DRAFT SUMMARY MINUTES
Scientific and Statistical Committee

Pacific Fishery Management Council
Hyatt Regency Mission Bay
Belmont Room
1441 Quivira Road
San Diego, California 92109
619-224-1234

November 5-6, 2007

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

The meeting was called to order at 8 a.m. Dr. Donald McIsaac briefed the SSC on priority agenda items.

Subcommittee assignments for 2007 are detailed in the table at the end of this document.

Members in Attendance

Mr. Tom Barnes, California Department on Fish and Game, La Jolla, CA
Mr. Robert Conrad, SSC Chair, 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. Tom Helser, National Marine Fisheries Service, Seattle, WA
Mr. Tom Jagielo, Washington Department of Fish and Wildlife, Olympia, WA
Dr. Peter Lawson, National Marine Fisheries Service, Newport, OR
Dr. Todd Lee, National Marine Fisheries Service, Seattle, WA
D. Charles Petrosky, Idaho Department of Fish and Game, Boise, Idaho
Dr. André Punt, University of Washington, Seattle, WA (Monday only)
Dr. Stephen Ralston, SSC Vice 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. Shizhen Wang, Quinault Indian Nation, Mercer Island, WA

Members Absent

None.

Scientific and Statistical Committee Comments to the Council

The following is a compilation of November 2007 SSC reports to the Council. (Related SSC discussion not included in written comment to the Council is provided in *italicized text*).

Groundfish Management

D.3. Stock Assessments and Rebuilding Analyses for 2009-2010 Fisheries

SOUTHERN BLACK ROCKFISH

Dr. David Sampson presented the southern black rockfish stock assessment to the SSC and Dr. Martin Dorn presented the Stock Assessment Review (STAR) Panel report. The SSC endorses this assessment and the corresponding decision tables for use in the Pacific Fishery Management Council (Council) management process.

Due to the lack of adequate sampling for rockfish species composition during the pre-PacFIN years (prior to 1981), the southern black rockfish landings are highly uncertain during the early years of the assessment time series. These landings were re-estimated in this assessment and found to be considerably greater than the landings used in the last assessment (2003). Sensitivity analysis was conducted to examine the effect of the revised landings estimates. Ratio estimates from the assessment (e.g. depletion level) were not greatly affected but absolute estimates (e.g. maximum sustainable yield [MSY]) were appreciably greater when using the revised landings time series. More generally, species-specific landings estimates from the pre-PacFIN era are problematic for many rockfish species; and truly accurate estimates may not be attainable some 30 years after the fact. However, total rockfish landings are fairly well known. The SSC recommends that during the "off-year" (2008), a consistent, comprehensive process be developed for estimating species-specific landings for this period. This process should (1) provide consistency among stock assessments; (2) ensure that the sum of the species-specific landings corresponds to the better known total rockfish landings; and (3) develop a means to characterize the uncertainty in the species-specific landings estimates.

The assessment is hampered by a lack of reliable indices of abundance. Further, none of the available indices indicate a long term trend in abundance but the Stock Synthesis 2 (SS2) estimated biomass (ages 2+) increased approximately 50 percent over the last decade. This increase in estimated biomass (B) resulted from two strong year-classes (1994 and 1999). Similarly, the relatively healthy status of this stock (current B is 70 percent of B_0) is driven primarily by these strong year-classes. However, neither the age- nor length-composition data appear to provide evidence for the strength of these year-classes. This discrepancy should be investigated further in the next stock assessment.

The scale of the biomass estimates differed considerably between the current and previous assessments (B from the current assessment is larger). The primary causal factor appears to be the natural mortality rates (M) assumed in the respective assessments. Use of the larger M (in the current assessment) was recommended by the previous STAR Panel to provide consistency with the M used for the northern black rockfish assessment. The SSC concurs with this approach.

The decision table, coupled with the probabilities assigned to the various states of nature, provides a large contrast in possible outcomes – implying a highly uncertain assessment (relative to other rockfish assessments). The probabilities were not statistically-based (e.g. based on the relative likelihood of fitted models) but rather developed from a consensus-building process carried out near the end of the STAR Panel meeting. This process may have resulted in an overestimation of the uncertainty associated with the southern black rockfish assessment.

The STAT initially attempted to carry out this assessment using a spatially structured model (using Oregon- and California-based areas) but the results were not encouraging. Although no attempt was made to model fish movement across area boundaries (characteristic of a fully fledged spatial model), modeling difficulties arose in simply apportioning recruitment to the respective areas While the SSC encourages this approach and commends the STAT for its initiative, these results may be a bellwether for the likelihood of viable spatial assessment of the Council's other data poor stocks. On the other hand, stocks with richer data sets (e.g. a time series of trawl survey data) may prove to be more amenable to spatially explicit stock assessment and management.

BLUE ROCKFISH

The SSC reviewed the blue rockfish stock assessment and STAR Panel documents and heard a presentation by Meisha Key, the blue rockfish STAT lead. Items of major uncertainty in the assessment included: 1) unclear implications of the possible existence of two separate blue rockfish species, 2) unclear reasons for the lack of male blue rockfish, 3) evidence for spatial variability and a decrease in average size at age (observed but not incorporated into the model), 4) an uncertain historical catch data stream, and 5) an uncertain value for natural mortality.

The SSC was concerned about a statement found on page 13 of the blue rockfish assessment document: "Because of the numerous violations of model assumptions, the STAT does not consider the management quantities estimated in this assessment to be sufficiently reliable for quantitative fisheries management." The SSC discussed this issue with members of the STAT present to determine if confidence in the assessment was sufficient to proceed with a quantitative stock assessment review, noting the apparent conflict with the blue rockfish STAR Panel report which had endorsed the use of the assessment for management. The STAT offered to edit the statement in question, and to provide the new version in writing, to better reflect its position with regard to use of the assessment in management.

The SSC subsequently received the following assessment document revision from the STAT: "The STAT advises that this assessment for management purposes be used with caution. The STAT feels strongly that the decision table does not provide symmetrical bracketing of uncertainty (described in decision table section) and that the BASE and High M scenarios are most likely. It is recommended that the projections under those scenarios be considered for management purposes." The SSC reviewed this revision by the STAT and endorses the assessment for use in establishing optimum yields (OYs) for management.

The decision table presented for blue rockfish considered two axes of uncertainty: 1) the historical catch stream (high, medium (base), and low), and 2) the assumed value of natural mortality (high,

medium (base), and low). The SSC discussion focused on the scenarios chosen to bound the base case. The STAT noted that the base and high (optimistic) scenarios were more likely than the low (pessimistic) scenarios. The SSC concurred that the decision table was not symmetrical with respect to the bounds chosen to bracket the base case to characterize uncertainty.

Finally, The SSC notes that the blue rockfish assessment was received quite late by most SSC members (on the Friday before the Council meeting), which added to difficulties in the final review.

REBUILDING ANALYSES

The Groundfish Subcommittee of the SSC met October 3-4, 2007 at the Alaska Fisheries Science Center in Seattle to review seven rebuilding analyses that were recently completed for overfished rockfish stocks managed by the Council, *viz.* bocaccio, Pacific ocean perch (POP), cowcod, canary rockfish, yelloweye rockfish, widow rockfish, and darkblotched rockfish

Current rebuilding harvest rates (expressed as spawning potential per recruit [SPR]) and median times to rebuild (T_{target}) for the overfished stocks are directly linked to one another and individually they reflect specific decisions the Council has previously made concerning rebuilding in as short a time as possible, taking into account the appropriate factors from the Magnuson-Stevens Act. Amendment 16-4 to the Groundfish Fishery Management Plan adopted specific SPRs and T_{target} values for each stock. From a regulatory basis, maintaining stability in current harvest rates (SPRs) would be desirable, presuming there have been no fundamental changes in our perceptions about stock productivity.

The SSC, therefore, determined (a) whether cumulative catches during the period of rebuilding exceeded the cumulative OY that was available, (b) whether the biological parameters in the stock assessment had been revised to such an extent as to warrant a change in T_{target}, (c) whether the proper data and software were used in order to satisfy all technical requirements for accuracy, (d) whether progress towards rebuilding is deemed to be adequate, (e) whether there is discrepancy between the current T_{target} and the median time to rebuild under the currently adopted rebuilding harvest rate ($T_{rebuild}$), and if so, what a new maximum time to rebuild ($T_{max(new)}$) should be, given the National Standard 1 guidelines and, secondarily, if the currently adopted SPR harvest rate will likely rebuild the stock before this $T_{max(new)}$. The SSC assessed whether the biological parameters in the stock assessment had been revised to such an extent as to warrant a change in T_{target} and examined, for example, whether $T_{rebuild}$ is beyond the value of T_{max} in Amendment 16-4.

Table 1 summarizes the deliberations of the SSC in regard to issues (a) – (e). Based on this table, the SSC notes the following:

1) Catches of six of the seven overfished rockfish stocks have been lower than what was available as a cumulative OY during the period of rebuilding. The only exception is canary rockfish, which exceeded its cumulative OY by 14 percent over the period 2000-2007. This overage was due primarily to an excess harvest of 40 mt in 2001, when constraints on the groundfish fishery were first being imposed. In some instances, catches have been far below the available OY (e.g., POP, cowcod, and widow rockfish). In general, management has been quite effective at curtailing fishing mortality on the overfished stocks in order to rebuild them as quickly as possible.

2) All assessments that were completed in SS2 met the appropriate technical requirements by utilizing the latest version of the rebuilding program (2.11) and by using the appropriate outputs from the rebuilding program. Likewise, the two analyses completed in ADMB (i.e., POP and widow rockfish) also were implemented and executed properly.

3) There are four instances where calculated times to rebuild are very similar to the T_{target} in Amendment 16-4 (POP, bocaccio, widow rockfish, and yelloweye rockfish), with the greatest discrepancy being six years. 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 warranted.

4) There are three stocks that depart strongly from the T_{target} values adopted in Amendment 16-4: cowcod, darkblotched rockfish, and canary rockfish; canary rockfish is very much ahead of schedule (42 years), while darkblotched rockfish and cowcod are substantially behind schedule (19 years and 23 years, respectively). For canary rockfish and darkblotched rockfish, these deviations from T_{target} are due primarily to changes in our understanding of stock productivity and depletion. In the case of cowcod, the departure from the expected rebuilding trajectory is due to correction of a technical flaw that existed in the 2005 assessment. The effect of this correction was to lower the estimated depletion level substantially, implying a longer time to rebuild the cowcod stock than was originally estimated. These changes represent fundamental revisions to our understanding of the biology of these species, which in turns warrants a revision in T_{target}.

5) Given the results of this year's 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 three stocks that are either markedly ahead or markedly behind schedule (canary rockfish, darkblotched rockfish, and cowcod). 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 OYs for the 2009-2010 biennial cycle.

Following the June Council meeting, an error was discovered in the visual survey estimate of abundance used in the cowcod assessment. This error was corrected and the results in Table 1 are based on the corrected assessment. The SSC recommends that the assessment document for cowcod be updated appropriately for inclusion in the SAFE.

The SSC notes that the Terms of Reference for Rebuilding Analyses was last revised in 2005. Given the changes in how rebuilding analyses are now used for Council decision making, the SSC intends to revise these Terms of Reference and will develop a standardized format to summarize results. Specifications for the associated rebuilding software will also be revised.

TABLE 1.

Species	Total Catch / Total OY	Adopted SPR Harvest Rate	Current T_{target} [1]	New Time To Rebuild At Current SPR [2]	Difference	$T_{max(new)}$ [3]
Darkblotched	97% (2001-2007	60.7%	2011	2030	**-19**	2040
POP	42% (2000-2006)	86.4%	2017	2011	6	2037
Canary	114% (2000-2007)	88.7%	2063	2021	**42**	2041
Bocaccio	69% (2000-2006)	77.7%	2026	2023	3	2033
Cowcod	55% (2000-2007)	90.0%	2039	2065	**-26**	2098
Widow	48% (2002-2007)	95.0%	2015	2009	6	NA
Yelloweye	73% (2002-2007)	71.9%	2084	2084	0	2090

1. Current T_{target} is the value adopted in Amendment 16-4.

2. $T_{rebuild}$ is the new time to rebuild at the adopted SPR harvest rate.

3. $T_{max(new)}$ is the new maximum time to rebuild base on the updated stock assessment and rebuilding analysis.

Darkblotched Rockfish

The darkblotched rockfish rebuilding analysis presented to the SSC incorporated a number of changes to both the stock assessment on which the rebuilding analysis is based and the rebuilding analysis itself. The major changes to the 2007 assessment included use of more extensive age data, lower steepness in the stock-recruitment relationship. As such, the productivity of the darkblotched rockfish stock is perceived to be lower than implied from the 2005 assessment. Changes to the rebuilding analysis, which was last conducted in 2005, include parametric simulation of recruitments from the stock-recruitment relationship based on current estimates of productivity (i.e., B_0, steepness, natural mortality), instead of re-sampling a range of historically estimated recruitments. Optimum yields for 2007 and 2008 were specified at 190 mt and 330 mt, respectively. Based on the new rebuilding analysis, the darkblotched rockfish stock is projected to recover 19 years later (2030) than anticipated from the 2005 rebuilding analysis. The new rebuilding time is 2030 at the currently specified SPR of 60.7 percent compares with the current target of 2011. However, the new rebuilding analysis suggests that the current SPR is within legal requirements of rebuilding by a newly defined $T_{max(new)}$ of 2040. Due to the large difference in the rebuilding targets the SSC recommends a redefinition of T_{target}.

Pacific Ocean Perch

The 2007 stock assessment update of POP was reviewed at the June groundfish subcommittee, SSC, and Council meetings. Estimated steepness has increased from 0.55 to 0.65 and current depletion, estimated from the median of the MCMC posterior distribution, is now estimated to 31.0 percent, due, in large part, to an increase in the strength of the 1999 year class. POP is unusual in that the full MCMC results are used in the rebuilding analysis, which is desirable as it more adequately captures the uncertainty inherent in the assessment. Catches have been very low relative to the available OY, averaging 42 percent over the period 2000-2006. Moreover, the estimated time to rebuild the stock, if the current harvest rate is maintained at an SPR of 86.4 percent, is 2011, which is six years ahead of schedule (T_{target} = 2017). Given these conditions, the SSC concludes that no change is necessary to POP harvest policies and that progress towards rebuilding is adequate.

Canary Rockfish

A full assessment of canary rockfish was completed this year in SS2, which included a number of major changes to the data and modeling approach, i.e., a complete re-evaluation of the age data, simplification of time blocks for fishery selectivity, and splitting the triennial survey into two segments with separate catchability coefficients (q). Given the changes to the model structure, spawner-recruit steepness (h) could no longer be reliably estimated within the model, and a steepness prior from a hierarchical meta-analysis of west coast Sebastes was used instead (h = 0.511). Based on these revisions, the current depletion of canary rockfish is estimated to be 32.4 percent, compared with 9.4 percent from the 2005 assessment. For the rebuilding analysis, the full 2007-08 OY catches (44 mt) were pre-specified and account was taken of both uncertainty about the parameters of the spawner recruit curve and variability about that curve (σ_r = 0.50). Also, the 12 fleets represented in the stock assessment were simplified to 5 fleets in the rebuilding analysis. Rebuilding projections also incorporated uncertainty in h by weighting according to the three states of nature identified in the assessment. Results showed that if the current harvest rate is maintained (SPR = 88.7 percent) the stock will rebuild by 2021, which is 42 years before the T_{target} (2063) specified in Amendment 16-4. Given this marked change in our perception of when recovery will

most likely occur, a redefinition of T_{target} is appropriate. If so, a newly defined $T_{max(new)}$ is 2041. If the current harvest rate is maintained, stock recovery would be expected to occur some time around 2021.

Bocaccio

Bocaccio was declared overfished in 1999 and the first rebuilding analysis for this stock was conducted in 2000. The most recent full assessment was completed in 2003 using the SS1 modeling platform, which was then updated in 2005 and again this year. This year's update indicates that current depletion is 13 percent of unfished, compared to 6.5 percent at the beginning of rebuilding. The bocaccio rebuilding analysis does not use a spawner-recruit relationship, but instead defines B_0 based on average recruitments from 1950-85 (multiplied by $SPR_{F=0}$) and, in addition, resamples recruits-per-spawner from 1970-2005 to generate future recruitment. Resampling recruits-per-spawners in this instance is justified because the estimated steepness is close to 0.20 (no density-dependence). The analysis indicates that the median time to rebuild if the current SPR harvest rate (77.7 percent) is maintained is 2023, which is three years ahead of schedule (current T_{target} = 2026). Recovery is being driven by strong 1999 and 2003 year-classes. Given these results, the SSC concludes that progress towards rebuilding is adequate and that existing management practices are effective and not in need of change. The next full stock assessment will be implemented in SS2.

Cowcod

Although the cowcod assessment was originally scheduled to be an update during 2007, the Council recommended that a full assessment be completed, based on a number of issues that were raised in the June update review. The estimated depletion of cowcod was strongly affected as a result of including the recommended changes into a full assessment, dropping from 17.8 percent to 3.8 percent. The principal cause of the change was the correction of a technical error that was discovered in the 2005 assessment. The rebuilding projections indicate that it will not be possible to rebuild the cowcod stock by 2039 (the current T_{target}), even if all catches are eliminated. Although three states of nature were developed in the full assessment, the rebuilding analysis was conducted in a manner similar to the 2005 rebuilding analysis. Uncertainty in the outcomes of the stock assessment was propagated solely through a discretized distribution of steepness, developed from the Sebastes meta-analysis "prior" for cowcod; no variability in recruitment *per se* was modeled (σ_r = 0). Cumulative catches since 2000, which are very uncertain, are nevertheless substantially below the available rebuilding OY. Still, due to the substantial decline in relative abundance, the time to rebuild is now 26 years greater than the T_{target} adopted in Amendment 16-4. The SSC therefore advises a revision to T_{target} is warranted, but adherence to the current harvest rate (SPR = 90.0 percent) provides continuity with past management practices and should rebuild the stock within $T_{max(new)}$.

Widow Rockfish

The widow rockfish rebuilding analysis presented to the SSC was based on a 2007 update of the 2005 stock assessment and of the rebuilding analysis conducted in 2005. The new assessment update indicates that widow rockfish spawning stock biomass has increased since being declared overfished in 2001 due to low catches and recruitment of the strong 1999 year class into the spawning population, and that the current level of depletion is estimated to be 35.5 percent. The new projections are based on the same underlying model structure and rebuilding assumptions as before, except that recruitment is simulated from the stock-recruitment curve for 2007 and beyond,

and 2007-2008 OYs are specified as 368 mt. The new median rebuilding time is 6 years earlier than previously calculated at the currently specified SPR of 95.0 percent (2009 compared to the current target of 2015). The widow rockfish stock is on track for recovery by the next assessment cycle.

Yelloweye Rockfish

The yelloweye rockfish rebuilding analysis presented to the SSC was based on a 2007 update of the 2006 stock assessment and of the rebuilding analysis conducted in 2006. The updated assessment corrected several technical issues associated with the previous assessment, but a change in the natural mortality rate revised the spawning stock biomass and associated depletion level down to 16.4 percent of B_0. Equilibrium unfished spawning biomass was calculated from the stock-recruitment relationship, with future recruitments generated using this relationship. Despite changes to the assessment, the yelloweye rockfish stock is on track to rebuild by 2084 if the current SPR of 71.9 percent is maintained. The calculated new $T_{\max(\text{new})}$ is 2090. The SSC notes that the summary table is missing from the assessment document.

Other

The groundfish subcommittee considered how to treat recruitments from when a stock is declared overfished (T_0) to the start of the current update. The SSC recommended that the recruitments that occurred between T_0 and the present should be set to those estimated in the assessment because this incorporates the best available scientific information.

Salmon Management

F.2. Salmon Methodology Review

The SSC Salmon Subcommittee and the Salmon Technical Team (STT) met at the Sheraton Portland Airport on October 24-25, 2007, to review four salmon methodology issues:

- Revisions to Council Operating Procedure 15.
- Genetic Stock Identification Study Proposal and EFP.
- Coho Fishery Regulation Assessment Model (FRAM) Base Period Revisions.
- Review of recovery exploitation rate for Lower Columbia River natural tules.

The Model Evaluation Workgroup (MEW) was also present. Comments on these four items follow.

Council Operating Procedure (COP) 15

The SSC reviewed proposed changes to the Salmon Estimation Methodology Updates and Review COP (COP 15) presented by Mr. Chuck Tracy. The changes were suggested primarily in order to:

1. Acknowledge the role of MEW.
2. Define what, in general, merits SSC review.
3. Make it clear that data modifications (including changes in the range of data to which an accepted methodology is applied) do not generally require SSC review. This includes such changes that occur subsequent to adoption of the final methodology review in November and prior to preseason forecast calculations early in the following year.

The SSC approves of the proposed changes and makes the following suggestions for clarification

purposes:

1. In the second proposed new sentence below "Objectives and Duties", add the word "could" before "merit a full review…"
2. In the second paragraph below "Objectives and Duties", replace "selected" with "ready".
3. Towards the end of the third paragraph below "Objectives and Duties", replace "three weeks" with "two weeks".

Genetic Stock Identification Study Proposal and EFP

Dr. Peter Lawson presented a project proposal for "Strategies to Minimize Catch of Klamath River Chinook Salmon in West Coast Mixed Salmon Fisheries". The goals of this project are to use genetic stock identification methods to determine the distribution of Klamath River and other PFMC-managed Chinook stocks in areas off the northern California and Oregon Coasts. The goals and objectives of the project are well defined and, if achieved, will provide information that will be valuable to fishery managers.

The proposed project would be similar to the Collaborative Research on Ocean Salmon (CROOS) Project conducted primarily in the waters off of central Oregon during 2006. Sampling methodologies and protocols developed by the CROOS project would be used in the proposed project which would extend sampling into the waters off of southern Oregon and northern California. The sample design, data collection methods, and proposed methods of analysis will meet project goals and objectives. The sampling design defines 144 weekly time/area strata for sampling. In recent years, a large number of the proposed strata have been closed to commercial fishing (51 in 2007). Therefore, an experimental fishing permit will be needed in order for samples to be collected from those areas which may be closed in 2008. If the project cannot collect samples from closed areas in 2008, the project goals and objectives will be compromised as the distribution and stock composition of fish in closed time/area strata will remain unknown. Therefore, the SSC supports the EFP application.

Sample size objectives of 240 fish per time/area strata are proposed. The analyses presented support these sample size goals. However, these analyses were based on the assumption of a random distribution of fish from a stock within a sampled time/area stratum. The SSC suggests that an analysis of the CROOS data be conducted to examine the assumption of a random distribution of fish from a stock or whether there is "clustering" of fish from a stock. If it appears clustering (due to schooling behavior) exists, the possible effect of this on the sample size objectives should be evaluated and appropriate sample allocation should be addressed. Additional details will need to be provided on the spatial distribution of sampling effort in closed areas under Plan A (such as transects versus random locations). Similar information should be provided with regard to Plan B (no EFP).

Finally, the stock impact analysis for the project (number of fishery-induced mortalities due to fishing in closed areas) is based on a maximum sample size of 12,240 fish (240 samples collected from each of 51 closed time/areas). However, sampling efforts in closed areas may continue after the sample size goal is obtained in order to distribute samples across the entire weekly time period, if possible. The SSC recommends that an additional impact analysis be conducted that accounts for the possibility of sampling more than 240 fish per time/area strata.

Coho FRAM Base Period Revisions

Mr. Jim Packer reviewed the status of base period updates to the coho FRAM. Over the past several months he has held a series of regional meetings from Canada to the Oregon Coast to explain recent developments in the model and to solicit suggestions and updates to the base period input data. As a result, there is an increased familiarity with the model, an increased acceptance of the model, and a substantially improved and updated input data set.

A considerable effort has gone into conducting new cohort analyses for the years from 1992 to 1997 with the intention of updating the FRAM base period. Except for 1992, fishing has been restricted in these years to the point that it is difficult to incorporate them into the base period. As a result, Mr. Packer recommended a new base period that included the updated data set and added only the year 1992 to the current 1986-1991 base period. Data from the Upper Fraser River in 1986 would be omitted because of poor data quality and anomalous estimates for the Thompson River stock in that year. An alternative is to use the current 1986-1991 base period years (without Upper Fraser 1986) but with updated data.

The SSC agrees that, because of the regional meeting process that was used, the updated data set should constitute an improvement over the earlier version and should be used for modeling. We had no objective way to evaluate the addition of the 1992 year to the base period. However, based on Mr. Packer's information that 1992 was similar in data scope and quality to the earlier years it seems that the addition of a seventh year would likely lead to a more robust base period.

The SSC had difficulty evaluating the new data set or proposed base periods because we have no objective measure of stock distributions or model performance for comparison. Now that there are five additional years of reconstructed fisheries that may not be used in the base period fisheries could be simulated using different base periods to reproduce 1993-1997 fisheries. Output could then be compared with the reconstructed fisheries and escapements to see how well they match. This would help resolve three important questions: (1) how well does a base period that uses years of coast-wide fishing and average exploitation rates represent catch patterns in years with restricted fishing or differing ocean conditions, (2) how sensitive is the model to the selection of base period, and (3) does the addition of 1992 to the base period improve the simulation of current fisheries? A set of metrics needs to be developed to facilitate this comparison among model runs.

In the future the SSC recommends that the MEW use the new cohort reconstruction tools to focus on post-season analysis. We now have a tool that could be used for estimating total abundance of coho salmon. This could lead to an agreed-to coast-wide coho data set for preseason forecasting in terms of the FRAM base period and for postseason evaluation of exploitation rates and escapements. It would also be useful to have the MEW use the current tools to analyze the 1979-1985 catch years. In addition to providing more data for potential base years this would fulfill the original intent of the MEW to have more people trained in the use and development of FRAM base period data.

Review of recovery exploitation rate for Lower Columbia River natural tules

Due to an apparent oversight, the document describing this analysis was not provided to the SSC or the Council prior to the November meeting. While the SSC salmon subcommittee (SSCSS) was able to conduct a review at the October Salmon Methodology Review Meeting, and the SSC recognizes their expertise, the SSC as a whole was not able to provide a complete review of this topic at this meeting and would be interested in revisiting this topic in March, 2008.

Dr. Michael Ford (NWFSC, Conservation Biology Division) gave a presentation on analyses to support a review of an Endangered Species Act jeopardy consultation on fisheries impacting Lower Columbia River (LCR) tule (early fall run) Chinook salmon. The work, conducted by a joint NMFS/WDFW working group, provides a comprehensive review of the data available to assess the status of the LCR tule populations and presents two analyses useful for evaluating rebuilding exploitation rates (RERs). There is an apparent lack of data on tule Chinook populations for the Oregon side of the Lower Columbia River. Beginning in 2007, harvest actions on these stocks are evaluated on the basis of a RER limit of 42 percent based on results from the analysis of three natural-origin tule populations. This was a reduction from the 49 percent limit that was used during the previous five years based on an analysis of the Coweeman River population. Estimates for the Coweeman River population indicate that recent brood-years have experienced adult equivalent exploitation rates in excess of both the 42 percent and 49 percent exploitation rate limits.

The working group developed two possible approaches for evaluating run status, one based on a viability curve analysis and the other based on rebuilding exploitation rates (RER). A viability curve shows how extinction risk varies with population abundance and productivity. Curves were presented for three harvest rates (0, 25 percent, 50 percent). Probability contours for estimates of current population abundance and productivity are superimposed on the viability curves to evaluate the current status of the population relative to extinction risk at three harvest levels. The RER approach uses a stochastic Viability-Risk Assessment Procedure (VRAP) to project population abundance into the future based on current productivity and capacity conditions. For their analyses the working group applied both approaches to the same fundamental run reconstruction data to develop relationships between recruitment and parental spawning stock for the three LCR tule populations with the best available data sets (Coweeman, Grays, and Lewis). The working group considered the data available from the other LCR tule populations to be too poor or too tainted by hatchery strays to use in the analyses. Plots of the curves fitted to the recruits versus spawner data for the three populations indicated that the data are extremely noisy and not well characterized by any of the spawner-recruit curves considered by the working group.

The results from both methods of analysis are sensitive to model parameters used to assess stock status when projecting a population's abundances into the future (e.g., the quasi-extinction threshold [QET] for the viability curve analysis and the lower and upper escapement thresholds [LET and UET] for the VRAP analysis). The choice of these values embodies the level of risk inherent in the chosen RER and, therefore, is partly (but not wholly) a policy decision

The SSCSS is concerned by the very poor quality of the data underlying the working group's analyses. The analyses are complicated and it is unclear how measurement errors propagate through the calculations and influence the results. The SSCSS suggests that the working group conduct an evaluation of the two methods using simulated data with known levels of measurement error, including a perfect data set with no measurement error. Comparing the results from such an

evaluation would provide a basis for selecting between the viability curve approach versus the RER approach. Analyses with simulated data could also measure the relative sensitivity of the two approaches to different forms of measurement error, the choice of values for assessing a population's projected future abundance (QET, etc.), and indicate possible sources of bias.

For the viability analyses, the probability distributions for the population's current status were generated using random time-series with 20 percent uniform error, which has a coefficient of variation of 11 percent. This seems a low level of uncertainty. The SSCSS suggests using normally distributed random errors with coefficients of variation of at least 20 percent.

Both methods are based on the assumption that the most important factors governing viability of these populations are the recently realized stock-recruit relationships rather than changes in ocean or freshwater environmental conditions or in hatchery supplementation practices. The data supporting this assumption are weak, so the degree of confidence that can be placed in either of these methods is low. The SSCSS recommends that sensitivity analyses to these other relevant factors should be conducted.

The SSCSS concurs with the working group's suggestion of exploring other analytical techniques. A mixed-model approach that simultaneously analyses data from multiple populations might provide better parameter estimates and allow for use of data from more of the populations.

Groundfish Management, continued

D.4. Management Recommendations fro 2009-2010 Groundfish Fisheries – Part 1

The SSC reviewed briefing materials pertaining to management measures being developed for 2009-2010 groundfish fisheries, especially Agenda Item D.4.a, Attachment 1, Table 2-1a (DRAFT GMT-recommended alternatives for acceptable biological catch [ABCs] and total catch optimum yields [OYs] for 2009 and 2010). The SSC discussion was facilitated by Dr. John Field, who focused the committee's attention on three topics that are of concern to the Groundfish Management Team (GMT). These were: (1) partitioning the sablefish OY north and south of 36° N lat., (2) establishing a reasonable range of OY for the northern black rockfish stock, and (3) determining the blue rockfish ABC. Beyond these three points of discussion, the SSC concurs with the remaining ABCs presented in Attachment 1 and endorses their use by the Council in developing management measures for the 2009-2010 management cycle.

In the case of sablefish, the coastwide OY has traditionally been allocated to "Monterey north" and the Conception International North Pacific Fishery Commission (INPFC) areas based on recent landings, with 96.5 percent of the coastwide OY going to areas north of 36° N lat. However, recent trawl survey results collected by the Northwest Fisheries Science Center (NWFSC) indicate that 28 percent of sablefish biomass is found in the Conception area. Theoretically, the best way to estimate region-specific OYs is to conduct a spatially explicit stock assessment, which might include adult movement patterns and spatial variability in growth, mortality, and recruitment. However, in situations where that type of detailed model is not available (as is the case here), the SSC advises that partitioning stock assessment results into subareas based on the distribution of fish observed in a fishery-independent survey is generally preferable to assignments based on the history of catches

from subareas. In any case, neither of the two methods of allocating catch is ideal. Furthermore, for the allocation option that utilized the NWFSC trawl survey data, the GMT reduced the Conception area OY by 50 percent, due to concerns about uncertainty in the estimates. Another factor to consider is the Cowcod Conservation Area (CCA), which restricts fishing in large portions of the Conception management area. Due to those prohibitions, the SSC concurs that some reduction in sablefish OY is justifiable.

With respect to a range of alternative OYs for black rockfish north, Dr. Field noted that the GMT was considering a low OY option that departed from the "low" state of nature scenario contained in the revised assessment. While the specifics of the options being considered by the GMT were not available during its discussion, the SSC notes that the range presented in Attachment 1 (125 – 492 mt) is consistent with the most recent version of the stock assessment that was approved by the SSC at the September meeting, being based on the "low" and "base" models in the approved assessment. Moreover, it has been common practice to use the low and base models to establish a range of potential OYs in developing management measures. The SSC advises that a range of 125 – 492 mt for northern black rockfish provides a reasonable starting point for Council deliberations.

The SSC reviewed the newly completed blue rockfish stock assessment under Agenda Item D.3 and endorsed the results of the assessment for use in managing the stock. In situations where a stock assessment has been completed and a base model has been identified, the ABC is drawn from the base model using the Council's default harvest rate (F50% for *Sebastes* spp.). For blue rockfish the estimated ABC in 2009 is 223 mt and in 2010 it is 221 mt, which the SSC endorses for use by management. Dr. Field reported that the GMT is considering an option to keep blue rockfish within the "minor nearshore rockfish south" management unit and avoid actively managing the species. As a general matter the SSC recommends that the Council manage fisheries based on stock targets and thresholds that are defined at a level concordant with stock assessments, not based on an assemblage aggregate. However, if the Council elects to continue managing blue rockfish as part of the southern nearshore assemblage, a point of concern should be identified, should the catch of blue rockfish exceed the ABC. The same concern applies to longnose skate, which was also assessed this year. Given the estimate of the ABC for that species (3,428 mt) it would be sensible to manage to that threshold of catch and to re-evaluate the ABCs for the remaining species in the "other fish" assemblage.

Council Administrative Matters

C.3. Magnuson-Stevens Act Reauthorization Implementation

The SSC reviewed the draft revisions to Council Operating Procedures (COP) 4 and 12.

- COP 4 reflects changes recommended by the SSC in September 2007. The SSC requests one additional change, namely, deletion of the second sentence in the "Subcommittees" section of the COP (p. 5) pertaining to formation of a socioeconomic subcommittee. This sentence appears superfluous as the SSC already has a socioeconomic subcommittee and the COP gives the SSC general discretion to establish subcommittees as necessary. The SSC also notes that additional revisions to this COP may be required once guidance is received from the National Marine Fisheries Service regarding new provisions of the Magnuson-Stevens Act.

- COP 12 specifies a five-year outlook for the Council's Research and Data Needs, as well as a five-year revision cycle. The SSC notes that a five-year cycle is reasonable, given the pace of research progress, and that the COP also provides the flexibility of out-of-cycle changes as needed. As a minor change, the SSC suggests that, in the first bullet in the "Purpose" section, the phrase "including sections" be changed to "including separate sections".

Groundfish Management, continued

D.7. Amendment 20: Trawl Rationalization Alternatives (Trawl Individual Quotas and Cooperatives)

The SSC had discussions with Mr. Merrick Burden and Mr. Jim Seger regarding details of the Trawl Rationalization Alternatives. The SSC Economics Subcommittee previously met with the Trawl Individual Quota Analytical Team (TIQAT) on September 9, 2007 to review the analytical framework and proposed analysis of trawl individual quota (TIQ) alternatives. The Subcommittee's report, which has been endorsed by the full SSC, was sent to the TIQAT and the Groundfish Allocation Committee. Below are highlights from the Subcommittee report and additional points regarding the Trawl Rationalization Alternatives.

The Trawl Rationalization Alternatives are complex and potentially confusing. To facilitate review by the Council family and the public, the SSC recommends that each option and provision begin with a clear statement of what it is intended to achieve, and conclude with an evaluation of its effectiveness relative to the stated objectives.

To facilitate understanding and proper interpretation of the Trawl Rationalization Alternatives, it will be particularly important that the TIQAT document the limitations of the data and models used, identify key assumptions underlying the analysis, distinguish between short-term and long-term effects, distinguish between economic efficiency versus distributional effects, and use methods such as sensitivity analysis to reflect the uncertainty associated with TIQ effects.

Analytical Scenarios (Agenda Item D.7.b, Attachment 4)

The TIQAT developed four analytical scenarios that include elements of the Trawl Rationalization Program that are expected to have major effects on the outcome of the program. Given the numerous issues that need to be addressed to establish the Trawl Rationalization Program and the multiple options associated with each issue, the SSC agrees that an approach of this type is needed to make the analysis meaningful yet tractable. However, the SSC also notes that some potentially significant options (e.g., initial allocation of quota shares by auction or "use-it-or-lose-it" provisions) have already been excluded from consideration. Excluded options such as these should be identified and the rationale for their exclusion discussed in the Draft Environmental Impact Statement (DEIS).

Lessons Learned From Other Rationalization Programs

Experiences from other rationalization programs may yield “real world” insights into potential effects of the Trawl Rationalization Program on harvesters, processors, and communities. To facilitate the Council's evaluation of the Trawl Rationalization Alternatives, a summary of the lessons learned from other rationalization programs should be provided for Council discussion in as early a draft of the DEIS as is possible.

Assessing Effects of Initial Allocation of Individual Fishing Quota (IFQ)

The Subcommittee recommends that the fleet consolidation analysis be accompanied by an analysis of alternative fisheries likely to be targeted by vessels displaced from the groundfish fishery. Fleet consolidation will lead to efficiency gains and reduced costs due to overcapitalization, but will also impose costs to communities through reduced economic activity and possible adverse effects on regional economies.

Illustrating Potential for Geographic Shifts in Fishery Patterns

The TIQAT proposes to use geographic differences in bycatch rates as a basis for projecting geographic shifts in non-whiting trawl effort, and to use lengthening of the whiting season that will likely occur with trawl rationalization as a basis for projecting a northward shift in midwater trawl effort. The SSC notes that other factors such as regional differences in fishery infrastructure and harvest efficiency may also affect the geographic distribution of fishing effort.

Illustrating the Potential to Reduce Overfished Species Catch Rates and Increase Target Species Catch and Revenue

For the non-whiting trawl sector, the TIQAT proposes to use the percent reduction in canary bycatch rates achieved under Washington’s arrowtooth flounder exempted fishery permit (EFP) as the basis for projecting changes in harvest of all overfished species under IFQs. The SSC notes that, while the arrowtooth EFP provides evidence of changes in canary bycatch rates, these rates are not necessarily applicable to other fishing strategies and geographic areas.

The bycatch prediction method proposed by the TIQAT will have a major effect on the outcome of the analysis, as the predictions will inform or serve as inputs into a number of other components of

the DEIS. The SSC recommends that the TIQAT emphasize the limitations of its bycatch projections and consider a range of bycatch rate reduction scenarios that reflect these uncertainties.

Allocation of Overfished Species

The TIQAT is currently considering three methods for allocating quota shares of overfished species: allocation based on catch histories for the bycatch species, allocation based on target species catch histories, and an auction system. The SSC notes that allocating bycatch quota shares on the basis of target species catch histories will be less disruptive and involve a less costly transition to efficiency than the method based on bycatch catch histories. It is not clear that the auction method for allocating quota pounds for overfished species will make fishers better off. The analysis will need to consider lay-up costs while waiting for the next seasonal auction and the potentially reduced supply of quota share that may be available during an auction.

Mandatory Economic Data Collection

It is important that information be collected that will allow an evaluation of the Trawl Rationalization Program. The SSC supports the mandatory economic data collection requirement.

Accumulation Limits

The setting of accumulation limits is a very important aspect of the Trawl Rationalization Program. These limits should be analyzed in terms of the economic efficiency gains that may result from the program. Additionally, the trade-offs between these efficiency gains and the adverse impacts on regional economies and communities need to be evaluated.

Review of Analytical Framework and Proposed Analysis of Trawl Rationalization Alternatives

SSC Economics Subcommittee

September 19, 2007

The SSC Economics Subcommittee met with the Trawl Individual Quota Analytical Team (TIQAT) on September 9, 2007 in Portland to review the analytical framework and proposed analysis of trawl individual quota (TIQ) alternatives. The Subcommittee appreciates the work of the TIQAT in preparing materials for this meeting and briefing the Subcommittee. The discussion regarding the TIQAT's analytical approach will facilitate the SSC's ability to review and provide feedback on the Draft Environmental Impact Statement (DEIS), once that is completed.

Analyzing the socioeconomic effects of the TIQ alternatives is a large and complex task. The challenges faced by the TIQAT are compounded by the limited availability of information directly relevant to the TIQ alternatives. To facilitate understanding and proper interpretation of the alternatives, it will be particularly important that the TIQAT document the limitations of the data and models used, identify key assumptions underlying the analysis, distinguish between short- and long-term effects, and use methods such as sensitivity analysis to reflect the uncertainty associated

with TIQ effects.

The Subcommittee's comments and recommendations regarding specific topics included in the TIQAT's analytical framework are as follows:

Analytical scenarios

The TIQAT developed four analytical scenarios that include elements of the TIQ program that are expected to have major effects on the outcome of the program. The scenarios are packaged in such a way as to provide a spectrum of lesser to greater restrictions on efficient, market-driven behavior. Given the numerous issues that need to be addressed to establish the TIQ program and the multiple options associated with each issue, the Subcommittee agrees that an approach of this type is needed to make the analysis meaningful yet tractable. The Subcommittee also notes that some potentially significant options (e.g., initial allocation of quota shares by auction) have already been excluded from consideration. Significant excluded options such as this should be identified and the rationale for their exclusion discussed in the DEIS.

Theory for illustrating negotiation outcomes

The TIQAT proposes to use game theory to help evaluate changes in bargaining power and negotiating stances between harvesters and processors resulting from TIQs. While game theoretic models can provide useful insights into strategic outcomes, the Subcommittee cautions that the TIQAT's use of such models will likely be based on a much less than complete understanding of the circumstances and motivations of harvesters and processors. To further complicate the situation, bargaining power will be affected not only by quota holdings but also by leasing arrangements, to the extent that such arrangements are allowed under the TIQ program. The Subcommittee recommends that the TIQAT limit its reliance on game theoretic models to predict TIQ outcomes.

Lessons learned from other rationalization programs

Experiences from other rationalization programs may yield "real world" insights into potential effects of the TIQ program on harvesters, processors and communities. However, to avoid undue extrapolation from these other programs, the analysis should focus on conditions that predisposed these other programs toward certain outcomes and surmise similar outcomes for the TIQ program only if similar conditions are met.

Assessing effects of initial allocation of IFQ

The initial allocation options include qualifying periods that may extend as far back as 1994 and as far forward as 2004, and thus do not necessarily reflect current participation patterns. The TIQAT proposes to compare annual quota shares associated with each initial allocation option with harvesting/buying activity in recent years (2004-2006). The Subcommittee agrees that this analysis will be useful for anticipating quota share concentrations and the congruence of initial allocations with current fishing practices.

Assessing expected amount of fleet consolidation

The TIQAT will use a model developed by the Northwest Fisheries Science Center (NWFSC) and Dr. Quinn Weninger (Iowa State University) that uses the methodology of Weninger and Waters (2003) to estimate fleet consolidation for the non-whiting trawl fleet under TIQs. The model will rely on cost and earnings data collected by the NWFSC to estimate vessel efficiency and predict the number of vessels that may remain active in the fishery after TIQs are enacted. The efficiency estimates rely on a directional distance function and will be solved by linear programming. While the Weninger model is appropriate for this application, the Subcommittee notes that it is not an economic behavioral model and is based on assumptions regarding fleet incentives and constraints that may not fully reflect the realities of the groundfish trawl fishery. These limitations should be noted in the DEIS.

The Subcommittee recommends that the fleet consolidation analysis be accompanied by an analysis of alternative fisheries likely to be targeted by vessels displaced from the groundfish fishery.

The Subcommittee also recommends that the TIQAT examine the maximum amount of fleet consolidation that is possible given the allocation limits (including and excluding the grandfathering allowances) in each scenario. This analysis will establish a boundary condition on the fewest number of vessels that can prosecute the fishery. This may or may not be the expected outcome of fleet consolidation, but could serve as a known limit for the analysis.

Illustrating potential for geographic shifts in fishery patterns

The TIQAT proposes to use geographic differences in bycatch rates as a basis for projecting geographic shifts in non-whiting trawl effort, and to use lengthening of the whiting season that will likely occur with TIQs as a basis for projecting a northward shift in midwater trawl effort. The Subcommittee notes that other factors such as regional differences in fishery infrastructure and harvest efficiency (as discussed below under Illustrating potential for regions to be made better or worse off by rationalization) may also affect the geographic distribution of fishing effort.

Illustrating the potential to reduce overfished species catch rates and increase target species catch and revenue

For the non-whiting trawl sector, the TIQAT proposes to use the percent reduction in canary bycatch rates achieved under Washington's arrowtooth flounder exempted fishery permit (EFP) as the basis for projecting changes in harvest of all overfished species under IFQs. This will be done by applying the percentage reduction in canary bycatch rates to the bycatch rates for other species, then inputting these reduced bycatch rates in the trawl bycatch model developed by the NWFSC and used by the Groundfish Management Team (GMT) to predict overfished and target species catches. The Subcommittee notes that, while the arrowtooth EFP provides evidence of changes in canary bycatch rates, these rates are not necessarily applicable to other fishing strategies and geographic areas. Also, the canary bycatch rates were calculated as the ratio of pounds of canary to pounds of all species caught in a tow. The extent to which changes in this ratio are due to successful bycatch avoidance versus changes in the abundance of other species caught with canary by EFP participants is not clear.

For the whiting sector, the TIQAT proposes using bycatch changes in the catcher-processor fleet (before and after initiation of the cooperative) to predict bycatch changes in the mothership and shoreside fleets. The Subcommittee cautions that differences in the nature and area of fishing operations may yield different bycatch outcomes for the different whiting fleets.

Both of the bycatch prediction methods proposed by the TIQAT will have a major effect on the outcome of the analysis, as they will inform or serve as inputs into a number of other components of the DEIS (e.g., bycatch and target species harvest projections from the NWFSC/GMT bycatch model, regional employment and income projections from the IQIO and FEAM models to be discussed below). The Subcommittee recognizes the difficulty of predicting bycatch rate changes with any degree of certainty, given the unprecedented nature of the TIQ program. The Subcommittee recommends that the TIQAT emphasize the limitations of its bycatch projections and consider a range of bycatch rate reduction scenarios that reflect these uncertainties.

Illustrating potential for regions to be made better or worse off by rationalization

The TIQAT proposes to evaluate relative regional effects of TIQs on the basis of regional differences in bycatch rates, fishery infrastructure, harvest efficiency, and initial allocation of quota shares. The Subcommittee agrees that these are relevant factors and that a qualitative rather than quantitative evaluation may be all that is possible. It is important that the DEIS distinguish between regional differences expected over the short term (e.g., associated with differences in initial allocation) versus differences expected over the long term (e.g., changes in harvest efficiency). Advantages that accrue to regions that currently have adequate infrastructure may change over time, to the extent that TIQs cause changes in the geographic distribution of infrastructure.

Describing impact on California Current Ecosystem resulting from changes in fishing behavior and catch

Ecosystem impacts will be subject to a high degree of uncertainty, given limited information on gear-habitat and predator-prey relationships.

Measuring regional economic impact of changes in catch and revenue occurring in a rationalized fishery

The TIQAT proposes to use two regional input/output (I/O) models to estimate baseline regional impacts and the effects of the alternatives on regional economies: (1) the NWFSC's Individual Quota Input-Output (IQIO) model to assess impacts associated with the non-whiting trawl sector, and (2) the Fisheries Economic Assessment Model (FEAM) to assess impacts associated with the processing and whiting trawl sectors. The IQIO model internalizes the interactions between fisheries and the rest of the regional economy, whereas the FEAM treats fisheries as an exogenous influence on economic activity. An advantage of the IQIO is that it is based on less restrictive assumptions than FEAM; however, it also requires detailed, fishery-specific enterprise budgets that are currently available only for limited entry trawlers.

Given the lack of comparable enterprise budgets for all sectors and fisheries relevant to the DEIS, the TIQAT's decision to use the best available model for each sector (IQIO for the nonwhiting trawl

sector, FEAM for the other sectors) is reasonable. To the extent possible, the TIQAT should address the comparability of IQIO and FEAM outputs by documenting differences between the models and their data inputs, and identifying any known or predictable differences between the models.

The I/O models (both IQIO and FEAM) are not behavioral models. Both models require front-ends that map changes associated with TIQs (e.g., changes in volume and species composition of bycatch and target species harvest, extent of fleet consolidation, and changes in the regional distribution of landings) into changes in vessel revenue or expenditures in each specified region. As indicated above, uncertainties in these front-end projections will compound the uncertainty associated with I/O model outputs and should be noted as such. Only those changes associated with TIQs that are quantifiable will be amenable to exploration in the context of I/O models.

The geographic resolution of the I/O models will be important for evaluating the allocational implications of TIQs. While finer geographic resolutions are preferable for exploring such implications, the Subcommittee recognizes that too fine a resolution may push the models (or their front-ends) beyond their ability to make meaningful or accurate predictions.

<u>Allocation of overfished species based on a bycatch rate</u>

The TIQAT proposes a method of allocating quota shares of overfished species that involves application of recent (2003-2006) bycatch rates to target species quota shares based on target species catch history during the qualifying period. This method was originally suggested by the GMT as more congruent with current fishing practices than bycatch history. The Subcommittee notes the following with regard to this method of allocation:

- *Over the long term, the initial allocation of bycatch quota shares may not affect the economic efficiency of the program, since trading of quota shares will likely redistribute overfished species quota shares to those participants who value them the most.*
- *Over the short term, use of bycatch rates versus bycatch history to allocate overfished species will have very different distributional implications – with bycatch rates producing an outcome that is more aligned with current fishing practice. The closeness of this alignment will depend not only on the use of current bycatch rates but also the extent to which the allocation of target species quota shares (which varies according to the qualifying period) also resembles current fishing practice.*
- *The more the initial allocation resembles the economically efficient allocation, the less disruptive and less costly will be the transition to efficiency. The extent to which an initial allocation that resembles the current fishery deviates from the efficient allocation is difficult to know in advance. However, to the extent that quota holders are likely to (at least initially) gravitate toward fishing practices with which they are already familiar, an initial allocation that coincides with current practice may cause less short term disruption than one that deviates from current practice. Alignment of target and bycatch species allocations may also facilitate the ability of quota holders to "bundle" their transactions in ratios that are consistent with current regulatory and fishery conditions.*

Additional recommendations

Quotas for overfished species are scarce by definition. Unused quota for target species may also become scarce, particularly toward the end of the season. Situations can conceivably occur where quota holders exceed their shares but are unable to rectify the situation due to low availability or high price of shares available on the market. This problem may be exacerbated to the extent that quota holders hold on to their shares for speculative reasons. The Subcommittee recommends that the TIQAT consider whether the TIQ program includes adequate incentives for quota holders to avoid such situations (perhaps through voluntary risk-reducing cooperative arrangements) or whether additional measures (e.g., minimum holding requirements) are needed to reduce their occurrence.

When a species moves from overfished to non-overfished status (or vice versa), accompanying changes in quota pounds and prices may occur fairly smoothly. However, given the importance of such transitions, the Subcommittee requests that the TIQAT consider whether major disruptions or allocational issues may be precipitated by such transitions and whether procedures or conditions need to be built into the TIQ program to deal with them.

Coastal Pelagic Species Management

D.7. Pacific Sardine and Pacific Mackerel Management

Pacific Sardine

The SSC reviewed the Pacific sardine stock assessment and Stock Assessment Review (STAR) Panel report. An overview of the stock assessment was provided to the SSC by Dr. Kevin Hill. Recent assessments of sardine were based on the forward projection age-structured assessment program (ASAP) and the September 2007 STAR Panel review focused on new assessment results based on the SS2 model platform. The STAR Panel concluded that the ASAP model had a number of difficulties that SS2 was able to overcome, including: 1) allowance for some sardine to spawn at age-0, 2) differences in timing of the fisheries throughout the range, 3) estimation of initial conditions, 4) variability in weight-at-age among fisheries and between the fishery and population, and 5) log-normal bias correction for the stock-recruitment relationship. Residual patterns in the fit to the length frequency data were also removed using SS2 and model fits to the survey index data were improved. Based on these improvements in the sardine model, the SSC concurs with the STAR and Stock Assessment Team (STAT) that results from SS2 providing a better basis for modeling sardine population dynamics.

Conversion of the Pacific sardine assessment into the SS2 modeling framework produced assessment results that are less optimistic about current stock status than that based on the 2006 ASAP assessment. In particular, age 1+ Pacific sardine biomasses are at lower levels and have declined more precipitously in recent years. This trend in biomass is largely driven by SS2 estimates of recruitment which show strong 1997 and 1998 cohorts and a weaker 2003 cohort. Recent cohorts estimated by SS2 appear to be weaker compared to the ASAP model estimates. Differences in 2007 SS2 and 2006 ASAP assessment results were identified to be largely driven by new data (a sharp decline in the daily egg production method [DEPM] index of abundance from 2006 to 2007).

Treatment of the data (quarterly partition of the length and conditional age compositions) in SS2 as well as other factors including model structure, weighting, and a revised survey index also contributed to differences from the last assessment.

Major uncertainties in the assessment were identified. The assessment assumes that indices of spawning biomass for the "standard" survey area are linearly proportional to total spawning biomass, which has yet to be verified. The assessment lacks fishery independent data from the Pacific Northwest. A routine, coastwide survey would greatly improve the assessment of the sardine population. Historic information on sardine is extensive and efforts should be directed at evaluating and, if deemed reliable, incorporating it into future assessments.

Lack of catch data from Mexico makes total removals for recent years uncertain. Stock structure for sardine continues to be a major source of uncertainty, and southern sub-population catches may have contributed to the unusually high 1985 catches. Finally, the value of natural mortality is uncertain. Uncertainty in the assessment was captured by a lower and upper value for natural mortality, M=0.3 and M=0.5.

The SSC acknowledges the improvement of the sardine assessment with the use of SS2 and commends the STAT on their work. The SSC endorses the sardine stock assessment as the best available science and its use for management. The STAR Panel recommended that consideration should be given to holding the next STAR Panel for sardine in 2009 rather than 2010. The SSC concurs with this.

Pacific Mackerel

The SSC reviewed the STAR Panel report for Pacific mackerel. The STAR Panel review held in September 2007 focused only on assessment methodology, specifically on whether future mackerel assessments should be conducted using the SS2 platform. The STAR Panel concluded that the use of SS2 would be preferred (in principle), but that model results produced unrealistically high exploitation rates. The SSC recommends that continued effort be directed at developing an acceptable SS2 model configuration. If sufficient progress is made, a new mackerel stock assessment could be scheduled for May 2009 to establish harvest guidelines for the 2009-2010 fishery season. The SSC agrees with the recommendations of the STAR Panel and notes that 2008 harvest guidelines have already been set by the Council based on the 2007 assessment conducted using ASAP.

Adjournment – The SSC adjourned at approximately 5:30 p.m., Tuesday November 6, 2007.

SSC Subcommittee Assignments, November 2007

Salmon	Groundfish	CPS	HMS	Economic	Ecosystem-Based Management
Pete Lawson	**Martin Dorn**	**Steve Ralston**	**Ray Conser**	**Cindy Thomson**	Tom Barnes
Robert Conrad	Ray Conser	Tom Barnes	Tom Barnes	Todd Lee	Martin Dorn
Owen Hamel	Owen Hamel	Ray Conser	Robert Conrad	David Sampson	Tom Jagielo
Charlie Petrosky	Tom Helser	Tom Jagielo	André Punt		Pete Lawson
David Sampson	Tom Jagielo	Tom Helser			Todd Lee
Shizhen Wang	André Punt	André Punt			André Punt
	Steve Ralston				Steve Ralston
	David Sampson				Cindy Thomson

Bold denotes Subcommittee Chairperson

PFMC
02/19/08