

DRAFT REPORT
of the
SCIENTIFIC AND STATISTICAL COMMITTEE
to the
NORTH PACIFIC FISHERY MANAGEMENT COUNCIL
June 2-4, 2008

The SSC met during June 2-4, 2008 at the Fishermen's Hall, Kodiak, Alaska. Members present were:

Pat Livingston, Chair

NOAA Fisheries—AFSC

Bill Clark

International Pacific Halibut Commission

Kathy Kuletz

US Fish and Wildlife Service

Lew Queirolo

NMFS—Alaska Region

Doug Woodby

Alaska Department of Fish and Game

Keith Criddle, Vice Chair

University of Alaska Fairbanks

Anne Hollowed

NOAA Fisheries—AFSC

Seth Macinko

University of Rhode Island

Terry Quinn II

University of Alaska Fairbanks

Troy Buell

Oregon Department of Fish and Wildlife

George Hunt

University of Washington

Franz Mueter

SigmaPlus Consulting

Farron Wallace

Washington Dept of Fish and Wildlife

Members absent were:

Gordon Kruse

University of Alaska Fairbanks

Sue Hills

University of Alaska Fairbanks

B-1(c) Plan Team Nominations

The SSC reviewed the nomination of Leslie Slater (USFWS) to the BSAI and GOA groundfish plan teams, the nomination of David Barnard (ADF&G) to the BSAI groundfish plan team, and the nomination of Mary Furuness (NMFS) to the BSAI groundfish plan team. **The SSC recommends approval of these nominations by the Council.**

B-2(b) Annual Catch Limits

Richard Methot (NMFS) summarized the recently published proposed guidelines for implementing the provisions of the 2007 MSA language requiring Councils to set annual catch limits (ACLs) and annual catch targets (ACTs) and to adopt accountability measures (AMs) for all directed fisheries, so as to avoid overfishing.

The new guidelines set out a hierarchy of catch reference points in which $OFL > ABC \geq ACL \geq ACT$. These allow for taking into account scientific uncertainty in estimating the true OFL when setting ABC. Furthermore where there is significant management uncertainty the Council should set an annual catch target (ACT) less than the ACL so that the realized catch will fall below the ACL with high probability. Councils may also set ACLs and ACTs for each sector of a fishery. Accountability measures (AMs) may be in-season or post-season.

It appears that for groundfish fisheries, NPFMC may be able to satisfy the new requirements by changing the term TAC to ACL through amending the FMPs. In amending the FMPs, it will be important to consider whether there is sufficient information to assign ACLs to stocks currently managed under the FMPs or whether some of the currently managed stocks will be required to be managed as ecosystem component stocks. A separate allowable catch target (ACT) may not be required because the catches are limited by an effective quota management system. Compliance for the crab and scallop fisheries could be more complicated and will require coordination with the State.

There will be a 90-day period for public comment on the proposed new guidelines. The SSC is prepared to form a subcommittee to review the guidelines and provide comments on them to the Council.

C-1 Subsistence Halibut

Jane DiCosimo (NPFMC) presented an initial/final draft of the RIR for a proposed regulatory amendment that would revise the current eligibility requirements in the halibut subsistence program. This action is focused on addressing an unintended consequence of the current eligibility scheme that disqualifies residents of extremely small, rural locations. Public testimony was not offered.

The SSC recommends that the document be released for public review with minor edits/corrections. Staff indicated that the specific language of Alternative 2 has been revised from the text presented in the review draft. The final document should present Alternative 2 in the updated form. The text in footnote 2 in the current document should be revised before final release to clarify that currently eligible residents/communities will *not* be rendered ineligible by this action. The SSC recommends that the RIR be revised so that estimates of potential additional participation in the subsistence program (for example in Table 6) are referred to as “projected” possible outcomes rather than “expected” outcomes. Furthermore, these projected additional harvests of halibut should be based on area specific projections of current per capita catches rather than a single pooled average per capita catch.

C-2 Salmon Bycatch

Diana Stram (NPFMC), Jim Ianelli (NMFS-AFSC), and Scott Miller (NMFS-AKR) summarized the initial review draft EIS/RIR/IRFA on Bering Sea Chinook Bycatch Management. Public testimony was provided by Karl Haflinger (Sea State), Jon Warrenchuk (Oceana), Paul Peyton (Bristol Bay Economic Development Corporation), Ed Richardson (Pollock Conservation Cooperative), Joe Plesha (Trident), and Becca Robbins Gisclair (Yukon River Drainage Fishery Association).

The major alternatives considered in the analysis are: (i) status quo, meaning continuation of Amendment 80 measures for Chinook and chum; (ii) a hard cap, with options for season and sector splits and rollovers/transfers/cooperatives, and (iii) triggered closures, with the same sort of options. Impacts on a number of Chinook runs and on the pollock fishery are calculated for 36 contrasting sets of measures by applying them to data on the actual distribution and timing of the pollock fishery in each of the years 2003-2007. The SSC commends the many analysts and authors for a very thorough analysis containing important new work on bycatch impacts. **We recommend the completed EIS/RIR/IRFA be released for public review.**

While the analysis does as much as possible to show what the impact of various bycatch management measures would have been in the years 2003-2007, there remains a great deal of uncertainty about what the impact of those measures might be in future years. Part of that uncertainty results from limited data on stock composition of the bycatch, which could be reduced by further research. Another concern is simply the year-to-year variability in the distribution of Chinook salmon relative to pollock. Thus, while the calculated impacts in 2003-2007 are in one sense the worst case because they make no allowance for changes in fleet behavior, it is quite possible that in some future year the impacts on the pollock fishery could be even larger, even with changes in fleet behavior. This may occur simply because of a greater spatial overlap of Chinook salmon and pollock than seen in any of the years 2003-2007. Moreover, the lack of reliable biomass estimates and stock-recruit relationships for western Alaska salmon stocks makes it difficult to assess the biological consequences of Chinook bycatch.

The SSC notes that setting a hard cap that is not indexed on some proxy for abundance is inherently problematic. For example, if bycatch is used as a proxy for salmon abundance and if it is a poor proxy, then low caps could be too high in low abundance years and high caps could be too low in high abundance years. The most straightforward way to reduce bycatch might be some sort of industry-sponsored financial incentive scheme, as suggested in public testimony. Additionally, there may be other incentive schemes available to both the Council and industry.

The initial review draft RIR/IRFA reflects the challenge of analyzing the large number of alternative configurations that are under consideration at this phase of the action's development. The RIR presents a systematic initial cut at assessing the economic and socioeconomic aspects and outcomes of the complex set of scenarios employed in the analysis. Presumably, these would be refined once the Council identifies a preliminary preferred alternative. However, the SSC notes that:

1. The economic impacts shown in the RIR are based on the bycatch amounts calculated in the EIS and therefore contain all of those uncertainties, plus additional uncertainty concerning the effect of any caps, apportionments, or changes in behavior on costs and revenues.
2. The document should take every opportunity to clarify that foregone revenue is estimated in terms of "gross" nominal dollars. The author does report that gross receipts, whether ex-vessel or first wholesale, are not an appropriate indicator of profits and should not be so interpreted. The document could more clearly indicate throughout that projected gross revenue changes may not be indicative of net revenue outcomes. Similarly, many of the tables and figures included in the draft RIR represent nominal prices and revenues. These tables, figures, and associated text should be revised to represent real (2007 base) prices using a CPI or PPI price deflator. This change will permit a more meaningful characterization of the economic and social impacts that accompany inter-annual variability in terminal area salmon fisheries of concern and more clearly represent the erosion in commercial revenues that has occurred in the western Alaska salmon fisheries.
3. The reported estimates of foregone revenues and revenues-at-risk should be characterized as upper-bound estimates and it should be noted that the change in net revenues could be larger or smaller than the projected gross revenue changes.
4. Although the analysis acknowledges that fleet behavior will be affected by the imposition of potentially binding hard caps or restrictive spatial closures, the projected impacts on the quantity and value of pollock catches have not been adjusted to reflect likely changes in fleet behavior. The analysis could benefit from inclusion of a discussion of the H&G flatfish fishery and similar examples of fisheries that have successfully accommodated stringent hard bycatch caps.
5. There is an unstated, but structurally important, aspect of a key component of the Chinook bycatch reduction action. Specifically, the rollover-transfer elements in the proposed action contain an implicit policy with respect to priority claims to Chinook.
 - a) A program that does not include a rollover-transfer provision implicitly recognizes that a Chinook bycatch cap is regarded by the Council as a true removal limit. As such, there is an embedded expectation that the priority claim to these Chinook resides with the terminal region salmon users/uses. Effectively, any Chinook salmon savings (i.e., avoided bycatch mortality) would be banked, in the sense that these Chinook would no longer be subject to risk of PSC removal in the pollock fisheries.
 - b) A program with a rollover-transfer provision implicitly confers a priority claim to a fixed number of Chinook salmon to the pollock fishery. That is, if a Chinook bycatch cap can be re-apportioned, traded, sold within and among sectors, etc., it is a consumable allowance that confers an entitlement to pollock fisheries to impose the specified amount of Chinook bycatch mortality. These Chinook would remain at risk of PSC removal by sequential exposure to pollock fishing through sector transfer-rollover mechanisms.

6. The downstream implications for recently realized AFA pollock cooperative economic and operational gains need to be explicitly addressed. The reported AFA co-op gains (e.g., significant increases in recovery rates, product quality, operational efficiencies, market responsiveness) may be compromised by new incentives to accelerate pollock harvests (i.e., a new race for fish), resulting from the proposed Chinook bycatch reduction action.

Minor comments:

A careful editing of this initial draft would substantially improve its accessibility and better focus attention on the key elements of this complex decision. For example,

1. Much of the background information contained in the RIR is already in the public domain and could better be briefly highlighted, included by reference, and cited to, in this document.
2. Chapter 8 has numerous typos, incorrect figure references, and incorrect information on “other marine resources” that need attention.

C-4 (a) Fixed Gear Recency in Western and Central GOA

Jeannie Heltzel (NPFMC) provided an overview of the initial review draft EA/RIR/IRFA. Public testimony was provided by Blake Painter (F/V Tradition).

The draft EA/RIR/IRFA presents a clear and well supported treatment of the proposed action. The analysis is well-balanced, employs the latest available scientific data, and interprets those data in a reasonable and appropriate manner. **The SSC recommends that the draft analysis be released for public review** after some minor editorial revisions and with the addition of a short discussion (in section 3.7.7) on the loss of option value that will result from adoption of Alternative 2, particularly with reference to distributional impacts suggested in Table 3-28. The SSC notes that this will likely increase purchase prices for LLPs, thereby presenting an increased barrier for new entrants.

Extinguishing licenses, even recently inactive licenses, constitutes an economic (welfare) loss to affected license holders. Holders of inactive licenses may be actively participating in other fisheries that conflict with fixed gear openings in the GOA and may be retaining their GOA fixed gear licenses as insurance against declines or failures in the fisheries in which they most recently participated. In extinguishing these inactive licenses, this action will eliminate the option value currently held by owners of inactive licenses and increase the value of licenses currently held by owners of active licenses. While estimating the absolute magnitude of these changes in economic well-being is beyond the scope of the EA/RIR/IRFA, the analysis could benefit from a qualitative discussion of these changes and their distributional implications.

The analysis points out that the proposed action may raise questions concerning the net effectiveness of extinguishing CV latent licenses. Inter-sector equity takes on an additional dimension when one considers, as noted on page 31 of the draft, that “... removing inactive catcher vessel licenses will not prevent entry of CP licenses into the CV sector ...” either through permanent conversion or annual operator’s choice (see footnote 8).

At the bottom of page 37, there is what appears to be a misstatement. The passage asserts, “First wholesale revenue from halibut, crab, salmon, and other non-groundfish catch for these vessels...” If this passage refers to bycatch and/or incidental catch by these CPs, the suggestion that revenues are earned is incorrect. If this passage intends to refer to alternative target fisheries that these operations participate in, the suggestion that revenues are earned would be correct, but the passage is misleading. This passage should be clarified.

The draft identified a scenario in which fixed gear licenses with a MLOA $\geq 125'$, currently being used on a vessel $<125'$, could be transferred to a larger vessel with detrimental impacts on effort. However, the sector has not recently found incentive to fish their licenses in this manner. Data presented identify only one such example. The analysis expresses a concern that, absent a formal prohibition, the result could be a wholesale transference of effort. This appears to overstate the risk. The SSC recommends that the draft EA/RIR/IRFA be revised to better reflect the likelihood of this occurrence and the nature of the incentive that would result in the asserted outcome.

The document suffers from some redundancy that could be eliminated by reorganization. Some background information also needs attention. For example, section 2.2 (marine mammals) and section 2.3 (seabirds), need clarification to eliminate unneeded discussion of species that are not typically encountered in the GOA. Changes in fishing effort have potential to influence direct and indirect impacts to seabirds. In the GOA hook and line fisheries, black-footed albatross requires attention because of its higher take in the GOA, and because it is a species of concern. Black-footed albatross are addressed (p.25), but mainly as a review of bycatch history. If CPs can enter the fishery as CVs and if larger vessels tend to have higher seabird bycatch, the bycatch rates for GOA could increase. If this shift is limited by MLOA, it should be noted here. Another outcome might be a stable bycatch rate, rather than an increase, due to removal of potential re-entries.

C-4 (b) Allocation of Pacific cod among sectors in Western Central GOA

Jeannie Heltzel (NPFMC) provided an overview of the initial review draft EA/RIR/IRFA. Public testimony was provided by Kenny Down (Freezer Longline Coalition) and Julie Bonney (Alaska Groundfish Data Bank).

The SSC recommends that the draft analysis be released for public review after some minor revisions and expansions. The initial review draft presents a balanced appraisal of the proposed action. Nonetheless, the analysis would benefit from inclusion of a discussion of how the proposed action could affect the extent of observer coverage. In addition, the public review draft should include an augmented discussion of interactions between the proposed actions and the crab and Amendment 80 sideboards. The analysis could also benefit from clarification in the use of terminology related to incidental catch, bycatch, and regulatory discards and a refinement of the discussion of potential impacts on marine mammals and seabirds. The SSC commends the analysts for the presentation of material that will aid policy-makers in their assessment of distributional implications at the community level. When combined with the contemplated “fixed gear recency” action, the community level impacts could be substantial in some locations. The SSC notes that when a TAC is not fully attained, nothing is “stranded”, in the usual sense of the term. It would be preferable to refer to unattained or unharvested TAC. Finally, the SSC notes that the analysis does a good job of highlighting the likelihood that none of the alternatives will actually address the problem statement unless further complementary developments (such as the formation of industry cooperatives) are assumed.

C-6 Research Priorities

The SSC reviewed and discussed the research priorities from June 2007 and changes suggested by the Joint BSAI and GOA Groundfish Plan team, the Crab Plan Team and the Scallop Plan Team. Public testimony was not offered.

The SSC reorganized the categories and updated the recommendations for Research Priorities for 2008-2009. In addition, emerging needs were identified for new research stemming from the reauthorization of the Magnuson Stevens Act, bycatch issues, and climate change. Changes were made to lists of Near-term (2008-2013) Research Priorities and Comprehensive Research Needs for Management of North Pacific

and Arctic Fisheries. These latter two lists are included in an appendix at the end of this report. Numbering within the three lists is not intended to represent a prioritization of the needed research. Moreover, this list should not be construed as a definitive list of necessary and important research related to living marine resources and their environment.

The SSC used the following rationale in assigning research activities to the various lists. If a research activity was thought to be essential and needed to be continued or if it was essential and needed to be initiated in the coming year, it was assigned to the list of research priorities for 2008-2009. If a research activity was thought to be important and should be initiated soon, it was assigned to the near-term priority list (2008-2013). Any research activity determined to be of value is identified in the comprehensive list.

Research Priorities for 2008—2009

I. Fisheries

A. Fish and Fishery Monitoring

1. Continuation of State and Federal annual and biennial surveys in the GOA, AI and EBS, including BASIS surveys, are a critical aspect of fishery management in Alaska. It is important to prioritize these surveys in light of recent proposed federal budgets in which funding may not be sufficient to conduct these surveys. These surveys provide baseline distribution, abundance and life history data that form the foundation for stock assessments and the development of ecosystem approaches to management. These surveys are considered the highest priority research activity contributing to assessment of Alaskan groundfish fisheries.
2. The expansion of routine surveys into the northern Bering Sea and baseline surveys of the Arctic Ocean will become increasingly important under ongoing warming ocean temperatures and range expansions of harvested fishery resources.
3. Continuation and expansion of cooperative research efforts to supplement existing surveys to provide seasonal or species-specific information for use in improved assessment and management.
4. For groundfish in general, continue and expand research on trawlable and untrawlable habitat to improve resource assessment surveys.
5. Continue research on the design and implementation of appropriate survey and analyses to aid the Council in developing mechanisms to assess species that are locally aggregated in their distribution and are thus not adequately represented (either over or under estimated) in the annual or biannual groundfish surveys.
6. Identification and recovery of archived data (e.g., historical agency groundfish and shellfish surveys) should be pursued.
7. There are needs to improve biological data collection (e.g. age, size and sex) of some bycatch species (e.g. sharks, skates, octopus, squid, sculpins, and grenadiers) to better quantify potential effects of bycatch on these stocks.

B. Stock Assessment

1. Improved stock assessment of “other species”, non-target rockfish, and data-poor stocks of crab. Highest priority research tasks include: (1) alternative indices of abundance (and biomass) and fishing mortality are necessary for species for which standard surveys are inadequate; and (2) life history information (specifically, natural mortality, size at maturity, and other basic indicators of stock production) for “other species” and data-poor stocks of crab to allow application of Tier 5 or Tier 4 assessment criteria. Little information is available especially for sculpins, skates, octopuses, squids, grenadiers and some sharks.

2. Studies on the effects of climate variability and climate change on recruitment and growth could include the development of standard environmental scenarios for future variability based on observed patterns. There is also a clear need for information that covers a wider range of seasons than presently available.
3. There is a need for the development of advanced stock assessment modeling techniques. Specifically there is a pressing need to develop techniques for linking uncertainty into stock assessments, including both scientific uncertainty (measurement error, process error or model misspecification) and implementation error (enforcement and catch monitoring).
4. There is a growing need for the development of stock assessment techniques that address seasonal and climate related shifts in the spatial distribution of fish and shellfish.
5. There is a growing need for information on stock boundaries. Specific issues include the potential creation of a separate Aleutian Island management area and stock delineation of salmon bycatch.
6. There is a need to investigate whether scallop beds coincide with retention zones, as determined by circulation patterns, and how this relates to stock structure. There is also a need to investigate movement of scallops within beds to determine whether scallops can and do fill in areas that have been previously harvested.

C. Fishery Management

1. Evaluate the effectiveness (e.g., potential for overharvest or unnecessarily limiting other fisheries) of setting ABC and OFL levels for data poor stocks (Tier 5 and 6 for groundfish and Tiers 4 and 5 for crab) (e.g., squid, octopus, skates, and crab).
2. Development of forecasting tools that incorporate ecosystem indicators into single or multispecies stock assessments to conduct management strategy evaluations under differing assumptions regarding climate and market demands. Standardization of “future scenarios” will help to promote comparability of model outputs.
3. Evaluation of economic effects from recently adopted crab rationalization program on Gulf of Alaska coastal communities, including Kodiak. This includes understanding the economic impacts (both direct and indirect impacts) and how the impacts are distributed among communities and economic sectors, conducting qualitative research to assess changes in community participation and effort in fisheries, and estimating net economic benefits.
4. As Kodiak is likely to be at the center of controversy over the likely consequences of Gulf rationalization, research should be designed to use Kodiak in addition to other Gulf communities as case studies in prospective analyses of the potential effects of Gulf rationalization options on fishing behavior and participation and economic impacts.

II. **Fisheries Interactions**

A. Bycatch and Observer Issues

1. Improved estimation of total bycatch for marine mammals, seabirds, non-target groundfish and crab and protected species. At present, it is clear that observer coverage in some fisheries is insufficient for estimation of total bycatch. Further, observer coverage must be analyzed to compare, to the extent possible, the total catch, bycatch, and fishing behavior between observed and unobserved fishing vessels. Examples include the CV trawl fisheries, sablefish longline fishery, Pacific cod pot and longline fishery, halibut longline fishery, and sport fisheries. Improved accuracy of identifications and enumerations of bycatch species is necessary. The current program results in imprecise bycatch (mortality) estimates for species, such as skates, sharks, yelloweye rockfish, and sablefish in halibut longline fisheries and discards in sport fisheries. Improved methods should include direct and alternative monitoring options (e.g.,

electronic logbooks, video monitoring) particularly on smaller groundfish, halibut, and sport vessels.

2. Gear technology. Further research is needed on gear modifications and fishing practices for reducing bycatch, particularly for PSC species (e.g., salmon).

B. Expanded Ecosystem Studies

1. Environmental influences on ecosystem processes

- a) Climate variability: Changes in ocean temperature may affect managed species, upper level predators, and lower trophic levels.
 - (i) Sea ice: If recent changes in ice cover and temperatures in the Bering Sea persist, they may have profound effects on marine communities. Development and maintenance of a database of the spatial extent and characteristics of sea ice as well as indices of the timing and extent of the spring bloom is a high priority. For this, maintenance of moorings, especially M-2, is essential.
 - (ii) Zooplankton production: Apparent declines in zooplankton wet weight over the shelf measured by the Oshoro Maru could imply the loss of critical copepod and euphausiid prey of important species, such as pollock. Development of a time series of zooplankton species composition and abundance for the Eastern Bering Sea is a high priority. Evaluate the potential of collaborative research with Japanese and Russian investigators to assess species composition and abundance in samples archived abroad.
 - (iii) Fish composition: Existing data sets (bottom trawl surveys, BASIS surveys) can be used to quantify changes in relative species composition of commercial and non-commercial species, identify and map assemblages, and monitor changes in the distribution of individual species and assemblages. Additional monitoring may be necessary in the Aleutian Islands and other areas of the Gulf of Alaska.
 - (iv) Fish movement: Studies to assess the movement of fish to understand the spatial importance of predator-prey interactions in response to environmental variability.

2. Trophic interactions.

- a) Temporal and spatial data collection: Diet information from seasons in addition to summer is needed to assess spatial and temporal changes in predator-prey interactions, including marine mammals and seabirds. The diet information should be collected on the appropriate spatial scales for key predators and prey to determine how food webs may be changing in response to shifts in the range of crab and groundfish.
- b) Ecosystem structure studies: Studies are needed on the implications of food web interactions of global warming, ocean acidification, and selective fishing. For instance, studies are needed to fully evaluate selective removal of some components of the ecosystem (e.g., Pacific cod, pollock) relative to others (e.g., arrowtooth flounder).

C. Protected Species Interactions

1. Population dynamics, life history and assessment of protected species, particularly Steller sea lions, and northern fur seals is a high priority. In particular, investigation of factors contributing to changes in natality of Steller sea lions is an important area of research.
2. Local fishery interaction studies. Whereas global fishery control rules may generally prevent overfishing on a broad regional basis, non-random patterns of fishing may cause high rates of removals in local areas important to apex predators such as Steller sea lions, ice seals, northern fur seals, spectacled eider, Steller's eider, and short-tailed albatross. More studies are needed to fully evaluate potential local effects of fishing on other components of the ecosystem (e.g., marine mammals, seabirds, and the impact on benthic habitat and fauna by bottom contact gear).

III. Habitat

A. Habitat Mapping

1. Improved habitat maps (especially benthic habitats) are required to identify essential fish habitat and distributions of various substrates and habitat types, including habitat-forming biota, infauna and epifauna.
2. Evaluate habitats of particular concern:
 - a) Bering Sea canyons
 - b) Assessment of the extent, distribution, and abundance of important skate nursery areas in the EBS to support of future HAPC.
 - c) Assessment of the extent of the distribution of *Primnoa* corals in the GOA.
3. Begin to develop a GIS relational database for habitat including development of a historical time series of the spatial intensity of interactions between commercial fisheries and habitat, which will be needed to evaluate impacts of changes in EFH on the growth, reproduction and distribution of fish and shellfish.

D-2 GOA Sideboards

- (a) GOA Sideboards for BSAI crab vessels**
- (b) GOA sideboards—GOA rockfish program**
- (c) GOA sideboards for AFA catcher vessels**

Due to time constraints, the SSC was unable to consider these analyses.

D-4 (a) GOA Rockfish Pilot Program

The SSC received a review of the first year of fishing under the Rockfish Pilot Program from Mark Fina (NPFMC). Heather McCarty (Island Seafoods) and Julie Bonney (Alaska Groundfish Data Bank) gave public testimony.

It was reported by staff that the program has resulted in an increased use of pelagic gear in the catcher vessel sector, accompanied by a substantial decrease in bycatch of shortraker and roughey rockfish and halibut. The reduction in incidental catch and bycatch was attributed to a few different measures taken by the catcher vessel sector. The sector also harvested most of its allocation with few overages. The sector received a substantial portion of the catcher processor sector allocation by transfer, increasing its share of the rockfish fisheries. Despite improvements in quality that likely arose under the new management, ex vessel prices in the fisheries remained relatively stable.

The SSC suggests that any reference in the document concerning the effects of the program on captains and crew be substantiated or removed.

Because the portion of TAC set aside for the open-access entry level fishery is small relative to the catching power of potential participants, there is concern that NMFS may be reluctant to open the entry level fishery. A pre-registration mechanism, coupled with a requirement that participants in the entry-level fishery devise a cooperative harvest agreement, might provide a level of predictability that would allow NMFS to open the fishery.

D-4(b) CGOA Rockfish EFP, Phase 1

Julie Bonney and Katy McGauley (Alaska Groundfish Data Bank) presented a report on Phase 1 of the project, conducted under an experimental fishery permit (EFP) to investigate the feasibility of using electronic monitoring (EM) to monitor the discard of halibut in the central Gulf of Alaska (CGOA) rockfish fishery, where all catches except halibut are retained. The aims of the project were to determine the feasibility, accuracy, precision, and cost of video-based estimates of halibut discards. All of the work was carried out on a single vessel, chosen for its suitability to the operation. There was no public testimony.

The experiment was informative and the EM system was effective for halibut bycatch estimation under the conditions of the experiment. The video equipment functioned well at sea and the video-based estimates were very close to the census values of halibut discards, both in number and weight. Interestingly, the video-based estimates were substantially and significantly higher than the estimates derived from standard observer basket sampling data on the same group of trips. The report contains a suite of thorough statistical analyses of the various estimates.

While the EM system worked well in this trial, it is not certain that it will work equally well on other vessels, as its performance depends on a suitable deck layout and operation. To some extent, deck work has to be tailored to the EM system for it to work properly. Successful use of EM is likely to be dependent on the cooperation of crew. The adaptability of the system to other vessels will be tested in Phase II of the project. Issues related to the wider use of EM systems will be considered this summer at a workshop to be held by NMFS Enforcement, NPRB, and the Council.

D-5 BSAI Crab OFLs and SAFE

Diana Stram (NPFMC) gave an overview of the Crab Plan Team deliberations and the team's OFL recommendations for 10 crab stocks. Presentations on individual stock assessments were provided by Jack Turnock (AFSC) and Jie Zheng (ADF&G). Additional ADF&G and NMFS staff were available to answer questions about the assessments. Public testimony was provided by Jack Tagart (Tagart Consulting representing Bering Sea Fisheries Research Foundation), Dick Tremaine (Norton Sound Economic Development Corporation), and Linda Kozak (C/P Patricia Lee).

The SSC appreciates the tremendous amount of work that has gone into preparing the BSAI Crab SAFE and the degree to which the contents of the assessments have been standardized to facilitate comparisons. The authors and the Plan Team should be commended for providing an excellent first iteration of the BSAI Crab SAFE under the new OFL definitions; we look forward to the ongoing evolution and refinement of this important document.

General recommendations to all assessment authors for future assessments:

1. To the extent possible a consistent format should be used for the assessments; sections that are not relevant to a particular stock should be omitted.
2. Each assessment should provide a range of alternatives for the Plan Team and SSC to consider when setting OFLs, for example alternative model configurations for Tier 1-3 stocks, alternative parameter values where these are highly uncertain and cannot be estimated, or alternative time periods used in Tier 4 and Tier 5 calculations.
3. Model-based stock assessments should clearly document all data sources, model equations, the number of parameters, a list of which parameters are estimated in the model, and a list of fixed parameters, and a justification for the selected parameter values.

4. The rationale for selecting a specific time period for establishing B_{MSY} proxies based on time series of recruitment (Tier 1-3) or biomass (Tier 4) or for establishing an OFL based on catch histories (Tier 5) should be clearly articulated. Unless compelling reasons exist to choose a different period, the default should be the full time series for which data are available. Where alternative time periods are considered, the rationale and the resulting reference points should be presented for consideration by the Plan Team team and SSC.
5. The crab OFL definitions are designed to provide a guide for defining the best available proxy for MSY when data is insufficient to directly estimate MSY. The guidelines allow gamma (γ) in the formula for computing F_{OFL} under Tier 4 to be set at a value higher or lower than 1. A gamma less than 1 might be justifiable if the available biomass measure includes a large portion of small crab that have not recruited to the fishery. A gamma greater than 1 might be justifiable if the directed fishery can be expected to harvest male crab with carapace widths well above the size at 50% maturity. The SSC agrees with the Plan Team recommendation that **future stock assessments should provide analyses to support the choice of gamma**. These analyses could include an exploration of fishery selectivity and a comparison of minimum size limits and size at 50% maturity for male crab. The SSC does not recommend the use of an F35%/M ratio derived from one stock as a default for gamma on an unrelated stock unless there is a strong rationale for concluding that the fishery is likely to be prosecuted in an identical manner and knowledge of stock status is sufficient to justify the harvest rate.
6. To the extent possible, bycatch information should be provided for all stocks included in the SAFE in order to move stocks from “retained catch OFL” to “total catch OFL”.
7. For stocks with an assessment model, the SSC requests that the authors include a table summarizing the fit to data (including number of parameters, likelihood for each data component, etc.).
8. The ecosystem considerations sections could be expanded to include information on prey and predator composition in a consistent format (e.g. pie charts similar to the groundfish assessments). A discussion of seabird predation on crab would be a useful addition. We note that seabirds feed on larval through juvenile crab, particularly in shallow or nearshore areas such as the Pribilof Islands. In addition, plankton-feeding birds eat larval crab throughout the year and juveniles are consumed by seaducks and seabirds, particularly during winter months.
9. Each assessment should include figures showing the available time series of catch and survey biomass, in addition to tables, to facilitate comparisons and the selection of appropriate time periods.
10. The presentation of recruitment time series should be standardized to clearly illustrate specific cohort strength.
11. Assessment authors should provide alternative options for setting OFLs to the Plan Team and the SSC, particularly where there are large uncertainties about correct model structure or parameter estimates.

General recommendations to the Plan Team:

1. Catch and biomass summaries, similar to those included in the groundfish SAFEs, should be included in the introduction to the BSAI Crab SAFE.
2. Provide the SSC with an electronic version of the OFL/ABC summary table (Table 3, p.23) that can be edited as needed and included in the SSC minutes. The summary table will help highlight stocks where there is agreement or disagreement between the Plan Team and SSC recommendations and will help the Council to better understand the recommendations.
3. The crab OFL definitions require the use of the best available proxy for long-term MSY. Therefore, it is not appropriate for the assessment authors or the Plan Team to apply ad hoc adjustments to the OFL as a means of introducing precaution. Instead, additional conservatism,

based on uncertainty in the OFL or other considerations, should be applied when choosing actual harvest levels, in this case by the State.

4. The SSC recommends that the Plan Team be provided with an opportunity to review the revised SAFE documents in September before NMFS reviews the recommended OFLs.

General recommendation regarding process:

1. The initial review of new analyses and stock assessment models and the review of major changes to existing models for BSAI crab should be conducted during the October Council meeting

Eastern Bering Sea Snow Crab

The SSC has reviewed this assessment several times over the last few years. The central component of this assessment is a length-based model, which integrates length composition, catch of the fishery, and surveys. A CIE review and an external review this year have provided many useful suggestions for improvement. The author has incorporated some of the suggestions into the current assessment model (e.g., pooling over shell condition, new treatment of recruit size and growth, and an alternative model for estimating maturity). The SSC encourages further work on refining estimates of selectivity and natural mortality.

The SSC concurs with the Plan Team recommendations: the stock should be managed under Tier 3, the range of years (1979 and later) used for parameter estimation is appropriate, and OFL should be determined using F35% and the base model.

Bristol Bay Red King Crab

A length-based model using trawl survey data, catch data (retained + bycatch), length-frequencies from the fishery, and fishery CPUE data has been used to estimate abundances and management parameters since 1995. An alternative length-based analysis (“research model”) was developed in 2004 to include small size groups.

The SSC has previously reviewed this model. However, the model has evolved: parameter estimates are now based exclusively on post-1984 data and survey catchabilities have been fixed at values determined from trawl experiments. The author justified exclusion of pre-1985 data because a model with constant M based on the full time series could not reproduce the observed decline in crab abundance. However, there is continuing uncertainty as to whether the decline in crab abundance was due to increased mortality (e.g. predation by Pacific cod), a shift in productivity, or a fishing impact. Therefore the SAFE should include results of models based on the longer time series (1968-2008) for comparison with the preferred model.

The SSC appreciates the inclusion of additional residual plots, the retrospective analysis, and additional sensitivity analyses in the assessment. These diagnostics indicate that the model provides a very reasonable fit to the 1985-2008 data.

The SSC concurs with the authors’ and Plan Team recommendation for tier 3 management of Bristol Bay red king crab under the new OFL definitions. The SSC provisionally accepts the use of 1995-2008 recruitments for computing $B_{35\%}$ because no other alternatives were explored in the current assessment. It is anticipated that alternative parameter estimates will be presented in the next SAFE.

Perhaps because this is the best developed crab stock assessment, it also provides the greatest opportunity to focus on model details and suggests the greatest number of questions to be explored in future assessments. The SSC recommends the following modifications and additions to next year’s assessment:

1. The model should be fit to the full time series, beginning in 1968, and to the more recent time series for evaluating and comparing both alternatives. We encourage the use of available historical data and, as necessary, modifications to the model structure to account for seeming discontinuities.
2. The period of recruitment that was selected for estimating $B_{35\%}$ was based on a presumed oceanographic regime shift in 1989. However, little evidence for a shift in mean recruitment or for an effect of the regime shift on red king crab was provided. Future analyses should include a more thorough evaluation of recruitment trends based on a model fit to the full time series. Absent a strong rationale to the contrary, the reference time period should include periods of both high and low recruitment to better represent the average reproductive potential of the stock.
3. It is anticipated that a revised time series of CPUE estimates for the trawl survey will be available in time for the next assessment (Bob Foy, NMFS, pers. comm.). For consistency with other analyses and over the long term, the assessment should incorporate this revised time series.
4. The analysis could benefit from a Bayesian framework for parameter estimation with prior distributions for natural mortality (M), catchability (Q), and other parameters. For example, a prior for Q could be based on results from trawl experiments, a likelihood profile for Q could be provided, or Q could be freely estimated.
5. A better rationale for the chosen weights for different likelihood components should be provided or, wherever possible, estimated coefficients of variation should be used for time series of catch, CPUE, survey biomass, etc.
6. A table of negative log-likelihoods for each likelihood component should be included for each candidate model.
7. The apparent convergence problem in the likelihood profile (Fig. 31) should be addressed.
8. The analysis could benefit from inclusion of a figure showing male pot bycatch selectivity and should include a rationale for the chosen selectivity function.
9. Estimates of uncertainty for biomass and recruitment should be reported.
10. If historical data are incorporated in future modeling, care should be taken to account for the major changes that have occurred in gear and fishing practices between the heyday of Russian and Japanese fisheries, the wild west days of the domestic derby fishery, and the current rationalized fishery.
11. Rationalization in the crab fishery has increased the soak time and may have resulted in increased escapement of smaller crab from pots and associated changes in selectivity. The SSC recommends that the authors evaluate the effects of soak time on CPUE and selectivity.

Eastern Bering Sea Tanner Crab

This stock does not have an assessment model for the entire EBS area, so survey information forms the basis of the assessment. As also recommended by the Plan Team, the SSC recommends development of a stock assessment model, perhaps as an expansion of the model that has been developed for the Bristol Bay segment of the EBS Tanner crab stock. The SSC also agrees with the Plan Team that TAC considerations in the current chapter should be removed, because this document should pertain to determining OFL. Per Plan Team request, Jack Turnock (NMFS) presented new information regarding the calculation of gamma by the formula $F_{35\%}/M$, that was not included in the chapter. This information suggests that if male selectivities are equal to 1, then $\gamma = 1.4$, while if selectivities are equal to values given in the overfishing EA, then $\gamma = 2.1$. The SSC recommends that the latter be used to calculate OFL as it directly integrates information about selectivity and growth.

The SSC concurs with the Plan Team that this stock is in Tier 4. The SSC recommends that all years up to and including 1980 be used to calculate the reference biomass, rather than the range 1975-1980. The

SSC further requests that an alternative calculation be added to the document by September that uses all years. This will help evaluate other changes that may improve the stock assessment.

Pribilof Islands Red King Crab

The SSC supports the crab plan team recommendation for designating the Pribilof Islands red king crab as a tier 4 stock. While the SSC accepts the range of survey years (1991 to 2007) selected by the Plan Team for determining an average mature male biomass as the reference biomass level, the SSC would also like to see calculations of OFL based on the full time series of biomass estimates beginning in 1980. The SSC also requests that the catch-survey model be resurrected to provide biomass estimates for this stock in future stock assessment reports.

Pribilof Islands Blue King Crab

Estimates of abundance from the annual NMFS trawl survey are available for this stock, but there are large uncertainties in the area-swept abundance estimates. Nevertheless, it is clear that the stock is currently at extremely low levels of abundance. ADF&G is developing a catch-survey analysis model, but the model has not been reviewed. **The SSC agrees with the Plan Team's recommendation to place the stock in Tier 4, using area-swept survey abundance estimates averaged over the periods 1980-84 and 1990-97 as a proxy for B_{MSY} , and a default value of $\gamma = 1$ to determine OFL.** The SSC encourages the development of the catch-survey analysis model for next year's assessment to obtain more stable abundance estimates.

St. Matthew Island Blue King Crab

The St. Matthew Island blue king crab stock was declared to be overfished in 1999 and has been managed under a rebuilding plan since 2000. There are good catch and survey data for the stock, including a triennial ADF&G pot survey. The SAFE document reports a model fit to the data that appears to perform reasonably well.

The Plan Team was uncomfortable with some features of the assessment data (particularly the failure to include available bycatch data) and model fit, and therefore chose not to place this stock in Tier 3. Instead the team for this year preferred to use the biomass estimates from the model fit but to use the standard Tier 4 procedures to set OFL. **The SSC agrees with management of this stock under tier 4 this year and all the plan team recommendations with respect to years of data, gamma, and natural mortality rate.** However, we look forward to having the authors and the team resolve the questions about the assessment model fit so that it can be used in the near future for the OFL determination. The SAFE document has a preface stating that the authors will get together before the September plan tem meeting to work through some of the issues. The SSC would like to get a progress report and the opportunity to review the model at the October meeting.

Norton Sound Red King Crab

A new model has been developed for this stock that includes a four-stage catch-survey analysis. There is need for further exploration of this model, in terms of which parameters can be estimated and sensitivity to model specifications. Nevertheless, the SSC agrees with the Plan Team and author that the model is appropriate for determining OFL. **The SSC concurs with the placement of the stock in Tier 4 but encourages further investigation of whether this stock could be placed in Tier 3.** The SSC requests a presentation on this model at the October meeting.

The SSC also accepts the choices for range of years, but requests that the rationale be elaborated more clearly. Similarly, a rationale for setting gamma equal to 1 needs to be provided.

Aleutian Islands Golden King Crab

The SSC concurs with the Plan Team recommendation to manage this stock as a Tier 5 stock. The SSC further recommends that the OFL be determined on the basis of average retained catch from a time period between the 1985/86 and 1995/96 seasons (OFL= 9,178,438 lbs). Earlier years were not recommended for inclusion because of a difference in the size limit regulations prior to 1985/86.

The SSC notes that a stock assessment model is under development and was provided as an appendix to the SAFE chapter. The Plan Team will review the model in the fall. It holds considerable promise as an alternative approach to management of the AI golden king crab population.

Pribilof Islands Golden King Crab

The SSC concurs with the Plan Team recommendation to manage this stock as a Tier 5 stock. Tier 5 management calls for defining an MSY proxy on the basis of average retained catch from a time period (1993-1999) that is determined to be representative of the production potential of the stock (OFL= 174,206 lbs). Data to support a total catch OFL is recommended for inclusion in the next year's assessment.

Adak Red King Crab

There is currently no assessment model for this stock and the ADF&G standard stock surveys are limited in geographic scope. Assessment authors recommend managing this stock under Tier 5, where the OFL is defined as the average retained catch from a time period thought to be representative of the production potential of the stock. The current evidence provided in this document indicates that the stock has declined to very low levels with no evidence of incoming recruitment. The Plan Team felt that setting OFL based on the average catch history might lead to an excessively high OFL because of strong indications that the stock is currently in an overfished condition, although a determination of overfishing cannot be made at present due to the lack of reliable biomass estimates. The Plan Team therefore recommended using average bycatch (instead of retained catch) as a conservative OFL. Bycatch data for the determination are available for 1996/97 – 2006/07.

The SSC disagrees with the Plan Team and recommends that the OFL be set at the average retained catch over the full time period (1985/86 to 2007/08), resulting in a retained catch OFL of 464,762 lbs for 2008/09. This includes periods of high and low catches, including periods when the fishery was closed because of conservation concerns. These catches likely reflect fluctuations in stock abundance and the average retained catch should be a more appropriate proxy for the long-term average production potential than a proxy based on bycatch only. The SSC acknowledges the depressed status of the stock and notes that the ADF&G has no intention of opening the fishery, as noted on p. 489 of the SAFE. The OFL should be the most appropriate proxy for MSY, and risk aversion is more appropriately applied when setting harvest levels. This OFL would also allow continued ADF&G - Industry surveys, which have taken as much as 154,000 lbs (in 2001/02, Table 3b).

The SSC recommends that the authors explore the possibility of using a biomass dynamics (production) model to assess this stock, if the large observed changes in the distribution of the fishery can be adequately addressed.