North Pacific Fishery Management Council

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MINUTES
Scientific Statistical Committee
June 4-6, 2001

The Scientific Statistical Committee met June 4-6 at Fishermen's Hall in Kodiak, Alaska. All members were present except George Hunt, Jr. and Al Tyler.

Rich Marasco, Chair	Jack Tagart, Vice Chair	Steve Berkeley
Keith Criddle	Doug Eggers	Steve Hare
Jeff Hartmann	Mark Herrmann	Sue Hills
Dan Kimura	Seth Macinko	Terry Quinn

C-1 STELLER SEA LIONS

The SSC received presentations on five Steller sea lion (SSL) topics: research funding; results of the "Is It Food II?" Workshop; preliminary comments by the Council's independent review panel; report from the RPA Committee (RPAC); and the proposed RPA EIS process. Presenters included Dr. Doug DeMaster, Drs. Gordie Swartzman and Daniel Goodman (Independent Review Panel), Larry Cotter (RPAC Chair) Dave Witherell, Tamra Farris, and Cathy Coon. Public testimony was provided by Alan Parks (AMCC), Beth Stewart (Aleutians/East Borough), John Gauvin (GFF), Donna Parker (Arctic Storm), Thorn Smith (NPLA), Bob Mikol (Ocean Logic), Paul MacGregor (APA), and Joe Macinko (Commercial Fisher).

Research Funding: More than $40 million has been made available for SSL research through a diverse suite of institutional programs. There is no formal oversight body to coordinate and focus the combined research efforts of these various institutions. To assure coordinated approaches to answering urgent management questions before this Council, the SSC suggests that NMFS create a unifying research board to oversee SSL research, with authority to direct and focus SSL research to be responsive to management needs. The SSC notes that the SSL Recovery Team is being reconstituted and hopes that a revised Recovery Plan will provide the overall context and could help focus future research. The SSC commends the early efforts to provide for information exchange at workshops such as the recent "Is It Food II" but urges that a more formal mechanism be formulated to ensure sharing and synthesis of data and ideas.

Dr. DeMaster reviewed the process used to award 25 projects nearly $15 million under the Steller Sea Lion Research Initiative (SSLRI). NMFS has worked in an unprecedented manner to expedite the selection of research projects and issuance of contracts to those projects. In doing so, it was acknowledged that NMFS set a rapid peer review process to evaluate the large number of proposals submitted. Reviewers had only 3 working days to comment on proposals. The SSC appreciates the desire to move expeditiously to make these awards. Although the SSC did not read any of the peer review evaluations, we believe that a longer peer review process would facilitate a more thorough evaluation of project proposals. We are hopeful that more time can be given to the peer review for future award cycles.

"Is It Food II?" Workshop: Dr. DeMaster provided a summary report of the "Is It Food II?" Workshop held May 30-31, 2001 at the Alaska Sea Life Center in Seward, AK. This is a reprise of a prior workshop held some 10 years ago. The SSC was impressed at the timely availability of the workshop summary, given that the meeting concluded only last week. In discussion of item 6 "Captive Feeding Studies" with Dr. DeMaster, the SSC learned that vitamin supplements were given throughout the captive feeding trials at both UBC and the ASLC. Also, apparently the feeding protocols are different. With respect to the results of the questionnaire, that was intended to solicit opinions of the participants on the workshop topic, the SSC notes that it should not be interpreted as an unbiased survey of scientific opinion on the topics.

Independent Review Panel: In response to the NMFS November 30, 2000 Biological Opinion (BiOp3) on the Alaskan groundfish fisheries, and the resultant controversial proposals for remedial management actions, the Council created an independent review panel. The panel was asked to evaluate BiOp3 and undertake additional tasks related to evaluation of fishery/SSL interactions. Drs. Swartzman and Goodman provided the SSC with a review of the panel's interim report to the Council.

Table 1 of the interim report presents a set of expected changes in a suite of response variables that is qualitatively evaluated for the direction of change under a range of hypotheses affecting SSL welfare. The SSC recommends that the panel state their hypotheses fully, including the underlying assumptions (e.g., that any change in prey resources would be detrimental to SSL) and annotate the table to explain the basis for their classification of the direction of anticipated change.

Discussion with the members of the panels revealed a need for the group to be briefed on the interpretation of SSL telemetry data, and in particular on the assumed bias in the spatial distribution of telemetry "hits" (locations). The "telemetry white paper" being prepared for the RPA committee could be useful to them. The panel will meet in late July, and the SSC recommends that a telemetry data briefing be set up for the panel at that time.

SSC endorsed the Panel's recommendation for explicit spatial analyses of demographic data and high resolution SSL and fisheries.

Among the tasks set out for the panel is the development of recommendations for an experimental design to evaluate the effects of fisheries on SSLs. The SSC recommends that the panel provide advice regarding the SSL response variables that can be practically and synchronously collected during "small scale" experiments to evaluate fishery opportunities to locally deplete SSL prey resources, i.e. during the pollock, Pacific cod and Atka mackerel experiments. In addition, the panel should make recommendations on how the diverse small scale experiments can be unified under an over-arching research plan, and how the outcomes of those experiments could be integrated into a statistically sound analytical framework that would make the research more responsive to generalization of their results.

RPA Committee: Larry Cotter, Dave Witherell, Cathy Coon and Doug DeMaster briefed the SSC on the RPAC's proposal for 2002 groundfish regulations. The SSC has no recommendations regarding preferred alternatives. However, the SSC was concerned with the method used to quantitatively evaluate the benefits of proposed alternatives. As was done in BiOp3, NMFS used population trend analyses in 13 geographic reaches covering the western population of SSLs to weight the evaluation of alternatives. The SSC believes that caution should be exercised in using the results of the analysis. The results should not be relied upon as indicative of actual population trajectories or as a reflection of statistically significant differences in trajectories as a consequence of alternative RPA proposals. The SSC strongly recommends that further clarification is needed regarding:

- The specific methods used to weight/score alternatives
- Critical underlying assumptions
- The rationale supporting harvest increases within critical habitat
- The rationale for including or excluding various fisheries and/or gear types.

With respect to the Global Control Rule, there is a need to provide a description of the rationale for the change. The SSC recommends that NMFS staff evaluate and contrast the modified and unmodified versions.

A report from the *ad hoc* experimental design committee was also presented. The SSC was pleased to see the concept of an experimental design included as part of BiOp 3 even though we expressed concerns about the specific design given in that document. In general, the change to several smaller scale experiments sounds reasonable but the SSC is concerned that during the experiments both fisheries and marine mammal data be collected at appropriate spatial and temporal scales. The SSC regards monitoring the efficacy of RPA measures essential. We urge NMFS to assure that an effective monitoring program is adopted.

RPA SEIS: Dave Witherell and Tamra Faris briefed the SSC on the RPA SEIS process, and timelines. The SSC has no comment on the process. The SSC is usually given a chance to comment on the analyses to be done. In this case, we were presented with a Table of Contents for the EIS on the RPA alternatives at the last meeting, but had no time to review or comment. The SSC understands the time pressure under which the documents are being produced but notes that it has been unable to comprehensively review he plan for the analytical document.

C3(b) AFA – REPORT TO CONGRESS

The SSC received a presentation on the draft, Report to Congress and The Secretary of Commerce: A report on the Impacts Resulting from Passage of the American Fishery Act by Darrell Brannan and Michael Downs. We also received public testimony from Trevor McCabe (At Sea Processor Association), and Brent Payne (United Catcher Boat Association).

This report is constructed from two years of data and industry experience with AFA. The pollock fleet and processing firms reported a number of examples of consolidation, reduced costs, and increased gross earnings during this period, as well as providing industry flexibility to respond to RPAs for Steller Sea Lions. The SSC notes that this fishery is dynamic and there may still be other changes ahead. A thorough evaluation of benefits and costs associated with AFA would be useful. Moreover, because there is tremendous interest in extending the Co-op model to additional fisheries, it is imperative that a thorough evaluation be undertaken on the scale of the CDQ and IFQ studies conducted by the NRC at the behest of Congress.

Suggested improvements to the report include:

(1) a more detailed description of the data collection and analytical methods, (2) additional discussion about the choice of variables selected in the community impact section (3) a summarization of findings reported, (4) inclusion of data to support claims of reduced bycatch.

An important missing element of the analysis is data on pollock catcher vessel industry ownership. This type of information was supplied to the Council by processing firms during the development the sideboard and excessive share analysis. Though there is a cooperative effort through a contract to ADF&G to collect this information from catcher vessels, initial catcher vessel interest in responding to the contracted survey, was reported to be low. Additional missing information that is critical for evaluating the impacts of the AFA is information on the fixed and variable costs of pollock harvesting and processing.

C-4 ESSENTIAL FISH HABITAT

The SSC heard a presentation by NMFS and Council staff members on the public scoping process and long range plans to address essential fish habitat. Public testimony was received from John Gauvin of the Groundfish Forum. As a result of recent litigation and court ruling, NMFS will be developing an EIS for essential fish habitat that tiers down from the groundfish EIS. As a first step in identifying habitat issues to be addressed by the EIS, NMFS will be holding a series of scoping meetings to solicit those issues of concern to the public. NMFS will then review these issues and determine which are significant and develop a range of alternatives that encompass the full suite of these issues. The SSC notes that NMFS has added four new criteria for EFH in addition to those already identified in the present EA.

The SSC is concerned that the public scoping process many not elicit all issues related to EFH or fishing impacts on that habitat and recommends that the agency not rely solely on public scoping to identify important habitat-related issues. The SSC believes that there are two areas where technical expertise is critical:

1. In developing new concepts for defining EFH and defining what habitats are essential to each species.

2. Determining the effects of fishing on these habitats, including effects of gear types other than bottom trawls.

The SSC further cautions that using fishery dependent CPUE data to define which habitats constitute EFH is inappropriate because areas of high CPUE may reflect regulations, availability, fishable bottom, temporary aggregations, etc. rather than habitat critical to particular life stages.

C-5 DRAFT PROGRAMMATIC SEIS

Steve Davis (NMFS SEIS Project Manager) provided a briefing on the process and schedule for acceptance of public comment and preparation of a response to public comment on the Draft Alaska Groundfish Fisheries Programmatic Supplemental Environmental Impact Statement (DPSEIS). The outside review team, Larry Cantor (University of Oklahoma) and Sam Atkinson (University of North Texas), provided an overview of the National Environmental Policy Act (NEPA) process and a summary of their preliminary review of the DPSEIS. Public testimony was provided by John Gauvin (Groundfish Forum), Donna Parker (Arctic Storm), and Paul McGregor (At-Sea Processor Association). The SSC commends Steve Davis and the DPSEIS authors for the epic efforts required to prepare the 3500-page document. The SSC further commends the outside review team for their helpful review and insights into the NEPA process.

Given the sheer size of the DPSEIS, the SSC was unable to provide a formal review of the entire document, but rather perused sections of Chapter 4—Environmental and Economic Consequences. Teams of SSC members drafted comments on sections 4.1 through 4.9. The draft comments were reviewed by the whole SSC in preparation of these minutes.

A DPS EIS is unfamiliar to the Council family and several questions need to be addressed. How this document will be used is important and should be made clear both in the Executive Summary and in the body of the document. Public testimony indicated some confusion on this issue.

If the DPSEIS is a planing document and the analytical environment it sets are used in future, then much more emphasis should be placed on describing results in this context. Model specifications, assumptions, and data sources need to be documented.

General Comments

The SSC views this massive document as a fairly comprehensive and balanced examination of Alaska groundfish management, subject to the comments and caveats described below. Although the range of alternatives bracket the probable extremes of management policy, inclusion of "no-fishing" and "no-management" alternatives would add to the comprehensiveness of the analysis and could be discussed and dispensed with based on their incompatibility with the Sustainable Fisheries Act. The SSC notes that the alternatives explored in the DPSEIS are not mutually exclusive, so that a preferred alternative could include elements of several of the alternatives. Moreover, a variety of management measures could be adopted to achieve the objectives described in the alternatives and thus the specific measures described in the DPSEIS should be considered as illustrative of the types of measures that could be adopted rather than as unique necessary and sufficient measures required to achieve the specific alternatives. The SSC is concerned that the labeling of the alternatives may unduly confuse the public. For example, does Alternative 2 (Increase Marine Mammal and Seabird Protections) convey the notion that the status quo does not provide sufficient protection? Does Alternative 3 (Increase Protection for Target Groundfish Species) imply that the status quo is deficient in current protection? Confusion may also arise regarding the Alternatives, which are designed to represent broad policy directions, and the specific objectives or management actions, which are used to illustrate possible management changes. For example, if the Council signaled its intent to increase protection to target groundfish species by adopting Alternative 3, this should not imply that the illustrative actions (such as specifying a MSST) are necessarily the best actions to achieve this policy. Further clarification of this SEIS process, the adoption of a preferred alternative, and the difference between policy and illustrative objectives would be useful in both the Executive Summary and the document.

The DPSEIS contains a reasonable analytical framework for comparing the alternatives. The model attempts to integrate single-species stock assessments with multispecies in-season management. One of the reasons that illustrative management actions were specified for each alternative was so that the consequences could be evaluated across alternatives. Nevertheless, the possible management actions that could be included under any alternative is much broader than the set examined with the model. Consequently, the results of the model should be viewed as being limited by the choice of management actions, and the range of consequences associated with each alternative is much broader. Furthermore, several different model configurations could have been evaluated (e.g., length of recruitment series, choice of spawner-recruit model, reaction of harvesters to closed areas, choice of fishing mortality, number of years projected into the future). These alternative configurations could easily have different qualitative and quantitative results. Therefore, the model results should be viewed with caution and only as an illustration of potential consequences. This point is particularly critical with respect to the economic results, because of the lack of economic cost data and consequent lack of economic modeling to deal with net benefits.

The SSC urges restraint in the use of numerical scales and scoring methods to rank management alternatives especially when the assessment is really qualitative or at most an ordered list. Core should be taken to describe the methodology used and assumptions made. Further, the implication of each assumption should be stated.

The SEIS could itemize data gaps and recommend needed areas of research to fill these gaps.

SALMON OVERFISHING DEFINITION

The SSC reviewed the draft EA for Amendment 6 to FMP for the salmon fisheries in the EEZ off the coast of Alaska revise definition of overfishing.

In Alternative 2 (preferred), overfishing definitions were constructed consistent with language of the Magnuson- Stevens act and policies of the State of Alaska and Pacific Salmon Commission under which the Southeast of Alaska troll fisheries are managed.

The SSC supports adoption of the preferred alternative.

The SSC has the following editorial comments on the document.

Page 1. "The Pacific Salmon Treaty "US/Canada bilateral agreement------ "should be replaced with "Pacific Salmon Treaty, Annex IV, Chapter 3 Chinook Salmon" and throughout the document.

Page 8. In the equation reflecting the MSY control rule for chinook Stocks, $\alpha(X_t)$ should be α_{Xt} and $\beta(X_t)$ should be β_{Xt}.

Page 8. Figure 1 is missing.

Page 9. Was the intent to have the F and MFMT for chinook salmon continuously increase? Might consider expressing the MFMT and F as T_{chin} year moving sums.

APPENDIX
DRAFT PROGRAMMATIC SEIS

Section Specific Comments

Executive Summary

Given the daunting magnitude of the DPSEIS, the Executive Summary and in particular Tables 1 and 2 can be expected to be the primary source of information reviewed by the public. While the current draft Executive Summary is balanced and lucid, it may be helpful to highlight the areas of controversy, provide an expanded discussion of the history and purpose of management actions taken following the completion of the programmatic EIS's under which the fisheries have been managed. The Council has taken many actions intended to protect target and no-target stocks, account for uncertainty, sustain fishing communities, increase net national benefits, protect essential fish habitat, and increase economic benefits. A few additional issues that could be addressed in preparation of the Final PSEIS Executive Summary include:

- Page 5 and throughout the Executive Summary and elsewhere in the document—Please note that "value" is not a synonym for "gross revenue". Although it appears that the document authors intend "value" to be understood as "gross revenue". In most instances, the use of the imprecise term "value" creates the potential for confusing gross revenues and net revenues, leading the incautious reader to misunderstand the magnitude of net economic benefits.

- Tables 1 and 2 will receive considerable attention and should be carefully reviewed to ensure clarity with respect to the baseline against which the alternatives are being assessed and uncertainty with regard to the magnitude and direction of impact.

Section 4.1.6—Stock Projection Model for Certain Target Species

As noted above, other model configurations could have been specified (e.g., longer or shorter recruitment time series, different models of spawner-recruit processes, different reactions of harvesters to closed areas, different choices of fishing mortality, trophic linkages among species in addition to technological linkages in catch/bycatch, etc.). These alternative configurations would have different quantitative results and might have different qualitative results. Therefore, the model results should be viewed with caution and only as an illustration of potential consequences. The DPSEIS could be improved by a more thorough documentation of model assumptions and a discussion of the implications of adopting those assumptions. For example,

- Page 4.1-146 paragraph 1 states, "Only recruitments from the years 1978– 1997 were used to estimate distribution parameters." And that "No serial correlation was assumed." The omission of pre-1978 recruitment data has been previously criticized by the SSC. If the observations are rejected because they are subject to measurement error, a set of formal Bayesian priors should be specified using the inverse coefficients of variation on the pre- and post-1978 observations. If they are rejected because they are draws from a previous state (e.g. a pre-regime shift state) there should be a likelihood attached to the reemergence of the pre regime shift state. By ignoring serial correlation, recruitment is treated as independent of stock and independent of previous recruitments, implying for example that pollock are not cannibalistic.

- Page 4.1-146 paragraph 1 states, "For each stock and alternative, 1,000 simulations were conducted." It is unclear whether these were conducted as a single 1000-step simulation or as one thousand 5-step simulations?

- Page 4.1-147 paragraph 3 assumes that "in all cases, stocks were assumed to fall into Tier 3", whereas the Stock Assessment and Fishery Evaluation documents used by the Council as a basis for management assign stocks to a variety of different Tiers based on the level of information and the stock condition.

- Page 4.1-147 penultimate paragraph states "Estimates of the coefficient of variation (CV) for each stock were estimated based on the existing survey data. The lower bound of the 90 percent confidence interval for a lognormal distribution with this CV and a median of unity was estimated for each stock. This lower bound value is the specified fraction by which max F_{ABC} (typically, $F_{40\%}$) was reduced in the projection model to accommodate survey imprecision." This assumption ignores the role of non-survey data and provides an uncomplete treatment of uncertainty.

- Page 4.1-147 paragraph 4 states, "Area restrictions on the eastern Bering Sea pollock fishery were imposed to reduce squid bycatch. Impacts of this restriction were modeled by adjusting the fishing mortality rate for the 5-year projection period so that the average mean catch over the 5-year period was reduced by 25 percent." Is the pollock catch reduced by 25% or is the squid bycatch reduced by 25%?

- Page 4.1-149 paragraph 1 states, "Under this alternative, the objective is to increase the short-term net economic benefits to the fisheries communities and their clients (e.g., fish consumers). This alternative was implemented by establishing a more aggressive harvest strategy by allowing fishing close to the F_{OFL} rate (but less than or equal to the F_{MSY} value)." This conclusion is dependent on restrictive assumptions about the exvessel demand for fish and about the catch supply functions. It is not clear that increased catch will result in increased gross revenue or increased net revenue.

- Page 4.1-149 paragraph 2 states, "Given that the total biomass of eastern Bering Sea pollock in the base year of 2000 was estimated to be 8,505,600 mt, the projections indicate that an increase of about 12 percent would be expected by the year 2005 under Alternative 1." This increase in 2005 is persistent across modeled alternatives, suggesting that it is an artifact of the recruitment modeling process reflecting a recursion to the mean. Consequently the significance of this increase should not be overstated here or in the economic analyses in section 4.8

- Page 4.1-149 paragraph 2 states, "Because the model treated all parameters except recruitment as though they were known without error, the confidence intervals generated by the model should be treated as minimal estimates; that is, the true confidence intervals are undoubtedly broader." This is a statement conditional on the validity of the assumption that recruitment is a random walk. It is unclear whether the model overstates or understates the true magnitude of variability. Moreover, because the simulation ignores pre-1978 recruitments, it is conditional on a constant post-regime shift state.

- Page 4.1-149 paragraph 2 states, "Assuming that these estimated recruitments were drawn from a single inverse Gaussian distribution, maximum likelihood estimates of the parameters of such a distribution were calculated." With fewer than 20 observations, it is unlikely that the hypotheses that the true distribution is normal or lognormal could be rejected or that an inverse Gaussian could be shown to be statistically superior.

- The last paragraph on page 4.1-153 states, "The mathematical model accomplishes this by maximizing a function of TAC species catch subject to all relevant constraints." This mathematical programming/allocation model should be presented in detail. It is unclear from the information provided whether this is a linear or non-linear programming problem or what constraints are specified to bound the model solution. Moreover, maximization of tonnage without weighting by value etc lacks economic intuition and ignores historic practice ... a pound of pollock is preferred to a pound of arrowtooth flounder. (See also equation 1 on page 4.1-155.)

- The last paragraph on page 4.1-154 states, "The bycatch matrix is based on the 1997– 1999 average catch." This assumes that bycatch is fixed in proportion to target species catch and ignores fluctuations in bycatch species abundance.

- Page 4.1-156 paragraph 1 includes two instances where the year 2000 is represented as the year 200.

- Page 4.1-156 "Model details" section identifies instances where the analysts imposed arbitrary constraints on the catch model to bound the solution to "reasonable" values. The need to impose these constraints is indicative of the weakness of the model ... it suggests behavior that would not be rational and must be constrained with arbitrary constraints rather than behavioral constraints.

- Page 4.1-163—Alaska Peninsula should be capitalized.

- Page 4.1-164 paragraph 3 states, "The 3-year means were used instead of the prices for the most recent year because we expect the former to provide better estimates of what prices will be in the next few years." This assumes a constant (real?) price, ignoring any effect of variability in catch on variability in price. Under this perspective, price and revenue forecasts add no information beyond that conveyed in catch.

- Page 4.1-164 neglects to list the most binding assumption of the economic model, the assumption that costs are invariant through time, and across variations in catch implied under the various alternatives. This latter assumption, ignored by the analysts, is untenable.

Section 4.2—Effects of Alternatives on Marine Mammals

The marine mammal section was one of the shorter parts of section 4, although additional information was found in section 4.1 because SSLs were chosen for the case study used to evaluate with alternative 2.1. The majority of the discussions were qualitative although the scoring process seemed to indicate a more quantitative approach. The SSC urges restraint in use of numerical scales and scoring in the situation.

The SSL section was an interesting update of recent happenings under the recent changes imposed by SSL protection measures. However, it was not well integrated with previous data to make a stand alone document. To understand the situation and implications, one would have had to read the Biological Opinion and related documents.

Monitoring programs should be included to compare effects with predicted outcomes. A component that is missing, but that should be included is a feedback mechanism for data collected in monitoring to be analyzed quickly and fed back into the decision-making process at reasonable intervals.

Agree with general comments on how difficult to follow and understand full details of the alternatives, lots of flipping back and forth, suggest they at least put in references as to where relevant sections can be found as some are not intuitive.

Section 4.3—Effects of the Alternatives on Seabirds

The authors have done an overall excellent job of identifying how fisheries activities may affect seabird populations. As is reasonable, they conclude that the biggest threat to seabirds by fishing activity is the incidental mortality caused by birds becoming caught in fishing gear and drowned. They address four issues: competition for fish prey (forage fish), injury to birds by collision with lines and boats, damage to benthic habitats and incidental bycatch in longline and trawl fisheries. However, the DPSEIS does not address the possibility that the fisheries, on the whole, may be beneficial to seabirds. It has been shown that some seabird species in some regions obtain a significant fraction of their diets from discards and offal. Additionally, the hypothesis that the removal of large, predatory fish results in a larger proportion of the forage fish biomass being available to seabirds requires further evaluation.

The DPSEIS details how efforts to reduce the bycatch of seabirds by the use various techniques has proven successful. Particularly valuable have been cooperative efforts between the industry, the USFWS, NMFS and conservation organizations to test the effectiveness of the deployment of devices to scare birds away from baited hooks as they are being set. These studies, sponsored by WSGP have proven very successful and there is now a program in place to aid the industry in deploying appropriate devices throughout the longline fleets. The evaluation of potential threats to seabird populations, and in particular the endangered Short-tailed Albatross, and evaluation of the potential effects of the management alternatives is reasonable.

The DPSEIS does not offer any quantitative models to help evaluate the potential population-level impact of fisheries-related seabird mortality. Such evaluations would be particularly relevant for those seabird species that are killed in high numbers. We need information not only on the population-level effect of bycatch on the Short-tailed Albatross, but also on more abundant species such as the Sooty Shearwater, the Short-tailed Shearwater, and the Northern Fulmar.

The authors of the DPSEIS point out that is little likelihood of competition between fisheries and seabirds for forage fish, as directed fisheries on these species are prohibited by Amendment 36 to the BSAI FMP and Amendment 39 to the GOA FMP. The amendments allow a 2% maximum retainable bycatch, so that these fish can be reduced to fishmeal and not wasted. There is an assumption here that the discarding of forage-fish-sized fish involves waste, but in the North Sea, these discards and offal are an important component of seabird diets (Furness et al., 1992[1]; Camphuysen et al., 1993[2]; Furness and Tasker, 1996[3]). In Europe, there is concern that decreasing the availability of discards and offal may cause declines in seabird populations. Additionally, the argument has been suggested that the removal of large predatory fish has left a greater proportion of forage fishes for seabirds. In Alaska, if removal of pollock was sufficient to reduce the production of age-0 and age-1 fish, that could be a problem, but a more likely scenario is that a reduction of adult pollock would reduce their predation/cannibalism on forage fish.

The DPSEIS evaluates the potential for bottom trawl fisheries to damage the foraging habitats of the threatened Steller's Eider and Spectacled Eider. The DPSEIS indicates that very little of the potential foraging habitats of these two epibenthic foraging sea ducks will be affected by the management alternatives evaluated. These conclusions appear reasonable.

The DPSEIS briefly discusses the potential for birds to collide with fishing vessels and the various lines deployed on these ships as well as those going into the water. There is virtually no data on the frequency or situations that affect the likelihood of bird strikes, and the DPSEIS appropriately has little to say about how the various management alternatives discussed might affect seabird mortality form striking vessels or their lines.

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[1] Furness, R.W., Ensor, K., & Hudson, A.V. 1992. The use of fishery waste by gull populations around the British Isles. Ardea 80: 105-113.

[2] Camphuysen, C.J., Ensor, K., Furness, R.W., Garthe, S., Huppop, O., Leaper, G., Offringa, H., & Tasker, M.L. 1993. Seabirds feeding on discards in winter in the North Sea. NIOZ Rapport 1993-8. Neth. Inst. Sea. Res., Texel.

[3] Furness, R.W. & Tasker, M.L. 1996. Estimation of food consumption by seabirds in the North Sea. ICES Coop. Res. Rep. 216: 6-42.

SPECIFIC COMMENTS:

- Page 4.3-1, paragraph 3: It is incorrect to say that the role of currents near the Pribilof Islands is unknown. See Coyle et al., 1992.[4] The statement that the Inner Front is crucial foraging habitat is an overstatement.

- Page 4.3-1, paragraph 4: Although large-scale oceanographic currents may determine the underlying productivity of a region, it is more likely that smaller-scale tidal currents force the local foraging opportunities of seabirds.

- Page 4.3-2, top paragraph: It is not correct to say that there are no studies of forage fish species in Alaska, although there is much less information than is needed.

- Page 4.3-11, Middle: An additional Action Item should be to model the potential effects of fisheries-induced seabird mortality on the population trajectories of relevant species. Such modeling could also investigate the potential effects of reduced mortality, particularly of juvenile birds, from the availability of discards and offal. It has been suggested that the increase of North Pacific Ocean populations of Laysan Albatrosses may have resulted, in part, from the availability of food provided by the fisheries in winter (PICES 2000)[5].

- Page 4.3-14, Table 4.3.3: Shearwaters should be included in the column under processing waste.

- Page 4.3-15, Table 4.3-4: It is not clear that the direct and incidental take of Northern Fulmars and other Albatrosses and Shearwaters should be listed as insignificant. Population modeling might show that the present levels of take are depressing population trajectories. Also, there should be a category for positive effect. For example, processing waste and offal may be beneficial to seabirds.

- Page 4.3-16, Table 4.3-5: The potential effects of processing waste and offal is misrepresented; this material is not wasted from the birds' perspective- it is a free lunch, particularly if no hooks are included.

- Page 4.3-20, Table 4.3-6: The column on "Mortality as a Percent of Total Estimated Alaska Summer Seabird Population" is badly misleading. What is important is the percentage of a particular species' population that is killed. For instance, the die-off of shearwaters in 1997 may have involved only 0.77% of the entire number of seabirds in Alaskan waters, but it represented about 11% of the short-tailed shearwaters within the region at that time. It seems likely that die-off had significant population effects for that species.

- Page 4.3-22, paragraph 3: Estimates for trends in age-0 and age-1 pollock are of critical importance, particularly in the vicinity of major colonies. Available data for the Bering Sea and Gulf of Alaska should be carefully examined for indications of how the availability of juvenile pollock is affected by changes in fishing pressure for adult fish, and the biomass of adult fish in the region.

- Page 4.3-23, bottom: Squid would likely become more available for birds if there was an increased fishery bycatch of squid. There would likely be a trivial reduction of the abundance of squid in the

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[4] Coyle, K.O., G.L. Hunt, M.B. Decker and T.J. Weingartner. 1992. Murre foraging, epibenthic sound scattering and tidal advection over a school near St. George Island, Bering Sea. Mar. Ecol. Prog. Ser. 83:1-14.

[5] Hunt, G.L. Jr., Kato, H., and McKinnell, S.M. [Eds.] 2000. Predation by marine birds and mammals in the subarctic North Pacific Ocean. PICES Scientific Report No. 14, 165 p.

ocean, but with bycatch, there would be dead or damaged squid being released at the surface in predictable places. Seabirds take advantage of these situations.

- Page 4.3-24, paragraph 3: Again discards may be beneficial to seabirds. Using the techniques employed in Europe, it might be possible to ascertain how much benefit seabirds derive from discards and offal, and then try to balance that out against the rates of mortality when birds are caught in fishing gear.

- Page 4.3-27, middle paragraph: A critical issue is the ability of rats to over winter on an island. At Kiska Island, rats stockpile auklet carcasses in old lava flows, possibly to return to them after the auklets finish breeding and depart from the island. Rats on islands where seabirds breed are a significant threat to seabirds in the North Pacific Ocean.

- Page 4.3-27, bottom: Data gathered recently by students in the laboratory of G. Hunt show that there has been a shift in the types of plastics ingested by short-tailed shearwaters. In the 1970s the major source was from industrial pellets, whereas in the late 1990s, the major source was from end users.

- Page 4.3-33: In varying the timing of fishing effort, there may be some effects on the value to seabirds of the discards and offal that result from the fishing activity. One would need to examine this carefully, as discards in times when the seabirds have high energy demands or naturally available food is hard to obtain may be more valuable to the seabirds than would be true in times of plentiful prey. A question that should be explored is whether pulsed fishing saturates the ability of the seabirds to take advantage of the waste produced.

- Page 4.3-34, top: The fact that more fulmars are caught when more hooks are set is not surprising. The question is how does the ratio of fulmars caught to hooks set vary? Apparently for many other species of seabirds, the ratio of birds caught to hooks set drops as the number of hooks set increases. It is unclear whether this is because the hooks are set more quickly by the same number of vessels and the birds become satiated and many hooks go down while birds are resting and digesting or because there are more vessels fishing and the number of birds per vessel is reduced, allowing birds to be more selective and thereby avoid becoming hooked. Perhaps the use of streamers will make all of this moot, but if not, there may be some important management implications in these ratios.

- Page 4.3-34, bottom: Are wintertime discards important for the survival of juvenile Short-tailed Albatrosses? For vessels other than long-liners without means of scaring birds away from hooks as they enter the water, there seems to be considerable benefit and very little downside for seabirds in the discards and offal provided by fishing vessels.

Section 4.4—Effects of the Alternatives on Target Groundfish Species

1. Generally the organization of the SEIS to be rational and encompassing the broad mandate of what is required. Broadly speaking, it seems the mandate of the SEIS is to explore the management of the Alaska groundfish fisheries at the OY level, which balances commercial fisheries with broader benefits, such as protecting the ecosystem, endangered species, and a precautionary approach to fisheries management. When making the tradeoff between commercial fisheries and environmental protection we must compare apples and oranges. However, when considering a fisheries management alternative, measuring the costs to commercial fisheries is relatively straightforward compared with predicting the impact of alternatives on achieving environmental goals. Therefore, its reasonable to better highlight costs to the commercial fisheries. For example, include ex-vessel landings and value of landings in the large summary Table 2. This supplies a quick reading of the "price" associated with a particular set of management goals.

2. What is disturbing is that the evaluation of alternatives travels down the familiar road of Biop3. However, conclusions based on inadequate data are often called "conditionally significant." It is assumed that alternative management plans, undertaken at great cost to commercial fisheries, will be effective in attaining the desired conservation goals. For example under Alternative 2.1 it is assumed that RPA measure will be effective for marine mammals; under Alternative 3 that time-area closures will provide healthier fish stocks; under Alternative 4, that grenadier and skates can be managed under an ABC when little is known about the species being protected; or under Alternative 5, that reduced trawling will result in improved benthic habitat.

3. What makes this SEIS interesting is the use of the multispecies projection model that provides quantitative multi-species projections to give meaning to the highly hypothetical alternatives. Although this is not a true multispecies model in terms of population interactions, by using bycatch estimates it does provide a more realistic estimate of landings that would occur under different management alternative than would a pure single species model.

4. The multispecies model predicts catch forecasts only 5 years into the future. Several section authors noted that such a short projection is insufficient to contrast the various alternatives. It is influenced too greatly by current stock conditions. Longer projections should be included.

5. It should be noted that Alternatives 2.2 and 6.2 are so extreme that they clearly violate the OY mandates of the Magnuson-Stevens Act. However, they should be kept in the SEIS because they would bracket any reasonable management regime.

6. The name of Alternative 3 should be changed to "precautionary fisheries management." Right now there is some indication that it attempts to deliver MSY, even better than Alternative 1. However, MSY is not a precautionary strategy, and the goal of this alternative is clearly to provide more precautionary fisheries management. References to attaining MSY under this alternative should be dropped.

7. Delete Alternative 4.1 and add it as an option under Alternative 4.2. The results of these options are similar for nearly all target and non-target species, and even for the species that the alternatives are designed to protect. This is especially true when one considers how little is known concerning the biology of skates, squid and grenadiers.

Modeling Comments

P4.1-150 and 151.

1. I found the notation for this section of computer code confusing mainly because the year 2000 catch and effort are referred to as C_{00} and F_{00}. This conflicts with the general notation C_{tu} and F_{tu} that is generally used. Instead the notation C_{0u} and F_{0u} could be used with the year 2000 referred to as time $t=0$.

2. When the subscripts are specific they should be made specific. For example, in Generic Step 4, $N_{11u}=R_{1u}$, where the first 1 refers to index age 1, and second 1 refers to the first year of the simulation, and u refers to the u-th simulation.

3. P 4.1-152, 4th line down, should be section 4.1.6.3.

4. Step 10, column headings, first column should be $t=1$, second column should be $t>1$.

5. Step 10, It's not clear why F_{tu} would be constrained as shown for <u>all</u> alternatives. For example in alternative 6.2, fishing is at F_{ofl} , but it is not likely that F_{oo} is larger than F_{ofl}.

6. Page 4.1-58 incorporating uncertainty in Alternative 3. This section is confusing. It can be more clearly stated as simply using the lower 90% confidence interval for the survey biomass estimate assuming that the survey biomass estimate is lognormal. Much more intuitively, approximately $log(\hat{B}) \sim N[log(B), cv(\hat{B})^2 = var(\hat{B})/\hat{B}^2]$, so that the lower confidence interval for $\hat{B}$ is $\hat{B}exp(-1.65cv(\hat{B}))$

7. Page 4.4-22. Generally, the multi-species projection model is designed to estimate F so that the projected catch matches the allowable catch under the bycatch model. It seems that it should be expected that the ABC catch and the bycatch model catch should differ, the bycatch model catch sometimes being lower. It is not clear why action had to be taken when ABC catch did not equal the catch allocated by the multi-species bycatch model. Apparently, the projection program then used different gear and age specific selectivities for the "various runs" of the stock projection model. There is an impression from reading Section 4.1.6.2 that these values were fixed from the most recent stock assessment (year 2000).

8. Several section 4.4 authors mention that the tool that advances the selectivity curve to 1+ the age at first maturity seems to fail to accomplish its precautionary goal. The usual interpretation of this strategy would be protect the young fish so that they will not be fished until they have spawned at least once, thereby increasing the spawning potential of the population. However, since the population is fished at $F_{40\%}$, the spawning biomass will stay the same, but would become younger. Since the older fish are often thought to be more fecund than younger fish, the net result of this strategy might be negative for reproductive potential.

9. P4.1-56 Incorporating a Minimum Stock Size Threshold under Alternative 3.

   a. First there is a problem that the current year (year for which TAC is being set) will not always be 2000, so it should be rewritten so that the current year is not assumed to be 2000.
   b. Next there is the problem that the projections that determine whether a stock is overfished are always made by fishing at the F_{OFL} level in Scenarios 1 and 2. This is a level of fishing that the NPFMC has never condoned and is therefore unduly pessimistic. These projections should be made fishing at the F_{ABC} level.

Section 4.5—Effects of the Alternatives on Non-Target (Forage, Other, and Nonspecified) Species

The conclusion of conditional adverse impact for the skate complex under Alternative 1 in the BSAI and grenadier complex under Alternative 1 in the GOA is based on an assumption that the relative magnitude of the rarer species in the catch is substantially higher than in the Surveys. For example in the BSAI skate complex the relative biomass of the common species (B. parmifera) to the rarer species (B. interrupta) was 14.26 in the 1999 survey. In the analysis of alternatives, it was assumed that the ratio of the two species in the catch was 4. The basis for the assumption of disproportional catch of the rare species was not clear in the document.

Section 4.6—Effects of the Alternatives on Prohibited Species

The effects of alternatives on prohibited species (halibut, herring, crab and salmon) are detailed in terms of changes in anticipated catch mortality. These changes are driven by the changes in directed catch predicted from a "multispecies" simulation model. While the model is described, detail on the model inputs is missing including discussion of model assumptions and constraints. Consequently, it is difficult to evaluate the reasonableness of the outcomes. It should be said, however, that the construction of this model is a very significant endeavor, and the attempt to evaluate the multspecies interactions is most welcome.

Specific Comments:

Prohibited species are a special protected class of fishes under the Council's groundfish FMPs. Retention of these fishes is strictly prohibited and the Council has taken deliberate action to limit the catch mortality of this group. In general, alternatives that lower the directed catch of groundfish tend to lower the expected catch of prohibited species, although changes in the allocation of directed catch among gears can have differential effects on prohibited species catch and these differences are illustrated in the effects of alternatives.

The conclusion of conditional significant adverse impact on chinook salmon and other salmon (mostly chum salmon) in the BSAI under Alternative 1 in the PSEIS analysis is surprising in face of the history of Council actions to control salmon bycatch in the BSAI groundfish fisheries. The salmon bycatch magnitude is substantially lower than the utilization in directed salmon fisheries. The Council actions to control salmon bycatch were motivated more by allocation than conservation. Salmon are fully exploited in directed fisheries so increases in salmon bycatch in BSAI fisheries represent interception of fish that would otherwise be taken in directed fisheries.

The PSEIS's conclusion of impact was based on a comparison of the higher salmon bycatch rate (i.e. the magnitude of bycatch relative to the catch in directed salmon fisheries) to that for other prohibited species. Salmon with their younger age at maturity, iteoparous life history, and relative high productivity can sustain higher rates of exploitation than the other prohibited species. The document's estimate of bycatch rate is conservative. Salmon bycatches are immature salmon and should be discounted for natural mortality to be strictly comparable to catches in directed salmon fisheries that occur on mature runs. Catches, particularly those in AYK chum salmon fisheries, is a very conservative index of the abundance of western Alaska chum salmon. The catch of AYK chum salmon has been constrained in recent years due to lack of markets and to fishery restrictions implemented in response to weak chum salmon runs in some areas of Western Alaska. In addition, the document incorrectly references the stocks in the western Alaska chum stock complex that is used in genetic stock identification studies of chum salmon bycatch cited by the analysis. The western Alaska stock complex that is identified in genetic stock identification methods includes chum salmon originating in rivers of the North Alaska Peninsula area in addition to those originating in the Bristol Bay and AYK area. The aggregate runs of the western Alaska chum salmon are on the order of several million per year (the salmon bycatch rate less than 1 percent of the run) and much greater in magnitude than catch of chum salmon in AYK rivers, and are at least an order of magnitude greater than the aggregate runs of western Alaska chinook salmon. The conclusion of conditional significant adverse impact on other salmon in the BSAI is not warranted in view of the relatively low contribution of western Alaska chum salmon to the other salmon bycatch and the magnitude of the western Alaska origin bycatch relative to the aggregate western Alaska chum salmon runs.

Additional page specific comments:

4.1-10—Under Alt. 2, there would be a reduction in TAC by the estimated consumption of SSL. All single species models already reserve a fraction of the total biomass for predators and other sources of mortality through the allowances for natural mortality. The further TAC reduction would constitute doubling the allowance for one specific predator that contributes to the natural mortality of the target groundfish species. While this may be acceptable as a policy, it does not represent a level of compensation that is necessarily warranted biologically.

4.1-11--The SEIS remarks about fishery management tools that could increase localized prey availability. The SEIS would be better served by characterizing these actions as limiting assumed adverse impacts of fishing. Presumptive fishery impact on "localized depletion" is a hypothesis that is extremely controversial. Available scientific evidence is equivocal with respect to such impacts. Consequently, NMFS should take pains to characterize the assumed benefits, rather than allude that such benefits would affirmatively accrue to the SSLs.

Bycatch limits: (4.6-9)—There is a need to remark about the size of the bycatch allowance in relation to the population size and directed catch , and about the physical size of the bycaught species relative to the mean size taken in the directed fishery. In this way you can help the reader relate the magnitude of the bycatch to impact on the fished population. (see page 4.6-12, last paragraph)

4.6-11, paragraph 2—references to herring bycatch limits are obscure. For example, "*...implemented limits on retention of 20 percent for groundfish ...*". The question one asks is 20% of what?

4.6-11, paragraph 4—What is the "*secondary limit*"? The terms primary and secondary limit are undefined.

4.6-12, Table 4.6-3. No units specified for tanner and opilio crab PSC. Notes fail to relate back to specific table cells.

4.6-14, paragraph 2—Observer Program: there is an unnecessary discussion of the problems associated with observer financing. This paragraph should be revised from the point of view of any indications of bias in the existing data and the impact of that bias on the welfare of prohibited species.

4.6-14, paragraph 3—The SEIS should identify to what extent any of the "*numerous EFPs*" have successfully identified effective bycatch controls, i.e., have EFPs been an effective means of developing technological advances toward the elimination of bycatch?

4.6-15, paragraph 4—No explanation of the types of king crab closed areas; what makes them different.

4.6-16, Table 4.6-4—Unlabeled column (col. 3 in lower half of the table) under Trawl Apportionments, Shallow Water.

4.6-19, paragraph 2—There is a reference to Table 4.6-3 as a summary of bycatch closures; this table does not summarize bycatch closures.

4.6-19, last paragraph—The text notes that herring and salmon bycatch caps typically only come into play when bycatch rates are very high (by implication, that is when the prohibited species abundance is very high). This strategy seems counterintuitive to the goal of protecting prohibited species. The authors should address the issue of the effective utility of constraints when prohibited species populations are abundant versus those times when they are not abundant. The contrast of an abundance based PSC cap should be noted. Second, there should be a remark on the stock origin of chum salmon taken as bycatch.

4.6-20, paragraph 3—With respect to VBAs and other bycatch allotment systems, there should be a reference to the high degree of uncertainty in individual vessel catch accounting and the resultant enforcement issues this provokes.

4.6-24, paragraph 3—The SEIS protests that they are missing halibut demographic data so there are no modeled outcomes for halibut population under alternative management actions. Detailed demographic data are readily available from the IPHC, so this constraint seems unnecessary.

4.6-26, Table 4.6-7: Rows mislabeled

4.6-27, Fig. 4.6-9: Need to change the scale on the y-axis; numbers sampled in GOA are 25% of those sampled in BSAI, there is no reason to display the size frequency on the same scale for the two areas, the point of interest is the contrast among gears.

4.6-28, paragraph 1—Alt. 1 estimated decrease in halibut mortality is not considered significant; yet, a drop in bycatch will produce an increase in directed fishing catch, thus benefit the industry socio-economically.

4.6-28, paragraph 2—Using the phrase, "*Examples of indirect impacts…would be…*" presents an expectation that these events may manifest themselves, even though discounted later in the paragraph. I would rephrase, e.g., "Halibut are considered to be a coast-wide stock and would therefore be genetically unaffected by any spacio-temporal concentration of bycatch." This phrasing is more affirmative and does not leave the reader with a sense that genetic alteration of the population is possible.

4.6-28, paragraph 3—The preponderance of halibut caught as bycatch are of sublegal size, and therefore immature individuals. The immediate impact on spawning biomass would be almost nil, the longer term impact would be mitigated by the anticipated survival rate of the bycaught fish.

4.6-35—Alt. 2.2 would reduce fisheries harvest for key BSAI species (pollock, cod and Atka mackerel) such that it is unlikely that the fisheries would remain a viable economic enterprise. Consequently, I would expect effects on PSC to be very positive, because groundfish fishing would in all likelihood cease. Fishing may remain in the GOA where overall reductions in harvest are less than in the BSAI, but in all likelihood only the line fisheries would continue. I cannot understand why the analysts conclude that flatfish trawl fishing would not be altered in any way under Alt. 2.2, flathead, rock sole and yellowfin sole catches in the BSAI would be reduced by more than 40% relative to Alt. 1. In the GOA, flathead and arrowtooth flounder catches would drop by more than 20%.

Section 4.7—Effects of the Alternatives on Habitat, Including Essential Fish Habitat

Comments:

1. Section 4.7 was difficult to evaluate without reference to information provided in other sections scattered throughout the SEIS document. Cross-referencing these key sections would greatly improve the readability of the document and enable the reader to follow the rationale of the analyses that follow. For example, it is not clear how impacts on fisheries and re-direction of effort were determined and the assumptions that went into these analyses are critical to evaluate the trade-offs involved in the selection of alternatives.

2. The focus of section 4.7 is primarily on the effects of the alternatives on corals, anemones, sea whips, sea pens, and sponges, which have been previously defined as HAPC. It is tacitly assumed that these emergent macro-invertebrates represent a proxy for essential fish habitat. Consequently, the analysis reflects the general lack of understanding about what constitutes EFH. While these invertebrate species may represent a component of EFH, there are certainly other important habitats and habitat characteristics essential for fish. A more explicit recognition of the limitations of the analyses that flow from this narrowly focused measure of EFH should be presented.

3. Evaluation of the impacts of the alternatives to habitat are seriously limited by a general lack of understanding of what constitutes EFH, especially for early life stages not sampled by the fishery. Further, little research has been done on habitat change in relation to fisheries. This section should include a discussion of research needs and recommendations on how to address these issues.

4. The role of other invertebrates as habitat or prey base for commercial species is unknown. The document's emphasis on these species implies a connection to fishery production that may not exist. By focusing the document solely on these invertebrates, more important habitat issues may be overlooked.

5. Since the actual value as EFH of the identified emergent invertebrates is not known, it is not possible to evaluate the trade-offs of the alternative management measures and the net benefits/losses to fisheries and even to EFH. For example, how important is habitat complexity relative to non-living substrate or how important are sponges relative to anemones?

6. There is no plan proposed to investigate the extent of bycatch mortality that corals, sea pens, sponges and anemones can sustain and still retain their ability to function as EFH.

7. Non-living substrate should be better characterized by grain size and associated biota. Sediments in the eastern Bering Sea are routinely disturbed by tidal currents and storms, and the associated biota can be assumed to be adapted to these routine events. Modification of these sediments by fisheries may be inconsequential.

8. The document should recommend a scientifically based study that would set out areas with contrasting fishing effort levels so that fishing effects on biota may become clear in the future.

9. The fundamental assumption that elimination of bottom trawling will be beneficial to benthic habitat is not well-supported by the data presented. For example, executive summary Table 2 shows that most of the effects of the status quo (alternative 1) are either not significant or conditionally significant.

Section 4.8—Economic and Social Effects of the Alternatives

Section 4.8 is not an adequate economic analysis. There is no analysis of net benefits. The analysis on changing exvessel value, etc., in regard to the alternatives, is flawed because there is no price response to changes in harvest levels and the scant economic data is used to generate tables of numbers that could lead the reader to assume that the reported values are reflective of the economic impacts that would occur if the alternatives were adopted. Further, it addresses only the *direct* portion distributional effects. A treatment of indirect and induced distribution impacts is lacking.
The tables with baseline data are informative. The tables that project impacts should be dropped from the DPSEIS and replaced with a qualitative discussion. That is, the DPSEIS should present a concise, and simple to understand, theoretical treatment of economic benefits and the revenue, income (and employment) distribution aspects of economic analysis. The authors should then discuss the alternatives in light of what might be expected to be the directional movements and if possible the magnitudes of the movements in net benefits and distributional considerations (both by fishing sectors and communities) of the alternatives. The DPSEIS should not attempt more sophisticated economic modeling as time requirements and data collection needs are too prohibitive. For example, to do the simple gross revenue analysis would require a system of demand curves for the suite groundfish species. For the distributional analysis missing expenditure data by fishermen and processors is needed. For net economic benefits to the nation both primary and derived demand *and* supply funtions are needed

In addition, the DPSEIS should include an explanation of why basic economic data (e.g., the harvesting and processing cost data) could not be produced. Any discussion of future benefits and costs should be couched in terms of net present value (NPV). Additional issues that should be addressed include:

- The model used to generate the impact estimates should be fully described in section 4.8.

- A discussion of how baseline employment numbers were estimated.

- Any discussion of "long-run" economic benefits should be based on a much longer time horizon than 5 years.

- "Value" is not a synonym for "gross revenue" or "total revenue". Although it appears that the document authors intend "value" to be understood as "gross revenue" in most instances, the use of the imprecise term "value" creates the potential for confusing gross revenues and net revenues.

- Page 4.8.2 paragraph 2: states that "Therefore, the variability in the estimates of ABCs across the 1,000 simulations is not captured by the "catch and bycatch model and is not reflected in the projections discussed in this section." This is an important limitation. The mean is a value that is unlikely to be realized in any actual outcome.

- Page 4.8.4 last paragraph states, "The use of the race for fish to allocate TACs and vessel limits among competing fishermen has resulted in excess processing capacity, which has increased both fixed and variable processing costs substantially." The harvester's race has not caused the processing capacity increase. Instead, processors compete with each other for processing shares, augmenting their production capacity to capture ever-larger shares of the landed catch.

- Page 4.8.5 paragraph 1 states, "Estimates of the final market value of BSAI and GOA seafood products are not available; however, it would be substantially greater than $1.2 billion, the projected 5-year mean of the product value of BSAI and GOA groundfish after primary processing with Alternative 1." This statement is an example of where the casual reader could be led to assume that $1.2 billion is an estimate of net revenue rather than an estimate of gross revenue, with net revenues being substantially smaller.

Section 4.9—Effects of the Alternatives on the Ecosystem

Review of the Groundfish SEIS Section 4.9- Effects of the Alternatives on the Ecosystem

<u>General comments</u>

This lengthy attempt to extrapolate the effects of the 6 alternatives (and their sub categories) contains a great deal of imaginative thinking along with a number of shortcomings. The section requires some serious editing and re-ordering. As it is written and organized, it is ineffective in helping one to grasp the overall impact of each of the various alternatives and quite difficult to use as a reference. Read in isolation, it is impossible to interpret. Nonetheless, the authors have made a valiant attempt to tackle an admittedly complex, and often ill-defined, topic.

The section is well set up by the Discussion in Section 3.9 (titled *Interactions among climate, commercial fishing, and ecosystem relationships in the North Pacific Ocean: a multispecies perspective*). The Discussion summarizes ecosystem changes in the GOA and BS/AI large marine ecosystems over the past 20-30 years, emphasizing the changes in community composition. As is often stated by authors here and in Section 4.9, the changes are generally believed to have been driven by differential recruitment success among species. Section 4.9 is rendered much more interpretable once Section 3.9 has been read. Moving this section to the front of the Ecosystem Impacts would enhance the interpretability of that section.

There is a lengthy section titled *Principles and Policies of Ecosystem-Based Management* preceding the discussion of the ecosystem impacts of the alternatives. In this section, management of North Pacific groundfish fisheries is evaluated with respect to the new performance standards for fishery management detailed in the recent National Resource Council publication *Sustaining Marine Fisheries*. Viewed in this light, fisheries management in the North Pacific is rightly is charaterized as among the most forward thinking, conservative management in the world.

The Ecosystem Impacts section is ordered such that each alternative is evaluated for its impact on three issues of the ecosystem:

1. predator-prey relationships
2. energy flow and redirection
3. diversity

Each of these issues is further broken down by effects. Thus predator-prey relationships are analyzed for the effects of the Alternatives on pelagic forage availability, spatial and temporal concentration of fishery impact on forage, removal of top predators, and introduction of nonnative species. Energy flow and redirection are analyzed for energy redirection (discards) and energy removal (catch). Diversity is analyzed for effects on species diversity, functional (trophic) diversity, and genetic diversity.

These particular issues are all worthy subjects of investigation. What is completely lacking however, is justification for choosing this particular set of issues and effects. The term Ecosystem encompasses all the other sections but is treated here as a catchall for subjects (species, processes, habitat, etc.) not individually analyzed. Putting the set of issues and effects analyzed in this section into context would help the reader understand why the Ecosystem section contains such a narrow set of issues.

The only mention made of modeling in this section is the work done with ECOSIM. It is quite impossible then to know how to interpret the scores given in Table 4.9-4 without an understanding of how the projections were made. Presumably some simulation modeling was done to generate the results upon which statements are made but no cross referencing (such as to Section 4.1) is made. It is unclear if results from ECOSIM modeling were used to score the Alternatives. On page 4.9-25, it is stated that different versions of ECOSIM result in different predictions about the direction of changes under various Alternatives. This is quite unsettling and needs to be very clearly explained.

Beyond the possible lack of model-based analyses, justification for the scoring in Table 4.9-4 is inadequate for several other reasons. There appears to be an excess of critical assumptions that essentially predetermine the scores. For example, one critical assumption is that more pollock is good. If an Alternative reduces pollock catch it receives a positive Ecosystem score. Another example is dispersion of catch by time and space. The ecosystem score is + if the Alternative disperses catch in time and space. These are both very complex issues that do not have such a simple ecosystem interpretation.

Given the lack of detail on modeling and the wealth of assumptions that go into scoring Table 4.9-4, one should question whether it would be preferable to drop these scores. An alternative might be to provide a verbal summary in each cell as to expected changes (including an Unknown answer).

The scoring system used to rate the impact of the Alternatives on Ecosystem issues was also used to score each Alternative relative to the eight NRC Ecosystem Management goals. Due to their more general nature, the scoring system works much more naturally for the NRC goals. For example, it is much easier to score an alternative for a goal such as Does Alternative X establish Marine Protected Areas than to answer the question. Does Alternative X result in increased species diversity? Table 4.9-6 (where the NRC goals are scored) would benefit by scoring Alternative 1 (status quo) rather than using 0 as the score. The other Alternatives could still be scored relative to Alternative 1. Scoring Alternative 1 would provide a modern assessment of whether North Pacific groundfish fisheries are being managed in an Ecosystem-aware context.

Editing/Reorganization suggestions

1. There are repeated passages on pages 4.9-11 and 4.9-12

2. The headings in Section 4.9.1.1 are inadequate. Each Evaluation section should contain the NRC recommendation that is being addressed

3. Tables 4.9-5 and 4.9-6 should be included in the NRC section (these tables score the alternatives relative to the eight NRC goals)
4. Section 4.9.2 should be reorganized The current structure of summarizing each Alternative under each Effect should be reversed so that each Effect is summarized under each Alternative. This would greatly enhance the utility of this section as a Reference.

Minor comments

Pg. 4.9-17 No inclusion of climate impacts on ecosystem structure. Surely this is one of the highest research priorities?

Pg. 4.9-19 It is almost impossible NOT to add the indices. If they are used they will be summarized. Verbal or other summary types should be considered.

Pg. 4.9-25 Why are temporal and spatially distributed removals necessarily better? For the ecosystem? Some species might be better off being harassed only in a few areas a few times a year as opposed to continually harassed, albeit with less effort.

Pg. 4.9-29 The paragraphs after the heading Alternative 6.1 discuss Alternative 5 impacts.

Pg. 4.9-30 – 2^{nd} paragraph. "e.g" is used when "i.e." should be used. This occurs several places in the document.

Pg. 4.9-31 decreased production of juveniles at high biomass levels

Pg. 4.9-36 Many times the comment is made that abundance changes are mostly driven by changes in recruitment that are related to environmental factors, but then they provide analysis under the assumption that fishing is the main force.