North Pacific Fishery Management Council

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MINUTES
Scientific Statistical Committee
April 19-21, 1993

The SSC met at the Anchorage Hilton, April 19-21, 1993. Members present were:

Bill Aron	Bill Clark, Chair	Keith Criddle
Doug Eggers	Bud Fay	Larry Hreha
Dan Huppert	Rich Marasco	Marc Miller
Phil Rigby	Jack Tagart	Al Tyler

C-6 COMPREHENSIVE RATIONALIZATION

The SSC received a status report from Council staff on the CRP process to date. Additionally, a sub-committee of the SSC met with Council staff and others to discuss the overall strategy and specific modelling approaches for the economic benefits assessment.

Regarding the benefit-cost analysis, the adequacy of the analysis should be assessed in light of its objectives. One objective is to meet the requirement of the Magnuson Act, E.O. 12297, and OMB for a finding that net national benefits will be generated by the rationalization program. The SSC has little doubt that, if implemented at reasonable cost, an IQ program covering the major groundfish species and prohibited species can lead to greater economic net returns ("rent") from the groundfish fishery. A relatively straight forward economic model of the fishery should suffice to demonstrate the likely magnitude of these benefits. A simple linear programming model could be developed for this purpose without involving the staff in the more complex multi-stage models that were proposed. This approach would also address SSC concern that a complex, multi-stage model would have extraordinary data requirements and that it might not correctly predict actual developments in the fishery.

A related objective would be to make fairly detailed forecasts of the changes in the fishery that would follow an allocation of harvest rights, such as changes in the distribution of landings and employment. We are not optimistic that this task can be accomplished at all. Unfortunately, these detailed predictions of changes in the fishing and processing sectors are what is needed to drive the economic impact assessment.

Regarding the economic impact models, the staff proposes to expand its ability by using impact models of two types. First a resurrected Jensen-Radtke FEAM model will be used for a few large

communities. The Council staff has responded to our earlier concerns about the documentation of the FEAM models by including this effort in their plan. Second, simpler "economic base models" will be developed for both large and smaller communities. Both types of impact model predict secondary impacts of an initial or primary effect of a program changes. These effects can be expressed as levels of output, incomes, and employment by fishing and other economic sectors. So, for example, a reduced fishing and processing industry in a particular community or village will have secondary or "multiplier" effects on other sectors in the village. A critical concern is the ability to forecast change in each community that will result from implementation of an ITQ program.

The "scenario" approach to the B/C analysis calls for a survey of industry. Plans for this survey are vague at present. The SSC suggests special attention be devoted to the survey design, particularly considering problems of non-response, self-selection, and strategic and hypothetical bias. Objectives for specific data should be specified soon. We look forward to reviewing more advanced plans for the industry information collection and the development of the scenario approach.

The aim of the social impact assessment is still unclear. We do not know what social changes or conditions need to be considered and predicted. The Council should identify factors it has an interest in beyond economic impacts such as employment and spending. Given constraints imposed on this study, there is a need to consult with General Counsel to determine minimal requirements. After these requirements are determined and Council interests identified, a committee of experts including Dr. Miller should be assembled to develop a study plan.

The SSC encourages the use of qualitative assessments as proposed by the staff to screen alternatives before performing a full analysis on a manageable (small) number of options.

D-2(a) PACIFIC OCEAN PERCH REBUILDING

In December the Council adopted an ABC for Gulf POP based on a biomass estimate from the stock synthesis model and the $F_{35\%}$ exploitation rate. In January the Council received an analysis of alternative rebuilding strategies based on resampling the spawner-recruit data from the stock synthesis model fit. Among other things, this analysis showed minimal rebuilding at the $F_{35\%}$ exploitation rate.

In its review of this study and recommendations for a plan amendment analysis in January, the SSC recommended that the exploitation strategy and the rebuilding strategy be developed from the same population model. Specifically, the Committee requested that the analysts carefully evaluate the spawner-recruit data and decide whether it was possible to fit a usable stock-recruitment relationship, from which it would be possible to estimate the optimal exploitation rate (F_{msy}) and the corresponding target biomass (B_{msy}), as well predict the stock trajectories to be expected from alternative rebuilding strategies.

At this meeting the SSC reviewed the new EA/RIR/IRFA. In line with the Committee's recommendation, the authors have conducted a thorough re-evaluation of the historical spawner-recruit data and fitted a stochastic spawner-recruit relationship, which served as the basis both for choosing an optimal exploitation rate and for forecasting the effect of alternative rebuilding strategies. The SSC endorses this procedure.

Both the Teams and the SSC have generally been reluctant to base their advice on managing any groundfish stock on fitted spawner-recruit relationships because these relationships are notoriously difficult to estimate. Only for Bering Sea pollock, and now Gulf POP, has the Committee chosen to rely on the available spawner-recruit data. The decision is always a difficult one, with arguments

on both sides, and this case was no exception. As in other cases, the POP spawner-recruit data are highly variable and it is not certain that the underlying stock-recruitment relationship has been constant for the last thirty years. This uncertainty necessarily extends both to the F_{msy} estimate and the rebuilding forecasts. Nevertheless, the spawner-recruit data set obtained from the synthesis model fit is quite large and well distributed over a wide range of spawning stock sizes. Moreover, the pattern of points is not sensitive to the specific tuning of the synthesis model used to reconstruct the stock history. We therefore believe the data should be an accurate reflection of the reproductive potential of the stock over the range of observed spawning stock sizes.

The estimate of F_{msy} (0.08) in the new analysis is below $F_{35\%}$ (0.11), which is included as the status quo and the first alternative policy. This is useful for purposes of comparison, but the $F_{35\%}$ rate would not be allowed by the Council's overfishing definition and therefore is not really a feasible alternative. This should be noted in the document.

As regards the TAC determination for 1993, the SSC notes that on the basis of the analysis presented in the document and approved by the Committee, both the ABC and overfishing levels for 1993 would have been set at the F_{msy} level, which is 3378 mt.

The primary emphasis in this analysis was on the biological potential for stock rebuilding rather than on the economic consequences of the alternatives. Some estimates of gross revenue are presented, but these are simply proportional to differences in physical yield, with or without discounting. Any price movement would alter these estimates. If fishing costs were subtracted from gross revenues to obtain net revenue, the differences among rebuilding strategies would be smaller in dollar terms because fishing costs would be lower at lower exploitation rates. The analysis does not provide any estimates of the effect of the different alternatives on the profitability of particular operations.

As to process, the SSC recommends that the analysis be released for public review after a few technical clarifications suggested to the authors. The Gulf Team should be asked to review the package and provide its advice before the Council takes final action, which would not be necessary until December.

D-2b ALLOCATION OF PACIFIC COD TAC

The SSC reviewed the draft EA/RIR/IRFA for Amendment 24 to the BS/AI fishery management plan. The analysis evaluates the potential biological and economic impacts of allocating the Pacific cod TAC according to type of fishing gear and/or season.

The BS/AI cod fishery has been fully Americanized since 1988. The domestic fishery was almost exclusively a trawl based fishery until 1989 when PSC caps began to constrain the trawl fishery. In 1992, the BS/AI trawl, longline, and pot fisheries for cod caught 47.9, 100.9, and 13.7 thousand metric tons of cod, respectively. An additional 42.8 thousand metric tons of cod were caught as bycatch in other BS/AI trawl fisheries. The sum of directed and incidental catches of cod exceeded the TAC by over 23 thousand metric tons in both 1991 and 1992. In addition to being fully subscribed, the length of the fishing season has become increasingly compressed in recent years. In response to a request from industry, the council asked for an examination of the biological and economic benefits of gear specific allocations of BS/AI cod and of the benefits of alternatives intended to change the seasonality of the cod fishery.

Biological Effects--It is not expected that cod yield per recruit will be by increased by exclusive allocation to trawl or longline fisheries, or by alternatives that change the seasonality of the cod

fishery. However, an increased allocation of cod to the pot fishery can be expected to result in slightly increased yield per recruit (about 10%) due to the increased size selectivity of pot gear. Although the concentration of fishing mortality during the first part of the year may result in reductions in the equilibrium stock size, equilibrium catches could be increased or decreased.

The alternatives are not expected to result in different impacts on marine mammal or seabird populations. There is some tradeoff among gear types in the bycatch of prohibited species, but recent catch estimates indicate that the groundfish OY can be harvested within present PSC limits, and the cost of bycatch is small relative to overall costs, revenues, and net benefits for all gear types.

Economic Effects--The economic benefits of the alternative allocations depend on the value of fish and the cost of catching them. The annual net benefits (ANB) of fishing represent gross revenue, less the cost of fishing and processing, less the foregone net value of bycatch, including prohibited species. It is estimated that a transfer of catch from the trawl fishery to the longline fishery would result in reduced ANB. Transfer of catch from the trawl fishery to the pot fishery in the first trimester would be expected to increase ANB.

Because there is considerable variation among vessels within a gear category, the conclusions may not hold for individual operations. That is, the ANB of some trawl vessels may exceed that of some pot operations even though the "representative" pot vessel generates a greater ANB than the "representative" trawler. Moreover, because catches, prices, and costs can be expected to vary differently over time, it cannot be assumed that current differences in ANB will constant. Nor can it be assumed that vessels with positive ANB will remain profitable in the long run.

The SSC considers the definition and computation of ANB acceptable. However, cost estimates used in the analysis of alternatives were based on a very small sample of the pot, longline, and trawl vessels and may not be representative. Because of the ease with which vessels can be modified, gear specific allocations of cod cannot be expected to alleviate the effects of overcapitalization.

Additional Issues-- Decisions about alternative management policies for cod need to be considered in the context of current and anticipated future change. The continued decline of BS/AI cod biomass can be expected to intensify competition for shares of the TAC. In a derby fishery without seasonal allocations, it can be expected that catches will become increasingly concentrated towards the beginning of the first trimester. The competitiveness of H&G freezer longliners can be expected to be lessened by a continuation of the current low price of cod and short seasons. Changes in technology can also be expected to change the relative competitiveness of different vessels. Recent adoption of filleting technology by some longliners can be expected to increase the ANB of longliners.

Recommendation--The SSC supports release of this the draft EA/RIR/IRFA for Amendment 24 for public review and comment. Because the Council already has the ability to allocate catch between gear groups, immediate industry concerns could be addressed through existing mechanisms. In the long term, the allocation of fish resources both within and between gear types could be resolved through ITQs.

D-2(d) GOA ATKA MACKEREL

The SSC received a presentation on the EA/RIR/IRF concerning the proposal to re-classify GOA Atka mackerel as a target species and recommends that it be sent out for public review. Atka mackerel has been included in the Other Species category since 1988. The directed fishery for Atka

mackerel resumed in the Western GOA in 1990. Removals of Atka mackerel by the directed fishery led to early closure of the fisheries for Other Species that year and in 1992. To prevent this from happening again in 1993, the Council reapportioned the TAC for Other Species among the three regulatory areas (Eastern, Central, and Western GOA), rather than Gulf-wide.

This proposal would make it possible to set an ABC and TAC for Atka mackerel. Implementation of this amendment would be beneficial since it allows management to be species specific. Other fisheries would benefit, as well, since Atka mackerel removals would not result in early attainment of the Other Species TAC.

The possibility of eventually combining the management of WGOA Atka mackerel with management of the BS/AI stocks was discussed, recognizing that they are contiguous and probably part of the same stock. The SSC recommends that the Plan Teams examine this issue in the development of future stock assessments.

The potential impact on marine mammals also was considered at length, since the present WGOA Atka mackerel fishery takes place within 10-20 miles of (formerly) major Steller sea lion rookeries. In addition, the removal by this fishery takes place in the winter, when juvenile sea lions apparently are disadvantaged nutritionally. Steller sea lions, for which the Atka mackerel appears to be an important prey, are depleted in the eastern Aleutians and are listed as threatened under the Endangered Species Act. High mortality of juvenile sea lions is believed to have been a major factor in their decline.

D-2(e) BS/AI CHINOOK SALMON BYCATCH

The SSC reviewed the EA/RIR/IRFA for Amendment 21b (Salmon Bycatch Management) to the FMP for the Groundfish Fishery of the Bering Sea and Aleutian Islands.

The document has been revised to address impacts of bycatch on chinook salmon runs to the Nushagak and Yukon Rivers. At historic bycatch levels the interceptions of chinook salmon by the BS/AI groundfish fisheries represent between 1% and 4% of the run to Yukon and between 2% and 7% of the Nushagak run. The SSC notes that the statistical precision of the estimates of interception for particular years is low due to: 1/ the necessity of using stock composition data taken in the late 1970's and early 1980's from the foreign fishery that was fishing in different areas than the domestic and JV fisheries and 2/ the necessity of expanding Yukon River catches to total run using an average exploitation rate.

An analysis was prepared in partial response to a request by the AP to examine the alternatives using data from individual years rather than averaged data. Because the 1992 weekly production reports were not yet available it was not possible to do a complete analysis. Analysis of the updated (1990-1992) observer data showed that: 1/ the proportion of chinook bycatch taken within the 200 m contour buffer and two blocks above Unimak Island was similar among all three years for the domestic bottom trawl fisheries for pollock and Pacific cod; 2/ the 1992 pelagic trawl fishery for pollock had a substantially lower proportion of chinook salmon bycaught within the 200 m contour and the Unimak blocks (approx. 40%) compared to that observed in 1990-1991 (70% - 80%).

The bycatch model as formulated does not take account of: 1/ costs in terms of changes in vessel operating efficiency associated with movement out of closed areas, and 2/ recent changes in the management regime in the Bering Sea, particularly the inshore/offshore allocation and CVOA. Thus, the bycatch model as formulated is not able to completely evaluate the costs of alternatives nor

evaluate any differential impacts on the offshore and inshore harvesting sectors due to differential access to the CVOA.

There are significant problems associated with estimation of chinook salmon bycatch rates in the domestic observer program. It is necessary to use whole haul sampling to precisely estimate chinook salmon bycatch rates. With limited observer resources it is not possible to conduct whole haul sampling on all vessels. Because of these sampling difficulties it will be difficult to implement a bycatch management regime based chinook salmon bycatch caps and most likely impossible to implement a VIP based on chinook salmon bycatch rates.

The SSC has no basis on which to choose a preferred alternative. Owing to interannual variability in the distribution of chinook salmon concentrations, it appears that no system of time-area closures will reliably control chinook salmon bycatch.

D-2(e) (cont'd.) SALMON VIP PROGRAM

The SSC reviewed a draft regulatory analysis of alternative VIP programs to limit salmon bycatch by trawlers. In the 1980's the foreign fishery was able to reduce its salmon bycatch when placed under bycatch limits, so it is possible that the domestic fishery could do the same if given individual incentives. This is not certain, however, and the analysis indicates that there would be substantial practical difficulties in implementing an effective program.

D-3(a) AMENDMENT FOR MINIMUM MESH SIZE FOR CODENDS USED IN THE DIRECTED POLLOCK FISHERIES

The SSC supports the review written by the staffs of the NPFMC and NMFS, and recommends that the document go for public review after minor change.

We would like to amplify the uncertainties associated with escapement survival. While some of the fish passing through the proposed larger mesh sizes will survive, specific data on the survival rate of the escaped fish is lacking. Studies have demonstrated that when fish are herded in a trawl they eventually fall back because of exhaustion. A large portion of these die due to extreme lactic acid build-up. The portion of fish that die is nearly 100% for fish that have been in the trawl for over 40 minutes, so for tows lasting from one to three hours, only the fish that are taken in the last half hour have a large portion of survivors. Of these survivors, the ones that are extruded with scraping against the mesh are likely to die due to scale loss.

Since the percentages of mortality are unknown but may be high, biologists for some time have not recommended mesh-size regulation for major conservation of juveniles.

As presented in the staff report, an immediate benefit of larger mesh may be that sorting time by the crew would be minimized on board the vessels. However, the report notes that the amount of sorting by the trawl would likely be less than indicated by the data, since research results are based a whole codend that was constructed of larger mesh rather that just the top panel. The report states that another benefit would likely be related to improved drag efficiencies related to the trawl itself. To the extent that these benefits are available, the fleet can be expected to adopt larger mesh without benefit of a regulation.

The report of the Staff and NMFS points out that there are enforcement problems with the measure, and that the costs will be high because enforcement would have to be carried out at sea.

D-3(b) TOTAL WEIGHT MEASUREMENT

The SSC reviewed a draft regulatory amendment to require two observers and either surveyed bins or certified scales on all vessels prosecuting CDP fisheries. This proposal was prompted by the consistent differences between observer and company reports of catches in general and the need to monitor the catches of individual CDP operations in particular.

The SSC regards accurate reporting of total fishery removals as a basic requirement for reliable stock assessments and effective management. The lack of accurate catch reports from operations that sort or process at sea is a serious problem for some stocks. Recent analyses have shown potential errors on the order of 20% for pollock and cod catches in the Bering Sea, which could introduce large errors into both assessment and management.

We believe that improved catch reporting by CDP operations can and should serve as a research and development project for practices that could be required of any operations that sort or process at sea. Experimental data is needed on the accuracy and reliability of volumetric measurements and scale weights; NMFS has some work under consideration. Equally important, industry comment is needed on the cost and practicality of alternative systems and operational constraints on their design and use.

We recommend releasing the draft for public review and comment.

D-3(e) ADVANCING THE STARTING DATE FOR EXTENSION OF TRAWL EXCLUSION ZONES

At present there is a 10 nm trawl exclusion zone around certain sea lion rookeries, which is extended to 20 nm during the pollock A season to provide a larger protected area during the winter months when sea lions forage farther afield. As a result of the Council's postponement of the start of the pollock B season, NMFS proposes to advance the starting date of the extension to November 1 to assure protection throughout the winter. This would not be done if less than 10% of the B season quota remained to be harvested on November 1, in order that the CDQ fishery could operate late in the year.

As the draft analysis states, and as the SSC has stated previously, it is plausible that the trawl exclusion zones provide some protection to sea lions, but there is no scientific basis for the precise size and timing of the zones. Advancing the starting date of the extension to November 1 is consistent with the reasoning behind the original measure. Providing an exception for the CDQ fishery is not consistent with earlier reasoning, and is not justified by the draft analysis. The Council may wish to consider as one alternative simply advancing the starting date, with no exceptions.

Better information on the seasonal distribution of sea lions is needed to decide the appropriate size of protected zones. We expect some new information from NMFS winter surveys this year. For now, the SSC recommends sending out the draft for review.

OTHER BUSINESS - SAFE Report Guidelines

In January 1993, the SSC reviewed "guidelines for the organization and content of the annual Stock Assessment and Fishery Evaluation (SAFE) documents", revising it's recommendations for an "Outline of SAFE Chapters". Subsequently, the SSC Chairman, Bill Clark, sent a copy of the revised outline to the Groundfish Plan Team Chairs, and requested review and comment from plan team members. The SSC had scheduled final action on the proposed guidelines at their April 1993 meeting.

The SSC received comments from one plan team member about some definitions and the organization of the outline. Some concern was also expressed regarding the apparent prescriptive nature of the proposed guidelines.

The SSC notes that these guidelines are intended as recommendations for SAFE chapter contents, and represent the elements the SSC wishes to have for reference in status of stocks reports. They are not intended to dictate methods of assessment or methods of arriving at ABC recommendations. The revised outline is presented below.

Recommended outline of SAFE chapters
North Pacific Council SSC
April 1993

Definitions

Exploitable Biomass: If a_r is the first age class recruited to the fishery, N_a is number of fish at age a in the population, w_a is the mean weight at age a, and s_a is the selectivity (partial recruitment factor) at age a, then exploitable B biomass is calculated as:

$$B=\sum_{a=a_r}^{\infty} s_a N_a w_a \qquad (1)$$

Instantaneous fishing mortality rate: Fishing mortality rates (denoted F) should always be reported as the instantaneous full-recruitment rate (s_a=1.0).

Order of sections

Introduction: include scientific name, general distribution, management units, and evidence of stock structure (or lack thereof).

Catch history: include table showing fishery removals (retained catch plus discards if known) and TAC by gear type and management area (i.e., areas for which the Council has set and ABC) over time, beginning with 1977; reference table in SAFE summary that lists catches for all years: calculate average catch since 1977; describe present fishery.

Assessment methods: describe methods used to estimate quantities presented in the remaining sections; discuss any changes in methods since the last assessment.

Assessment parameters: for all items in this section, indicate any changes known to have occurred over time. If the stock is fished by more than one gear type, show recruitment/selectivity parameters by gear type.

Natural mortality; age and size at 50% recruitment; maximum age.

Length and weight at age; maturity at age; selectivity at age; equations (including coefficient values) or schedules, by sex as appropriate.

Other parameters: as appropriate.

Abundance and exploitation trends

Trends in abundance: include table showing exploitable biomass over time from as far back as known up to the present; also a table showing the corresponding time series of total numbers at age; tabulate past and present estimates of exploitable biomass from the previous two assessments; tabulate standard errors of exploitable biomass estimates or discuss sources of uncertainty in estimates; discuss any trends in year-class strength.

Spawner-recruit relationship: if a spawner-recruit relationship is estimated, tabulate the data, plot the fit, and report the fitted equation (including coefficient values).

Reference fishing mortality rates and yields: calculate $F_{0.1}$ $F_{30\%}$, $F_{35\%}$, and $F_{40\%}$. ($F_{30\%}$ is the full-recruitment F that lowers spawning biomass per recruit to *30%* of the unfished value.) Calculate the corresponding yields for the coming year at each calculated F, and at $F = M$.

Maximum sustainable yield: when these are estimated, include estimates of *MSY*, F_{MSY}, and B_{MSY} (exploitable biomass at the *MSY* level).

Projected catch and abundance: include tables and figures showing projected catch, spawning biomass, and exploitable biomass for a range of fishing mortalities including that used to determine ABC.

Acceptable biological catch: the ABC calculation is based on single-species considerations which may be modified by quantifiable ecological factors where appropriate. Further adjustments to the ABC may be based on unquantifiable ecological relationships and other considerations. Detailed justifications for each modification should be presented.

Overfishing definitions: calculate values for both the fishing mortality rate and the catch corresponding to overfishing.

Other considerations: e.g., recommendations for temporal or geographic distribution of ABC; any TAC considerations.

Summary: include a table showing M, age of full recruitment, $F_{0.1}$, $F_{30\%}$, $F_{35\%}$, F_{MSY}, B_{MSY}, the equilibrium unfished exploitable and spawning biomass levels, exploitable and spawning biomass levels as projected for the coming year, fishing mortality rate and ABC recommended for the coming year, overfishing rate of fishing mortality and corresponding catch.