DRAFT MINUTES
Scientific Statistical Committee
March 31st - April 2, 2003

The Scientific Statistical Committee met March 31st through April 2, 2003 at the Hilton Hotel in Anchorage, AK. The following members were present, except Sue Hills, Seth Macinko, Ken Pitcher, and David Sampson:

Rich Marasco, Chair	Jack Tagart, Vice Chair	Keith Criddle
Gordon Kruse	Mark Herrmann	Terry Quinn
George Hunt	Anne Hollowed	Steve Hare
Doug Woodby		

C-3 STELLER SEA LIONS

Addendum to the 2001 Biological Opinion

The SSC received a review of the Addendum to the Endangered Species Act Section 7 Consultation, Biological Opinion and Incidental Take Statement of October 2001 by North Pacific Fisheries Management Council Staff, Bill Wilson and NMFS Staff, Shane Capron. Public Testimony was provided by John Gauvin and Andrew Philemonof of St. George.

Most members of the SSC received the Draft Addendum on the morning of the meeting and were able to conduct only a very quick review of the document. Initial review suggests that Staff has made a good start on answering questions raised by Judge Zilly in his 18 December 2002 remand. The SSC was informed that comments on the Draft Addendum would be accepted through 18 April 2003.

The SSC has the following suggestion for improving the Draft Addendum:

1. It is essential that the assumptions and methods used to develop tabular material be provided so that their validity can be assessed.
2. There was a question as to why in the analysis of the telemetry studies, a cutoff of 4 m was used to distinguish foraging dives. Was the possibility of surface-foraging considered, and would it be possible to distinguish near-surface forage dives from shallow dives when traveling?
3. Tabular material and figures should be developed so that they "stand alone". The units used should be listed and all axes labeled.
4. Where possible, variances should be documented (e.g., Table III-5), and statistical tests of significance provided.
5. In Table III-4, apparent drops in catch rates may reflect declining populations rather than a reduction in the proportion of fish caught in critical habitat. It is suggested that catch rates be standardized against some measure of population size such as the ABC.
6. In Table III-5, is average catch/day the most relevant metric?
7. Table III-6 was confusing in that it was not clear from the legend how it was constructed. Does it really show that there was a shift in catch from inshore to offshore? The graph needs to differentiate the shift from inshore critical habitat from shift out of offshore critical habitat.
8. Table III-7 requires considerable attention.
    a. It will be essential to lay out very carefully the methods used to develop estimates of the biomass of fish within the 0-10, 10-20 and 20+ nm zones, as well as, the seasonal biomass splits.

b. Among the contrasts of concern in this table is the change in estimated exploitation rates between 1999 and 2002. Because current year biomass tends to be underestimated, the SSC is concerned that like values are compared, i.e., that the ratio is not compromised by estimation process errors.
c. An estimate should be provided of the biomass that remains after the fishery occurs. This is the presumptive prey field experienced by the sea lions.
d. Explain why the Jan-June biomass number is used for the annual biomass.
e. Discuss the issue of what is a sufficient biomass of prey to leave in critical foraging habitat. It could be informative to provide the ratio between the estimated energy requirements of sea lions and the amount of prey present in critical foraging habitat.

9. It would be useful to discuss the apparent lack of a decline in sea lions at Dalnoi Point, St. George Is. (Table I-3) in light of the large increases in inshore catches of pollock south of St. George Is. (Table III-9). This haulout or rookery is a good candidate for a study on the impact of inshore fishing.

The possibility of restoring trawl fisheries for pollock in the Aleutian Islands was briefly discussed. For trawl fishing outside of critical foraging habitat, the 2002 Biological Opinion found no jeopardy. Therefore, a resumption of this fishery outside of critical habitat is strictly an issue of whether the TAC will support the fishery.

C-4 ESSENTIAL FISH HABITAT

The SSC heard a report on Essential Fish Habitat EIS issues by Dave Witherell, John Kurland, John Olson, and Cindy Hartman. Staff reviewed a set of documents, which included drafts of an EIS Table of Contents, RIR Table of Contents, EIS Chapters 1 & 2, supporting documentation for an expanded Alternative 5b, discussion outline of research and monitoring approaches, and a draft manuscript on living substrates in Alaska. Public comments were received from Ben Enticknap (Alaska Marine Conservation Council), Whit Sheard (The Ocean Conservancy), Josh Sladek Nowlis (Alaska Oceans Network), Geoff Shester (Oceana), John Gauvin, and Donna Parker (Arctic Storm).

Staff addressed some of the issues raised by the SSC in our December 2002 and February 2003 minutes, and the SSC appreciates the staff's attempt to address these concerns. Changes include descriptions of the goals and objectives of the needed EFH action and the rationale behind the various alternatives, existing closed areas (e.g., Steller sea lion closures, red king crab savings area), and current use of effort controls and gear modifications in the status quo alternative.

A number of the SSC's previously stated concerns remain. However, it is clear that it not possible for staff to address all of the issues, while meeting a June 2003 deadline. With this in mind, the SSC identified the following reduced set of recommendations for the analysts to address in their analysis and final documentation:

1. The Fujioka-Rose model description and results should be included in the EFH documentation. The SSC realizes that a preliminary model has been under a state of continued development and error correction (one of the casualties of the rushed analysis to meet court-ordered deadlines), and the analysts have been hesitant, rightfully so, to release each model iteration. However, the analysis must now move forward with the model in its current state to establish and analyze the alternatives. **A description of the current model, including its methods and assumptions is important to clarify some uncertainties and misconceptions about model development, interpretation of model results and the merits of some of the alternatives.** For instance, there is some confusion about the model output, termed "bio shelter % effected." Some public testimony indicated that the areas of greatest apparent impacts on biogenic structure in the Bering Sea are designated as the "open areas" for fishing in Alternatives 4 and 5 and that the closed areas comprise the least

desirable fishing locations. However, the SSC is of the understanding that the model output maps of biogenic impacts are not based on biogenic data, but instead are based largely on indices of fishing intensity of the gear (trawls) assumed to create the greatest impacts. So, it is important to clarify whether the open areas truly occur in areas of sensitive biogenic habitats or whether these areas are artifacts of current fishing locations. This is one example of the pressing need to understand the model basis for the alternatives.

2. *The need (or lack of need) for additional effort reduction and/or gear modification measures should be further justified for each of the alternatives.* The three primary tools to mitigate potential effects of trawling on benthic habitats are: (1) closed areas, (2) effort reduction, and (3) gear modifications. The updated documentation addresses the current use of effort reduction and gear modifications (and closed areas) under the status quo. Under some alternatives, new gear modifications (e.g., conversion to pelagic trawl or fixed gear in slope rockfish areas in Alternatives 2 and 3) or TAC reductions (a form of effort control) are considered. The need for and use of added gear or effort controls under some alternatives, but not others, should be better justified. In doing so, analysts should consider potential fish movements between closed and open areas and effort displacement or concentration (and its potential consequences) as a result of new area closures.

3. *An attempt should be made to refine the criteria used to construct the alternatives.* Effort focused on this refinement will help the reader understand the basis of the alternatives and their ability to achieve the stated objectives. In refining these criteria, among other things, the analysts should describe the expected biological response as a consequence of implementing the proposed management action.

4. *In analyzing Alternative 5b, total removals should be considered in addition to the catch and bycatch rates.* Incorporating total bycatch will help to identify areas with low bycatch catch ratios that nonetheless have high bycatch impacts owing to high fishing effort (and catch) levels.

5. *Difficulties in implementing Alternative 5b, as discussed by staff, should be included in the analysis and documentation.* NMFS staff noted that there are some implementing difficulties with this alternative. For instance, the historical observer database does not distinguish corals (long-lived, slower recovery) and bryozoans (short-lived, shorter recovery).

6. *As discussed in the SSC's January 2003 minutes, the upcoming analysis should include the following for each alternative: (1) ability to meet the stated objectives; (2) biological consequences arising from implementation of the proposed management action; (3) economic and social costs and benefits by sector and community; and (4) enforceability.* The SSC is concerned that data needed to evaluate the cumulative and incremental benefits and costs and strategic responses to EFH closures are not available. The SSC suggests that estimates of existence and option values be derived from meta-analysis of published estimates of value for similar resources. The analysts should include a discussion of the distribution of existence and option benefits and the distribution of the costs of providing the benefits.

7. The intended approach for addressing HAPC, in addition to EFH, should be clearly articulated in the documentation so that the Council family can consider the proposed action in the broader context of habitat management.

The SSC reviewed a draft discussion outline of Research and Monitoring Approaches for Evaluation of EFH Mitigation Alternatives. The SSC believes that experiments can be designed to measure the consequences of individual acts of fishing. Paired control and treatment tests could be designed to evaluate this research objective. However, the test sites selected for this experiment should be selected with the following considerations in mind. Ideally, the several paired control and treatment experiments would be conducted so that a reasonable sample size would be available for statistical evaluation of impacts of fishing. When selecting the control and treatment sites investigators should ensure that both sites are exposed to equivalent oceanographic, topographic, and biological factors such that it would be reasonably likely that fishing is the primary factor influencing the response variables. If multiple control and treatment sites cannot be monitored, the investigators should consider sub-dividing their sites to allow for multiple comparisons within the control and treatment sites.

The potential response variables that would be measured in an evaluation of the impacts of the EFH alternatives should be identified. The SSC recognizes that there are a variety of potential biological response variables that could be considered when conducting control and treatment experiments including: species diversity, species abundance, spawning biomass, mean size of the fish in the region, mean trophic level of the region, species composition, average weight of fish within the region, average age of fish within the region. Likewise indices of habitat complexity could be monitored. While it is possible that there will be statistically different responses in the control and treatment sites, the SSC encourages NMFS to evaluate whether these differences are due to changes in fishing mortality, or habitat quality and to evaluate whether these changes (if they are detected) are significant relative to the long term sustainability of the managed fished populations within the region.

C-5 PROGRAMMATIC GROUNDFISH SEIS

The SSC received an update on development of the Groundfish PSEIS from Steve Davis (NMFS) and Diane Evans (NPFMC), and a presentation by Dr. Jim Ianelli (AFSC) on modeling work analyzing impacts of the various alternatives presently contained in the Groundfish PSEIS.

The purpose of the presentations to the SSC was twofold: 1) to update developments since the 2002 Council meeting and 2) to allow for a technical assessment of a "Multi-species technical interaction projection model." At the June 2002 Council meeting, the Council approved a suite of four policy alternatives each with a management approach and set of management objectives. The Council also approved a FMP framework for analysis, with each policy represented by a set of bookends that are intended to frame the range of management measures. Progress since that Council meeting included a refinement of analytical methodology, reworking of the first draft, refinement of the FMP framework and development of the multi-species projection model. Following resolution of a Court action, an expedited timeline has been agreed upon, one that will result in a Record of Decision (ROD) by September 2004. To meet this deadline, the Council will need to select its preferred alternative by June 2003 with final determination in Spring 2004. The SSC notes that very little time will be provided for public comment and time for full analysis of the alternatives has been severely curtailed.

Analysis of the alternatives has proceeded on two fronts. On one front a qualitative approach was demonstrated. This method summarizes the likely impacts of the alternatives using summaries of past history and anticipation of future regulatory actions. On the second front, a multi-species model was developed in an attempt to quantify the potential impacts of the four alternatives and their associated bookend FMPs. The multispecies model that was presented is an extension and expansion of a model used for the Steller sea lion EIS. The model was used to develop "more realistic" analysis of the impacts of the alternatives. The model uses the most recent stock assessments and projects catches for each alternative over a 5 year time horizon using a variety of assumptions and constraints.

While the model is a potentially useful tool, the SSC has a number of reservations about its utility in its current format as well as the conclusions that may be drawn from model output. Dr. Ianelli noted several model weaknesses, including a constant, non-varying catch composition matrix among target fisheries, difficulties assigning bycatch among fisheries, assumption of optimal fisheries management behavior, and artificial constraints on future growth or shrinkage of fisheries. In addition, the SSC notes a number of concerns:

- Ex-vessel value estimates are used as a means of generating gross fisheries revenues and play an important role in the objective function. A major problem with this approach is that, since information is not available, costs are ignored and equal value is placed on fish regardless of how it was caught, e.g., a pollock from the AFA catcher-processor fleet has the same value as a

pollock caught in a open-access fishery, despite the fact that the costs of catching the pollock are substantially different.

- Prices are assumed to be constant over time and this is not likely to hold true over the 5 year time horizon used in the projections or across the widely differing levels of catches anticipated under the alternatives.

- The use of linear approximation for non-linear processes becomes progressively less appropriate as the degree of non-linearity increases and as the conditions being evaluated become increasingly different from conditions under which model parameters were estimated.

- Spatial dynamics are ignored in the model. Working at such gross detail likely results in lost detail. One situation in which this might be important involves bycatch rates. Under some alternatives fishing grounds are closed resulting in smaller available grounds. It is likely that bycatch rates in the remaining open areas will increase and this possibility is not addressed in the model.

- There is an assumption of constancy over time with the model. In the very short term, this probably isn't much of an issue but as the time horizon increases, the importance of factors such as environmental change (regime shifts) and trophic interactions (predator-prey relationships) become much more important.

- Gross revenue maximization does not reflect widely accepted economic or social objectives, Because the model solution is driven by the objective function, specification of the objective function needs to be carefully constructed. The SSC recommends that alternative objective functions be considered. If the purpose of the model is to reflect public interest in living marine resources, the relevant objective would be to maximize the present value of the sum of profits to havesters and processors, surplus benefits to consumers of seafood products, and surplus benefits associated with non-consumptive demands for living marine resources. If the purpose of the model is to project likely management actions under the alternatives, it might be useful to express the objective as a minimization of the weighted square deviation between actual and target levels of catch where the weights reflect management preferences for meeting TACs. Regardless of what objective is ultimately selected, the SSC recommends that sensitivity analyses be considered to explore the robustness of model solutions.

Thus, the SSC is not recommending that the model results be deleted, but rather that the appropriate caveats and limitations of the modeling be carefully described. The utility of the model over basic catch projections is that technical multi-species fishery interactions have been included. Finally, the SSC requests documentation on the model used in the analysis as well as the criteria used in significance determinations.

C-6 ALLOCATION OF PACIFIC COD AMONG FIXED GEAR SECTORS

Nicole Kimball (NPFMC) provided an overview of the Initial Review Draft EA/RIR/IRFA for proposed Amendment 77 to the BSAI Fishery Management Plan. The proposed action addresses harvest allocations for the fixed gear allocation fisheries for Pacific cod formally addressed by Amendment 64 which expires in Dec 31, 2003. The SSC recommends that the document go out for public review after some minor inconsistencies in the document and areas of further work, as identified by Council staff, are addressed. The SSC notes that the document was very well written and appreciates the excellent presentation.

C-7 IR/IU—Amendments A and C

Marcus Hartley (Northern Economics) provided the staff presentation. Public testimony was provided by Susan Robinson, Mike Petersen, Donna Parker, and Paul MacGregor.

The briefing material for amendment A consists of an outline of potential elements and options to be considered if the Council chooses to evaluate a BSAI non-AFA trawl catcher-processor co-op program. The briefing material for amendment C is an incomplete draft analysis.

During the staff presentation, and in public testimony, it was suggested that the cooperatives envisioned under amendment A could induce changes in vessel and fleet behavior that would increase incentives to cooperate to minimize discards. If the Council intends that amendment A serve as a mechanism for effectuating amendment C goals, both amendments should be explored in an integrated analysis and linked decision.

The SSC also notes that the analysis of amendment C needs to address problems associated with the product recovery rates (PRRs) used to back calculate retained catches. It is not evident that the PRRs provide an accurate representation of current production practices or the variability of product yields across processing facilities, target stocks, or seasons. PRRs have not been established as a suitable basis for monitoring retention and utilization at the level of individual vessels or vessel pools, particularly over short observation periods. The SSC does not support releasing the EA/RIR for amendment C for public review until the completed analysis is reviewed by the SSC, AP, and Council.

C-8 OBSERVER PROGRAM

Nicole Kimball presented for review, a draft schedule and outline for potential analysis to restructure the North Pacific Groundfish Observer Program. This review covered a variety of decision points and issues associated with restructuring the observer program. The SSC appreciated the opportunity to review the document. The SSC suggests that the draft might benefit from a review of alternative mechanisms for funding observer programs. The SSC encourages the inclusion of a brief discussion of alternative program designs, and why they are or are not appropriate models for monitoring North Pacific fisheries. For example, the New Zealand system is fully under a contract basis with defined standards for information quality. The SSC also encourages an expanded discussion concerning which entity pays the fee, and a discussion of how the cost of the fee will be distributed among consumers, processors, and harvesters.

D-1(a) F40 REPORT

The SSC received a report from Grant Thompson (AFSC) regarding recommendations presented in the review of the NPFMC harvest policy by the independent scientific review team chaired by Dr. Goodman. Public testimony was provided by Ed Richardson, (PCC) and Josh Nowlis (AON).

Dr. Thompson's report highlighted a number of issues. The SSC has focused on three of them. The first issue relates to whether a more conservative harvest rate (such as F50%) would be desirable for rockfish species in the GOA and BSAI. The SSC requests that stock assessment analysts and the groundfish Plan Teams explicitly evaluate the harvest strategy for rockfishes during the TAC-setting process this fall.

The second issue relates to whether further improvements are needed for the current harvest strategy. The SSC suggests that the PSEIS process is the appropriate place for this consideration. The SSC urges that the PSEIS analysts carefully consider the F40% report and be responsive to its recommendations.

The third issue is whether changes are needed in the Tier formula for ABC and OFL. These changes might be warranted to account for resiliency of the species or to incorporate greater caution for species with less information. As this matter pertains to general consideration of National Standard 1, our comments on this matter are found in D-1(f).

D-1(b) ROCKFISH RESEARCH AND MANAGEMENT

The SSC heard a report on rockfish research by Grant Thompson (NMFS) and a report by the ad hoc working group that is examining new species categorization approaches by Jane DiCosimo (NPFMC). Public testimony was provided by Ed Richardson (PCC), Jerry Merrigan, and Michelle Ridgway.

Rockfish research plans included several projects for 2003 and tentative plans for 2004. The SSC supports this initiative for rockfish research as proposed by the AFSC's rockfish working group. The SSC suggests two additions to the list of research and monitoring needs: (1) continued effort to document the spatial distribution of rockfish removals, and (2) collection of market and value information on rockfish. To identify specific priorities among the list of needed rockfish research, the SSC recommends that the working group should examine the tradeoff between the costs of collecting the new information versus the potential value of the new knowledge.

An ad hoc working group is examining broad questions about which species and species groups should be managed, how to deal with species with widely varying levels of information, and management goals and approaches for intended targets and incidental species. The SSC supports the approach taken by the ad hoc group. The approach to date includes both common sense, as well as, innovative thinking. The distinction of management goals for the target and incidental of species is a step forward.

The ad hoc working group asked the SSC to provide guidance on the collection of data necessary to meet tier 3 data quality requirements. The SSC notes that the current process to determine the appropriate tier for each stock is an interactive process involving the stock assessment authors, plan teams, and SSC. The SSC believes that this process works well. Additionally, the SSC cautions the working group that it may not be prudent to attempt to move all species into the tier-3 level of information. In some cases, the lower tiers may be associated with management controls that are sufficiently conservative for some species, whereas the research and monitoring programs necessary to acquire the additional tier-3 information may be cost prohibitive for little additional conservation benefits. So, an analysis of benefits and costs should be considered in setting species-specific tier goals and designing research and data-gathering programs.

D-1(c) TAC-SETTING

The SSC was briefed on this issue by Sue Salveson (NMFS). Public testimony was provided by Paul MacGregor (MCA). At issue is a new alternative to TAC-setting using proposed and final rule-making. Essentially, the proposed rule in October would contain a range of alternative TAC values. Then, after preparation of the SAFEs and specification of new TACs at the December meeting, NMFS will determine whether the new TACs are a logical outcome of the proposed rule. If yes, than a final rule will be filed. If not, then a new proposed rule will be initiated, or a waiver for good cause will be sought in order to issue a final rule. The SSC endorses consideration of this alternative, as it seems a transparent and minimally disruptive means of complying with administrative requirements, while ensuring use of the most current stock assessment data.

D-1(d) EXEMPTED FISHING PERMITS

The SSC heard a report by John Gauvin regarding his application for an exempted fishing permit (EFP) to conduct a test of a salmon excluder device for pollock trawls. The permit application describes a pelagic trawl equipped with an escape mechanism for salmon. The permit would allow the cost recovery sale of pollock captured in the process of testing the effectiveness of the salmon excluder first for chum salmon in fall 2003, and then for chinook salmon in winter/spring 2004. Mr. Gauvin described an experimental design, including statistical power considerations in determination of sample size, which was estimated as 200 chum and 30 chinook. The experimental net will be constructed under the direction of Dr. Craig Rose (AFSC). The SSC was favorably impressed with the application and the experimental design and supports granting the permit, hoping that it may lead to improved salmon bycatch mitigation in the future.

D-1(f) NATIONAL STANDARD 1

The SSC was briefed on this issue by Grant Thompson (AFSC) and Dave Witherell (NPFMC). Public testimony was give by Josh Nowlis (AON) and Ed Richardson (PCC). In May 200, the Council sent a letter drafted by the SSC to NMFS headquarters, detailing problems encountered in attempting to implement guidelines related to National Standard 1 (related to overfishing). NPFMC did not receive a written response to this letter, but in February 2003, NMFS filed an advance notice of proposed rulemaking, indicating its desire to revise guidelines to National Standard 1.

The SSC is poised to assist the Council in providing comments to NMFS on the proposed rulemaking. A short draft letter will be prepared, to which the previous letter will be appended. (The SSC finds that the previous letter is still pertinent and that the problems identified are still relevant.) In the new letter, three problems will be highlighted: (1) The automated rebuilding algorithm in the NPFMC's harvest control rule should be considered as an alternative to specifying an MSST, (2) Recruitment variability can trigger repeated rebuilding plans, as is seen in our crab overfishing definitions (for example, the Pribilof blue king crab population is below MSST, despite no harvest or bycatch for a period of several years), and (3) The term "overfished" is often a misnomer implying an unproven link between fishing and depleted status.

The SSC is pleased that NMFS is considering the revision to the guidelines. Once the new guidelines have been released, the SSC will be interested in improving our overfishing definitions. In particular, revisions might be useful for species with vulnerable life history characteristics (such as rockfishes). Secondly, it would be useful to see if greater conservatism can be introduced into Tiers with less information (as recommended in the F40 report).

D-1(g) RESEARCH PRIORITIES

The SSC reviewed the list of research priorities as edited by the BSAI and Gulf Groundfish plan teams in November 2002. The SSC used this list to develop a short list of research topics needing immediate attention: The complete list of research priorities is attached in the Appendix.

A. Critical Assessment Problems

• For rockfish stocks there is a general need for better assessment data, particularly investigation of stock structure and biological variables.

a) Supplement triennial trawl survey biomass estimates with estimates of biomass or indices of biomass obtained from alternative survey designs.

b) obtain age and length samples from the commercial fishery, especially for POP, northern rockfish, and dusky rockfish.

c) Increase capacity for production ageing of rockfish so that age information from surveys and the fishery can be included in stock assessments in a timely manner.

• Further research is needed on model performance in terms of bias and variability. In particular, computer simulations, sensitivity studies, and retrospective analyses are needed. As models become more complex in terms of parameters, error structure, and data sources, there is a greater need to understand how well they perform.
• There is a need for life history information for groundfish stocks, e.g., growth and maturity data, especially for rockfish.
• There is a need for information about stock structure and movement of all FMP Groundfish species, especially temporal and spatial distributions of spawning aggregations.

B. Stock Survey concerns
• There is a need to explore ways for inaugurating or improving surveys to assess rockfish, including nearshore pelagics.
• There is a need to develop methods to measure fish density in habitats typically inaccessible to NMFS survey gear, i.e. untrawlable habitats

C. Expanded Ecosystem Studies
• Research effort is required to develop methods for incorporating the influence of environmental and climate variability, and there influence on processes such as recruitment and growth into population models, especially for crab stocks.

• Forage fish are an important part of the ecosystem, yet little is known about these stocks. Effort is needed on stock status and distribution for forage fishes such as capelin, eulachon, and sand lance.

• Studies are needed to identify essential habitat for groundfish and forage fish. Mapping of nearshore and shelf habitat should be continued for FMP species.

D. Social and economic research
• Development of time series and cross-sectional databases on fixed and variable costs of fishing and fish processing.
• Pre- and post-implementation economic analyses of crab and GOA groundfish rationalization.
• Identification of data needed to support analyses of community level consequences of management actions.
• Development of integrated multispecies - multifishery models for use in analyses of large scale management actions, such as PSEIS and EFH.

E. Bycatch
• Identify sources of variability in actual and estimated bycatch rates.

F. Monitoring
• Promote advance in video monitoring of other wised unobserved catch for improved estimation of species composition of total catch and discrimination of retained and discarded catch

G. **Research Priorities Identified by the NRC SSL Committee Steller**

The SSC held a brief discussion on the research and monitoring recommendations of the NRC Steller Sea Lion (SSL) Committee, as presented in the Executive Summary of their report. The SSC noted that their recommendations are consistent with recognized needs, but also that there is

considerable ongoing SSL research. Among the NRC's recommendations, the SSC wishes to particularly identify their recommendation for a spatially-explicit, adaptive management experiment to definitively conclude whether fishing is playing a role in the current lack of SSL recovery. As noted in the SSC's February 2003 minutes, there are a number of scientific, economic, and ESA regulatory considerations that must be addressed before such a plan can be seriously considered for implementation. However, the SSC supports further exploration of the merits of this adaptive management approach.

PLAN TEAM MEMBERSHIP

The SSC recommends that the Council appointment of Drs. Karim Aydias and Robert Foy to the Bering Sea /Aleutian Islands and Gulf of Alaska Groundfish Plan Teams, respectively.

APPENDIX 1

2003 Research Priorities

A. Critical Assessment Problems

1. Some of our stocks are disproportionately harvested across large areas of the GOA and BSAI due to area closures, other management actions, or fishery behavior. Additional analysis should be undertaken to examine potential effects of disproportional harvesting

2. More information is needed on "other species." Observer data should be collected and analyzed for individual species. Better estimates of abundance are needed. Lastly, life history data is limited for many species in this complex. Stock assessments at the assemblage level (sharks, skates, squid, sculpins, and octopus) are planned in the near future.

3. Rockfish: There is a general need for better assessment data, particularly investigation of stock structure and biological variables.
   a. Supplement triennial trawl survey biomass estimates with estimates of biomass or indices of biomass obtained from alternative survey designs.
   b. Obtain age and length samples from the commercial fishery, especially for Pacific ocean perch, northern rockfish, and dusky rockfish.
   a. Increase capacity for production ageing of rockfish so that age information from surveys and the fishery can be included in stock assessments in a timely manner.

4. Pacific cod: Research into methods of ageing Pacific cod has been completed and production ageing has begun. Working through the backlog of age structures should be given a high priority.

5. Walleye pollock: There is a continuing need for research on stock structure as it relates to assessments. There is a critical need for stock interactions studies and pollock recruitment patterns. We continue to emphasize the need for age-structured assessments of recognized stock units.

   The SSC believes that the magnitude of the catch, size and age structure of the EBS stock harvested in the Russian zone in the vicinity of the transboundary area is needed. It may be necessary to consider fishing removals from the Russian zone and their impact on EBS pollock mortality in the estimates of ABC and TAC.

   Assessment of the status of the Gulf of Alaska resource is critically dependent upon results of resource surveys. *T*hese surveys will be conducted every two years. While this is a positive development, various ways of supplementing the biennial survey data should be evaluated.

   More research should also be conducted on the movement of pollock between the GOA and BSAI and across regions within GOA and BSAI, (e.g., Bogoslof, Donut Hole, PWS, Shelikof, and SE inside).

   More research using acoustic data should be conducted.

6. Crab research: Research should be expanded on handling mortality, stock structure and life history parameters.

7. Age- and length-structured assessments: These assessments integrate several data sources using some weighting scheme. Little research has gone into evaluation of different weighting schemes, although the weight can have a large effect on the assessment results. Research is needed on which weighting schemes are robust to uncertainties among the different data sources. Age structured assessments depend upon age determination techniques and ongoing age validation is needed.

   Correct model specification is critical to stock assessment. Further research is needed on model performance in terms of bias and variability. In particular, computer simulations, sensitivity studies, and retrospective analyses are needed. As models become more complex in terms of parameters, error structure, and data sources, there is a greater need to understand how well they perform.

8. Life history information, e.g., growth and maturity data, is incomplete for a number of stocks. This information is essential for determination of ABC, OFL and preferred fishing mortality rates. Maturity data are lacking for: Pacific cod, Dover sole, other flatfish, sablefish, and many species of rockfish. Life history and distributional patterns of Greenland turbot are lacking. To better understand sablefish recruitment variability, additional information on the geographical distributional and movement of juvenile sablefish is needed. More research should be done on sources of age-specific fish mortality.

9. Identification of the origin of chum and chinook salmon stocks captured incidentally in the groundfish fisheries is needed. The chum salmon stocks in particular are recognized as a mixture of Asian and North American origin. Resolution of stock origin is important in the consideration of bycatch management.

10. There is need for information about stock structure and movement of walleye pollock, Atka mackerel, Pacific cod, POP, and other rockfish. Specifically, we need information on temporal and spatial distributions of spawning aggregations of fish (especially Pacific cod).

11. Further research is needed about management strategies that provide for conservation of aquatic resources. Topics that need attention include: which measure of biomass should be used in biomass-based adjustment of ABC and OFL; what measure of average recruitment to use in $B_{40\%}$; the effect of seasonality in spawning, recruitment, and harvest on optimal harvest rate; adaptive management schemes which are designed to provide understanding of multispecies interactions and spatial population dynamics. One objective is to develop multispecies analysis of stocks.

12. Presentation of uncertainty in stock assessments is often lacking or incomplete. Further research is needed into which methods are most appropriate for capturing uncertainty in the status of populations. The use of Markov Chain-Monte Carlo (MCMC) methods appears to be a promising line of research and its use with AD Model Builder should be further explored.

13. Management measures such as time-area closures and other restrictions are frequently imposed, but rarely rescinded. Studies are needed to evaluate the effectiveness of

management measures on conserving populations, achieving management goals and assessing other ecosystem effects.

14. The Groundfish Teams expressed concern regarding the lack of coverage by trawl survey in both the eastern GOA and in all deepwater strata during 2001 and strongly recommended continued coverage of deeper stations in future surveys.

B. Stock survey concerns

1. Conservation of aquatic resources in the North Pacific is critically dependent on a consistent time series of trawl, hydroacoustic, and longline surveys. The continuity of these series must remain one of the highest priorities of NMFS and the Council. Data analysis should be expanded to include non-target, non-FMP species.

2. Explore ways for inaugurating or improving surveys to assess rockfish (including nearshore pelagics), pollock, squid and Atka mackerel.

3. Expand bottom trawl surveys in the Gulf of Alaska-to include slope areas that encompass the population range of Greenland turbot, rockfish, thornyheads, and sablefish.

4. Improve surveys for Bering Sea crab complementary to the existing Bering Sea crab/groundfish survey (e.g. Norton Sound, Pribilof Islands, St. Matthew Island, and Bristol Bay).

5. Direct observation (e.g. submersible and dive surveys) offers unique opportunities to directly examine gear performance, fish behavior in the proximity of gear, gear related habitat impacts, and differences of fish density between trawlable and nontrawlable habitat.

6. There is a continuing need to perform gear calibration and fish observation studies to validate indices of abundance (e.g. fishing longline and trawl gear side-by-side, and fishing different baits on longline gear over the same stations).

7. Little scientific sampling has occurred of seamounts within the EEZ for groundfish, halibut, and crab abundance. Surveys that sample these seamounts may improve estimates of total abundance in the EEZ, particularly for sablefish and rockfish stocks.

8. Data from annual ADF&G crab surveys should be examined and their usefulness for assessing groundfish abundance in near-shore areas should be evaluated. Dialogue between ADF&G and NMFS assessment scientists regarding ways of gaining more useful groundfish data from this survey should be encouraged.

9. Encourage development of methods to measure fish density in habitats typically inaccessible to trawl survey gear.

C. Expanded Ecosystem Studies

1. Considerable research is being conducted on the effects of climate on the biology and dynamics of marine populations. Research effort is required to develop methods to incorporate climate variability and its influence on processes such as recruitment and growth into our models of population dynamics.

2. There have been considerable recent advances in using naturally occurring stable isotopes in diverse types of studies. Examples include identifying residence times and areas at various life stages; computing trophic levels and food web dynamics; examining ontogenetic changes and patterns of migration. Studies using these natural markers should be encouraged.

3. Explore the utility of placing trained marine mammal/seabird observers onboard vessels conducting fishery surveys. Such observations may contribute to abundance estimates, or to provide indices of abundance and associations with oceanography and prey distributions. In particular, relationships among oceanographic conditions and animal condition and health should be explored.
   a) More research should be collected by placing trained marine mammal/seabird biologists on line transect surveys to begin an index of abundance for birds.
   b) Encourage data exchanges between USFWS and NMFS RACE and NMML.

4. Effort is needed on status of stocks and distribution of forage fishes and shellfish, such as capelin, eulachon, sand lance and euphasids. Forage fish are an important part of the ecosystem , yet little is known about these stocks. The Lowell-Wakefield Symposium (October 1996) presented current research on forage fishes.

5. Studies of the effects of harvesting and processing activities on the ecosystem and habitat should be instituted. One example would be a study contrasting species diversity and abundance in the red king crab savings area with that in adjacent regions.

6. Trophic dynamics research should be undertaken on the relationships among critical species, e.g., Pacific cod and its prey (including shrimp and crabs). The feasibility of constructing multispecies models using ongoing collection of gut contents data should be investigated.

7. Groups of species in the rockfish and flatfish families are now managed as “species complexes.” Research should be expanded on the question of biological linkages among the components of "species complexes" that justify this management approach. Further, are there other, unidentified groups of species that are ecologically related and could be managed as a unit?

8. Studies are needed to identify essential habitat for groundfish and forage fish species in the Gulf of Alaska and Bering Sea. This identification is required by the MSFCMA and would benefit from field studies conducted across a matrix of spatial, temporal, and life history stages. Mapping of nearshore and shelf habitat should be continued for FMP species.

9. Expand studies of distribution, abundance, and productivity of seabird populations and ensure that data are collected in ways that provide for rigorous analyses of seabird/marine mammal/oceanographic/fisheries interactions. Historic data on seabirds in Alaska was collected during the 1970s (through OCSEAP); but the quantity of data collected afterwards has been insufficient to adequately examine trends in these interactions.

10. Historic (i.e., OCSEAP) data existing in the USFWS Pelagic Database needs be reformatted to update and make the data accessible, to enable analysis on seabird/fishery interactions.

11. More recent (1990's - present) data needs be consolidated and added to the pelagic database.

12. Seabird diet needs to be described for more areas and species, including winter diet needs of seabirds. Existing and historic diet data needs to be consolidated and put into a format accessible and appropriate for examination of long-term trends. Very little is known about winter diets of birds.

13. Multivariate statistical analysis of the time series of annual survey data may identify which species regularly occur in assemblages. Mapping these assemblages through space and time may reveal changes in the distribution and abundance of the species of the Eastern Bering Sea. These mappings and trajectories may be applicable to adaptive management approaches suggested for exploring ecosystem concerns. Although related analyses were started by NMFS in the late 1970's, they have not been conducted in recent years. Recent advances in spatial statistics may prove fruitful tools for re-examining these existing data.

14. Uncertainty about the relationship between the Steller sea lion population and groundfish fisheries has taken an elevated significance. With this uncertainty as to the extent of factors affecting Steller sea lions, it is critically important to investigate the effects of mitigation measures on the sea lions, the fisheries, and the ecosystem. The monitoring must be based on an experimental design that provides information about the interaction of fisheries and Steller sea lions. Five questions are central to future work:

15. What is the distribution of fish in relation to areas used for fishing, and what are the seasonal changes?
    a. What is the distribution of fish in fishing areas before and after fishing?
    b. How do Steller sea lions use pollock in relations to pollock distributions?
    c. How does the Steller sea lion's pollock feeding habits influence sea lion population dynamics?
    d. Does the fishery effect Steller sea lions in other ways (e.g., behavioral disturbance)?
    e. How much is needed per SSL compared to what is there seasonally and geographically – demand vs. availability, to address localized depletion?
    f. How much is needed per SSL compared to what is seasonally and geographically available, i.e., demand vs. availability

16. More research should be conducted to estimate jellyfish abundance trends because it may be an ecosystem indicator (it is a habitat for pollock).

17. There is an apparent increase of a parasite occurrence in some flatfish stocks (flathead sole and Greenland turbot) in the Bering Sea. This may signal changes in the ecosystem and has important consequences for the fishery. Research on this should be pursued.

18. Killer whale depredation of sablefish catches has been a problem in the Bering Sea since the beginning of the survey. Additional information on the impacts of killer whale depredation on sablefish in the ecosystem and in the sablefish survey should be assessed, along with further consideration of sperm whale depredation of sablefish.

D. Social and economic research

There is a critical need for the development and continued maintenance of basic social and

economic information databases on the fisheries and fisheries dependent communities of GOA and BS/AI. This information is required for establishing a baseline to be used in the evaluation of the impacts of alternative management measures.

1. There is a need to collect and maintain longitudinal data sets that include:
    a. Domestic and International transaction level observations of exvessel, wholesale, and retail prices;
    b. domestic and international production by species and product form;
    c. product inventories and trade volume by product form;
    d. fixed and variable harvesting and processing costs;
    e. employment and income;
    f. locus and magnitude of expenditures in support of harvesting and processing;
    g. nature and extent of regional economic linkages;
    h. tax receipts and transfer payments; and,
    i. socioeconomic and demographic data for fishery dependent communities (income levels and distributions, population levels and distributions.
2. There is a need for economic analyses of:
    a. the demand for fisheries products (exvessel, wholesale, international, and retail markets);
    b. introduction and cost functions for catch and processing;
    c. estimates of the producers and consumers surplus associated with fisheries under current management regimes;
    d. prior and post-implementation studies of the net benefits and distribution of net benefits associated with changes in management regimes (e.g., changes in product markets, characteristics of quota share markets, changes in distribution of ownership, changes in crew compensation, as a consequence of the halibut/sablefish IFQ program or the pollock, crab, and salmon co-ops);
    e. Regional models of economic activity in fishery dependent communities;
    f. An assessment of the cumulative efficiency and equity consequences of management actions that apply time/area closures;
    g. estimates of the net economic benefits of recreation and subsistence harvests;
    h. bioeconomic models of multi-use fisheries;
    i. estimates of the existence and option values associated with corals, seabirds, and marine mammals;
    j. Behavioral models of fleet response to alternative fishing opportunities to better predict how fishing effort will shift in response to possible management actions (e.g., time/area closures, marine reserves, bycatch restrictions, co-ops, IFQs);
    k. changes in catch efficiency and operating costs associated with gear modification and avoidance behaviors intended to reduce bycatch;
    l. better methods for assessing the social costs of bycatch; and,
    m. models of the relationship between sampling strategies and the confidence of bycatch estimates associated with individual and pooled bycatch quotas, and
    n. Models of mechanisms for providing traceability, ensuring safety and certifying product and production process attributes of fishery products.

3. Research pertinent to assessment of the social impacts of actions contemplated by the Council include:
    a. Fishery/Community Linkages: Field research aimed at capturing the full array of linkages between fisheries and social and economic life in fishery dependent communities.
    b. Social Assessments: Selected community and industry assessments should be

conducted to establish baseline conditions underlying social problems identified by the Council and the Advisory Panel. As appropriate, these projects can be extended to generate time series information.

c. Social Impacts: Social impact and policy research should be conducted regarding the identification and potential effects of alternative management actions.

d. Develop better methods for determining the social costs and benefits of management actions (e.g. through the use of non-market valuation techniques).

E. Bycatch problems

1. Research on gear modification and other methods for reducing bycatch should be expanded.
2. A better quantification of discard mortality rates is needed, especially for crab.
3. Data on size/age and sex of crabs taken as bycatch are needed to assess impacts.
4. Comprehensive evaluations are needed of single and multiple time/area closures and other bycatch management measures.
5. Develop better methods for assessing the social costs of bycatch.
6. Identify sources of variability in actual and estimated bycatch rates.
7. Collect bycatch information in the directed halibut fisheries using observer coverage. Current logbook information is inadequate to quantify this bycatch. Research efforts should also include development of video monitoring options.

F. Fishery Monitoring

1. Inseason management and stock assessment are critically dependent on catch estimates. There is a need to conduct ongoing analyses of the accuracy and precision of catch estimates in all fisheries. An analysis of the utility of fishery logbook information should be conducted. In particular, determine if it is possible to gain insight into fleet performance from such information. Examine feasibility for developing a representative CPUE index and determine if it is proportional to stock size.
2. Evaluate sampling procedures used by observers and various catch estimation procedures. Recent analyses have been conducted on efficient methods of collecting representative biological data from target species. Similar studies should be conducted on the collection of prohibited species biological data.
3. Development of catch and bycatch sampling procedures for individual vessel accountability programs.
4. Promote advance in video monitoring of otherwise unobserved catch for improved estimation of the species composition of total catch and the discrimination of retained and discarded catch.

APPENDIX 2

Statistical and Scientific Committee (SSC)
North Pacific Fishery Management Council
December, 2002

Policy Regarding Preparation Of SSC Minutes

The preparation of minutes is one of the most important duties of SSC members. The SSC minutes should reflect the discussions of the SSC as a body during the SSC meeting. The minutes serve multiple purposes: (1) a record of what transpired at the meeting, (2) scientific advice to the Council and to the public, (3) the "institutional memory" of the development of SSC policy regarding various issues. As such, it is important that SSC minutes be clearly written, accurate, and transparent. The following guidelines are meant to assist achieving these goals.

1. Before the meeting, the SSC Chair will assign individuals to various agenda items.
2. Each individual should read the documents pertaining to the agenda item particularly carefully. Look for the key issues involved and research previous SSC comments on the item.
3. Be prepared to take the lead at the meeting in asking questions and formulating SSC advice on the agenda item. Generally, there is a presentation by staff followed by SSC questions, public testimony, and finally SSC discussion and formulation of advice.
4. The Chair will summarize the main points that constitute SSC advice. Be sure to write these points down.
5. Get together with other individuals responsible for writing minutes on the particular agenda item. Decide how to divide up the task. One person should assume the lead to assemble written and electronic submissions cohesively and to give the draft section to the SSC secretary (who is Gail Bendixen as long as she is alive and well).
6. The start of the SSC minutes should contain the agenda number and title and a list of staff members and the public who spoke before the SSC. After that, provide a summary of previous consideration of this item and address what are key issues being discussed by the SSC.
7. The SSC minutes should provide an accurate description of the scientific discussion. Therefore, sufficient detail should be provided to reflect the range of opinions that were expressed.
8. Use bold font to highlight key statements that should be emphasized by the Chair when presenting the minutes to the Council. Try to write the minutes with this aspect in mind. For example, detailed criticisms of methodology or results meant for the analysts should appear in separate paragraphs, so that the Chair can easily navigate through the reading of the minutes to the Council.
9. Other SSC members are encouraged to read the draft sections of all agenda items and provide comments to the leader of that agenda item. Please make your comments constructive and clear. If you have suggested changes, please write these out legibly. Avoid ambiguous advice such as "Put something in about "", "This is not clear to me", "This needs work""

10. You may come up with a brilliant idea that should have been considered at the meeting but wasn't. The idea does not belong in the SSC minutes. Reconsideration by individual SSC members should be brought to the attention of the entire SSC and, if warranted, included in a subsequent set of SSC minutes.
11. Avoid recommending changes of a substantive nature that were not discussed at the meeting.
12. The SSC Chair has responsibility for final editing of the SSC minutes. The Chair may change or delete the minutes for clarity, scientific logic, and accuracy.
13. The SSC secretary will send the draft minutes out to all members after the meeting, and members are encouraged to recommend final changes.