North Pacific Fishery Management Council

Richard B. Lauber, Chairman
Clarence G. Pautzke, Executive Director

Telephone: (907) 271-2809

605 West 4th Avenue, Suite 306
Anchorage, AK 99501-2252

Fax: (907) 271-2817

Certified Dave Benduxen

Date 1/16/96

MINUTES
Scientific and Statistical Committee
December 4-6, 1995

The Scientific and Statistical Committee of the North Pacific Fishery Management Council met December 4-6, 1995 at the Hilton Hotel in Anchorage. All members were present except Marc Miller:

Terrance Quinn II, Chair	Keith Criddle, Vice-Chair
Doug Eggers	Al Tyler
Rich Marasco	Harold Weeks
Jack Tagart	Bill Aron
Phil Rigby	Sue Hills
Doug Larson	

C-3 Improved Retention and Utilization (IR/IU)

Chris Oliver explained the history of this proposal and Lew Queirolo presented the analytical outline for the EA/RIR. Public testimony was presented by Paul Seaton of AMCC and John Gauvin of AFTA.

The SSC identified a number of concerns about the proposed amendment and developed a number of recommendations about issues the analysts should consider in the EA/RIR.

First the Council needs to provide a clear statement of the problem. One reference to a problem is a clause (page 1, paragraph 2) from the September 11, 1995 revision of the document, "Increased Retention /Increased Utilization Implementation Issues Associated with the BSAI Mid-water Pollock and BSAI Rock Sole Fisheries," which appeared as Agenda Item C-5(c) in September and as C-3(b) at this meeting:

"the concern that, under present regulations, groundfish catches are being 'underutilized,' resulting in discard levels which are perceived to be unacceptably high."

This might be a useful starting place for drafting the problem statement.

Secondly, the Council should provide the staff with a clearer articulation of the objective(s) of the proposed amendment, which seems to involve the way groundfish resources are used. The SSC notes that two objectives related to resource use are:

(1) to encourage vessels to avoid bycatch in the first place; and
(2) to require that bycatch which does occur is processed to some degree.

The Council might have other objectives in mind, as well.

Under objective (1), improved retention is imposed as a burden to get harvesters to alter their behavior, so as to reduce bycatch.

If the Council adopts (1) as the primary objective, the SSC is concerned that the range of alternatives considered in the proposed analytical outline may not be sufficiently broad. There are a number of ways to control bycatch other than by requiring increased processing of bycatch, including: setting bycatch levels directly, for vessels, fleets, or the fishery as a whole; specifying time/area closures; and gear restrictions. The SSC recognizes that many of these have been used in the past, and that with limited time for analysis it may not be possible to evaluate the full suite of alternatives. The SSC recommends that the staff maintain a close linkage with the concurrent proposal on IBQs to utilize insights that may emerge from that analysis in the evaluation of IR/IU alternatives. The EA/RIR should also include an explanation as to why the alternatives analyzed were chosen.

If the Council adopts (2) as the primary objective, the analysis may well show that costs from the proposal exceed benefits. The fact that the industry is not now utilizing bycatch indicates that it is unprofitable to do so, so the requirement of increased retention could lower profits and net benefits from the fishery. While it is possible that markets to support the products produced by further utilization of bycatch may emerge, it is by no means assured. It is possible that IR/IU will simply require more processing (and processing cost) of product that will end up being disposed. To help resolve these questions, the SSC recommends that the staff evaluate, to the extent possible, the degree to which existing markets are capable of absorbing the product resulting from IR/IU processing. Particular attention should be paid to the whitefish meal market.

The SSC was presented with two alternatives: Alternative 1 applies only to processors. Alternative 2 encompasses catcher boats as well. With respect to these Alternatives, the SSC discussed the issue of monitoring and enforcement in some detail. Alternative 1 will not likely control discards that could occur from unobserved hauls and from catcher boats delivering to shoreside processors, because it applies only to processors. This may lead to significant differential effects on different segments of the fleet, which should be considered in the analysis. Differential effects will also occur because some segments of the industry will potentially have to invest in processing equipment while others will not. Small catcher-processors may not be able to accommodate meal plants or storage for low value, high volume products

A critical issue for effective enforcement is the level of observer coverage in the fishery. Under both Alternatives, intense monitoring will require an increase in coverage per vessel and the number of vessels with observers. It is imperative that observer responsibilities related to the IR/IU program not degrade the quality of the existing biological and catch data collected by the Observer Program.

Staff indicates that enforcement will be based on the observed product mix for processors, back-calculated using NMFS Standard Product Recovery Rates. The SSC notes that this is problematic because of the variation in PRRs for individual processors and the incentives which may be created to manipulate those PRRs under the IR/IU proposal. The SSC requests that staff consider in the analysis the likely detection thresholds which would trigger enforcement. That is, given what is known about the variation in PRRs and vessel by vessel variations in bycatch, what magnitude of discrepancy would be needed to indicate a potential violation?

The SSC also discussed the potential ecological implications of not returning bycatch to the marine ecosystem. The diversion of such a large source of carbon from the marine ecosystem could have significant effects on marine communities. Though this most likely cannot be evaluated quantitatively, a qualitative discussion may give a sense for the order of magnitude of impact.

C-4 Individual Bycatch Quotas/Comprehensive Rationalization

The SSC notes that there is a symmetry in impacts that the analysis should fully recognize. The directed fisheries for bycatch species also can be viewed as imposing costs on the groundfish fisheries, to the extent that bycatch caps prevent attainment of OY for groundfish stocks or cause the groundfish fisheries to fish on less productive grounds. The SSC noted that Appendix B (this material is also presented in Processed Report 95-07, pp. 5-8, Figure 1-3.) explaining the analytical framework for the bycatch problem, while correct, is written in a non-standard way and could be confusing. The SSC gave suggestions for modifications to the analysts and recommends it be rewritten before being circulated widely for review. The SSC commends the analysts for drawing on experience with other commodities where quota-like systems have been used, as in the NMFS Processed Report 95-03, and encourages them to continue doing so in the development of the analysis.

The following observations on the analytical outline were made:

-- The SSC recommended that staff working on this proposal communicate regularly with staff working on the IR/IU proposal because of the common elements of both analyses.

-- A clear rationale for excluding salmon from the definition of VBA species should be provided.

-- The SSC noted that transferability of individual bycatch quotas is likely to be an important factor in determining the net social benefits of an IBQ system, because it will not be possible for management authorities to determine a priori what the efficient levels of bycatch for individual vessels are. The analysis should also consider the ways in which the alternatives identified in Item 4 of the analysis differ with respect to their monitoring and enforcement requirements.

-- In the spirit of full utilization, Item 5 (Retention of VBA species) should also consider the alternative of retention and use of VBA species. Item 10 should also consider the option of allowing vessels in the fleet to "opt in" to the VBAP if they are not originally part of the program; that is, what are the individual-vessel benefits of doing so traded off against higher observer/management/enforcement costs.

-- Item 12 needs to consider the implications of deviations greater than 10% from a vessel's VBA. The analysis should consider potential biological impacts in addition to the management requirements.

-- Item 13.2 appears to be redundant with Item 2.3.

-- The restrictions on VBA ownership in Item 16.1 need to be specified.

Processed Report 95-07 contains a comparison of the CDQ and open access pollock fisheries in the Eastern Bering Sea and should be useful for the IBQ analysis. The SSC recommends that the analysts take the analysis one step further and develop standard error estimates for the point estimates of bycatch rates. The assertions of "significant differences" in bycatch rates of herring and Tanner crab between the two fisheries (e.g., pp. 16, 17, 18, 20) imply statistical significance. The SSC notes that the term "significant" as used in the text was not meant to imply that the differences observed were significant in the statistical sense.

Lastly, it is noted in the Analytical Outline that in the absence of adequate monitoring and enforcement, there would not be accountability of the vessel level and the three objectives of a VBAP would not be met. It was also indicated that NMFS has initiated efforts to determine how these two issues might be addressed. **Given the complexity of the program outline and the outstanding monitoring and enforcement issues, the SSC recommends that serious thought be given to the design and implementation of a small pilot program.** Such an approach would supply information that would assist in the design of a full scale program.

C-5 Observer Program

The SSC received reports from Council staff, NMFS staff and Chris Blackburn, Observer Oversight Committee Chair. Public testimony was received from Ron Dearborn, Jerry Nelson and Paul McGregor.

As in September, the SSC reiterates its serious concern over future data quality. As pointed out in September, regardless of the funding mechanism chosen, the SSC believes in order to be effective the program must contain several essential elements:

- The program must have statistically sound levels of coverage. Previous studies have suggested that coverage at 20 to 30% may be adequate for stock assessment, closer to 90% for bycatch estimation of certain species, and 100% or more for management programs requiring individual compliance.
- Observer placement must be flexible enough to provide representative data from all fisheries. Ideally, a type of random sampling scheme would be used to select vessels, trips, and/or hauls.
- Compensation and treatment of observers must be sufficient to retain experienced and well trained personnel.
- An "arms length" relationship must exist between the entity suppling the observer and the recipient.
- Program objectives, data collection methodologies and data quality should undergo periodic review.
- Data needs and priorities should be evaluated annually.

To some extent, the current Pay-As-You Go program lacks five of these six elements. Staff and OOC presentations and SSC discussions suggest that **elements listed above can be built into either the Research Plan or a modified Pay-As-You-Go program. The SSC urges the Council to move swiftly and select one of these two options for implementation.** Prolonged debate on this issue will only increase uncertainty faced by industry and persons associated with the program. Increased uncertainty will undermine the morale of observers and program staff, with the likely end result being the deterioration in the quality of the program and data collected.

D-1 GENERAL SAFE ISSUES

Rationale for Using $F_{40\%}$ in Some Stock Assessments

In the 1960's and 1970's, most fishery management recommendations were concerned with determining maximum sustained yield (MSY) and its associated fishing mortality F_{MSY}. Due to uncertainties in recruitment processes and quality of information, many scientists became skeptical of the ability to determine MSY and feared that recommended harvest levels from that policy were too high. During the early 1980's, the first shift to lower exploitation rates came with the introduction of $F_{0.1}$, which is based on the point where the marginal change in yield with increasing exploitation is reduced to 10% of that at low exploitation levels. In the late 1980's, concern over $F_{0.1}$ and related policies was expressed, because no explicit consideration of spawning stock preservation was contained in these policies. This led to the use of policies based on the exploitation rate that would keep spawning stock biomass (per recruit) above a "safe" level. By examining several species and life histories, it turned out that the $F_{35\%}$ level was a suitable proxy for the F_{MSY} level. These examinations did not consider variability in recruitment. Recently, examinations were made where variability in recruitment was accounted for. When variability in recruitment is high, and especially when the presence of low recruitment might persist over time, harvesting at the $F_{40\%}$ level has been recommended. As explained in a paper by William Clark

(1993): "The year-to-year variability of yield is hardly affected by the target level of spawning biomass per recruit, but the frequency of episodes of low spawning biomass -- if defined as less than 20% of the unfished level -- may be reduced substantially by fishing at $F_{40\%}$ rather than $F_{35\%}$, even though there is only a small difference in average spawning biomass between $F_{35\%}$ and $F_{40\%}$."

The Plan Teams and SSC considered which stocks in the BSAI and Gulf of Alaska are subject to high recruitment variability or uncertainty. Generally, the gadids (pollock and cod), sablefish, rockfishes, and Atka mackerel are candidates for consideration. While the Teams and SSC did not agree in every case, **there was general agreement that $F_{40\%}$ was a desirable harvest rate for consideration in the evolution of conservative harvest rate policies.** SSC recommendations below for pollock, cod, Greenland turbot, POP, and Atka mackerel for both the BSAI and GOA are based on harvest rates at least as low as $F_{40\%}$. For other flatfishes, recruitment variability is not much of an issue at the current time, so our recommendations continue to be based on $F_{35\%}$, in agreement with the Teams. For sablefish, the current biomass - based adjustment has been shown to be suitably conservative, so we continue to recommend that policy and note that the analysts will be studying alternatives in the next year. For other rockfishes, harvest recommendations are mostly based on F=M (natural mortality), at least partly due to lack of sufficient data for doing anything else. We encourage further collection and examination of maturity data for rockfishes, as well as examination of $F_{40\%}$, in order to refine harvest rates in the future.

Notes to the Teams about SAFEs

The SSC suggests to the Teams that they reevaluate their ABC and OFL policies at their 1996 meetings, in light of a movement to $F_{40\%}$ as a target fishing mortality for some species and consideration of changes to OFL definitions (which should be in an EA/RIR in January, 1996).

The SSC suggests that the Teams consider the stock assessment document from the Northeast Fisheries Science Center, which Council staff will make available. In that document are graphical presentations of the stock assessment process and uncertainty in data and modeling, which might be adapted for use in our SAFE's. The SSC continues to encourage additional material in the SAFE's that describe uncertainty in assessment results.

D-1(a) BERING SEA ALEUTIAN ISLANDS SAFE

BSAI - Pollock

The status of stocks of the eastern Bering Sea (EBS), Aleutian Island (AI) and Bogoslof pollock resource was reviewed for the SSC by Dr. Loh-Lee Low.

EBS: The pollock resource of the EBS is assessed using three primary models: cohort analysis, CAGEAN, and stock synthesis. Each model is prepared by a separate analyst. These three methods independently resulted in estimates of 1994 biomass which were very similar to each other, ranging from 7.1 to 7.2 million mt. Because of this similarity, the Plan Team accepted the biomass estimate from the cohort analysis (least-squares estimation technique), and thus maintained continuity with past estimates of abundance. Using cohort analysis and projected recruitment in 1995 and 1996, the 1996 estimated stock biomass was 7.36 million mt. **The SSC agrees with this general approach but has concerns about the method of projection.**

There was considerable discussion about the predicted strength of the 1992 year class. The current fishery has been heavily dependent on the very strong 1989 year class, and is expected to become dependent on the 1992 year class. Estimates of the 1995 and 1996 recruitment at age 3 (the 1992 and 1993 year classes) are based on a linear relationship between age 1 abundance as seen in the trawl survey and modeled age 3 abundance from the cohort analysis. The SSC attempted to evaluate alternative interpretations of the relationship between surveyed age 1

and modeled age 3 abundance. The linear model as developed by the stock assessment author is strongly influenced by the large 1989 year class. The effect of this influence is to cause 7 of the last 8 projections of year class strength to exceed the observed (modeled) year class abundance. Substitute linear models which eliminate or reduce the influence of the 1989 year class on projected recruitment result in lower estimates of recruitment and a more balanced pattern of residuals (differences between observed and predicted values). Additionally, the confidence intervals on predicted recruitment values are very large ranging from zero to nearly twice the predicted value. Therefore, the SSC believes that the projected 1996 biomass is uncertain and may be overestimated.

Alternative predictive models which do not depend on interpretation of a single data point would be preferable to the models evaluated by the SSC at this meeting. Additionally, analysts can assist the SSC's interpretation of their predictive models by reporting statistics which relate the fit of the data to the model: correlation coefficients, standard errors of the parameter estimates, and confidence intervals on the predicted value for example.

For the predictive model on recruitment, the pattern of residuals over time indicated positive serial correlation. This could arise from omitted dynamic effects or from the omission of important explanatory variables. The simple regression seeks to explain the transformation of age 1 fish into age 3 fish in subsequent years. The model could be extended to account for the influence of factors such as cannibalism and environment. For example, a regression of the form:

$$\text{Age 3 abundance} = a + b_1 (\text{Age 1 survey}) + b_2 (\text{environment}) + b_3 (\text{Age 3+ biomass in year t-3})$$

where environmental variables might include sea ice cover, air temperature and/or sea bottom temperature, may help to account for apparent anomalies in time series of observations. Formal treatment of serial correlation can be expected to improve model fit. We note also that age 1 biomass is estimated subject to error. Consequently, the basic linear regression model assumptions are violated. There are regression techniques (error in variables) that can be used to address these problems.

Additional concerns regarding the 1992 year class strength include the possibility that the rate of exploitation on the year class is underestimated, and that recent fishery independent indicators of abundance have not corroborated the earlier observations of year class strength. As noted previously by the SSC, the 1992 year class has experienced an undocumented rate of exploitation in the Russian fishery now being prosecuted along the US/Russia provisional boundary northwest of the Pribilof Islands. Whereas the 1992 year class appeared to be abundant in the 1994 hydroacoustic/bottom trawl survey, that year class does not show strongly in 1995 bottom trawl survey. Although the stock assessment author reminds us that we have had this experience previously, the SSC recommends using a cautionary approach until the estimated strength of the 1992 year class is evaluated by observing its contribution to the 1996 fishery.

The stock assessment author has provided alternative estimates of stock abundance and ABC based on projected 1995 recruitment (1992 year class, 7.701 billion) and modeled 1995 recruitment (3.247 billion). [These estimates are found in a memo from Dr. Wespestad to Dr. Low which is available in the Council briefing book (Tab D-1 a-b).] The SSC notes that the modeled estimate of 1995 recruitment is based on a single datum from the catch-at-age matrix; improved estimates of this year class strength can only be obtained with the addition of annual observations of catch-at-age in future years. At the lower recruitment level and an exploitation rate based on $F_{40\%}$ (F=0.30), estimated 1996 stock abundance is 5.981 million mt as contrasted with 7.362 million mt estimated at the higher recruitment level. ABC estimates drop to 1.092 million mt under the lower recruitment estimate compared to 1.293 million mt at the higher level.

To account for alternative interpretations of 1995 recruitment, the SSC recommends adopting a midpoint estimate of the ABC, or 1.193 million mt. The associated mid-point biomass is 6.672 million mt. The level of overfishing is derived from averaging the F_{msy} (F=0.46) exploitation rate multiplied by the two projected 1996 biomass estimates derived from the two 1995 recruitment values (7.7 and 3.2 billion fish), and results in a catch

level of (1.59 + 1.34)/2=1.46 million mt. The value 1.34 was obtained by scaling 1.59 by the ratio of the ABC's (1.092/1.293).

Under market conditions prevalent in 1993, a 100,000 mt change in the catch of pollock would have resulted in a 5.5 to 6 million dollar change in exvessel gross revenues if the change in catch was absorbed in surimi production (Herrmann, Criddle, Greenberg and Fellar, 1995). Changes in net revenues may be larger or smaller than changes in gross revenues depending on changes in total costs.

Aleutian Islands: The Aleutian Islands management region is defined as waters west of 170W longitude. Historically, allowable catch in the Aleutian Island region has been determined based on estimated bottom trawl survey biomass for a larger area which extended eastward to 165W longitude. This eastward extension is the Unalaska-Umnak area. In the current assessment, the Plan Team recommend an ABC based on the Aleutian Island region proper, excluding the Unalaska-Umnak area. In 1994, the Unalaska-Umnak area represented 43% of the estimated pollock biomass as determined by bottom trawl survey. Thus, exclusion of the eastern portion of the surveyed biomass substantially reduces the estimated ABC. The stock assessment author (in Section 1.7.2) notes that based on fishing location, a portion of the catch in the eastern Aleutians may be comprised of Aleutian Basin fish and that the bulk of Aleutian area fishing is focused in the eastern area. Nevertheless, since the eastern Aleutian biomass is not incorporated in either the Aleutian Basin or EBS areas for the purpose of assessing allowable removals, there is no compelling argument for excluding an allowable catch from this area. Subsequently, **the SSC has reverted to historical practice** and included the Unalaska-Umnak area in the estimate of Aleutian Islands ABC.

The SSC has computed the projected 1996 Aleutian Islands biomass, including the Unalaska-Umnak area, as prescribed in Section 1.7.2 of the BSAI SAFE. Biomass is the product of the 1994 bottom trawl survey biomass and a ratio of 1994 to 1996 EBS biomass. Since the SSC revised the estimate of EBS 1996 biomass, the ratio was recomputed from cohort analysis estimates of 1994 biomass (7.09 million mt) and the mid-point estimate of 1996 biomass as described above in the EBS section of our minutes (6.67 million mt). The revised 1996 Aleutian Islands biomass is 142,505 mt (0.9409*151,444), compared with the SAFE's 152,958. Estimated ABC is computed by application of the $F_{40\%}$ fishing mortality rate, 0.34, with a resultant exploitation rate of 25%. **Therefore, ABC is 35,600 mt** (142,505*.25). The OFL was approximated by scaling the OFL in the SAFE (50,476) by the ratio of biomass (142,505/152,958), resulting in 47,000.

The SSC encourages further consideration of stock structure and description of available information from this area. The SSC is concerned about declining biomass in this area but believes that further corrective actions must await resolution of stock structure issues.

Bogoslof Pollock

There has been a doubling of the estimated biomass of pollock in the Bogoslof area to 1.1 million mt as determined by the 1995 hydroacoustic survey. The estimate was based on a replicated survey and the SSC believes it to be accurate. The distribution of pollock was observed to be within the survey area with no evidence of immigration or emigration during the survey period and magnitude, precision, and age composition of abundance estimates is consistent between replicate surveys. In addition to the large increase in the 1989 year/class there was also a large increase in the abundance of older aged pollock in the Bogoslof area. Therefore, the increase in biomass was only partially due to recruitment of the 1989 year/class with recruitment of older aged pollock from other areas. It is possible that the increase in Bogoslof pollock biomass was due to recruitment or migration of older aged pollock from the eastern Bering Sea or Aleutian Island shelf areas. This observation suggests that the current model of the stock structure that Bogoslof pollock are permanent residents of the Aleutian Basin may be incorrect.

Without an understanding of the relationship of pollock in the Bogoslof pollock area to those in the adjacent Eastern Bering Sea and Aleutian Islands shelf areas, the independence of the Bogoslof Area, Aleutian Islands shelf, and Eastern Bering Sea shelf stock assessments for pollock cannot be assumed. **In view of this uncertainty, the SSC recommends a conservative exploitation rate for the Bogoslof area.**

The SSC further recommends that further research be initiated to determine the relationship among pollock in the Bogoslof, EBS and Aleutian Island shelf areas. This research should include examining the consistency of the current model of stock structure relative to: the synchrony of year/class strength by stock (i.e., Bogoslof, Aleutian Islands, and Eastern Bering Sea); the timing, magnitude, age, and size at age of historical catches that have occurred in the Aleutian Basin; and seasonal pollock migrations based on fleet distribution patterns.

The SSC recommends setting an ABC for the Bogoslof area = 121,000 mt and is based on an $F_{40\%}/2$ exploitation rate (0.11) applied to the current biomass (1.1 million mt). The SSC does not concur with the Team's recommendation of OFL (330,000 mt) based on the $F_{30\%}$ exploitation rate, but rather considers its ABC calculation to be consistent with the overfishing definition. Thus, the SSC recommends OFL=ABC=121,000 mt. The adjustment applied to the $F_{40\%}$ rate to calculate ABC was consistent with the adjustment used in 1995 and based on the ratio of the current biomass to the appropriate level which we believe produces MSY (about 1/2).

BSAI - Pacific Cod

The SSC concurs with the analysts' recommendations for the ABC (305,000 mt under an $F_{40\%}$ harvest strategy). There was discussion on the differences between the position of the analyst and the Plan Team. The latter supported the $F_{35\%}$ level of exploitation. The SSC concluded that the more conservative F was preferable because of recruitment variability. Recruitment variability was similar to walleye pollock that was recommended to be taken at an $F_{40\%}$ rate. The Pacific cod assessment also pointed out that the size selectivity of the trawl fishery is due to shift because of the 6" mesh-size regulation. This means that the catch rate on the older fish will increase. This shift is not accounted for in the present assessment. Once selectivity of the gear can be estimated, this shift can be accounted for; until then the use of $F_{40\%}$ provides some additional conservative benefits.

BS/AI - Yellowfin sole

The Team's recommended ABC (278,000 mt) for this species was developed by applying an $F_{35\%} = 0.13$ to the estimated biomass of 2,850,000 mt obtained from a stock synthesis analysis. The overfishing level (342,000 mt) was determined by applying $F_{30\%} = 0.15$ to the biomass estimate. **The SSC supports these recommendations.**

BS/AI - Greenland turbot

As was the case last year the Team's ABC recommendation for Greenland turbot was based on a length-based stock synthesis analysis. In the past, the SSC was reluctant to accept the approach because of the newness of the model. After further examination of the assessment, **the SSC believes that, given the conservative assumptions used, the model provides a solid basis for the development of an ABC for this species.** Therefore, it recommends acceptance of the Team's ABC of 17,000 mt that was developed by applying the model $F_{40\%}$ (0.25) to the mean exploitable biomass of 67,000 mt. The model uses a high catchability (Q=0.75) and an equal split between longline and trawl gear. **While the SSC supports the Team's ABC, it recommends that the higher number be phased in over a three year time period.** This approach will allow the exploration of the possibility for conducting joint industry/NMFS surveys of the Bering Sea slope and Aleutian Islands. If surveys are conducted, results of these surveys will make it possible to refine the assessment prior to fully increasing the ABC to 17,000 mt. **Given a three year phase-in period, the 1996 SSC ABC recommendation is 10,300 mt** (67,000*0.154). The exploitation fraction used in this calculation was derived by determining the

exploitation fraction for the 1995 ABC of 7,000 mt (7,000/67,000=0.104), calculating the exploitation fraction for the Team's proposed 1996 ABC (17,000 mt/67,000 mt=0.254), calculating the difference between these two fractions (0.254-0.104=0.15), and dividing the difference by 3. Exploitation fractions for 1996, 1997, and 1998 are 0.154, 0.204, and 0.254. Concurring with the Team's recommended 2/3 -1/3 split of the eastern Bering Sea and Aleutian Islands, the area-specific 1996 ABCs are 6,900 mt and 3,400 mt, respectively. The OFL for this species is 25,110 mt that was determined by applying the $F_{30\%}$ =0.37.

BS/AI - Arrowtooth flounder

The SSC agrees with the Team's 1996 ABC for this species, 129,000 mt. Results of an application of a length based stock synthesis model were used for the first time in the development of this value. The biomass estimate and exploitation rate used were 576,000 mt and $F_{35\%}$ = 0.27, respectively. It's important to note that the assessment did not incorporate information for the Aleutian Islands in the development of the proposed ABC. The OFL is 162,000 mt ($F_{30\%}$ = 0.34 times 576,000 mt).

BS/AI - Rock sole

The Team's recommended ABC (361,000 mt) was developed by applying a $F_{35\%}$ = 0.18 to the eastern Bering Sea biomass estimate, 2,360,000 mt. The OFL, 420,000 mt, was determined by applying $F_{30\%}$ = 0.22 to this biomass estimate. **The SSC concurs with both the recommended ABC and OFL.**

BS/AI - Other Flatfish Complex

The eastern Bering Sea ABC for this complex was developed by breaking out Alaska plaice and aggregating the remaining species into a group titled, "miscellaneous species." The 1995 trawl survey estimates of the exploitable biomass for these two groups were 552,300 mt and 37,800 mt, respectively. The $F_{35\%}$ exploitation rates (0.17 for Alaska plaice and 0.19 for miscellaneous species) were used to calculate ABCs of 93,700 mt and 7,200 mt, respectively. Using $F_{30\%}$, (0.20 for Alaska plaice and 0.23 for miscellaneous species), OFLs were determined to be 110,500 mt and 8,700 mt, respectively.

For the Aleutian Islands, a biomass-based expansion ratio was calculated for the miscellaneous flatfish category (Alaska plaice have not been encountered in this area). The percentage of the miscellaneous flatfish biomass in this area ranged from 4% to 13% between 1983 and 1986. The midpoint, 10%, was used to calculate ABC for this management area, 720 mt. Using a similar approach, OFL was calculated to be 870 mt.

Summing over species categories and management area yields a total ABC and OFL of 102,000 mt and 120,000 mt, respectively. **The SSC agrees with the Team's recommendation.**

BS/AI -Flathead sole

The eastern Bering Sea ABC for this species was developed by assuming that the 1995 survey biomass estimate, 593,000 mt, approximates the mid-year 1996 value and applying the $F_{35\%}$ = 0.19 exploitation rate. The resulting value was 112,750 mt. The Aleutian Island ABC, 2,900 mt, was determined by applying the $F_{35\%}$ = 0.19 exploitation rate to the 1994 survey biomass estimate, 15,400 mt. The total ABC is 116,000 mt. The OFL (140,000 mt) was calculated by applying $F_{30\%}$ = 0.23 to the biomass estimate for the two areas. **The SSC agrees with the ABC and OFL proposed by the Team for this species.**

BSAI - Sablefish

The SSC recommends that ABCs be set at the level recommended by the assessment chapter author (1,200 mt for the Bering Sea and 1,300 mt for the Aleutian Islands). The recommended ABCs are slightly higher

than the levels recommended by the Plan Team, yet they represent a substantial reduction from 1995 levels reflecting biomass declines due to continuing low recruitment. Sablefish ABCs are developed by applying the $F_{35\%}$ exploitation rate adjusted downward by the ratio of current biomass to target biomass; the recommended F is 0.112. ABC is then apportioned among areas based on a 5 year exponential weighting of survey biomass distribution. Overfishing for the Bering Sea/Aleutian Islands is based on $F_{30\%}$ and is 3,300 mt.

The SSC feels that the biomass adjusted $F_{35\%}$ exploitation strategy is appropriately conservative. Nevertheless, we encourage the assessment authors and Plan Teams to continue their analyses of alternative harvest strategies and to continue development of an age-structured stock synthesis model to supersede the current stock reduction analysis.

Public testimony by Bob Alverson (Fishing Vessel Owners Association) and Tim Henkel (Deep Sea Fishermen's Union) indicated that the commercial fishery has also observed a drop in abundance in BSAI sablefish. They recommended that a commercial CPUE index be developed as a complement to the domestic longline survey. The SSC suggests that the potential for such a commercial index be explored.

BSAI - Rockfish

Pacific Ocean Perch Complex

For the Eastern Bering Sea the complex is split into POP (*Sebastes alustus*) and four other red rockfish (ORR) species. For the Aleutian area the ORR is split into two groups, northern + sharpchin and rougheye + shortraker. Data from the 1994 trawl survey was incorporated into the assessments. For POP the age based synthesis model was run using $F_{44\%}$. For the Eastern Bering Sea POP $F_{44\%}$ (0.058) yielded an ABC of 1,800 mt and OFL using $F_{30\%}$ of 2,860 mt. However, similar methods applied for the Aleutian Area assessment produced an initial ABC of 17,000 mt. Because this is a 70% increase over the 1995 ABC and because of the potential high variability in survey estimates, the analyst chose to perform a 1000 year simulation randomly selecting from observed recruitments and applying $F_{44\%}$. **The average yield, chosen as the long-term ABC, was 12,100 mt.** Applying $F_{30\%}$ (0.096) to the average estimated biomass of 133,000 mt provides an OFL of 25,200 mt. Although the SSC did not reject this new approach, it did request that for next year's assessment the analyst provide a comparison between this and the previous assessment method, determine how the new model responds to a series of declining and increasing biomass, and look at serial correlation and density dependence effects.

In December 1994 the SSC requested that the team look at creating harvest subareas similar to those for Atka mackerel. The plan team has recommended that the Aleutian POP ABCs and TACs be allocated to the three subareas based on the average biomass estimates from the two most recent surveys, Eastern (25%), Central (25%), and Western (50%). **The SSC accepted the Team's allocation.**

For the northern/sharpchin and shortraker/rougheye groups average survey biomass estimates times natural mortality provided the ABCs which also equal the OFLs. The SSC questioned the use of the unweighted average of five surveys back to 1980 for the Aleutians and of six surveys back to 1979 for the Eastern Bering Sea and recommends the consideration of another procedure to account for survey uncertainty and recent biomass changes.

The SSC recommended ABCs and OFLs (in metric tons) for the POP complex follow.

Species Group Eastern Bering Sea	ABC	OFL
POP	1,800	2,860
ORR	1,400	1,400

Aleutian Area		
POP Total	12,100	25,200
Western	6,050	
Central	3,025	
Eastern	3,025	
Northern/Sharpchin	5,810	5,810
Rougheye/Shortraker	1,250	1,250

Other Rockfish Complex

This rockfish group includes thornyheads (*Sebastolobus*) and approximately 15 other minor rockfish species not included in the POP complex. Since over 90% of the complex biomass is composed of thornyheads the natural mortality of shortspine thornyhead (0.07) was used to calculate ABC by applying this rate (F = M) to the average trawl survey biomass estimates for this species group. ABCs for 1996 increased somewhat from those for 1995 because 0.07 is an increase from 0.05 (M for POP) used previously. The SSC was concerned with the survey biomass averaging procedure, particularly since recent surveys (1991 and 1994) for the Aleutian area are much lower than earlier (1980, 1983, and 1986) surveys. The SSC recommends that the analyst review the procedure and consider other methods which could compensate for survey variability while still capturing recent biomass changes. The analyst should also consider using $F_{40\%}$ which was applied in the GOA assessment for thornyhead rockfish as an alternative to the F = M strategy.

The ABCs for the complex are as follows:

EBS	ABC = OFL = 497 mt	biomass = 7,100 mt
Aleutians	ABC = OFL = 952 mt	biomass = 13,600 mt

BS/AI - Atka Mackerel

The SSC concurs with the Team's recommended ABC (116,000 mt) based on the $F_{40\%}$ applied to the projected 1996 biomass (578,000 mt) and OFL (164,000) based on the $F_{30\%}$ exploitation rate.

BSAI - Squid and Other Species

The SSC concurs with the Plan Team's ABC recommendations based on average catch levels for squid and other species - 3,000 mt and 27,600 mt respectively. Overfishing levels are set at 3,000 mt for squid, and 137,000 mt for other species based on F=M=0.2 and a 3-year average survey biomass of 687,000 mt.

D-1(c) GULF OF ALASKA SAFE

GOA - Pollock

The SSC reviewed an updated stock assessment for GOA pollock. New information provided in this analysis includes (1) biomass estimates from the 1995 echo integration trawl survey of Shelikof Strait, (2) age data from the 1994 fishery, (3) 1995 length frequency data from the Shelikof survey, (4) revised biomass estimates for a portion of the hydroacoustic survey time series, 1981-1991, (5) revised estimates of weight-at-age, and (6) updated catch data.

Four versions of the stock synthesis model were presented. The plan team accepted, and the SSC concurred, that Model C was the preferred configuration. Model C changes the configuration used in 1994 by estimating the

initial age composition rather than assuming it to be in equilibrium prior to the onset of the fishery and incorporating revised weight-at-age parameters.

The SSC notes that while the population biomass is estimated to continue to decline through 1996, biomass is projected to increase in subsequent years following recruitment of the strong 1994 year class. The appearance of this year class is good news in light of the downward trend in this population over the past few years.

Considering the projected improvements in stock biomass **the SSC endorses the stock assessment authors' and Team's recommended 1996 ABC's of 52,000 mt for the Western and Central Gulf, and 2,800 mt for the Eastern Gulf.** This ABC based on the fishing mortality rate (=0.30) that represents a tradeoff between the risk of spawner biomass falling below the threshold and increasing yield as a function of fishing mortality.

This rate is less than the $F_{40\%}$ rate and as such is regarded as a conservative exploitation strategy. The overfishing rate is obtained from the $F_{30\%}$ fishing mortality level (0.50) and is equivalent to a harvest of 82,000 mt in the Western and Central Gulf and 4,400 mt in the Eastern Gulf.

The SSC heard a report from Chris Blackburn, AGDB, which expressed concerns with assumptions made in the stock synthesis model. The SSC suggests that the analysts review stock structure assumptions and survey weighting in light of these concerns.

The SSC notes that the Team reviewed available biological data from the pollock found in Prince William Sound. A new fishery has developed on significant concentrations of spawning pollock within and near the southwestern entrance to Prince William Sound. Twenty-four thousand mt of pollock were observed in limited hydroacoustic surveys during late May of 1994 and 30,000 mt during the spawning period of 1995. This information suggests that potential exists for significant biomass within Prince William sound that may support a fishery above the current eastern Gulf of Alaska fishery. Because the existing surveys were not coincidental with the triennial survey, the possibility that the pollock found in Prince William Sound during the winter and late spring migrate out of Prince William Sound and are available to the triennial surveys during the summer cannot be discounted. **In view of the limited data and current status of Gulf pollock, the SSC and the Team were not able to recommend establishing a separate ABC for Prince William Sound pollock above the current eastern Gulf ABC at this time.** The SSC recommends that the timing of future surveys of Prince William Sound be designed to coincide with the triennial Gulf of Alaska survey and that additional biological data (age and length) be collected, to estimate ABC and to determine the relationship of the spawning pollock in Prince William Sound to the wider Gulf of Alaska population.

GOA - Pacific Cod

The SSC recommends adoption of the Team's ABC, 65,000 mt, OFL, 88,000 mt, and regional apportionment. The ABC and OFL were derived by applying the $F_{40\%}$=0.40 and $F_{30\%}$=0.57, respectively, to the estimated exploitable biomass, 314,00 mt.

GOA -Flatfish

The Team's ABCs and OFLs for species in this complex are identical to those used in 1995. The SSC agrees with this rollover. The 1996 exploitable biomass for each category in this complex is based on abundance estimated from the 1993 triennial trawl survey. As in 1995, application of age information for rex sole and maturity estimates for all species or groups allowed calculation of ABCs based on $F_{35\%}$. These fishing mortality rates were applied to the exploitable biomass estimates from the 1993 triennial trawl survey to determine ABCs.

The ABC for the shallow water group was determined by summing biomasses calculated for rock sole, yellowfin sole, and other shallow-water species. The fishing mortality rates used for other species in the shallow water

group were taken from the flathead sole estimates. Fishing mortality rates used to calculate ABCs were: deepwater (0.125), rex sole (0.125) rock sole (0.147), yellowfin sole (0.149), shallow species (0.145), flathead sole (0.145) and arrowtooth flounder (0.125).

Species/Group	ABC	Exploitable Biomass
Deep water	14,500	116,570
Rex sole	11,210	89,660
Shallow water	52,270	355,590
Arrowtooth	198,130	1,585,000
Flathead sole	28,790	198,470
TOTAL	304,990	2,345,330

The OFLs, determined by applying the $F_{30\%}$ exploitation rate to the appropriate biomass estimates, are listed below.

Species/Group	OFL rate	OFL
Deep water	0.146	17,040
Rex sole	0.146	13,090
Shallow water		60,260
Rock sole	0.172	
Yellowfin sole	0.175	
Other species	0.159	
Arrowtooth	0.146	231,420
Flathead sole	0.159	31,560

GOA - Sablefish

The SSC concurs with the Plan Team's recommendation for ABC (17,078 mt) based on a biomass adjusted $F_{35\%}$ harvest strategy (F=0.112). Sablefish biomass continues to decline as a result of continued low recruitment. Apportionment of ABC across management areas is based on a 5 year exponential weighting of survey biomass distributions: Western Gulf - 2,200 mt, Central Gulf - 6,900 mt, West Yakutat - 3,040 mt, and East Yakutat/Southeast - 4,940 mt. Overfishing is set at the $F_{30\%}$ level (22,800 mt).

The SSC feels that the biomass adjusted $F_{35\%}$ harvest strategy is appropriately conservative. Nevertheless, we encourage the assessment authors and the Plan Teams to continue their analyses of alternative harvest strategies and to continue the development of an age-based stock synthesis model to supersede the current stock reduction analysis.

Public testimony by Bob Alverson (Fishing Vessel Owners Association) and Tim Henkel (Deep Sea Fishermen's Union) recommended that a commercial fishery CPUE index be developed as a complement to the domestic longline survey. The SSC suggests that the potential for such an index be investigated.

Alverson and Henkel noted that there was some inadvertent survey - commercial fishery interference in 1995, and that some low level of interference with future surveys may be unavoidable despite efforts to the contrary. The SSC acknowledges the efforts made by the commercial fishery to avoid survey interference and requests continued industry efforts to share survey plans with their memberships to minimize the potential for future interference. The SSC also notes the proposed changes in 1996 survey plans to provide for more opportunity for fishing activity that could avoid the survey.

GOA - Rockfish

Pacific Ocean Perch

The synthesis model for Pacific ocean perch, first used for the 1993 assessment, was updated with 1995 fishery data and run ahead for one more year using the 1995 GOA TAC as the 1996 projected catch. New age at maturity data and updated stock-recruitment data summarized in the analysis but were not incorporated in the synthesis model. Further significant changes to the model will wait until new fecundity and survey biomass estimates are available in late 1996.

An estimate of current exploitable biomass of 163,220 mt is an increase above last year's estimate of 142,470 mt. Increasing recruitment, particularly for the strong 1986 year class, is the primary reason for this increase in estimated biomass. **The ABC was calculated using the optimal fishing mortality** (F_{msy} of 0.078 adjusted by the ratio of the current (125,704 mt) to target (150,000 mt) female spawning biomass) **to provide for rebuilding. The ABC of 10,165 mt** is an increase of 1,935 mt over the 1995 analyst's estimated ABC. **Because this ABC is equal to the overfishing level, the Plan Team further reduced this number by $F_{35\%}/F_{30\%}$ to provide a buffer between the ABC and OFL. The SSC does not agree with the latter adjustment. As it did last year, the SSC accepted the analysts' ABC, which is also equal to OFL.** The ABC was apportioned by management area based on the area biomass estimates from the 1987, 1990, and 1993 trawl surveys; weighting each previous survey at 2/3 of the next later survey, a ratio of 4:6:9, respectively. The SSC ABC area allocations for the Western (18.1%), Central (47.9%), and Eastern (34.0%) areas are respectively, 1,840 mt; 4,870 mt; 3,455 mt and for the Team are 1,460 mt; 3,860 mt; and 2,740 mt. Under the POP rebuilding plan, TAC is calculated from the average of the optimal F and the fishing mortality rate sufficient to provide for unavoidable bycatch (based on 1992 rates). For 1996 this fishing mortality corresponds to $F_{55\%}$. To calculate TAC, this rate is further reduced by the ratio of current biomass to optimal biomass (corresponding to $F=_{44\%}$). **The SSC notes that the TAC is not directly tied to the ABC.**

In September the SSC asked the Plan Team and analysts to report on the feasibility of running the model separately for the Western/Central and the Eastern areas, providing two ABCs for POP in the Gulf. Analysts expect that increasing the number of assessments within the Gulf will increase the variability of the estimates. Also, much of the early catch data was lumped as red rockfish, and catch area was not well documented. **The SSC recommends that NMFS and ADF&G analysts work cooperatively on several issues for the next POP assessment.** These include attempting to obtain a better fit with the survey biomass estimates, better describing how the model fits the multiple data sets, and using age and catch distribution data to investigate stock structure.

Other Rockfish

ABCs (in mt) for the following rockfish species groups were based on F = M applied to the average survey biomass (1987, 1990, and 1993) and are the same as those for 1995. $F_{30\%}$ was used to calculate OFL for rougheye, northern, and sharpchin, while for shortraker and for the remaining other slope rockfish F = M was used. The plan team noted that the small northern rockfish ABC for the Eastern Gulf could cause a high proportion of discard for this species in the Eastern area.

Species Group	GOA ABC	West.	Cent.	East.	OFL
Shortraker/rougheye	1,914	173	1,213	528	2,925
Northern	5,271	641	4,613	17	9,926
Other slope	7,098	176	1,166	5,756	8,395

Pelagic Shelf Rockfish

For pelagic shelf rockfish (PSR), the Plan Team recommended that dusky rockfish be separated from the other species in the group. Black rockfish and other nearshore pelagics are not protected from overharvest because the current assessment is dominated by dusky rockfish, which is much more abundant in the offshore trawl surveys. The Plan Team has proposed an amendment for alternative management of the nearshore component of the assemblage. The public commented that during the next year additional effort for black rockfish and other nearshore shelf pelagics is expected. NMFS regional staff testified that a separate ABC for the other PSR (only 340 mt as calculated by the plan team), could encourage discards for fear of shut down. In addition, little is known about bycatch of PSR in the new ITQ halibut fishery, and a delay in implementing a separate other PSR ABC will provide the opportunity to obtain this information. The SSC was also concerned about the lack of information needed to set harvest limits. **The SSC is very concerned about the potential overharvest of the other PSR and strongly recommends that the Council proceed promptly with the development of a plan amendment analyzing management alternatives for pelagic shelf rockfish to be implemented in time for the 1997 fishery.** Alternatives could include allowing Alaska to manage the other pelagic shelf rockfish either inside or outside the GOA FMP, as specified in the Plan Team's amendment proposal. **For 1996, the SSC recommends rolling over the 1995 ABC (5,190 mt)** and OFL (8,704 mt).

GOA - Demersal Shelf Rockfish

Exploitable biomass for this complex is determined from submarine surveys. Improvements to survey design and reconsideration of the calculation of line transect length led to changes in previous survey estimates and an increase in estimated 1995 biomass. **The SSC concurs with the use of the lower 90% confidence limit as the best estimate of yelloweye rockfish biomass,** which results in an estimate of 42,552 mt for 1996. **The SSC also agrees with the choice of F=M=0.02 for calculating ABC, adjusted upward by 10% to account for species other than yelloweye, which leads to an ABC of 950.** The OFL, calculated from $F=F_{30\%}= 0.04$, is 1,700.

GOA - Thornyheads

For the second year a length based synthesis model has been used for the assessment. For 1996 analysts examined geographic distribution and incorporated 1994 fishery and longline survey data. The primary reason for the reduced 1996 ABC (1,560 mt) from the 1995 ABC (1,899 mt) was the incorporation of an increased size at 50% maturity. **The $F_{40\%}$ value (0.059) was used in calculating ABC** and $F_{30\%}$ (0.086) for the OFL. **The analysts and Team expressed concern that future shifts toward trawl gear not accounted for in the model could potentially exceed the overfishing level because of the greater vulnerability of younger fish. Historically trawl catches predominated while for 1993 and 1994 total catches by trawl and longline were approximately equal.**

GOA - Atka Mackerel

For the 1996 fishing year, the SSC recommends that the Team's calculated ABC be reduced by one-half consistent with last year's recommendation. This conservative approach is recommended because of uncertainty in the abundance of Atka mackerel and concerns for marine mammals. Atka Mackerel is an important prey species for sea lions and occurs in abundance near sea lion rookeries. **The SSC and the Team are concerned that 80 - 99% of fishery removals in recent years have occurred within 20 nm of important sea lion rookeries.**

Ecosystem Considerations

The SSC thanks the Plan Teams for their continued efforts to bring forward ecological information and concerns pertinent to the management of groundfish harvesting. **The SSC concurs with the Team's basic plan to continue yearly additions with periodic updates and revisions. The SSC also re-iterates its suggestion that the Council establish a diverse working group** - drawn from the Council, Plan Teams, AP, SSC, industry, and other interested parties - **charged with exploring approaches to incorporating and disseminating additional ecological information and providing guidance on future topics to be addressed in greater depth,** e.g. disproportionate harvest of groundfish species. **We note that this year's discussion of groundfish discard and re-incorporation of offal into the food web is directly pertinent to the Council's consideration of improved retention and improved utilization.**

D-1(e) Halibut Discard Mortality

The SSC was unable to take this up, but has endorsed the approach used in the past.

D-2(a) POP Rebuilding Plan Amendment

In September the SSC commented on the EA/RIR/IRFA of alternatives to amend the Gulf of Alaska Pacific Ocean Perch Rebuilding Plan. The four additions requested by the SSC were incorporated in the revised amendment proposal. Public testimony supporting Alternative 3 (re-evaluation of the rebuilding plan) was provided by Laura Jansen, Tyson Seafoods. The SSC notes that Alternative 3 is not a true alternative, because it results in no action beyond status quo except for consideration of further action. The SSC notes that under the rebuilding plan the Council's determination of TAC is not directly linked to ABC. This does not present a problem at the current time, because the TAC formula currently gives a value lower than ABC, but it is a difference compared to other species. **Essentially, the SSC views the proposed amendment primarily as an issue of Council flexibility in setting TAC.**

In considering the wholesale processed product values reported in Table 1, it is important to recognize that the costs of harvesting and processing are not considered, so that the net revenues (profits) will be considerably smaller than the gross revenues reported. It is also important to recognize that the present value of future catches that could be obtained from accelerated rebuilding at lower TAC levels are not included. **Therefore, the estimated values reported in Table 1 are overstated if viewed as impacts of Alternative 2,** because they fail to account for these foregone future values and because they fail to account for harvesting and processing costs.

D-2(b) Pollock Trimester Allocation

The SSC was unable to take this up due to time constraints.

D-2(c) Pacific cod allocation

Council staff indicated to the SSC that the current gear allocation for the BSAI sunsets on December 31, 1996. **Given time and data limitations, the SSC believes that a qualitative assessment would be adequate for analysis of a simple rollover. Deviations from the current allocation are likely to generate significant economic and social impacts. Data limitations and analysis complexity would make it extremely difficult to characterize the nature and magnitude of the impacts given time constraints imposed on the analysis (that is, to have a draft EA/RIR by April).**

Harbor Seal Report

Rich Ferrero, National Marine Mammal Laboratory (NMML) reported results of the September 2-10, 1995 aerial survey for harbor seals in Bristol Bay from Port Moller to Nanvak Bay. At the time of the last survey in 1991, this stock was characterized as stable at 9-10 thousand seals. In 1995, the mean of the 7 replicate counts along the north side of the Alaska Peninsula was 2,352 with a maximum count of 3,440. Togiak National Wildlife Refuge conducted concurrent surveys at Nanvak Bay where the mean count was 406 and the maximum was 515. These are substantially lower than the 1991 survey results when the North Alaska peninsula mean count was 8,562 and the maximum count was 9,612. The Nanvak Bay mean count in 1991 was 301 with a maximum count of 406. If funds are available in 1996, the survey will be repeated during the molt period and perhaps during the pupping period. NMML is not hypothesizing any cause/effect relationship and notes the lack of data in this area.

Plan Team Membership

The SSC endorses the nomination of Dr. Joshua Greenberg, University of Alaska Fairbanks, Dept. of Resources Management, to the Crab Team. His expertise in resource economics should be valuable to the Team and is in an area not currently covered by existing Team members.

Bering Sea and Aleutian Islands Groundfish

Species		PT ABC		SSC ABC	PT OFL		SSC OFL
Pollock	EBS	1,290,000		1,190,000	1,590,000		1,460,000
	AI	26,200		35,600	28,800		47,000
	518	286,000		121,000	330,000		121,000
Pacific cod	EBS/AI	357,000		305,000		420,000	
Yellowfin sole	EBS/AI		278,000			342,000	
Greenland turbot	EBS/AI	17,000		10,300		25,100	
Arrowtooth flounder	EBS/AI		129,000			162,000	
Rock sole	EBS/AI		361,000			420,000	
Flathead sole	EBS/AI		116,000			140,000	
Other flatfish	EBS/AI		102,000			120,000	
Sablefish	EBS	1,100		1,200			
	AI	1,200		1,300			
	Total	2,300		2,500		3,300	
POP complex							
True POP	EBS		1,800			2,860	
Other POP	EBS		1,400			1,400	
True POP	AI		12,100			25,200	
Sharp/Northern	AI		5,810			5,810	
Sharp/Rougheye	AI		1,250			1,250	
Other rockfish	EBS		497			497	
	AI		952			952	
Atka Mackerel	Western		55,700				
	Central		33,600				
	Eastern		26,700				
	Total		116,000			164,000	
Squid			3,000			3,000	
Other Species	EBS/AI		27,600			137,000	
BS/AI Total		3,134,909		2,820,809	3,923,169		3,602,369

Gulf of Alaska Groundfish

Species		PT ABC	SSC ABC	PT OFL	SSC OFL
Pollock	W/C		52,000		82,000
	E		2,810		4,400
	Total		54,810		86,400
Pacific cod			65,000		88,000
Deepwater flatfish			14,590		17,040
Rex sole			11,210		13,091
Shallow water flatfish			52,270		60,262
Flathead sole			28,790		31,557
Arrowtooth flounder			198,130		231,416
Sablefish			17,090		22,800
POP complex					
	W	1,460	1,840	1,840	
	C	3,860	4,870	4,870	
	E	2,740	3,455	3,455	
	Total	8,060	10,165	10,165	
Shortraker rougheye			1,910		2,925
Other slope rockfish			7,110		8,395
Northern rockfish			5,270		9,926
Pelagic shelf rockfish		340	5,190	411	8,704
Dusky rockfish		5,090	(inc.)	8,532	(inc.)
Demersal shelf rockfish			950		1,702
Thornyhead rockfish			1,560		2,200
Atka mackerel		6,480	3,240		9,800
GOA Total		478,660	477,285	604,622	604,383