

MINUTES
Scientific and Statistical Committee

Pacific Fishery Management Council
Hilton Orange County/Costa Mesa Hotel
Emerald Bay II Room
3050 Bristol Street
Costa Mesa, California 92626
Telephone: 714-540-7000

October 31-November 1, 2013

Members in Attendance

Dr. Andrew Cooper, Simon Fraser University, Vancouver, B.C.
Mr. Robert Conrad, Northwest Indian Fisheries Commission, Olympia, WA
Dr. Martin Dorn, National Marine Fisheries Service, Seattle, WA
Dr. Owen Hamel, SSC Chair, National Marine Fisheries Service, Seattle, WA
Dr. Daniel Huppert, University of Washington, Seattle, WA
Mr. Tom Jagielo, Seattle, WA
Ms. Meisha Key, SSC Vice-Chair, California Department of Fish and Wildlife, 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
Dr. William Satterthwaite, National Marine Fisheries Service, Santa Cruz, CA
Ms. Cindy Thomson, National Marine Fisheries Service, Santa Cruz, CA
Dr. Tien-Shui Tsou, Washington Department of Fish and Wildlife, Olympia, WA

Members Absent

Dr. Vladlena Gertseva, National Marine Fisheries Service, Seattle, WA

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

The meeting was called to order at 8 a.m. on Thursday, October 31, 2013. Council Executive Director, Dr. Donald McIsaac briefed the SSC on priority agenda items.

SSC Recusals for the November 2013 Meeting		
SSC Member	Issue	Reason
Dr. Owen Hamel	H.6 Biennial Harvest Specifications	Dr. Hamel contributed to the estimation of Other Fish OFLs.
Mr. Tom Jagielo	E.2 Coastal Pelagic Species 2014 EFPs	Mr. Jagielo contributed to the Northwest aerial sardine survey EFP.
Dr. Pete Lawson	C.2 Salmon Methodology Review	Dr. Lawson contributed to the 2013 Technical Revision to the OCN Coho Work Group Harvest Matrix.
Dr. Will Satterthwaite	C.2 Salmon Methodology Review	Dr. Satterthwaite contributed to the Sacramento fall Chinook analysis.

C. Salmon Management

2. Salmon Methodology Review

Five topics recommended for review at the abbreviated Salmon Methodology Review were reviewed by the Scientific and Statistical Committee (SSC). SSC comments on each of the topics follow:

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

In November 2012 the Council approved using the wild coho salmon jack-to-smolt ratio from the Mill Creek (Yaquina) Life Cycle Monitoring site as a new predictor of marine survival for wild adult coho salmon for use in 2013 management. Approval was provisional, pending further analysis to address SSC recommendations regarding the new predictor and mitigate possible risks from reliance on a single site for predicting marine survival.

An ensemble mean forecast was developed using seven two-variable generalized additive models that incorporate additional biological and oceanographic indicators to predict marine survival. These models are very similar to the preseason models currently used to forecast OCN abundance. The ensemble mean forecast improved performance compared to the 2012 revision relying solely on the Mill Creek jack-to-smolt ratio. The proposed predictor is more robust to a change in any single indicator, and it appropriately limits impact rates when survival is expected to be low but allows harvest opportunity when it is expected to be high.

Three of the seven ensemble models rely on jack-to-smolt ratio data from the Mill Creek. To address concerns about alternative methods for predicting marine survival if there were a catastrophic failure at the Mill Creek site that prevented estimation of the jack-to-smolt ratio, a suite of three-variable environmental models was developed. An ensemble mean of six three-variable models was shown to perform nearly as well as the two-variable ensemble mean described above and was superior to the model relying on the Oregon Production Index Hatchery predictor.

The SSC recommends that the two-variable ensemble mean model be used to predict marine survival for use in the OCN coho salmon harvest matrix. In the event that jack-to-smolt ratio data from Mill Creek are unavailable, the three-variable ensemble mean model should be used. Every year the models should be refit incorporating the most recent data. Variable selection may change over time, and should be reviewed in five years, or when it becomes clear that some models are no longer well-supported statistically.

Lower Columbia Natural (LCN) Coho matrix control rule

Mr. Chris Kern (Oregon Department of Fish and Wildlife) made a presentation to the SSC which included two new analyses suggested at the subcommittee meeting (Addendum to C.2.a, Attachment 2). The primary purpose of the analysis was to incorporate new information from eight populations, in addition to the Clackamas and Sandy populations, into the framework for evaluating alternative harvest management matrices for LCN coho.

Spawner-recruit functions and full seeding levels were developed for all populations. Methods varied depending on available data, accounting for differences between the Washington and Oregon recovery plans. Relative risk and opportunity for a range of harvest strategies and harvest matrices was evaluated using a stochastic population viability analysis (PVA).

One strength of the proposed analysis framework is that it characterizes the relative risk from alternative harvest scenarios to the entire LCN coho evolutionarily significant unit, rather than simply the two healthiest populations (the Sandy and Clackamas). The SSC recommends using the shorter 1993 to 2009 data sets for the Sandy and Clackamas populations

The SSC evaluated the data reconstruction techniques used and technical aspects of the PVA. We did not evaluate any specific scenarios. The analysis framework is suitable for ranking the relative risk of various harvest scenarios. Numerical estimates of extinction risk from the model should be considered as index values only, and in no way represent actual probabilities of extinction. The analysis is complex, and the SSC identified several areas where alternative analytical techniques could be applied. However, the basic technique and application are sound, and relative rankings of scenarios are not likely to be greatly affected by the statistical refinements suggested. The populations used in the analysis do not exactly match those in the Fishery Regulation and Assessment Model (FRAM) model. These differences will need to be reconciled before a resulting harvest strategy can be applied.

Continued monitoring of LCN coho populations should help refine capacity and productivity estimates for Oregon populations and allow for empirical estimates for Washington populations. Investigation of alternative metrics to better represent marine survival of LCN coho, similar to approaches used for the OCN coho harvest matrix, should also be examined.

Incorporation of estimated legal and sublegal Chinook encounters into the Fishery Regulation and Assessment Model (FRAM)

Ms. Angelica Hagen-Breaux (Washington Department of Fish and Wildlife) presented this analysis to the SSC. Recent Chinook FRAM projections of total sublegal encounters for

fisheries operating under minimum size limit regulations differ substantially from recent field observations for many fisheries. While the basis for differences is not understood, FRAM's current structure allows for *ad hoc* calibration of base period sublegal encounter rates through the use of a simple multiplicative adjustment factor, thereby providing users the ability to improve correspondence between model-projected sublegal encounters and sublegal encounter estimates based on data from sampled fisheries.

A comprehensive set of available sample-based estimates of sublegal Chinook encounters for a range of modeled fisheries was used to develop and test a set of simple computational algorithms to incorporate these data directly into FRAM modeling (i.e., to estimate the necessary adjustment factors for the model). The effect of the proposed changes on key model outputs (e.g., exploitation rates on stocks of conservation concern) was evaluated. Overall, recalibrating FRAM's current base period to produce fishery-level sublegal encounter totals consistent with recent data introduced minimal changes when assessed in terms of stock-specific impacts even though changes in sublegal encounter totals were substantial for some individual fisheries.

The proposed change to FRAM modeling of sublegal encounters: (1) improves fishery-level projections of total sublegal encounters; (2) strengthens the link between ongoing monitoring activities and fishery modeling; (3) minimally changes past assessments of stock-level impacts; and (4) establishes a foundation for improved size-limit modeling.

The SSC noted that the von Bertalanffy method currently used to estimate growth within a year may not be appropriate and may contribute to poor model performance in this area. Future model revisions could address this issue. Recent size-at-age data are most relevant to current fisheries. The SSC recommends that data be updated annually and older data that may not represent current conditions be dropped from the time series as appropriate.

The SSC recommends the incorporation of the revised sublegal encounter estimates in the FRAM model for 2014.

Modifications to Fishery Regulation and Assessment Model (FRAM) algorithms on sublegal and legal encounters and minimum size limits

Ms. Angelika Hagen-Breaux (Washington Department of Fish and Wildlife) gave a presentation to the SSC on a proposed change to Chinook FRAM which would allow evaluation of proposed size limit changes to FRAM fisheries. Chinook FRAM was originally designed to evaluate changes in fishery catches and stock impacts resulting from changes in minimum size limit regulations. Recent attempts to use this feature revealed the FRAM methodology and supporting data to be flawed.

At the 2012 Salmon Methodology Review, the Washington Department of Fish and Wildlife presented a method to address this size limit problem. Several issues were raised by the SSC at the 2012 review. The SSC recommended not to adopt the changes presented in 2012.

For the October 2013 Salmon Methodology Review, an improved method to estimate sublegal encounters in FRAM was suggested (see previous discussion item). Using updated sublegal

encounter rates reduces the exploitation rate changes calculated for key stocks. Because encounters would be calibrated to recent-year observations under the proposed approach, those fisheries that experienced size limit changes since the base period would no longer need to be adjusted; only recent size limit changes would need to be modeled. In addition, the adjustment algorithm was modified to keep total encounters constant.

While this method addresses a known FRAM problem in evaluating proposed changes to fishery size limits, it does not address the problem of FRAM incorrectly allocating sublegal impacts to stocks and age groups. This problem would be addressed by the work currently being done to develop and implement a new Chinook FRAM base period including revisions to the model code dealing with growth.

The SSC recommends incorporating this method in FRAM modeling for 2014. This would be an interim measure until a new Chinook FRAM base period, model code revision, and model calibration allows incorporation of new growth and size limit algorithms.

Alternative forecast methodologies for the Sacramento Fall Chinook Index

Dr. Mike O'Farrell (National Marine Fisheries Service, Southwest Fishery Science Center) presented an analysis of alternative forecast methodologies for the Sacramento Fall Chinook Index (SI) to the SSC. The analysis compared the performance of a variety of potential forecast models for the SI. Models included simple averages, jack to SI regressions with multiple lags, time series models based on autocorrelated error or smooth changes in the jack relationship, and regressions including environmental variables. Models were fitted with data from 1983, in contrast to the shorter time series currently in use. Models were evaluated statistically, and examined for their ability to track recent trends in the SI that have proven challenging to forecast.

Most models out-performed the current model based on "leave one out" and "one year ahead" cross-validation techniques. Some environmental models performed well, but the environmental factors that contributed to the forecast tended to change over time, leading to the conclusion that variable selection in these models was inherently unstable. The authors identified a simple autoregressive error model relating jacks to SI as the most parsimonious and robust alternative. This model allowed for temporal changes in the expected ratio of the SI to the number of jacks the previous year through autocorrelation in residual errors. The performance gains compared with the current model are modest when error is calculated across all years, but the model structure should reduce the risk of extended periods of over- or under-predictions.

The SSC recommends use of the proposed "Model 8" for forecasting the SI in 2014.

E. Coastal Pelagic Species Management

2. Exempted Fishing Permit (EFP) for 2014 Notice of Intent

The Scientific and Statistical Committee (SSC) reviewed the notice of intent to conduct another

Pacific Northwest aerial sardine survey under the Council's exempted fishing permit process. No written report on the 2013 Northwest Aerial Sardine Survey was provided to the SSC. Due to extensive fog, the 2013 survey was unable to proceed as planned, and returned half of the 3,000 ton harvest quantity originally allocated for the survey. The SSC expects to see a full report of the 2013 survey at our March 2014 Pacific Council meeting, and we will provide a more detailed review then. A broader review of this survey approach should be conducted next year, perhaps in conjunction with a review of the southern California survey.

3. Establish Maximum Sustainable Yield (MSY) Reference Point for Northern Anchovy

No new scientific information relevant to establishing an maximum sustainable yield (MSY) for the northern subpopulation of northern anchovy is available, and so the Scientific and Statistical Committee (SSC) reiterates its recommendation from November 2010 that $F_{MSY}=0.3$. This is the default exploitation rate for Pacific mackerel, and is deemed appropriate because northern anchovy are likely to be at least as productive as Pacific mackerel, and likely have higher natural mortality, which would typically be associated with a higher F_{MSY} . The SSC notes that when used in the context of coastal pelagic species (CPS) management, F_{MSY} is an annual exploitation rate rather than an instantaneous fishing mortality rate.

Reference points for monitored CPS stocks such as the northern subpopulation of northern anchovy are difficult to determine due to limited data to estimate biomass and productivity. This subpopulation is currently lightly fished, with inconsistent effort, making the time series of catch an unreliable indicator of stock status. Due to both high uncertainty and large fluctuations in stock biomass, a fixed biomass-based or catch-based MSY is not meaningful.

F_{MSY} should be revisited if new information on productivity becomes available.

4. Methodology Review Process and Preliminary Topic Selection

Mr. Kirk Lynn (CDFW) provided the Scientific and Statistical Committee (SSC) with an overview of the aerial survey for Pacific sardine in the Southern California Bight. This survey is a partnership between the CDFW and the California Wetfish Processors Association. The survey involves a series of transects during which an observer visually estimates the tonnage and number of schools on each transect and photographs are taken throughout the transect. The tonnage of fish estimated for the Bight could be used to create a relative index of abundance for use in assessments. The data collected on species composition of schools could be validated using samples collected using jigging. That sampling could also be used to provide biological information on the size composition of fish schools.

The SSC identified several technical issues that would be discussed during a review of this aerial survey and relayed them to the proponents. Addressing some of these issues will require the collection of additional data. The proponents of the survey should consider whether it will be possible to sufficiently address these issues by the time of a review. A review of the California Bight survey could potentially occur during Spring 2014 at the earliest, ideally in conjunction with a review of the acoustic-trawl survey or the aerial survey in the Pacific Northwest.

The SSC reviewed the draft Council Operating Procedure (COP) 24. The COP should make clear the link with the Terms of Reference developed for conducting methodology reviews for groundfish and Coastal Pelagic Species. In addition, it should be made clear that the TOR referred to on page 2 of the COP pertains to the technical aspects of the specific methodology being reviewed.

5. Pacific Sardine Stock Assessment and Management for 2014, Including Tribal Set-Aside

The Scientific and Statistical Committee (SSC) heard a presentation from Dr. Kevin Hill on the new Pacific sardine biomass projection. No new survey data are included in the projection model; however, catch data that were previously included as preliminary estimates are now incorporated as actual values for the second semester of 2011 and the first and second semesters of 2012. The additional data enabled estimation of 2012 year class recruitment, which was below the historical average.

The harvest guideline (29,770 mt) has decreased from the previous assessment, resulting from a declining trend in biomass, coupled with a change in timing of the biomass estimate from the middle to the end of the year.

The SSC endorses the overfishing limit for the calendar year 2014 (59,214 mt) which will be updated (superseded) by a new assessment scheduled to be reviewed in March 2014. The new assessment will incorporate updated fishery composition data for the US, and new survey data, including 1) a spring 2013 daily egg production method (DEPM) estimate, and 2) spring and summer 2013 acoustic-trawl survey (ATM) estimates. Based on preliminary survey reports, a continued decline is expected.

The SSC recommends keeping the stock at category 1 for the purpose of deriving the acceptable biological catch (ABC). The SSC also notes that a continuing shortcoming of the Stock Synthesis model (no coefficient of variation of summary biomass) should be addressed. This information is routinely needed to derive the P* buffer, and would greatly aid calculation of ABCs going forward.

H. Groundfish Management

7. Essential Fish Habitat (EFH) Review Phase 2 Report and Proposals to Modify EFH

The Scientific and Statistical Committee (SSC) reviewed the draft Phase 2 report from the Essential Fish Habitat Review Committee (EFHRC) (Agenda Item H.7.b, Supplemental Attachment 1). Mr. Kerry Griffin briefed the SSC on the report and was available to answer questions.

The SSC notes that the EFHRC's Phase 1 report (presented to the Council in September 2012) and the subsequent Synthesis Report developed by NMFS (presented to the Council in April 2013) indicate the availability of extensive amounts of new information relevant to groundfish essential fish habitat (EFH). Should the Council decide to proceed with Phase 3, it would greatly facilitate the process, especially the analysis of alternatives, if the Council evaluated the

effectiveness of the current EFH designations and conservation areas relative to meeting its objectives. Without such an evaluation it may be difficult to gauge whether proposed changes to EFH are likely to be improvements.

5. Approve Stock Assessments and Cowcod Rebuilding Analysis

Data-moderate Stock Assessments

The Scientific and Statistical Committee (SSC) reviewed the results of revised stock assessments for brown, China, and copper rockfish conducted by Dr. E.J. Dick (SWFSC). The revised assessments considered alternative spatial stratifications and included a revised catch time series from the Oregon Recreational Boat Survey (ORBS). The revised assessments for all three species showed very minor differences in spawning biomass trajectories under the alternative spatial stratifications. In cases where assessment boundaries do not align with management boundaries, the overfishing limit (OFL) should be apportioned based on historical catch data.

For brown rockfish, the Stock Assessment Review (STAR) Panel approved a coastwide model. A revised model was presented for California only. The SSC concluded that insufficient data were available to assess the area north of California separately and recommends using the original STAR Panel-approved coastwide model to obtain the OFL. Any spatial allocations of the coastwide OFL should be done using historical catch proportions by area.

For China rockfish, the STAR Panel approved two models (northern and southern) split at 40°10' N. lat. A revised stratification was presented with the northern-southern split moved to 42° N. lat. The SSC finds no scientific basis to recommend choosing between these two alternatives. The models used to provide the OFL should reflect the management boundaries selected by the Council.

For copper rockfish, the STAR Panel approved two models; one for south of Point Conception and another covering the area from Point Conception to the U.S-Canada border. A revised stratification was presented for the area north of Point Conception, yielding two models with a split at 42° N. lat. Based on an evaluation of model diagnostics, the SSC does not have confidence in the results of the Oregon-Washington model. The SSC recommends using the STAR Panel-approved models and applying historical catch data to apportion the OFL, either at 40°10' N. lat., or at 42° N. lat.

The SSC discussed how requests for changes in stock assessment boundaries late in the process could be avoided in the future, since these requests were disruptive in this year's stock assessment process. Issues concerning stock boundaries should be addressed early in the stock assessment process. One possibility is to strengthen the recommendations in the Stock Assessment Terms of Reference for the stock assessment team (STAT) to consult early in the process with the GMT and fisheries managers about spatial management issues associated with the stock being assessed. The SSC emphasizes that biological and scientific considerations must take precedence in developing stock assessments.

Cowcod Rebuilding Analysis

The SSC reviewed a draft rebuilding analysis for cowcod (Agenda Item H.5.a., Supplemental

Attachment 2), based upon the 2013 assessment. Progress towards rebuilding was reviewed in relation to the current median time to rebuild (T_{TARGET}) for cowcod of 2068. The current spawners per recruit (SPR) harvest rate ($F_{82.7\%}$) implies that the stock will rebuild by 2020 with a 50 percent probability, so rebuilding is ahead of schedule. The catches of cowcod have been lower than the cumulative annual catch limit (ACL) during the period of rebuilding. The SSC concludes that progress towards rebuilding is ahead of schedule.

The rebuilding analysis for cowcod was conducted using Extended Depletion-Based Stock Reduction Analysis (XDB-SRA) rather than the rebuilding software used for assessments conducted in Stock Synthesis (i.e., the Puntalyzer). There was limited time to conduct all the required model runs, and thus the analyses shown to the SSC were preliminary. However, successful runs providing projections of zero catch, catch given the current ACL, and catch under the current SPR rate (Runs 1-3) may provide sufficient basis for Council decision-making. The run needed for the SSC to set an OFL was not available to the SSC. The rebuilding analysis will be completed in time for an SSC Groundfish Subcommittee call in late 2013. Any requests for additional model runs (besides the appropriate OFL run) should be communicated to the STAT.

3. Sablefish Permit Stacking Program Review Scoping

Mr. Jim Seger (PFMC) briefed the Scientific and Statistical Committee (SSC) regarding the preliminary plans for the sablefish permit stacking program review. The SSC discussion focused on highlighting priority indicators for several of the objectives described in Agenda Item H.3.a, Attachment 3. The list of priority indicators recommended for objectives 1-3 follows.

1. Objective 1 – Rationalize the fleet and promote efficiency
 - a. Season length and average fishing days by year
 - b. Table 1 as currently defined
 - c. Table 1 information for before and after program implementation, not aggregated by tier ownership
 - d. Permit price for available years.
2. Objective 2 – Maintain or direct benefits toward fishing communities
 - a. Port involvement and dependence ratio
 - b. Proportion of fixed gear allocation harvested by year
 - c. Percent of landings by owner on board versus non-owner on board vessels
3. Objective 3 – Prevent excessive concentration of harvest privileges
 - a. Graph of ownership concentration
 - b. Gini coefficients for ownership concentration
 - c. Graph of control concentration
 - d. Gini coefficients for control concentration

6. Biennial Harvest Specifications for 2015-2016 Groundfish Fisheries

Estimating OFL for Species in the “Other Fish” Complex

The SSC reviewed Agenda Item H.6.a, Supplemental Attachment 6 that describes a procedure for calculating overfishing limits (OFLs) for some species for which OFLs were requested. The method applies F_{MSY} harvest rate proxies to estimates of stock biomass from the NWFSC West Coast Bottom Trawl Survey. This method was used during the previous biennial harvest specification cycle to provide OFLs for big skate, California skate, ratfish, and Pacific grenadier. The SSC endorses the approach, but notes that the method makes the strong assumption that the survey catchability coefficient is 1.0 and likely results in a conservative OFL for species such as grenadier whose geographic range extends into depths beyond the survey area. Also, the OFLs for these species should be updated as additional survey data become available.

OFLs for Kelp Greenling and Cabezon

There are no OFLs for kelp greenling off Oregon and Washington or for cabezon off Washington in the current table of proposed OFLs (Agenda Item H.6.a, Attachment 1). It may be possible to develop DB-SRA estimates for these stocks. The SSC was informed that (time permitting) Dr. E.J. Dick would: (a) assemble the needed catch history data; (b) send it to agency staff in Oregon and Washington to confirm the acceptability of the catch histories; and then (c) derive the DB-SRA estimates by early December 2013. However, his top priority would be to complete the rebuilding analysis for cowcod. The SSC will review the DB-SRA estimates of OFLs for these species during a conference call that will be scheduled for December.

Category Designation for the Rougheye / Blackspotted Rockfish Assessment

The SSC revisited the decision that was made at the September meeting to designate the new stock assessment for rougheye rockfish as a category 1 assessment. Given that the assessment is for a complex of two species (rougheye and blackspotted rockfish) and given that there is insufficient information available to confirm that these species have similar vulnerability to the fishery and rates of biological productivity, the SSC recommends that the assessment be classified as a category 2 assessment. Both the ABCs and decision table will be updated to reflect this change.

OFLs for Canary Rockfish

The OFLs for canary rockfish originally included in the September briefing book were not endorsed by the SSC in its September statement because of concerns that they may have been incorrect (Agenda Item G.7.b, Supplemental SSC Report, September 2013). Subsequent investigation of the calculations found that the values originally presented in the September briefing book are correct and the SSC recommends these values.

OFLs for Cowcod

The OFL for cowcod in the Conception area will be derived from the completed rebuilding analysis. The OFL for the Monterey area will be derived from an application of DB-SRA using a distribution for depletion for cowcod in the Conception area as a prior to estimate the OFL. These OFL decisions will be a part of the SSC Groundfish Subcommittee conference call discussions planned for December.

OFL Recommendations

The SSC recommends the OFLs and assessment category assignments that are presented in the revised table of harvest specifications for 2015 and 2016 (Agenda Item H.6.a, Supplemental Attachment 7). The OFLs for brown, China and copper rockfish will be determined by the Council's decision regarding the management boundaries. The table includes some species that are not currently included in the FMP but are under consideration with regard to revisions to the stock complexes (e.g., Aleutian skate).

Ecosystem Considerations in Tier 1 Environmental Impact Statement

The SSC discussed the findings of the SSC's Ecosystem-Based Fishery Management Subcommittee (SSC-ES), which met on October 30 with members of the California Current Integrated Ecosystem Assessment Team and the Groundfish Management Team, to discuss the use of ecosystem models to inform the Tier 1 Environmental Impact Statement (EIS) (see attached). The Atlantis model was deemed the only ecosystem model currently capable of contributing to the Tier 1 EIS. Atlantis covers the area from Point Conception to Cape Flattery and thus excludes the Southern California Bight. The model can be used to evaluate ecosystem effects associated with harvest but not the effects of fishing on habitat. Some groundfish stocks are modeled individually while others are grouped into larger functional groups. Three west coast applications of Atlantis have been published in the peer-reviewed literature.

The SSC recommends that published findings from Atlantis regarding ecosystem effects of groundfish harvest be considered for their relevance to the Tier 1 EIS. Atlantis should also be used directly in the Tier 1 EIS to evaluate the ecosystem effects of a limited number of catch projections representing low and high states of nature. Because ecosystem effects may not be fully realized until after the 10-year Tier 1 projection period, the SSC recommends that Atlantis extend the catch projections for at least another 20 years based on the fishing mortality rates experienced in the tenth year of the projection period. The SSC requests that the Atlantis modelers consult informally with the SSC-ES this winter regarding the types of ecosystem indicators that they anticipate providing for the Tier 1 analysis.

The use of Atlantis in the Tier 1 EIS represents a first exploratory use of ecosystem models for Council decision making. Atlantis outputs should be interpreted qualitatively rather than quantitatively. Although Atlantis is also capable of evaluating economic and social effects, in the interest of time and pending further review of the model, the SSC recommends that its use for this Tier 1 analysis be limited to ecosystem effects. The SSC recommends a thorough review of Atlantis to more fully understand its capabilities and limitations. Dr. Isaac Kaplan (NWFSC) is expected to complete the documentation needed for such a review by June 2014. Results of the review would not be available in time to inform the Tier 1 analysis but could be useful for future specifications cycles.

Report of the Ecosystem Subcommittee Meeting on Ecosystem Considerations in the Groundfish Harvest Specification EIS Analysis

The SSC Ecosystem-Based Management Subcommittee met on October 30 with members of the NOAA California Current IEA Team (Drs. Phil Levin and Isaac Kaplan of the NWFSC, Drs. John Field and Brian Wells of the SWFSC), Mr. John DeVore, and Messrs. Corey Niles and Dan Erickson (Groundfish Management Team) to discuss the general analytical approach to be used in the Tier 1 Environmental Impact Statement (EIS) and the potential ecosystem effects that could be incorporated into that analysis.

The Tier 1 EIS is being prepared as part of the 2015-2016 harvest specifications process to help alleviate the arduous analytical and procedural workload that currently occurs in each biennial cycle. The Tier 1 EIS will analyze the effects of a range of plausible catch streams over the next 10 years, although ecosystem impacts may be assessed over longer timeframes. Beginning in 2017-2018, catch alternatives that fall within this range could be evaluated by reference to the Tier 1 analysis. The Tier 1 EIS could be modified before the end of the 10-year period, should new information become available that substantively changes the catch projections or the data and methods used to analyze the effects of those projections. The Subcommittee supports the general approach being proposed for the Tier 1 EIS.

Dr. Isaac Kaplan provided a summary of existing ecosystem models which could potentially inform future Council actions, and outlined features of the Atlantis model. The Subcommittee then considered these presentations in the context of the needs for the Tier 1 EIS analysis.

Apart from the Atlantis model, there are four models which have been applied to the US West Coast:

- The Ecosim model of the California Current was originally developed by Dr. John Field. This model covers the US West Coast north of Point Conception, and represents 63 functional groups, including 17 groundfish species. This model, unlike Atlantis, is not spatially-structured, but could form the basis for an evaluation of the impacts of future catch series on ecosystem characteristics. A concern with this model is that it was parameterized in the early 2000s. Substantial changes to our understanding of the biomass and dynamics of species off the West Coast have occurred since then. Although work is underway to update the model, a reparameterized model will not be available in time for the Tier 1 EIS analysis.
- EcoTran is a model for Oregon which includes more than 80 functional groups, and focuses on lower trophic level processes. Like Ecosim, EcoTran is non-spatial. However, it does account for uncertainty due to parameterization and input data. This model is not currently set up to conduct projections so is not suitable for a Tier 1 EIS analysis.
- ROMS-COSINE is a model which can be used to represent benthic habitat based on physical features. This model could provide input for other models. However, as it does not currently include groundfish, it is not suitable for a Tier 1 EIS analysis.
- NEMURO-SAN is a fine-scale model which represents the dynamics of the lower trophic levels. However, it currently focuses on the coastal pelagic food web, and only includes two fish species making it unsuitable as the basis for Tier 1 EIS analysis.

These models each include features which may be useful as the Council moves forward to take ecosystem considerations into account. However, none of these models is immediately useful

nor could they be suitably modified in time for use in the Tier 1 EIS analysis. In contrast, the Atlantis model for the West Coast has been developed specifically to conduct evaluations of fisheries management policy. Atlantis is capable of representing multiple trophic levels spatially and includes modules which allow fisheries and fisheries management actions to be modeled. Atlantis can be used to obtain a better understanding of fisheries, management systems, social and economic behavior and climate impacts on entire ecosystems. The model has been implemented for a number of ecosystems worldwide. Three implementations for the west coast of North America and one for Northeast U.S. have been published in the peer-reviewed literature.

The Atlantis model for the U.S. West Coast covers the region from Cape Flattery to Point Conception and models 51 biological functional groups, including 21 fish groups. It can allow for multiple fisheries and a variety of management controls. The Atlantis model is best suited of the models reviewed for conducting analyses for the Tier 1 EIS. The Subcommittee recommends that the Atlantis model be incorporated into the Tier 1 EIS by discussing the results of published research using the Atlantis model, and by a limited set of model runs that evaluate the ecosystem impact of catch projections from single species models. The SSC EBFM subcommittee has the following recommendations in relation to the analyses for evaluating the impact of catch streams on ecosystem characteristics.

- The results should be reported largely qualitatively (for example as changes which are near zero, small and negative, large and negative) and the focus should be on between-scenario variation in results rather than the results as predictions of the future.
- The focus for the evaluation should be on ecosystem impacts even though Atlantis can provide social and economic outputs, due to the added workload of providing these latter outputs and the short time frame for completing the Atlantis runs. Social and economic effects will be included as usual in the biennial specifications analysis.
- Atlantis is not designed to evaluate fisheries impacts on habitat; other analytical methods would be needed to evaluate those impacts in the Tier I EIS.
- Analysts should consult with Council Advisory Groups including the SSC to ensure the set of model outputs reflect Council issues and concerns.
- The number of scenarios should be kept to a minimum. Atlantis can implement the control rules used for managing West Coast species, or can be run with a pre-specified series of catches. However, the control rule option has not been tested for the West Coast. It would therefore be advisable to run the model for pre-specified series of catches.
- The impacts on the ecosystem may only occur well after ten years. Projections should therefore be undertaken in which the catches for the first ten years of the projection period are based on the catch streams reported in decision tables and the catches for the eleventh and subsequent years determined by setting the fishing mortality by species equal to that for the tenth year of the projection period.
- Catches should be assigned spatially rather than using a model of fleet dynamics under catch shares.
- The number of catch scenarios should be minimized, for example by creating a “high” catch scenario in which the catches by species are set to those for high state of nature and a high P^* , and another “low” catch scenario in which the catches by species are set to

those for low state of nature and a low P^* . If the results are qualitatively the same for these two scenarios, there is confidence that they will be robust across a range of future catch series.

- Atlantis requires the specification of spatial closure scenarios. Projections should be conducted for existing spatial closures and the extreme scenario of no spatial closures.

The results from ecosystem models are often sensitive to their specifications. Ideally therefore, projections should be conducted for as many ecosystem models as is possible to assess which results are consistent across ecosystem models. The only alternative model which is sufficiently well developed to allow robustness of results to be evaluated is the Ecosim model. However, this model would need to be updated before it could be used for comparative studies, and it is unlikely that this will be possible before March 2014.

The Subcommittee recommends that a full review of the Atlantis model be conducted. This will not be possible before the March 2014 Council meeting when results are needed to support the Tier 1 EIS. This review could be organized by the NWFSC, or under the existing Council process for methodology reviews. The SSC and CIE experts could be involved in the review irrespective of how it is undertaken. However, a Council-sponsored review would allow for more involvement of the public as well as Council Advisory Bodies, and would foster a better understanding of the appropriate use of ecosystem models in the Council process.

SSC Notes:

- *Prior to the next biennial specification cycle there should be exploration of fitting random-effects models to the survey data as a refinement to the current approach for estimating OFLs from survey biomass estimates.*
- *Prior to the next stock assessment cycle, we should modify the Terms of Reference for stock assessments and establish the rule that any assessment of a complex of species cannot be designated as a category 1 assessment unless there is good evidence that the component species have very similar life-history characteristics and similar rates of biological productivity.*
- *Need to examine different approaches for apportioning OFLs to stocks that have geographic boundaries that differ from the assessment boundaries.*
- *In relation to the cowcod rebuilding analysis:*
 - *The next Rebuilding Analysis should allow for implementation error.*
 - *The final version of the document needs to finalize the calculation of T_{MIN} , the projections for runs 3+ and the calculation of the probabilities of rebuilding by various years.*
 - *Projections should be conducted based on sequences of catches as well as of fishing mortality.*

8. Electronic Monitoring Alternatives

The Scientific and Statistical Committee (SSC) reviewed the draft set of alternatives developed by Council staff for integrating electronic monitoring (EM) into the trawl catch share program's compliance monitoring (Agenda Item H.8.a, Attachment 1). The Groundfish Electronic Monitoring Policy Advisory Committee (GEMPAC) and the Groundfish Electronic Monitoring Technical Advisory Committee (GEMTAC) met in October to review the draft alternatives. Mr. Brett Wiedoff briefed the SSC on the report from this meeting (Agenda Item H.8.b, Supplemental GEMPC Report).

The alternatives identified under the five policy topics are reasonable. However, the SSC notes that the objectives of using EM as a compliance monitoring tool are not clearly defined, which makes risk analysis challenging. The SSC did not receive updates on the current pilot study conducted by the Pacific States Marine Fisheries Commission; therefore, the SSC is unable to provide any feedback. The SSC expects to see a detailed study design that addresses the management measures identified in the alternatives. Also, in order to provide scientific guidance for future analyses, such as video sampling rate and cost analysis, the SSC encourages the collection of information from a variety of vessels and from existing EM programs, such as British Columbia's program.

I. Council Administrative Matters

6 Future Council Meeting Agenda and Workload Planning

The Scientific and Statistical Committee (SSC) discussed the meeting schedule for 2014. The SSC suggests that the meeting dates of two currently scheduled meetings for 2014 be adjusted slightly. The SSC suggests that its March meeting be expanded from two days to three days (March 7 to 9) with the first day devoted to a review of the Integrated Ecosystem Assessment (IEA) State of the Ecosystem Report. This would necessitate that the Pacific sardine Stock Assessment Review (STAR) Panel be shifted one day earlier and occur from March 3 to 6.

The Economic Subcommittee will be meeting with the GMT to discuss the socioeconomic models to be used in future specification processes. The plan is to schedule this meeting in association with one of the 2014 Council meetings.

The groundfish historical catch reconstruction workshop will likely occur sometime in late 2014. Timing of this workshop will depend on the progress made by Washington.

The SSC recommends a Council-sponsored full review of the Atlantis model. This would allow involvement of the public as well as Council Advisory Bodies, and would facilitate a better understanding of the appropriate use of ecosystem models in the Council process. Review of the Atlantis model would likely occur in June 2014 at the earliest.

The NWFSC will take the lead on the workshop for methods of data reweighting. Dr. Chris Francis will possibly be in the country during the first half of 2014 and, as a leading expert on this topic, his participation in this workshop would be extremely beneficial.

A potential CPS survey methodology review was discussed but the schedule for this review cannot be set at this time as it requires input from the two proponents of the surveys (Pacific Northwest and California aerial). The SSC recommends this be a Council-sponsored review.

A Groundfish Subcommittee conference call to finalize overfishing limits (OFLs) and harvest specifications for 2014 will be scheduled for some time in December. This would also include the evaluation of the completed cowcod rebuilding analysis. The exact dates will be set after a poll of potential participants is conducted.

The following tables are provided to assist the Scientific and Statistical Committee to plan meetings and workshops that involve SSC participation. The meetings and workshops are based on the Council's 2014 meeting schedule and off-year science improvements decided by the Council in September 2013.

DRAFT Tentative Council and SSC Meeting Dates for 2014

Council Meeting Dates	Location	Likely SSC Mtg Dates	Major Topics
<p>March 8-13, 2014 Advisory Bodies may begin Fri, March 7 Council Session begins Sat, March 8</p>	<p>DoubleTree by Hilton Hotel Sacramento 2001 Point West Way Sacramento, CA 95815 Phone: 916-929-8855</p>	<p>Three Day SSC Session Fri, March 7 – Sun, March 9</p>	<p>IEA annual report Final CPS EFP Sardine harvest param. Review Groundfish methodology review Groundfish 2015-16 spex Rockfish barotrauma mort. rates Salmon review/Pre I CA current & IEA reports</p>
<p>April 5-10, 2014 Advisory Bodies may begin Fri, Apr 4 Council Session begins Sat, Apr 5</p>	<p>Hilton Vancouver Washington 301 W. Sixth Street Vancouver, WA 98660 USA Phone: 360-993-4500</p>	<p>Two Day SSC Session Fri, April 4 – Sat, April 5</p>	<p>Pacific sardine assess. Groundfish 2015-16 spex Groundfish electronic monitoring Salmon methodology topic selection</p>
<p>June 20-25, 2014 Advisory Bodies may begin Thu, June 19 Council Session begins Fri, June 20</p>	<p>Hyatt Regency Orange County 11999 Harbor Blvd. Garden Grove, CA 92840 Phone: 714-750-1234</p>	<p>Two Day SSC Session Thu, June 19 – Fri, June 20</p>	<p>Mackerel HG & mgt. measures Pacific sardine methodology review Groundfish 2015-16 spex Prelim. groundfish stock assess. plan & ToRs Groundfish electronic monitoring HMS mgt. measures, SDC, and ref. pts.</p>
<p>September 12-17, 2014 Advisory Bodies may begin Thu, Sept 11 Council Session begins Fri, Sept 12</p>	<p>DoubleTree by Hilton Spokane City Center 322 N. Spokane Falls Court Spokane, WA 99201 Phone: 509-455-9600</p>	<p>Two Day SSC Session Thu, Sept 11 – Fri Sept 12</p>	<p>Plan science improvements Salmon methodology topic priorities Final groundfish stock assess. plan & ToRs Groundfish EFH amendment Halibut bycatch estimate</p>
<p>November 14-19, 2014 Advisory Bodies may begin Thu, Nov 13 Council Session begins Fri, Nov 14</p>	<p>Hilton Orange County/Costa Mesa 3050 Bristol Street Costa Mesa, CA 92626 Phone: 714-540-7000</p>	<p>Two Day SSC Session Thu, Nov 13 – Fri, Nov 14</p>	<p>Prelim. CPS EFP Salmon methodology review</p>

SSC meeting dates and durations are tentative and are subject to change in response to Council meeting dates, agendas, workload, etc.

Proposed Workshops and SSC Subcommittee Meetings for 2014

Tentative – Depended on funding, dates subject to change

☐ – Prep. Work Underway, Scheduled to Occur; ◐ – Status of Supporting Analyses Uncertain, Remains a Priority;

▨ – Setbacks exist, Questionable; ■ – Funding or Prep. Not Avail, likely to be canceled or postponed

	Workshop/Meeting	Potential Dates	Sponsor/ Tentative Location	SSC Reps.	Additional Reviewers	AB Reps.	Council Staff
1	Pacific Sardine STAR Panel	March 3-6	Council La Jolla	Punt, Key	2 CIE	CPSMT/ CPSAS	Griffin
2	CPS Survey Methodology Review	TBD	Council TBD	CPS Subcm	TBD	CPSMT/ CPSAS	Griffin
3	Groundfish Historical Catch Reconstructions	Late 2014	TBD	GF Subcm	None	GMT GAP	DeVore
4	Methods for Data Reweighting	TBD	NWFSC/ TBD	GF & CPS Subcms	TBD	GMT GAP	DeVore
5	Reference Points (Bzero) Workshop II	TBD	TBD	GF Subcm	CIE/External 1-3:	GMT GAP	DeVore
6	Evaluation of Stock Productivity Methodological Approaches	TBD	TBD	GF Subcm	TBD	GMT GAP	DeVore
7	Review Atlantis model	TBD June-Dec.	NWFSC/ TBD	EBM Subcm	TBD	EAS	Burner
8	Improving Socioeconomic Analysis	TBD	Council/ TBD	Econ Subcm	TBD	GMT GAP	DeVore, Dahl

Proposed Workshops and SSC Subcommittee Meetings for 2014

Tentative – Depended on funding, dates subject to change

☐ – Prep. Work Underway, Scheduled to Occur; ◻ – Status of Supporting Analyses Uncertain, Remains a Priority;

▨ – Setbacks exist, Questionable; ◼ – Funding or Prep. Not Avail, likely to be canceled or postponed

	Workshop/Meeting	Potential Dates	Sponsor/ Tentative Location	SSC Reps.	Additional Reviewers	AB Reps.	Council Staff
9	Salmon Methodology Review	Oct.	Council	Salmon Subcm	None	STT SAS	Burner
10	Transboundary Groundfish Stocks	?	Council	2 TBD?	?	GMT GAP	DeVore

SSC Subcommittee Assignments, November 2013

Salmon	Groundfish	Coastal Pelagic Species	Highly Migratory Species	Economics	Ecosystem-Based Management
Robert Conrad	Vlada Gertseva	André Punt	Robert Conrad	Cindy Thomson	Martin Dorn
Owen Hamel	Andrew Cooper	Owen Hamel	Andrew Cooper	Vlada Gertseva	Vlada Gertseva
Meisha Key	Martin Dorn	Dan Huppert	André Punt	Dan Huppert	Pete Lawson
Pete Lawson	Owen Hamel	Tom Jagielo		Todd Lee	Todd Lee
Charlie Petrosky	Tom Jagielo	Meisha Key		André Punt	André Punt
Will Satterthwaite	Meisha Key			David Sampson	Will Satterthwaite
	André Punt				Cindy Thomson
	David Sampson				Tien-Shui Tsou
	Tien-Shui Tsou				

Bold denotes Subcommittee Chairperson