

SUMMARY MINUTES
Scientific and Statistical Committee

Pacific Fishery Management Council
Marriott Hotel SeaTac Airport
Seattle Ballroom 2 and 3
3201 South 176th
Seattle, WA 98188
March 7-9, 2009

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

The meeting was called to order at 8 a.m. on Saturday, March 7, 2009. Dr. Donald McIsaac briefed the SSC on priority agenda items. Dr. McIsaac also noted that annual financial forms for 2009 are due and requested SSC members submit their forms to the Pacific Fishery Management Council (Council) office by the end of March 2009.

Dr. David Sampson announced he will be resigning from the SSC after the March 2009 meeting. The SSC thanked David for his hard work and numerous contributions to SSC responsibilities. The SSC particularly noted the loss of Dr. Sampson's expertise in economics which reduces the SSC Economic Subcommittee to just two members. Subcommittee assignments for 2009 are detailed in the table at the end of this document.

Members in Attendance

Dr. Louis Botsford, University of California, Davis, CA
Mr. Robert Conrad, Northwest Indian Fisheries Commission, Olympia, WA
Dr. Ramon Conser, National Marine Fisheries Service, La Jolla, CA
Dr. Martin Dorn, National Marine Fisheries Service, Seattle, WA
Dr. Owen Hamel, National Marine Fisheries Service, Seattle, WA
Dr. Selina Heppell, Oregon State University, Corvallis, OR
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, Idaho
Dr. André Punt, University of Washington, Seattle, WA (Absent Monday)
Dr. Stephen Ralston, SSC Chair, National Marine Fisheries Service, Santa Cruz, CA
Dr. David Sampson, Oregon State University, Newport, OR
Ms. Cindy Thomson, National Marine Fisheries Service, Santa Cruz, CA
Dr. Theresa Tsou, Washington Department of Fish and Wildlife, Olympia, WA
Dr. Shizhen Wang, Quinault Indian Nation, Mercer Island, WA
Dr. Vidar Westestad, Research Analysts International, Seattle, WA

Members in Absent

Mr. Tom Barnes, California Department on Fish and Game, La Jolla, CA

Scientific and Statistical Committee Comments to the Council

The following is a compilation of March 2009 SSC reports to the Pacific Fishery Management Council (Council). (Related SSC discussion not included in written comment to the Council is provided in *italicized text*).

Coastal Pelagic Species Management

C.1. Stock Assessment Review (STAR) Panel Terms of Reference for 2009

The Scientific and Statistical Committee (SSC) reviewed the revised Coastal Pelagic Species (CPS) Stock Assessment Review (STAR) Panel Terms of Reference for 2009. The revised Terms of Reference provide more flexibility in the completion and review of the CPS stock assessment updates. The SSC recommends making the following change in the last sentence in the Review Format section on page 13 of Agenda Item C.1.a, Attachment 1.

If the review meeting concludes that it is not possible to update the stock assessment, the SSC will consider all of the model runs examined during the review meeting and will provide fishing level recommendations to the Council.

The SSC also recommends the following table, currently in Appendix C, to be a standalone recommendation to guide the 2009 stock assessment process.

Panel	Dates	Goal	Reviewers ^{1/}
1	May 4-8	1. Review Pacific mackerel assessment 2. Review Pacific sardine surveys: (a) Aerial Survey, and (b) Egg Production Survey	5 total (n+4): 2 members of the SSC – Dr. André Punt (Chair), Dr. Owen Hamel, 1 outside reviewer designated by the CIE with stock assessment expertise, 2 outside reviewers – designated by the SSC and the SWFSC with stock assessment and survey expertise.
2	Sept. 21-25	1. Review Pacific sardine assessment	4 total (n+3): 2 members of the SSC – Dr. André Punt (Chair), Dr. Selina Heppell 1 outside reviewer designated by the CIE, 1 outside reviewer – designated by the SSC and the SWFSC.

1/ One member of the CPSMT and one member of the CPSAS will attend each panel as advisors.

Coastal Pelagic Species Management, continued

C.2. Exempted Fishing Permit for Sardine Research

The Scientific and Statistical Committee (SSC) reviewed two Exempted Fishing Permit (EFP) applications submitted for 2009 research on aerial surveys for estimation of sardine biomass. At

issue is the allocation of 1200 MT of sardine for research. The SSC heard presentations by representatives of each of the EFP applicants: Tom Jagielo of the Northwest Sardine Survey, who presented results of a pilot study from 2008, and Diane Pleschner-Steele of California Wetfish Producer's Association, who presented plans for surveys in California.

The Northwest Sardine Survey has made methodological progress through their pilot study and is planning additional data collection to relate aerial survey photos to school biomass. This is essential if a broad-scale aerial survey is to be used to estimate total stock biomass or to develop an index of abundance for use in stock assessment. Both EFP applicants agree to work together on aerial transect and photo methodology to assure that data are compatible for analysis.

We support an aerial survey from Cape Flattery to Monterey Bay using standardized sampling to determine school distribution and abundance. However, the SSC notes that this does not cover the entire range of the stock. The surveys in the north and south portions of this range should be synchronous to avoid potential biases due to school migration. The study plan should clarify how the researchers will confirm that schools identified by pilots are sardine, as opposed to anchovy or other schooling fish. The visual characteristics of non-sardine schools should be identified to assure proper exclusion during analysis of the aerial transect data. The estimated biomass of confirmed sardine schools then needs to be determined through point set sampling. The preliminary data suggest that biomass is variable among schools of similar surface area; this variability needs to be characterized for schools of different sizes in different geographic regions. Variable environmental conditions, depth of schools, fish density within schools and capture techniques may lead to differences in the predicted relationship between school surface area and biomass. A review of historical sardine aerial surveys may provide information on fish behavior and day-night differences. The SSC recommends that the point set sampling for the 2009 EFP be allocated to cover the spatial extent of the study area and sample schools of different sizes.

It will take some time to fully develop survey methods to generate rigorous, reliable data for use in stock assessment. Given the set-aside for 2009 and the biomass of medium to large-sized schools (50+ MT each), it is unlikely that all of these issues can be addressed this year. Mr. Jagielo will have an initial power analysis complete for the May STAR Panel meeting for a discussion of appropriate sample sizes to characterize variability. A full survey design will be needed three weeks in advance of that STAR Panel. A full survey report, and diagnostics of sources of uncertainty will be needed for the STAR Panel review in September. The SSC will ultimately need to assess the utility of the aerial survey approach for stock assessment.

Both groups of researchers should continue to work together on standardized methods to assure that their results can be combined for evaluation. The SSC commends the applicants for their cooperation and industry collaboration in this important research.

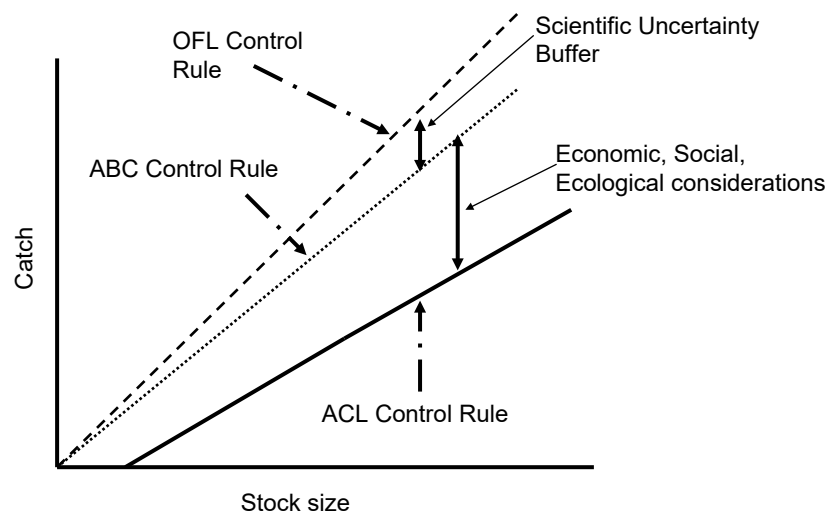
Coastal Pelagic Species Management, continued

C.3. Fishery Management Plan (FMP) Amendments to Implement Annual Catch Limit (ACL) Requirements

All of the Council's Fishery Management Plans will need to be modified to some extent due to implementation of Annual Catch Limits (ACLs). The Council's Coastal Pelagics Fishery

Management Plans already include harvest control rules which relate catch limits to assessment results and monitoring data. These harvest control rules could form the basis for satisfying the ACL requirements.

Three control rules will be needed to address the NS1 requirements. The overfishing limit (OFL) control rule is based on achieving maximum sustainable yield. Catches above the OFL constitute overfishing. Under the reauthorized Magnuson Act, the OFL and the acceptable biological catch (ABC) control rules differ due to scientific uncertainty (the scientific buffer). The ACL is lower than the ABC. The Council’s current optimum yield (OY) control rules (such as the 40:10 control rule applied for groundfish management) account for the impact of ecological, social, and economic considerations. The Scientific and Statistical Committee (SSC) therefore recommends that the difference between the ABC and ACL control rules should account for ecological, social, and economic considerations. The figure below illustrates the three control rules in a hypothetical situation.



The SSC notes that there will not be a need for an annual catch target (ACT) control rule for Council fisheries for which management controls are successful. Such fisheries include groundfish and Coastal Pelagic Species (CPS).

The current Council harvest control rules do not explicitly account for scientific uncertainty. One way to include scientific uncertainty would be to base the ABC on a lower fishing mortality rate than that used to compute the OFL. The extent of difference between the fishing mortality rates used to compute the ABC and the OFL could be calculated based on scientific uncertainty quantified by examining the variation in past assessment results and using the confidence intervals from a stock assessment. The aim of these examinations would be to assess how often the ABC from an assessment would exceed the OFL. It may be necessary to develop a tier system with, for example, three tiers, based on the level of scientific uncertainty, where the scientific buffer is larger for stocks that are more uncertain.

The SSC is required to provide recommendations for ABCs and hence needs to account for scientific uncertainty related to the estimation of OFL. A process should be established whereby the Council

can evaluate the trade-off between the size of the scientific buffer and the risk of overfishing to establish a level of risk aversion. The SSC would then review the application of the scientific buffers based on that policy choice. It is not the role of the SSC to make policy decisions.

Coastal Pelagic Species issues

In relation to Coastal Pelagic Species, the SSC notes that Pacific sardine, Pacific mackerel, northern anchovy, and jack mackerel would require ACLs. Market squid are short-lived and should be an exception under the ACL regulations. Agenda Item C.3.a, Attachment 3 suggests that the cutoffs included in the harvest control rules for Pacific sardine and Pacific mackerel provide a buffer for scientific uncertainty. The SSC does not support this suggestion because the cutoffs included in these harvest control rules were selected to maximize long-term yield given variation in recruitment (an MSY control rule). In relation to jack mackerel and northern anchovy, which are monitored species under the CPS Fishery Management Plan (FMP), the SSC recommends re-examining, and possibly updating, the existing assessments for these species and setting an ACL based on a low exploitation rate. If the catch exceeds this ACL, a stock assessment would be conducted. Even though krill is a prohibited harvest species, an ACL, based on the estimate of MSY included in the CPS FMP, may need to be set.

The SSC reviewed the two schedules in Item C.3.a, Attachment 3. Even the moderate schedule will be very difficult to achieve if additional analyses are required prior to the first FMP amendment drafts.

Salmon Management

D.6. Fishery Management Plan (FMP) Amendments to Implement Annual Catch Limit (ACL) Requirements

All of the Council's Fishery Management Plans (FMPs) will need to be modified to some extent due to implementation of Annual Catch Limits (ACLs). Dr. Peter Dygert discussed the applicability of the new NS1 Guidelines to salmon stocks under Council management. The Council staff summary, Agenda Item D.6.a Attachment 2 presents the latest thinking on how these guidelines could best be applied. Many aspects of the Salmon FMP are compatible with ACLs.

The principal difficulty with applying ACLs to salmon lies in accommodating the diversity of stocks and management approaches that have evolved over time to meet the needs of individual biological stocks as well as political considerations. There is flexibility in the NS1 Guidelines to accommodate some of these existing agreements. Many stocks appear to qualify as exceptions because they are included in the Pacific Salmon Treaty, or are listed under the Endangered Species Act. Other stocks are impacted at low levels in Council fisheries and may qualify as Ecosystem Components.

The FMP needs more explicit definitions of Overfished, Overfishing, and Conservation Concern. Triggers for starting and ending an Overfishing Concern should be made more explicit. In addition, the Council may wish to distinguish between cases of underproduction, where stocks are low because of environmental or habitat considerations, and overfishing, where stocks are low because of fishing activities. The management response may not be different under the two circumstances, but this could help focus restoration efforts on the appropriate sector.

Consideration of uncertainty in salmon management is implemented unevenly. In some cases it is built into escapement goals or exploitation rate control rules. In most areas it is either not explicitly estimated or not considered. Buffers in the Guidelines are linked to uncertainty. More explicit accounting of the various sources of uncertainty in salmon management will help in establishment of realistic buffers that are not overly precautionary.

Accountability measures, as defined in the NS1 Guidelines, are applied differently north and south of Cape Falcon, largely because of the differing management methods applied. The FMP should make it clear how these accountability measures (AMs) align with NS1 Guidelines or why AMs may not be necessary in some cases.

Even the moderate schedule to accomplish this FMP amendment will be difficult to achieve, especially if new methodologies need to be developed to incorporate uncertainty.

Salmon Management, continued

D.1. Review of 2008 Fisheries and Summary of 2009 Stock Abundance Estimates

Dr. Robert Kope, from the Salmon Technical Team (STT), provided the Scientific and Statistical Committee (SSC) with an overview of the 2008 salmon fisheries and abundance estimates for 2009. Dr. Pete Lawson, from the SSC, reviewed a change in the approach to forecasting abundance for Oregon Coast Natural (OCN) and Oregon Production Index (OPI) coho salmon.

The SSC notes that: (1) the Klamath River Fall Chinook stock has failed to achieve its minimum spawner escapement target in four of the last five years and (2) the preseason forecast for the Sacramento River Fall Chinook stock is for an abundance only slightly greater than the 122,000 minimum escapement target.

With regard to the OCN predictor, the Oregon Production Index Technical Team (OPITT) has adopted a new abundance time series based on new run reconstructions and application of the backwards FRAM model. The new data series has the advantage of being consistent with the data series used for FRAM modeling, but it is much shorter than the data series used in previous years and has less contrast in the environmental variables. The OCN forecast model developed for 2009 is similar to previously-used models, but incorporates an environmental variable that accounts for different productivity during warm and cold ocean regimes. The SSC recommends that OCN forecast methods be reviewed at the salmon methodology review in the fall.

The SSC commends the STT for adding figures to Preseason Report I that compare preseason with corresponding post-season estimates for various stocks making significant contributions to Council area fisheries (Figures I-1, I-2a, and I-2b). This additional information facilitates the visual evaluation of uncertainty regarding preseason estimates. As a further step towards a formal evaluation of uncertainty and risk in salmon management, the SSC recommends that Preseason Report I include prediction intervals for estimates of salmon abundance and exploitation rates. Given the uncertainties in projecting salmon abundance and exploitation rates, it is difficult to assess the chances of achieving management objectives or to evaluate whether a management goal has been attained. The explicit recognition of uncertainty in salmon statistics is a necessary first step towards incorporating uncertainty and risk in salmon management decision making. Quantifying this

uncertainty may be needed to meet ACL requirements in the future.

SSC Notes

The SSC requests that in the future, the X and Y axes in Figures I-1, 2a and 2b be swapped so that the preseason forecast is on the X axis and the postseason estimate of abundance is on the Y axis.

Salmon Management, continued

D.2. Identification of Stocks Not Meeting Conservation Objectives

Dr. Robert Kope reported to the Scientific and Statistical Committee (SSC) on identification of Pacific salmon stocks not meeting conservation objectives. Four stocks have failed to meet their escapement goals for three or more consecutive years. These stocks are Queets Spring/Summer Chinook, Quillayute Spring/Summer Chinook, Klamath River fall Chinook (KRFC), and Western Strait of Juan de Fuca coho. The Queets and Quillayute Chinook stocks are exceptions to the Council's overfishing policy because they are harvested at less than five percent exploitation rate in Council fisheries. KRFC are currently subject to an overfishing concern, and are being managed under a rebuilding plan.

Sacramento River fall Chinook failed to meet its escapement goal in 2007 and 2008, and are forecast to be only slightly above the minimum escapement goal in 2009, in the absence of fishing. Abundance for Stillaguamish coho and Snohomish coho are projected to be below their escapement goals in 2009. Because these two stocks fall under the U.S. v. Washington agreement, the Council may allow fishing impacts on these stocks in 2009 if annual management objectives are agreed to by the relevant Parties.

The SSC has concerns about the unavailability of data necessary for a timely assessment of the status for some stocks (e.g., the 2008 postseason escapement estimates are currently not available for Grays Harbor and Queets natural coho).

Groundfish Management

G.1. Pacific Whiting Harvest Specifications and Management Measures for 2009

Dr. Owen Hamel presented the Scientific and Statistical Committee (SSC) with an overview of the Pacific whiting stock assessment (Agenda Item G.1.a, Attachment 1) and Dr. David Sampson summarized the report of the joint Canadian and U.S. Pacific Whiting Stock Assessment and Review (STAR) Panel that occurred February 3-6th in Seattle (Agenda Item G.1.a, Attachment 2). The SSC also received a presentation on an age-structured model developed by Dr. Steven Martell of the University of British Columbia that was not available for review at the STAR Panel. In addition, Mr. Alan Sinclair (Department of Fisheries and Oceans [DFO] Canada) described the process used by DFO to review the assessment conducted by Dr. Martell and presented the review report. It was not possible for the SSC to review this additional assessment in any detail. The SSC notes, however, that there are major differences between the two stock assessments, including: (1) how selectivity was modeled, (2) how the data were aggregated, (3) the weighting of data elements, and (4) productivity assumptions. A thorough evaluation of these differences in model structure, as would

normally occur during a STAR Panel review, would be needed for the SSC to judge the reliability of the Canadian assessment.

The 2009 whiting assessment was implemented using new SS3 software, but on the whole the structure of the assessment was similar to the 2008 assessment. Differences between the 2008 and 2009 assessments included more flexible modeling of fisheries selectivity, improved treatment of aging error, and freely estimating the level of recruitment variability. In combination, these changes produced a large downward shift in the absolute scale of biomass. A new data set, consisting of historical California fishery samples from Santa Barbara during 1963-1970, was also added, but this had very little influence on assessment results. The acoustic survey catchability coefficient (q) was freely estimated for the first time in the 2008 assessment, although it was recognized that this parameter was likely to be imprecisely estimated. Survey catchability was again estimated in the current assessment, and the estimate of q increased from 0.46 in the previous assessment to 0.85 in the current assessment. This had the effect of scaling the estimate of population biomass downwards. Imprecisely estimated parameters are expected to change as additional data are added or when changes are made to a model's structure.

The 2009 assessment did not exhibit a marked retrospective pattern, such that recruitment and spawning stock biomass changed systematically as the terminal year of the assessment was reduced. This is a desirable characteristic of assessment models, but was an issue with the last whiting assessment.

The SSC endorses the use of the SS3-based 2009 Pacific whiting assessment as the best available scientific information and recommends that it be used to form the basis for management of the stock. The assessment results indicate that the Pacific whiting stock has continued to decline as the strong 1999 year class passes out of the population and has not replaced by a similar strong year class. Estimates of stock status indicate that the stock is now at the lowest spawning biomass ever observed and is projected to decline further in the next three years under current harvest management. The Canadian assessment generally led to similar findings as the SS3 model, but also showed a sharp increase in fishing mortality over the last few years.

The SSC recommends that the decision table (Table 1 in Agenda Item G.1.b Supplemental GMT Report) based on the posterior distribution be used for management purposes. The three-year projections in Table g indicate that the stock is likely to approach or decline below the minimum stock size threshold ($0.25B_0$), which is an important consideration for Council decision-making. The SSC would like to point out several 2009 OY values in the Table.

- A 2009 OY of 253,582 mt (first row) represents the maximum likelihood estimate (MLE) of the OY based on the 40-10 harvest policy adopted for Pacific whiting, but this level of catch would result in a 50 percent probability of overfishing in 2009. Although an ABC calculated from the MLE results in a catch of 291,965 mt, the SSC considers the catch level that produces a 50 percent probability of overfishing a better way to calculate the ABC. The SSC therefore recommends that 253,582 mt should be considered the upper limit of potential 2009 OYs.
- A 2009 OY of 215,000 mt approximates the 40-10 harvest control rule if the ABC is 253,582 mt. The SSC regards this value as the best estimate of a 40:10 OY in 2009 because results

from the posterior distribution best account for uncertainty in the assessment, at least in comparison with the MLE result.

- A 2009 OY of 184,000 mt results in a 50 percent probability of the stock dropping below the minimum stock size threshold in 2010. Therefore, a 2009 catch in excess of this amount corresponds to a greater than 50 percent probability of the stock dropping below $0.25B_0$ in 2010, which may lead to the stock being declared overfished, depending on the outcome of the 2010 assessment.

The SSC has previously noted that the population dynamics of Pacific whiting are not well matched to the default harvest policy for groundfish. Whiting biomass would be expected to fluctuate at a level well below $B_{40\%}$ if the fishery were conducted under an $F_{40\%}$ harvest policy for an extended period of time. Given that whiting recruitment is highly variable, application of the 40-10 control rule will lead to excursions into the overfished zone. The SSC reiterates its previous recommendation that the trade-offs achieved by alternative harvest policies for Pacific whiting should be investigated.

Late arrival of the 2008 fishery data left little time for the STAT to analyze, let alone explore, alternative model structures. Future whiting STAR Panels will likely be presented with more than one model to review. An assessment and review process conducted under a compressed timeline, as was done this year, may cause a decline in the quality of the assessment and the review. The SSC recommends that a later date be considered for the whiting STAR Panel, which would allow more time to assemble the prior year's data and would also facilitate the interaction of the U.S. and Canadian analytical teams. Such a delay in schedule might be achieved without disrupting the current fishing seasons if an initial release of quota allowed the fishery to begin prior to finalizing the assessment.

SSC Notes

The assessment included annual aging-error matrices to account for the apparent reduced mis-aging of strong year classes. Since incorporating these matrices into the assessment model produces changes in the relative magnitude of year classes, there is some circularity in this approach.

SSC is concerned about the decision to estimate the parameter for recruitment variability (σ_R), since the usual practice is fix this parameter at a plausible value. The maximum likelihood estimate for this parameter is zero, and the value estimated when fitting the model represents a local minimum (however well defined). The benefits of estimating this parameter are not obvious, and there is some potential that estimating this parameter could have some subtle effect on parameter estimation in general.

Calculations of stock depletion were based on the default option that the growth pattern at start of the modeled period is representative of unfished stock size. Since there have been significant changes in whiting growth, and since studies suggest that these changes are associated with changing environmental conditions and not density dependence (Dorn 1992), this default assumption should be reconsidered. In addition, estimates of growth depend on age reading methods that have improved over time. Alternatives include basing estimates of depletion on the

average growth pattern, or on current growth patterns.

Due to appreciable differences in the 2008 and 2009 assessment results (e.g. the time series of SSB estimates), a systematic, stepwise examination of the new data and modelling changes should be done in preparation for the next stock assessment. The goal would be to ascertain the principal cause(s) for the difference in assessment results..

Adjournment B The SSC adjourned at approximately 5:30 p.m., Sunday March 8, 2009.

SSC Subcommittee Assignments, March 2009

Salmon	Groundfish	CPS	HMS	Economic	Ecosystem-Based Management
Pete Lawson	Owen Hamel	André Punt	Ray Conser	Cindy Thomson	Selina Heppell
Loo Botsford	Loo Botsford	Tom Barnes	Tom Barnes	Todd Lee	Tom Barnes
Bob Conrad	Ray Conser	Ray Conser	Robert Conrad		Ray Conser
Owen Hamel	Martin Dorn	Owen Hamel	Selina Heppell		Martin Dorn
Charlie Petrosky	André Punt	Selina Heppell	André Punt		Pete Lawson
Shizhen Wang	Steve Ralston	Steve Ralston	Vidar Westpestad		Todd Lee
	Theresa Tsou	Shizhen Wang			André Punt
	Vidar Westpestad				Steve Ralston
					Cindy Thomson
					Theresa Tsou

Bold denotes Subcommittee Chairperson

PFMC
05/27/09