

North Pacific Fishery Management Council

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DRAFT REPORT
of the
SCIENTIFIC AND STATISTICAL COMMITTEE
to the
NORTH PACIFIC FISHERY MANAGEMENT COUNCIL
February 5-7, 2007

The Scientific and Statistical Committee met during February 5-7, 2007 at the Benson Hotel in Portland, OR. Members present were:

Pat Livingston, Chair
NOAA Fisheries—AFSC

Keith Criddle, Vice-Chair
University of Alaska Fairbanks

Bill Clark
International Pacific Halibut Commission

Sue Hills
University of Alaska Fairbanks

Anne Hollowed
NOAA Fisheries—AFSC

Gordon Kruse
University of Alaska Fairbanks

Seth Macinko
University of Rhode Island

Franz Mueter
SigmaPlus Consulting

Steve Parker
Oregon Department of Fish and Wildlife

Terry Quinn II
University of Alaska Fairbanks

Theresa Tsou
Washington Dept of Fish and Wildlife

Doug Woodby
Alaska Department of Fish and Game

Members absent:

George Hunt
University of Washington

Ken Pitcher
Alaska Department of Fish and Game

Election of Officers

Pat Livingston was elected to chair the SSC. Keith Criddle was elected as vice-chair. The SSC commends and thanks Gordon Kruse who has provided exceptional leadership during his two-year tenure as SSC chair.

B-8 Protected Species

Robyn Angliss (NMML) and Bridget Mansfield (NMFS AK Region) responded to the SSC request for additional information about the analytic methods used to devise the annual List of Fisheries (LOF). Bill Wilson (NPFMC), Kristin Mabry (NMFS AK Region), and Larry Cotter (SSLMC chair), reported on measures taken by the SSLMC to refine the proposal ranking tool (PRT) pursuant to recommendations of the SSC (October 2006). Bill Wilson also provided a report on recent changes to the FMP consultation schedule, the status review and extinction assessment of Cook Inlet belugas, and proposals under review by the Alaska Board of Fisheries (BOF) that would expand cod fisheries in state waters in the Alaska Peninsula and Aleutian Islands management region. Public testimony was not received on any of these topics.

List of Fisheries (LOF)

The SSC commented on the LOF several times before including in December 2006, and requested presentation of additional information on the process and the methods at this meeting. The SSC commends Robyn Angliss (NMML) for her excellent job of responding to the October 2006 SSC comments and questions about the 2005 LOF and looks forward to receiving the full description of the LOF analysis for Alaska fisheries (Perez 2006) that will be available shortly.

Timing of release of the annual LOF has often precluded SSC and Council review within the normal comment period. Renewing a request included in the Council's letter of February 28, 2005, our June 2006 minutes request that "... the Proposed Rule for LOF be scheduled in a way that allows for SSC review before the end of the comment period." Consequently, the SSC is pleased to learn that an effort will be made to ensure that the LOF analysis and publication will occur on or around June 1st so that the normal review period encompasses the Council's June meeting. If it is not possible to get the information to the Council in advance of the June meeting, the SSC requests that the NMFS review schedule be adjusted to allow SSC review and Council comment in October or during another regularly scheduled Council meeting.

In order to better understand the methods used to record, analyze, extrapolate and classify fisheries in Alaska, the SSC would like to schedule a review of Perez (2006) at the June 2007 meeting, when it is also anticipated that the next LOF will be brought to the Council.

Because the LOF determination is largely reliant on observer data, fisheries with infrequent observer coverage may remain assigned to LOF categories appropriate to the year in which they were last observed, but uncharacteristic of more recent year's performance. For fisheries not regularly observed under the groundfish, crab, or scallop observer programs, the AK marine mammal observer program has, contingent on funding, provided observer coverage in one or two fisheries in each two year period. As a result of the limited resources budgeted to the AK marine mammal observer program and the large number of unobserved fisheries, individual fisheries may be observed as infrequently as once every two to three decades. NMFS's response to comments in the final LOF for 2005 recognizes that fisheries evolve quickly and when recent data are available, they utilize data from the previous 5 years to classify the fisheries. However, if no recent data are available, NMFS policy is to use data from the most recent observation period; data that may be several decades old. This approach is logically inconsistent in two ways. First, by recognizing that fisheries evolve quickly and restricting classification data to the most recent 5 years, NMFS agrees that the older data used to classify other fisheries are not representative of recent performance. Second, NMFS argues that because older data are all that exist, they must be used. The SSC notes that, where estimates of marine mammal serious injuries and mortalities are not available for unobserved fisheries or fishery components, the LOF designation is listed as "unknown". The SSC encourages NMFS to carefully review the use of legacy data and to prioritize observer coverage to update those estimates, derive proxy estimators to use in lieu of observer coverage, or to classify those fisheries as "unknown".

The current scale of operation for the AK marine mammal observer program will always result in the problem of outdated observations that do not represent the current performance of a fishery. Essentially then, the observer program cannot be relied on as a meaningful basis for classifying all fisheries. Options to address this problem include: dedicating sufficient funds to provide robust observations for fisheries on a timely basis; redesigning the observation program to generate less precise estimates of injuries, but to cover more fisheries per unit time with current funding levels; or to reconsider the reliance on observer information in categorizing fisheries in the first place. A framework to incorporate other, more qualitative information in classifying a fishery could be investigated. An additional option could be to seek information from alternative observer programs that may be funded through competitive grants, state, or private funding. This option would require NMFS and the observer program to provide criteria for observations to be evaluated and utilized.

SSLMC Proposal Ranking Tool

On behalf of the SSLMC, Larry Cotter (SSLMC chair), thanked and commended the Council and NMFS staff (Bill Wilson, Kristin Mabry, Melanie Brown) who have supported development of the Proposal Ranking Tool (PRT); the SSC is similarly appreciative of the effort that staff have devoted to this project.

It is important to recognize that the PRT is a multi-criteria decision tool to be used to evaluate some aspects of proposals for changes to SSL protection measures in the GOA and BSAI groundfish fisheries. It is NOT an assessment of actual benefit or harm to SSL, distance from the jeopardy bar or quantifiable changes to critical habitat. It is one of the several tools that will be used to evaluate proposals to change regulations impacting SSL protection measures. Although the proposals can be scored with this tool, until the recovery plan and BiOp are released, the SSLMC will not know if NMFS Protected Resources Office agrees with the relative importance of the variables scored in the PRT.

In October 2006, the SSC asked the SSLMC to address several issues related to the structure and organization of the PRT. The report detailed those discussions well; and the SSC thanks the SSLMC for their attention to the SSC comments. For example, the SSC asked the committee to re-examine the issue of the structural adjust feature of the software: document where it should be used, and the effect of using it. The SSC appreciates the work and agrees that it is now being used correctly.

The SSC agrees that the PRT is ready to be used to score the proposals that have been submitted but notes that several areas of uncertainty remain and requests the SSLMC to continue documenting development, use and issues that arise as it is used. This analytic approach is new for the Council and although it is potentially a useful approach to explicitly represent decision criteria and qualitative judgments involving disparate elements, there is a need to assess how well the PRT functions in practice.

The SSC has a few questions and concerns. The report states that some issues will be considered “outside the model” such as safety, management benefits, demographic impacts, fishing rate changes, etc. Evaluating these other factors will be important in the overall ranking of individual proposals. Making the evaluation process and criteria as transparent as possible will aid in the judging process and also in future proposal development. **The SSC recommends that to the degree possible, the SSLMC specify the framework and evaluation process prior to actually ranking proposals.** That is, the SSC would like to see a list of these issues, some sense of their relative importance, and some information about how those issues will be weighted relative to the score from the PRT and whether the PRT will be used to prescreen proposals that will be subsequently judged according to these other criteria or whether the other criteria will be used to prescreen proposals that will then be ranked using the PRT. Although not requesting this as a change to the PRT now, the SSC notes that if all that work were done, those elements, including potential benefits, could possibly be added to the model, perhaps as higher level nodes and branches. The SSC concurs with the SSLMC’s view that the PRT is a living tool that can be revised and added to as needed.

The SSC cautions that the scores not be treated as absolute clear differences; the ranking score has no units associated with it. Evaluations of each proposal will result in an impact score, but not an indication of uncertainty to allow the scale of differences in impact score to be resolved. One potential mechanism to incorporate uncertainty in the ranking process would be to capture the uncertainty in weighting factors for variables where there was lack of consensus within the committee in determining the weight. Evaluating a given proposal under the range of weights for different variables would incorporate the uncertainty in variable weights and provide an overall indication of uncertainty associated with the impact of the proposal relative to aspects scored in the PRT (see e.g., Merritt and Criddle 1993). Alternatively, the robustness of model rankings could be explored using functions included in Expert Choice that indicate the magnitude of change that would be required to change model rank.

The PRT will rank the impacts of various proposals relative to “status quo”. The definition of status quo should be clarified in the current draft document. The regulatory environment to be used as status quo should be defined to prevent or allow a cumulative creep in impacts over time due to implementation of new regulations.

FMP consultation schedule

In December we heard that the date for receipt of the draft BiOp had been changed to early June. The State of Alaska then sent a letter requesting that the recovery plan be revised in response to public comment (including that from the SSC’s special August meeting) before the BiOp is drafted. The rationale was that many of the comments pertained to the recovery criteria, clearly an important part of the BiOp. If the BiOp is written with the old criteria, the SSC would just reiterate many of their previous comments. The reply from NMFS agrees, and cites other factors too that resulted in their decision to revisit the recovery plan, take the comments into account, and issue a draft revised recovery plan in May and that release of the draft BiOp will be delayed until late 2007.

Status Review of Cook Inlet Belugas

NMFS must decide whether or not to list the Cook Inlet belugas within 12 months of April 20, 2007, the date that a petition to list the Cook Inlet Beluga Distinct Population Segment as endangered under the ESA was received. The primary findings of the status review are: 1) that the range of the population has contracted; 2) that the population is not growing at 2-6% as it was predicted to do when hunting was prohibited; 3) that this is a Distinct Population Segment and if extirpated is unlikely to be repopulated; 4) that anadromous fish runs are very important to the Cook Inlet belugas; and 5) that Population Viability Analysis results suggest that the possibility that the Cook Inlet belugas will be extinct within 300 years cannot be dismissed if status quo is maintained in the factors that are affecting them.

BOF State Waters Cod Fisheries

The BOF is meeting this week to consider several groundfish proposals. Probably the most important in relation to Protected Resources are the ones that seek to increase cod harvests in state waters from 25% of the federal TAC to 50% of federal TAC. A letter about it from NMFS to the state was included in our notebooks. If the proposals go forward, and more cod is taken close to SSL CH with fewer regulatory protections in place than would be the case in federal waters fisheries, a new section 7 consultation could be triggered. How that would influence the changed schedules for the draft Recovery Plan and draft BiOp is unknown.

C-3 Seabird Interactions

The SSC received staff reports on seabird interactions from Bill Wilson (Council Staff), Kim Rivera (NMFS-AKR), Kristin Mabry (NMFS-AKR), Scott Miller (NMFS-AKR), and Greg Balogh (USFWS).

Kristin Mabry provided an overview of the Draft EA/RIR/IRFA to revise seabird avoidance regulations, including recent revisions to this proposed amendment based on information received since the December 2006 Council meeting. The amendment arose from evidence of a low level of occurrence of albatrosses and other seabird species of concern in inside waters of Alaska and from new research on the performance of seabird mitigation devices on 25-55 ft vessels. The amendment provides alternatives that would rescind some seabird deterrent measures in inside waters and enhance some measures in outside waters in the EEZ. Since the Council’s December 2006 meeting, an area associated with the entrance to Cross Sound was added as a third region of Southeast Alaska inside waters where seabird mitigation devices would be required. The Council is scheduled to take final action on this amendment at this meeting.

Greg Balogh (USFWS) presented a review of recent studies on movement patterns of three species of albatross. In general, tagged birds spent 2/3 of their time in the Alaskan EEZ during the relatively short period of time that tags were retained. Albatross exhibit extensive migrations between breeding grounds

in Japan and feeding grounds in Alaska. His study showed that all albatross are capable of traveling large distances with short-tailed albatross juveniles and black-footed albatross exhibiting average movements over 150 km per day. Short-tailed albatross was the only species for which tagged individuals made extensive use of the Bering Sea. A large flock of short-tailed albatross was observed in a region adjacent to Donut Hole. Black-footed albatross were shown to be generalists utilizing shelf, shelf-break and oceanic waters. Laysan's albatross appeared to be specialists occupying oceanic waters. Specific new information that led to the revision of management options included the movement of a short-tailed albatross tagged in 2006 into IPHC area 4E, waters of Southeast Alaska (NMFS area 659), Cross Sound, and in Canadian waters of Dixon Entrance.

The SSC reviewed and commented on a draft amendment in December 2006. The SSC compliments the analysts for addressing the SSC's previous comments in the revised document, which is ready for final action. The analysis concludes that none of the alternatives are expected to result in significant effects on seabird populations and that economic impacts are minimal. Vessels have already acquired the seabird avoidance gear and no significant effects have been observed. **The SSC concludes that Alternative 3a is more precautionary than either Alternative 2 or 3b. In response to SSC questions, USFWS representative Greg Balogh indicated that Council adoption of either Alternative 2 or Alternative 3b option 3 would probably trigger a formal Section 7 consultation.**

Members of the SSC were informed that the AP selected Alternative 3a including the sub-option to draw a line at 56.17.25 N for the Chatham Strait region and the sub-option to revise the boundary between inside and outside waters in the Cross Sound area. **The SSC agrees that the revision to the boundary between inside and outside waters in the Cross Sound area is a more reasonable boundary line than the boundary associated with the ADF&G groundfish statistical area.** The partition is consistent with topographic or bathymetric demarcations between oceanic waters and Icy Strait and the expected flow patterns within the region. **However, the rationale for adoption of the proposed sub-option in the Chatham Strait area is not as well motivated.** The observation of black-footed albatross within the Chatham Strait region, and the absence of topographic or bathymetric demarcations to partition the region as suggested by the AP, suggests that black-footed albatross could occur throughout area 345603. It was noted that black-footed albatross are not currently listed under ESA and thus, might be more robust to fishing impacts. However, the SSC was informed that the USFWS has listed black-footed albatross as a species of concern and a petition was received to list black-footed albatross under the ESA.

The SSC considers the provisions for weather safety to be reasonable and not likely to be less precautionary for black-footed albatross, given the anecdotal information that seabird bycatch is reduced during high winds.

C-4 Charter Halibut Management

Nicole Kimball and Darrell Brannan (NPFMC) provided an overview of the draft EA/RIR for a halibut charter moratorium. Jane DiCosimo (NPFMC) and Jonathon King (Northern Econ) described the work plan for analysis of measures to limit IPHC Area 2C charter halibut harvests. Public testimony was provided by Bruce Leaman (IPHC) and Bob Alverson (Fishing Vessel Owner's Association).

Moratorium Limited Entry Analysis

The SSC recommends against releasing the draft EA/RIR/IRFA for public review. The draft analysis does a fine job of providing an overview of the fishery and the circumstances that have motivated the development of an analysis. It also provides a thorough description of the manifold dimensions of the various options within Alternative 2. However, the analysis needs a better characterization of costs and benefits under the alternatives. Much of the boilerplate of this analysis builds on the framework used in the 2001 Charter GHF analysis and in the 2001 Charter IFQ analysis; greater attention to previous might prove useful for the present analysis.

The appropriate bases for comparing the economic benefits of the status quo alternative and the various combinations of options under the action alternative are the sum of producer¹ and consumer² surplus across both sectors and the distribution of benefits among producers and consumers in both sectors. (See e.g., Easley 1992³, Edwards 1991 and 1995⁴, Criddle 2004a, b, and 2006⁵.) While the total surplus value will be maximized when the marginal net surplus is equated between the two sectors, this analysis is not about the determination of an optimal allocation, but is instead a comparison of benefits under two alternatives. The two alternatives can be compared by answering the question: Are the total net benefits to anglers, charter operators, commercial fishermen, and consumers greater under alternative 1 or alternative 2? While answering this question is not a trivial undertaking, it is considerably easier than determining if the net benefits would be increased or decreased by changing the allocation between the two sectors.

Because the number of halibut charters is large, barriers to entry have been low, and the services offered by halibut charters are not strongly differentiated, halibut charters can be assumed to behave as “perfect competitors” or as weakly differentiated “monopolistic competitors”. Perfect competitors and monopolistic competitors may earn positive levels of producer surplus in the short run, but in the long run, they can be expected to earn zero producer surplus—that is, they can be expected to earn just enough revenue to cover their operating costs and the opportunity costs of their capital investments and labor. Consequently, the principal source of net economic benefits from halibut charters is angler surplus—the difference between the benefits that anglers derive from sport fishing for halibut onboard charter boats and the costs that they incur. In contrast, because the number of commercial harvesters is relatively low and particularly because they hold individual harvest quotas, commercial fishermen can be expected to earn modest levels of producer surplus in the short run and in the long run; although their net revenues may be higher, the expected value of future net revenues is folded into the asset value of their IFQ and thus they face relatively high opportunity costs of their capital. Once again, consumer surplus is a substantial component of the net economic benefits of commercial fishing. (These concepts are represented in an appendix to the February 2002 SSC minutes and more fully represented in Criddle (2004b) and most fully in Criddle (2006). Of particular importance to this analysis is that the distribution of benefits varies as a function of the combination of regulatory structures present in the charter and commercial fisheries.)

While regional economic benefits under the status quo and various configurations of the action alternative will differ, changes in regional expenditures generally do not lead to changes in net national benefits. Moreover, increases (decreases) in regional expenditures and employment associated with halibut charter spending will be offset by decreases (increases) in regional expenditures and employment associated with commercial fishing.

¹ Producer surplus is the difference revenues and costs (including opportunity costs). For the commercial fishery, producer surplus is exvessel revenue less operating costs and the opportunity costs of capital investments (boat and IFQ) and the owner’s labor. Similarly for charters, producer surplus is the difference between revenues earned from clients and operating and opportunity costs.

² Consumer surplus is the difference between willingness to pay and the costs actually incurred (including opportunity costs). Exvessel demand is derived from consumption demand, so for the commercial fishery, consumer surplus can be reasonably approximated as the integral between the exvessel demand curve and the exvessel price. Similarly, for halibut charters, consumer surplus (aka angler surplus) can be motivated as the integral between the anglers demand for halibut catches as an attribute of a sportfishing trip and the price paid for that trip.

³ Easley JE Jr. 1992. Selected issues in modeling allocation of fishery harvests. *Marine Resource Economics* 7(2): 41-56.

⁴ Edwards SF. 1991.. Critique of three economics arguments commonly used to influence fishery allocations. *North American Journal of Fisheries Management* 11: 121-130.

Edwards SF. 1995.. Economics guide to allocation of fish stocks between commercial and recreational fisheries. NOAA-Tech-Rept-NMFS-94.

⁵ Criddle KR. 2004a. Economic principles of sustainable multi-use fisheries management, with a case history economic model for Pacific halibut. Pages 143-171 in DD MacDonald and EE Knudson (editors), *Sustainable Management of North American Fisheries*, American Fisheries Society. Bethesda, MD.

Criddle KR. 2004b. Property rights and the management of multiple use fisheries. Pages 85-110 in DR Leal (editor), *Evolving Property Rights in Marine Fisheries*. Rowman & Littlefield Publishers, Lanham, MD.

Criddle KR. 2006. Disparate rules for allocating common resources. Working paper.

To be suitable for public review, **this draft EA/RIR/IRFA needs to characterize the changes in consumer and producer surplus in total and within each sector under the status quo and action alternatives.** Exvessel demand elasticities are available from Herrmann and Criddle (2006)⁶ and other studies cited therein. Estimates of the elasticity of demand, cross price elasticity of demand, and income elasticity of demand for halibut charter trips is available in Criddle et al. (2003)⁷. In addition, **the draft analysis needs to characterize the gross-scale changes in the patterns of regional expenditures and employment.**

In addition to these critical issues, other important issues that should be addressed in the next draft include:

- The problem statement (p. 3) is somewhat confusing: ““To address the potential against the rush of new entrants into the charter fishery, the Council is considering establishing a moratorium on the charter sector..” It appears that there is concern for two problems, continued growth in the number of charter operators and continued growth in charter harvests. These are not the same and the analysis should carefully distinguish between them when assessing the probable outcomes of the various options and alternatives.
- A representation of the geographic distribution and magnitude of capacity that would arise under the alternative moratorium configurations. This could be developed similar to the CQE section. If the numbers are overwhelming in a table format, the analysts should consider representing them using a GIS map with shading used to represent the number (density) of halibut charter homeports, owner’s places of residence, client origins, etc.
- A dynamic characterization of the status quo that reflects the fact that the GHL has not functioned as a binding constraint on halibut charter catches and there is little reason to anticipate that it will represent a binding constraint, so the status quo alternative can be expected to be characterized by continued erosion of commercial catches.
- Table 2 should include information on the variance or coefficient of variation on the number of trips per charter vessel as a means of better representing the extent of heterogeneity within the charter sector.
- There is a rich literature regarding the values generated by recreational activities such as sportfishing. The section beginning in the last paragraph of page 11 needs to be rewritten to reference that literature. Note also that the halibut charter trip demand model reported in Criddle et al (2003) and the survey results reported in Herrmann et al. (2001)⁸, ISER (1999)⁹, and Jones and Stokes (1991, 1995)¹⁰ provide empirical information about the motivations of resident and nonresident halibut anglers.
- The current draft analysis incorrectly states that auctions are not a permissible allocation mechanism. The SSC notes that H.R. 5946—18 states:
(d) AUCTION AND OTHER PROGRAMS.—In establishing a limited access privilege program, a Council shall consider, and may provide, if appropriate, an auction system or other program to collect royalties for the initial, or any subsequent, distribution of allocations in a limited access privilege program if—(1) the system or program is administered in such a way that the resulting distribution of limited access privilege shares meets the program requirements of this section; and (2) revenues generated

⁶ Herrmann M and KR Criddle. 2006. An econometric market model for the Pacific halibut fishery. *Marine Resource Economics*. 21:129-158.

⁷ Criddle KR, M Herrmann, ST Lee and C Hamel. 2003. Participation decisions, angler welfare, and the regional economic impact of sportfishing. *Marine Resource Economics* 18:291-312.

⁸ Herrmann M, ST Lee, KR Criddle and C Hamel. 2001. A survey of participants in the Lower and Central Cook Inlet halibut and salmon sport fisheries. *Alaska Fishery Research Bulletin* 8: 107-117.

⁹ Institute for Social and Economic Research (ISER). 1999. Economics of sport fishing in Alaska. Prepared for Alaska Department of Fish and Game. Anchorage, AK.

¹⁰ Jones & Stokes Associates, Inc. 1987. Southcentral Alaska sport fishing economic study. Prepared for Alaska Department of Fish and Game, Sport Fish Division. Sacramento, California.

Jones & Stokes Associates, Inc.. 1991. Southeast Alaska sport fishing economic study. Prepared for Alaska Department of Fish and Game, Sport Fish Division. Sacramento, California.

through such a royalty program are deposited in the Limited Access System Administration Fund established by section 305(h)(5)(B) and available subject to annual appropriations.

- Page 33—paragraph 2: It should be noted that Wilen (2006) assumes that the halibut charter fishery operates as a monopolistically competitive market. This assumption does not hold if the market is perfectly competitive.
- It is anticipated that Table 27 will be completely revised to provide quantitative estimates (or quantitatively-based qualitative estimates) of the impacts under Alternative 1 and a representative sample of configurations of alternative 2. This table should also reflect changes in the capital value of IFQ shares. Costs to self-guided anglers and subsistence harvesters should also be represented in the table.

Additional questions that need to be answered by the analysis are:

- Will the moratorium be effective at limiting capacity?
- Can the moratorium serve as a stable basis for the development of a more comprehensive LAP?
- Is the moratorium a necessary or advantageous intermediate step in the development of a more comprehensive LAP?
- Are there unique requirements in the MSFCMA that would govern the creation of a moratorium or the evolution of a moratorium towards a more comprehensive LAP?

Work Plan for Revised GHL Analysis

In reference to an analysis on a proposed charter GHL or moratorium for areas 2C and 3A, the SSC minutes (December 1999) remark:

The EA/RIR/IRFA makes a generally persuasive case that most of the management measures under consideration for implementing the GHL will not be effective in constraining and reducing sport halibut harvest. The possible exception is a reduction in the daily bag limit of halibut from 2 fish to 1.

In February 2005, our minutes noted:

... the approach the Council has adopted to management of the charter-based sport fishery for halibut presents a clear example of the types of problems that can emerge when there are substantial temporal delays between prosecution of the fishery, generation of data on the magnitude of removals, and tweaking of management measures intended to influence the magnitude of future removals. This type of problem is commonly known as a delayed feedback loop. Delayed feedback loops exhibit cyclic overshoot and undershoot around the intended target, but control rules can be designed to dampen the oscillation if the system is stationary and deterministic. If the system includes a random element, or a trend or other nonstationarity, management actions will tend to exacerbate cyclic overshoot and undershoot. The upshot of this is that **it is unlikely that catches in the charter-based halibut sport fishery can be constrained to intended targets when there is a 1-2 year delay between prosecution of the fishery and generation of data regarding the magnitude of removals and another 1-2 year delay between when the data are available and management measures are selected and implemented.** One solution to the delayed feedback problem is to shorten the delays. In the case of management of the charter-based halibut sport fishery, this would involve development of indices of removals that can be used to estimate catches as the season progresses coupled with the adoption of management measures that could be automatically triggered if removals were projected to exceed the GHL.

Finally, the SSC observes that **the inexorable consequence of a GHL that is non-binding within a season, coupled with management instruments for limiting catches by the charter-based halibut sport fishery that are potentially ineffectual, is that the Council should anticipate an ongoing *de facto* reallocation of catches from the commercial fishery to the charter-based sport fishery for halibut.** If the charter-based sport fishery were subject to binding limits under an IFQ program, the reallocation between commercial and charter-based fisheries would take place through voluntary transactions in a market. In the absence of tradable harvest shares, the Council will, consciously or unconsciously, serve as the arbitrator between the commercial and charter industries with actions taken to benefit one sector resulting in uncompensated costs to the other sector. Within such a political market, each sector is left with an individually rational but collectively irrational incentive to squander potential benefits of increased shares in an endeavor to influence the Council's active or passive decisions.

The proposed work plan for analysis of measures to limit IPHC Area 2C charter halibut harvests is familiar. **The proposed work plan mirrors the work plan adopted for the 2001 GHL analysis.** The management measures to be considered correspond with those considered in the 2001 GHL analysis. The SSC recommended against release of three drafts (February 1997, April 1997, and September 1997) of the 2001 GHL EA/RIR/IRFA. Nevertheless and despite the residual discomfort voiced in our December 1999 review of the draft analysis, **the 2001 GHL analysis would serve as an excellent template for development of a new analysis.** Additional years of observations, and experience with the outcomes of applying some of the proposed management measures should help improve the strength of conjectures about their likely efficacy. The SSC offers the following observations and cautions:

- The only appropriate basis for comparing the economic benefits of commercial fishing and charter-based sport fishing is a comparison of marginal changes in producer surplus and consumer surplus in each sector. (See e.g., Easley 1992¹¹, Edwards 1991 and 1995¹², Criddle 2004a,b, and 2006¹³.)
- Although the estimates reported in Herrmann et al. (2001)¹⁴ and Criddle et al. (2003)¹⁵ are a decade old, they are the most current available estimates of the demand for halibut and salmon charter trips in lower Cook Inlet. While the demand for trips has increased considerably since 1997, it is unlikely that current value of resident and nonresident own-price elasticity of demand, cross-price price elasticity of demand, or income elasticity of demand differ markedly from the estimates reported in Criddle et al. (2003). Because it is likely that there are regional differences in the elasticity of demand, it would be prudent to use information reported in ISER (1999)¹⁶ and Jones and Stokes (1991, 1995)¹⁷ to

¹¹ Easley JE Jr. 1992. Selected issues in modeling allocation of fishery harvests. *Marine Resource Economics* 7(2): 41-56.

¹² Edwards SF. 1991.. Critique of three economics arguments commonly used to influence fishery allocations. *North American Journal of Fisheries Management* 11: 121-130

Edwards SF. 1995.. Economics guide to allocation of fish stocks between commercial and recreational fisheries. NOAA-Tech-Rept-NMFS-94.

¹³ Criddle KR. 2004a. Economic principles of sustainable multi-use fisheries management, with a case history economic model for Pacific halibut. Pages 143-171 in DD MacDonald and EE Knudson (editors), *Sustainable Management of North American Fisheries*, American Fisheries Society. Bethesda, MD

Criddle KR. 2004b. Property rights and the management of multiple use fisheries. Pages 85-110 in DR Leal (editor), *Evolving Property Rights in Marine Fisheries*. Rowman & Littlefield Publishers, Lanham, MD.

Criddle KR. 2006. Disparate rules for allocating common resources. Working paper.

¹⁴ Herrmann M, ST Lee, KR Criddle and C Hamel. 2001. A survey of participants in the Lower and Central Cook Inlet halibut and salmon sport fisheries. *Alaska Fishery Research Bulletin* 8: 107-117.

¹⁵ Criddle KR, M Herrmann, ST Lee and C Hamel. 2003. Participation decisions, angler welfare, and the regional economic impact of sportfishing. *Marine Resource Economics* 18:291-312.

¹⁶ Institute for Social and Economic Research (ISER). 1999. Economics of sport fishing in Alaska. Prepared for Alaska Department of Fish and Game. Anchorage, AK.

¹⁷ Jones & Stokes Associates, Inc. 1987. Southcentral Alaska sport fishing economic study. Prepared for Alaska Department of Fish and Game, Sport Fish Division. Sacramento, California.

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qualify the results of applying the elasticity estimates from Criddle et al. (2003) to halibut charters in Area 2C. Alternatively, it may be advantageous to structure a simple contingent behavior survey (see e.g., Layman et al. 1996)¹⁸ of a representative sample of 2006 southeast Alaska cruise ship passengers. Respondents could be asked “Did you take a halibut charter trip in 2006?” Affirmative respondents could be asked “Would you have taken the trip if the daily bag limit had been 1 fish?” Negative respondents could be asked the open ended question “If you had not taken a halibut charter, what would you have done instead?”

- Several authors have published estimates of exvessel demand elasticity for commercial harvests; the most recent study, Herrmann and Criddle (2006)¹⁹ includes a thorough discussion of the strengths and limitations of previous studies.
- **Careful consideration should be given to the effect that the proposed measures will have on halibut mortality and bycatch mortality rather than simply retained catch of halibut.**
- There is little point in assessing the impact of management measures that are deemed unenforceable (see e.g., Sutinen 1993)²⁰.
- Given that there seems to be some reluctance to pursue the management measures that are most likely to be effective (reduced bag limit, or annual bag limit), **it may be useful to suggest a few additional alternatives to the Council.** For example, one alternative would be to issue tags as is frequently done in hunts for which recreation demand exceeds sustainable yields, tags could be issued on a first-come-first serve basis, via lottery, or via primary or secondary auction, and could be subdivided into resident, non-resident and charter pools. Mandating the use of artificial lures and prohibiting the use of attractants would almost certainly reduce CPUE and thereby reduce catch per trips and the demand for trips.

While the draft work plan is intended to explore possible management measures for Area 2C, **the SSC urges that serious consideration be given to extending the analysis to Area 3A.** It is likely that some non-resident anglers whose primary trip purpose is to catch halibut may substitute trips to Area 3A for trips in Area 2C if management measures implement in Area 2C are perceived as being more restrictive than measures in force in Area 3A. Moreover, even if this substitution effect is minor, there is a clear pattern of increasing halibut charter catches in Area 3A and every reason to anticipate that the GHF will be exceeded by ever larger margins for the foreseeable future.

C-6(b) Cod Genetics

Jane DiCosimo (NPFMC) summarized the findings reported in two reports on cod stock structure. Public testimony was provided by Thorn Smith (North Pacific Longline Association).

A progress report on genetic studies by Hauser and Canino showed large differences between samples from Asia (Japan and Korea) and Alaska. The westernmost Alaska samples came from the central Aleutians, and the data suggested a zone of contact between Alaskan and Asian stocks somewhere to westward, raising the possibility that cod in the western Aleutians are of Asian origin, or mixed with Asian fish. The report by Ormseth, Connors, and Neidetcher compared biological data on cod from the eastern Bering Sea and from the Aleutian Islands. Aleutian Island fish are somewhat larger at a given age than Bering Sea fish and have a different diet. The relative frequency of fish smaller than 70 cm decreases steadily to the westward along the Aleutian chain, suggesting that Aleutian recruits come from the east or the west or both. But surprisingly, few tags released in the Bering Sea have been recovered in the Aleutians.

¹⁸ Layman RC, JR Boyce and KR Criddle. 1996. Economic valuation of the chinook salmon sport fishery of the Gulkana River, Alaska under current and alternate management plans. *Land Economics* 72: 113-128.

¹⁹ Herrmann M and KR Criddle. 2006. An econometric market model for the Pacific halibut fishery. *Marine Resource Economics*. 21:129-158.

²⁰ Sutinen, JG. 1993. Recreational and commercial fisheries allocation with costly enforcement. *American Journal of Agricultural Economics* 75: 1183-1187.

The differences between cod in the western Aleutians and cod in the rest of Alaska suggest a possible stock boundary within the Aleutians rather than between the Aleutians and the eastern Bering Sea. This would be consistent with the oceanography of the region. **We recommend that genetic samples from the western Aleutians be collected to determine the kinship of those fish,** and that Alexei Orlov be contacted about recent genetic work on cod in Russian waters. We also encourage further study of differences in biological features among the eastern, central, and western Aleutians, taking account of environmental and fishery influences in each region. While stock structure between the eastern Bering Sea and the Aleutians remains unresolved, future stock assessments should account for observed differences in size-at-age between regions.

C-8 VMS Requirements

Ben Muse (NMFS AK Region) provided a presentation in the preliminary initial review draft of an EA/RIR/IRFA for extending the existing Vessel Monitoring System (VMS) requirement to all vessels that have a federal fishing permit (FFP) or that have IFQ or CDQ halibut or sablefish aboard, possibly with exemptions for certain vessel classes or activities. The analysis lists some general benefits of the expanded requirement and presents detailed calculations of compliance costs relative to revenues for various kinds of vessels. For many vessels the compliance costs are large relative to revenues. Public testimony was provided by Carter Hughes (Alaska Trollers Association) and Dan Hull (Cordova District Fishermen United).

The analysis addresses the concerns noted by the SSC in its October 2006 minutes. The reported costs relative to revenues are informative. We think the plotted distributions would be more useful if the scale were reduced so that a viewer could see what proportion falls below 5% or 10% or 50%. At present that information is obscured by scaling all the ratios to the maximum.

It is clear that extending the VMS requirement to small operators will be burdensome. For that reason we think it is important to clearly identify the benefits of the requirement, or the compelling need for it, in the case of all affected vessel types.

D-1(a) Dark Rockfish Management

Diana Stram (NPFMC) presented an initial review draft EA/RIR/IRFA for removing dark rockfish from the fishery management plans for the GOA and BSAI. There was no public comment.

The history of this proposed action stems from official recognition of dark rockfish as a distinct species from dusky rockfish in 2004. The Council initiated the EA in 2005 and a preliminary draft of this document came before the SSC in April 2006. The SSC made a number of comments in the minutes at that time requesting additional analyses and improvements to the document. These requests were largely addressed in the revised draft, at least to the extent that existing data would allow.

One of the SSC's concerns as identified in the April 2006 minutes was the extent to which dark rockfish is truly a nearshore species given the relatively high catches in the 2005 NMFS trawl survey in offshore waters near the Shumagin Islands. This uncertainty still exists. Available data in the new report, including Figures 3-5a through 3-5e for the GOA and Figure 3-10 for the BSAI (based on the trawl survey) do not support a mostly nearshore distribution in that virtually all of the high survey catches occurred offshore of state waters, suggesting that if dark rockfish are in fact a nearshore species, then the trawl survey data alone do not provide a representative assessment. It should be kept in mind that the majority of NMFS survey stations are offshore. In fact, dark rockfish were rarely encountered in the survey, and the high catches shown in the figures were virtually all from single tows. The same is true of black rockfish, which we do know to be an inshore species.

The draft report repeatedly refers to stock assessment efforts that the State of Alaska might undertake if ADF&G assumes management. While it is expected that catch accounting for dark rockfish will receive the same high level of attention as existing state fisheries, it is questionable as to whether the state will have adequate funding to implement a stock assessment program for this species. Thus, moving dark rockfish management to the state may not be more precautionary than the status quo.

The SSC recommends release of the initial draft for public review provided that various corrections and enhancements to the document are made, including the following:

- Page 7, Figure 3-2. Figure caption should refer to dark portion and white (not gray) portion.
- Page 11, Table 2. Add a companion table with CVs.
- Page 12, Table 3. This table should include values for years 1996 and 1999 when the species were separated in the catch accounting.
- Page 15-22, Figures 3-6 through 3-8. For these figures, it is difficult to distinguish small positive catches from zero catches. Perhaps the figures could be increased in size (similar to Figure 3-5) or the symbols could be enhanced for positive catches.
- Page 23, Figure 3-9. Changing the x-axis from bins of unequal width to a linear x-axis would more clearly show the rarity of high biomass hauls.
- Pages 23-24, Tables 4 to 6. These tables would be more informative if they included the percent of hauls. Also, average depth provides only minimal information, and does not show great separation between Dark and Dusky rockfish in these tables. It may be more illustrative to plot frequency histograms of 1) all survey to depths, 2) depths at which a) dark, b) dusky, and c) black rockfish are caught.
- Page 25, Table 8. Column width should be increased to enhance readability.
- Page 25, Tables 9 and 10. Delete the entry under the 1997-2006 column for dusky rockfish (currently 0 / 0%), because the dusky rockfish category is not applicable to this time period.
- Page 29, Figure 3-12. The legend, y-axis, and title are inconsistent. Please clarify whether bars represent percentages by weight, frequency of occurrence (percentage of tows with positive catches), or something else.
- Pages 34-39, and 68. Table numbers need correction.
- Page 43, Figures 3-13 and 3-14. Clarify that this figure only shows Kodiak and Chignik areas, and not other regions of the state. Also identify what is indicated by the numbers adjacent to the vertical bars.
- Page 44. Add a brief statement on the history and status of the fishery in Southeast Alaska.
- Page 54. Clarify how risk of overfishing dark rockfish in local areas would be reduced by the action. Clarify how state bycatch management would differ from the current situation of federal management of incidental catch and MRAs invocation in the PSR fishery, including how bycatch will be determined for unobserved boats. Clarify levels of observer coverage (perhaps in section 3.2 and refer to Table 18) and how species composition is determined for unobserved boats.

D-1(b) Review of CIE Rockfish Report

Paul Spencer (AFSC) summarized the findings of a CIE review of the rockfish harvest strategies and stock assessment methods. He also summarized the response to the review by the Rockfish Working Group (RWG). Public testimony was provided by Tory O'Connell (Alaska Marine Conservation Council) and Jon Warrenchuk (Oceana).

The CIE review (actually 3 independent reviews) was broad in scope and included significant suggestions that apply to the entire groundfish stock assessment program. **On the whole, the review provides a strong endorsement of the current rockfish stock assessment approach.** Many of the specific

recommendations that could be addressed immediately were incorporated by rockfish stock assessment authors in the 2006 assessments. At least two recommendations dealt with long-standing questions and were the focus of the RWG response:

- 1) accounting for potential bias of extrapolating biomass from trawl surveys to include areas with untrawlable grounds, and
- 2) re-evaluation of estimates of M .

The SSC strongly commends the RWG for its thoughtful and thorough response to the CIE review. The SSC recognizes that the CIE review process largely falls outside of the purview of the Council; however, there are specific issues pertaining to stock assessments and harvest strategies that the SSC feels are deserving of comments.

Overall, the SSC understands that the CIE review was undertaken in response to the 2002 report by Goodman et al. that suggested that the $F_{40\%}$ harvest strategy may not be sufficiently conservative for some Alaskan rockfish stocks. In contrast, the CIE review concluded that the harvest strategies were possibly overly conservative. In particular, the CIE review objected to the concept of the “author’s recommended ABC”, suggesting instead that the buffer between F_{ABC} and F_{OFL} should be set based on objective measures of uncertainty in the assessments. **The SSC conveys its support for the current process of having the stock assessment scientists make the ABC recommendations**, noting that the scientists are in the best position to judge the limitations of the assessments, which cannot always be quantified.

One of the CIE reviewers (Dr. Cordue) noted that in the absence of detailed information on fine-scale stock structure the current spatial scale of management is appropriate. This is an area of continuing concern for the SSC, in that small-scale stock structure may predispose fished stocks to local depletion. **We suggest that it would be appropriate to conduct a management strategy evaluation focused on evaluating whether the current harvest strategies are robust with respect to potential fine-scale stock structure.**

The RWG response identified specific actions that the AFSC will undertake to validate and update the values of natural mortality now in use, as well as new modeling approaches and a series of field efforts to be undertaken to resolve issues of potential bias in biomass estimates due to the presence of untrawlable grounds. This will be a substantial effort and the SSC strongly supports this work.

In regard to the estimation of M , the SSC notes there will continue to be significant difficulties with accurate estimation of M and that it may be worthwhile to first investigate the sensitivity of ABC estimates to errors in the estimates of M . Also, we note that it is best to err on the conservative side in these estimates.

In regard to the effect of untrawlable grounds on biomass estimates, the SSC recommends that research continue on species-specific distribution patterns of rockfish in untrawlable areas relative to trawlable areas and on the spatial distribution and extent of untrawlable areas in the Gulf of Alaska. In particular, we support the efforts to evaluate and model effects of changing biomass on catchability (q). For example, stock assessment authors could estimate the functional response of q to changes in biomass within the stock assessment model (with a clear rationale for the form of the functional response).

D-1(c) GOA Arrowtooth MRA

Andy Smoker (NMFS, Alaska Region) provided an oral report and slides in response to a proposed change to the maximum retainable allowance (MRA) for the arrowtooth target fishery in the GOA. Mr. Smoker described recent trends in arrowtooth flounder catch and value, noting that the value is increasing and that discard rates in the target fishery are declining. Julie Bonney (Groundfish Databank) provided public testimony. The SSC appreciates receiving the informational report from Mr. Smoker and

recognizes that the trends reported may have important implications given the significance of arrowtooth flounder in the GOA ecosystem.

D-2(a) BSAI Crab Overfishing Definitions

The SSC reviewed the Environmental Assessment for Amendment 24 to the King and Tanner Crab FMP to amend overfishing definitions. The staff presentation was coordinated by Diana Stram (NPFMC), with technical presentations from Crab Workgroup members, Shareef Siddeek (ADF&G), Jie Zheng (ADF&G), and Jack Turnock (AFSC). Public testimony was provided by Jack Tagart (Bering Sea Research Foundation), Steve Minor (Mayor, St. Paul), and Arni Thompson (Alaska Crab Coalition).

The development process for this amendment dates back to at least 1998, when the first overfishing Amendment 7 was established with a clear understanding that it should eventually be modernized and frameworked. Serious work on the amendment package commenced in 2003 with establishment of a workgroup made up of 2 ADF&G and 2 NMFS scientists. Their hard work is coming to fruition with the production of this draft EA, which shows that substantial progress has been made since the last time the SSC visited this issue in October 2006. Milestones include the text of the EA, a well-written problem statement, refinement of the tiers comprising the overfishing definitions, assignment of species to tier levels, defining a new measure of “currency” for reproductive potential, fleshing out the parameters in the tiers, comprehensive simulations evaluating the alternates, and informative analyses for choosing between the alternatives.

Results from the simulation analyses show some major differences from previous SAFEs in determining OFLs, particularly for EBS snow crab. Results show that use of the current OFL often leads to population decline or even depletion, highlighting that timely consideration of this amendment (in the next year) is certainly warranted.

The SSC recommends that this EA does not go out for public review at this time. Rather, the document should be revised according to comments provided below and then reviewed at the June 2007 meeting for release to the public. Delaying until June allows for the Crab Plan Team to review the document at its May meeting. Because of the complexity of the overfishing issue, the SSC believes that the document must be clear in its presentation so that the public understands the alternatives being proposed, along with their limitations and advantages. The recommendations by the SSC concern mainly organization, clarification, and rationale, not analytical flaws. Nevertheless, until these clarifications are made, the SSC is unable to validate that the analyses constitute best scientific information available.

The SSC recommends the following changes to the EA:

1. The document should be thoroughly reorganized around the Tier system changes. Currently the document presents the alternatives by species and area groups, which is very confusing.
2. The document should clarify that the use of “mature male biomass” as the measure of biomass is a frameworked measure. If and when a better measure becomes available, such as effective female spawning biomass, the change should be possible without amending the FMP.
3. Similarly, the document should clarify that the values for natural mortality M and limit parameter γ in Tier 4 are frameworked values and can be changed in SAFE documents and other Council actions without amending the FMP.
4. The EA contains a new tier 6 for those species with so little information that it is not possible to determine an OFL. These species are rarely harvested, occur infrequently in surveys, and have rarely been studied. The problem is that species within an FMP are required to have an objective determination of OFL. The workgroup should consult within NOAA to see if this would be a permissible tier level according to regulations. In addition, the workgroup should consider some alternatives: (1) pooling groups of similar species and areas into a complex for which an OFL can

- be determined, (2) removing these species from the FMP, or (3) continue the status quo values from Alternative 1 for these species.
5. The fitted Beverton-Holt stock-recruitment relationships represented in Figure 7-4 appear to be biased and should be reevaluated. In addition, the statistical properties of the estimated stock-recruit relationships (coefficient and serial correlation coefficient estimates, standard errors, F statistics, etc) should be reported for all eight relationships represented in Figure 7-4, all six relationships in Figure 4-8, and both relationships in Figure 8-5.
 6. One major difference between Alternative 1 and Alternatives 2 and 3 is that mature male biomass is used instead of total mature biomass. The EA should provide extensive comparisons in time series, projections, and assessment results between these two sets of alternatives, so that the change in “currency” can be fully understood. Does the change in currency alter our perception of the status determination criteria and whether they have been breached in the past? If big differences in OFL are found, how much is due to the change in currency and how much is due to a change in the biological reference point?
 7. There was a tentative recommendation to restrict γ in Tier 4 to 1 – 1.5 for red and blue king crabs, 1 – 2 for Tanner crabs, and 2 – 4 for golden king crabs. The rationale given was that these ranges would be conservative, which would seem a consideration more appropriate for an ABC than an OFL. The authors need to give a more compelling justification, or else they should simply return to the range indicated from the analytical results.
 8. The authors need to provide further explanation for the restrictions on the values of α and β in the simulations. Simulation results suggested that higher values might provide even better performance statistics, but they were not used. Analysts should consider inclusion of the CV on catch as an index of expected fluctuations in catch.
 9. Further explanation of how Alternative 3 is a viable alternative should be given. It seems unwieldy that the SSC and Council would approve a procedure to determine OFL in June but have the actual calculations done by NMFS and ADFG, NMFS overfishing determinations done and then implemented by the state of Alaska prior to seeing the results of its implementation at the October meeting.
 10. The CIE review suggested utilizing some biomass indicator that is proportional to total fertilized egg production, and suggested mature male biomass as an interim proxy. Because the choice of spawning biomass currency is the key metric for population status determination, a solid justification for this relationship incorporating theory and supporting experimental data should be supplied in the analysis. In addition, the form and slope of the relationship between mature male biomass and total fertilized egg production would be expected to vary among species and potentially vary based on other biological or environmental factors. These assumptions and the sensitivity of assessment models to these assumptions should be documented and explored in the document.
 11. The current analysis and projection models do not portray uncertainty in survey biomass estimates or in outputs of the projection model. The SSC appreciates the work in developing the stock assessment models. Because the evaluation of alternatives requires comparison of the performance of control rules, a measure of uncertainty in those projected values is needed to determine substantive differences in performance (e.g., differences in yield, rebuilding times, or ending biomass) as shown for some measures in tables 4.2-6, 7.4-9, or 8.4-7. Measures of variance in figures showing biomass time trends would also be helpful (e.g. figs 4-1, 4-2, 4-4, etc).
 12. The rationale for the choice of years used to determine mean catch for Tier 5 should be transparent, objective and not be influenced by regulatory actions or closures during those periods. These levels are assumed to be sustainable and also robust to changes in environment. If a reliable catch history cannot be determined, these stocks should be placed in with those in Tier 6.
 13. The SSC requests a more detailed description of the process, federal and state management options, and risks associated with the timing of events proposed under each alternative.

14. The SSC requests the addition of a table showing a comparison of recent past and projected future performance for each stock occurring under alternatives 1, 2, and 3. This will help with addressing comment 6.
15. This document does not contain a true economic analysis, which should be reviewed prior to public review. The discussion provided in section 12.7 (Effects of Alternatives) is incomplete. As presently constructed, section 12.7 is nothing more than a discussion of point estimates of catch projections under the three alternatives. This section needs to be expanded to reflect the variation associated with those catch projections, the likelihood of fishery closures under those catch projections, and an analysis of the anticipated economic consequences of the alternatives. The economic analysis should include forecasts of changes in CPUE across the alternatives and through the simulation period. In addition, the analysis should use current prices to estimate revenues under each alternative and through the forecast period. These revenue projections should be used to derive net present value estimates of revenues through the forecast period. Where possible, the analysis should draw on data reported under the mandatory data collection program implemented in conjunction with crab rationalization to estimate expected net revenues. Because the putative benefits of the alternatives rely on the premise that conservative harvest strategies will yield increased long term average yields, the time frame represented in the discussion included in this section should be calculated to allow stock-recruit relationships to affect harvestable populations. Inclusion of 100 year projections of economic consequences would help to characterize potential long term benefits.
16. This document does not contain a true analysis of community impacts, which should be reviewed prior to public review. The discussion provided in section 12.6 (Communities) is incomplete. Section 12.6 needs to be expanded to more fully describe the unique relationships between fisheries for the 22 managed crab stocks that would be affected under this amendment. While some of these stocks are fished by many vessels and delivered to several processors, other stocks are fished by small numbers of vessels and delivered to a single processor. Similarly, while some crab stocks are harvested and processed by participants who also participate in other crab and groundfish fisheries, other stocks are harvested and processed by participants who specialize in a single crab stock. The combination of these unique relationships with particular Tier classifications can be expected to lead to different impacts among the varied communities that are dependent on the crab fisheries. One useful metric for evaluating the effect on communities is the number of years the fishery would be closed under the sets of alternatives, which has obvious consequence for the sustainability of a community.

D-2(b-d) BSAI Crab Management

Mark Fina (NPFMC) presented a discussion paper on a use cap exemption for custom processing in the AI, a discussion paper on use caps for vessels fishing cooperative allocations in the BSAI, and characterized a possible analytic approach for examining some outcomes of crab rationalization as part of the upcoming 18 month review of the program. Public testimony was provided by Dave Fraser (Adak Fisheries).

(b) Custom Processing Cap Exemption

The MSA includes a provision to exempt custom processing in the northern Bering Sea from processing caps established under crab rationalization. This discussion paper is intended to help the Council structure a problem statement for consideration of a similar exemption for custom processing in the western Aleutian Islands. If the Council chooses to pursue an amendment analysis for this action, the SSC anticipates that the analysis would include quantitative estimates of the potential impacts (positive or negative) to communities that have historically engaged in fisheries that could be affected by this action. We anticipate that this analysis will take advantage of information reported under the mandatory data collection program implemented in conjunction with crab rationalization. At a minimum, we anticipate

that the analysis of options and alternatives will include estimates of differences in gross revenues, costs, and net revenues.

(c) Cooperative Vessel Use Caps

The draft problem statement included in this analysis suggests that the proposed action is intended to mitigate potential adverse impacts of consolidation consequent to exempting cooperative fishing of IFQs from vessel use caps. The SSC notes that in order to isolate the extent to which consolidation is attributable to the exemption, it will be necessary to estimate the extent to which consolidation would have occurred had vessel use caps been in place, the extent to which consolidation is attributable to the arbitration structure, and the extent to which consolidation was influenced by depressed exvessel prices and elevated fuel costs. Failure to jointly determine the extent to which these other factors contributed to the scope of consolidation could lead to incorrect projections of the extent to which restrictions on cooperative fishing will mitigate perceived adverse impacts of consolidation. In addition, it is anticipated that the analysis will provide quantitative estimates of the magnitude of perceived negative impacts (numbers of full-time equivalent jobs, total crew payments, changes in net revenues to IFQ-holders who chose to fish cooperatively instead of individually, etc.).

(d) 18-Month Review

The proposed descriptive analysis of the operation of arbitration procedures during the initial year of crab rationalization is appropriate, but should be followed-up with a comprehensive quantitative analysis of the program in 2009 or 2010.

D-3 BSAI Salmon Bycatch Management

Diana Stram (NPFMC) reported on the status of Amendment Package 84B and provided a summary of a discussion paper on salmon bycatch in the Eastern Bering Sea pollock fishery, including a graphical spatial analysis to look for bycatch hotspots and approaches to setting trigger caps. Public testimony was provided by John Gruver (AFA Catcher vessel Cooperative and the Pollock Conservation Cooperative) and by Ed Richardson (Pollock Conservation Cooperative).

Summary data for 2006 indicate that Chinook bycatch reached an all time high last year. Catches have continued at high levels in 2007, and have already exceeded the trigger level in the pollock A season, which began on January 20. An exempted fishing permit now allows participating AFA qualified and CDQ vessels to continue fishing provided that they comply with provisions of the VRHS closure system.

The SSC received a copy of the Section 7 Consultation – Supplemental Biological Opinion Regarding Authorization of Bering Sea/ Aleutian Islands Groundfish Fisheries. This report concludes that the take of listed species of Lower Columbia River and Upper Willamette River Chinook salmon in BSAI groundfish fisheries is best characterized as a range of recent observations (rather than the specified incidental take indicator of 55,000 Chinook) and that in judging the fishery in future years the agency will use the range (36,000 – 87,500) to assess whether there have been significant increases in the take of listed Chinook. Analysts should consider the impacts of this change on their analysis.

The SSC last addressed this issue in October, 2006, and also in April, 2006 when we held a salmon bycatch workshop. One of our recommendations in October was to examine the spatial distribution of salmon catches on a relatively short time scale to look for consistent hotspots. The staff report provided this examination on a two-week basis, using salmon catch as the metric displayed in map form for the eastern Bering Sea. A specific suggestion is to provide mapped data in a series of 3 columns, with pollock catch in column 1, salmon bycatch rates in column 2, and salmon catch in column 3, where rows are time steps.

The SSC notes that it may be worthwhile to graphically display maps using shorter time periods, such as one week; however, this approach to identifying hotspots is qualitative and fairly labor intensive. A more quantitative and powerful approach may be to conduct a spatial correlation analysis with varied time scales in the sense of an exploratory data analysis. A caveat to this approach is the limitation of the data, in that the analysis will be limited to those areas where fishing actually occurs. This constraint is exacerbated by the degree to which the pollock fleet has moved off of hotspots in compliance with the Voluntary Rolling Hot Spot (VRHS) closure system. There are likely to be other factors affecting pollock and salmon catch to be taken into consideration, including vessel and gear characteristics.

The SSC reiterates a prior recommendation to consider oceanographic conditions that may influence salmon bycatch rates. These conditions include surface and subsurface temperatures, as well as the location of fronts and eddies.

In regard to the alternatives for establishing trigger caps as catch limits by species, the SSC has no further insight to offer beyond that provided in prior minutes. Finally, the SSC notes that a second workshop on salmon bycatch scheduled for the March, 2007 meeting will address stock of origin issues that may be useful in setting specific trigger caps.

D-4(a) Aleutian Island Habitat Conservation Area

Cathy Coon (NPFMC staff) and Melanie Brown (NMFS) provided an overview of an updated EA to adjust the boundaries of two habitat conservation areas in the Aleutian Islands (near Buldir and Agattu Islands). Scott Miller (NMFS) described the RIR/IRFA. Public comment was received by Jon Warrenchuk (Oceana) and John Gauvin (H&G Workgroup).

Errors present in the earlier October draft have been corrected and the current analysis incorporates SSC comments from October 2006, including information on status of red-faced cormorants. Council staff and NMFS also convened a workshop specifically to examine potential impacts on red-faced cormorants. The SSC appreciates their efforts and thoroughness. Also included is an expanded section on seabirds, and more information on potential rockfish impacts. **The SSC recommends that the document be released for public review after incorporating comments and any new information from upcoming VMS analysis and newly requested observer data.**

A reorganization of the description of habitat impacts around the four stated premises and their supporting evidence would help clarify the rationale for Alternative 2.

For example:

- 1) Buldir area has coral: supporting evidence
- 2) Buldir area has not been trawled: supporting evidence
- 3) Agattu area has been trawled: supporting evidence
- 4) Agattu area does not have coral: supporting evidence

In the current draft, this information is scattered among several places.

D-4(b) Bering Sea Habitat Conservation

Cathy Coon (NPFMC staff) and Melanie Brown (NMFS) presented an overview of the initial EA to further conserve fish habitat in the Eastern Bering Sea. Scott Miller (NMFS) presented the RIR/IRFA analysis. Public comment was provided by Jon Warrenchuk (Oceana), John Gauvin (H&G Workgroup), and George Pletnikoff (Greenpeace).

The goal of this action according to the problem statement is a precautionary effort “to reduce potential adverse effects of fishing on EFH and to support continued productivity of managed fish species”. Because this EA is tiered off the findings in the EFH EIS (including no significant or long-term impact of bottom trawling on habitat), and the range of alternatives do not change fishing rate, intensity, or decrease

area fished, the EA should not find any significant habitat impacts due to bottom trawling. It follows that any significant impacts of this action would be economic or community based, not habitat based. Therefore, attainment of the action's goal cannot likely be evaluated.

Analysis in the EA assumes that fish stock distribution and fishing distribution will remain static into the future. However, **much of the potential economic impact from this action depends on how and where fish stocks and fishers change their distributions in the future. These dynamics are not captured in the EA.** Some anticipation of the effects of shifting distributions of biota and fishing may be possible to evaluate. Consider some recent publications on changes in groundfish and crab species distributions in the EBS. Orensanz et al. (2004)²¹ and Zheng and Kruse (2006)²² looked at crab changes (red king, Tanner, and snow crab) and a few crab predators – Pacific cod, rock sole, and skates. Some groundfish showed a clear trend in changes of centers of distribution with changes in mean bottom temperature. Mueter and Litzow (in prep.)²³ have examined changes in groundfish species distributions more fully and quantify the northward shift in center of distribution for numerous species over the past 25 years. Other invertebrates may not have changed as much. Perhaps one could plot ice edge position against mean summertime temperatures from NMFS surveys to indicate directional environmental change.

Several aspects of the current alternatives, their structure, and their relationships to each other are problematic. The SSC has several suggestions to clarify the Alternatives and create a more useful analysis.

- There is little contrast between open areas under options 1 and 2. It will be difficult to quantitatively evaluate impacts with the scale of the differences in proposed boundaries. The largest contrast in open areas proposed is when the northern Bering Sea research area is added, but it is added under gear modifications. **The SSC suggests the addition of alternatives that provide contrast in extent of open areas will be most informative in decision-making.**
- Sub-options to include or exclude areas such as Etolin Strait and areas surrounding local communities add complexity that could be resolved through discussion and consensus rather than evaluation through the NEPA process.
- The SSC would like to see the data and criteria used to generate the proposed areas, as the rationale is unclear and some boundaries appear subjective and are still evolving. It would be useful to see how these areas would be defined if the data were temporally partitioned to examine any spatial shift in fishing effort that has occurred during the period examined.
- To judge changes in the fished area relative to the assessed area for many fish stocks, it would be useful to provide an overlay of the NMFS trawl survey station grid relative to the proposed areas. It may help to better evaluate the level of available fishery-independent information in the area in question and match biomass estimates with areas of fishing. We also would appreciate more detailed views of the Bering Sea slope bathymetry and fish distributions in areas designated by each option.
- In the current set of alternatives specifically named areas (e.g., Etolin Strait) have different boundaries under different options. These named areas should be made consistent.

²¹ Orensanz, J. L., B. Ernst, D. A. Armstrong, P. Stabeno, and P. Livingston. 2004. Contraction of the geographic range of distribution of snow crab (*Chionoecetes opilio*) in the eastern Bering Sea: an environmental ratchet? California Cooperative Oceanic Fisheries Investigations Reports **45**:65-79.

²² Zheng, J., and G. H. Kruse. 2006. Recruitment variation of eastern Bering Sea crabs: Climate forcing or top-down effects? Progress in Oceanography **68**:184-204.

²³ Mueter, F. J., and M. A. Litzow. in prep. Warming climate alters the demersal biogeography of a marginal ice sea. Ecological Applications

- The northern research area is a confusing option. Research or EFP fishing can occur anywhere with the proper permits and authority. The research area idea noted by the SSC in December suggested designing and implementing an adaptive management experiment to study the effects of trawling in previously untrawled areas. The current description of the research area under option 3 is simply a closed zone, and in option 4 it is an open zone. **The SSC encourages the development of an area for fishing impact studies through a well-designed experiment with open and closed areas and appropriate monitoring to study fishing impacts on benthic communities and ecological processes.**
- The gear modification alternative is discrete and also joined with other options in an additional alternative. The SSC is glad to see the fleet and NMFS working towards developing gears with minimal habitat impacts. However, **we have some concerns about requiring this gear modification by rule based on small sample sizes, limited habitats sampled, and limited information on impacts to target catch rates, bycatch rates, and PSC rates.** In addition, the impacts measured were restricted to sea whips, basket stars, and sponges, whereas EFH encompasses a much broader suite of characteristics. The SSC encourages more testing and evaluation of gear modifications, especially on differences in catch rates and measuring habitat impacts.
- It would be useful to show proposed open areas under each alternative/option as modified by current spatial restrictions on areas open to non-pelagic trawl gear. For example, how much of an open area proposed is further reduced by SSL closures, crab savings areas, etc...

In general, the alternatives and options presented are complex and could be simplified. The SSC suggests proposing three independent alternatives: An open vs. closed area approach, a gear modification approach, and a development of some type of research area. Development of any of these alternatives (with options if necessary) as an a la carte menu, instead of combinations of options, would simplify the approach, analysis, and aid public understanding of the proposal by the public. It is also unclear to the SSC why alternatives that provide additional protection to particular habitat types were considered and rejected, when it is essentially an open vs. closed area. Perhaps some areas, such as skate nurseries and canyons, are intended to be considered separately in the HAPC process discussions in April.

- The EA should define what low effort is explicitly and how that value was chosen.
- Some new maps have been added with bathymetry and habitat information as requested in December. However, black and white versions of open area maps in description of alternatives are still difficult to evaluate, especially in visualizing differences among open areas.
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- Some habitat type information is presented, but there is no evaluation of how much of a particular habitat is included in proposed open versus closed areas.

The SSC notes that the suite of options does not address impacts on EFH by pelagic trawl gear. In June 2006, the SSC stated:

The SSC also supports an assessment of the effects of pelagic trawl gear on benthic habitats, as advised in a letter to the Council from the Alaska Regional Office of NMFS (June 1). The analysis should include a review of the current performance standard based on the number of crab captured, which, given the design and placement of large mesh on pelagic trawls, may be a poor indicator of effect on benthic habitats.

The SSC appreciates efforts by staff and industry to meet with communities in Western Alaska to obtain input on nearshore closure area designations (e.g., Etolin Strait) and potential community impacts. In attempting to collect this input, the SSC notes that public testimony emphasized that CDQ organizations, ANCSA corporations, and Tribal Governments (Village Councils) may not have uniform perspectives on the relative significance of particular community impacts. It may also be helpful to evaluate ADF&G subsistence surveys to describe areas of use.

In developing any rules associated with mandatory gear modifications, the SSC encourages a clear and specific definition of what constitutes modified versus unmodified gear to aid in modification compliance and enforcement. In addition, when defining which target species the modified gear requirement will be applied to, it will be important to include all desired target species. This process should be consistent with the NMFS algorithm to designate the target species for a tow. We note that there are currently seven groups of flatfish stock assessment categories for the BSAI: (1) northern Rock sole, (2) flathead sole, (3) Alaska plaice, (4) yellowfin sole, (5) arrowtooth flounder, (6) Greenland turbot, and (7) other flatfish (14 – species: starry flounder, rex sole, longhead dab, butter sole – Sakhalin sole, English sole, Arctic flounder, butter sole, Pacific sanddab, Petrale sole, roughscale sole, sand sole, slender sole, deepsea sole, curlfin sole)

When determining costs to vessels for modifying gear, the EA should clarify whether vessels carry spare sweeps or repair parts (discs) and whether those costs are included in the annual cost estimates.

D-5 AI Fishery Ecosystem Plan

We received a progress report from the AI ecosystem team presented by Diana Evans (Council staff) and Sarah Gaichas (AFSC). The SSC compliments the team on their considerable progress and appreciates the incorporation of prior SSC comments on the FEP outline. Public testimony was provided by Chris Krenz (Oceana).

Considerable revisions were made to the outline since October 2006. The presenters focused on chapters 3 and 4, which summarize the physical, biological, and human environment of the Aleutian Islands ecosystem. Most importantly, chapter 3 will include a description of potential interactions among these different components, which will form the basis for the ecosystem assessment in chapter 4. The ecosystem assessment consists of a risk assessment to identify interactions of potential concern in terms of their relative risk and probability. In addition, suitable indicators will be identified from existing indicators or new indicators will be developed for high risk / high probability interactions.

The SSC provides the following additional comments on the proposed structure of the document, the validity of the overall approach, and the proposed list of interactions and associated indicators.

Regarding the structure of the document, we reiterate comments from our October 2006 minutes to include a section on coordination between the release or future updates of the FEP and the release of related documents. Specifically, we suggest that the publication of the FEP should coincide with the publication of NEPA documents such as updates of the PSEIS, TAC setting EIS documents, and other EIS documents relating to the Aleutian Islands. To facilitate this coordination we strongly encourage the team to coordinate their efforts with the Alaska Regional Office.

The SSC notes that the outline indicated that the FEP would include “recommendations”. The SSC reminds the authors that this document is intended to synthesize information and that if the Council wishes to amend its plans based on information presented in this document, that recommendations for alternative management would be considered in a separate process. Thus, the section title might be changed to a synthesis of research findings.

Regarding the validity of the overall approach, we agree with the list of potential interactions identified by the team and with the general approach of 1) identifying potential interactions, 2) conducting a risk assessment, and 3) choosing or developing suitable indicators for assessing and monitoring risk. With regard to the interactions, we encourage the team to also consider including interactions among the higher-level categories of interactions, such as interactions between climate effects and fisheries, or between fisheries effects and predator-prey interactions. With regard to the risk assessment, we encourage the team to provide a clear rationale for and a description of the adopted risk assessment approach, particularly in the context of the extensive literature on risk assessment (e.g., several recent NRC reports). Dr. Gaichas indicated that the team intends to use a consensus approach to qualitatively assess probability

of risk versus the scale of impact for various interactions. The team may wish to consider the use of the Analytic Hierarchy Process for coming to an agreement on risks.

Regarding the suggested list of indicators and the content of the document, these are difficult to evaluate without seeing the completed document, but we provide the following comments. We look forward to reviewing a draft of the full FEP when it becomes available.

- A clear statement on the purpose and need of the proposed action with regard to the geographic region considered should be provided. A discussion of the oceanographic basis for delineating the Aleutian Islands ecosystem from the Gulf of Alaska and Bering Sea (specifically the observed break at Samalga Pass in physical properties and biota) should be included in the geography section (chapter 2).
- The history section should include a description of the main stressors that have affected the ecosystem in the past, such as overfishing of Pacific Ocean Perch and historical whaling, as well as a description of other significant events such as the extinction of the flightless cormorant.