DRAFT

MINUTES
Scientific Statistical Committee
October 1-3, 2001

The Scientific Statistical Committee met September 1-3, 2001 in SeaTac, Washington. All members were present except Terry Quinn and Seth Macinko.

Rich Marasco, Chair	Jack Tagart, Vice Chair	Steve Berkeley
Keith Criddle	Doug Eggers	Steve Hare
Mark Herrmann	Sue Hills	George Hunt, Jr.
Dan Kimura	Jeff Hartmann	Ken Pitcher
Al Tyler		

C-2 SSL MEASURES

In August, 2001 the NMFS released a Draft Supplemental Environmental Impact Statement (DSEIS) addressing proposed Steller sea lion (SSL) protection measures scheduled for implementation in 2002. In a special meeting, the NPFMC met in September to review and comment on the DSEIS. The SSC minutes from the September meeting identified a number of issues that required further attention in the DSEIS and accompanying draft Biological Opinion (BiOp4, Appendix A of the DSEIS). Given the size and scope of the DSEIS, the SSC advised the NPFMC that the committee had not had time to thoroughly review the August document, and further noted that lack of comment by the SSC should not be interpreted to imply acceptance of statements in either the DSEIS or BiOp4. During this meeting, the SSC focused its attention on changes made to the DSEIS to address our September comments. Because the changes to the DSEIS were presented to the SSC at this meeting, our prior caution regarding lack of SSC comment remains relevant. Tamra Faris, Dave Witherell, Ann Hollowed, Jim Ianelli, Galen Tromble, John Isaacs, Lew Queirolo, Ben Muse, Sue Salveson and Michael Downs reported on changes to the DSEIS. In addition to reviewing the revised DSEIS, the SSC received a briefing from W.D. Bowen on the final report of the NPFMC's SSL Independent Review Team (IRT). We provide additional comments on the IRT's final report. Public testimony was given by Julie Bonney, AGDB, Bob Alverson, FVOA, Dave Fraser and Carl Haflinger.

The DSEIS proposes protection measures designed to mitigate presumptive adverse impacts of the groundfish fishery on the survival and recovery of endangered SSLs. As the SSC has noted in the past, the true cause(s) of SSL decline and lack of recovery remain unknown; as does the impact of the groundfish fishery on SSL survival. The protective measures proposed in the DSEIS are regarded as necessary precautionary management measures to avoid possible adverse impacts of fishing.

Final Report of the Independent Review Team

The IRT final report addressed 4 tasks: 1) review of the November 30, 2000 Biological Opinion (BiOp3), 2) review of the design of field experiments, 3) evaluation of the response of other pinnipeds to nutritional stress, and 4) comment on BiOp4.

Task 1—Review BiOp3. The SSC has commented extensively on BiOp3 and has no comments on the IRT review of the document.

Task 2 – Experimental design. The IRT report contains a useful list of possible response variables that could be monitored to determine the status of the SSL population under a number of alternative hypotheses to explain their decline (Table 1, p 49 of their report). Unfortunately, the IRT did not explicitly describe the alternate hypotheses and criteria for the ratings in Table 1. However, they have pointed out many of the well-known difficulties in obtaining and interpreting the data for the response variables. The IRT concludes that large-scale experiments are unlikely to give clear answers to the questions asked and they suggest small-scale experiments. The Council still needs recommendations for "*an appropriate experimental design to improve our understanding of the interactions between fisheries and SSL, and the efficacy of proposed management measures to promote recovery of the SSL population.*" As we said in September, we recommend "*development of requisite experimental design to accomplish this task".*

Task 3—Response of Other Pinnipeds. The SSC found it interesting that the IRT did not discover instances worldwide where fisheries caused a similar decline or prevented lack of recovery of another pinniped population.

Task 4—Review of BiOp4. The SSC recognizes most of the limitations discussed by the IRT. However, it also recognizes that there is no choice but to work with the best data currently available. Additional analyses of available data and results of ongoing research will be considered as they become available. The critical question before the Council and NMFS is whether the proposed RPAs and BiOp4 are well-supported with a reasonable rationale. No new issues were identified in the IRT report that would invalidate rationales supporting the BiOp4.

Telemetry data. The IRT report highlights concerns that have been addressed in BiOp4 and the RPA committee minutes. The SSC and other Council groups have discussed these concerns extensively. BiOp4 clearly states that the proposed RPAs are sensitive to assumptions about and analysis of existing telemetry data. The SSC recognizes that there are limitations associated with the use of ARGOS derived locations data in identifying important foraging areas. However, at this time they are the best information available for developing reasonable RPAs. As noted above, fisheries are presumed to have adverse impacts on SSL survival, but the lack of definitive cause and effect relationships make it impossible to know with certainty that any proposed protection measure will render SSLs better off. As a consequence, the NMFS and RPA Committee have chosen to make reasoned assumptions regarding the benefits of such measures.

A critical assumption in the development of proposed protection measures evolved out of recent analysis of SSL satellite telemetry data. Early analysis of telemetry data was used to rationalize 10 nm and 20 nm protection zones as designated critical habitat. That analysis focused on examination of maximum distances traveled by telemetered SSLs. Recent analyses looked at the actual distribution of telemetry observations as a means to infer the probability of encounter with SSLs at fixed distances from land. The resultant interpretation of these data suggested that SSLs were predominately found within 10 nm of shore. Because the actual foraging distribution of the SSLs tagged with telemetry devises is unknown, there is a further assumption that these animals also forage predominately where they are found, i.e., within 10 nm of shore. The IRT identifies this conclusion as a critical assumption. The assumption is critical because if it is violated the inferred benefits of protecting SSL in this habitat may be unrealized. The SSC agrees with the IRT that the inferences made from the analysis of telemetry data represent critical assumptions. However, even using the most conservative approach (the 90% filtering of nearshore observations, Table 5.1b BIOP 4)) 80% of the locations of adult females, when they are on rookeries with young pups and most vulnerable to localized depletion (i.e., summer), fall within the 10 nm zone . SSLs with many observations outside of the 10 nm zone, which include summer juveniles and winter females, are sex and age classes that move widely during these

seasons and thus should be less vulnerable to localized depletions (see IRT citation Raum-Suryan et al. in press).[1]

The IRT argues that there is reason to believe that the probability of observing a telemetered SSL is biased. They suggest that SSLs have a disproportionate probability of being observed when closer to land. The new analysis of telemetry data relies on the assumption that every tagged animal had an equal probability of being observed by the tracking satellite regardless of the sea lion's position at sea. The IRT points to a number of SSL behaviors that may cause the assumption to be violated; however, each behavior identified could affect the observation of SSLs near shore as well as off shore. Consequently, the actual impacts of these behaviors on the overall probability of sighting a telemetered animal are indeterminate.

The SSC believes that the existing data and current analyses are the best information available upon which to build a rationale for the establishment of protective zones, just as earlier analyses of a subset of the existing telemetry data were the best information available to base an initial definition of critical habitat. As existing data undergo more rigorous analyses, additional telemetery data become available, and as marine mammal scientists acquire the ability to tag a wider range of size or age classes in the SSL population we may observe a different pattern of sea lion distribution. When such data are available, we can revamp our concepts of appropriate protection zones. Until then, we must make due with the information at hand.

Jeopardy calculations**.** Again, the IRT report restates the general discomfort expressed previously by the BiOp4, RPA committee, SSC and other Council family with the lack of a "bright line" definition of what constitutes jeopardy. The IRT final report notes (P. 39) that "*all of these predictions* [i.e., projections of population trends under alternative RPAs] *must be interpreted with great caution*." BiOp4 states (P. 135, line 4) "*The population trajectories ...are not intended to accurately predict population trends. Rather, given the assumptions discussed above, the predicted trajectory was intended for use as an index of the effectiveness of the proposed action ...*" Clearly, the IRT's concern is duly noted in the BiOp.

Draft SEIS

The main problems highlighted by the SSC are significance criteria utilizing TAC, a new index of daily removals, and an explanation of the determinations made in the cumulative impacts section. Although we have not seen new language for all sections of the revised DSEIS, the sections we did see and description of proposed changes provided to us during briefings (e.g., subsistence, accounting for additional costs of observers) seemed responsive to our comments.

[1]Raum-Surya, K.L., K.W. Pitcher, J.L. Sease, T.R Loughlin, D.G. Calkins (in press). Insights to dispersal, rookery fidelity, and metapopulation structure of Steller sea lions (*Eumetopias jubatus*) in an increasing and declining population in Alaska, Marine Mammal Science.

Section 4.1 Effects on Marine Mammals

In our September minutes the SSC noted that:

> "The DSEIS uses a system of classification for the significance of assumed impacts of the alternative proposed management actions. One of the criteria for this system is the proportional change in annual TACs. The SSC recommends that TAC not be used as metric for significance classification. The global availability of pollock, Pacific cod and Atka mackerel is determined to be adequate to meet the foraging needs of SSLs in BiOp4 (p 147, lines 18-21): "*The effects described above indicate that the fisheries as proposed, are not likely to reduce the abundance of prey within local foraging areas and alter the distribution of groundfish prey in ways that could reasonably be expected to reduce the foraging effectiveness of sea lions, therefore, it would not reduce the likelihood of their survival and successful reproduction nor their likelihood of recovery in the wild."* The DSEIS rates the impacts of harvest of prey as "conditionally significant negative (adverse)". This inconsistency needs to be resolved."

In September, the SSC was disturbed by the utilization of TAC to infer positive or negative impacts on the harvest of SSL prey. In prior opinions, NMFS focused on localized depletion of prey resources as the vector for potential adverse impacts of fisheries on the survival of SSLs. Since the TAC addresses the global level of removals, and since global catch is not regarded as a constraint on SSL survival, the application of a TAC metric appeared completely inappropriate.

In response to the September SSC comments, Tables of the Summary of Effects of Alternatives 1 through 5 were updated. In the October version of the SEIS, a new set of criteria were developed to judge the effect of harvest on prey resources. These criteria are based on the deviation of daily average removal rates[2]. The old TAC criteria were also retained. The SSC has a number of concerns as to the appropriateness of the new approach. The document provides almost no explanation of the new scoring methodology. Thus, before detailing the weaknesses of the new approach, a summary of the approach is provided.

1. For each Alternative, a Daily Average Removal Rate is computed by species for every day of the calendar year (e.g., September SEIS Figs. 4.1-5, 4.1-7 and 4.1-9).
2. An average Daily Removal Rate across Alternatives is then computed for each calendar day.
3. For each alternative a ratio (termed deviation in the document) of the daily removal rate to the average daily removal rate across alternatives is computed. Ratios less than 1.0 are given a negative value.
4. This daily ratio is then summed (integrated) across the days of the year to obtain the yearly sum of relative mean daily removal rate deviates (October SEIS, Table 4.1-3).
5. A yearly sum between –100 and +100 results in a significance rating of I. Absolute values between 101 and 250 result in a CS rating (a positive sum yields a CS- rating). Absolute values greater than 250 result in a significant rating.

The new rating criteria are flawed by a number of logical inconsistencies, not the least of which is that the calculated index has little intuitive meaning. For example, an alternative that allowed 100% of the TAC to be caught in a single day, when other alternatives had zero catch, would be

[2] Under this new approach all previous scoring in the Marine Mammal and Cetacean ESA listed tables of both CS+ and CS- in the Harvest of Prey Species Question have been changed to Insignificant (I).

regarded as having an insignificant impact on the harvest of prey because it's ratio score would be zero. The method for evaluating the harvest of prey species might be approached more rationally as follows:

1. Assume that low TAC is better.
2. Assume that constant catch throughout the year is better.
3. Pick a desirable TAC that would be S+, that is lower than all Alternative TACs.
4. The daily catch based on this TAC is m=TAC/365.
5. For each Alternative calculate the daily catch rate, say dj, j=1,365.
6. Calculate the root mean square error rmse=sqrt(S(dj-m)^2/365).

The smaller the RMSE the better. The RMSE can be increased only by increasing TAC or increasing variability of the daily catch rate.

If this category is retained as a measured effect of alternatives, criteria for judging the impact must relate to the likelihood that harvest will be more or less concentrated in space and time.

Cumulative Impacts – The SSC received a report that answered some of the questions addressed in our September minutes, however we received no revised language or outline of proposed changes to the document that address the problems noted. The SSC reiterates its concern over the lack of definition of terms and description of methods.

Economic Issues--It was reported that all SSC concerns were addressed in regard to the portions of the SEIS that focused on economics. The concern over the econometric market modeling was addressed by pulling that section out of the report. This will not affect the economic findings presented in the SEIS as the econometric model was not used in the initial analysis. The failure of having a defensible market model here should not discourage future efforts to build these models. Indeed, increased effort needs to be put into building and maintaining these types of market models so that when they are needed the analyst will have sufficient time to use them effectively.

C-3 SEABIRD BYCATCH REDUCTION

The SSC heard a report by Edward Melvin on a two-year study on "Solutions to seabird bycatch in Alaska's longline fishery". The SSC was also presented with a summary of the draft EA/RIR/IRFA on seabird avoidance measures by Kim Rivera, NMFS Protected Resources Division. Public testimony was given by Thorn Smith, representing the North Pacific Longline Association, Liz Mitchel, a former observer, and Jerry Merrigan, representing Prowler Fisheries.

The SSC offers the following comments on the issue of avoidance of seabird bycatch, in particular the bycatch of the endangered short-tailed albatross.

The SSC found that the Washington State SeaGrant Study of methods to reduce seabird bycatch was excellent in its conception, execution and analysis, as pertains to the reduction of seabird bycatch by large vessels involved with the Pacific cod and the sablefish and halibut IFQ longline fisheries.

The SSC notes that the proposed changes to existing regulations, while appropriate and useful for reduction of seabird bycatch by the large vessels in the longline fishery, may not be appropriate for application on smaller vessels, particularly small vessels fishing in the inside waters of

southeast Alaska. We suggest that the inside waters of southeast Alaska are not frequented by Short-tailed Albatrosses at present, and therefore less stringent regulations to avoid seabird bycatch may be appropriate.

There remains a need for additional study of the necessity for bycatch reduction on small vessels and on the best ways to achieve this, if bycatch reduction is required. The SSC recognizes that small vessels may not be able to deploy streamer lines as specified for the larger vessels of the longline fleet. The SSC suggests that it may be appropriate for the implementation of improved seabird bycatch reduction on large vessels at this time. However, it may be appropriate to delay imposition of new regulations on the smaller vessels, other than the removal of the nighttime deployment of gear as an approved method for bycatch reduction, until more information about the amount of bycatch taken by the smaller vessels is available. We suggest that members of the small-vessel segment of the industry cooperate in developing new information, equivalent to that now available from the larger vessels on the frequency of bycatch and the most appropriate methods for bycatch reduction.

The SSC suggests that the tables on pages 52 and 56 of the EA/RIR/IRFA should be reconsidered in light of the possibility that bycatch of Laysan and Black-footed Albatrosses may have significant negative impacts on the these species, even though demonstration of such impacts may be difficult. Alternatives 1 and 2 might be more reasonably considered as CS- rather than I.

The SSC is concerned that performance standards, such as having streamers extend to a point at which the ground line is 2 m below the surface, will be extremely difficult to enforce.

The SSC finds few data to back up the statement on page 2 of the EA/RIR/IRFA that "All of the proposed alternatives have the potential to impose significant adverse economic impacts on a substantial number of small entities." There is a need for more complete analyses of the benefits of reduced bait loss, reduction of risk of fisheries closure, as well as the costs of installing and operating the seabird bycatch avoidance measures.

C-5 DRAFT SEIS

Steve Davis (NMFS) provided the SSC with an update on the status of the DPSEIS. The preparers are in the process of categorizing and responding to comments provided following public release of the document.

D-1 GROUNDFISH

Preliminary 2002 Groundfish SAFE Reports.

The SSC received an oral presentation by NMFS/AFSC staff on the preliminary results of several stock assessment surveys conducted in 2001. These included:

1. The winter/spring hydroacoustic mid-water trawl survey of eastern Bering Sea including area 518, SCA, and areas north and west of the SCA.
2. The winter 2001 bottom trawl survey of the SCA in the eastern Bering Sea, the Shumagin Islands area of the GOA, and areas south of Kodiak in the GOA.
3. The preliminary results of the summer 2001 bottom trawl survey of the eastern Bering Sea.
4. The winter/spring hydroacoustic mid-water trawl survey of the GOA. The SSC notes that comprehensive surveys were conducted on spawning aggregations of Pollock in the Shumagin Islands area, the Cherikof/Shelikof area, and areas south of Kodiak Island.
5. The summer 2001 biennual bottom trawl survey of the western and central Gulf of Alaska.

The SSC notes that the eastern GOA was not surveyed in 2001 and that full assessment of biomass will not be available for many groundfish species. The unsurveyed area is important, especially for rockfish and thornyheads. Therefore, effort should be made to survey this area in the future.

Related SAFE Issues

EBS/AI Pacific Ocean Perch

Paul Spencer and Jim Ianelli from the AFSC, presented results from a new AD Model Builder model for Pacific Ocean perch in the EBS/AI regions. The AD Model Builder results were carefully calibrated with previous stock synthesis results before proceeding. Because of the inadequacy of POP survey data for the EBS in terms of the time, area, depth, and precision of coverage, the EBS survey data were not sufficient to support an independent stock assessment model for that region. Therefore, the SSC is on record requesting that a POP model combining the EBS and AI regions be attempted. The current assessment fulfils that request. Nevertheless, available biological data and modeling results leave it unclear whether POP in the EBS and AI are indeed a single stock. However, the SSC believes that the combined assessment using only the AI survey data should be used for stock assessment, until either sufficient data are available for a separate EBS assessment, or the stock structure of POP in the EBS and AI regions becomes known. Therefore, the SSC prefers the assessments, that combine the EBS/AI into a single assessment model. The options include: (1) basing the assessment on the AI stock alone, thereby ignoring the EBS portion of the stock, and (2) including both the EBS and AI catches and AI and EBS survey time series. The first of these options seems overly conservative while the second might overweight the questionable EBS time series. The final options which seems preferable, would be to base the assessment on the total AI/EBS catches, but using only the AI survey data.

Other Species - approaches to assessments

The SSC received a discussion paper from Jane DiCosimo and Sarah Gaichas on progress towards management of the 'other species' categories for the BS/AI and GOA regions. The SSC is concerned that management based on gross taxonomic groupings will lead to a weakest link problem, where management will be expected to demonstrate "no harm" to species present in low and declining numbers. The development of ABCs and TAC for gross taxonomic groupings has the problem that species are grouped together that are neither ecologically connected, nor similar in their rates of productivity. This is a NMFS-wide problem that may need to be approached at a national level. The SSC recommends continuation of the current approach while a search is conducted for an alternative method.

For many of the other species, biological and catch information is of questionable quality due to limited sampling, imprecise species identification and other factors. We don't expect significant improvement in our knowledge in the immediate future. Rather than using typical quota setting measures for conservation of other species, other devices, such as restricted area management, should be explored. Survey and observer catch data should be examined to determine if such an approach has promise.

Historic Trends In GOA Pollock Abundance Based on Pre-1984 Bottom Trawl Surveys.

Martin Dorn presented work done with Elizabeth Conners and Eric Brown at the AFSC, to extend trawl survey biomass estimates for the GOA back to the 1961-1984 time period. These surveys were performed using a 400 mesh eastern trawl, and therefore required a recent fishing power correction (von Szalay and Brown, in press)[3] from the 400 mesh eastern trawl to the NMFS poly-nor'eastern trawl used for the NMFS triennial bottom trawl surveys. The method used by Dorn et al. involved using a GLM model to compensate for very inconsistent site sampling at carefully selected trend sites sampled over the years. GLM allows following annual trends in abundance despite inconsistent sampling of sites. These GLM estimates were then adjusted using the FPC to provide results comparable with results from recent surveys. Utilizing these data in the stock assessment model showed improved confidence in hind-casts despite large variations in the standardized survey estimates.

Thornyheads

The SSC received a report from Sarah Gaichas on the status of stocks of thornyhead rockfish. Model estimates of natural mortality rates seemed high to the SSC in part because they exceed rates for Pacific ocean perch a species with lesser longevity. We suspected that the model might be reacting to a truncated age distribution from the fishery. Thoryhead rockfish are known for their size and age stratification by depth (i.e., their bathymetric demography). For the population along the Pacific coast (WA, OR, CA) smaller fish are typically found on the shelf and larger fish along the slope. We recommend that stock analysts explore the bathymetric demography of the species in Alaskan waters, and evaluate whether the catch-at-age data are appropriately stratified to reflect thornyhead size and age stratification.

[3]Von Szclay, P.G. and E. Brown, In Press. A side-byside trawl comparison to determine fishing power differences and their applicability between Natural Marine Fisheries Service and Alaska Department of Fish and Game trawl survey gear. Alaska Fishery Research Bulletin.

D-2 CRAB

Doug Pengilly and Gretchen Harrington presented the 2001 king and Tanner crab SAFE to the SSC.

The 2001 crab SAFE shows little recovery for the depressed crab stocks. For another year, only Bristol Bay red king crab and EBS snow crab are in condition to support any directed fishery. Pribilof Island blue king crab and St. Matthew blue king crab are classed overfished, with no directed fishery as sustainable yields are below threshold for fishery openings. The results of the 2001 survey show little evidence of recruitment and these stocks are expected to remain depressed. Pribiof Island red king crab is closed due to blue king crab bycatch concerns and uncertainty in survey estimates of spawning biomass. The spawning biomass of EBS Tanner crab increased slightly from the 2001 level but is well below the MSST level. Results of the 2001 survey suggest some moderate recruitment of juveniles.

The spawning biomass of Bristol Bay red king crab remained unchanged from the 2001 level and is roughly at the B_{msy} level. The spawning biomass of Bering Sea snow crab is above MSST, and increasing due to recruitment of males and females in the 70 mm CW size range. The size frequency data from the 2001 survey suggests that spawning biomass of Bering Sea snow crab can be expected to increase in the coming year.

The SSC received an update on the plans to complete an EIS for BSAI crab fishery management plan. This effort will be directed at analyzing alternative fishery management measures under a rationalized crab fishery. The analysis will be conducted in parallel with the economic analysis of crab rationalization with the draft EIS completed by April 2002. The SSC notes that changes to the management system under a rationalized fishery will be substantial. Many elements of the current management system under an open access fishery will not be appropriate under a rationalized fishery and will have to be re-evaluated. Catch monitoring, the minimum GHL's, pot limits, seasons, and the method of in-season adjustments required to conserve stocks given the uncertainty in pre-season assessments will have to be re-evaluated. The SSC notes that the EIS development team has not been appointed, nor have ADF&G staff resources been identified to assist with the EIS. Thus we are concerned about the ability to have a draft document completed by April.

MISCELLANEOUS ITEMS

Plan Team Membership

The SSC recommends the appointment of Lowell Fritz to the BSAI Groundfish and Forest Bowers to the BSAI Crab Plan Teams, respectively.

"Effects of the AFA on the Harvesting Capacity Utilization and Technical Efficiency of Catcher-Processors," by Ron Felthoven, National Marine Fisheries Service.

Ron Felthoven (NMFS) presented initial results from an analysis of recent changes in fishery capacity and capacity utilization in the BSAI pollock fishery. The analysis offers some interesting insights into the consequences of changes induced by the shift to Co-Op management in the pollock fishery. In the absence of operator cost data, the techniques employed offer a promising approach to examine the potential changes in fleet structure under alternative management actions. As a refinement of the stochastic production frontiers model it is suggested

that a proxy for skipper and crew experience be constructed and examined as a possible additional input variable to separate out technical inefficiency from differences in harvests due to skipper and crew expertise.

Crab Rationalization (Comments provided by the SSC Economic Group)

Following the June Council meeting Chris Oliver informed the SSC that the Council requested economic performance measures for the crab rationalization program. This request was made in response to the Council's expression of interest in receiving input regarding ways to, "objectively measure the success of the program." His letter of June 26, 2001, indicated an interest in determining, "…benefits and impacts to harvesters (including vessel owners, skippers and crew), processors and communities.."

Performance measures will vary with the types of policy choices being considered and the entities that are the focus of the effects analysis. An existing set of policy choices are outlined in the June motion on crab rationalization analysis, and it is assumed that the economic effects to be analyzed are the efficiency and distributional effects that satisfy the Council's interest and respond to various Congressional and Executive mandates. It is also assumed that these measures will include the monitoring of change in support sectors, at the regional or community level.

The types of measures that we believe are relevant to the council request are listed below, and are followed by a listing of potential data required.

- Net economic benefits for industry producers
- Distribution of profits
- Distribution of personal income and employment
- Distribution of harvester and processor primary expenditures
- Other distributional effects
- Changes in revenue per pot lift
- Changes in 1st wholesale revenue and export revenue
- Changes in deadloss
- Changes in pots fished per trip
- Changes in distribution of landings
- Changes in employment (fishing and processing)

Ideally, performance measures would provide direct information about changes in the profitability of fishing and processing. Application of any of the critical measures identified above requires the design and implementation of a mandatory comprehensive data collection program. While too numerous to list all the examples here, this conclusion has been reached after many unsuccessful voluntary efforts to collect economic data from various segments of North Pacific fisheries. The latest example of an unsuccessful voluntary data collection effort is the ownership data for Pollock catcher vessels for the required report to congress on AFA.

This list of data given below is intended to characterize the information that would need to be collected for the harvesting and processing sectors of the BSAI crab fishery. We request additional time to consult with other economists and industry to describe more specific data collection and confidentiality issues.

This data collection will include the following mandatory information:

- Annual harvesting and processor ownership, firm organizational information and verification of all vessels and permit holders involved in the BSAI crab fisheries.
- Prices and quantities of landed product by vessel and permit by relevant species, size and possible other factors by individual landing.
- Prices and quantities of wholesale product, by firm, including quality variables and products by week or month (or other observation period).
- Annual Crew and Labor unique identifiers and name and address data for vessels and processing operations. (may be coordinated through ADOL)
- Monthly crew and labor activity (and payments) by unique identifier.
- Periodic (i.e. once / 3 to 5 years) harvester and processor fixed and variable cost data collection through a sample of firms (or census).
- Prices of quota exchanges or market exchange of history.
- Pots carried per trip.
- Charges in dead loss.

Expanded discussion of Annual and Periodic Industry Economic data for Harvesters and Processors in Rationalized Crab fisheries.

Annual harvesting and processor Ownership and firm organizational information and verification.
The unit that forms the basis for economic observation is a firm. A firm may be defined as a vessel, plant or various aggregations of these components. Organizational connections may have implications for economic behavior of an entity and is also useful in determining how the industry is concentrated. Increasingly, the Council is dealing with industry aggregation issues that have implications for how prices may be determined. The identifiers for a firm should include addresses, phone numbers owner names, federal ID numbers and SSN numbers. This information should be updated when a vessel or plant is transferred, and should be verified at least annually.

Prices and quantities of landed product
Observations of prices and quantities for current BSAI crab fisheries are currently collected on fish tickets. Unlike many fisheries, landed prices for crab have a fairly good record for pricing individual fish tickets. Pricing fish tickets would need to become mandatory under this action, and a regulatory change would need to be prepared for and passed by the Board of Fish to implement this regulation.

Prices and quantities of Processed product
Currently, processed product prices and quantities for crab are recorded in the Commercial Operators Annual report. As an annual report, this data is collected only once per year and aggregates a full year of buying and selling. While this annual data reporting is important, wholesale revenue changes beyond those induced by stock fluctuations will require more frequent reporting intervals.

Prices and quantities of quota share exchanges or exchanges of history.
If the Council implements a transferable quota or cooperative, some type of record of transaction and details on exchange of shares or history would be required as part of an applied rationalization program. The RAM Division would presumably monitor and administer this program and data collection.
Annual Crew and Labor unique identifiers
All participants in a fishery including crew and skipper need to be identified to collect information on monthly wages and employment. This would require a name and address data for

these participants in a vessel operation. While permit holders are now included in the registration data for holding limited entry permits in crab fisheries, monthly crew identification will be needed. There are a number of ways that this could be accomplished, for example, it could be coordinated through ADOL, or ADF&G.

Annual Labor unique identifiers and name and address files for laborers in processing operations.

Various Alaska Department of Labor databases collect much of this information for some processing operations. A review of the coverage of this reporting would be required to determine if it is sufficient**.**

Monthly labor activity by unique identifier for both Harvesting and Processing

Labor costs are typically a significant input to the harvesting and processing of fish. No labor data collection exists in crab fisheries or other Alaska fisheries (permit holder information exists but does not record crew labor). Labor requirements are likely to respond dramatically as open access fishery is converted to an IFQ, cooperative, or similar rights based management regime. Unique identifiers are required for crew and other labor because an individual may work on more than one vessel in a month, or week. The National Bureau of Labor statistics data collection that is used to estimate employment data for all other industries requires individual identifier information for its estimates.

Periodic (i.e. once every 3 to 5 years) harvester and processor fixed and variable cost data collection through a sample of firms (or census).

Industry costs are critical to developing estimates of net benefits and distributional effects analysis. The costs to individual firms to provide detailed cost information may be considerable, particularly when these firms are small operations. A properly designed periodic cost and earnings information collection effort augmented by other management information data that may be collected is sufficient for evaluating many anticipated questions. Structured cost surveys may also be augmented by reporting of annual tax reports for schedule C.

Pots carried per trip

Current data on use of pots is limited to records of registration. Additional information could be collected on landing slips or other means. Changes in pots carried per trip would provide indirect information about changes operating costs and in the safety of fishing activities.

Changes in deadloss

Change in deadloss from handling and release may be a proxy for the conservation effects of a rationalization program, or provide feedback to bioeconomic models.