SUMMARY MINUTES
Scientific and Statistical Committee

Pacific Fishery Management Council
Doubletree Hotel and Executive Meeting Center Portland Lloyd Center
Jackson Room
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Portland, OR 97232
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September 10-12, 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 (Monday only)
Dr. Todd Lee, National Marine Fisheries Service, Seattle, WA
Dr. André Punt, University of Washington, Seattle, WA
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

Members Absent

None.

Scientific and Statistical Committee Comments to the Council

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

Salmon Management

I.1. Salmon Methodology Review

The Scientific and Statistical Committee (SSC) was given an update by Mr. Dell Simmons on the status of several subjects that were considered at the April Council meeting as potential candidates for the salmon methodology review in October. The SSC notes that some of the these subjects are principally new data applications for existing models, and as such SSC review may not be appropriate or necessary. However, other subjects involve the development of new methodologies or principles where the underlying concepts and technical underpinnings are clearly the purview of SSC review.

Following are SSC recommendations concerning review of the nine subjects that are under consideration:

- **(1) Coded-wire-tag (CWT) representation for lower Columbia River natural coho in the Coho Fishery Regulation Assessment Model (FRAM).**
  (2) CWT representation for lower Columbia River natural tule Chinook in the Chinook FRAM.
  (9) Adding stocks from south of Cape Falcon to the Chinook FRAM.

  These three subjects are each data configuration issues for the existing FRAM models. Since the FRAM models are documented and have already undergone SSC review, they do not require additional SSC review for potential use involving new data configurations. However, the SSC requests that, rather than submitting these items to SSC review, changes of this nature be reviewed and documented by the Methodology Evaluation Workgroup (MEW) and presented to the SSC in a status report.

- **(3) Development of the Recovery Exploitation Rates currently used for Lower Columbia River natural tule Chinook.**
  (4) Development of the Recovery Exploitation Rates currently used for Lower Columbia natural coho.

  Mr. Simmons informed the SSC that there is a report available for Item 3, but not for Item 4. The SSC is interested in reviewing the general methodology used to estimate Recovery Exploitation Rates and the range of tradeoffs involved, rather than specific applications. These rates are always a compromise between the most rapid recovery scenario (i.e., zero harvest) and an acceptable level of risk in the interest of maintaining fisheries.
- **(5) Coho FRAM base period development and selection of years for base period averaging for input into the Coho FRAM.**

These two subjects involve simulations that warrant SSC review of the methodologies employed, and methods for evaluating trade-offs between alternatives. Mr. Simmons reported that the Pacific Salmon Commission is taking the lead on this work, and results should be available for review in October.

- **(6) Sensitivity analyses of the Chinook and Coho FRAMs to major assumptions, including sensitivity to parameters related to mark-selective fisheries.**

  Mr. Simmons informed the SSC that this work will not be ready for review during this management cycle. However, the SSC considers this to be of primary importance as part of the ongoing process of FRAM model review. Analysis of sensitivity of the FRAM models to selective fishery parameters remains a high priority with the SSC.

- **(7) Genetic Stock Identification experimental design, including general purpose experimental objectives, proposed statistical sampling design, and sampling protocols, for West Coast ocean salmon fisheries.**

  The SSC notes that this work is expected to be funded through a Saltonstall-Kennedy proposal that is due on 1 October. The technical content of the proposal should be available in time for the salmon methodology review.

- **(8) September 1 maturity boundary ("birth date") for Klamath River fall Chinook.**

  Mr. Simmons informed the SSC that there is no analysis in process.

The SSC Salmon Subcommittee will review these products in October prior to the full SSC meeting in November. As always, the SSC requires good documentation and ample review time to make efficient use of the SSC Salmon Subcommittee's time. Materials to be reviewed should be submitted at least two weeks prior to the scheduled review. Agencies should be responsible for ensuring that materials submitted to the SSC are technically sound, comprehensive, clearly documented, and identified by author.

Salmon Management, continued

I.2. Klamath River Fall Chinook Overfishing Assessment Progress Report

Mr. Chuck Tracy reviewed progress on developing a Klamath River Fall Chinook Overfishing Assessment Report. The document is in an early draft stage. The authors should make an effort to provide graphics that are simple, clear, and informative. Sections appear to have been written independently and assembled with little effort to integrate them. There are several conclusions in the Harvest Management section, but the overall document contains no overall conclusions or recommendations.

In Section 4, Harvest Factors, it is pointed out that with random errors the chance of achieving a goal in any year is 50% and the chance of missing it in three consecutive years is 1 in 8 or higher. When managing for the escapement floor, as has been the recent practice with Klamath River Fall Chinook, there is a high probability of the stock being classified as overfished in the normal course of events. In this context, the over-fishing determination should establish whether the failure to meet

escapement goals for three years is the result of specific adverse factors rather than a sequence of random events.

The harvest section provides a reasonable standard for quantifying factors that affect escapement in a way that allows comparison of relative importance. Section 5, assessing other factors, should be structured in the same way to the extent possible, recognizing the lack of quantitative information on some factors' impacts on survival. This would facilitate a comparison of the relative roles many factors play relative to current escapement patterns.

As the report is currently structured, harvest issues are considered separately from habitat and productivity issues. If the intent is to identify all factors that led up to the current over-fishing declaration, there needs to be a section in the report that integrates all factors whether or not they lie within the Council's management jurisdiction. The SSC suggests adding a new section that considers contributing factors in combination to provide a more complete basis for evaluating the extent to which each factor contributed to the escapement failures and for communicating these factors to responsible agencies.

The lack of integration of marine survival into the escapement time series, or any discussion of the role fluctuations of marine survival may have played in the current situation is an obvious gap in the analysis. The Salmon Technical Team's maximum sustainable yield report from 2005 shows that including marine survival in a recruitment model substantially improves the fit. This information should be used quantitatively in the current report.

Council Administrative Matters

B.3. Magnuson-Stevens Act Reauthorization Implementation

The Scientific and Statistical Committee (SSC) reviewed the draft revision to Council Operating Procedure (COP) 4. The revision generally reflects current practice regarding SSC roles and responsibilities. The SSC notes that the COP – particularly paragraph 1 under "Objectives and Duties" – may need to be revisited once guidance is received from NMFS regarding the process for establishing annual catch limits.

The SSC suggests the following editorial changes to the COP:

<u>Topic – "Objectives and Duties"</u>

Paragraph 1, first sentence: The term "independent" was inserted to characterize SSC advice to the Council. Paragraph 3b defines "independent" in terms of ensuring that SSC advice is not unduly influenced by SSC members directly involved in producing reviewed materials. Use of the term "independent" in paragraph 1 should be similarly clarified in terms of other types of influences SSC members are expected to avoid (e.g., fishery management policy by the Council and agencies, constituent pressure).

Paragraph 1, second sentence: The SSC has long supported the Council's practice of separating

science and policy as highly beneficial to the credibility of the SSC's scientific advice. The phrase "rather than supplant" provides some discomfort to the SSC, as it appears to suggest a need to safeguard against SSC intrusion into policy decisions. Given the extent to which the technical nature of the SSC's role is circumscribed in other portions of the COP, the SSC considers the phrase unnecessary and requests that it be deleted from the paragraph.

Paragraph 1, third sentence: For general clarity and to remove ambiguity regarding Council and SSC roles in dealing with equally probable estimates, replace "determining allocations or the setting of annual catch limits, quotas, and harvest guidelines within acceptable biological catch levels, or determining the best available science when multiple equally probable estimates exist" with "determining allocations; setting annual catch limits, quotas and harvest guidelines within acceptable biological catch levels; and deciding between estimates deemed equally probable by the SSC."

Paragraph 2, first sentence: For clarity, replace "Assist in the development, …" with "Provide advice regarding the development, ..."

Paragraph 3, first sentence: For clarity, replace "proposed regulations, measures to prevent overfishing" with "proposed management measures".

Paragraph 3b, second sentence: For clarity, replace "SSC review and deliberation of such items" to "SSC deliberation and conclusions regarding such items".

Paragraph 4, first sentence: For clarity, replace "recommend entities with ongoing research programs" with "identify ongoing research programs". Also replace "optimal execution" with "implementation".

<u>Topic – "Composition"</u>

To more fully address the issue of SSC expertise, add a third sentence to the first paragraph as follows: "More generally, the Council shall strive to ensure that SSC members reflect the range of expertise needed for all Council FMPs."

Second sub-bullet under bullet 2. Delete "one with expertise in groundfish stock assessment". It is not clear why expertise is specified for one but not all agencies. Such decisions may be better left to agency discretion rather than mandated in a COP.

<u>Topic - "Officers"</u>

To reflect the current practice of two-year terms for the SSC chair, replace "one-year terms" with "a two-year term" in the second sentence. Also delete the fourth sentence.

Highly Migratory Species Management

F.4. North Pacific Albacore Tuna Stock Assessment

The Scientific and Statistical Committee (SSC) was given a presentation on the Report of the Albacore Working Group of the International Scientific Committee (ISC) for Tuna and Tuna-Like Species in the North Pacific Ocean by Dr. Ray Conser (SWFSC).

The stock assessment of albacore tuna was conducted using the processes of the ISC and not those of the Pacific Fishery Management Council (Council). It involved the application of the package VPA-2BOX to catch-at-age data inferred from catch-at-length data and seventeen catch-rate indices. Although the current level of fishing mortality ($F_{17\%}$) was estimated to exceed many conventional fishing mortality references points, no agreed reference points currently exist for albacore tuna in the North Pacific. In addition, the spawning stock biomass was estimated to be at a high level at present and increasing.

The information provided in Agenda Item F.4.a, Attachment 2 was insufficient for the SSC to conduct a full review of the assessment. In particular, although eighteen background documents were presented to the ISC Working Group, and typical assessment outputs were examined in detail, the final report did not include this information, being largely a summary document. Therefore, given the lack of information, the SSC is unable to determine whether this assessment represents the best available science. Consequently, the SSC is unable to endorse the assessment at present.

Given the volume of information expected from a full highly migratory species (HMS) assessment, it is not be feasible for the SSC to review an HMS assessment during its normal meeting and a special meeting of the HMS subcommittee would likely be required to conduct a thorough review of the material.

A different approach than the SSC reviewing the summary document of the ISC meeting needs to be taken if the Council wishes the SSC to take a larger, and more rigorous, role in the review of assessments of HMS species conducted by international entities. For example, a member of the SSC could participate in the ISC Working Group and provide a report for Council consideration. This would provide for the maximum amount of direct SSC involvement in the review process. Alternatively, Terms of Reference (TOR) for HMS stock assessments could be developed by the SSC HMS subcommittee. Following approval by the Council, the Council could encourage, through the U.S. delegation, that the ISC modify its TOR for albacore assessments along the lines of the Council-developed TOR. The ISC Working Group would require sufficient lead time to modify its practices in order to satisfy changes to its TOR. Although there can be no guarantee that the ISC would adopt TOR for HMS assessments developed by the SSC, assessment reports produced following such TOR would provide a more rigorous basis for reviewing the assessment, although not to the extent a full Stock Assessment Review Panel Review.

Finally, the Working Group report noted that work is being conducted to apply the Stock Synthesis 2 (SS2) approach to albacore tuna in the North Pacific. The SSC encourages further work along these lines.

Highly Migratory Species Management

F.4. Yellowfin Tuna Overfishing

Dr. Mark Maunder (Inter-American Tropical Tuna Commission [IATTC]) briefed the Scientific and Statistical Committee (SSC) on the stock assessment conducted for yellowfin tuna in the Eastern Tropical Pacific (Agenda Item F.3.a, Attachment 2). The SSC reviewed the assessment, noting that there is currently no terms of reference document for highly migratory species stock assessments. The report on the yellowfin tuna stock assessment, however, includes most of the information typically included in a stock assessment report used for Council decision-making and hence could be reviewed by the SSC. Based on its review of the assessment, the SSC endorses the assessment, and its use for status determination purposes.

The assessment indicates that the spawning stock biomass (SSB) has been relatively stable since 1984 with periodic fluctuation. For the base-case assessment, the stock is estimated to be slightly below SSB_{MSY} with a fishing mortality rate (F) slightly above F_{MSY}. Therefore, based on the point estimates from the base-case assessment, overfishing is occurring and the stock is in an overfished state under the terms of the IATTC treaty. However, it should be noted that there is considerable uncertainty in the "current" estimates of both F and SSB. Also, note that the "current" estimates reflect an average over 2003-2005.

The base-case assessment assumes that recruitment is independent of SSB (i.e. steepness is one). The extent to which "current" F exceeds F_{MSY} depends on the relationship between spawning biomass and recruitment; the lower the value of steepness, the greater the implied extent of overfishing. Dr. Maunder noted that steepness for yellowfin tuna was unlikely to be one, but that it was also unlikely to be much lower than one.

The recruitment used in the calculation of SSB_{MSY} is the average over the entire period considered in the assessment. However, Dr. Maunder noted that the results of the assessment are consistent with a change in average recruitment in about 1984. The value of SSB_{MSY} would have been higher had it been based on recent (post-1983) recruitment; and hence the current stock status determination would have been more pessimistic.

Finally, the SSC notes that, at present, very few U.S.-flagged vessels operate in the commercial fishery for yellowfin tuna and landings are minimal (approximately 1% of the total). Hence, multi-national management arrangements are needed to stop overfishing.

Groundfish Management

G.4. Stock Assessments for 2009-2010 Groundfish Fisheries

The Scientific and Statistical Committee (SSC) reviewed eight stock assessments and the associated Stock Assessment Review (STAR) Panel reports. Six of these were full stock assessments and two were updated assessments. The SSC evaluated each stock assessment in terms of whether it

represents the best available science and whether it satisfies the Terms of Reference for Groundfish Stock Assessments. In some cases, the SSC has identified additional information which needs to be included in the assessment reports before they are finalized and included in the Stock Assessment and Fishery Evaluation (SAFE) document. Moreover, all stock assessment reports will be reviewed by STAR Panel Chairs for consistency with the Groundfish Terms of Reference prior to being submitted to the Pacific Fishery Management Council (Council) Staff for inclusion in the SAFE.

The outcomes of the assessments are summarized in terms of relative biomass (the ratio of current to unfished spawning output; also referred to as "depletion") and, in particular, how current spawning stock biomass relates to the Council's management target of 40% of unfished spawning output ($0.4B_0$) and its overfished threshold for groundfish species of 25% of unfished spawning stock biomass ($0.25B_0$). An evaluation of whether overfishing has occurred in recent years is also provided for each stock. The SSC identified a base-model, "low" and "high" states of nature, and the resulting decision table for use in Council decision making for each acceptable full stock assessment.

The SSC acknowledges the great amount of work put forth by all the assessment authors and thanks them for their efforts. As a whole, the assessment documents were much more thorough and of higher quality than during the previous cycle and they more closely followed the Terms of Reference. Finally, the SSC notes that convening STAR Panels which consider only two stocks undergoing full assessment reviews was much more manageable and resulted in a more in-depth and rigorous review.

The assessments raised several general issues that require further work, preferably before the next round of assessments. These issues are listed in the SSC statement on off-year science improvements (Agenda Item G.2.c, Supplemental SSC Report).

NORTHERN BLACK ROCKFISH

The SSC reviewed the assessment, the STAR Panel report and a statement by the Washington Department of Fish and Wildlife (WDFW) for black rockfish (*Sebastes melanops*) north of Cape Falcon, Oregon. A presentation of the assessment was provided by Mr. Farron Wallace and Dr. Theresa Tsou (WDFW) and some of the key considerations during the STAR Panel were highlighted by the Panel Chair (Dr. Owen Hamel). The last assessment of this stock was conducted in 1999. The 2007 assessment was based on fitting the estimates of abundance and catch-rates from tagging, along with age- and length-composition data for the trawl fishery, the non-trawl fishery and the sport fishery. Substantial new information has become available since the 1999 assessment, including revised catch data, discard estimates, recent length and age data, and recent tagging information.

During the STAR Panel meeting, the stock assessment team (STAT) and STAR Panel agreed on a base-model. However, following the STAR Panel meeting, and having informed the STAR Panel, the STAT created an alternative base-model in which the natural mortality for mature females (>15 years) was $0.24yr^{-1}$ rather the STAR base-model value of $0.20yr^{-1}$. The STAT noted that this model fitted the data better than the final STAR base-model and the STAR Panel Chair agreed that had this alternative model been provided during the STAR Panel, it would likely have been selected as the base-model given the STAT support for it. The SSC agrees that the alternative base-model should supplant the base-model selected during the STAR Panel. The STAT also provided evidence that the

"low" state of nature (mortality for females increasing from 0.12 to 0.16) led to a very poor fit to the data. The SSC recommends that the "low" and "high" states of nature be replaced by scenarios in which female natural mortality increases from 0.12 to 0.18 ("low") and 0.19 to 0.28 ("high"). The change to the "low" and "high" states of nature will necessitate a change to the decision table and the assessment report.

The alternative base-model estimates that the spawning output of black rockfish north of Cape Falcon has been increasing over recent years and is currently above the Council management target of $0.4B_0$ (projected 2007 spawning output 55.2% of B_0). This assessment also indicates that overfishing has not occurred in recent years.

The SSC endorses that the alternative base-model and decision tables based on the revised "low" and "high" states of nature can form the basis for Council decision making. The "low" and "high" states of nature should be considered to be equally likely and half as likely as the alternative base-model. Given the uncertainty associated with the allocation of historical catch to species, and the inability to fully utilize the tagging data in the assessment, the SSC recommends that northern black rockfish again be a full assessment for the next assessment round.

Notes:

It would have been desirable to have had the same scenarios regarding natural mortality in the northern and southern black rockfish assessments. This is no longer possible as the M scenarios for northern black rockfish are based on model fits. However, the southern rockfish assessment should use the M scenario in the alternative base-model as a starting point.

A concern with almost all the 2007 stock assessments is uncertainty regarding the allocation of historical catches to species. The SSC strongly supports an "off-year" activity in which a "best" rockfish catch series is created.

Add a section to the assessment report on age validation.

Add a table to the assessment report listing the model outputs in item D-6-c of the Groundfish Terms of Reference (time-series of total biomass, spawning output, depletion relative to B_0, recruitment, fishing mortality or exploitation rate) as well as a table that lists fecundity, weight, etc. as a function of age.

CANARY ROCKFISH

The SSC reviewed the canary rockfish (*Sebastes pinniger*) assessment and STAR panel report. A presentation was provided by Dr. Ian Stewart of the Northwest Fisheries Science Center (NWFSC). The previous canary rockfish assessment was done in 2005. New data added to the assessment model included NWFSC survey data from 2003 to 2006, and coast-wide pre-recruit indices during 2001-2006. Ageing of both historical and recent otolith samples added substantial new age data to the assessment. Although these new data are not highly influential, they do address issues identified during previous assessment reviews.

In this assessment (and in previous assessments) fishery selectivity was modeled in multi-year time blocks with changes in selectivity allowed between blocks. In contrast to the previous assessment, where blocks were defined arbitrarily to improve model fit, the current assessment defined selectivity blocks according to major management actions. Both the STAT and the STAR panel considered this to be a more objective and rigorous approach to defining selectivity blocks, and the SSC endorses this decision. A result of this change is that the best overall fit to the data now occurs at a much higher stock size than the previous assessment. In addition, the estimate of steepness, which previously had been precisely estimated at a low value, was now higher and less precisely estimated. However, the data were not entirely consistent. Composition data (length and age data) fit best at high stock size (and high steepness), while the trend from triennial trawl survey fit best at low stock size (and low steepness). Since steepness was no longer reliably estimated by the model, the STAR panel and STAT agreed that the best approach was to use the meta-analysis of steepness to identify a base model and "high" and "low" states of nature.

These revisions to the model produced a consistent pattern of underestimating the first half of the triennial trawl survey index and overestimating the more recent portion. The STAT and STAR panel identified a potentially important shift in the seasonal timing of the Triennial trawl survey in 1995, and developed a model with two survey catchability blocks to allow catchability to change as a result of this shift. This model eliminated the pattern in the fit to the survey index, had relatively minor impact on model results, and was adopted by the STAT and STAR panel as the base model. While the SSC accepted this decision for the current assessment, because of the broader implications to other assessments that use this time series, a high priority should given to further examination of trawl survey data to support the change in catchability (see Agenda Item G.2.c, Supplemental SSC Report).

The base model estimates that spawning stock biomass has been increasing from a minimum of 13% of B_0 in 1994 to 32% of B_0 at the start of 2007. These features represent a significant change from the previous assessment. For example, in the 2005 assessment, spawning stock biomass was estimated to be between 6% and 11% of B_0 at the start of 2005. Fishing mortality rates have been less than 1% since 2001, indicating that overfishing has not occurred since then. The rate of increase is highly dependent on the value of steepness, and moreover the rate of increase is projected to slow as weaker recruitments in recent years begin entering the mature population.

The identification of stock-recruit steepness as the major axis of uncertainty is an important qualitative change from the previous assessment. However, canary rockfish stock-recruit dynamics cannot be fully explored without incorporating Canadian data into the assessment. Joint work with Canada should be considered for the next assessment.

The SSC endorses the decision table with base model and "high" and "low" states of nature as the best available science to provide the basis for Council decision-making. The "low" and "high" states of nature should be considered to be equally likely and half as likely as the alternative base-model. The SSC recommends that canary rockfish be considered for an update in the next assessment cycle unless further examination of trawl survey data do not support the change in triennial trawl survey catchability or progress is possible on a transboundary assessment.

WIDOW ROCKFISH

The widow rockfish (*Sebastes entomelas*) assessment update was initially reviewed by the SSC Groundfish Subcommittee in June 2007. During that review, it was noted that two sources of landings over the 1991-2006 period were not included in the assessment update, namely 1) at-sea processing records and 2) bycatch estimates from observers.

Subsequently, the assessment database was updated to include these data and additional model runs were made. The SSC reviewed the revised runs – presented by Dr. Steve Ralston – and found that none of the key assessment results (including current relative biomass) was affected by inclusion of the additional landings data. Correspondingly, projection results were quite similar. The SSC endorses the use of the assessment results in support of management decisions.

In the next assessment cycle, widow rockfish would benefit from a full stock assessment. Projections indicate that the stock may be approaching its rebuilding target ($0.4B_0$). The Council's ability to classify this stock as "rebuilt" will be greatly enhanced if it is based on a full assessment. The SSC also encourages exploration of the use of the Stock Synthesis 2 (SS2) model in the next widow assessment to better handle the apparent area-specific growth rates and other modeling issues.

BOCACCIO

The SSC reviewed the bocaccio (*Sebastes Paucispinis*) assessment and STAR panel report. The last full assessment of bocaccio was conducted in 2003 and was subsequently updated in 2005. The 2007 STAR panel had expected a full assessment for this cycle; however, an update was delivered. The update continued to use the original Stock Synthesis 1 (SS1) model. Conversion to SS2, and exploration of concerns raised by the previous two STAR Panels would have been the main reasons for a full assessment.

The update had the same base model configuration as the original 2003 assessment and the 2005 update, but included: 1) refreshed landings, 2) recent length compositions, and 3) one new point for the California Cooperative Oceanic Fisheries Investigations (CalCOFI) survey. Assessment results indicated that the stock continued to increase. The 1999 year class is still a driving factor, and a larger than average 2003 year class appears to be evident based on updated Recreational Fishery Information Network (RecFIN) length composition data from Southern California. Rebuilding follows the same upward trajectory as was previously projected in 2003; spawning output has doubled since rebuilding started. Depletion in 2005 assessment was estimated at 10.7% in 2005, while depletion in 2007 assessment was estimated to be 13.8% in 2007.

The SSC endorses the bocaccio assessment for use in management; however, the same unresolved problems and major uncertainties remain as in the 2003 assessment. The SSC recommends that the next assessment should be a full assessment and should explore issues recommended by the past three STAR Panels.

COWCOD

The SSC reviewed the assessment and the STAR Panel report for cowcod (*Sebastes levis*) in the Southern California Bight. A presentation of the assessment was provided by Mr. E. J. Dick and the

key points of the STAR panel report by the STAR Panel Chair (Mr. Tom Jagielo). The last full assessment of this stock was conducted in 2005. The 2007 assessment was originally scheduled to be an update. At the update review in June, 2007, a number of technical issues were raised by the STAT and the SSC concluded that it would be appropriate to conduct a full assessment. The STAT was able to provide a full assessment for review at the STAR panel in mid-July. Given the limited time frame it was not possible for the STAT to fully explore all issues which might have been addressed had cowcod originally been scheduled for a full assessment. This inability to fully explore all of the issues was recognized when the recommendation for a full assessment was made in June.

A number of changes were made from the 2005 assessment in terms of both data and model structure. Gear selectivity, which had been mis-specified in the 2005 assessment, was corrected and revised. The growth curve for cowcod was re-estimated based on corrected data. The commercial and recreational sectors were modeled as separate fisheries. Commercial landings were revised based on a new ratio estimator for historical commercial landings (1900-1968) and port level information from the Southern California Bight. In addition, the California Commercial Cooperative Groundfish Program (CALCOM) (1969-1985) landings estimates had been revised recently, and those changes were incorporated into this assessment. Significant changes were made to the spatial stratification and the model used to develop the Commercial Passenger Fishing Vessel (CPFV) logbook indices. Steepness changed from 0.5 to 0.6 in the base model based upon the expectation of the prior.

The base model agreed upon at the STAR panel is based upon a stock-recruitment steepness value of 0.6. The "low" and "high" states of nature are based upon steepness values of 0.4 and 0.8 respectively. In addition, the CPFV index was excluded from the "high" state of nature, thus increasing the influence of the visual survey. The base model depletion in 2007 is 4.6% with a slowly increasing trend (~ 0.3% per year). The "low" and "high" states of nature have depletion levels in 2007 of 4.1% and 27.3%, respectively. This assessment supplants the 2005 assessment and the results are not comparable to that assessment due to structural changes identified in June.

The SSC endorses the base model and the decision table based on the "low" and "high" states of nature for Council decision making. However, the "low", "base", and "high" states of nature have not been assigned relative probabilities. Given issues with the CPFV index, the historical catch series, and the lack of time to fully address all issues, the SSC recommends that cowcod again be a full assessment for the next round of assessments.

Notes:

The SSC notes that the port level data show different trends, and suggests a more complex (detailed) treatment of historical catch data should be explored.

CHILIPEPPER ROCKFISH

The SSC reviewed the assessment and STAR Panel report for chilipepper rockfish (*Sebastes goodei*) in the waters off California and Oregon. A presentation of the assessment was provided by Dr. John Field and the key points of the STAR Panel report summarized by the STAR Panel Chair (Dr. David Sampson). The last full assessment of this stock was conducted in 1998. Substantial new data have been incorporated into this assessment including a revised catch reconstruction back to 1982 and

extensive length and age composition data extending back to 1978. The model also included fishery-dependent indices of relative abundance based on trawl log-book and CPFV observer data, and fishery-independent indices based on AFSC triennial shelf and NWFSC shelf/slope bottom trawl surveys. A juvenile index of abundance from the Southwest Fisheries Science Center (SWFSC) Santa Cruz young of the year (YOY) rockfish survey and coastwide YOY rockfish survey was also used.

The current chilipepper rockfish assessment used Stock Synthesis 2 (v2.00c), and represents a substantial improvement over the last assessment. Sexes were modeled separately and selectivity was modeled using a double-normal selectivity curve for the recreational fisheries and catch-per-unit-effort (CPUE) indices. Growth was modeled as time-varying and blocked to correspond to shifts in Pacific decadal oscillation (PDO), which improved model fit. Steepness was fixed at the meta-analysis prior of 0.57 and natural mortality fixed at 0.16 and 0.20 for the females and males, respectively. The 1998 assessment used M of 0.22 and 0.25 for the females and males, respectively. The assessment model fit the age and length compositional data reasonably well, with poorer fits to the survey indices. In general, there were conflicting signals between compositional and survey data, although the strength in the 1999 year class supports the upward trend in triennial survey abundance indices.

The current stock assessment shows similar trends in biomass in comparison to the 1998 assessment. The overall magnitude of biomass is lower primarily due to a lower natural mortality assumed for the current assessment. In general, recruitment strengths are similar for both assessments.

The base model estimates that spawning stock biomass has declined since the early 1900s to a low of 26% of B_0 in 1999, but has subsequently increased to 71% in 2007 due to a very strong 1999 year class. As with many other rockfish, the stock-recruitment value of steepness represents the dominant axis of uncertainty. The "low" and "high" states of nature are based upon steepness values of 0.34 and 0.81, respectively, and represent 25% probability and half as likely as the base case. The base model depletion in 2007 is 71%, with a depletion of 46% and 81% associated with low and high states, respectively.

The SSC endorses the stock assessment and the decision table with base model and "low" and "high" states of nature as the best available science to provide the basis for Council decision-making. The SSC recommends chilipepper rockfish be considered as an update in the next assessment cycle.

DARKBLOTCHED ROCKFISH

The SSC reviewed the darkblotched rockfish (*Sebastes crameri*) stock assessment and STAR Panel report, which was greatly facilitated by a presentation provided by Dr. Owen Hamel. The new assessment supersedes the 2005 assessment and includes the following new sources of data: 1) updated landings from 1980-2004 and new landings estimates for 2005 and 2006, 2) updated 2003 and 2004 discard rate estimates, and a new 2005 estimate, 3) new 2005 and 2006 NWFSC slope trawl survey data, 4) addition of the 2003-2006 NWFSC shelf trawl survey, 5) new GLMM estimates for all surveys, and 6) a variety of conditional age-at-length data that were developed using consistent aging criteria over the 2004-2007 time period. In addition, the new assessment eliminated AFSC slope trawl survey "super-years" and the Pacific Ocean perch survey (1979 and 1985) from

the model. Retention curves are now estimated using full length compositions, rather than the average size, of discards. Collectively, these changes represent a substantial advance in the development of the darkblotched model.

The SSC makes note of the fact that the STAR Panel report identified a point of disagreement between the Panel and the STAT regarding the estimation of spawner-recruit steepness (***h***), a parameter that has a major influence on stock productivity. In particular, the STAR Panel preferred to fix this parameter at the median value of a "prior" distribution (i.e., $\boldsymbol{h} = 0.50$) that was developed from a meta-analysis of US west coast rockfishes. In contrast, because the prior was developed without any influence from darkblotched rockfish, the STAT preferred to estimate steepness within the assessment model using the prior distribution, which yielded an estimate of $\boldsymbol{h} = 0.60$. In this instance the SSC concurs with the STAT's approach because it incorporates what appears to be meaningful information from the current stock assessment into the productivity estimate.

The assessment indicates that stock size in 2007 is currently 22% of the unfished level. In comparison, the last assessment estimated stock size to be 16% in 2005. The stock is rebuilding, with spawning output having increased by 68% over the last five years (i.e., 4,071 to 6,853), much of which has been based on strong 1999 and 2000 year-classes.

The STAT and STAR Panel agreed that natural mortality rate (***M***) represents the major axis of uncertainty in the stock assessment. The base model assumes $\boldsymbol{M} = 0.07$, which was bracketed by values of 0.05 and 0.09 as alternative states of nature in a decision table analysis. Those results showed a wide range of potential stock sizes in 2007 (i.e., 2,891 – 15,092) but probabilities were not assigned to any of the states. The SSC notes that because this species is overfished and under rebuilding, results from a rebuilding analysis that will be presented at the October mop-up panel will be more definitive. The SSC endorses the darkblotched rockfish stock assessment as the best available science and recommends that it be used in managing the stock. The SSC recommends that darkblotched rockfish be considered for an update in the next assessment cycle.

Notes:

A few parameters appear to be at the bound, a situation that should be investigated

The procedure for specifying initial multinomial sample sizes for tuning the model may not be applicable to conditional age-at-length samples.

ARROWTOOTH FLOUNDER

The SSC reviewed the stock assessment document and STAR panel report for arrowtooth flounder (*Atheresthes stomias*). Dr. Isaac Kaplan (NWFSC) gave a presentation on the assessment. This stock was previously assessed in 1993 using a dynamic pool model that was based on limited data and did not provide estimates of absolute biomass or depletion. The new assessment, conducted using Stock Synthesis 2, is based on a much more comprehensive base of information, including age and length composition data and biomass indices from several surveys.

Because substantial but unrecorded quantities of arrowtooth flounder are discarded due to limited

market opportunities, the catch history of arrowtooth flounder is highly uncertain. The rate of natural mortality, which differs between males and females, was the other major source of uncertainty identified during the STAR Panel review. These two sources define the alternate states of nature for the decision table in the assessment. The more productive state of nature is based on doubling the base-model catch history and has higher rates of natural mortality; the less productive state is based on halving the base-model catch history and has lower rates of natural mortality. The alternate states of nature differ markedly in the optimum yields that the stock could support, from a low of 2,668 mt in 2009 for the low productivity state of nature to over 142,000 mt for the high state of nature. Probabilities were not assigned to the alternate states of nature but the probabilities associated with the high and low states of nature are much lower than 25%. The base model estimates that spawning biomass has always been above the management target and has been increasing in recent years due to an exceptionally strong 1999 year-class. Spawning biomass in the base model is estimated to be 79% of the unexploited level at the start of 2007.

The SSC endorses the base-model and decision table provided in the assessment document and recommends that they can form the basis for Council decision making. The SSC further recommends that the next assessment of this stock should be a full assessment so that there can be fuller exploration of the various sources of uncertainty identified in the assessment and during the STAR review. It is unlikely that status of this stock will need re-evaluation in the next assessment cycle.

Groundfish Management, continued

G.2. Off-Year Science Improvements

The Scientific and Statistical Committee (SSC) discussed off-year science improvement activity and concluded that several highly focused topics would be more productive that a large number of items. The SSC also deliberated about the organization and planning of these activities. Some research topics would be best addressed in a workshop setting while others may be most effectively accomplished within committees or working groups. Success of any research topic described herein will require substantial scientific input and support. The SSC offers the following topics, in prioritized order, with organizational and planning suggestions:

- Post-mortem workshop of the 2007-2008 assessment cycle to evaluate the stock assessment review process. The SSC recommends that this workshop take place in Portland on December 5, 2007.
- Data enhancement projects undertaken as follows:

  Reconciliation of historical commercial groundfish catches for use by managers and assessment scientists. Such an effort should include establishment of a database for historical groundfish catch histories that include a coordinated and comprehensive allocation structure (strata, time, etc) which is web accessible and maintained for updates and revisions. This task may be best handled using a committee (catch reconstruction working group) comprised of federal and state representatives, including industry input.

  Similar reconciliation of historical recreational catches and raw catch and effort data. Recreational databases should be accessible, transparent, and standardized across states to the

extent possible and include ancillary information on regulations. A committee or working group including RecFIN representatives and stock assessment analysts may be the appropriate mechanism to accomplish this task.

Both of these projects should include a review process that allows agencies and industry to provide needed checks on the validity of the data.

- A comprehensive analysis of survey timing and other factors affecting catch rates in both the triennial and Northwest Fisheries Science Center shelf/slope bottom trawl surveys. Factors affecting survey catchability may need to be incorporated into generalized linear models to account for such changes.
- A second harvest policy evaluation workshop to evaluate groundfish harvest policies. Such a workshop may need to consider the Council's groundfish harvest policies with regard to the new annual catch limits and accountability measures specified in the Reauthorized Magnuson-Stevens Act. Final scheduling is anticipated to be determined after annual catch limits are clarified. The SSC, in conjunction with National Marine Fisheries Service, State agencies and Academics, will assist in planning and organization of this workshop with Council Staff.
- Development and use of priors on survey catchability. The current whiting and sablefish stock assessments depend critically on priors for catchability that would benefit from such a workshop. This research topic would require two steps. First, development of methodology and second, a workshop to apply the methodology.
- Evaluation of alternative methods to survey rockfish which do not commonly occur in the traditional bottom trawl surveys. This topic would be focus of a workshop to evaluate survey methodologies currently being developed for suitability in stock assessments.
- Development of data poor assessment approaches and their implementation into the management process. This topic may best be addressed by a working group. California Department of Fish and Game is currently in the process of sponsoring a symposium on this topic.

Notes:

A steering committee should be established to establish the breath and scope of such workshops and designate time tables for completing of tasks.

Database to include uncertainty in historical catch reconstructions.

Groundfish Management, continued

G.5. Amendment 15: Limiting Participation in the Pacific Whiting Fishery

The Scientific and Statistical Committee (SSC) reviewed "Environmental Assessment of Management Measures to Prevent Harm to the Pacific Whiting Fishery" (Agenda Item G.5.b, Attachment 1, September 2007).

The following table summarizes information from the Environmental Assessment (EA) regarding limited entry provisions under the status quo, the number of entities qualifying for a whiting endorsement under each alternative to the status quo, and actual participation in 2005 and 2006.

	CatcherProcessrs	Motherships(MS)	MSBoats	ShoreBasedBoats
Status Quo	Coop	No lim entry (LE)	176 LE permits (derby)	
Alt 1a	11	7*		
Alt 1b	10	6	64	56
Alt 2a	11	8*		
Alt 2b	10	7	64	63
Alt 3	10	7	39	56
2005Partcpn	6	5	18	29
2006Partcpn	9	6	20	37
* Corrections to EA conveyed to SSC by G. Kirchner (ODFW).				

Bycatch rates for salmon and overfished rockfish tend to be higher in the spring than later in the season. According to the EA, whiting participation is expected to be higher under the status quo relative to the other alternatives, which could lead to earlier season fishing. Potential biological and economic effects associated with this acceleration of fishing activity cited in the EA include: higher salmon and rockfish bycatch, earlier achievement of the shore-based whiting allocation, lower revenue and higher cost per vessel, more pressure on other fisheries once the whiting fishery closes, potentially adverse effects on boats that have few alternatives to whiting, and disruption of processing activity. Little evidence is provided in the EA to substantiate these effects.

Underlying the analysis of biological and economic effects is the assumption that alternatives to the status quo would be more effective than the status quo in preventing acceleration of the derby fishery. The validity of this assumption is not clear in the EA. Specifically, of the 176 catcher boats that hold limited entry permits, only a small number participated in the whiting fishery in 2005-2006 (years of record high revenues and prices). While the alternatives to the status quo would cap whiting participation, the number of mothership and shoreside catcher boats qualifying for a whiting endorsement under each alternative is considerably higher than recent participation and (depending on the alternative) would allow for a doubling or tripling of current participants. In order to demonstrate that the alternatives prevent acceleration of the derby fishery relative to the status quo (as asserted in the EA), it will be important that the EA include a discussion of why participation would increase even more under the status quo than the doubling or tripling allowed under the alternatives.

The focus of the EA on preventing acceleration of the race for fish appears to pertain to the mothership and shoreside sectors (which are derby fisheries). The effects of the alternatives may be quite different for the catcher-processor sector, which is not a derby fishery. The catcher-processor sector operates under the auspices of the Pacific Whiting Conservation Cooperative (PWCC), which engages in coordinated efforts to limit effort and reduce bycatch. Entry of non-PWCC catcher-processors may or may not transform this sector from a rationalized to a derby fishery. The economic implications of the alternatives for this sector should be addressed in the EA.

The objective of Amendment 15 is "to develop conservation and management measures to protect the West Coast non-tribal Pacific whiting fishery and the participants in the fishery from adverse impacts caused by vessels with no sector-specific historical participation in the Pacific whiting fishery. The proposed limitations on entry are intended to restrict introduction of additional harvest capital in the fisheries, which could result in an accelerated race for fish" (p. 9). Relative to this objective, it is not clear that the status quo will result in an accelerated race for fish relative to the other alternatives. It is also not clear why limited entry for motherships is included among the alternatives, at least as it relates to the race for fish; if there are other reasons for such mothership restrictions, they should be documented in the EA. As indicated above, one area where the alternatives may yield changes in economic efficiency relative to the status quo is the catcher-processor sector. Other than that, the fundamental issue addressed by the amendment appears to be one of distributional equity.

Pacific Halibut Management

H.2. Bycatch Estimate for International Pacific Halibut Commission

The Scientific and Statistical Committee (SSC) reviewed a report by John Wallace and Jim Hastie on Pacific Halibut Bycatch in IPHC Area 2A in the 2006 groundfish trawl fishery (September 2007). The methodology employed to estimate Pacific halibut bycatch was unchanged from that used in the past two years. Halibut bycatch varies by season, depth, latitude, and the proportion of arrowtooth flounder in the catch. The SSC appreciates that confidence intervals (requested by the SSC last year) were included in this year's document.

The SSC notes that until estimation methods change from the current technique, which appears to have become routine, the SSC does not see the need for further review.

Pacific Halibut Management, continued

H.3. Pacific Halibut Abundance Estimate

The International Pacific Halibut Commission (IPHC) held a stock assessment workshop June 27-28, 2007. Three members of the Scientific and Statistical Committee (SSC) attended the workshop (Dr. Martin Dorn, Dr. Thomas Helser, and Mr. Tom Jagielo). The SSC expresses its strong support for this type of workshop and commends the IPHC for facilitating a greater understanding of their stock assessments and stock assessment process. However, this type of workshop does not provide a forum for the type of independent review that takes place during a Stock Assessment Review (STAR) Panel.

The SSC was not in a position to conduct a formal review of the Pacific halibut assessment. However, the following comments are intended to inform the Council about some key elements in the assessment.

1. There is more uncertainty in the assessment than is explicitly acknowledged in the assessment document.

2. There is evidence that survey catchability is not the same in all areas. This may be particularly true in Areas 2A relative to other areas. Area 2A survey catch per unit of effort (CPUE) could be weighted by depth to help alleviate this issue.

3. The Pacific halibut assessment has moved from a multi-area assessment to a single area assessment to better account for the evidence of movement of fish. The overall estimate of biomass is largely invariant to the choice of modeling frameworks. Although these frameworks represent the bounding conditions on movement (i.e., no movement and complete mixing), the truth is between these bounds. The IPHC has expressed their intention to investigate the explicit modeling of fish movement in future assessment work. The SSC agrees that this is an important area of research.

4. Given that the choice of a multi-area or single area assessment does not affect the overall biomass estimate, its main effect is distributional.

5. The IPHC assessments do not contain terms of reference. If the IPHC wishes to continue external review, terms of reference for the process would be helpful.

Public Comment

Karen Garrison, National Resources Defense Council.

Ms. Garrison reviewed the processes by which steepness was estimated in the recent assessments of darkblotched rockfish and canary rockfish. She stressed the importance of characterizing the risk associated with the treatment of this important assessment parameter. Ms. Garrison recommended the SSC make an effort to convey these risks and tradeoffs to the Council when reviewing and commenting on assessments for use in groundfish management.

Adjournment: The SSC adjourned at approximately 5 p.m., Wednesday, September 12, 2007.

SSC Subcommittee Assignments, September 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
David Sampson	Tom Helser	Tom Jagielo	André Punt		Pete Lawson
	Tom Jagielo	Tom Helser			Todd Lee
	André Punt	André Punt			André Punt
	Steve Ralston				Steve Ralston
	David Sampson				Cindy Thomson

Bold denotes Subcommittee Chairperson

PFMC
10/18/07