North Pacific Fishery Management Council

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MINUTES
Scientific Statistical Committee
December 2-5, 1991
Anchorage, Alaska

The Scientific and Statistical Committee of the North Pacific Fishery Management Council met December 2-5 at the Anchorage Hilton. All members except Dan Huppert and Marc Miller were present, namely:

Terry Quinn, Co-Chair	Bill Clark, Co-Chair	Larry Hreha	Rich Marasco
John Burns	Don Rosenberg	Bill Aron	
Gordon Kruse	Jack Tagart	Doug Eggers	

Public comment

C-1 Marine Mammals

The SSC reviewed the November 20 draft of the NMFS proposed regime to govern interactions between marine mammals and commercial fishing operations. The new document reflects careful consideration of the comments of the NPFMC on the earlier proposal and demonstrates positive steps forward to eliminate problems found in the first document. The SSC notes:

1. The allocation of the PBR (formerly the ABR) will now be governed by NMFS with the advice of Councils and State agencies.

2. The PBR calculation is simplified by eliminating one level of conservation factor by not applying a recovery factor (F_r) to stocks more than two-thirds of K. The other conservation factors are higher than before, resulting in higher values for PBR.

3. A number of areas of uncertainty including OSP concepts, monitoring requirements, user fees and implementation dates are clarified.

Several concerns remain:

1. The absence of flexibility in the requirement that the minimum population estimate must be used in calculating the PBR. The SSC believes that where good population estimates exist, these should be used in preference to the minimum estimates. Minimum estimates should be used as default values.

2. The OSP concept remains difficult to rationalize in view of the historical evidence that shows carrying capacity to be variable. Current OSP application implies that carrying capacity is constant and that downward trends in marine mammal populations must be caused by human activities. The SSC urges the review of the application and value of this concept.

3. The document does not contain a table of population estimates that will be used in determining the PBR. Calculations, however, based on available information (Table 1) suggest that the northern sea lion and fur seal PBRs will not limit existing fisheries, but that walrus may be limiting. The walrus issue must be examined in light of the incidental take of 20 walruses by fisheries in 1990 versus a subsistence take of at least 10,000 animals. The current NMFS proposal implies that all commercial fisheries that may take walrus incidental to fishing could be stopped.

Table 1. Estimated PBR for selected marine mammals.

Species	Estimate	R_{MNPL}	F	PBR
Sea Lion 1989 Ak Count	47,960	0.06	0.5	1,438
1989 Ak Estimate	63,834	0.06	0.5	1,915
1991 Kenai-Kiska Count	21,725	0.06	0.5	651
Northern Fur Seal 1991 estimate	800,000	0.06	0.5	24,000
Walrus 1991 estimate	180,000	0.06	--	10,800

Table 2. Estimated subsistence take for selected marine mammals.

Species	Annual Subsistence Take
Sea Lion	200 - 300
Fur Seals	1,500
Walrus	10,000 - 11,000

Annual takes by domestic fisheries in recent years are probably less than 100 per year for each of the above species.

C-2 Sablefish/Halibut IFQs

The SSC reviewed and discussed the implementation plan. The SSC did not find technical issues requiring comment.

C-2(c) Expansion of IPHC Area 4C

The SSC reviewed the proposed boundary modification to Area 4C. The document states the specific objectives associated with the boundary change, but concludes that the objectives will not be accomplished by the proposed action.

While the area is small in comparison with the whole Bering Sea, the proposed change substantially increases the size of Area 4C. The document does not provide any information on economic and social effects, or on consequences for fisheries other than the halibut fishery.

If the Council wishes to pursue this action, the SSC suggests that all objectives and all effects should be considered in an analysis.

C-4 USFWS Draft Seabird Management Plan

The SSC had no opportunity to review this plan, which arrived during the meeting, but wishes to do so. Concern about environmental issues, including seabirds, and fisheries management actions may make this plan critical to the Council. The SSC recommends that the Council notify USFWS of its interest, seek to extend the comment period, and distribute the report for discussion at the January meeting.

C-5 North Pacific Fisheries Research Plan

The SSC heard a progress report on the plan and looks forward to reviewing the document when completed.

D-1(b) Bycatch Amendment 19/24

The SSC is concerned that all of the bycatch management measures in the amendment are stopgaps. The problems raised in the package are more likely to be resolved by the ongoing development of a comprehensive bycatch management system.

The SSC reviewed the draft EA/RIR/IRFA for amendment 19/24, and received comments from several sources. The document contains a wealth of information and should be useful to the Council in making decisions. The SSC generally endorses the methods used in the analysis, the predictions of consequences, and the estimates of costs and benefits, subject to the qualifications stated in the document. Our main concerns about the analysis are that bycatch rates tend to be highly variable, that the effectiveness of vessel incentive programs has been assumed rather than established by experience, and that some costs (specifically the cost of fishing cleaner) cannot be estimated. It should also be kept in mind that the absolute values of the simulation model results depend on conditions in 1990 and 1991, when the underlying data were collected. The **relative** values should be more reliable.

The cost/benefit analysis was a very important part of the document. In the analysis, costs and benefits are computed as net value (wholesale value less variable cost) obtainable from foregone groundfish catch on the one hand, and foregone catches of bycatch species in the directed fisheries on the other. The SSC agrees with this method of estimating costs and benefits.

The analysis strongly favors the vessel incentive program but there is little indication of how the program will work. It is not clear what the impact of the existing program has been, nor is it clear

what potential impacts the proposed amendments might have. The underlying assumptions still require careful assessment, and a history has to be built, since the present program has not been in place long enough to give a clear indication of its effectiveness. Generally, PSC's are an expensive way to control bycatch.

As regards specific measures, the conclusion of the analysis are:

(i) **Hot spot authority.** The analysis indicates that this mechanism (Alternative 2.1) would be ineffective for avoiding times and places of high bycatch in the short term. Alternative 2.2 would allow time-area closures by regulatory amendment. The SSC notes that such closures, once implemented, are impossible to evaluate owing to lack of data, and difficult to remove.

(ii) **Vessel incentive programs.** The analysis indicates that an expanded vessel incentive program would be highly effective. This may be true, but it should be noted that the analysis simply assumes that vessels can and will limit their bycatch rates in response to the program. The present program has not yet been evaluated. Furthermore, the program is costly to implement, and there are real practical and statistical problems involved in setting appropriate standards and detecting violations. The SSC heard some public testimony on these problems.

(iii) **Delays of fishing seasons.** The analysis indicates that the effects of season delays are variable among species, mostly minor, and inconsistent among years.

(iv) **PSC's for non-trawl fisheries in the BS/AI.** PSC's are effective in limiting bycatch, but the analysis shows that the cost-benefit ratio is extremely high if the effect of PSC's is to reduce groundfish catches.

(v) **Revised PSC allocation groups for BS/AI trawl fisheries.**
(vi) **Reconcile fishery definitions.**
(vii) **Revised directed fishing standards.** All three measures result in administrative improvements. The analysis indicates that regrouping the fisheries will not have a significant effect on bycatch levels.

D-2 Groundfish Specifications for 1992

The SSC accepts the Team's ABC recommendations in almost every case. Those cases where the SSC's view differs from the Plan Team are discussed below. All of the SSC recommendations with respect to present values of exploitable biomass, ABC, and overfishing limits are summarized in Table 3 for the Bering Sea and Aleutians, and in Table 4 for the Gulf of Alaska.

Bering Sea and Aleutians

Pollock

Eastern Bering Sea

The 1992 EBS exploitable biomass, based on the cohort analysis tuned to the survey abundance estimates, was estimated to be 6.2 million tons and represents a substantial decline from the peak levels of the early 1980's. This decline in biomass based on the cohort analysis was verified in the 1991 survey which estimated the biomass to be 6.5 million tons, down from the 12.2 million tons estimated in the 1989 survey. This decline may continue past 1992, because the 1986 - 1989 yearclasses were below average while the 1990 yearclass may only be average. This lack of recent

recruitment is reflected in the low off-bottom component (20%) observed in the 1991 survey. The SSC accepts the Team's recommendations for ABC and overfishing limit.

Aleutian Islands

The 1992 pollock biomass was based on the 1991 bottom trawl survey estimates expanded for the off-bottom component and projected to 1992 based on assumptions of population change used for the EBS stock. The SSC accepts the Team's recommendation for ABC and overfishing limit. The SSC recommends that for next year, the Team develop estimates of ABC and overfishing limit based on age-structured analyses and appropriate estimates of growth and natural mortality which use data collected from the Aleutian Island population.

Bogoslof Area

Stock Structure

The SSC believes the Aleutian Basin pollock population should be managed separately from the EBS and AI populations. The Basin population has a different age structure, a different size-at-age, a different area and time of spawning, a different migration pattern, and has experienced a different level of exploitation. Available evidence indicates that the fishery that occurs in the international zone of the Bering Sea (i.e., the Donut Hole) exploits the Basin stock. A portion of the stock spawns in the vicinity of the Commander Islands and another portion spawns in the vicinity of Bogoslof Island. It is generally believed that a majority of the Basin pollock originates from the Bogoslof component.

The SSC strongly supports the international effort (P.R.C., Japan, R.O.K, Poland, U.S.S.R., and U.S. scientist) to develop a comprehensive assessment of the Aleutian Basin pollock. A second workshop is scheduled for late February 1992 in Seattle, to assemble the available data and to review and expand the models currently being developed by U.S. scientists. It is expected that a consensus on biomass estimates for the western and eastern Bering Sea components of Basin pollock will be developed at the workshop.

ABC Considerations

A precipitous decline in the biomass of the Bogoslof pollock has occurred since the 1989 survey. Available evidence strongly suggests that the Bogoslof stock has been overexploited.

The Team estimated the 1992 Bogoslof biomass to be 444 thousand tons based on a projection of the 1991 survey and natural mortality rate observed for the EBS population. The SSC notes that this projection does not consider the removals in the fishery in the U.S. EEZ and the donut fishery, nor does it consider recruitment or growth. Because no recent strong yearclasses of pollock have been observed in EBS shelf surveys, recruitment prospects for the Basin stock are quite uncertain, and the growth of individuals from the Basin stock which is composed primarily of older aged pollock, is low. Because removals may likely be greater than growth and recruitment, the SSC believes the Team's estimate of 1992 Bogoslof biomass may be optimistic. The SSC, agrees with the team that because of uncertainty in the magnitude of catches of Bogoslof pollock in the Donut area, it is not possible to develop a projection that considers removals, growth and recruitment.

The Team assumed that the rate of natural mortality (M=0.3) for the Bogoslof population was equal to that for the EBS population. Because the Bogoslof population is much older than EBS

population, the SSC believes this rate to be too high. The SSC estimated the natural mortality rate for the Bogoslof population (M=0.2) based on a reduction of the EBS natural mortality rate by the ratio of the maximum age of the EBS and Bogoslof populations. The SSC notes that this rate is the same rate used by Polish scientists in their assessments of the Aleutian Basin pollock.

The SAFE indicates that the current Basin biomass as predicted by the preliminary Aleutian Basin stock cohort analysis is only about 10% of the largest observed biomass and well below B_{msy}. A precise estimate of the ratio B/Bmsy is impossible, but it is probably on the order of 1/4. Given the low level of abundance, the SSC believes that under the Council's overfishing definition an exploitation rate of 1/4 of the natural mortality (F=1/4*0.20) is appropriate. In developing its estimate of ABC, the SSC applied this rate (M/4) to the 1992 biomass (491 thousand tons) estimated based on the Team's method of projecting the 1991 Bogoslof survey but used the revised rate of natural mortality. The SSC recognized that its estimate of 1992 biomass is more optimistic than the Teams, but believes that this potential error is compensated for by the conservative exploitation rate. The SSC estimate of ABC is 25 thousand tons. This is also the overfishing definition.

TAC Considerations

Because of the current status of the Bogoslof population, the likelihood of continued exploitation of the Bogoslof stock in the unregulated Donut fishery, and the potential impacts on marine mammals and seabirds, the SSC strongly recommends that the TAC be set at a level to provide for bycatch only.

Greenland turbot

After considerable deliberation, the SSC concurred with the Team's ABC recommendation, but rejected the Team's overfishing definition based on F_{msy}. Earlier at this meeting, the SSC discussed the general use of F_{msy}, and came to the conclusion that F_{msy} estimates should not be used for purposes of overfishing definitions when based on SRA models or when stock-recruit relationships are unavailable. Both are the case for Greenland turbot.

The SSC noted disparities in other biological reference points ($F_{0.1}$ = 0.056 and F = M = 0.18) for Greenland turbot, and defaulted to an overfishing definition based on long-term (1977-1987) average catch (34,600 t). Data since 1988 were omitted from this calculation, because the catch was artificially constrained by the 7,000 t ABC for bycatch purposes only. However, the SSC encourages the team to revisit overfishing specifications for Greenland turbot in next year's SAFE document.

Due to the difficulties in achieving consistency in the application of the overfishing definition, the SSC has appointed an *ad hoc* subcommittee to report at its January 1992 meeting on the general application of F_{msy} and B_{msy} estimates. The SSC plans to recommend general guidelines on their use in future GOA and BS/AI groundfish specifications and overfishing determinations.

Pacific Ocean Perch Complex

POP

The Team calculated the ABC for POP, S. alutus, by applying an F_{msy} to an estimate of current biomass, both derived from SRA analysis. The SSC prefers to use a more conservative exploitation rate, F=M=0.05, to calculate ABC, in accordance with its treatment of other rockfish groups. Applying this exploitation rate to estimates of current exploitable biomass for the eastern Bering Sea

(70,800 t) and Aleutian Islands (234,000 t) gave ABC estimates of 3540 t for the eastern Bering Sea and 11,700 t for the Aleutian Islands. In the case of the Aleutian Islands the Team recommended that the ABC be split. They recommend that 26% be allocated to the area east of 180 degrees, with 76% allocated to the area west of 180 degrees. It was brought to the SSC's attention that such a split requires a plan amendment. Therefore, we recommend that this item be submitted as a proposal during the next amendment cycle. It is recommended that the F=M criterion be used to define overfishing for both of these areas.

Other red rockfish

The SSC concurs with the procedure used by the Team to calculate ABCs for species in this group. They applied an F=M exploitation rate to an estimate of current biomass obtained by averaging biomass estimates from bottom trawl surveys. Natural mortalities used are 0.06 for northern and sharpchin, 0.025 for rougheye, and 0.03 for shortraker. The biomass estimates for these species are as follows: northern/sharpchin (EBS) 17,500 t, (AI) 94,500 t; rougheye (EBS) 3,000 t, (AI) 25,300 t; and shortraker (EBS) 9,200 t (AI) 19,700 t.

The SSC recommends, therefore, that the ABC for other red rockfish for the eastern Bering Sea be set at 1,400 t. As it did last year, the SSC does not recommend splitting the complex up. In the view of the SSC, the additional protection of rougheye and shortraker afforded by separating them into their own group would be insignificant.

For the Aleutian Islands, the SSC recommends that this complex be divided into two groups: rougheye and shortraker rockfish (S. aleutianus and S. borealis) and all remaining species. It is recommended that the ABC for shortraker/rougheye be set at 1,220 t and 5,670 t for sharpchin/northern.

It is recommended that the F=M criterion be used to define overfishing for species groupings in both areas.

Other Rockfish

The SSC concurs with the Team's recommended ABC's for this complex: 400 t for the eastern Bering Sea and 925 t for the Aleutian Islands. These estimates were obtained by applying an exploitation rate equal to the natural mortality for POP, 0.05, to the estimate of current exploitable biomass, 8,000 t for the eastern Bering Sea and 18,500 t for the Aleutian Islands. Estimates of current biomass were obtained by averaging the results of recent trawl surveys.

It is recommended that the F=M criterion be used to define overfishing for this grouping in both areas.

Atka mackerel

The SSC accepts the Team's determination that the best estimate of ABC, given information now available, is 260,500 mt. This is a large increase over last year's ABC of 24,000 mt, which was calculated as the simple average of previous annual catches because no reliable estimates of biomass were available. This year a usable biomass estimate of 870,000 mt has been obtained by fitting the stock synthesis model to catch at age data and trawl survey results from 1986 and 1991. This biomass estimate may be conservative, because some fraction of Atka mackerel biomass is distributed in midwater and nearshore, and therefore is not included in the standard bottom trawl survey estimate.

ABC was calculated by applying the estimated rate of natural mortality (0.3) to the biomass estimate. The SSC believes that this rate of exploitation is also conservative.

While accepting the ABC determination, the SSC is concerned that the available data series are short and in some respects inconsistent. We are also apprehensive about possible environmental problems that may result from an increased catch of the magnitude implied by the new ABC estimate. In particular we heard testimony from the Aquatic Resources Conservation Group and Dr. Thomas Loughlin regarding the role of Atka mackerel as a prey species of marine mammals. During their migrations northern fur seals (a depleted species) feed heavily on Atka mackerel as they move through the Aleutian passes. In these circumstances, the SSC prefers to phase in the higher value over a six-year period, adopting the current biomass estimate and raising the exploitation rate in steps from M/6 in 1992 to M in 1997. According to this scheme, the recommended ABC for 1992 is (.30/6)*870,000 = 43,000 mt. While this approach provides a 6-year schedule for increasing ABC, it should be clear that the estimates and procedure will be reviewed annually. The main purpose of the gradual approach is to postpone a large ABC increase until its correctness has been confirmed by additional data and analysis.

The SSC accepts the Team's overfishing definition as the fishing mortality rate that drives spawning biomass per recruit to 30% of the unfished level, which is F=0.50, much larger than M.

The SSC is particularly concerned about the need to distribute a greatly increased harvest over the range of the stock in proportion to the distribution of biomass, which would require taking the bulk of the catch west of 180 W. The proposed approach sets an ABC for 1992 that can safely be taken from the eastern Aleutians, where the fleet will naturally tend to operate. For later years in the schedule, however, it is critical that the Council develop a plan amendment that will allow TAC's to be allocated geographically.

ABC and Overfishing

As shown in Table 3, the recommended ABC's for the Bering Sea/Aleutian Islands are equal to the overfishing definition for Bogoslof pollock, rock sole, the POP complex and its subdivisions, other rockfish, squid, and other species. The recommended ABC's are lower than the overfishing definition otherwise.

Gulf of Alaska

Except as discussed below, the SSC agrees with the Team's specifications. SSC values of Gulf of Alaska exploitable biomass, ABC's, and overfishing limits are given in Table 4.

Pollock

The 1992 GOA pollock exploitable biomass is estimated using stock synthesis (SS) analysis. SS is an age-structured model which incorporates auxiliary information such as survey estimates of abundance and can simultaneously evaluate a variety of data inputs. In the 1991 assessment of GOA pollock, the SS model was separately tuned to bottom trawl and hydroacoustic survey data. These models produced estimates of stock biomass which varied substantively. The Plan Team preferred the model tuned to the bottom trawl survey data but the SSC was reluctant to dismiss the estimates derived from the model tuned to the hydroacoustic data. The SSC suspected that revision of fishing power correction factors would result in lower bottom trawl survey estimates of abundance which could subsequently cause the two models to converge.

As the analysts prepared the 1992 assessment the concern over the use of hydroacoustic and bottom trawl survey data was again evident. The analysts went to great lengths to examine additional data on GOA pollock. They incorporated length frequency data from the Japanese fishery which exploited GOA pollock between 1964 and 1975. This addition essentially doubled the time series of spawner/recruit data. They were also able to add to the bottom trawl survey time series by incorporating data from 1975. To thoroughly explore these data sets, the analysts created three separate models: Models A, B and C. Each model incorporated hydroacoustic and bottom trawl survey data. A complete time series of hydroacoustic survey data was used in each model with the surveys treated as relative indices of abundance, i.e., as an indicator of the trend in abundance. All three models used the 1990 bottom trawl survey data treated as an absolute index of abundance. Furthermore, the models were heavily weighted (high emphasis factor) to force agreement with the bottom trawl survey abundance estimate. Selectivity to the survey data was estimated in models A and B but fixed in model C. Using the 1990 bottom trawl survey data helped to anchor model estimates of current biomass, but was not very helpful in constraining the historic trend in biomass. To aid in this effort, models B and C incorporated 1975 and 1990 bottom trawl survey data.

While model B produced the best total likelihood values of the three models, the preferred model recommended by the analysts was model C. Model C produced a better fit than model B to the hydroacoustic age composition data, provided a better fit to the 1984 bottom trawl survey biomass and had similar bottom trawl survey selectivity values. Estimates of current biomass from model C are more conservative than estimates from model B. The SSC agrees with the Plan Team and stock assessment analysts that model C is the preferred model.

Using the extended time series of spawner/recruit data from model C, the stock assessment analysts derived an estimate of F_{msy} and B_{msy}. The F_{msy} values were then used in combination with estimates of recruitment to project annual yield and stock biomass from 1992 to 1994. The Plan Team's estimated ABC (108,000 t) is the average annual yield from this 3-year projection. While the SSC applauds the efforts of the stock assessment analysts to extend the spawner/recruit time series thereby increasing our opportunity to expose an underlying density-dependent spawner/recruit relationship, we remain unconvinced that such a relationship has been credibly demonstrated. Consequently, we cannot support the F_{msy} derived from this relationship nor its use to obtain the GOA pollock ABC.

We believe the foundation for changing the exploitation strategy has not been firmly laid. While we believe the analysts are on the right track toward stabilizing the parameter estimates of the SS model and thereby generating reliable estimates of abundance, there are sufficient uncertainties with respect to stock abundance that we should remain cautious. For example, we want to see whether the parameter estimates of the current preferred model will persist with the addition of 1991 fishery data. Until parameter estimates of the preferred model become stabilized we recommend continuation of conservative estimates of ABC.

In addition, the SSC believes a conservative exploitation strategy is appropriate because of continuing declines in population biomass. Moreover, we note that while the causes of decline in the northern sea lion population are unknown, marine mammal scientists have identified changes in available prey, including pollock, as one possible factor in that decline. Links to available prey have also been suggested as factors affecting declines of other marine mammals and sea birds. Debate continues with respect to partitioning of the pollock resource among all predators including man, and the SSC believes the proposed conservative ABC is a responsible reaction to this debate.

The SSC recommends a 1992 W/C GOA pollock ABC of 84,000 t. This value is the product of the

model C estimated 1992 beginning year biomass (interpolated from 1991 and 1992 mid-year biomass) and a 10% annual exploitation rate. The SSC found no information in the SAFE on establishment of an ABC for the eastern GOA. The Plan Team informed the SSC that the 1990 trawl survey estimate of eastern GOA pollock abundance was 33,525 t. Based on this biomass estimate and applying the 10% exploitation rate, the SSC recommends an eastern GOA pollock ABC of 3,400 t. The overfishing quota for the W/C region is estimated from the $F_{0.30}$ exploitation strategy and is 219,000 t. Similar application to the eastern GOA results in an overfishing quota of 8740 t. The SSC recommends that the W/C pollock ABC be divided among management districts in proportion to the distribution of the 1990 bottom trawl survey biomass estimates.

The Council should note that over the next year, the stock assessment scientists will explore exploitation strategies which fully consider the population dynamics of GOA pollock. While we cannot predict with certainty that the preferred exploitation strategy will differ from the 10% exploitation rate, current indicators suggest that the rate will increase.

Slope rockfish

POP

The SSC concurs with using the average of the 1987 and 1990 trawl survey biomass estimates to obtain the exploitable biomass for 1992 (229,100 t). In the process of selecting an exploitation rate to calculate ABC, current and historical biomass estimates were compared. The SAFE indicates that the current biomass predicted by SRA is about 20 percent of virgin biomass and around half of B_{msy}. (While neither current biomass nor B_{msy} is well determined by SRA, their ratio B/B_{msy} is quite consistent among runs.) Given the low level of abundance, the SSC believes that the Council's overfishing definition requires lowering the preferred exploitation rate (F=M=.05) by half. Therefore, ABC = 5730 t for 1992, and this is also the overfishing limit. It is recommended that this ABC be distributed among regulatory areas in the following proportions: 28.3% in the Western area, 30.0% in the Central area and 41.7% in the Eastern area. Applying these proportions to the Gulfwide ABC, yields ABCs of 1622 t for the Western, 1719 t for the Central and 2389 t for the Eastern areas.

At present there is a lack of information on operational units for POP. In the absence of this information, the SSC believes that the overfishing definition for this species should be applied on a Gulfwide basis. Maintenance of TACs within the regional ABCs will achieve the level of conservation considered appropriate for this species. The SSC concurs with the Team that slope rockfish is one of the least appropriate species to have a Gulf-wide pooling of ABC and that subarea TAC's should not exceed subarea ABC's.

Shortraker/rougheye

The SSC concurs with the Team's recommendation that the ABC for these two species be set at 1,960 t. This ABC was obtained by applying the appropriate natural mortalities for each of these species (0.03 for shortraker and 0.025 for rougheye) to their respective biomass estimates. It is recommended that the distribution of ABC among regulatory be based on results of the 1987 and 1990 trawl surveys. Based on the averages of the 1987 and 1990 trawl surveys, exploitable biomass of shortraker and rougheye rockfish should be distributed among regulatory areas in the following proportions: 5.3% in the Western area, 65.5% in the Central area, and 29.1% in the Eastern area. Applying these proportion to the Gulfwide ABC, yields ABCs of 104 t for the Western, 1,290 for the Central and 573 t for the Eastern areas.

The SSC concurs with the Teams recommendation that F30% (0.046) and F=M be used to define overfishing for rougheye and shortraker, respectively. The SSC recommends that the overfishing be applied on a Gulfwide basis for the same reasons given in the overfishing discussion for POP.

Other rockfish

The SSC concurs with the Team's ABC recommendation for this group of rockfish (14,060 t). The regional distribution of this ABC is 1,390 t for the Western, 6,510 t for the Central, and 6,160 t for the Eastern areas. The SSC concurs with the recommendation that the F30% be used to define overfishing for northern (0.113) and sharpchin (0.08) rockfish. Natural mortality rates are recommended for the other species. The SSC recommends that the overfishing definition be applied on a Gulfwide basis for the same reasons given in the overfishing discussion for POP.

Pelagic shelf rockfish

The Team recommends that in the development of an ABC that black rockfish be broken out of the complex and treated separately. The growth in landings between 1990 and 1991 in the eastern and central gulf and uncertainty associated with the size of the black rockfish stock were responsible for the adoption of this approach. The SSC believes that it is premature to break this species out at this time. Additional information on the status and structure of this stock is needed before a decision can be made on how to treat this species. For 1992, the SSC recommends that ABC for this complex be set at 6,886 t, with 1212 t, 4393 t and 1281 t allocated to the Western, Central and Eastern districts, respectively.

The SSC concurs with the Team's recommendation that the F30% (0.151) for dusky rockfish be used to define overfishing for this complex. As in the POP case, it is recommended that the overfishing definition be applied on a Gulfwide basis.

Demersal shelf rockfish

The SSC concurs with the Teams ABC recommendation for this complex (552 t). This value was obtain by summing the ABCs calculated for the Southeast Outside (448 t) and east Yakutat (104 t) districts. The SSC concurs with the Team's recommended definition of overfishing for this complex 732 t (448 t, average landings for the SEO, plus 284 t, F30% * east Yakutat biomass). The SSC commends the analysts for their use of line transect methods, which has now provided an estimate of biomass not previously available.

Thornyhead rockfish

As for other rockfish species, the SSC prefers to set an ABC on the basis of F=M=0.07 rather than the fishing mortality rate chosen by the Team, which is the rate that reduces exploitable biomass-per-recruit to 50% of the unfished level. If a fishing mortality rate were to be chosen on the basis of biomass-per-recruit, the appropriate measure would be spawning biomass-pr recruit, rather than exploitable biomass-per-recruit. Recent work suggests that this target would be in the vicinity of 35% of unfished spawning biomass-per-recruit, and that the corresponding fishing mortality rate usually exceeds F=M. Pending a reconsideration of all rockfish exploitation rates, the SSC prefers to set F=M. Applying this exploitation rate to the estimate of current biomass (25,697 t) yields an ABC of 1,798 t for 1992.

The SSC concurs with the Team's recommendation that F30% (0.095) be used to define overfishing.

ABC and Overfishing

As shown in Table 4, the recommended ABC for Gulf of Alaska Pacific Ocean Perch is equal to the overfishing definition. The recommended ABC's are lower that the overfishing definition otherwise.

D-2(a) Environmental Assessment of 1992 Groundfish TACs

The SSC received a presentation by Ron Berg on the development of the draft Environmental Assessment (EA) for 1992 Groundfish Total Allowable Catch Specifications. The SSC commends the EA authors for their expeditious and thorough preparation of this document. The SSC notes that the present document compared interim ABC's proposed by the Plan Team at their November meeting with preliminary TAC's set by the Council in September. This comparison might create the impression that the Council sets TAC's higher than ABC's, which is no the case. For further assessments the SSC recommends that the draft EA consider preliminary TAC's and ABC's set at the annual September meeting of the Council and that the final EA be revised to reflect the Council's final TAC's and ABC's set at the annual December meeting.

With respect to specific items of the draft EA, the SSC notes the predator/prey discussion focuses on seabirds and we would like to see a similar discussion examining marine mammals. This discussion might also be embellished for certain fishes, particularly the relationship between arrowtooth flounder and pollock. The SSC recommends the EA address implications of increased fishing for atka mackerel taking into consideration the role of atka mackerel as forage for marine mammals with attention to the northern fur seal. We also recommend that the EA discuss fisheries stock assessments with respect to the natural mortality allowance (M) contained in every assessment of ABC, particularly with respect to how this allowance provides for sources of mortality including predation by fish, birds and other mammals. We have further requested a revision of language regarding the extent of northern sea lion predation on pollock, noting particularly that "65% frequency of occurrence" does not imply that pollock form 65% of the sea lion diet by weight. The SSC would like to see a description of the size and/or age distribution of prey consumed by fishes, birds and mammals as compared to the size/age distribution of fish removed by commercial fisheries. Finally, the SSC had advised Ron Berg of several editorial comments which Ron agreed to consider.

Bycatch matters

The SSC reviewed and accepted the new estimates of halibut discard mortality rates reported in the SAFE.

Table 4. SSC Recommendations - Gulf of Alaska

Stock	Region	B_{92}	B_{MSY}	F_{msy}	ABC Strategy	ABC	Overfishing Definition	Y_{of}	Notes
Pollock	W/C	840K	?	?	F_{hist}=10%	84K	$F_{30\%}$=.283	219K	SS Model C
	E					3400	$F_{30\%}$=.283	8900	1990 Trawl survey
Cod	GOA	363K	?	?	$F_{0.1a}$=.177	63.5K	$F_{30\%}$=.245	87.6K	ECW TAC Partition
	E					3.2K			
	C					39.4K			
	W					20.9K			
Deepwater flat	GOA	196K	?	?	$F_{0.1a}$=.20	39K	$F_{30\%}$=.26	51.5K	Flathead sole $F_{0.1}$
	E					3990			
	C					33500			
	W					1740			
Shallow flat	GOA	257K	?	?	$F_{0.1a}$=.20	50K	$F_{30\%}$=.26	70.9K	
	E					1740			
	C					21260			
	W					27480			
Arrowtooth	GOA	1788K	?	?	$F_{0.1a}$=.17	304K	$F_{30\%}$=.30	427K	
	E					11680			
	C					253320			
	W					38880			
Flathead	GOA	241K	?	?	$F_{0.1a}$=.20	48K	$F_{30\%}$=.26	63.1K	
	E					3710			
	C					31990			
	W					12580			

Table 4. (continued)

Stock	Region	B_{92}	B_{MSY}	F_{msy}	Strategy	ABC	Overfishing Definition	Y_{of}	Notes
Sablefish	GOA	179K	?	?	$F_{0.1a}$=.13	20.8K	$F_{30\%}$=0.18	28.2K	Constant R
	SEO					5.0K			
	WYK					3.7K			
	C					9.6K			
	W					2.5K			
Slope rockfish: POP	GOA	229.1K	?	?	F=M/2	5730	F=M/2	5730	B_{92}/B_{MSY}=1/2
	W					1622			
	C					1719			
	E					2389			
SR/RE	GOA	73.0K	?	?	F=M	1960	$F_{30\%}$	2900	
	W					104			
	C					1290			
	E					573			
Other slope	GOA	230.5K	?	?	F=M	14060	$F_{30\%}$	20710	
	W					1390			
	C					6510			
	E					6160			
Pelagic shelf rockfish	GOA	?	?	?	F=M	6886	$F_{30\%}$	11360	Includes black rockfish
	W					1212			
	C					4393			
	E					1281			

Table 4. (continued)

Stock	Region	B_{92}	B_{msy}	F_{msy}	ABC Strategy	ABC	Overfishing definition	Y_{of}	Notes
Demersal shelf rockfish	GOA	?	?	?	Ave.catch	552	Ave.catch (SEO); $F_{30\%}$=.04 (E.Yak.)	732	ABC=Y_{of}=448 (SEO); ABC=104, Y_{of}=284 (E. Yak.)
Thornyhead	GOA	25697	?	?	F=M=.07	1798	$F_{30\%}$=0.095	2440	

Table 3. SSC Recommendations - Bering Sea/Aleutian Islands for 1992 fishery

Stock	Region	B_{92}	B_{MSY}	F_{msy}	ABC Strategy	ABC	Overfishing Definition	Y_{of}	Notes
Pollock	EBS	6.2M	6.0M	0.38	$F_{0.1a}$=.31	1.49M	F_{msy}=.38	1.77M	Cohort Analysis
	AI	215K	?	0.38	$F_{0.1a}$=.31	51.6K	F_{msy}=.38	62.4K	1991 survey
	Bogoslof	491K	?	?	F=M/4=.05	25K	F=M/4	25K	B/B_{msy} = 1/4
Cod	BSAI	910K	?	?	$F_{0.1a}$=.145	182K	$F_{30\%}$=.149	188K	F_{msy} dropped
Yellowfin sole	BSAI	2.7M	?	?	$F_{0.1a}$=.14	372K	$F_{30\%}$=.17	452K	ABC formula changed
Greenland turbot	BSAI	307K	?	?	Bycatch only	7K	Ave.Catch	34.6K	1977-1987
Arrowtooth	BSAI	457K	?	?	$F_{0.1a}$=.18	82.3K	$F_{30\%}$=.25	114K	
Rock sole	BSAI	1.48M	904K	.176	F_{MSY}=.176	260.8K	F_{msy}=.176	260.8K	Cushing S-R curve
Other flatfish	BSAI	1.26M	?	?	$F_{0.1b}$=.159	199.6K	$F_{30\%}$=.23	289K	$F_{0.1b}$ from rock sole
Sablefish	EBS	11.7K	?	?	$F_{0.1a}$=.13	1400	$F_{30\%}$=.18	1840	
	AI	25.7K	?	?	$F_{0.1a}$=.13	3000	$F_{30\%}$=.18	4030	
POP complex									
True POP	EBS	70.8K	?	?	F=M=.05	3540	F=M	3540	SRA & trawl survey
	AI	234K	?	?	F=M=.05	11700	F=M	11700	
NO/SC/RE/SR	EBS	29.7K	?	?	F=M	1400	F=M	1400	
NO/SC	AI	94.5K	?	?	F=M	5670	F=M	5670	
RE/SC	AI	45.K	?	?	F=M	1220	F=M	1220	
Other Rockfish	BS	8K	?	?	F=M	400	F=M	400	Surveys
	AI	18.5K	?	?	F=M	925	F=M	925	
Atka Mackerel	BS/AI	870K	?	?	F=M/6=.05	43K	$F_{30\%}$=.5	435K	Stairstep ABC
Squid	BS/AI	?	?	?	Ave. Catch	3600	Ave. Catch	3600	
Other species	BS/AI	794K	?	?	Ave. Catch	27200	Ave. Catch	27200	