North Pacific Fishery Management Council

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MINUTES
Scientific and Statistical Committee
December 1-4, 1990
Anchorage, AK

The Scientific and Statistical Committee of the North Pacific Fishery Management Council met December 1-4, 1990 at the Hilton Hotel in Anchorage, Alaska. Members present were:

Richard Marasco, Chairman
Doug Eggers, Vice Chairman
Jack Tagart
Larry Hreha
Gordon Kruse

William Aron
Don Rosenberg
Terry Quinn
William Clark

C-4 Inshore-offshore

The SSC was given a report by Dr. Jim Cornelius on the status of the economic and social impact analyses. It was reported that additional completed industry surveys have been received by Council staff.

The Committee also was provided with a copy of a letter addressed to Steve Davis from Dr. John Petterson concerning the approach being used to conduct the Social Impact Assessment. The letter was provided to the SSC's inshore-offshore allocation subcommittee for examination and comment.

C-5 Halibut Management for Regulatory Area 4E

The SSC received the draft regulatory analysis for halibut management for regulatory area 4E at the start of our meeting. The SSC had insufficient time at this meeting to review the document.

C-8 Plan Team Membership

The SSC reviewed the membership of the GOA groundfish, BS/AI groundfish, Crab and troll salmon plan teams, and Halibut management team. It is recommended that the members of each of these teams be reappointed.

D-2   GULF OF ALASKA GROUNDFISH

D-2(a) Gulf of Alaska groundfish -- SAFE, ABC's, Overfishing

The SSC reviewed the stock assessments in the SAFE report and the Team's ABC recommendations, including regional allocations. For the first time this year, it was also necessary to consider the proper criteria in the definition of overfishing to use for each stock (according to the Council's rules and the kind of information available) and to determine if the ABC recommendation resulted in overfishing. Except as noted below, the SSC agreed with the Team on all issues.

In the review of the ABC's, the SSC considered the status of the northern Sea Lion based on recent NMFS surveys in addition to comments by the Aquatic Conservation Group. The information provided to the SSC during the past two years does not prove cause and effect between fishing operations in the North Pacific and changes in the sea lion populations. The SSC was provided with a letter clarifying comments in the Plan Team report regarding the status of the sea lion population. The letter states that counts of the animals made in 1990 were not statistically different from similar rookery counts made in 1989.

Gulf Pollock

The SSC supports the Team's recommendation that the 1991 ABC be set at 133,400 mt. The Team and the SSC had difficulty in determining a proper exploitation rate. The Team has been given guidance to assist in the selection of exploitation rates in the future.

The SSC notes the Team recommendation to maintain the 6,250 mt apportionment in Shelikof Strait. There is concern that this apportionment might lead to additional pressure on spawning stocks outside the area. The SSC has requested that the Team review this possibility and include a recommendation in next year's SAFE. More detailed minutes of the SSC discussions appear in Appendix A.

Slope Rockfish

The GOA Plan Team provided an ABC for the slope rockfish complex which protects the less abundant but commercially more desirable rougheye and shortraker rockfish. They have determined ABC as a product of a natural mortality rate (M=0.05) and the total biomass discounted by a rate (44 to 50%) chosen to reduce the chances of overfishing the rougheye and shortraker rockfish. The SSC believes it is time to address protection of species in the complex more directly.

The SSC proposes an alternative approach which splits species out of the complex. We propose dividing the complex into three species groups: (1) Pacific Ocean perch (*Sebastes alutus*); (2) rougheye and shortraker rockfish (*S. aleutianus* and *S. borealis*); and, (3) all remaining species now in the slope rockfish complex. Pacific Ocean perch, rougheye and shortraker rockfish appear to be the principal target species of the complex.

The SSC recommends 1991 ABCs for the three groups of the slope rockfish complex as follows: Pacific ocean perch, 5,800 mt; rougheye/shortraker, 2,000 mt; and remaining slope rockfish, 10,100 mt. These ABCs need to be partitioned among management areas. Division of the complex into three subgroups provides for the maximum cumulative ABCs while providing the necessary protection from overfishing to the species in the complex, that may be selectively fished because of their high value. More detailed minutes of the SSC discussion on slope rockfish appear in Appendix B.

Shelf Demersal Rockfish

The population dynamics of the shelf demersal rockfish are poorly known. The Plan Team has not recommended an ABC for this species complex. For species of this type the amended groundfish FMP requires that overfishing be defined as the mean catch since the inception of the MFCMA. Using landing data from 1982 to 1989 reported on Table 7-2 (p. 170) of the GOA SAFE, the SSC computed mean landings for shelf demersal rockfish of 445 mt. Since the ABC can be no larger than the allowable catch under the definition of overfishing the SSC recommends an ABC of 445 mt.

Thornyhead Rockfish

The Plan Team recommends an ABC for thornyhead rockfish of 980 mt based on the 1990 adjusted trawl survey estimate of abundance and an historic exploitation rate of 3.8%. For those species without an estimate of F_{MSY} or one of its alternatives such as $F_{0.1}$ the SSC has recommended using F=M as the preferred exploitation strategy. We adopted this strategy for the species in the slope complex as previously described. Therefore, we recommend that the ABC for thornyheads be calculated as the product of 1990 adjusted trawl biomass and M=0.07, which is approximately 1,800 mt. The ABC is equivalent to the definition of overfishing for this species.

D-2(c) Halibut PSC Limits

The SSC reviewed the Halibut Commission documents on the status of the halibut resource and the estimated discard mortality rates, and the Team report on halibut prohibited species catch limits. The SSC supports the Team's recommendation to increase the longline mortality rate from 13% to 16%.

D-3 BERING SEA/ALEUTIAN ISLANDS GROUNDFISH

D-3(a) BS/AI Groundfish -- SAFE, ABC's, Overfishing

The SSC reviewed the stock assessments in the SAFE report and the Team's ABC recommendations, including regional allocations. For the first time this year, it was also necessary to consider the proper criteria in the definition of overfishing to use for each stock (according to the Council's rules and the kind of information available) and to determine if the ABC recommendation resulted in overfishing. Except as noted below, the SSC agreed with the Team on all issues.

Pollock

The SSC concurred with the Team's recommended ABC of 1,676,000 mt for the EBS as well as the Team's corrected ABC of 101,000 mt for the Aleutians. In both areas, estimated biomass was greater than B_{MSY} and the recommended ABC based on $F_{0.1}=0.31$ is lower than that using $F_{MSY}=0.335$, resulting in the conclusion that ABC does not result in overfishing. This conclusion is based on independent treatment of these areas and the Aleutian Basin stock. An International Workshop to be held in February, 1991 in Seattle sponsored by AFSC will consider interchange among the Bering Sea stocks and modeling of stock interchange. This meeting will provide the scientific basis to develop future management strategies.

Bogoslof (Area 515)

The team noted that pollock taken near Bogoslof Island have a different age composition and slower growth rates then the EBS stock. Based on the 1989 hydroacoustic survey the team recommends establishing a 1991 ABC for the area of 286,000 mt.

The SSC does not support establishing a separate ABC for this area at this time. We believe that an ABC must be established for the total basin stock. The Bogoslof pollock are considered to be a part of the Basin stock which is exploited in the donut hole. Lack of knowledge regarding stock structure, migration and biomass make it impossible to recommend an ABC at this time. The SSC has requested that the team address this issue next year using information from the February workshop.

The SSC is concerned about the total removals in the Basin area including Area 515 and their impact on the stock. The SSC notes that the harvest in Area 515 has increased to 290,000 mt in 1990. The SSC recommends that any portion of the TAC taken in Area 515 be limited to 200,000 mt, the average harvest of the past 4 years in Area 515.

<u>Pacific Ocean Perch Complex</u>

The BS/AI Groundfish Plan Team provided ABCs for the POP complex in the eastern Bering Sea and Aleutian Islands areas. They have calculated ABCs as a product of exploitation rate (corresponding to $F_{0.1}=0.06$ developed for POP) and the total biomass for both areas discounted by 50% to reduce the chances of overfishing rougheye and shortraker rockfish. As for the Gulf of Alaska, the SSC believes it is time to address protection of species in the complex more directly.

For the Aleutian Islands, the SSC proposes the same split into three groups as the Gulf of Alaska: 1) Pacific Ocean perch (<u>Sebastes</u> <u>alutus</u>); 2) rougheye and shortraker rockfish (<u>S</u>. <u>aleutianus</u> and <u>S</u>. <u>borealis</u>); and 3) all remaining species in the previous "POP complex" (northern rockfish, <u>S</u>. <u>polyspinus</u>, and sharpchin rockfish, <u>S</u>. <u>zacentrus</u>). The SSC recommends use of F=M to calculate exploitation rate for each of the three groups, where M=0.05 is used for POP, M=0.025 for shortraker/rougheye rockfish, and M=0.05 is used for northern/sharpchin rockfish. Estimates of biomass and associated ABCs for these three groups in the Aleutian Islands area was determined by the Plan Team, and appear in summary tables of the SSC's recommendations.

For the eastern Bering Sea, the SSC recommends splitting the complex into two groups: 1) Pacific Ocean perch; and 2) all remaining species (rougheye, shortraker, northern, and sharpchin rockfish). In the case of the eastern Bering Sea, the SSC does not recommend the additional split into the rougheye/shortraker group, because the estimated biomass of these two species is only 6,200 mt. Over 95% of the combined BS/AI/GOA rougheye/shortraker biomass occurs in the Aleutian Islands (49,800 mt) and Gulf of Alaska (72,600 mt). In the view of the SSC, the additional protection of these two species afforded by separating them into their own group in the eastern Bering Sea would be insignificant. The SSC used the same procedure to calculate ABCs used for the Aleutian Islands region. The calculated ABCs for shortraker/rougheye and northern/sharpchin were combined to form a summed ABC for this group.

D-3(c) Seasonal Apportionment of BS/AI Pacific Cod TAC

The SSC heard a report on a request for emergency action to seasonally apportion the BS/AI Pacific cod TAC and associated halibut PSC. Those requesting the emergency action note a concern for the "reproductive capacity" of cod stocks.

The SSC reminds the Council that Amendment 19/14 to the GOA and BS/AI FMPs could not demonstrate any significant biological benefits to seasonal allocation of the pollock TAC. There were no indications that the reproductive capacity of pollock would be adversely impacted by harvest concentrated during the spawning season. While a similar analysis has not been done for Pacific cod, the SSC does not expect a different result. Consequently, the SSC does not anticipate a biological concern for reproductive capacity of Pacific cod as a result of concentrated harvest during the spawning season.

D-3(c) Herring Forecasts

The SSC reviewed the preliminary forecasts of catch and abundance for Bering Sea herring stocks in 1991. The total Bering Sea herring biomass is estimated to be 83,406 mt. The SSC notes that for the two years when the forecast is available, the forecast under-estimated the actual biomass.

The SSC recommends that in the future the status of the herring stocks be included as an appendix to the SAFE.

Gulf of Alaska Groundfish
1991 SSC recommendations and apportionments (metric tons)

Species	Area	ABC
Pollock	W/C	130,000
	Shelikof	6,250 a/
	E	3,400
	Total	133,400
Pacific Cod	W	25,700
	C	48,300
	E	3,900
	Total	77,900
Flatfish, Deep	W	2,000
	C	38,900
	E	9,600
	Total	50,500
Flatfish, Shallow	W	48,800
	C	22,200
	E	3,000
	Total	74,000
Arrowtooth	W	40,800
	C	272,100
	E	27,200
	Total	340,100
Flathead Sole	W	12,600
	C	32,700
	E	5,000
	Total	50,300
Sablefish	W	2,925
	C	10,575
	W, Yakutat	4,050
	E, Yak/S.E. Out	4,950
	Total	22,500

(table continued next page)

Species	Area	ABC
Pacific Ocean Perch	W	1,624
	C	1,798
	E	2,378
	Total	5,800
Rougheye/Shortraker *	W	100
	C	1,320
	E	580
	Total	2,000
Other Slope Rockfish *	W	1,212
	C	5,454
	E	3,434
	Total	10,100
Pelagic Shelf Rockfish *	W	800
	C	3,100
	E	900
	Total	4,800
Demersal Shelf Rockfish*	S.E. Out.	445
Thornyhead*		1,800
Other Species		N/A
GULF OF ALASKA TOTAL		772,825

a/ W/C pollock ABC includes the ABC for Shelikof
* ABC is equivalent to the definition of overfishing

Summary of Stock Abundance and Exploitation Strategies for the Gulf of Alaska for 1991 as recommended by the Scientific and Statistical Committee.

Species	Region	Exploitable Biomass (mt)	B_{MSY}	$F_{OF}e/$	Exploit. Strategy (F)
Pollock	W/C	900,000	-	0.416	0.14 a/
Pacific Cod	All	424,100	-	0.254	0.184 b/
Flatfish Deep	All	201,540	-	0.26	0.20 b/
Flatfish Shallow	All	333,850	-	0.26-0.30	0.19-0.20 b/
Arrowtooth	All	2,000,800	-	0.22	0.17 b/
Flathead Sole	All	251,800	-	0.26	0.20 b/
Sablefish	All	194,000	-	0.18	0.116 b/
POP	All	231,900	498,500	0.05	0.025 c/
Rougheye/Shortrak	All	72,600	-	0.025/0.03	0.025/0.03 c/
Other Slope Rock	All	223,900	-	0.05/0.07	0.05/0.07 c/
Pelagic Shelf Roc	All	96,330	-	0.05	0.05 c/
Demersal Shlf Roc	All	-	-	445 mt	445 mt d/
Thornyheads	All	25,700	-	0.07	0.07 c/

a/ The ratio of 1990 mean exploitable biomass an the recommended ABC
b/ $F_{0.1}$ strategy
c/ F=M strategy. In the case of POP, F = 0.5 x M.
d/ Historic mean catch since the inception of the MFCMA
e/ F_{OF} is the fishing mortality used to determine if the proposed ABC violated the Councils' overfishing definition.

Bering Sea/Aleutians Groundfish
1991 SSC recommendations and apportionments (metric tons)

Species	Area	ABC
Pollock	EBS	1,676,000 a/
	AI	101,460
Pacific Cod *		229,000
Yellowfin sole		250,600
Greenland turbot		7,000
Arrowtooth flounder		116,400
Rock sole *		246,500
Other flatfish		219,700
Sablefish	EBS	3,100
	AI	3,200
Pacific Ocean Perch *	EBS	4,570
Rough./Short./Sharp./North. *	EBS	1,670
Pacific Ocean Perch *	AI	10,775
Rougheye/Shortraker *	AI	1,245
Sharpchin/Northern *	AI	3,440
Other Rockfish *	EBS	400
	AI	925
Atka mackerel *		24,000
Squid		3,800
Other species		28,700

BERING SEA/ALEUTIAN ISLANDS TOTAL	2,932,485

a/ Recommend limiting the portion of the eastern Bering Sea TAC take in area 515 to 200,000 mt.
* ABC is equivalent to the definition of overfishing

Summary of stock abundance and exploitation strategies for the Eastern Bering Sea (EBS) and Aleutian Islands (AI) for 1991 as recommended by the Scientific and Statistical Committee.

Species	Area	Exploitable Biomass (mt)	B_{MSY}	F_{OF}[6]	Exploit. Strategy
Pollock	EBS	6,667,146	5,900,000	0.335	$F_{0.1}$=0.31
	AI	405,847[1]		0.335	$F_{0.1}$=0.31
Pacific cod	BS/AI	1,030,000	926,000	0.156	F_{MSY}=0.156
Yellowfin sole	BS/AI	1,790,000	1,410,000	0.19	$F_{0.1}$=0.14
Green. turbot	BS/AI	325,552	384,628	30,500[2]	7,000[2]
Arrow. flounder	BS/AI	590,400		0.25	$F_{0.1}$=0.18
Rock sole	BS/AI	1,363,700	904,000	0.176	F_{MSY}=0.176
Other flatfish	BS/AI	1,223,000[3]		0.23[1]	F_{MSY}=0.176
Sablefish	EBS	26,400		0.175	$F_{0.1}$=0.13
	AI	27,700		0.175	$F_{0.1}$=0.13
POP[4]	EBS	91,400		0.05	F_M=0.05
	AI	215,500		0.05	F_M=0.05
Short./Rougheye/ Sharp/Northern	EBS	36,500		0.025-.05	F_M=0.025
Short./Rougheye	AI	49,800		0.025	F_M=0.025
Sharp/Northern	AI	68,800		0.05	F_M=0.05
Other Rockfish	EBS	8,000		0.05	F_M=0.05
	AI	18,500		0.05	F_M=0.05
Atka Mackerel	BS/AI			24,000[5]	24,000[5]
Squid				3,800[5]	3,800[5]
Other Species		827,400		28,700[5]	28,700[5]

[1]The estimate of pollock exploitable biomass and other flatfish overfishing rate were reported in error by the Plan Team. The SSC's and corrected Plan Team's estimates are identical.

[2]Overfishing is defined as the long-term (1977-1990) average catch for the Bering Sea and Aleutian Islands. The exploitation strategy is an ABC=7,000 mt, which equates to F=0.0215.

[3]Eastern Bering Sea only.

[4]Sebastes alutus only.

[5]Calculated long-term (1977-1990) average catch for the Bering Sea and Aleutian Islands.

[6]F_{OF} is the fishing mortality used to determine whether the proposed ABC violated the Council's overfishing definition.

Appendix A - Comments on Gulf of Alaska Pollock

In view of the 1991 biomass estimate of 1.3 million mt in the central and western Gulf produced by the stock synthesis model when fitted with major emphasis on the series of bottom trawl estimates, the Team rejected the corresponding estimate based on hydroacoustic surveys (about 0.5 million mt) as too low. To determine an ABC, the Team used the 1990 exploitation rate of 10%, arriving at a recommendation of 133,400 mt.

The SSC was unwilling to disregard the lower biomass estimate based on the hydroacoustic survey. Discussion brought out that a review of fishing power corrections applied to the trawl survey estimates may result in a substantial downward revision of the 1990 estimate and possibly some earlier ones, thereby reducing the discrepancy between the absolute stock sizes and trends shown by the two survey methods. For the time being, the SSC prefers to continue using both series for biomass estimation.

In the case of the 10% exploitation rate, it was noted that this value had been chosen in 1988 on the basis of, among other things, historical rates of exploitation calculated assuming a rate of natural mortality $M=0.4$. In this year's SAFE, the estimation of M was reconsidered and a new value $M=0.3$ adopted, which had the effect of raising the estimates of historical exploitation rates considerably.

The SSC considered a number of alternative methods for determining ABC. The central issue was whether to employ the spawner-recruit curves and yield curves that had been derived in the SAFE report. The curves based on fits of the stock synthesis model to the bottom trawl data indicated a high value of F_{MSY} and a present stock size well above B_{MSY}; the curves based on hydroacoustic data indicated the reverse.

Like the Team, some members of the SSC believed that the spawner-recruit data were too variable and contradictory to permit a reliable estimate of F_{MSY} and B_{MSY} by either survey method. These members generally favored estimating present biomass as the average of the trawl and hydroacoustic estimates, and applying an exploitation rate determined independently such as $F_{0.1a}$ or $F=M$ or the rate used in setting the Bering Sea ABC (about 23%).

Other members felt an ABC should be derived from the yield curves in the SAFE report, either by the procedure advocated by the authors of the assessment or by another procedure that would take into account the effect of the overfishing definition in the case of the estimates based on hydroacoustic data.

Both approaches imply a lower estimate of present biomass and a higher rate of exploitation than the values adopted by the Team, but all the alternatives resulted in an ABC value in the vicinity of the 130,000 mt recommended by the Team. Rather than trying to resolve the methodological differences at this meeting when there is no opportunity for further work before Council action, the SSC recommends

adoption of the Team's ABC, without endorsing either the biomass estimate or the exploitation rate on which it is based. The SSC requests that next year's SAFE include a consideration of alternative exploitation rates: those based on density dependent spawner-recruit relationships as well as density independent spawner-recruit relationships, such as $F_{0.1a}$ or the Bering Sea exploitation rate.

Regards to the overfishing definition, the SSC's estimate of mid-year 1991 biomass is the average of the two stock synthesis estimates with pessimistic short-term recruitment forecasts, or $(1.3+0.5)/2=0.9$ million mt, so the exploitation rate implied by an ABC of 130,000 mt is 0.14, higher than the Team's 10% but still well below the exploitation rate that reduces biomass per recruit to 30% of the unfished value. And, while the SSC as a whole does not accept the B_{MSY} estimates in the assessment, it notes that its estimate of present biomass exceeds both B_{MSY} estimates derived there (both about 770,000 mt).

Appendix B - Comments on Slope Rockfish

To obtain ABCs for the three slope rockfish groups, the SSC estimated the total biomass of each species or species group, then assuming a preferred harvest strategy of F=M, multiplied the biomass by an appropriate species specific estimate of M. Biomass was determined by averaging the 1987 and 1990 exploitable trawl survey biomass reported on Table 5-7 (p. 155) of the GOA SAFE. We averaged biomass estimates from these two surveys rather than accept 1990 biomass. Given the historic rates of exploitation for this complex, we find it implausible that the biomass has declined as dramatically as suggested by the 1990 survey. Species specific estimates of M were obtained from Table 5-8 (p. 156). For those species on Table 5-8 with no estimate of M we estimated M from a species of similar maximum age by adjusting the known rate by the ratio of maximum ages. For example, M=0.025 for rougheye rockfish (mid-point of the range 0.01 to 0.04) which has a maximum age of 140 years; there is no estimate of M for shortraker rockfish which has a maximum age of 120 years; we estimated M for shortraker rockfish as 0.025*(140/120) = 0.03. A similar exercise was performed to estimate M=0.05 for northern and harlequin rockfish. With estimates of natural mortality in hand, preliminary ABCs for each species or species group on Table 5-7 could be computed. We used M=0.07 from Darkblotched rockfish for the species group "other" on Table 5-7.

Next we aggregated the preliminary ABCs for each species in the new species groups (Pacific Ocean perch; rougheye/shortraker; and other slope rockfish). Before suggesting final ABCs we had to determine if there was any evidence that current stock biomass was below B_{MSY}. The GOA SAFE estimates B_{MSY} for Pacific Ocean perch under three recruitment scenarios on Table 5-10. Although it is difficult to defend a particular recruitment scenario the mean ratio of current stock biomass to B_{MSY} is approximately 0.5, i.e., current Pacific Ocean perch stock biomass is 50% below B_{MSY}. The definition of overfishing requires discounting the exploitation rate for species whose current biomass is less than B_{MSY}. Consequently, the SSC computed the final ABC for Pacific Ocean perch as a function of B*M*0.5. No estimates of B_{MSY} are available for the other species in the slope rockfish complex; so, the level of overfishing is determined as M*B and is equal to the ABC.