North Pacific Fishery Management Council

James O. Campbell, Chairman
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Richard J. Marasco
Chairman

DATE: 4/7/88

MINUTES
Scientific and Statistical Committee
January 19-20, 1988
Anchorage, Alaska

The Scientific and Statistical Committee met January 19 and 20 at the Sheraton Hotel in Anchorage, Alaska. Members present were:

Richard Marasco, Chairman	Doug Eggers, Vice Chairman
Don Rosenberg	Robert Burgner
Larry Hreha	Bill Clark
Bill Aron	Don Bevan
Terry Quinn	Dana Schmidt

C-1 Election of Officers

The SSC elected the following officers for this year:

Richard Marasco	Chairman
Doug Eggers	Vice Chairman

D-1 Gulf of Alaska Groundfish FMP

A. Emergency action request.

The SSC reviewed the proposal for emergency regulation submitted by Mark Hutton. The following documents were reviewed: "A Proposal for an Emergency Regulation to Change the Sabelefish Longline Season", a report that was prepared by Mr. Hutton; an October 12, 1987 memorandum to Jim Branson from Mr. Hutton; and a letter from the International Pacific Halibut Commission to Jim Branson. Mr. Hutton also gave an oral presentation to the SSC. In addition to this presentation, the SSC received comments from several sablefish fishermen.

The SSC would like to commend Mr. Hutton for his effort to gather and analyze data pertinent to the proposal. The SSC was unable to verify the accuracy of either the halibut bycatch rate or mortality percentage. However, the SSC feels that the application of these data to the total fleet is probably inappropriate. The SSC would like to point out that the bycatch rate obtained

by Mr. Hutton's survey is in agreement with the rate published by ADF&G (Commercial Fisheries, News Release 5/27/87). The SSC does not see this as an immediate biological problem nor was the SSC presented any information from IPHC that identified this as a biological problem. The data for calculating the potential savings are limited and better information on incidence rates is needed. The SSC notes that this requires observer data. These data need to be collected.

B. Proposal review.

The SSC heard a report from Council staff summarizing action taken by the plan team and Plan Amendment Advisory Group (PAAG) on proposals submitted. The SSC concurs with the PAAG's assignment of a low priority rating to proposals 2, 7, 10, and 15.

With regard to proposal #10, the SSC provides the following comment. This proposal would allow the two plans to come closer together. We feel that both reserve systems need to be reviewed. In light of the projected work load of the staff and plan team, the SSC does not consider this proposal to be of high priority at this time. We recommend that the plan teams continue to work to develop one reserve system.

The SSC received public testimony and discussed at some length proposal #15. While the SSC felt that the problem this proposal was intended to address is important, there was concern that the proposal does not represent a viable solution to the problem. It was felt that this problem could be better solved in the short term through development of more refined DAP estimates and timely release of DAP to JVP. The PAAG found that proposals 12 and 13 are not necessary, that proposal 8 should be assigned to a working group, and that proposal 9 does not require an amendment--the SSC agrees with these determinations.

The pollock mesh size proposal #3, addresses an issue that is worthy of examination. The SSC concurs with the PAAG's suggestion that ADF&G, NWAFC, Council staff, and members of industry get together to develop a strategy for exploring this issue. The SSC recommendations on the remaining proposals are listed in Table 1.

C. Retention of sablefish bycatch prior to opening of the directed longline season.

The SSC does not have any comments to offer on this issue at this time.

D-2 Bering Sea Aleutian Islands Groundfish FMP

The SSC heard a report from Council staff summarizing action taken by the plan team and PAAG on proposals submitted. The SSC concurs with the PAAG's assignment of a low priority rating to proposals 6, 7, 9, 18, 19, and 24. Of the proposal rated low priority, the SSC took public testimony on one, proposal #9. It was apparent from the testimony received that the level of effort and the size of the sablefish TAC for the Aleutian Islands management area were of concern. The SSC felt that the proposer was of the opinion that subdividing the area could increase the TAC and thus the length of time that fishermen could fish. The SSC noted that the research survey used to

Table 1. 1988 SSC Priority Amendment Recommendations for the Gulf of Alaska Groundfish FMP

Proposal Number	Title	Priority	Cycle	Assigned to
1	Sablefish season[a/]	high	current	plan team
11	Permit/reporting loophole	high	current	plan team
4,5,6	Rockfish management	high	extended	plan team
14	Directed fishing definition	high	extended	plan team

a/ Recognizing concern regarding the availability of necessary data, the SSC concurs with the PAAG and plan team that proposal #1 be given high priority for the current cycle, including the addition of the PAAG's alternatives.

Table 2. 1988 SSC Priority Amendment Recommendations for the Bering Sea and Aleutian Islands Groundfish FMP

Proposal Number	Title	Priority	Cycle	Assigned to
1	Bycatch Committee proposal	high	current	plan team
11	Permit/reporting loophole	high	current	plan team
15	RAD deadline	high	current	plan team
17	Directed fishing definition	high	extended	plan team
21,22	OY range	high	current	plan team
23	Support industry preference	a/		
26	Roe rocksole/JVP prohibition	high	current	plan team
13	Weekly reporting	high	current	NMFS
14,16	NMFS PSC framework	SSC believes that these proposals address an important problem and should be passed on to the Bycatch Committee		

a/ While this proposal may be considered high priority, the SSC feels that the legal and policy ramifications of the proposal will require extensive analysis which probably cannot be completed within the current cycle.

establish the ABC covers the entire management area; therefore, subdividing the management area would not increase the ABC. While subdividing the area could result in increased fishing time in some areas (i.e., fewer boats fishing in a specific area), it also could reduce the fishing time in others (i.e., same number of boats and smaller TAC). There is no indication that the current fishing pattern is causing localized depletion. It was agreed that proposals, 2, 3, 4, 5 and 25 should be passed on to the Bycatch Committee and that no action be taken on proposals 12 and 20. With respect to proposal #10 (reporting system), there is a critical need for a thorough examination of data required for management and collection systems required to obtain them. The SSC recommends that the Council appoint a workgroup to address this issue. Proposal 8 is addressed in the Gulf of Alaska presentation (Proposal 3). The SSC recommendations on the remaining proposals are listed in Table 2.

C-9 Other Business

A. Personnel - The SSC reviewed the nomination by Commissioner Collinsworth of Dr. Dana Schmidt for the SSC position vacated by Dr. Phil Mundy. The SSC supports this nomination and recommends that the Council appoint Dr. Schmidt.

B. 603 Guidelines - Acceptable Biological Catch (ABC) is an acceptable level of harvest which recognizes the status and dynamics of the stock, environmental conditions, and ecological factors. It is developed and justified on the basis of biological, environmental, and ecological information. One feasible approach to setting ABC is a constant harvest rate policy, involving the multiplication of the best estimate of exploitable biomass by an exploitation rate. The choice of an exploitation rate must be justified. When information is lacking, the exploitation rate should be no higher than the natural mortality rate. ABC, however, must equal zero when the stock is at or below its "threshold".

Threshold is the population level below which there is concern over the ability to rebuild the stock to its MSY level over an acceptable period of time. A threshold level will be developed based on relevant scientific information. When information is lacking, the threshold shall be equal to 25% of the average biomass in the absence of a fishery.

Overfishing is the application of exploitation rates that drive the stock below its threshold. Exceeding allowable biological catch need not result in overfishing, unless that excess is carried out over sufficient time at high enough exploitation rates to reduce the population below the threshold.

C. Arctic Environmental Data System Workshop and NMFS Ecosystem Workshop

Both of these workshops were discussed by the SSC. It was agreed that the SSC would be represented at the Arctic Environmental Data System Workshop by Don Rosenberg and at the NMFS Ecosystem Workshop by Terry Quinn.

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Richard Marasco
Chairman

DATE: 6/10/88

MINUTES
Scientific and Statistical Committee
April 11-12, 1988
Anchorage, Alaska

The Scientific and Statistical Committee met April 11-12 at the Sheraton Hotel in Anchorage, Alaska. Members present were:

Richard Marasco, Chairman	Doug Eggers, Vice Chairman
Don Rosenberg	Robert Burgner
Larry Hreha	Bill Clark
Don Bevan	Terry Quinn
Dana Schmidt	John Burns
Jim Balsiger for Bill Aron	

D-2 King and Tanner Crab FMP

Council staff indicated that the Crab Management Committee received a request suggesting that the release of the FMP be delayed to allow the crab industry time to resolve differences over some of the provisions in the plan. Accommodation of the request will delay initial review of the FMP until June.

D-3 Gulf of Alaska Groundfish FMP

Amendment 17

The SSC reviewed and discussed the Draft Environmental Assessment and Regulatory Impact Review/Initial Regulatory Flexibility Analysis for the following two issues covered in Amendment 17:

(1) Delay sablefish opening.
(2) Federal permit requirements.

(1) Delay sablefish opening.

Data available for evaluating the alternatives are extremely limited and exhibit substantial variability. There is a critical need to collect pertinent data on halibut bycatch in the

sablefish fishery. These data are needed by depth and by month. An observer program would make it possible to collect these data.

The SSC recommends that this portion of Amendment 17 go out for public review taking into account the following comments:

Alternative 4. This alternative specifies a depth restriction of 500m. The analysis suggests that other depth restrictions (300m, 400m) also could be considered.

Alternative 5. This alternative, the fishing season framework for sablefish, is a strong candidate because of uncertainties associated with the bycatch data. Therefore, the associated discussion should be strengthened. The description of this alternative should state that split seasons could be allowed and a version for concurrent halibut/sablefish fisheries should be examined.

The SSC also made several other editorial comments.

(2) Federal permit requirements.

It is recommended that this portion of the amendment package be sent out for public review. The SSC wants to go on record supporting timely submission of accurate catch data by both floating and shore-based processors.

Proposed Regulatory Amendment to Limit the Bycatch of Sablefish in the Hook-and-Longline Fishery

The SSC received a presentation from the NMFS Regional Office on the proposed regulatory amendment to remedy the hook-and-longline sablefish bycatch problem. The proposal will establish a 4% or higher limit on the bycatch allocation. The SSC could not find any scientific justification for the 4% level, noting that the data provided in Table 1 were not "bycatch rates" but instead "landing percentages".

D-4 Bering Sea/Aleutian Islands Groundfish FMP

Amendment 12

The SSC reviewed and discussed the Draft Environmental Assessment and Regulatory Impact Review/Initial Regulatory Flexibility Analysis for the following five issues:

(1) Bycatch controls.
(2) Federal permit requirements.
(3) Non-retainable groundfish catch limits.
(4) Resource Assessment Document (RAD) deadline.
(5) JVP prohibition on roe rock sole.

It also reviewed and discussed the Draft Supplemental Environmental Impact Statement and Regulatory Review/Initial

Regulatory Flexibility Analysis for the proposal to increase the optimum yield (OY) range.

(1) Bycatch control.

The SSC concurred with the Team's findings that all of the bycatch control alternatives had limited biological consequences and that allocation was the main issue. However, recommendations were made to the plan team to describe further the biological information upon which the limited biological impact assertions rest. It was also suggested that the socioeconomic impact section be expanded to provide more detail on how various fisheries might be affected by the proposed options. Comments were also raised restating that the 1% value was based on an industry compromise and not founded on identifiable biological or economic objectives.

Application of Alternatives 2 and 3 to the expanding DAP fishery would require an observer program. The SSC also noted that the statement concerning 100% observer coverage should be modified to reflect a more realistic coverage requirement.

The SSC recommends this amendment be distributed for public comment after the suggested modifications are made.

(2) Federal permit requirements.

This proposal is the same as for the GOA and is discussed in that section.

(3) Non-retainable groundfish catch limits.

The SSC recommends that this portion of the Amendment 12 be released for public review. However, it is argued in Section 4.4.3 that the marginal cost of data collection and monitoring systems would be minimal. The SSC disagrees with this statement. A satisfactory system does not exist for the DAP fisheries.

(4) Resource Assessment Document deadline.

It is recommended that this portion of the amendment package be released for public comment.

(5) JVP prohibition on roe-bearing rock sole.

It was apparent that a lack of information hampered the Team in its attempt to develop the supporting documents for this proposal. Prior to releasing this proposal for public review the SSC believes that the problem statement should be refined and the alternatives further developed and analyzed. An outline of what the SSC would like to see in a reworked analysis follows.

The SSC feels that the following is a better description of the problem and indication of need for action (Section 6.1).

"Roe-bearing rock sole has become an important fishery for domestic (DAP) fishermen. While roe-bearing rock sole had once been harvested by foreign fisheries (TALFF), the JVP fisheries had, prior to 1988, only taken rock sole incidental to target fisheries on yellowfin sole. This proposed amendment is to enable domestic operators to exercise the domestic processor preference by limiting the JVP harvest of rock sole during a portion of the spawning period. It is estimated by the current DAP fishermen that the original market in Japan for roe-bearing rock sole is 15,000 mt. Two proposed alternatives, in addition to the status quo, are provided. Alternative 2 would limit the retention of rock sole by the JVP fisheries to no more than 30% of the total catch during the period January 1 to April 1. Alternative 3 would separate rock sole from the "Other flatfish" category, establish a TAC specifically for rock sole, and allow the Council to establish a split-season apportionment in order to isolate the roe-bearing harvest from harvest outside the spawning season."

Section 6.4 needs to be expanded to include an analysis of the impact of each alternative. For example, Alternative 1, Status Quo, the analysis should provide estimates of how large the JVP catch of roe-bearing rock sole could be in the absence of any action. Alternative 3 should be expanded to indicate how JV's would be affected by the inability to retain rock sole caught early in the year.

(6) Optimum yield (OY) range.

The SSC reviewed the draft SEIS/RIR/IRFA and discussed it in detail with the plan team. The proposal addresses the issue of the upper end of the OY range. The Team's analysis describes the probable impacts of higher TAC's that could result from an increased upper end of the OY range. The SSC commended the Team for preparing such an extensive document in the short period of time that was available. Numerous technical and editorial suggestions were made. It was also recommended that an analysis of probable market effects of catch levels that would be possible given higher TAC's be expanded to include a discussion of market access.

The document should be released for public review and comment.

C-4 Donut Fisheries

The SSC received a report of the recent NMFS acoustic survey in the donut hole, and a study of the possible effect of catch underestimates on the population model by which pollock ABC's are calculated. The latter study pointed out the close agreement of acoustic and analytic estimates of eastern Bering Sea stock size through 1985, which indicates that at least until that time, it was realistic to treat the EBS stock separately and to regard the

reported EBS catches as a reasonably accurate measure of fishery removals from that stock.

The SSC intends to review the available information on pollock stock structure this fall, but it expects that definitive answers will have to await the results of a few years of coordinated international scientific work.

C-10 Other Business

NMFS 602-603 Guidelines

Several members of the SSC attended a two-day meeting which was held in Seattle, during the first part of February, to discuss the Draft 602-603 Guidelines. In attendance at the meetings were members of the North Pacific, Pacific and Western Pacific SSC's and NMFS staff. Topics of discussion included definitions of ABC and threshold, default specification of threshold, and contents of the SAFE document. Views of each of the SSC's were given on each of these items. After NMFS has similar meetings in New England and Florida a new draft of the 602-603 guidelines will be circulated for review and comment.

Sablefish Limited Entry Data Request

Dr. John Harville requested assistance from the SSC in obtaining data that is needed to support the Council's efforts to explore limited entry options for the sablefish fishery. Drs. Marasco and Eggers agreed to meet with Dr. Harville at 2 p.m. on April 19, 1988 at the Northwest and Alaska Fisheries Center to formulate a course of action.

Reports

The SSC received the following reports:

1. The Northwest and Alaska Fisheries Center reported on a port sampling program based in Kodiak to determine age composition of the DAP pollock catch. Reports on the following subjects were also given: scientific sampling of the Polish pollock fishery in the Donut, and research survey activities in the Aleutian Basin and Shelikof Strait.

2. Terry Quinn reported on the NMFS Ecosystem Workshop.

3. Don Rosenberg reported on the Arctic Data Meeting that he attended.

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MINUTES
Scientific and Statistical Committee
June 20-21, 1988
Anchorage, Alaska

The Scientific and Statistical Committee met June 20 and 21 at the Sheraton Hotel in Anchorage, Alaska. Members present were:

Richard Marasco, Chairman
Don Rosenberg
Larry Hreha
Don Bevan
Dana Schmidt
Jim Balsiger for Bill Aron
Doug Eggers, Vice Chairman
Robert Burgner
Bill Clark
Terry Quinn
John Burns

C-4 NMFS Habitat Policy

The SSC did not have adequate time to carefully review, discuss and comment on this policy. Nevertheless, the SSC does not object to releasing the document for public review. A subcommittee of the SSC, consisting of John Burns, Dana Schmidt, Bill Aron, and Bud Burgner, has been appointed to review the document. Comments will be submitted to the Council at the September Meeting.

C-5 Domestic Observer Program

Ron Dearborn gave a report summarizing what the Council's pilot program has accomplished to date. He suggested that the remaining funds be used to address specific fisheries where scientific data are lacking for management. The SSC concurred with these proposals and recommends that the Council approve the approach suggested.

C-9 Sablefish Management

The SSC reviewed the document and has no comments to offer at this time.

C-12 Other Business

Proposed Conservation Standard (602.11)

The SSC appointed a subcommittee (Marasco and Bevan) to comment on the proposed standards. These comments will be provided to the Council's Executive Director prior to the July Chairmen's meeting.

Salmon Team Membership

The SSC reviewed the CV's of three individuals whose names have been submitted for consideration for membership on the salmon plan team. The SSC recommends that they be appointed to the team. (R.H. Williams, Oregon Department of Fish & Wildlife, A.C. Wertheimer, Auke Bay Lab, H.A. Schaller, Columbia River Intertribal Fish Commission)

Biological Reference Points

A subcommittee consisting of Bill Clark and Terry Quinn has been appointed to explore the utility of various biological reference points in evaluating the status of stocks. The document that describes the results of this effort will be provided to the team by mid-July to facilitate development of the 1988 RADs.

D-2 Crab FMP

The SSC reviewed the redrafted FMP for the Bering Sea/Aleutian Islands and concluded that it should be sent out for public review following the correction of several items.

(a) The ABC and Threshold definitions (e.g. on page 4-3) should be stated in terms of the crab FMP and followed by a description of how these definitions differ from the NPFMC's standard definitions.

(b) Page 8-18 identifies a threshold for females in terms of "above-average recruitment that is statistically significantly higher than the average recruitment." A detailed description of the statistics involved in making this determination is needed.

(c) Chapter 9 should be modified so that it contains information on what management actions would take place if the guideline harvest level exceeds the upper end of the OY range.

(d) Page 8-32 reads "Assuming that all vessels participating in the fishery are registered with the State,...". This exact language has been recommended by the committee steering the development of this draft FMP. Much of the capability of enforcement rests on the registration with the state of Alaska. This system will inevitably result in the collection of data that have confidentiality restrictions and limit information available to federal employees. This data access problem must be addressed.

(e) The "closed waters" section is incorrectly classified as a framework provision. It should either be edited into a true framework provision or be specified as a measure that is deferred to the state.

D-3 Gulf of Alaska Groundfish FMP

Proposal 1. Delay the opening of the longline sablefish fishing season by either a plan amendment or framework procedure.

Data are extremely limited to determine the best choice of an opening date for the sablefish longline fishery. It was not possible to choose between the three alternatives specifying a particular date, and the alternative specifying a depth range may have enforcement problems. Establishing annual seasons for fisheries based on current information is a common management measure in several fisheries such as halibut. Since the need for changes in fishing seasons is likely to increase in the future, the SSC recommends that a framework measure is the best alternative for dealing with future problems and providing the Council with administrative flexibility. This approach provides for suitable public input into the setting of fishing seasons and allows for split seasons to accommodate the needs of the harvesting and processing sectors.

The SSC recommends that alternative 5 be pursued as an FMP amendment. If problems occur with approval of the amendment by the Department of Commerce, the regulatory amendment approach suggested by NMFS should be pursued.

D-4 Bering Sea/Aleutian Islands Groundfish FMP

Proposal 1 - Establish a bycatch management system for king crab, Tanner crab, and halibut.

The SSC reviewed the pros and cons of the four alternatives, and comments are summarized briefly as follows:

Alternative 1. (No action). This alternative offers no bycatch mortality control or accountability. Rational bycatch management could not be accomplished, and if bycatch continued unconstrained, it could ultimately create a conservation problem. The present time/area closure of zone B (Figure 2.1, Amendment 12 Draft EA/IRFA) would lapse.

Alternative 2. Continuation of status quo. Bycatch controls for crabs apply to the DAH yellowfin sole/other flatfish fishery, and bycatch controls for halibut apply only to the JVP yellowfin sole/other flatfish fishery. No restrictions are established on C. opilio. No limit is placed on potential bycatch in other groundfish fisheries. No adjustment is made if stock status of bycatch species changes. The Zone B time/area closure of would continue.

Alternative 3. Bycatch framework. This alternative covers all groundfish fisheries and gear types (not limited to yellowfin sole/other flatfish fishery). It allows for adjustment of caps for crab bycatch as population levels of crab species change. The cap remains fixed for halibut bycatch. This option does not currently address C. opilio. The Zone B time/area closure would continue. Operational, administrative and enforcement costs will be higher than for alternative 2, but benefits should be greater. Option 3A would have higher implementation costs than option 3B, but presumably would provide better protection of individual fishery groups.

Alternative 4. Numerical limits. This is the most restrictive alternative. It would cover all groundfish fisheries. As with alternative 2, it provides no flexibility in bycatch allowances with change in crab population levels. It does not specify the DAP/JVP split in bycatch allowances. It would minimize the effect on halibut because the boundaries of closed Zone B would be expanded. The implementation costs would be less than for Alternative 3. The long-term intent of alternative 4 after 1990, as well as how the bycatch caps will be allocated between various fisheries needs clarification.

The SSC notes that the choice of alternatives for establishing bycatch limits is strictly an allocation issue at the present time. The 1 % value established in option 3 is an example of this allocation process. Alternatives 2, 3, and 4 all require a domestic observer program for the DAP fishery for implementation, but something less than 100 % coverage would be required if random sampling can be implemented. There is need to account for bycatch in all groundfish fisheries. This is only provided by alternative 3 and 4.

The SSC has a strong preference for alternative 3 because of its coverage of all groundfish fisheries and sensitivity to change in stock status of crab bycatch species. There are pros and cons relative to choice of 3A and 3B. Alternative 3A presents complex implementation barriers but better addresses allocation concerns. A middle ground between the two alternatives could be considered.

Proposal 2 - Require all floating processors receiving groundfish caught in the EEZ to obtain federal permits and report catch weekly.

The SSC supports Alternative 2 that requires all vessels receiving groundfish from the EEZ to have a federal permit regardless of processing location.

Proposal 3 - Establish non-retainable catch limits on the catch of groundfish species for which the TAC has been previously attained.

There currently is no limit on the amount of discard of non-retainable fully utilized species both in JVP and DAP fisheries. NMFS would like to have some guidance on an acceptable limit on the amount of discard. Three alternatives are proposed. Alternative 1 is the Status Quo. Although not specifically stated in the EA/IRFA, the Council under alternative 1 could limit the non-retainable catches by setting TAC's that considered discards of fully utilized species in non-directed fisheries. However, year to year variability in

bycatches and associated uncertainties in projected discards for given TAC's may promote less than full utilization of the resource.

Under alternative 2 a portion of ABC would be set aside for each species as a conservation margin. Non-retainable catch limits would be provided from this conservation margin and be imposed after achievement of a species TAC in fisheries that result in significant bycatch. Non-retainable catch limits would be apportioned among DAP, JVP, or foreign fisheries according to relative distribution of TAC among those fisheries.

Alternative 2 provides guidance to NMFS as to when to close the fishery, is the most comprehensive with respect to fisheries, and places limits on total removals of a species. However, it is very complex, requires domestic fishery observer data for implementation and places additional burden on the staff.

Alternative 3 is identical to alternative 2 except would apply only to JVP and foreign fisheries. The same comments regarding alternative 2 apply to alternative 3 except that data collection mechanisms currently exist for implementation.

The SSC could not specifically recommend any alternative because it could not ascertain whether the problem was severe enough at present to warrant the complex and expensive solution proposed.

The SSC has repeatedly expressed the need for monitoring and accounting for total fishery removals and the full consideration of those in determination of ABC and in making projections of future abundance.

The SSC noted that both alternative 2 and 3 of the proposal addresses the problem that the single species rule does not apply to foreign fisheries. The SSC further noted that under alternative 1 a regulatory amendment could be develop to extend the single species rule to foreign fisheries.

Proposal 4 - Remove the July 1 deadline for the annual Resource Assessment Document (RAD).

The SSC supports Alternative 2 that removes the July 1 RAD deadline. The SSC further supports the draft Council policy on RADS for groundfish FMPs.

Proposal 5 - Establish limits on the amount of roe-bearing rock sole that can be retained by joint ventures.

The stated objective of this proposal is to preserve the fishery and markets for roe-bearing rock sole that have been established by the DAP sector. The SSC interpreted preserving the fishery and markets to mean maintenance of current price and market access.

Data presented in the May 18, 1988 Draft Environmental Assessment and Regulatory Impact Review/Initial Regulatory Flexibility Analysis (EA/IRFA) for Amendment 12 indicates that weekly frozen rock sole with roe price on the Tokyo wholesale market declined during the first quarter of 1988. The Bill Atkinson's News Report (Issue 252) reported that:

> "In preparation for this year's roe-rock sole sales period, brokers from the Tokyo wholesale market advised that 500 Yen/kilo ($1.82/lb) was the maximum that the market could bear. As the first lots were place on the Shiogama market in February, the Tokyo brokers held firm and most of the imports sold for between 470 and 480 Yen/kilo ($1.71-1.75/lb); at on point, Shiogama prices for roe-rock sole from the U.S. factory trawlers dropped as low as 450 Yen/kilo ($1.64/lb), with JV product going as low as 400 Yen/kilo ($1.45/lb)."

Both the EA/IRFA and industry analysts (Orr letter to Pautzke dated June 16, 1988) agree that the increase in product supply has contributed to the price decrease. The SSC is of the opinion that it would be incorrect to attribute the full responsibility for the decline to increased product supply (data on catch 1987 relative to 1988). During the same period of time, the currency exchange rate between the Japanese yen and the U.S. dollar has varied. The role of other demand determining factors, for example, the prices of substitute products is not clear.

It impossible at this time to discern the importance of various demand factors in determining the level of prices. However, it is clear that the only vehicle that the Council has available to it to influence the roe-

rock sole market price is the setting of fishery quotas. Further, while it is possible to debate the role that increased supplies played in the recent price decline, it seems improbable that it was inconsequential.

It would appear, therefore, that if it is the intention of the Council to take action that has the highest probability of preserving the DAP roe-rock sole fishery, Alternative 3 should be adopted, with catches constrained to be in the vicinity of between 15,000 to 20,000 mt. A large expansion in the DAP catch could have an adverse impact on prices and, therefore, the economic viability of the fishery. It must be noted that this approach does not constitute a fail-safe method for preserving attractive prices; any action by the Council could be undermined by changes in the exchange rate, availability of alternative sources of supply and prices of substitutes. Since Alternatives 1 and 2 allow large increases in the catches of roe rock sole, they are considered incapable of achieving the stated objective of this proposal.

Prior to adoption of any management measure an examination of costs and benefits is required. Costs associated with Alternative 3 are dependent upon management controls placed on JVP fisheries. Prohibition of JVP flatfish fisheries during the roe rock sole fishery, prohibition of retention during the roe rock sole season, or retention of quantities of roe rock sole that are sufficient to allow operation of other JVP flatfish fisheries are possibilities. In 1987 and 1988, JVP catches of rock sole during the period of the roe fishery were one to five thousand mt, worth $500,000 to $2.25 million. If JVP catch and prices in 1988 approximate those for 1989, prohibition of a JVP roe rock sole fishery could result in a loss of approximately $2.0 million. This loss must be compared with the potential change in DAP income that could result from any price decline in the Japanese market due the JVP allocation. The magnitude of this loss can not be quantified at the present time. These same conclusions are applicable to the option that would prohibit retention during the roe rock sole season. Allowing retention of some of the bycatch during the roe rock sole season would reduce the loss of revenue that would accrue to JVP's, with the magnitude of the loss being dependent upon the quantity of fish that can be retained. However, the quantities harvested could impact prices.

Regardless of any other action the Council may take on this issue, the SSC recommends taking rock sole out of the "Other flatfish" category so that removals can be monitored.

Proposal 6 - Revise the upper limit to the optimum yield (OY) range.

The SSC reviewed the Draft Supplemental Environmental Impact Statement and Regulatory Impact Review/Initial Regulatory Flexibility Analysis for a Proposal to Increase the Optimum Yield (OY) Range in the Fishery Management Plan for the Groundfish Fishery of the Bering sea and Aleutian Islands. The SSC also received copies of the public comments from the American High Seas Fisheries Association, the Alaska Factory Trawler Association/Pacific Seafood Processors Association and Greenpeace. The SSC also received testimony from public.

The SSC notes that the objective of the EIS/RIR/IRFA is to evaluate the implementation of an increase of the upper end of the optimum yield (OY) range for groundfish from the current value of 2.0 million metric tons to a higher value. In 1983, the groundfish complex MSY was estimated to be 1.7 - 2.4 million metric tons. The OY range was established at 85% of the MSY range, or 1.4 - 2.0 million metric tons. We note that the upper end of the OY was not established as a means of preventing "overfishing" and should not be viewed as a biological limit.
The FMP also states "An amendment will be made when the status of the groundfish complex changes substantially from the present condition or when socioeconomic considerations dictate that OY should fall outside the present range.

The SSC provides the following comments on the proposed alternatives.

Alternative 2. The SSC does not support, with one dissention, using the sum of the annual estimates of acceptable biological catch (ABC) as a means of setting the upper end of the OY range. The SSC is concerned with using ABC in this manner. ABC is an annually determined starting point for the establishment of the annual TAC's. We feel it is important in the council process, that ABC recommendations made by the team and SSC be as free as possible of social, economic and political concerns. This alternative could lead to the addition of social, economic and political factors being included within the ABC recommendations. Since ABC is an annual determination with expected fluctuation, its use in calculation of a cap could lead to constantly changing cap.

Alternative 1 & 3. The status and condition of the stocks have changed since the original amendment, setting a 2 million metric ton upper limit, suggesting that the upper limit could be changed. This is suggested by the fact that in 1988, the sum of the ABC's is over 2.8 million metric tons and is projected to be approximately 2.6 million metric tons in the near future. The best estimate of the current groundfish complex MSY is not available. It is larger than the pollock MSY of 2.545 mmt and smaller than the sum of currently-estimated single species MSY's, which total 3.4 mmt.

The SSC does not have a recommendation on a specific value of the upper limit or a choice between alternative 1 and 3. Using the 1983 procedure, taking 85% of MSY yields a range of 2.2 mmt to 2.9 mmt. Therefore, using the 1983 procedure the upper cap would fall within 2.2 mmt and 2.9 mmt range.

In setting an OY the SSC recommends that the council take into consideration concerns regarding fishing in the international zone, illegal fishing, a lack of an observer program for the DAP fishery, the lack of controls on bycatch, and declines in marine mammals and seabirds.

The SSC did not have sufficient time to undertake a detailed review of the 3 public comment documents received. The SSC understands that these comments will be taken into consideration in developing the final draft SEIS/RIR/IRFA. Some of the public comment has cast doubts on the trustworthiness of the annual ABC's. The SSC restates its confidence in the assessments and the resulting ABC values as a starting point in determining TAC's. The description and discussion of world groundfish production and markets included in the NRC Report to the American High Seas Fisheries Association are useful additions to material contained in the SEIS. Further, the section that addresses JVP and TALFF catch, production and distribution under Alternative 2 is valuable. Insufficient time was available to carefully review the economic analyses contained in the document. It was determined, however, that conclusion reached in the NRC report regarding economic impacts do not differ materially from those contained in the SEIS.

With respect to the AFTA/PSPA report, it also provides some valuable information on BS/AI groundfish fisheries. For example, given are data on employment, capacity, investment, cost, and etc. This information augments that contained in the SEIS. The document does not contain analyses that contradicts the economic impact conclusions contained in the SEIS.

North Pacific Fishery Management Council

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Date: 12/1/88

MINUTES

Scientific and Statistical Committee
September 25-27, 1988
Anchorage, AK

The Scientific and Statistical Committee of the North Pacific Fishery Management Council met September 25, 26 and 27 at the Sheraton Hotel in Anchorage, Alaska. Members present were:

Richard Marasco, Chairman	Doug Eggers, Vice Chairman
Don Rosenberg	Bill Clark
Larry Hreha	Terry Quinn
Don Bevan	John Burns
Dana Schmidt	Bill Aron

C-2 Halibut Management

The SSC members on the Halibut RAAG briefly reviewed recommendations on the 21 regulatory proposals received.

C-3 Sablefish Management

The SSC reviewed the EA/RIR/IRFA for Sablefish Management in the Gulf of Alaska and the Bering Sea/Aleutian Islands. We find that the document does not adequately describe the seven identified problems. The SSC feels that the document should be improved before it is forwarded to the Secretary of Commerce for implementation. We have provided the staff with specific comments in this regard.

The SSC found that the document provides information on how effective the various alternatives address the identified problems, possible impacts of each alternative, and the mechanics of implementation and operation.

Results of the staff's analysis are summarized in Section 8. A table containing a summary of this information was provided to the SSC. The SSC notes that of the alternatives considered, the one that addresses all of the identified problems is an IFQ management system.

The SSC recommends that after the Council's final selection of the preferred alternative the document be carefully reviewed and improved to insure that the

selected management program is fully described. For example, the IFQ alternative does not contain at this time a statement on the restriction required to meet the National Standard regarding excessive rights. Further, there is a need to develop information that allows examination of the potential benefits and costs associated with each alternative.

C-5 Domestic Observer Program

In the past the SSC has expressed concern regarding the erosion of the scientific data base resulting from the Americanization of the fleet. This loss of information, which in the past has been provided by the foreign observer program, will lead to ineffective management and possible concern for some of the resources managed by the Council.

Bycatch management proposals that impose the least restriction on the target fisheries while insuring minimum bycatch are impossible without data on bycatch amounts and rates. Likewise, discard amounts are unknown and therefore the analysis of impacts on the resource not determined. Even our ability to project the status of the resource is becoming impaired.

The SSC sees erosion of this data base to be one of the most serious management problems facing the Council. Without information on bycatch, discards, catch per unit of effort, age structure of the harvest, and so forth, effective management will become impossible. This will lead to the Council either becoming very conservative in its management strategies or in possible damage to the resource.

The SSC believes action must be taken to correct this problem within the next few years and therefore has developed a proposed plan amendment for consideration during the coming annual amendment cycle. This proposed amendment has been provided by the SSC to the Council in accordance with the call for proposals.

C-7 Habitat Policy

The SSC endorses development and acceptance of a habitat policy by the NPFMC. The proposed habitat policy, though not entirely appropriate for marine and coastal habitats adjacent to Alaska, provides a useful framework from which a Council policy can be crafted.

The proposed policy, as written, is predicated on the reality of severe habitat degradation and loss from anthropogenic sources within the jurisdictions of several Councils. Therefore, it encourages and promotes intervention to "develop" habitats (see policy), and to "create and develop productive habitats where increased fishery productivity will benefit society" (see objective #3). Though such a policy and objective may be desirable in circumstances where significant habitat losses have already occurred, such manipulation in more-or-less pristine habitats is not desirable and should be discouraged.

The guiding principle of "no net habitat loss" (see objective #1) should be tempered to focus on losses caused by man. Additionally, that principle should be tempered on the basis of some threshold level of significant loss as well as the costs and benefits of remedial actions. Alaska is in the most

active geologic zone in North America. Encouragement of an objective that fosters corrective action to alter or reverse natural change is not necessarily desirable. Every significant adverse habitat alteration by man should not be paired with one engineered to create and develop habitat equal to that lost. Such compounded manipulation may not be desirable.

Several editorial changes are suggested to focus more directly on maintenance rather than creation and development of habitats, on responses to anthropogenic rather than natural habitat alteration and loss, and on protection of natural systems that support fishes rather than the more narrow protection of favored species that are taken for commercial and recreational purposes.

Recommended editorial changes are as follows:

Page 1, - paragraph 6, change the word "develop" to the word "maintain."

Page 2, - paragraph 2, change the word "develop" to the word "maintain."
- policy objective #3
- change the phrase "create and develop" to the word "maintain." Also, insert the word "natural" between the words "productive habitats."

Page 6, - all sections, substitute the word "activities" for the word "projects."
- add, "(5) Activities that result in releases of any toxic wastes."

Subject to these changes we recommend that the Council adopt the policy.

C-9 Other Business

1. Arctic Research Commission

The SSC received a presentation by Mayor Fuhs on the actions of the Arctic Research Commission and the proposed interdisciplinary research program entitled, "The Bering Sea as a System". Over the past years members of the SSC have participated in the development of this proposed program. The SSC strongly supports funding and implementation of this program and requests that the Council continue to be involved in the program development.

2. Team Membership

The SSC reviewed resumes for two individuals, Gregg Williams and David W. Carlile, who have been recommended for membership on the Council's two groundfish teams. We recommend that their appointments be approved.

In light of the fact that composition of the plan teams has not been reviewed for a couple of years, the SSC has decided to place this item on its December 1988 agenda. The staff has been asked to contact each of the involved agencies requesting that they review their participation and submit their new nominations to the Council prior to the December meeting.

D-2 Crab FMP

The SSC has reviewed the public comments and has nothing further to offer on this FMP at this time.

D-3 GOA Groundfish FMP

1. Amendment 17a - Sablefish Seasons

The SSC reviewed the EA/RIR/IRFA for the proposed amendment to split the sablefish season. Although data are lacking for determining precise benefits, the analysis prepared suggests that two primary benefits could occur with apportionment to a fall fishery. The first benefit is a reduction in halibut bycatch in the sablefish fishery due to lower estimated bycatch in the fall than in the spring. The second benefit would accrue from harvesting sablefish in the fall when prices historically have been high. To illustrate the potential gains, the SSC summarized information presented in the EA/RIR/IRFA. This information is presented below for the three options considered.

Gain From Split Sablefish Seasons*
(in millions of dollars)

	Spring/Fall Split		
Benefits	75/25	50/50	25/75
Value of halibut savings**	0.9	6.5	7.6
Increased value sablefish caught	2.8	5.6	8.4
Total	3.7	12.1	16.0

* It is noted that the bycatch data for domestic fisheries are limited.
** Does not account for the possibility of fishermen shifting to other fisheries with high halibut bycatch.

Other analyses suggested possible improvements in fish quality and vessel safety depending on the area (in the Central and Western Regulatory Areas, the most favorable weather occurs during June through September). Clearly, the analyses favors a split season with an apportionment of 25/75 between spring/fall. The Council may also consider better coordination with IPHC so that the sablefish season can occur simultaneously with the open halibut periods to avoid bycatch altogether in those periods.

2. Initial Acceptable Biological Catch Recommendations

The SSC reviewed the RAD and made several suggestions regarding clarity of presentation and additional analyses which should be performed and incorporated into the final RAD. These changes could result in different values for ABC at the December Council meeting.

Pollock

The SSC heard the team presentation, received two reports from Peter Craig of ADF&G, and heard testimony from the public. The SSC is concerned about pollock population levels in the Gulf. The spring 1988 hydroacoustic survey resulted in a biomass estimate of 330,000 mt in Shelikof Strait, which is not in accord with previous estimates of biomass from the 1987 bottom trawl survey and analysis of commercial catch-at-age data. The decline in maturity-at-age and length-at-age of pollock in the presence of a decling population is also of concern. Finally, there has been no indication of strong year classes appearing in the fishery in recent years.

Currently, it is hypothesized that the spawning component of pollock returns to Shelikof Strait in the spring of each year. This hypothesis has direct management implications. If true, pollock in the Gulf should be managed as a single unit and concern for pollock in Shelikof Strait translates into concern for pollock Gulfwide. The team suggested that this hypothesis may need to be reevaluated. The SSC has received reports which indicate that spawning occurs in other parts of the Gulf.

It is not clear what an appropriate threshold level for pollock should be. The RAD suggests that a threshold level for pollock may be 585,000 mt to 768,000 mt based on analyses of spawners and recruits. Theoretical population dynamics studies suggest that a threshold at 10% to 25% of unfished biomass may be reasonable. Using the highest observed biomass of 3 million mt (assumed to be an estimate of the unfished biomass), this results in a range of 300,000 mt to 750,000 mt. Some SSC members believe that a threshold level for pollock is not appropriate due to the variable recruitment observed in the population. Further, even if a threshold were established, it is not clear whether the threshold applies only to Shelikof Strait or Gulfwide.

If current pollock biomass is below the threshold, then ABC is zero. Some SSC members believe that ABC should be set to zero in light of the uncertainties involved. Others believe that ABC could be set to some low level based on a conservative fishing rate and biomass estimate. Others believe that ABC for Shelikof Strait is zero but that ABC outside Shelikof Strait cannot be determined on the basis of available information. A majority of the SSC recommends setting the ABC at zero to indicate concern about this population. Results from further analyses and data should be available in the final RAD.

The SSC believes the hypothesis that the spawning component of pollock return to Shelikof Strait in the spring of each year must be carefully examined. To accomplish this the SSC recommends establishing a TAC of 50,000 mt applicable to the fishery between January 15 and April 15. No more than 5,000 mt of this TAC may be taken in Shelikof Strait during this time period. In light of current population estimates, a removal of this amount of fish is probably not excessive and would provide useful information.

Between April 16 and August 31, no directed pollock fishery should be allowed in the Gulf of Alaska.

After evaluation of data from fisheries inside and outside Shelikof and the 1989 spring hydroacoustic survey, the Council could then recommend at its June meeting whether a fall fishery should take place. In any case, observers

should be used to collect information from both inside and outside fisheries. The SSC recommends that remaining funds in the Council's Domestic Observer Program be used for this purpose.

Pacific Cod

The SSC concurred with the team's choice for ABC of 99,000 mt apportioned among management areas as suggested. The SSC has requested that the team do additional analyses that would allow calculation of the F0.1 exploitation rate prior to the December meeting.

Sablefish

The SSC recommended the mid-point of the range of the team ABCs, or 35,000 mt, with this total apportioned among management areas as suggested.

Flounders

The flounder complex is currently characterized by high abundance and relatively low catches. Arrowtooth flounder, a low value species, comprises 54% of the estimated biomass for the complex. If catches become large, the Council may wish to separate arrowtooth flounder from the flounder complex to prevent adverse impacts on individual species.

The SSC concurs with the team that the natural mortality rates used in the analysis are unrealistically high. The SSC calculated revised ABCs using natural mortality estimates from the Bering Sea of 0.12 for yellowfin sole and 0.2 for other flounder species. Using exploitation rates equivalent to these natural mortality values, the revised ABC for flounders is 345,000 mt. The team's method for apportioning this total among the three management areas was used to disaggregate this total.

Slope Rockfish

The plan team recommended a Gulfwide ABC of 14,100 mt for this rockfish assemblage. The ABC is based on stock reduction analysis using biological parameters from POP and biomass estimates from areas deeper than 100 meters sampled in the 1987 Gulf of Alaska trawl survey. The plan team calculated the ABC by multiplying the estimates of exploitable biomass by Fmsy = 0.02. The plan team believed that this approach would permit rebuilding of the stocks. They also suggested that the Council might wish to consider separate ABCs for shortraker and rougheye rockfish to prevent overexploitation by a fishery targeting on these species. Such a separation would result in an ABC of 12,100 mt for the shallow slope rockfish and 2,000 mt for the shortraker and rougheye.

The SSC believed that a better estimate of ABC would be based on selecting F = 0.04. This would give an ABC of 24,200 mt for shallow slope rockfish and 4,000 mt for the deep slope species. The SSC wishes to note that the absence of an observer program makes enforcement of separate ABCs impossible and therefore recommends a combined ABC of 28,200 mt. The SSC agrees with the plan team that an allowed catch of 14,100 mt would permit some rebuilding of these stocks and lessen the problem associated with a fishery targeting on individual species.

Pelagic Shelf Rockfish

The SSC recommends the same procedure be used to calculate ABC for this group as was used for slope rockfish, applying a fishing mortality rate of 0.04 to the trawl survey estimate of biomass. This produces an ABC of 6,600 mt, or twice the value recommended by the team. We believe the higher ABC to be conservative because biomass is almost certainly underestimated by trawling.

Demersal Shelf Rockfish

The SSC agrees with the plan team that very little is known about this species assemblage and that it is impossible at this time to estimate an ABC. CPUEs have been declining and if management wishes to prevent the continuation of this decline, current harvest levels must be reduced. This group of rockfish is managed under the FMP by ADF&G.

Thornyheads

The SSC accepts the plan team recommendation that the ABC be set equal to the MSY level of 3,750 mt, which is unchanged from 1988, noting that the catches continue to increase and that the 1988 catch was the highest on record.

D-4 Bering Sea/Aleutian Islands Groundfish FMP

1. Amendment 12A - Bycatch Controls

The SSC continues to express concern about the lack of observer coverage necessary to insure accounting of bycatch or the establishment of bycatch rates to be used in the future.

The halibut fixed mortality limit may present future problems if the biomass of the halibut stock fluctuates causing a higher or lower percentage removal from the stock. The team explained that the lack of a biomass estimate for the juvenile part of the halibut stock, and out-migration limited the options available.

A bycatch of 1% or less of the surveyed crab numbers cannot be detected by changes in the resource base by use of survey or catch statistics. The SSC believes that accounting of bycatch mortality and subsequent controls are necessary for conservation purposes. Although we cannot measure the impact of removals of 1%, we believe a limit of removals at this level can assure that bycatch has no measurable negative impact upon the reproductive potential of the crab population.

2. Initial Allowable Biological Catch Recommendations

The SSC wishes to note that during the 1988 eastern Bering Sea trawl survey it was determined that the opening of the net was 2 meters less than assumed. This means that the area swept was less than expected and changes indicated in biomass from 1987 to 1988 might not reflect true increases or decreases in abundance. Therefore, care is warranted in comparing 1988 biomass estimates with those developed for previous years. The SSC recommends that historical biomass estimates be adjusted to reflect this new information.

Pollock

The SSC gave long and careful consideration to stock divisions in the Bering Sea and the possible effect of Donut Hole catches on productivity. There appears to be two major stock components in the U.S., EEZ--a shelf group in the eastern Bering Sea and a basin group to the west, but they are probably not distinct stocks.

The SSC believes that the cohort analysis and survey estimates provide an adequate assessment of the shelf pollock in the eastern Bering Sea, even if there is some dispersion of fish from this group into the basin group. We therefore support the team's recommendation of an ABC of 1.34 million mt for the eastern Bering Sea shelf component.

For the basin area, there is insufficient information to estimate biomass and knowledge of stock divisions to estimate the rate of exploitation. Since the fish in Area 515 (Bogoslof Island) are tentatively regarded as being part of the basin group and since data are not available to estimate ABC for the Basin, we do not support the team's recommendation that an ABC be calculated for Area 515 and added to the ABC of shelf pollock in the eastern Bering Sea.

The SSC recommends that until additional information is available, the ABC for the Aleutian Islands management area be calculated as in the past. Therefore, the SSC's ABC for 1989 is 160,000 mt.

The SSC advises caution in allowing any increase in catch from the basin group of fish. However, a plan amendment would be required to control the harvest of basin and shelf groups of fish separately.

Pacific Cod

The SSC reviewed the assessment model that has been developed and refined to estimate stock size and forecast production. The SSC supports the ABC recommendation based on the model results (370,600 mt).

Yellowfin Sole

The SSC recommends approval of the team's recommendation of 241,000 mt.

Greenland Turbot

The SSC recommends the ABC remain at 14,100 mt as a preliminary number until the team reexamines the analysis contained in the RAD. The SSC had questions concerning how the results of the SRA were used to arrive at the team's ABC recommendations.

Arrowtooth Flounder

The SSC accepted the team's procedure for calculating the current exploitable biomass for arrowtooth flounders, but later noted that a four-year averaging process was adopted to estimate biomass for other flatfish species. The SSC suggests that the team evaluate whether or not the same averaging process would improve the estimate of current biomass.

Regarding the exploitation rate, the SSC noted that the Fmax rate used by the team to derive ABC may not be sustainable. Therefore, a more conservative F0.1 rate is recommended. This results in an ABC estimate of 82,900 mt.

Rock Sole

To calculate an ABC, the team used the exploitable biomass of 1,071,000 mt, obtained by averaging the 1984, 1986 and 1987 biomass, multiplied by the Fmsy exploitation rate developed from a biomass based production model. This model gives an exploitation rate of 0.13. The natural mortality for rock sole is estimated to be 0.2. Therefore, the SSC feels that the exploitation rate used by the team is low. We believe a more appropriate rate is the F0.1 derived from a yield-per-recruit analysis. That rate is 0.18.

The SSC believes that the exploitable biomass is better represented by including the 1988 survey results in the calculation. By including data from 1988 we start to make an adjustment for the area swept calculation. This results in an exploitable biomass of 1,277,900 mt.

Therefore, the SSC recommends that ABC for the eastern Bering Sea be 230,000 mt (1,277,900 x 0.18). In order to account for the Aleutian Islands ABC, the SSC used the team procedure, resulting in a final ABC of 236,900 mt.

Other Flatfish

As in the case of rock sole, the SSC recommends that the four-year averaging technique to estimate the current exploitable biomass and the F0.1 exploitation rate derived from the yield-per-recruit analysis. This results in a new estimate of 222,600 mt.

Sablefish

The SSC notes that the relative abundance index (RPW) for the eastern Bering Sea declined by about 60%. The size of the reduction from 1986 to 1987 is considered uncharacteristic for this species. It was indicated in the RAD that killer whales could have had some effect on the survey. Nevertheless, the decline suggests that caution is warranted in the development of ABC for this species. In the case of the Aleutian Islands, the same index has remained relatively stable for the last four years.

The biomass estimates (16,900 mt and 96,800 mt for the eastern Bering Sea and Aleutian Islands, respectively) provided in the RAD are considered the best available information for use in developing ABCs. Given the magnitude of the RPW decline and uncertainty associated with its interpretation, the SSC recommends that the ABC for the eastern Bering Sea be based on a $F = 0.10$ (exploitation rate of 9.1%). Applying this rate to the projected biomass gives an ABC of 1,538 mt for the eastern Bering Sea. It is recommended that the ABC for the Aleutian Islands be held constant at the 1988 level (5,800 mt).

Pacific Ocean Perch

The SSC recommends approval of the team's recommendation of 6,000 mt and 16,600 mt for the eastern Bering Sea and Aleutian Islands, respectively.

Other Rockfish

The SSC recommends approval of the team's recommendation of 400 mt and 1,100 mt for the eastern Bering Sea and Aleutian Islands, respectively.

Atka Mackerel

The SSC recommends approval of the team's recommendation of 21,000 mt.

Squid

The SSC recommends approval of the team's recommendation of 10,000 mt.

Other Species

The SSC recommends approval of the team's recommendation of 59,000 mt.

3. Sablefish Targeting Proposal

The proposal to amend the sablefish regulatory regime focuses on several possible alternatives to define "targeting". The SSC believes that this does not properly reflect the real decision before the Council on allocation among gear groups. The Council may define targeting but the definition may not control discards. If the targeting definition is set too high, it will result in a de facto allocation to trawls of the sablefish. If the definition of targeting is set too low, it will result in additional discards which will not be measured. Even with an observer program, it is the SSC's view that any definition of targeting will, in some cases, not meet legitimate bycatch requirements, and may constrain a directed fishery. Conversely, in other cases, the bycatch allocation may exceed that required by the directed fishery. Without a means to measure discards it is impossible to enforce an allocation of the bycatch of these discards.

SSC GULF OF ALASKA ABC RECOMMENDATIONS 1989

SPECIES		ABC (mt)	TAC (mt)
Pollock	Western Central	0	50,000
	Jan 15 - April 15	---	50,000 (no more than 5,000 may be taken in Shelikof Strait)
	April 16 - Aug 31	No directed fishing	
	Sept 1 - Dec 31	To be determined	
	Eastern	3,375	
Pacific cod	Western	18,810	
	Central	73,260	
	Eastern	6,930	
	Total	99,000	
Flounders	Western	69,000	
	Central	239,000	
	Eastern	37,000	
	Total	345,000	
Sablefish	Western	5,075	
	Central	15,500	
	Eastern	14,425	
	Total	35,000	
Slope rockfish	Western	6,800	
	Central	12,200	
	Eastern	9,200	
	Total	28,200	
Pelagic Shelf	Western	1,100	
	Central	4,700	
	Eastern	800	
	Total	6,600	
Demersal Shelf		---	
Thornyhead rockfish		3,750	
Other Species		---	

SSC BERING SEA AND ALEUTIAN ABC RECOMMENDATIONS 1989

SPECIES		ABC (mt)	TAC (mt)
Pollock	EBS	1,340,000	
	515	---	
	Aleutians	160,000	
Pacific Cod		370,600	
Yellowfin Sole		241,000	
Greenland Turbot		14,100	
Arrowtooth Flounder		83,000	
Rock Sole		236,900	
Other Flatfish		222,600	
Sablefish	EBS	1,538	
	Aleutians	5,800	
POP	EBS	6,000	
	Aleutians	16,000	
Other Rockfish	EBS	400	
	Aleutians	1,100	
Atka Mackerel		21,000	
Squid		10,000	
Other Species		59,000	

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Date: 1/10/89

MINUTES
Scientific and Statistical Committee
December 4-6, 1988
Anchorage, AK

The Scientific and Statistical Committee of the North Pacific Fishery Management Council met December 4, 5, and 6 at the Sheraton Hotel in Anchorage, Alaska. Members present were:

Richard Marasco, Chairman	Doug Eggers, Vice Chairman
Don Rosenberg	Jack Tagart
Larry Hreha	Terry Quinn
Don Bevan	Dana Schmidt
Bill Aron	Bud Burgner

C-1 SSC AND PLAN TEAM MEMBERSHIP

(a) SSC Membership

During our September meeting it was brought to our attention that Dr. William Clark resigned from his position with Washington Department of Fisheries. While his tenure on the SSC was short, Dr. Clark's contributions were many.

(b) Plan Team Membership

The SSC reviewed resumes for several individuals who have been recommended for membership on the Council's two groundfish teams. Bill Wilson has been nominated to replace Steve Davis on the Gulf of Alaska Team and Washington Department of Fisheries has withdrawn Jack Tagart. Jeremy Collie and Grant Thompson have been nominated to replace Ole Mathisen and Vidar Wespestad on the Bering Sea/Aleutian Islands Groundfish Team. The SSC recommends approval of these appointments.

C-3 HALIBUT MANAGEMENT

The SSC reviewed the Environmental Assessment and Regulatory Impact Review/Initial Regulatory Flexibility Analysis of Management Proposal for the halibut fishery off Alaska. The SSC believes that the analysis of the various activities are reasonable.

D-1 GULF OF ALASKA GROUNDFISH

Pollock

The SSC received substantial information regarding the status of the Gulf of Alaska pollock stocks. The spring 1988 hydroacoustic survey resulted in a biomass estimate of 330,000 mt in Shelikof Strait. This is not in accord with previous estimates of biomass from the 1987 bottom trawl survey. The reported decline in maturity-at-age and length-at-age of pollock in the presence of a declining population is also of concern. There is no indication of strong year classes appearing in the fishery.

It has been hypothesized that the spawning component of pollock returns to Shelikof Strait in the spring of each year. This hypothesis has direct management implications. If true, pollock in the Gulf should be managed as a single unit and concern for pollock in Shelikof Strait translates into concern for pollock gulfwide. The SSC agrees with the team that this hypothesis needs to be reevaluated.

There is evidence, in recent years, of spawning pollock outside of the Shelikof area. The higher abundance and older age composition of pollock in the 1987 NMFS bottom trawl and the 1988 ADF&G bottom trawl surveys suggest that the 1988 Shelikof hydroacoustic survey did not estimate the entire gulfwide abundance of pollock. There is evidence from egg and larval surveys, from fishermen and Soviet scientists that spawning pollock occur outside Shelikof Strait.

It is not clear what an appropriate threshold level for pollock should be. In the September RAD the team estimated that the threshold level for pollock may be 585,000 mt to 768,000 mt based on an analysis of spawners and recruits during the recent period of high abundance. Theoretical population dynamics studies suggest a threshold at 10% to 25% of the average unfished or pristine biomass level. The very high biomasses and recruitment levels observed during the early 1980's may not be indicative of average pristine stock levels. The SSC agrees with the team that an estimate of threshold is not available at this time.

Because the available indicators of stock strength are inconsistent, the team was unable to determine an ABC for the Gulf of Alaska Pollock. The SSC after a review of the information recommends that an ABC be set for Gulf of Alaska pollock. At the September meeting the SSC was unable to reach a consensus but a majority recommended that ABC be set at zero. The SSC now recommends that a conservative ABC be set based on the information from the NMFS and ADF&G bottom trawl surveys, the evidence of spawning pollock outside Shelikof, and the inability to determine that the population is below a threshold.

The SSC examined several different methods for estimating the 1989 biomass level. We believe the 1987 NMFS bottom trawl survey provides the best estimate of exploitable (593,000) biomass. Discussion with the team chairman regarding augmentation of this estimate for the mid-water biomass resulted in the conclusion that the data are insufficient to allow this action. In developing an appropriate exploitation rate the SSC examined past pollock fishing in the Gulf prior to the development of the Shelikof Strait fishery. Catches were about 10% of the estimated biomass and harvesting at this rate

outside Shelikof Strait was coincident with a substantial increase in the pollock population. Using the 593,000 mt derived from the 1987 NMFS bottom trawl survey and a 10% exploitation rate, the SSC recommends that the ABC for the Western and Central Gulf of Alaska pollock be set at 60,000 mt.

The SSC recommends, that the Council in setting TAC's, limit the harvest inside Shelikof to no more than 6,250 mt. A harvest of this level will provide for continuity in fishery performance data and biological samples necessary for catch-at-age analysis. The SSC notes that emergency action must be taken, for conservation purposes, to designate a Shelikof Management area to limit the removals.

The SSC concurs with the team in suggesting that the Council consider, in setting TAC, that the biomass projection model shows little difference in short term biomass trend under catches ranging from 0 to 50,000 mt.

The SSC notes that substantial new information will be available by the June Council meeting, including the 1989 Shelikof survey, results of fishing effort directed inside and outside the Shelikof area, and a more complete analysis of threshold.

Lacking new information for the Eastern gulf pollock population the SSC concurs with the team and suggests using the method reported in the 1987 RAD to estimate ABC of 3400 mt for the Eastern gulf.

Pacific cod

In the final 1989 RAD, the plan team provided a revised estimate of projected 1989 exploitable biomass of Pacific cod based on 1984 and 1987 U.S. trawl surveys. ABC was calculated to be 71,200 mt based on an Fmsy estimated from stock reduction analysis. The SSC concurs with this estimate of ABC.

It should be noted that the team's analysis provides a much lower estimate of MSY biomass than obtained in previous analyses and that if the new MSY estimates are correct, present exploitable biomass of Pacific cod is at a level well above MSY.

Flounders

The SSC recommends that arrowtooth flounder be broken out of the flounder category in accord with the Bering Sea/Aleutian Island groundfish plan and to prevent overexploitation of more commercially viable species.

Because populations are apparently close to virgin populations, the team chose fishing morality rates to maximize yield per recruit (Fmax) for arrowtooth flounder, rock sole, and yellowfin sole and F0.1 for flathead sole. The SSC accepts ABC's presented by the team but cautions that continued use of Fmax is not wise because it may eventually reduce the populations below the level that produces maximum sustained yield. Due to the potential for high halibut bycatch, the Council may elect to choose TAC's lower than ABC's for this complex.

The ABC's for arrowtooth flounders, other flounders and total by area are:

Area	Arrowtooth Flounder	Other flounder	Total
W	38,051	73,449	111,500
C	199,072	185,228	384,300
E	37,494	21,406	58,900
TOTAL	274,617	280,083	554,700

Sablefish

The SSC concurs with the teams recommendation of an ABC of 30,900 mt. The SSC discussed the preception presented by some members of industry that CPUE's were decreasing.

Slope rockfish

The team recommends an ABC as a range, from 14,700 to 30,700 mt. The SSC believes that the midpoint rather than a range is more appropriate. Therefore the SSC recommends an ABC of 22,700 mt. This ABC should be apportioned among the regulatory area as recommended by the team.

Pelagic rockfish

The team recommends an ABC of 3,300 mt. Discussions with the team indicated that during their deliberations, the team did not evaluate the SSC recommendation made in September. The SSC believes that using a fishing mortality rate of 0.04 is still appropriate. Using that rate results in an ABC of 6,600 mt.

Demersal shelf rockfish

The SSC agrees with the plan team that very little is known about this species assemblage and that it is impossible at this time to estimate an ABC. CPUE's have been declining and if management wishes to prevent the continuation of this decline current harvest levels must be reduced. This group of rockfish is managed under the FMP by ADF&G. They plan to propose that the 1988 harvest level be reduced by 50 to 70% in 1989.

Thornyheads

The SSC accepts the plan team recommendation that the ABC be set equal to the MSY level of 3,750 mt which is unchanged from 1988, noting that the catches continue to increase and that the 1988 catch was the highest on record.

D-2 BERING SEA/ALEUTIAN ISLANDS GROUNDFISH

The SSC notes that there are differences in estimates of MSY in the Resource Assessment Document and in the Fishery Management Plan. We suggest that the estimates be updated at the time of the next plan amendment.

(a) ABC recommendations

Pollock

The SSC considered stock divisions in the Bering Sea and the possible effect of Donut Hole catches on productivity. One hypothesis suggests there are two major stock components in the U.S., EEZ--a shelf group in the eastern Bering Sea and a basin group to the west.

The SSC believes that the cohort analysis and survey estimates provide an adequate assessment of the shelf pollock in the eastern Bering Sea, even if there is some dispersion of fish from this group into the basin group. We therefore support the team's recommendation of an ABC of 1.34 million mt for the eastern Bering Sea shelf component.

Since the November RAD was written new information is available from the 1988 hydro-acoustical and bottom trawl surveys of the EBS. The preliminary survey results indicate an eastern Bering Sea shelf biomass of about 11.1 million tons. While this new estimate may require a revision of both MSY and ABC of the eastern Bering Sea pollock, we recommend that this be considered after the survey data has been completely evaluated and analyzed.

There is insufficient information to determine either the biomass or the ABC for the basin area. Since the fish in Area 515 (Bogoslof Island) may contribute to the basin population and since data are not available to estimate ABC for the Basin, we do not support the team's recommendation that an ABC be calculated for Area 515 and added to the ABC of shelf pollock in the eastern Bering Sea.

Although we are unable to determine an ABC for Area 515, the SSC considered whether there should be a separate TAC for this area. The SSC notes that biomass in the basin area is additional to that in the eastern Bering Sea. Nonetheless, we believe the uncertainties regarding stock structure and other vital population parameters make it premature to set a separate TAC at this time.

The SSC believes that until more information is available, the ABC for the Aleutian Islands management area be calculated as in the past and recommends an ABC for 1989 of 117,900 mt.

In any case a plan amendment would be required to control the harvest of basin and shelf groups of fish separately.

Pacific cod

The SSC concurs with the team's ABC recommendation of 370,600 mt for Pacific cod.

Yellowfin sole

The SSC concurs with the team's ABC recommendation of 241,000 mt for yellowfin sole.

Greenland turbot

The SSC notes that there is considerable variation in estimates of ABC depending on the value chosen for the recruitment parameter in the SRA analysis. The SSC concurs with the team's 1989 ABC recommendation of 20,300 mt and notes that this value is higher than the 1988 ABC due to reanalysis. The population should decline over the next few years regardless of catch level as recruitment has been low for several years. The Council may wish to choose a TAC lower than ABC in light of the low observed recruitment.

Arrowtooth flounder

The SSC concurs with the planning teams decision to use a five year average less the 1985 data in determining trawl based biomass. The SSC supports the plan team's recommended ABC for this species, 163,700 mt.

Rock sole

The SSC concurs with the plan team's recommendation, 171,000 mt.

Other flatfish

The SSC concurs with the plan team's recommendation, 155,900 mt.

Sablefish

The team proposes ABC's for sablefish of 2,800 mt in the Eastern Bering Sea management area and 3,400 mt in the Aleutian management area. These ABC's were determined by applying an exploitation rate determined by an annual surplus production approach to the estimated 1989 exploitable biomass. The SSC examined the reference points used by the team in making this recommendation.

The SSC accepts the team's estimates of the 1989 exploitable biomass. These estimates are projected using the 1986 trawl surveys and applying relative changes in abundance as indicated from the 1988 longline survey. This results in exploitable biomass estimates of 25,300 mt in the Eastern Bering Sea area and 68,000 mt in the Aleutian area.

The SSC noted that the current biomass levels appear to be determined by a strong 1977 year class. There are no further indications of a strong year class. Biomass trends from the longline survey have been downward since 1985. In the Eastern Bering Sea area the current biomass (25,300 mt) appears low compared to the equilibrium biomass that would occur at current recruitment levels with no fishing (about 60,000 mt). In the Aleutian area the current biomass of 68,000 mt is about 62 percent of the unfished biomass (about 110,000 mt).

The SSC noted that the reference points used by the team are all determined by the application of SRA, which had strict assumptions regarding growth, natural mortality and recruitment. We believe these reference points should be viewed with caution.

The team's proposed exploitation rates (Eastern Bering Sea - 11%, Aleutian - 5%) were based on a surplus production approach which would keep the exploitable biomass at equilibrium. The SSC does not believe that exploitation rates based on surplus production are appropriate in this situation. This approach produces lower exploitation rates when the biomass is high compared to the unfished biomass (the model develops a 5% exploitation rate for the Aleutian stocks when the exploitable biomass is at 62% of the unfished biomass estimate and 11% for the Eastern Bering Sea stocks when the exploitable biomass is at 42% of the unfished biomass.)

The SSC recommend a simple and conservative approach: an exploitation rate of 9.1% (corresponding to a natural mortality of 0.10) for both areas. This will allow the possibility of rebuilding in the Eastern Bering Sea population and provides a conservative approach for the Aleutian population which may be declining. This results in an ABC of 2,300 mt for the Eastern Bering Sea management area and 6,200 mt of the Aleutian management area. In setting the TAC in the Aleutian area the council should note that the catch has never exceed 3,900 mt.

Pacific Ocean Perch

Recommendations of Pacific ocean perch ABC, from the November RAD, of 6,000 mt and 16,600 mt for the Bering Sea and Aleutian Islands are unchanged from those presented in the September draft. The SSC concurs with the team's recommendation.

Other rockfish

Recommendations of Pacific ocean perch ABC, from the November RAD, of 400 mt and 1,100 mt for the Bering Sea and Aleutian Islands are unchanged from those presented in the September draft. The SSC concurs with the team's recommendation.

Atka mackerel

The SSC concurs with the team's recommendation, 21,000 mt.

Squid

The SSC concurs with the team's recommendation, 10,000 mt.

Other species

The SSC concurs with the team's recommendation, 59,000 mt.

(b) Groundfish PSC's

The SSC has no comments to offer on this topic at this time.

(c) Bycatch limits proposed for 1989 (Amendment 12a)

In a joint session with the AP, Council staff described a computer simulation program that has been developed to examine impacts, including benefits and costs, of alternative bycatch management approaches. We also received reports

from Steve Hoag, IPHC, Dr. Robert Stokes, University of Washington, and several members of the public.

The SSC would like to commend Council Staff, members of the Northwest and Alaska Fisheries Center who developed computer program, and others who provided data to adjust the initial model. This effort has shown that bycatch controls can have significant economic impacts on both groundfish fisheries and fisheries that target on species taken as bycatch, that benefit and cost estimates are sensitive to assumptions made in the analyses, and that there are serious voids in our data bases.

Benefit/cost analysis provides a tool that assists the evaluation of alternative management options. A characteristic of benefit/cost analyses is that results are frequently sensitive to assumptions made. The results of the program developed to examine the Council's September bycatch decision indicate a sensitivity to bycatch rate, catch-per-unit-effort, and fishing patterns. Public testimony indicated that some of the bycatch rates used in the model are inappropriate. Similar views were expressed about CPUE's with catch-per-hour being the preferred to the two measured used in the analysis and fishing patterns. The use of 100% mortality rate for halibut taken in all trawl fisheries was challenged. Data examined by the SSC indicates that, while mortality rates are high, they probably are not 100% for all trawl fisheries. Observer data for Bering Sea foreign and joint venture trawl fisheries for 1986 and 1987 indicate that from 5 to 24 percent of the halibut caught were in excellent condition. The percentage of halibut observed during 1988 to be in excellent condition in selected domestic Bering Sea and Gulf of Alaska fisheries ranged from 5 to 48. The SSC recommends using a halibut bycatch survival rate in Bering Sea DAP fisheries based upon an average of the percent of halibut released in excellent condition. In the 1988 winter-spring bottom trawl and summer Pacific cod bottom trawl factory/mothership fisheries, the average halibut bycatch in excellent condition was 12.7%. Since Bering Sea halibut bycatch in these fisheries is composed primarily of small fish, the SSC used 0.48 as the survival fraction of these fish. The resulting estimated survival rate is 6%.

The SSC would like to caution the Council that this estimate is based on limit data. Further, the SSC was unable to determine survival rates for other Bering Sea fisheries, for example the H&G fishery, due to insufficient data.

Definitive statements about the benefits and costs associated with implementing proposed bycatch caps in 1989 are not possible. This statement should not be taken as a criticism of the usefulness of the model but as an indication of the lack of DAP bycatch data and our limited understanding of these fisheries. If domestic fishermen are unable to lower halibut bycatch rates, a large portion of the eastern Bering Sea could be closed to groundfish fishermen.

Criticisms voiced over results obtained from the simulation model indicate that we have stretched the foreign/joint venture data base to its limits. Even more disconcerting, our ability to update these data is coming to an end as the fishery is pursued by domestic, unobserved vessels. Scientists, in their attempts to examine the impacts of management measures, are increasingly faced with the frustrating task of locating usable data. The absence of credible data bases also limits the SSC's ability to function as a review and advisory body. In the opinion of the SSC we are in a crisis situation. Lack

of domestic fisheries data affects our ability to determine the status of groundfish stocks and evaluate the impact of management measures. The impact of these data gaps will be significant in 1989, in the likely absence of information on the age structure of the catch by the DAP fishery.

(d) Proposed sablefish directed fishing definition

The SSC reviewed the Issue Paper on Amending the Definition of Directed Fishing of Sablefish Directed Fishing in the Bering Sea Area. The proposal to reduce the retention rate for sablefish does little to control the fishing mortality on sablefish. If the retention rate is below the actual bycatch rate necessary to prosecute the fishery, sablefish will be discarded. Information does not exist to estimate the actual mortality expected under various retention rates.

The proposal has allocation implications that were not addressed in the analysis. The SSC heard public testimony that some trawl fishing operations were designed to process sablefish and need to retain sablefish to maintain profitability. In the absence of information on management goals, the SSC is unable to comment further on an appropriate change to the definition.

The SSC offers the following specific comments on the document:

1. The bycatch data presented in Table 2 for TALFF and JVP fisheries are not directly comparable with the bycatch rates presented for the DAP fishery as presented in Tables 4 and 5. Bycatch rates in Table 4 and 5 are a percentage of the target species only when sablefish were present while the rates in Table 2 are the percentage of sablefish for the total harvest.

2. The bycatch rates provided in Table 4 include both retained and discarded catch. Table 5 most likely does not include discarded catch. Because discards are included in the rates direct application to the TAC harvest is not possible. The magnitude of this error is most likely small.

3. Table 8 "High Estimates" represents the best estimate of the sablefish catch (retained and discarded) needed to operate in 1989 with the current definition of directed fishing and given the assumption that operations of the fishermen and JVP/DAP allocations are the same as in 1988. If it is assumed that all of the catch is retained and the fishery strategy does not change, then about 3,100 mt would be harvested. If TAC is set at the recommended SSC ABC then 2,300 mt would be retained and 830 mt would be discarded. This assumes that no targeted sablefish fishery is allowed. If one is allowed, discards would increase by that catch.

The SSC recommends that caution should be exercised in using the results in Table 7 and 9. These tables reflect amounts of sablefish taken by various fisheries under alternative bycatch rates. The rates used are not a reflection of needs required to carry out fisheries under 1988 conditions. Likewise, these tables do not reflect the changes in catch from JVP and DAP that are occurring.

OTHER BUSINESS

(b) Research and Data Collection Priority Recommendations of the SSC

The SSC reviewed recommendations of the council staff and the Gulf of Alaska and Bering Sea/Aleutian Islands Groundfish plan teams for research needs. Given the decrease in observer coverage of the fleet and uncertainty about sources of future data necessary for management of the fisheries of both the Bering Sea and Gulf of Alaska, the following priorities are recommended. The SSC also emphasizes that we continue to depend upon the existing research programs of the National Marine Fisheries Service and the Alaska Department of Fish and Game and assume these programs will continue.

The highest priority program:

Provide for the domestic observer programs for the Bering Sea and Gulf of Alaska groundfish fisheries with the intent of providing statistically valid sampling of the commercial groundfish harvests. These data are essential for management of the groundfish species and bycatch of other commercial species.

Other high priority programs for management of North Pacific Fisheries:

Determine stock structure, life history information, population dynamics and other biological data essential for management of Pollock stocks with special emphasis on the stocks of the central Bering Sea and the Shelikof Straits.

Determine the actual age structure of populations of groundfish in the Gulf of Alaska and the Bering Sea through valid aging techniques and sampling programs and provide support for the port sampling programs necessary to collect the data.

Conduct studies of trophic interactions in the Bering Sea ecosystem with particular emphasis on the interrelationships between critical populations of fish, shellfish, and marine mammals.

SSC GULF OF ALASKA ABC RECOMMENDATIONS 1989

SPECIES		ABC (mt)	TAC (mt)
Pollock	Western Central	50,000	
	Jan 15 - April 15	---	(no more tham 6,250 maybe taken in Shelikof Strait)
	Eastern	3,400	
Pacific cod	Western	13,500	
	Central	52,000	
	Eastern	5,700	
	Total	71,200	

		Arrowtooth	Other	Total
Flounders	Western	38,051	73,449	111,500
	Central	199,072	185,228	384,300
	Eastern	37,494	21,406	58,900
	Total	274,617	280,083	554,700

Sablefish	Western	4,900
	Central	13,900
	Eastern	5,300
	S.E./E.Yakutat	6,800
	Total	30,900
Slope rockfish	Western	5,500
	Central	9,900
	Eastern	7,300
	Total	22,700
Pelagic Shelf	Western	1,100
	Central	4,700
	Eastern	800
	Total	6,600
Demersal Shelf		---
Thornyhead rockfish		3,800

SSC BERING SEA AND ALEUTIAN ABC RECOMMENDATIONS 1989

SPECIES		ABC (mt)	TAC (mt)
Pollock	EBS	1,340,000	
	515	---	
	Aleutians	117,000	
Pacific Cod		370,600	
Yellowfin Sole		241,000	
Greenland Turbot		20,300	
Arrowtooth Flounder		163,700	
Rock Sole		171,000	
Other Flatfish		155,900	
Sablefish	EBS	2,300	
	Aleutians	6,200	
POP	EBS	6,000	
	Aleutians	16,000	
Other Rockfish	EBS	400	
	Aleutians	1,100	
Atka Mackerel		21,000	
Squid		10,000	
Other Species		59,000	