

North Pacific Fishery Management Council

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MINUTES SCIENTIFIC STATISTICAL COMMITTEE February 7-9, 2005

The Scientific and Statistical Committee met during February 7-9, 2005 at the Madison Renaissance Hotel in Seattle, WA. Members present were:

Gordon Kruse, Chair
Steve Hare
Terry Quinn
Doug Woodby
Ken Pitcher

Pat Livingston, Vice Chair
Sue Hills
David Sampson
Mark Herrmann
Franz Mueter

Keith Criddle
Anne Hollowed
Farron Wallace
Seth Macinko

Members absent:

George Hunt

Election of Officers

Gordon Kruse was elected Chair and Pat Livingston was elected Vice Chair.

B-7 Protected Species

Bill Wilson (Council staff) presented eight reports on protected resource issues. Robyn Angliss (NMML) presented additional information on the list of fisheries, and Ann Edwards (NRC Research Associate and visiting scholar at UW) presented information on the seabird – offal project. Public testimony was presented by Gerry Merrigan (Prowler Fisheries), Thorn Smith (North Pacific Longline Association), and Ed Richardson (Pollock Conservation Cooperative).

List of Fisheries for 2005

The SSC previously commented on the analyses and assumptions that went into the List of Fisheries for the 2005 report in our October and December 2004 minutes. Four main issues were highlighted: (1) the sampling of incidents of serious injury and mortality of marine mammals, which are rare events, and the appropriate length of time series of observations to use to estimate the frequency of these rare events, (2) the need for observers to estimate the frequency of serious injury and mortality in state-managed fisheries, (3) the assignment of observed mortalities to more than one marine mammal stock per occurrence, and (4) the appropriateness of procedures used to estimate incidents of serious injury and mortality for unobserved hauls and fisheries. **The SSC feels that these issues remain to be addressed,**

but they are not easily resolved and the SSC intends to continue a dialogue with analysts to provide advice on their long-term solution. Here, the SSC adds additional comment on these issues.

Measures of Fishing Effort

The SSC discussed the appropriateness of the use of total catch as a proxy for fishing effort. Given the data availability, it is understandable that catch has been used in this way, especially when aggregating across diverse gear types. However, now that some aggregate fisheries are being disaggregated into finer, discrete fishery units based on target species and gear, direct estimates of fishing effort units might be used. **The SSC encourages the analysts to explore the use of direct measures of fishing effort (instead of using catch as a proxy for effort) in future analyses at least when and where possible.**

Sample Size

There is a trade off between sample size and precision of estimates of rates of incidents of serious injury and mortality. On the one hand, estimation of rates of occurrence by fishery has the potential to discriminate differential rates among various fisheries. On the other hand, splitting of limited data into finer fishery units leads to the possibility of generating biased estimates associated with small sample sizes. The same goes for the length of the time series used to estimate the frequency of rare events. The analysts provided good justifications for selecting a 5-year period (rather than, say, a 10-year period); one reason is that fisheries change over time so that historical rates may not apply to contemporary fisheries. However, use of a shorter time period can increase the influence of a single rare observation on the average used for estimation. **The SSC recommends that the analysts further consider the tradeoff between desires for finer spatial and temporal resolution of incidental take estimates and the potential for introduced bias associated with small sample sizes used to make these estimates.**

Assignment of Individual Incidental Takes to more than One Stock

The SSC reconsidered the issue of assigning a particular take (e.g., killer whale) to more than one stock (e.g., transient vs. resident ecotype) for the affected fishery when it is uncertain to which marine mammal stock the take belongs. The approach taken was to assign the take to both stocks when the stock origin was uncertain. In such instances, another approach would be to apportion the take among stocks from a probabilistic weighting based on the observed proportions of the two ecotypes in the region in which the take occurred. The SSC noted that the particular approach used depends on the purpose of the analysis. For instance, if the goal is to obtain best estimates of takes by stock and fishery or to predict future takes, then the probabilistic approach may be most appropriate when data are adequate to estimate the proportions. If instead the goal is to estimate the maximum possible number of takes of a particular stock by a particular fishery, then the dual-assignment approach may be best because it is most conservative. **The SSC urges the analysts to clearly note the procedure used and its caveats, so that others using summary tables do not mistakenly double count the number of actual number of takes when stock of origin is uncertain.** Robyn Angliss noted that when genetic samples are taken, the take can be correctly assigned appropriately to the correct stock and the take is not listed under both ecotypes. The SSC anticipates that this “double-counting issue” will become less of a problem as the database of genetic samples is built and the database of confirmed stock identifications becomes more adequate.

Estimation Procedure for Total Take

Most of the SSC discussion concerned the statistical methods used to estimate the number of takes and the confidence interval for those estimates. **The SSC recommends that future analyses should address some additional considerations, including assumptions about the statistical distribution (e.g., discrete versus continuous, symmetrical versus asymmetrical) from which the sample is drawn.**

For instance, the common assumption that samples are taken from a continuous normal distribution can lead to a negative lower bound on the confidence interval. Of course, the number of takes cannot be less than zero. So, the analyst might want to consider a lognormal distribution or a censored normal distribution to ensure that the confidence interval does not include negative numbers.

The SSC also discussed the effect of rounding the estimated number of takes to an integer (i.e., whole number of animals). This procedure makes sense from a practical standpoint, but the SSC notes that this rounding requires that adjustments to the confidence interval need to be made. Moreover, the SSC would like to see an explicit statement of the rounding rule used to rounding up to a whole number of animals. To avoid rounding issues altogether, the SSC recommends that the analysts consider using a discrete distribution such as the Poisson distribution, which is more appropriate for count data.

Finally, the SSC recommends that a more detailed discussion of strata (page 9 of Perez 2003) is needed, particularly regarding how the analysts calculated regional and annual estimates of incidental takes. The SSC was especially uncomfortable with the way in which unobserved takes were combined with observed takes. The SSC understands that takes volunteered by vessel crew during unobserved hauls occurred on vessels with observers only. The SSC is comfortable with the approach to extrapolate estimates of takes from the observed portion of a fishery to the unobserved portion of the same fishery, but the addition of volunteered (unobserved takes) is problematic and alters the statistical properties of the estimates in unknown ways, because the number of hauls represented by these volunteered accounts is undefined.

Other Issues

The SSC recommends that the analysis should use the most recent estimates of killer whale abundance for the area west of Kodiak. The estimates, based on considerable survey effort, indicate much larger populations than previously thought. Inclusion of these data would increase the estimate of PBR and might affect the classification of some fisheries.

The two documents reviewed by the SSC do not address the issue of serious injuries associated with entanglement and escape of marine mammals in active and discarded fishing gear and marine debris. Steller sea lions and northern fur seals are particularly vulnerable. This source of serious injury or mortality occurs regularly but the extent is unknown and difficult to estimate. It is likely that this source of mortality could be much greater than the incidental take in commercial fisheries. Common entanglements include fragments of netting, packing bands, loops of line around the neck and ingested hooks from long-line fisheries and commercial and sport trolling. **The SSC recommends that future analyses should describe how the cumulative effects of all mortality sources have been taken into account.**

The SSC received brief informational reports on the following items concerning protected species:

1. When the EIS on the harvest and management regulations for northern fur seals on the Pribilof Islands was released, NMFS indicated that they would be doing a second EIS on the general management of northern fur seals, including fishery interactions. It now appears that the second EIS will be put off for an unknown length of time.
2. Northern fur seal biologists and other marine scientists met with the Pribilof Islands Cooperative in Anchorage during January 28-30 for a comprehensive review of northern fur seal information.

3. The State of Alaska has adopted by reference the federal regulations for use of sea bird avoidance measures for longline fishing in state waters.
4. A petition was received to list black-footed albatross under the ESA. The U.S. Fish and Wildlife Service determined that an emergency listing is not appropriate.
5. A report on a new research program to evaluate discards and offal effects on seabirds was presented by Ann Edwards (NRC Research Associate and visiting Scholar at UW). The study will look at cumulative impacts of fishing on seabirds. The study will consider the negative effects of direct take (increased mortality) and the potential positive effects of offal (improved feeding) on these birds. Pending the results of stable isotope analysis from museum specimens of albatross, a number of additional research items could be addressed with field research such as evaluating effects of offal on bird behavior and consumption in Alaska waters. Other data sources that could be used to understand offal availability include estimates of offal from shoreside processors that is taken offshore, and the groundfish food habits database. Tagging could provide additional valuable information on the distribution of birds at sea in relation to the fisheries and their discards.
6. NMFS has rescinded its decision to designate North Atlantic and North Pacific stocks of right whales.
7. A petition for a parallel pollock trawl fishery in state waters will be addressed during the March meeting of the Alaska Board of Fisheries. Aleut Enterprise Corporation has asked for pollock openings in state waters within Steller sea lion protected zones. NMFS has indicated that such fisheries could reopen formal consultation on jeopardy to Steller sea lions.

C-1 EFH

The SSC received reports summarizing three substantive changes made to Essential Fish Habitat including:

- a) a re-evaluation on the effects of fishing contained in Appendix B of the Preliminary Final EIS for Essential Fish Habitat,
- b) a revision of two alternatives for describing and identifying EFH on seamounts, and
- c) analyses of two new options for Aleutian Islands Alternative 5b to minimize effects of fishing on EFH.

Presentations were made by Jon Kurland (NMFS, Juneau), Dan Ito (AFSC), Matt Eagleton (NMFS), and John Olson (NMFS). Dr. Craig Rose (AFSC) presented results from a validation study of the fishing effects model. Ben Entiknap (Alaska Marine Conservation Council), Whit Sheard (Ocean Conservancy), Jon Warrenchuk (Oceana), John Gauvin (Groundfish Forum), and Paul MacGregor (At Sea Processors Association) gave public comment.

The SSC provided extensive comment on EFH issues in its minutes of previous meetings, especially in March, October, and December 2004.

Appendix B Evaluation of Fishing Effects

Substantial revisions and additions were made to the analyses, and evaluations resulting from the fishing effects model. The SSC commends authors and contributors for their responsiveness to our concerns and

requests, particularly given the short time frame since completion of SAFE documents in December. Evaluations were greatly expanded to consider habitat effects with respect to distribution, spawning/breeding, growth, condition (weight at length), feeding, and stock trends. Results were not significantly changed and there were no findings of more than minimal and not temporary effects. The number of unknown designations increased by three. **The SSC notes that some evaluations found that fishing effects on habitat might have had detrimental effects on managed species but the analyses were unable to conclude an effect of fishing due to insufficient information (e.g., Atka mackerel, sablefish, Pacific ocean perch, and other rockfish).** In the POP example, the evaluation recognizes that “a reduction in living structure may jeopardize these fishes’ ability to grow to maturity” (page B-101). However, analysts note that the extent of the association with sponges is unknown and therefore evaluation for effects on growth to maturity was “unknown.” In the case of sablefish, a decreasing trend in biomass and MSY levels is taken as indication that “the level of MSY has been impaired,” but it is not possible to distinguish between fishing effects and climate change, and the resulting evaluations of fishing effects on growth and feeding are given as “unknown.”

The analysis found no evidence that Council-managed fishing activities have more than minimal and temporary effects on EFH for any FMP species. Yet, the CIE committee and the SSC notes that a significant proportion of the ratings (36%) for fishing effects were classified as “U” or unknown. **Given this result, application of the precautionary approach is warranted, as mentioned in the SSC’s October 2004 meeting minutes.**

The SSC suggests that an analysis of fishing effects on EFH would have been more robust if it analyzed probabilities and consequences of both Type 1 and Type 2 errors. In simple terms, “Type 1” errors are those in which the null hypothesis (H_0 : No effect) is rejected when, in fact, the null hypothesis is true. In this case, this would mean that we conclude that there are fishing effects when, in fact, there are actually none. On the other hand, “Type 2” errors are those in which the null hypothesis is accepted when, in fact, it is false. Again, in our case, this means we would have concluded no fishing effects when, in fact, they actually existed.

Regarding the need for precaution, the SSC recommends that corals deserve special mention. Page B-137 of the EFH EIS states that “While few evaluators cited coral as specifically linked to life history function, in some areas it may be an important component of the living structure that is potentially linked to growth to maturity for some of these species. Because of their slow recovery, corals warrant particular consideration for protection ...” The National Research Council committee (NRC 2002) on the effects of trawling and dredging on seafloor habitats also singled out corals as needing special protection from the effects of mobile bottom-contact gear owing to their vulnerability to impact and the millennia that may be required for recovery. **The SSC agrees with these assessments.**

The validation study conducted by Dr. Rose was in response to requests by both the CIE review panel and the SSC, and the SSC commends Dr. Rose for completing this study in a very limited time frame. Conclusions from this effort were that (1) the model is inadequate as a predictor of annual changes in living structures, (2) predictions of long term equilibria are not possible due to the lack of information on the original unfished habitat condition, and (3) nonetheless, the model is still the best available tool for assessing the spatial distribution of relative fishing effects on habitat. As the full report of this work was not yet available, the SSC withholds further comment, except to reiterate our prior comments (October, 2004) encouraging further validation of the long term effects, using, for example, data from other regions, provided that initial habitat condition is known or can be estimated.

Aleutian Islands Alternative 5b Options

Two new options for Alternative 5b for the Aleutian Islands are under consideration, bringing the total options to three for this alternative, which seeks to protect deep-water coral and sponge habitat by restricting non-pelagic trawling to areas that have already been trawled. The three options vary in several respects, including the boundaries for areas to remain open to bottom trawling. **The SSC is concerned that considerable uncertainty remains as to the appropriateness of the boundaries for the 3 options, such that it is not clear if the locations of proposed open areas optimally protect existing coral and sponge habitat.** In the case of options 1 and option 2, proposed by Oceana, the use of haulback endpoints (rather than the actual trawl track locations) may result in considerable error in the identification of fished areas. In the case of option 3, put forth by the fishing industry, confidentiality concerns limit the ability for public review of the trawl location data. Given the need for the Council to select a preferred alternative at this meeting, there appears to be little time for further analysis and boundary development. **The SSC suggests that the final result, if one of these options is selected, could be improved by allowing for flexibility in final designation of open area boundaries, based on future improved mapping of the actual fishing location data.**

D-1 Groundfish

D-1(a) Non-target

Jane DiCosimo (NPFMC) reported on the progress of the Council's non-target species committee and reviewed alternatives for amendments to the FMP to improve management of non-target species. She noted that Alternative 5 is on hold pending final decisions regarding proposed rule changes to National Standard Guideline (NSG) 1. The SSC inquired about the status of the proposed rule for NSG 1 and restated their concern that the language of the proposed rule may prohibit the implementation of Alternative 4.

The SSC continues to be concerned about the current regulations for setting other species TACs in the GOA because removal of skates from the other species category could allow an increase in the catch of non-target species, as may have occurred recently with the development of a spiny dogfish fishery in the GOA. The SSC underscored the need for an amendment to allow the TAC for GOA other species to be set at 5% or less of the GOA groundfish TACs.

D-1(b) Rockfish

Jane DiCosimo (NPFMC) reviewed progress on developing a rockfish management discussion paper. **The SSC reviewed suggested areas of investigations for future analyses (identified on page 1 of the briefing document) and with this list. In addition, efforts to identify rockfish stock structure through expanded genetic studies are an additional important area of research and the SSC encourages use of new genetic tools.** SSC members also noted that an analysis of the potential role of maternal age on reproductive potential of POP was included in the 2004 SAFE and was reviewed at the December 2004 meeting.

The SSC also received a report by Dr. Paul Spencer (AFSC) on the potential for fisheries to cause localized depletion of rockfish. The SSC noted that depletion studies are difficult to implement in the field. Potential areas of concern include the problem of determining whether the populations are closed as well as the appropriate spatial scale over which to do the analysis. The SSC also noted a consistent pattern in which POP CPUE was high on the first day of the season. We encouraged Dr. Spencer to investigate processes, such as fish behavior, underlying this trend. **The SSC provided technical comments to Dr. Spencer on his analysis and encouraged expansion of this type of study to other species such as yelloweye rockfish.**

D-1 Draft Paper on MPAs in Alaska

The SSC received a report and reviewed a draft manuscript by David Witherell regarding the “Application of Marine Protected Areas for Sustainable Production and Marine Biodiversity off Alaska.” This paper pertains to implementing the fishery management policy adopted by the Council in their PSEIS. Under the policy priority of “protection of habitat” the policy has three specific priority actions relating to MPAs: (1) develop and adopt definitions of Marine Protected Areas in Alaska, (2) review all existing closures to see if these areas qualify for MPAs under established criteria, and (3) evaluate effectiveness of existing closures. The paper goes a long way toward meeting these objectives. The paper classifies existing management areas off Alaska that qualify for MPA status using two classification schemes. One is based on an annotated scheme developed by the MPA center (Table 1 of the paper), while an alternative approach, developed by the author, classifies MPAs based on one of five primary objectives identified by the author. The SSC appreciates the latter approach and supports its use as a practical classification scheme, rather than (or in addition to) a classification used by the MPA center. **To more rigorously evaluate effectiveness of the closures the SSC recommends that the author develop and clearly state a set of criteria specific to each of the primary objectives. The SSC further recommends that the paper should clarify that its emphasis was to identify MPAs in the EEZ only, and it should clarify the relationship between federal and state efforts to define and classify MPAs.** For instance, the SSC noted that vast areas of state waters closed to trawling and dredging would qualify as MPAs, as well as refuges such as Glacier Bay National Park. These should be either added to the paper or at least referenced for completeness.

Crab Overfishing Working Group

We received an oral progress report from Dr. Jack Turnock (AFSC) on recent work by the Working Group to develop new overfishing definitions and harvest control rules for BSAI crab fisheries. The Working Group has proposed a six-tier system analogous to the tier system used in groundfish management. Work continues on developing length-based simulation models to evaluate impacts of adopting this alternative for the EA/RIR. For code validation redundant models are being programmed in FORTRAN and ADMB.

The Working Group advised the SSC that the EA/RIR for crab overfishing definitions, originally scheduled for presentation to the SSC in June 2005, may be delayed until the October 2005 meeting. Simulation results may be available for presentation to the SSC at the June 2005 meeting. The working group reported on several sticky issues impeding progress, and the SSC provided advice to assist them.

For instance, the analysts reported that they have been having difficulty adapting Clark’s approach for groundfish to develop the $F_{35\%}$ type of F_{MSY} proxy because of uncertain aspects of crab life history (e.g., male to female mating ratios, size selection greater than maturity, and the range of permissible spawner-recruit curves). The Working Group has attempted a meta-analysis to resolve the choice of feasible values for the SR curve parameters. **The SSC encourages the Working Group to continue working for consensus on crab life-history parameters and developing the spawning-biomass-per-recruit approach for choosing F_{target} and F_{limit} .** The SSC notes that there seem to be problems in fitting the SR curves to data from three BSAI crab stocks. **To help resolve these problems, the SSC suggests that the Working Group should explore autocorrelation and depensation in recruitment, as well as shifts in spawner-recruit (SR) parameters among time periods.**

Should the Working Group be unable to resolve the choice of feasible SR parameters, the SSC recommends revisiting the tier system and finding alternatives to the spawning-biomass-per-recruit

approach. For example, the ratio of $F_{\text{target}}/F_{\text{limit}}$ could be replaced by a constant fraction, such as $0.75F_{\text{limit}}$, provided that limit reference points can be determined.

One critical element of the harvest control rule and tier system is the biomass-based adjustment to fishing at low stock sizes. There are several choices for the measure of biomass that could be used – male biomass, female biomass, and mature biomass – and the working group has been struggling with the decision about which to use. **Here, the SSC recommends the use of effective female spawning biomass (ESB) as a default in the development of the overfishing definitions because of its established use in current crab management and its ability to adjust for deficits of mature male crabs.**

The SSC recommends that the Working Group focus its work on finalizing the tier system, unless it intends to use a management strategy evaluation approach to define the parameters of the tiers. Management strategy evaluation is a simulation testing approach fully described in the Council's F40 report (Goodman et al. 2002). Until a feasible tier system is developed to make use of existing data for all crab stocks, attempts to define the scope of the EA/RIR analysis will be futile. The SSC anticipates that issues such as choice of M and male:female mating ratios will be framework items to be specified during the annual stock assessment process.

The SSC also recommends that the Working Group drop Alternative 2, which would specify fixed numerical values for the overfishing definitions in the revised FMP. It seems very unlikely that any set of fixed values would remain tenable in the long term and thus would require amendments to the FMP.

As the SSC indicated at its Dec. 2004 meeting, many BSAI crab stocks appear to undergo irregular cycles in population size, which suggests that any overfishing definition will need to account for such natural variation. **The SSC wishes to reiterate that the Working Group should strive to develop a harvest control rule that avoids forcing the fishery into unnecessary rebuilding restrictions during naturally occurring periods of low productivity. Perhaps a rule could be developed to switch between different controls during high- and low-productivity states.**

Catch Accounting System

The SSC received a report from Dave Ackley (NMFS AKR) on the new catch accounting system. The SSC appreciates the efforts of AKR staff to develop this new accounting system. The report included a comparison of catch estimates for 2002 using the old blend approach and the new accounting system. Differences were generally small, except for some fisheries, such as squid. Differences in historical catch estimates could affect stock assessment analyses for the affected species. **Therefore, the SSC recommends that additional comparisons of catch estimates from the old and new system should be conducted, because changes in historical estimates of catch could affect stock assessment analyses. The SSC also noted that if the other species category is divided into finer species assemblages then there will be a need to modify the system to accommodate additional species groups.**

Workshop on Multispecies and Ecosystem Modeling

The SSC conducted a workshop on multispecies and ecosystem modeling on February 9, 2005. The workshop was organized by Kerim Aydin of the Alaska Fisheries Science Center. The workshop provided an excellent opportunity for the SSC to interact with AFSC staff on new approaches to apply multispecies and ecosystem models to Alaska. The SSC thanks the Council for this opportunity. A total

of 11 presentations were given during the workshop, divided among three subject areas: modeling work that extends currently used stock assessment models, multispecies and harvesting strategy/reference point modeling, and new approaches currently under development. The SSC was impressed with the breadth and depth of the ongoing work in the area of multispecies and ecosystem modeling. It appears likely that at least some this work will bear fruit in the near future in helping to define and implement “ecosystem management.” Throughout the day there was ample opportunity for dialogue and feedback between the SSC and presenters. The SSC recommends that workshops of this nature be convened on a regular basis, perhaps at February Council meetings when the issue of research priorities is generally discussed. The SSC also recommends that PowerPoint presentations and short summaries of each talk be posted on a website, so that the information can be made more broadly available to other interested members of the Council family who were unable to attend.

Ad-Hoc Meeting of Social Scientists

Social scientists from the SSC, AFSC, ADF&G, NMFS – Alaska Region, and NPFMC met and shared information about recently completed, ongoing, and prospective research projects. Findings from many of these studies have contributed to or have the potential to contribute to the analysis of pending or anticipated Council actions. It was agreed that regular periodic meetings of this group would be helpful in creating an awareness of projects and possibilities for synergy. It is anticipated that future editions of the Economics and Social Science chapters of the SAFE will include summaries and conclusions of policy relevant social science research. Future meetings of the group could help to identify social science analytic and data gaps that could hinder assessment of anticipated Council actions. While we did not prioritize research to fill information and analytic gaps for the upcoming year, we anticipate that there will be a substantial need for research related to the economic and community impacts of potential changes in the management of Pacific cod.