

SUMMARY MINUTES
Scientific and Statistical Committee

Pacific Fishery Management Council
Hilton Orange County/Costa Mesa

Balboa Bay 2

3050 Bristol Street
Costa Mesa, CA 92626

Phone: 714-540-7000

November 1-2, 2011

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

The meeting was called to order at 8 a.m. on Tuesday, November 1, 2011. Council Executive Director, Dr. Donald McIsaac briefed the SSC on priority agenda items.

Members in Attendance

Dr. Louis Botsford, University of California, Davis, CA (Wednesday, Nov. 2nd only)
Dr. Ramon Conser, National Marine Fisheries Service, La Jolla, CA
Mr. Robert Conrad, Northwest Indian Fisheries Commission, Olympia, WA
Dr. Martin Dorn, SSC Chair, National Marine Fisheries Service, Seattle, WA
Dr. Carlos Garza, National Marine Fisheries Service, Santa Cruz, CA (Thursday Only)
Dr. Vladlena Gertseva, National Marine Fisheries Service, Seattle, WA
Dr. Owen Hamel, SSC-Vice Chair, National Marine Fisheries Service, Seattle, WA
Ms. Meisha Key, California Department of Fish and Game, Santa Cruz, CA
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
Dr. Vidar Wespestad, Research Analysts International, Seattle, WA

Members Absent

Dr. Selina Heppell, Oregon State University, Corvallis, OR

SSC Recusals for the November 2011 Meeting.		
SSC Member	Issue	Reason
Dr. Owen Hamel	Pacific ocean perch rebuilding analysis	Dr. Hamel was lead member of the STAT.
Dr. Owen Hamel	Darkblotched rockfish assessment	Dr. Hamel was a member of the STAT
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.		
<i>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.</i>		
SSC Member	External Panel Membership	
Dr. André Punt	Chaired the STAR Panel for Pacific sardine..	
Dr. Ramon Conser	Member of the STAR Panel for Pacific sardine.	

Scientific and Statistical Committee Comments to the Council

The following is a compilation of November 2011 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*).

Salmon Management

C.1 2011 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 Council office in Portland on October 4 and 5, 2011, to review the four salmon methodology issues identified by the Council at the September meeting:

- Abundance-based management framework for Lower Columbia River (LCR) tule fall Chinook,
- Cohort reconstruction and harvest impact model for Sacramento winter run Chinook,
- Examination of the potential bias in Coho Fishery Regulation Assessment Model (FRAM) from mark-selective fisheries, and
- Review and evaluation of preseason and postseason mark-selective fisheries north and south of Cape Falcon.

Abundance-based management framework for Lower Columbia River tule fall Chinook

Mr. Ray Beamesderfer presented the work of the Tule Chinook Work Group (TCW) on evaluating the relative risk and relative change in fishing opportunities presented by alternative abundance-based management (ABM) approaches (Agenda Item C.1.a, Attachment 1). ABM could provide more protection for weak runs, and more fishing opportunity on large runs.

The model was similar to the one used to evaluate Klamath River Fall Chinook *de minimis* fisheries which has been reviewed by the SSC. Data are limited for LCR wild tule Chinook (LRN) so LCR hatchery tule Chinook (LRH) were used as a proxy for predicting the status of the stocks. The Population Viability Model developed included both hatchery and natural stocks in a single model. Results are dependent on the current mix of hatchery and natural stocks.

The model evaluated conservation risk and harvest benefits under a variety of ABM scenarios. Conservation risk was expressed as the probability of natural stocks falling below a critical threshold in 20 and 100 years. Harvest benefit was expressed as change in average harvest numbers over 100 years. “Win/win” scenarios with reduced risk and increased benefits were recommended for further consideration. Consecutive years of restricted fishing are especially damaging to the viability of fisheries. The SSC recommends evaluating the probability of multi-year closures and the median length of closures as additional criteria for comparing scenarios.

The analysis assumes that hatchery production remains constant. If hatchery production changes, then the tier structure will need to be reevaluated. Furthermore, tier frequency of occurrence is modeled on recent past environmental conditions but will be dependent on patterns of future environmental conditions and may not match model expectations in the near future. The SSC considers the methods to be reasonable for addressing the relative risks and benefits. With the addition of a closure analysis, the results will give insights into social and economic effects and be adequate for setting harvest policy.

Cohort reconstruction and harvest impact model for Sacramento winter run Chinook

Dr. Mike O’Farrell (STT) gave presentations on the cohort reconstruction for Sacramento winter run Chinook (Agenda Item C.1.a, Attachment 2) and the harvest impact model developed for Sacramento winter run Chinook (Agenda Item C.1.a, Attachment 3).

Cohort reconstructions were performed for ten broods (1998–2007) of hatchery-origin Sacramento winter run Chinook (SRWC) using coded-wire tag data. The results of the cohort reconstruction indicated that the majority of ocean fishery impacts came from recreational fisheries south of Point Arena, California. For complete broods 1998–2005, the number of potential SRWC spawners was reduced by an estimated 11 to 28 percent due to ocean salmon fisheries. In the future, consideration of genetic stock identification (GSI) data may help to more closely define the distribution of SRWC in the area south of Point Arena.

The winter run cohort reconstruction was reviewed by the Center for Independent Experts (CIE) in March 2010 and its comments were incorporated into the analyses presented for Council review. The SSC considers this cohort reconstruction to provide the best available estimates of:

- a) past SRWC fishery impacts, by time and area, and

- b) parameters needed for the winter run Chinook harvest impact model.

The Winter Run Ocean Harvest Model (WRHM) is similar to the Klamath Ocean Harvest Model (KOHM) and Sacramento River Harvest Model (SHM) have been previously reviewed by the SSC and STT and approved for Council use. The three ocean harvest models treat age structure differently. The KOHM is fully age-structured, the SHM combines all ages and is not age structured, and the WRHM models only age 3 fish. A size-at-age model is incorporated into both the KOHM and WRHM in order to forecast release mortality incurred by sublegal size fish. In contrast to the KOHM and SHM, the WRHM does not account for in-river fisheries, as winter run Chinook are rarely harvested in the Sacramento River.

The SSC considers the WRHM a significant improvement in the Council's ability to model and project harvest impacts on Sacramento winter run Chinook, and endorses the model for Council use. The SSC compliments the authors for providing thorough and comprehensive documents, which greatly facilitated the review process.

The SSC notes that the WHRM cohort analysis and Harvest Model structure lends itself to variance estimates for model projections. The SSC recommends that the incorporation of variance estimates into the Harvest Model projections be explored.

Examination of the potential bias in Coho FRAM from mark-selective fisheries

Mr. Robert Conrad and Ms. Angelika Hagen-Breaux presented an evaluation of the bias in Coho FRAM estimates of the mortalities for unmarked stocks when mark-selective fisheries operate during a FRAM time step (Agenda Item C.1.a, Attachment 4). This has been a difficult issue because the calculations needed to make a rigorous bias adjustment cannot be implemented in the current FRAM. The authors have developed and tested an alternative method to estimate the bias within the FRAM framework.

The analysis compared stock-specific fishery exploitation rates (ER) for unmarked stocks using the standard FRAM to bias-corrected estimates calculated from FRAM output for the years 2009 and 2010. The average differences by which FRAM underestimated the total exploitation rate for unmarked stocks were very low: -0.003 in 2009 and -0.002 in 2010.

In the standard FRAM model, the bias increases with the number and intensity of mark-selective fisheries. Bias in this analysis was low because mark-selective coho fisheries in 2009 and 2010 tended to be relatively low in intensity and concentrated in earlier time periods. In the final time step fisheries are typically more intensive and non-selective. The nature of the FRAM model is to overestimate unmarked mortalities in these terminal fisheries, partially balancing the underestimation of mortalities in earlier mark-selective fisheries. As long as the pattern of fisheries is similar to those in 2009 and 2010, overall bias in the FRAM model is expected to be low.

Although bias was generally low, accounting for bias could be important for stocks that are managed for exploitation rate guidelines. Without bias correction, ER guidelines could be exceeded. This appeared to be a risk for Fraser River Coho and Lower Columbia River Coho.

The differences between the FRAM and bias-corrected ERs in time step 4 (September) were large enough so that these stocks may have exceeded ER guidelines due to lack of bias accounting.

The current testing excluded several significant sources of mortality including catch non-retention (e.g., coho mortality in Chinook fisheries), drop-off mortality, and mark recognition errors. For this reason the total mortality rates reported in these analyses are generally lower than rates that were modeled by the STT. The bias correction results reported could not be compared with more analytically rigorous bias estimates. However, the degree of bias is consistent with the theoretical modeling that the SSC reviewed in 2010.

The SSC recommends that the proposed bias-correction methods be implemented and tested in FRAM. Testing should include code evaluation and verification of results under a variety of fisheries scenarios and with the full set of mortality factors. This implementation should be available for methodology review in 2012 prior to adoption for use in 2013 fisheries modeling. For 2012 fisheries modeling, the SSC recommends continuing to use their interim guidance, including a preseason evaluation of impacts. The Council may choose to include a precautionary buffer for stocks with exploitation rate guidelines.

Review and evaluation of preseason and postseason mark-selective fisheries north and south of Cape Falcon

Dr. Robert Kope (STT) presented an evaluation of causes and effects of bias in anticipated mark rates in the ocean recreational mark-selective fisheries for coho salmon in 2000–2010 (Agenda Item C.1.a, Attachment 5). More unmarked fish are typically encountered per marked fish landed in the ocean mark-selective fisheries than expected preseason, raising the concern that more unmarked fish may be killed as a result of incidental mortality than is projected preseason.

Bias was apparent in the expected mark rates, and varied by year and by management area. Several possible causes of the bias were investigated, including: over-predicting marked hatchery fish abundance; under-predicting unmarked fish abundance; and a differentially lower survival of marked fish relative to that of unmarked fish. The report concluded that under-predicting natural coho abundance was the most likely cause of much of the observed bias in expected mark rates. The report also noted that post-season estimates of incidental mortalities due to the release of coho in mark-selective fisheries have been less on average than predicted preseason because mark-selective fisheries generally have not landed their preseason expected catch or quota. The SSC notes that mark recognition errors and incorrectly reported hatchery mark rates could also contribute to the bias.

The SSC recommends that this issue continue to be examined.

The report of the SSC's Salmon Subcommittee can be found in Appendix A.

Groundfish Management

E.1 Stock Assessments for the 2013-2014 Groundfish Fisheries

The Groundfish Subcommittee of the Scientific and Statistical Committee (SSC-GS) met in Seattle during September 26-30, 2011 to review stock assessments for three groundfish species (widow rockfish, bocaccio, and darkblotched rockfish) and rebuilding analyses for six overfished groundfish stocks (Pacific ocean perch, petrale sole, canary rockfish, yelloweye rockfish, bocaccio, and darkblotched rockfish). The full Scientific and Statistical Committee (SSC) reviewed the assessment documents (Agenda Item E.1.a, Attachments 1-3), the rebuilding analyses (Agenda Item E.1.a, Attachments 5, 6, 8, and 10 and Supplemental Revised Attachments 7 and 9) and the Groundfish Subcommittee report (Agenda Item E.1.a, Attachment 4). The SSC also reviewed the document “An Alternative View of Widow Rockfish Productivity” (Agenda Item E.1.a, Supplemental Attachment 11) prepared by the Groundfish Analysis Team of the Southwest Fisheries Science Center at Santa Cruz.

Bocaccio

Dr Vladlena Gertseva (SSC and National Marine Fisheries Service [NMFS]/Northwest Fisheries Science Center [NWFSC]), Chair of the September meeting, summarized the assessment and the SSC-GS report.

The last full assessment for bocaccio was completed in 2009. An update assessment, presented to the SSC in June 2011, did not meet the terms of reference for an update because of changes in model structure and data. The Stock Assessment Team (STAT) made these changes because a strict update estimated that the 2010 year-class was extraordinarily and unrealistically strong, based on length frequency data collected in the 2010 NWFSC shelf-slope trawl survey. The Council decided that the update should receive additional exploration and review based on a limited set of analyses developed by the SSC.

The revised update assessment covers the stock of bocaccio in the Conception, Monterey and Eureka International North Pacific Fisheries Commission (INPFC) areas and differs from a strict update in the following aspects: (1) it includes a new data source, an index of age-0 abundance based on power plant impingement data, and removes very small fish from the NWFSC data series, and (2) the major axis of uncertainty in the decision table is based on recruitment strength rather than the relative emphasis given to the different biomass indices.

The revised update assessment estimates that depletion in spawning output was 26 percent at the start of 2011, above the 25 percent minimum stock size threshold for rockfish but below the 40 percent management target. If harvests are consistent with the current rebuilding spawning biomass per recruit (SPR) of 0.777, the assessment projects that the stock would rebuild to the 40 percent management target by 2020 under both the base model and the pessimistic alternative, which is based on average strength for the 2010 year-class. The stock would rebuild by either 2016 or 2017 under the optimistic alternative, which allows a very strong 2010 year-class.

The SSC endorses the use of the 2011 bocaccio revised update assessment for status determination and management in the Council process.

The SSC-GS noted that additional fishery and survey data will be available by the March or April 2012 Council meetings. These data could be used to better evaluate the strength of the 2010 year-class. However, these new data cannot be evaluated in isolation. They should be evaluated only within the context of all the other data that inform the assessment model. In any event, a new update, if conducted and approved by the SSC, could be used for setting annual catch limits (ACLs) or annual catch targets (ACTs) for 2013 and 2014 but it should not be used for setting the overfishing limits (OFLs).

The SSC recommends that the next assessment of this stock should be a full assessment so that the strength of the 2010 year-class can be evaluated more rigorously, and to explore the conflicting indices that are currently part of the assessment structure.

Because the bocaccio assessment is based on a fully developed age-structured model, the SSC recommends that bocaccio be treated as a Category 1 stock.

Darkblotched rockfish

Dr. Vladlena Gertseva (SSC and NMFS/NWFSC), Chair of the September meeting, summarized the assessment and the SSC-GS report.

The last full assessment for darkblotched rockfish was completed in 2007 and an update was conducted in 2009. A new update assessment was reviewed by the SSC in June 2011. This update's estimate of depletion at the start of 2009 was 15.1 percent, whereas the comparable estimate from the 2009 update was 27.5 percent. Such a large change in stock status was unexpected. Further, the cause of the change could not be determined during the limited time available for review of the update. The Council therefore decided that the update should receive additional exploration and review based on a limited set of analyses developed by the SSC.

The revised update assessment covers the stock of darkblotched rockfish in the waters off Washington, Oregon, and California. Although the revised update conducted a thorough step-wise evaluation of the new and modified data used in the assessment, the analyses were not able to pinpoint the new data elements that fully accounted for the large drop in estimated depletion. An analysis of the influence of the stock-recruit steepness parameter indicated that the revised update model would have estimated steepness at an implausibly high value (1). The 2007 full assessment and the 2009 update fixed the steepness parameter at 0.6. For the revised 2011 update the SSC-GS and the STAT agreed to fix the steepness at 0.76, the mean value of the most recent prior probability distribution from the meta-analysis of rockfish productivity conducted by Martin Dorn. Also, the SSC-GS recommended that the decision table be structured with stock-recruit steepness rather than natural mortality as the major axis of uncertainty.

Results from the revised update assessment are reasonably consistent with results from the 2009 update. The estimate of depletion at the start of 2009 is 25.9 percent from the revised update whereas it is 27.5 percent from the 2009 update. The revised update assessment estimates that depletion in spawning output was 30.2 percent at the start of 2011, above the 25 percent minimum stock size threshold for rockfish but below the 40 percent management target. The estimated spawning output has increased steadily over the past ten years, more than doubling during this period. If harvests are consistent with the current rebuilding SPR of 0.649, the base

model projects that the stock would rebuild to the management target by 2017.

The SSC endorses the use of the 2011 darkblotched rockfish revised update assessment for status determination and management in the Council process.

The SSC recommends that the next assessment of this stock should be a full assessment to allow further exploration of selectivity assumptions and how to treat the survey data.

Because the darkblotched rockfish assessment is based on a fully developed age-structured model, the SSC recommends that darkblotched rockfish be treated as a Category 1 stock.

Widow rockfish

Dr Vladlena Gertseva (SSC and NMFS/NWFSC), Chair of the September meeting, summarized the assessment and the SSC-GS report.

Widow rockfish was declared to be overfished in 2001. The last full assessment for widow rockfish was completed in 2009. The widow rockfish Stock Assessment Review (STAR) Panel, which met during July, did not endorse the base model for management use and recommended that alternative model configurations be investigated. During the September Council meeting the SSC reviewed the assessment document and STAR Panel report and concurred with the STAR Panel recommendation that further exploration of alternative model configurations was needed. The Council agreed and decided that the assessment should receive additional exploration and review based on a set of analyses suggested by the SSC.

The revised assessment covers the stock of widow rockfish in the waters off Washington, Oregon, and California. Compared to the 2009 assessment, the new assessment made several important changes and simplifications to the model structure. The new assessment has one area. Selectivity curves are assumed to be length-based. Survey selectivity curves are forced to be asymptotic. Spawning output was measured in terms of spawning stock biomass. Natural mortality (M) is estimated separately for males versus females and is influenced by the prior probability distribution for M developed by Owen Hamel. Finally, the steepness parameter for the stock-recruitment relationship was fixed at 0.76, the mean value of the most recent prior probability distribution from the meta-analysis of rockfish productivity conducted by Martin Dorn. In the 2009 assessment the steepness parameter was estimated at 0.41.

There were also some changes in the data used in the new assessment relative to the 2009 assessment, including: treatment of the at-sea processing fleet as a separate fleet rather than as parts of the other fleets and use of length composition data. Recent previous assessments of widow rockfish relied on age composition data and did not use length composition data.

The new assessment estimates that depletion in spawning stock biomass was 51.1 percent at the start of 2011, above the 40 percent management target. Further, the estimated spawning stock biomass has increased steadily from a low of 30.6 percent at the start of 2001. The new assessment estimates that the relative spawning stock biomass never dropped below the 25 percent minimum stock size threshold. The increase in biomass during the past decade was the result of reduced catches rather than strong year-classes. Estimates of recent recruitment have been below model expectations.

The new assessment's estimate of depletion at the start of 2009 was 50.0 percent, whereas the 2009 assessment's estimate of depletion at the start of 2009 was 38.5 percent. This large increase in estimated stock status resulted primarily from the decision by the SSC-GS and STAT to fix the steepness parameter at 0.76 due to the lack of information to reliably estimate steepness. If the new assessment had been allowed to estimate steepness, the value of steepness and the estimate of depletion would have been much lower.

The SWFSC Groundfish Analysis Team disagreed with the assertion by the SSC-GS that "no data currently exist to reliably estimate widow rockfish productivity." The SSC notes that the profile likelihood of steepness for widow rockfish is less informative compared to the steepness profiles estimated for other West Coast rockfish stocks. Furthermore, the magnitude of the likelihood values depends fundamentally on the adequacy of the underlying model structure. Changes in model structure, such as switching from domed to asymptotic selectivity, can produce much larger changes in log-likelihood than 2 units.

The SSC agree with the Groundfish Analysis Team's conclusion that there is considerable uncertainty regarding the new stock assessment's finding that the stock has rebuilt. Productivity and status of this stock are highly uncertain because the available biomass indices are not informative. Nonetheless, the SSC considers the base model of the new widow rockfish assessment to be the best available science.

The SSC endorses the use of the 2011 widow rockfish assessment for status determination and management in the Council process.

If the pessimistic state of nature is correct (steepness is equal to 0.41), then only the 1500 mt catch stream shown in Table ES8a of the assessment document results in the estimates of spawning stock biomass remaining above the minimum stock size threshold during the 10-year projection period.

The SSC recommends that the next assessment of this stock should be a full assessment to incorporate reconstructed historical landings data for Washington, to resolve potential inconsistencies in the age-reading data, to evaluate the strength of incoming year-classes, and to explore the utility of several legacy data sets, such as the Oregon bottom trawl catch per unit of effort (CPUE) index, for which complete documentation is lacking.

Because the widow rockfish assessment is based on a fully developed age-structured model, the SSC recommends that widow rockfish be treated as a Category 1 stock.

Rebuilding Analyses

The SSC reviewed rebuilding analyses for six overfished groundfish stocks managed by the Council: Pacific ocean perch (POP), petrale sole, canary rockfish, yelloweye rockfish, bocaccio, and darkblotched rockfish.

Progress towards rebuilding for the rockfish was reviewed in relation to the median times to rebuild (T_{target}) that were adopted in Amendment 16-4 and/or the current T_{target} that was adopted in 2009 (Table 1, below). Rebuilding is occurring for all species. Figure 1 (below) shows relative population trajectories of overfished groundfish stocks since 1980. The SSC notes the following.

- a) Catches of five of the six overfished species stocks have been lower than what was available as a cumulative optimum yield (OY)/ACL during the period of rebuilding. Catch of canary rockfish exceeded the cumulative OY/ACL by 18.5 percent over the period of 2001-2010. However, the percentage has steadily decreased (which is evident from changes in the running four year average), reflecting active management. POP catch exceeded the rebuilding OY in 2007 by 4 percent. However the cumulative catch for POP over 2000-2010 is only 52.2 percent of the cumulative rebuilding plan OYs for this period. In general, management has been quite effective at curtailing fishing mortality on the overfished stocks in order to rebuild them as quickly as possible.
- b) All rebuilding analyses met the appropriate technical requirements by utilizing the latest version of the rebuilding program and by using the appropriate outputs from the rebuilding program.
- c) In four cases (petrale sole and yelloweye, bocaccio and darkblotched rockfishes) rebuilding is one to eight years ahead of schedule. For these stocks, progress towards rebuilding is considered adequate, and the SSC recommends that no redefinition of T_{TARGET} or adjustment to the rebuilding harvest rate is necessary.
- d) Two stocks are behind schedule and are very unlikely to rebuild by the current T_{TARGET} : canary rockfish and POP. Canary rockfish rebuilding is three years behind schedule. Although this deviation is relatively minor due to the sensitivity in the estimated median time to rebuild at different SPR rates, results indicate that even if all harvest is eliminated from 2013 onwards, there is slightly less than 50 percent probability that the stock will rebuild by the current T_{TARGET} (2027). For POP, if the current SPR rate in the rebuilding plan (0.864) is maintained, the stock would not rebuild with a 50 percent probability until 2051, which is 31 years later than the current T_{TARGET} . The change is primarily due to a revised estimate of B_0 and depletion, rather than the current biomass level. This represents a fundamental revision to our understanding of the status of this species, which in turn warrants revisions to T_{TARGET} .
- e) Given the results of the 2011 assessments, new maximum times to rebuild ($T_{MAX(NEW)}$) were calculated for each stock based on the most recent assessment models and National Standard 1 Guidelines. These are needed for the two stocks which are behind schedule (canary rockfish and POP). Rebuilding will occur for these stocks well before ($T_{MAX(NEW)}$) if the current target SPR harvest rates are maintained. For this reason the SSC suggests that considering status quo harvest rates for all overfished stocks is a reasonable starting point for the Council's deliberative process when developing ACLs for the 2013-2014 biennial cycle.

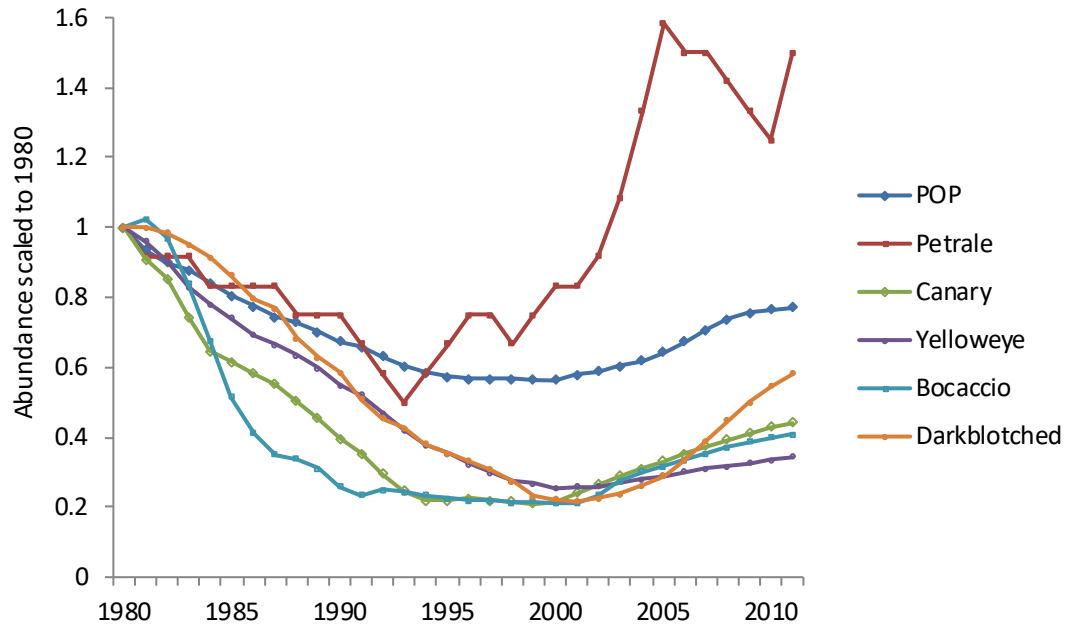


Table 1. Projected rebuilding target dates for overfished groundfish at current harvest rates.

Species	2009 Assessment Depletion	2011 Assessment Depletion	Total Catch/ Total OY During Rebuilding ¹	Adopted SPR Harvest Rate	T _{TARGET} Specified in Amendment 16-4	Current T _{TARGET} ²	New T _{F=0}	New T _{REBUILD} At Current SPR ³	Difference between Current T _{TARGET} and New T _{REBUILD} ⁴	T _{MAX(NEW)} ⁵
Pacific ocean perch (POP)	28.6%	19%	52.2% (2000-2010)	86.4%	2017	2020	2043	2051	<u>-31</u>	2071
Petrale sole	11.6%	18%	NA	30%	2016	2016	2013	2013	3	2023
Canary	23.7%	23%	118.5% (2001-2010)	25-5 rule 88.7%	2063	2027	2028	2030	<u>-3</u>	2050
Yelloweye	20.3%	21.4%	63.7% (2003-2010)	76%	2084	2074	2045	2067	7	2083
Bocaccio	28.12%	26%	35% (2000-2010)	77.7%	2026	2022	2018	2021	1	2031
Darkblotched	27.5%	30%	94% (2002-2010)	62.1%	2011	2025	2016	2017	8	2037

1. The years considered are the years since the stock has been under rebuilding.
2. Current T_{TARGET} is the value adopted, or not modified, by the Council in 2009.
3. T_{REBUILD} is the new time to rebuild at the adopted SPR harvest rate.
4. Positive values reflect rebuilding being ahead of schedule, while negative values reflect delays. Values which are bolded and underlined indicate a substantial difference indicating a low probability of rebuilding by T_{TARGET} (<40%).
5. T_{MAX(NEW)} is the new maximum time to rebuild based on the NEW stock assessment and rebuilding analysis. In the case of petrale sole, the maximum rebuilding time is defined by the 10-year rule which is interpreted here as being 10 years beyond the year the stock was declared overfished (i.e., 2011).

Groundfish Management, continued

E.4 Biennial Management Specifications for 2013-2014 Groundfish Fisheries Pt.1

The Scientific and Statistical Committee (SSC) reviewed Table 1 of Agenda Item E.4.a, Attachment 1; which provides overfishing limits (OFLs) for bocaccio, darkblotched rockfish and widow rockfish. Assessments for these stocks were reviewed by Groundfish Subcommittee of the Scientific and Statistical Committee (SSC) and were endorsed by the full SSC at this meeting. Overfishing limits for bocaccio, darkblotched rockfish and widow rockfish are based the 50 percent spawning biomass per recruit (SPR) rate, which is considered a proxy for F_{MSY} . The SSC recommends adoption of the OFLs for bocaccio, darkblotched rockfish, and widow rockfish in Table 1. The SSC also recommends adoption of the adjusted OFL for canary rockfish in Table 1.

To set acceptable biological catch (ABCs) for these species, SSC again recommends use of the P* approach, in which the buffer between the OFL and the ABC is determined by the value of sigma, representing scientific uncertainty and established by the SSC, and the Council's choice of a P* to express its policy decision on acceptable risk. For all stocks except widow rockfish, the default value of sigma (0.36) for category 1 stocks was considered appropriate. For widow rockfish, the SSC recommends a larger value of sigma (0.41) derived from the base model and low state of nature in the widow rockfish decision table. This approach is intended to better represent uncertainty in stock-recruit steepness, which is considered the major source of uncertainty in the widow rockfish assessment. The resulting buffers for the Council's P* choice are given in Table 2 (Agenda Item E.4.a, Attachment 2).

Two other issues were discussed by the SSC related to OFLs for groundfish. First, it was brought to the SSC's attention that the yelloweye rockfish assessment does not estimate relative year class strength. Based on the criteria established for the stock categories, yelloweye rockfish should therefore be considered in category 2 rather than category 1, and the sigma for category 2 should be used to set the ABC. Second, based on SSC recommendations at the September 2011 meeting, the OFL for the Other Fish complex in Table 1 is the sum of OFLs only for those species with OFL estimates. Species in the complex without OFLs were assumed not to contribute to the OFL for the complex. OFLs could potentially be developed for additional species in the Other Fish complex, but this may require restructuring the complex to include species that are not currently in the complex, such as additional skate species.

SSC notes:

The following method is used to generate a sigma from a decision table:

The ending biomass from the base and low states of nature are assumed to represent the 0.5 and 0.125 points along a log-normal distribution (given that they chosen to represent 50% and 25% of the probability distribution). The high state of nature is not included because P only pertains to the uncertainty in the direction below the base model. To calculate sigma, take the natural log of the ratio of ending biomass in base state to that in the low state. Divide by 1.15 to get sigma (since 12.5% of the probability density resides below 1.15 standard deviations from the mean/median in a normal distribution).*

Council Administrative Matters

J.4 Future Council Meeting Agenda and Workload Planning

Under this agenda item, the Scientific and Statistical Committee (SSC) discussed the Groundfish Management Team's (GMT's) concerns regarding rebuilding analyses and, more generally, the tentative list of the 2012 Council science workshops and SSC subcommittee meetings, reflecting the September 2011 Council decisions.

Mr. Corey Niles (WDFW, GMT) summarized the key points in *Suggested Issues and Questions on Rebuilding for the SSC* (Agenda Item J.4.b, GMT Report). Several other GMT members also participated in the ensuing discussion with the SSC. A strategy for addressing the GMT issues was agreed.

1. The SSC Groundfish Subcommittee will determine which of the GMT issues/questions are scientifically relevant – many of the GMT points address policy issues that are the purview of the Council rather than the SSC.
2. The relevant science issues/questions will be addressed by augmenting the *Terms of Reference for Rebuilding Analyses* (TOR), as appropriate. Other modifications to the TOR – based on the "Post Mortem" review of the 2011 stock assessment process – will also be incorporated into the TOR revision.
3. A draft of the revised TOR will be reviewed during a one-day meeting among members of the GMT and the SSC Economics and Groundfish Subcommittees to be held immediately prior the SSC meeting in March or April 2012. The draft TOR will then be further revised based on points agreed at this meeting.
4. The full SSC will then review the draft the following day, and submit the final revised TOR to the Council for approval.

Mr. Mike Burner (Council staff) presented a tentative list of the 2012 Council science workshops and SSC subcommittee meetings. The SSC generally concurs that items on the list are important and can – for the most part – be completed during 2012, but offers the following comments and caveats.

1. For both the assessment process review ("Post Mortem") and the transboundary stocks issue, it would be mutually beneficial and cost-effective to consider the CPS stocks as well as groundfish.
2. For the Coastal Pelagic Species Methodology Review (to consider incorporating the Canadian trawl survey into the Pacific sardine stock assessment), a meeting in April or May 2012 is preferable to the current tentative scheduling during January or February.
3. Regarding a workshop on assessing the socio-economic impacts of ecosystem-based management, the goals and objectives are somewhat unclear. The SSC is willing to work with the National Marine Fisheries Service (NMFS) Northwest Region (the principal proponent for this workshop) in formulating objectives. Further planning for this workshop should await the development of terms of reference.
4. A workshop on reference points (including B_0) and alternative harvest control rules is desirable but would require a substantial amount of preparatory research to be successful. The workload involved here is likely the greatest of all the workshops proposed for 2012. Firm commitments from the NMFS Science Centers and/or State agencies are most critical for this workshop.

5. A workshop on transboundary stocks in 2012 may be premature. During the coming year, it may be more fruitful to initiate contacts with the appropriate scientists and fishery managers from Canada (for groundfish) and Mexico (for CPS) with the goal of conducting workshops or perhaps joint assessments in the ensuing years.
6. Although the Washington catch reconstruction will not be completed in time for a review in 2012, the methods that will be used for the catch reconstruction could be reviewed in 2012, e.g. methods for estimating the species compositions, the variance of the catch estimates, etc. Such a methods review would benefit the Oregon and California catch reconstructions as well. The topic could be taken up as an SSC agenda item in April 2012, and may lead to a recommendation for a follow-up workshop later in the year.

Although not covered in the tentative list of the 2012 Council science workshops and SSC subcommittee meetings, there is a need to review the socio-economic models used in the management process. While it is not possible to review all of the models used in socio-economic analyses, four models with the highest priority for review were identified by the SSC in September 2011: (i) California recreational model, (ii) nearshore fixed gear model, (iii) non-nearshore fixed gear model, and (iv) revisions to the IO-PAC model. Rather than holding a workshop to review these models, the relevant models could instead be considered in a series of one-day SSC Economic Subcommittee meetings, held immediately prior to the regularly scheduled SSC meetings in 2012.

The SSC reviewed a revised estimate of F_{MSY} for Pacific sardine at this meeting (Agenda Item F.2), and recommended convening a workshop during 2012 to design a simulation analysis that will re-evaluate the sardine harvest control rule and the estimation of F_{MSY} .

Finally, for all potential 2012 workshops and subcommittee meetings, successful outcomes are likely only if sufficient work can be completed prior to the respective meeting dates. While there is ongoing research that could be reviewed for some of the proposed workshops (e.g. Data-Poor Species Assessment), others appear – at least presently – to lack the necessary developmental work, e.g. Reference Points (B_0) Workshop II. It may be advisable to schedule workshops during 2012 only if the NMFS Science Centers and/or State agencies are willing to commit the resources needed to carry out the requisite preparatory work.

SSC Notes

Future socio-economic model reviews would cover additional models: (a) the Oregon recreational model; (b) the Washington recreational model; (c) the limited entry fixed gear sablefish daily trip limit model north of 360 N. latitude (d) the open access daily trip limit (DTL) sablefish north and south of 360 N. latitude; (e) the commercial harvest projections to port regions; (f) the trawl rationalization model (which will be developed this year by the GMT); (g) the community vulnerability analysis; (h) the NWFSC's new vessel financial profile model; and (i) the economic data collection program for catch shares.

Proposed Workshops and SSC Subcommittee Meetings for 2012

Tentative – Depended on funding, dates subject to change

Workshop/Meeting	Potential Dates	Tentative Location	SSC Reps.	Additional Reviewers
Groundfish/CPS Assessment Process Review (Post Mortem)	First Week of Dec. <u>2011</u>	Teleconference/Webinar	2011 STAR Panel Participants.	<i>2011 CIE participation</i>
Acoustic ROV survey for Rockfishes	Early Feb	La Jolla	Dorn, Punt	<i>2 CIE: TBD</i>
CPS Methodology Review(tentative)	April or May	La Jolla	Chair: Punt Hamel	CIE: TBD
Assessing Socioeconomic Impacts in Ecosystem-Based Fisheries Management	First Qtr 2012	Seattle	Econ and EBM Subcms.?	
Data Poor Species Assessment	Late April or Early May	Seattle or Santa Cruz	Dorn, Punt, Conser	CIE: TBD
Reference Points (Bzero) Workshop II	Summer/Fall	Portland	GF Subcm?	CIE 1:
Transboundary Stocks	TBD	?	?	TBD
Groundfish Historic Catch Reconstructions	NMFS Rpt. at Council Mtgs April SSC Mtg	Council Meetings	None	None
Pacific Sardine Updated Assess. Review	Late-Sept or Early Oct	Portland	CPS Subcm. Punt	TBD
Salmon Methodology Review	Early-October	Portland	Salmon Subcm.	None
Clarification on the Conservation Performance of Rebuilding Plans	March 30 SSC Subcommittee/GMT Meeting	Discuss under J4 at Nov 2011 SSC mtg	GF/Econ Subcms & GMT	None
Groundfish Impact and Economic Model Reviews	Held the day before 2012 SSC sessions	Council Meetings	GF/Econ Subcms & GMT	None

Coastal Pelagic Species (CPS) Management

F.2 Pacific Sardine Assessment and CPS Management Measures for 2012

Dr. Kevin Hill presented the 2011 assessment of the northern subpopulation of Pacific sardine and Dr. André Punt reported on the Stock Assessment Review (STAR) Panel that convened on October 4-7, 2011.

The 2011 assessment uses four survey indices: two egg production indices and an aerial index, which have been the primary abundance data series in previous assessments, and an acoustic survey, which had not been previously used. The acoustic survey was reviewed by a methodology review panel earlier this year and endorsed by the Scientific and Statistical Committee (SSC) for use in the assessment model. Additional length data from the Mexican fishery were also included. The current assessment model has many fewer parameters than the 2009 assessment (61 vs. 132). This was accomplished by reducing the number of fisheries modeled, reducing time blocking of fisheries selectivity, and shortening the assessment time period. In addition, during the STAR Panel the initial fishing mortality (F) was set to zero and catchability (q) in the acoustic trawl survey was set to one.

The SSC notes that there are contradictory trends in the three recent survey indices, which introduce substantial uncertainty into sardine biomass estimates. The new model estimated a higher sardine biomass than previous assessments for recent years, and the SSC was advised that this was likely due to increases of varying magnitude in all of the survey indices and recent data suggesting strong recruitment.

The SSC endorses the 2011 assessment as the best available science for management of the northern subpopulation of Pacific sardine in 2012.

Dr. Hill also briefed the SSC on a re-estimation of F_{MSY} in which the Amendment 8 analysis was duplicated with two differences: the Scripps Institute of Oceanography (SIO) Pier temperature index was removed from the stock-recruit relationship, and recent stock and recruitment information was used. The F_{MSY} harvest rate of 0.18 is very similar, but slightly lower than the previous F_{MSY} estimate of 0.1985. The SSC notes that temperature, or another correlated environmental variable, may be important in sardine recruitment, but that the SIO index is not reflective of the temperature in the area of greatest sardine spawning activity and is no longer correlated with sardine productivity.

The SSC recommends that the updated F_{MSY} be used for management in 2012, but that this should be considered strictly an interim measure. The SSC further endorses an overfishing limit (OFL) of 154,781 that arises from this updated F_{MSY} . To set acceptable biological catch (ABC) for sardine, SSC again recommends use of the P^* approach, in which the buffer between OFL and ABC is determined by the value of sigma, representing scientific uncertainty and established by the SSC, and the Council's choice of a P^* to express its policy decision on acceptable risk. The default value of sigma (0.36) for category 1 stocks was considered appropriate for Pacific sardine.

The SSC further recommends that a workshop be convened within the next year to design a simulation analysis similar to Amendment 8 analysis but employs current modeling approaches to provide estimates of F_{MSY} and updated parameters for the harvest control rule. The SSC

further recommends that a full management strategy evaluation be performed for the northern subpopulation of Pacific sardine as soon as time and resources permit.

SSC Notes:

The SSC further noted several potential improvements to future assessments, including incorporation of sex-specific data and considering fishery/fleet structure.

Ecosystem-Based Management

H.1 Integrated Ecosystem Assessment Report

Drs Brian Wells (SWFSC), Nick Tolimieri (NWFSC), and Kelly Andrews (NWFSC) provided the SSC with an overview of the Integrated Ecosystem Assessment (IEA) discussion document (Agenda Item H.1.b, Attachment 1). This substantial document provides information on climate, predator-prey and non-fisheries impacts on hake, sablefish, canary rockfish, bocaccio and Sacramento River Chinook salmon, and moves forward the inclusion of ecosystem considerations in assessments and Council decision-making. The document is one outcome of the IEA process, and is focused on providing information for a limited number of species. It is not a broad overview of the status and trends of the California Current Ecosystem.

The information provided in the report could potentially be used in a variety of contexts, including improving salmon forecast models and identifying information and hypotheses that could be included in stock assessments, and in principle harvest control rules. It may also provide information that would assist the Council when selecting P*, and assist the Scientific and Statistical Committee (SSC) when it assesses sigma, the uncertainty associated with the Overfishing Level.

It will be necessary to develop appropriate processes for reviewing the use of this information. Due to time constraints, the SSC was unable to review the technical aspects of the document, nor was the SSC able to comment on any of questions raised in the document. Rather, review of the document would best be conducted in the context of a focused workshop, which would likely require several days to a full week. Such a workshop would evaluate the detailed analyses underlying the conclusions presented. Once the basic methodology and hypotheses are reviewed, there would be little need to prepare a lengthy document each year; rather an annual update of the basic indices could be provided.

The SSC is concerned that the overall summary plots could be easily mis-interpreted and recommends that these plots be modified to better reflect the uncertainty associated with the indices and their likely impact on stocks. In addition, information should be provided on how the various factors should be weighted when used for decision making.

The SSC notes that the document provides trends in indicators over five years. The appropriate length of time for assessing both time-trends and current indicator status is likely species-specific. The time length for each species should be evaluated separately for each species. The SSC also notes that some of the conclusions such as climate impacts on recruitment and abundance are more definitive than appears to be case from the data. In general, the information provided in the report should be considered hypotheses, which would be examined further before being used for decision making.

Finally, the SSC reiterates the benefit of having scientists with an ecosystem considerations background directly involved in stock assessment teams as this will provide the best way for ecosystem information to be integrated into stock assessments. However, even as currently structured the document is sufficient to identify factors which might be explored in stock assessments.

Ecosystem-Based Management, continued

H.2 Development of a Council Fishery Ecosystem Plan

The Scientific and Statistical Committee (SSC) reviewed a draft of a Pacific Coast Fishery Ecosystem Plan being developed by the Ecosystem Plan Development Team (EPDT). The EPDT proposes development of an annual ecosystem report and species-group reports that would summarize information from the annual ecosystem report for the Council's use in its harvest-setting deliberations.

The SSC notes that the National Marine Fisheries Service Science Centers and the Integrated Ecosystem Assessment (IEA) Team (Agenda Item H.1) have also begun drafting an IEA Report that describes conditions in the California Current Ecosystem as they relate to FMP species. The IEA Report and the annual ecosystem report proposed by the EPDT appear to be similar in terms of objectives and content. The SSC recommends that the EPDT and IEA Team coordinate to ensure that they are working from the same base data, avoid duplication of effort, and perhaps even consider producing a single joint report. Such coordination would be facilitated by the fact that some EPDT members are also members of the IEA Team.

The SSC appreciates the desire of the EPDT to provide relevant species-group summaries that would facilitate the Council's harvest deliberations. The SSC notes that these informational documents (referred to by the EPDT as 'hotsheets') should provide sufficient detail to allow stock assessment scientists and Stock Assessment Review Panels to consider species-relevant ecosystem information in a nuanced manner. The SSC is willing to review future drafts of the annual report and the species-group information documents as they become available.

Appendix A of the draft Fishery Ecosystem Plan includes a preliminary list of lower trophic-level species in the California Current Ecosystem that are currently harvested or could potentially be subject to fishery development. In terms of ecosystem management, the SSC considers it premature to consider lists of species for management action without first considering what species groupings would best serve to promote ecosystem diversity and function. The SSC recommends that the EPDT develop species groupings based on criteria related to diversity and function. The SSC also notes that maintaining ecosystem diversity may or may not require bans on harvest.

Groundfish Management, continued

E.7 Trawl Rationalization Trailing Actions – *Update postponed until March 2012.*

Adjournment: The SSC adjourned at approximately 6:00 p.m., Wednesday, November 2, 2011.

SSC Subcommittee Assignments, November 2011

Salmon	Groundfish	CPS	HMS	Economic	Ecosystem-Based Management
Robert Conrad	Vidar Wespestad	André Punt	Ray Conser	Cindy Thomson	Selina Heppell
Loo Botsford	Loo Botsford	Ray Conser	Robert Conrad	Vlada Gertseva	Ray Conser
Carlos Garza	Ray Conser	Carlos Garza	Selina Heppell	Todd Lee	Martin Dorn
Owen Hamel	Martin Dorn	Owen Hamel	André Punt	André Punt	Vlada Gertseva
Meisha Key	Vlada Gertseva	Selina Heppell	Vidar Wespestad	David Sampson	Pete Lawson
Pete Lawson	Owen Hamel	Meisha Key			Todd Lee
Charlie Petrosky	André Punt				André Punt
	David Sampson				Cindy Thomson
	Tien-Shui Tsou				Tien-Shui Tsou

Bold denotes Subcommittee Chairperson

DRAFT Tentative Council and SSC Meeting Dates for 2012

Council Meeting Dates	Location	Likely SSC Mtg Dates	Major Topics
March 2-7, 2012 Advisory Bodies may begin Thu, March 1 Council Session begins Fri, March 2	DoubleTree Hotel Sacramento 2001 Point West Way Sacramento, CA 95815 Phone: 916-929-8855	Two Day Session Thurs, March 1 – Fri, March 2	GF Stocks for 2013 Assessments Salmon Review/Pre I
April 1-6, 2012 Advisory Bodies may begin Sat, Mar 31 Council Session begins Sun, Apr 1	Sheraton Seattle Hotel 1400 Sixth Avenue Seattle, WA 98101 Phone: 206-447-5534	Two Day Session Sat, March 31 – Sun, April 1	Seabird bycatch in GF
June 21-26, 2012 Advisory Bodies may begin Wed, June 20 Council Session begins Thurs, June 21	San Mateo Marriott 1770 South Amphlett Boulevard San Mateo, CA 94402 Phone: 650-653-6000	Two Day SSC Session Wed, June 20 – Thurs, June 21	P. Mackerel Assessment Final 2013 GF Stock Assess. Fishery Ecosystem Plan
September 13-18, 2012 Advisory Bodies may begin Wed, Sept 12 Council Session begins Thurs, Sept 13	Doubletree Hotel Boise-Riverside 2900 Chinden Blvd Boise, ID 83714 Phone: 208-343-1871	Two Day SSC Session Wed, Sept 12 – Thurs, Sept 13	Salmon Meth. Rev Topic Select Halibut bycatch in GF
November 2-7, 2012 Advisory Bodies may begin Thurs, Nov 1 Council Session begins Fri, Nov 2	Hilton Orange County/Costa Mesa 3050 Bristol Street Costa Mesa, CA 92626 Phone: 714-540-7000	Two Day SSC Session Thurs, Nov 1 – Fri, Nov 2	Salmon Methodology Rev Pacific Sardine Assess. 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 2012

Tentative – Depended on funding, dates subject to change

Workshop/Meeting		Potential Dates	Tentative Location	SSC Reps.	Additional Reviewers
1	Groundfish/CPS Assessment Process Review (Post Mortem)	First Week of Dec. <u>2011</u>	Teleconference/Webinar	2011 STAR Panel Participants.	<i>2011 CIE participation</i>
2	Assessing Socioeconomic Impacts in Ecosystem-Based Fisheries Management	First Qtr 2012	Seattle	Econ and EBM Subctes.?	
3	Acoustic ROV survey for Rockfishes	Early Feb	La Jolla	Dorn, Punt	<i>2 CIE: TBD</i>
4	Clarification on the Conservation Performance of Rebuilding Plans	March 30 SSC Subcommittee/GMT Meeting	Discuss under J4 at Nov 2011 SSC mtg	GF/Econ Subctes & GMT	None
5	Groundfish Historic Catch Reconstructions	NMFS Rpt. at Council Mtgs April SSC Mtg	Council Meetings	None	None
6	CPS Methodology Review(tentative)	April or May	La Jolla	Chair: Punt Hamel	CIE: TBD
7	Data Poor Species Assessment	Late April or Early May	Seattle or Santa Cruz	Dorn, Punt, Conser	CIE: TBD
8	Coastal Pelagic Species Catch Shares II	May	Monterey Area	CPS and Econ Subcm	CPSMT/CPSAS

Proposed Workshops and SSC Subcommittee Meetings for 2012

Tentative – Depended on funding, dates subject to change

	Workshop/Meeting	Potential Dates	Tentative Location	SSC Reps.	Additional Reviewers
9	F _{MSY} for Pacific Sardine	Spring/Summer	La Jolla?	?	CIE: TBD
10	Reference Points (Bzero) Workshop II	Summer/Fall	Portland	GF Subcm?	CIE 1:
11	Pacific Sardine Updated Assess. Review	Late-Sept or Early Oct	Portland	CPS Subcm. Punt	TBD
12	Salmon Methodology Review	Early-October	Portland	Salmon Subcm.	None
13	Groundfish Impact and Economic Model Reviews	Held the day before 2012 SSC sessions	Council Meetings	GF/Econ Subctes & GMT	None
14	Transboundary Stocks	Initial Steps in 2012	?	?	TBD
15	Integrated Ecosystem Assessment – Annual Report and App. to Stock Assessments	2012	?	EBM Subs.	EPDT/EAS

This table was presented to the Council under Agenda Item J.4 after the SSC had adjourned and is included for reference only

SSC SALMON SUBCOMMITTEE REPORT ON
2011 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 PFMC offices in Portland on October 4 and 5, 2011, to review the four salmon methodology issues identified by the Council at the September meeting:

- Abundance-based management framework for Lower Columbia River tule fall Chinook,
- Cohort reconstruction and harvest impact model for Sacramento winter run Chinook,
- Examination of the potential bias in Coho FRAM from mark-selective fisheries, and
- Review and evaluation of preseason and postseason mark-selective fisheries north and south of Cape Falcon.

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

Abundance-based management framework for Lower Columbia River tule fall Chinook

The SS-SSC reviewed the methodology used to evaluate abundance-based management (ABM) strategies for Lower Columbia River (LCR) tule Chinook (Agenda Item C.1.a, Attachment 1). Mr. Ray Beamesderfer presented the work of the Tule Chinook Work Group (TCW) on evaluating the relative risk and relative change in fishing opportunities presented by alternative ABM approaches. Interest in using ABM approaches has increased since the ESA exploitation rate (ER) ceiling has been gradually declining, from 49% in 2002-2006 to 37% currently. ABM would allow for a variable ER ceiling depending upon the predicted escapement, providing more protection for poor runs, and more fishing opportunity on large runs.

The TCW first evaluated whether there was adequate data and predictive capability to use an abundance-based method. While data are limited for LCR wild tule Chinook (LRN), LCR hatchery tule Chinook (LRH) are considered reasonable proxies for predicting the status of the population. The Population Viability Model developed included both wild and hatchery populations in a single model, with simplifying assumptions, such as no hatchery straying onto the natural spawning grounds. The argument for the adequacy of the model given these simplifying assumptions is that the goal is to evaluate relative risk, rather than absolute risk.

Each ABM scheme considers two or more ER levels to be implemented at different LRH abundance forecast levels. It allows for significant prediction error and simulates the population 1000 times over 100 years, then compares the relative risk of the four-year moving average escapement reaching an undesirably low level at any point during that time and also compares the average catch of LRH tules. ABM schemes labeled Win/Win include at least a 3.5% reduction in risk and 3% increase in average harvest (equivalent to a change of 1% to 36% or 38%, respectively) in the current constant ER ceiling. Other concerns, such as the risk of closing different fisheries for more than one year, or for multiple years, could also be considered in choosing an ABM scheme, although that information is not currently provided.

Since Alaska, Canada and treaty catch account for a large portion of the removals, an exploitation rate ceiling below 30% is undesirable, and therefore later runs did not consider schemes with ERs below that level. ABM schemes explored have 1-5 tiers with different associated ERs, or ramps with the ER increasing monotonically with predicted escapement.

The SS-SSC considers the methods and analyses used to be reasonable and adequate for addressing the relative risk as well as expected average harvest amounts of LCR tule Chinook. However, given the uncertainties in absolute risk as well as in prediction, along with the simplifications of the model, the further the alternative ERs are from the current base level of 37%, the more uncertainty there is in the results of the analysis in terms of both relative risk and relative average harvest.

Cohort reconstruction and harvest impact model for Sacramento winter run Chinook

Dr. Mike O'Farrell (STT) gave presentations on the cohort reconstruction for Sacramento winter run Chinook (Agenda Item C.1.a, Attachment 2) and the harvest impact model developed for Sacramento winter run Chinook (Agenda Item C.1.a, Attachment 3).

A cohort reconstruction for Sacramento winter run Chinook (SRWC) was needed to estimate parameters used in the Sacramento winter run Chinook harvest impact model (WRHM). Cohort reconstructions were performed for ten broods (1998–2007) of hatchery-origin winter run Chinook using coded-wire tag data. The results of the cohort reconstruction indicated that the majority of ocean fishery impacts came from recreational fisheries south of Point Arena, California. For complete broods 1998–2005, the number of potential SRWC spawners was reduced by an estimated 11 to 28 percent due to ocean salmon fisheries. The winter run cohort reconstruction was reviewed by the Council for Independent Experts (CIE) in March 2010 and their comments were incorporated into the analyses presented for Council review. The SS-SSC considers this cohort reconstruction to provide the best available estimates of:

- c) past SRWC fishery impacts, by time and area, and
- d) additional parameters needed for the winter run Chinook harvest impact model.

The WRHM is similar to the Klamath Ocean Harvest Model (KOHM) and Sacramento Harvest Model (SHM) for Sacramento fall Chinook that have been previously reviewed by the SSC and STT and approved for Council use. The WRHM shares many structural similarities to the KOHM in particular. Like the KOHM, the WRHM is an age-structured model, though it only accounts for age class 3 fish. The WRHM is linked to a cohort reconstruction model with the same structure as in the KOHM and will be updated annually. A size-at-age model is incorporated into both the KOHM and WRHM in order to forecast release mortality incurred by sublegal size fish. In contrast to the existing harvest models, the WRHM does not account for river fisheries as winter run Chinook are rarely harvested in the Sacramento River. Neither preseason ocean abundance forecasts nor spawner escapement forecasts are made by the WRHM. As such, the WRHM can be considered a simplified harvest model in the same family as the KOHM and SHM.

The SS-SSC considers the WRHM a significant improvement in the Council's ability to model and project harvest impacts on Sacramento winter run Chinook, and endorses the model for Council use. The SS-SSC compliments the authors of the documentation for the cohort reconstruction methodology and WRHM for providing thorough and comprehensive documents

for review which greatly facilitated the review process.

Comments to the authors:

The SS-SSC notes that recent Genetic Stock Identification (GSI) analyses may provide additional data to support and further refine the catch impacts by area and time estimates from the CWT analyses for the Sacramento winter run Chinook stock.

*In calculating total exploitation rate, it might make more sense to look at the total impact on survival as $1 - [(1 - ER \text{ in month 1}) * (1 - ER \text{ in month 2}) * \dots * (1 - ER \text{ in month 12})]$. What is done now is to add up all the catch and divide that by the catch + escapement. This ignores if the catch was in March (Month 1) or February of the next year (Month 12), which means ignoring the effect of mortality throughout the year. Of course the same amount of catch in Month 1 has less overall impact than if it is taken in Month 12, since a substantial amount of natural mortality will have taken place over the course of the year, reducing the population from which the catch is taken. The above equation deals with this by calculating the actual proportional reduction in the modeled returns.*

Examination of the potential bias in Coho FRAM from mark-selective fisheries

Mr. Robert Conrad and Ms. Angelika Hagen-Breaux presented an evaluation of the bias in Coho FRAM estimates of the mortalities for unmarked stocks when mark-selective fisheries operate during a FRAM time step (Agenda Item C.1.a, Attachment 4). This has been a difficult issue because the calculations needed to make a rigorous bias adjustment cannot be directly implemented in FRAM. The authors have developed and tested an alternative method to estimate the bias within the FRAM framework.

The analysis compared stock-specific fishery exploitation rates (ER) for unmarked stocks using the standard FRAM to bias-corrected estimates calculated from FRAM output for the years 2009 and 2010. The average differences by which FRAM underestimated the total exploitation rate for unmarked stocks were -0.003 in 2009 and -0.002 in 2010.

In the standard FRAM model, the bias increases with the number and intensity of mark-selective fisheries. Bias in this analysis was low because the intensity of mark-selective fisheries in 2009 and 2010 was low relative to non-selective fisheries. Mark-selective coho fisheries tend to be relatively low in intensity and concentrated in earlier time periods. In the final time step fisheries are typically more intensive and non-selective. The nature of the FRAM model is to overestimate unmarked mortalities in these terminal fisheries, partially balancing the underestimation of mortalities in earlier mark-selective fisheries.

Although bias was generally low, accounting for bias could be important for stocks that are managed for exploitation rate guidelines. Without bias correction, ER guidelines could be exceeded. This appeared to be a risk for Fraser River Coho and Lower Columbia River Coho. The differences between the FRAM and bias-corrected ERs in time step 4 (September) were occasionally in the range of -0.015 to -0.045. It would be informative to identify the reasons for these higher estimates of bias.

The current testing excluded several significant sources of mortality including catch non-retention (e.g., coho mortality in Chinook fisheries), drop-off mortality, and mark recognition errors. For this reason the total mortality rates reported in these analyses are generally lower than rates that were modeled by the Salmon Technical Team. The bias correction results reported could not be compared with more analytically rigorous bias estimates. However, the degree of bias is consistent with the theoretical modeling that the SSC reviewed in 2010.

The SSC recommends that the proposed bias-correction methods be implemented and tested in FRAM. Testing should include code evaluation and verification of results under a variety of fisheries scenarios and with the full set of mortality factors. This implementation should be available for methodology review in 2012, prior to adoption for use in 2013 fisheries modeling. For 2012 fisheries modeling, the SSC recommends continuing to use their interim guidance, which includes a preseason evaluation of impacts. The Council may choose to include a precautionary buffer for stocks with exploitation rate guidelines.

Review and evaluation of preseason and postseason mark-selective fisheries north and south of Cape Falcon

Dr. Robert Kope (STT) presented an evaluation of causes and effects of bias in anticipated mark rates in the ocean mark-selective fisheries for coho salmon (Agenda Item C.1.a, Attachment 5). More unmarked fish are typically encountered per marked fish landed in the ocean mark-selective fisheries than is expected preseason, raising the concern that more unmarked fish may be killed as a result of incidental mortality than is being projected preseason. The evaluation focused on 2000-2010 Council ocean recreational fisheries.

Bias was apparent in the expected mark rates, and varied by year and by management area. Several possible causes of the bias were investigated, including: over-predicting marked hatchery fish abundance; under-predicting unmarked fish abundance; and a differentially lower survival of marked fish relative to that of unmarked fish. The report concluded that under-predicting natural coho abundance was the most likely cause of most of the observed bias in expected mark rates. The report also noted that post-season estimates of incidental mortalities due to the release of coho in mark-selective fisheries have been less on average than predicted preseason because mark-selective fisheries generally do not land their preseason expected catch or quota.

The SS-SSC endorses the conclusions of the report for Council management.

A review of natural coho forecasts should be considered as a topic for a future methodology review as it could provide additional insight on the issue of the under-prediction of natural fish abundance. Post-season assessment of predicted versus actual impacts should continue to be a part of the annual post-season assessment process.

PFMC
11/16/11