**<br>Advisory Bodies may begin Fri, Apr 5<br>Council Session begins Sat, Apr 6 | Sheraton Portland Airport Hotel<br>8235 NE Airport Way<br>Portland, OR 97220<br>Phone: 503-281-2500 | Two Day SSC Session<br>**Fri, April 5 – Sat, April 6** | Rockfish Barotrauma Mitigation<br>Groundfish EFH<br>Salmon EFH FPA |
| **June 20-25, 2013**<br>Advisory Bodies may begin Wed, June 19<br>Council Session begins Thurs, June 20 | Hyatt Regency Orange County<br>11999 Harbor Blvd.<br>Garden Grove, CA 92840<br>Phone: 714-750-1234 | Two Day SSC Session<br>**Wed, June 20 – Thurs, June21** | Mackerel HG & Mgt. Measures<br>Review 2013 GF Stock Assess.<br>Final Groundfish Stock Complexes<br>Final 2015 and Beyond Spex Process<br>Unmanaged Forage Fish Protection |
| **September 12-17, 2013**<br>Advisory Bodies may begin Wed, Sept 11<br>Council Session begins Thurs, Sept 12 | The Riverside Hotel – Boise<br>2900 Chinden Blvd<br>Boise, ID 83714<br>Phone: 208-343-1871 | Two Day SSC Session<br>**Wed, Sept 11 – Thurs Sept 12** | Review 2013 GF Stock Assess.<br>Plan Science Improvements<br>Salmon Meth. Topic Select<br>Halibut Bycatch Estimate |
| **November 1-6, 2013**<br>Advisory Bodies may begin Thurs, Oct 31<br>Council Session begins Fri, Nov 1 | Hilton Orange County/Costa Mesa<br>3050 Bristol Street<br>Costa Mesa, CA 92626<br>Phone: 714-540-7000 | Two Day SSC Session<br>**Thurs, Oct 31 – Fri, Nov 1** | Review 2013 GF Stock Assess. (if needed) & Reb. Analyses<br>Salmon Methodology Rev<br>Pacific Sardine Assess.<br>Fishery Ecosystem Plan |

**SSC Meeting Dates and Durations are tentative and are subject to change in response to Council meeting dates and agendas, workload, etc.**

| Proposed Workshops and SSC Subcommittee Meetings for 2013<br>Tentative – Depended on funding, dates subject to change<br>▭ – Prep. Work Underway, Scheduled to Occur; ▭ – Status of Supporting Analyses Uncertain, Remains a Priority;<br>▨ – 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** | Pacific Sardine Harvest Parameters Workshop | Feb 5-8 | Council La Jolla | CPS Subcm | ? | CPSMT/ CPSAS | Griffin |
| **2** | Review of Methods to Develop Groundfish Abundance Indices for Data-Moderate Assessments | March 5 | Council Tacoma | GF Subcm | None | GMT GAP | DeVore |
| **3** | Groundfish Nearshore and Non-Nearshore Model Reviews | March 8 | Council Tacoma | GF/Econ Subcms | None | GMT Reps | DeVore, Dahl |
| **4** | IOPAC and EDM Model Reviews | April 8 | Council Portland | Econ Subcm | None | ? | DeVore, Dahl |
| **5** | Data-Moderate STAR Panel | April 22-26 | Council Santa Cruz | Dorn, Punt | CIE: TBD | GMT GAP | DeVore |
| **6** | Petrale/Darkblotched STAR Panel | May 13-17 | Council Seattle | Tsou | 2 CIE & 1 additional reviewer | GMT GAP | DeVore |
| **7** | Groundfish Bocaccio Update and Catch Reports Review | June 19 | Council Garden Grove | GF Subcm | None | GMT GAP | DeVore |

| Proposed Workshops and SSC Subcommittee Meetings for 2013<br>Tentative – Depended on funding, dates subject to change<br>▭ – Prep. Work Underway, Scheduled to Occur; ▬ – Status of Supporting Analyses Uncertain, Remains a Priority;<br>▨ – 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** |
| **8** | Integrated Ecosystem Assessment – Annual Report and App. to Stock Assessments | June 2013? | NWFSC/ SWFSC TBD | EBM Subcm | ? | EPDT EAS | Burner |
| **9** | Rougheye/Aurora STAR Panel | July 8-12 | Council Seattle | Sampson | 2 CIE & John Field | GMT GAP | DeVore |
| **10** | Thornyheads STAR Panel | July 22-26 | Council Seattle | TBD | 2 CIE & 1 additional reviewer | GMT GAP | DeVore |
| **11** | Cowcod/Sanddabs STAR Panel | August 5-9 | Council Santa Cruz | Gertseva | 2 CIE & 1 additional reviewer | GMT GAP | DeVore |
| **12** | Mop-up STAR Panel | Sept 23-27 | Council ? | GF Subcm | None | GMT GAP | DeVore |
| **13** | Reference Points (Bzero) Workshop II | Summer/Fall | Council Portland | GF Subcm | CIE/External 1-3: | GMT GAP | DeVore |
| **14** | Groundfish Historic Catch Reconstructions | ? | Council Meetings - Wrkshp | 2-3 TBD | None | GMT GAP | DeVore |

| Proposed Workshops and SSC Subcommittee Meetings for 2013<br>Tentative – Depended on funding, dates subject to change<br>▭ – Prep. Work Underway, Scheduled to Occur; ▭ – Status of Supporting Analyses Uncertain, Remains a Priority;<br>▨ – 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** |
| **15** | Assessing Socioeconomic Impacts in Ecosystem-Based Fisheries Management | ? | NWFSC Seattle? | Econ and EBM Subcms? | ? | EPDT IEA | Burner |
| **16** | Transboundary Groundfish Stocks | ? | Council | 2 TBD? | ? | GMT GAP | DeVore |

## Appendix A

October 19, 2012

SSC SALMON SUBCOMMITTEE REPORT ON
2012 METHODOLOGY REVIEW

The Salmon Subcommittee of the Scientific and Statistical Committee (SS-SSC), the Salmon Technical Team (STT), and the Model Evaluation Workgroup (MEW) met at the Shilo Inn Suites Hotel in Portland on October 10 and 11, 2012, to review the five salmon methodology topics identified at the September Council meeting as ready for review:

- Implementation and assessment of proposed bias-correction methods for mark-selective fisheries into the Fishery Regulation and Assessment Model (FRAM) for coho,
- Impacts of mark-selective ocean recreational fisheries on Washington Coast coho stocks,
- Technical revision to the Oregon Coastal Natural (OCN) coho work group harvest matrix,
- Comparison of two methods for estimating coho salmon encounters and release mortalities in the ocean mark-selective fishery, and
- Review of modifications to Chinook FRAM size limit algorithms implemented to allow evaluation of size limit changes.

A summary of each of the items discussed will be given to the full SSC at the November meeting. The Salmon Subcommittee report on each item and its recommendations are summarized below.

Implementation and assessment of proposed bias-correction methods for mark-selective fisheries into the Fishery Regulation and Assessment Model (FRAM) for coho

Ms. Angelika Hagen-Breaux presented an analysis of the effects of implementing bias-correction methods for mark-selective fisheries into Coho FRAM (Agenda Item C.3.a, Attachment 1). She demonstrated the degree of bias reduction achieved by implementing bias-corrected methods and discussed additional potential improvements.

The most difficult technical obstacle encountered while developing bias-correction algorithms in Coho FRAM was the need for a way to model multiple simultaneous fisheries. This has been resolved with a weighted release mortality factor that is an exact analytical solution. As a result, there are now algorithms in the Coho FRAM that account for multiple encounters of unmarked fish in mark-selective fisheries. Effects of this bias reduction are relatively small but potentially significant. A few fisheries showed unbiased total exploitation rate increases of about 1.5 percent compared to the biased calculation.

Mark-recognition error (failing to recognize a marked fish or, conversely, mistaking an unmarked fish for marked) affects bias when estimating exploitation rates for both marked and unmarked cohorts. Releasing a marked fish introduces bias into the estimate of the exploitation rate on the marked cohort because a portion of the released fish are now subject to release mortality similarly to unmarked fish. Conversely, keeping an unmarked fish reduces the bias expected for the unmarked cohort because the fish is now a landed mortality. The effects of mark-recognition errors on bias are relatively small but it was demonstrated that the bias-correction procedures implemented in Coho FRAM properly account for their effects.

The bias-correction methods that were implemented do not address bias due to the methods used in Coho FRAM to model drop-off mortality and mortality in non-retention fisheries. The additional bias introduced by drop-off mortality and mortality in non-retention fisheries will be very small compared with other sources of uncertainty in the modeling. Efforts to further improve Coho FRAM would more usefully be directed to improving base-period data and run-size forecasts.

The bias testing reported to the SSC was done using simplified FRAM runs. A test with the final 2012 run comparing results with and without bias correction will provide a realistic assessment of the effects of this adjustment and help to verify that the model is running correctly. Pending the results of this comparison, the SSC recommends implementation of bias correction for multiple encounters and mark-recognition error in Coho FRAM for modeling 2013 fisheries.

*Discussion – there was sorting in the base period, so the effect of mark recognition error is present in the BP. Are we double-accounting by correcting in the model? Probably, but it is better to have an analytically correct model and strive to have an unbiased BP data set.*

Impacts of mark-selective ocean recreational fisheries on Washington Coast coho stocks

Dr. Robert Kope reported on the results of his examination of the impacts of mark-selective recreational fisheries in Washington Marine Catch Areas 1, 2, 3, and 4 on Washington Coastal natural coho salmon stocks (Agenda Item C.3.a, Attachment 2). Data from fishery years 2006 through 2010 were used for these analyses. Coded wire tag (CWT) recovery data from all ocean fisheries, pre-terminal fisheries, and escapement were available for hatchery coho stocks in the Gray's Harbor, Queets, and Quillayute watersheds and were used to estimate stock-specific fishery impacts. Exploitation rates for Hoh River natural coho were estimated as the average of the rates for the Queets and Quillayute stocks which were based on CWTs. This is a reasonable approach for estimating exploitation rates for the Hoh natural stock for which there are no hatchery CWT data.

Anglers intentionally release legal-size marked coho salmon in these recreational fisheries. Differences in the incentives for the charter and private boat sectors lead to differences in the release rates of legal-size marked coho, with private boat anglers releasing legal-size marked coho at a higher rate than charter boat anglers. Information from observer programs and voluntary trip reports were used to estimate these rates for the charter and private boat sectors, respectively. On average, charter boat anglers released 1.9 percent of the legal-size marked coho that were brought to the boat compared to 7.2 percent for private boat anglers. The impact analyses conducted properly accounted for these differences between the fleets plus the difference in angling success between the charter and private boat fleets.

The analyses estimated relatively small impacts on Washington Coastal natural coho salmon stocks by the ocean mark-selective fisheries. Annual stock-specific impact rates ranged from 0.4 percent and 3.7 percent of the total impacts on the unmarked stocks. Average impacts across years for each stock were between 0.8 percent (Quillayute) to 1.7 percent (Queets). FRAM preseason

predictions of impacts by the ocean recreational fisheries have been very close to the estimates based on CWTs for Grays Harbor and Quillayute coho stocks, on average. Impacts by these fisheries on Queets natural coho have been consistently over-predicted by FRAM and impacts on Hoh natural coho have been over-predicted on average.

In 2009, there were relatively large differences between FRAM predictions and CWT-based estimates of impacts for all four stocks. FRAM under-predicted mortalities for Grays Harbor and Quillayute natural stocks and over-predicted total natural mortalities for Hoh and Queets stocks. This may have been due to a sampling issue in 2009, but it is unclear if the relatively poor FRAM performance in 2009 was a biological or analytical result.

The SS-SSC endorses the methods used for these analyses and the conclusions drawn in the report.

Technical revision to the Oregon Coastal Natural (OCN) coho work group harvest matrix

Mr. Erik Suring and Mr. Mark Lewis reported on the analyses supporting the document "2012 Technical Revision to the OCN [Oregon Coastal Natural] Coho Work Group Harvest Matrix" (Agenda Item C.3.a, Attachment 3). Maximum allowable harvest rates for OCN coho are annually specified using a two-dimensional matrix with five levels of Parent Spawner Status (spawning density relative to full seeding) and four levels of a Marine Survival Index. Currently, the Oregon Production Index Hatchery (OPIH) jack/smolt ratio is used as a proxy for predicting OCN coho marine survival since data on wild adult coho salmon marine survival were unavailable when the matrix was developed. The authors of Amendment 13 to the PFMC Pacific Coast Salmon FMP recognized that this marine survival predictor was less than ideal and therefore stated explicitly that the methods for estimating the technical parameters of the matrix could be changed without plan amendment.

The document describes a proposed change in the basis for estimating the Marine Survival Index. A change is warranted due to the low correlation between the OPIH jack/smolt ratio and the observed OCN adult marine survival index measured at the Life Cycle Monitoring (LCM) sites from 1999 through 2011 ($r = 0.3$, $R^2 = 0.087$, $P = 0.33$). The predicted Marine Survival Index category (i.e., the one used for management) has been different than the subsequent observed category in 10 of these 13 years (under-predicting nine times and over-predicting once).

The LCM adult trap on Mill Creek (Yaquina River) is the only LCM trap which currently captures all upstream migrating fish, including jacks. Thus Mill Creek provides the only natural jack/smolt ratio that could be used as a predictor of OCN marine survival. The LCM Mill Creek jack/smolt index has been a far better predictor of OCN marine survival over the past 13 years ($r = 0.86$, $R^2 = 0.74$, $P = 0.00002$) than the OPIH jack/smolt ratio. Had the Mill Creek index been in use, the predicted marine survival category would have been incorrect in only five of the 13 years (under-predicting four times and over-predicting once).

The SS-SSC supports the proposed change to the OCN Harvest Matrix. However, the SSC notes that the use of a single site could be problematic if there is an event which causes this site to no longer be representative of OCN coho during a particular year. The LCM program does monitor

out-migrant abundance, size, weight, timing, environmental factors, and correlations with other sites. There should be a provision to revert to the OPIH predictor if there are indications that the Mill Creek site might be unrepresentative in any particular year (for example, no jacks return). ODFW will investigate using other sites to provide additional natural jack/smolt ratios, but it will not be able to collect all upstream migrants at any other site.

The SS-SSC recommends that current OCN pre-season forecast methods, approved by the Council in 2011, be investigated as a method for predicting marine survival categories. This would present an alternative to relying solely on Mill Creek jack/smolt data. The forecast is based on multiple basin-wide indices that are regularly updated and easily available and has a longer historical time series for hindcasting (back to 1990). The disadvantage of this approach is that it is an abundance forecast, not a marine survival forecast, but there may be methods to translate from one to the other.

*Some 20 to 200 jacks return each year to Mill Creek. The relatively low numbers add to the uncertainty of the predictor. In the regression analysis, the logit transform is used, but it really makes little difference here. It is also not clear that it reduces the heteroscedasticity of the data. A simple regression would be more transparent. In any case, the regression should be updated every year (and include data from 1998).*

Comparison of two methods for estimating coho salmon encounters and release mortalities in the ocean mark-selective fishery

Mr. Robert Conrad presented an evaluation of two methods for estimating total encounters of legal-size coho salmon and release mortalities for legal-size marked and unmarked coho salmon in the ocean mark-selective recreational fisheries off the Washington coast (WDFW Marine Catch Areas 1, 2, 3, and 4) (Agenda Item C.3.a, Attachment 4).

For estimating total encounters with legal-size coho salmon, the current method of estimation assumes:

- there is no release of legal-size marked coho salmon by anglers, and
- the proportion of marked and unmarked coho salmon in all legal-size encounters is the same for the charter boat and private boat fleets.

Data collected during the 2009, 2010, and 2011 charter boat observer and voluntary-trip report programs do not support these two key assumptions.

The proposed alternate method incorporates fleet-specific estimates of the release rate of legal-size marked coho salmon and estimates total encounters of legal-size marked and unmarked coho salmon separately for each fleet, and does not rely on either of these assumptions.
The evaluation indicated that the current methods consistently underestimate both the total encounters with legal-size coho salmon and the number of encounters with unmarked legal-size coho salmon. As a result, release mortalities for unmarked legal-size coho salmon were underestimated by about 10 percent to 15 percent in these fisheries during the years 2009 to 2011.

The SS-SSC recommends using the proposed alternate method in 2013 to estimate total encounters of legal-size coho salmon, and release mortalities for legal-size marked and unmarked coho salmon by the ocean mark-selective recreational fisheries in WDFW Marine Catch Areas 1, 2, 3, and 4.

*The proposed method would affect post season estimates (not FRAM pre-season projections).*

*There are several reasons why there may be a difference between fleets in both release of legal-size marked coho and the proportion of marked and unmarked legal-size coho. Charter boat captains try to efficiently fill limits for clients, vs. private boat anglers having more motivation to release their catch hoping for larger fish or more time on the water. There are some differences in distance fished off-shore and communication among boats between fleets, and an indication that private boats may target Chinook more than coho, among other reasons.*

*If there is no difference in encounters or marked/unmarked proportions between fleets, the choice of method doesn't matter (i.e., the point estimate would be the same).*

Review of modifications to Chinook FRAM size limit algorithms implemented to allow evaluation of size limit changes

Mr. Jim Packer presented a proposal for modifying the current size-limit algorithms in Chinook FRAM that are used to predict the number of sub-legal and legal encounters in a fishery (Agenda Item C.3.a, Attachment 5). A previous assessment which evaluated a proposed change to a size limit in a recreational fishery had identified a serious problem with the way Chinook FRAM deals with size limit changes and subsequently projects total encounters. Specifically, it was determined that when a size limit different from the base period limit was entered for a FRAM fishery, the total number of encounters with a stock by the fishery with the changed size limit would increase or decrease - sometimes by a substantial amount. Obviously, this is not expected as the total number of encounters with a stock by a fishery with a changed size limit should remain the same (if everything else is held constant) but the proportion of total encounters classified as sublegal and legal should change.

The proposed modification to FRAM results in the total number of projected encounters with a stock by the fishery with a changed size limit to remain essentially the same. This was done algebraically in the model without any changes to the fundamental methods Chinook FRAM currently uses to model growth, the projected size distribution of a stock at any point in time, or the number of encounters expected with sublegal and legal fish relative to the base period. Because of this, if the proposed changes to the size-limit algorithms were implemented in Chinook FRAM, it could dramatically change the historical exploitation rate patterns for all stocks harvested by fisheries which have had a change in their size limit since the base period. This would affect a substantial number of fisheries and stocks.

In fisheries which have had a size limit change since the base period, the difference between the exploitation rates projected using the proposed algorithms and those projected by the current FRAM could have consequences for management. The new algorithms could potentially increase

the projected exploitation rate for a listed stock or stock with an exploitation rate guideline compared to current Chinook FRAM projections. There is also the possibility it could project lower exploitation rates compared to current FRAM projections. The consequences are difficult to predict without comparable model runs for the two versions of the model.

The SS-SSC recommends that the proposed size-limit algorithms not be implemented in Chinook FRAM. The proposed algorithm would result in different exploitation rate projections for numerous stocks compared to those projected by the current version of Chinook FRAM. These differences would require an application of the revised Chinook FRAM to past years' data so that current conservation standards for many Chinook stocks, which are based on current FRAM estimates of exploitation rates, could be reevaluated retrospectively.

There was discussion if the proposed methodology could be applied only to those fisheries for which size limit changes are currently being proposed. Because of the basic problems identified above, there may be unanticipated consequences of a piecemeal application of the proposed method and this concept is not supported by the SS-SSC. What is needed is an entirely new evaluation of how Chinook FRAM currently estimates sub-legal encounters relative to the base period and how stock-specific estimates of distributions by length are used to estimate sublegal and legal encounters. Any changes to these processes would require a retrospective estimation of stock-specific exploitation rates and a re-evaluation of current stock-specific conservation standards.

There is unfortunately no method currently available to appropriately evaluate the effects of a change to a size limit in a fishery. A method that assesses the effects of a change to a size limit outside the model was discussed. The results from such an analysis could be used to adjust model inputs for that fishery to account for a change in impacts due to a size limit change. This could only occur for those fisheries which have several years of empirical estimates of sublegal and legal encounters in addition to length composition data associated with those encounters. For example, several mark-selective fisheries in Puget Sound have data that might be used for this purpose.