MEMORANDUM

TO: Council, SSC, and AP Members

FROM: Clarence G. Pautzke
Executive Director

DATE: September 22, 1991

SUBJECT: Gulf of Alaska Groundfish

ACTION REQUIRED

a. Review 1992 Draft Preliminary Stock Assessment and Fishery Evaluation (SAFE) report and approve for public review.

b. Set initial 1992 Total Allowable Catches (TACs) and apportionments for public review.

c. Set initial 1992 Prohibited Species Catch (PSC) limits for public review.

BACKGROUND

This meeting begins the Council's annual groundfish cycle with review and release to the public of preliminary estimates of 1992 groundfish TACs and halibut PSC mortality limits for fisheries, gear groups, areas, and seasons. The Council will set final specifications for 1992 in December.

a. SAFE Document

The Gulf of Alaska Groundfish Plan Team met in Seattle on September 3-6 to prepare the draft preliminary SAFE report which was sent to you on September 16. The preliminary SAFE represents the best information currently available concerning the status of stocks and recommended Acceptable Biological Catches (ABCs). Much of the information is based on the final 1991 SAFE pending the completion of stock assessment work in 1991 and synthesis of data from completed stock assessments. A final 1992 SAFE report will be prepared before the Council's December meeting when they will make final recommendations to the Secretary for the 1992 specifications. This preliminary SAFE contains the Plan Team's estimates of biomass and ABCs for all groundfish species covered under the Gulf FMP and information concerning bycatch of halibut to provide guidance to the Council in establishing preliminary PSC apportionments. Item D-1(a)(1) is the introductory chapter from the preliminary SAFE which summarizes the Plan Team's recommendations.

b. Set Initial ABCs, TACs, and apportionments for the 1992 Fisheries

Item D-1(b)(1) in your notebook is a table describing the 1991 ABCs, TACs, and catch statistics (through August 18) as well as the Plan Team's initial recommendations for 1992 ABCs for all groundfish species. During the week of this Council meeting, the SSC and AP recommendations will be filled in and supplemental handouts provided to the Council. Item D-1(b)(2) is a blank worksheet for the Council's recommendations. Both of these worksheets are available as overhead projections for the benefit of the Council and the public. Under Amendment 21, 25% of the initial specifications for groundfish will go forward as interim specifications for the 1992 fisheries until superseded by publication of the Council's recommended final specifications in the FEDERAL REGISTER, sometime in early 1992.

c. Set Initial PSC limits for halibut

The FMP requires that initial PSC limits for halibut also be sent out for public review. Amendment 21 clarifies the halibut PSC framework to permit the Council to specify PSC limits by season and by gear type. For the 1991 fishing year the PSC limits were apportioned as follows:

	Trawl Gear		Hook and Line Gear
1st quarter	600 mt (30%)	1st trimester	200 mt (26.6%)
2nd quarter	600 mt (30%)	2nd trimester	500 mt (66.6%)
3rd quarter	400 mt (20%)	3rd trimester	50 mt (6.8%)
4th quarter	400 mt (20%)		
TOTALS	2000 mt		750 mt

Part B of the 1992 preliminary SAFE report contains information on halibut bycatch in the 1991 groundfish fisheries in the Gulf of Alaska. The information in this section details the occurrence of halibut bycatch by time, area, and fishery.

All hook and line fisheries were prohibited on July 8 for the remainder of 1991 when the total halibut PSC apportionment to that gear group was achieved. Pot fisheries were exempt from PSC related closures in 1991.

In 1991, the second quarter trawl halibut PSC apportionment lasted only five weeks, with the bottom trawl fisheries closing on May 8, and reopening on July 1 when the third quarter apportionment became available. If the proposed season delays are enacted for 1992, this would alter the seasonal requirements of halibut PSC in the trawl fisheries. The amount needed for the first quarter might be less than in 1991 if all fishing seasons are delayed until late January or early February. If the directed rockfish trawl fisheries are delayed until July, the amount of halibut bycatch needed for the second quarter would be reduced as well, and perhaps moved into the third or fourth quarters. Approximately 540 mt of halibut mortality was attributed to the directed rockfish fishery in 1991, primarily executed in March and April.

INTRODUCTION

This **preliminary** Stock Assessment and Fishery Evaluation report (SAFE) for the Gulf of Alaska groundfish resources is applicable for management of the 1992 groundfish fishery under the Fishery Management Plan for Groundfish of the Gulf of Alaska (FMP). The SAFE presents the best available information on the biological status of groundfish stocks, and **preliminary** recommendations for acceptable biological catches (ABCs). As required by the Magnuson Fishery Conservation and Management Act, the North Pacific Fishery Management Council will use these recommendations, as well as socioeconomic information, to determine total allowable catches (TACs) and other management strategies for the 1992 groundfish fisheries in the Gulf of Alaska.

The SAFE is organized by topic. The first part is the biological section, which presents a Plan Team review of the condition of each target species or species group and recommendations for acceptable biological catch (ABC). The second part is the bycatch section which provides information needed to support development of prohibited species catch (PSC) mortality limits for Pacific halibut.

The third part is an overview of the economic condition of the various Gulf of Alaska groundfish fisheries. This overview, which is bound separately but is part of this SAFE, also includes a detailed description of all groundfish fisheries in the Gulf of Alaska and also in the Bering Sea and Aleutian Islands area.

The Plan Team for the Gulf of Alaska Groundfish FMP met in Seattle on September 3-6, 1991 to review the status of stocks of thirteen species or species groups that are managed under the FMP. The Plan Team review and discussions were based on technical papers from the Alaska Department of Fish and Game and from the Alaska Fisheries Science Center, results from the NMFS 1990 Gulf of Alaska trawl surveys, the 1990 longline survey, and presentations by NMFS scientists. Attendance at the September Plan Team meeting included:

Plan Team Members:	J. Balsiger (Team Chairman), B. Bracken, J. Fujioka, L. Halderson, J. Hastie, H. Lin-Lai, S. Lowe, R. Merrick, C. Oliver, G. Williams.
AFSC scientists:	A. Hollowed, D. Colpo, R. Methot, J. Pearce J. Terry, T. Wilderbuer
Public Attendance:	D. Benson (Artic Alaska Fisheries Corp.- Capt. Ocean Enterprise) V. Curry (American Factory Trawlers Assoc.) D. Fraser (Cape Flattery Fisheries) H. Hartman (Aquatic Resources Conservation Group) F. Matthews (Aquatic Resources Conservation Group) P. Pagels (Greenpeace) T. Smith (North Pacific Fixed Gear Coalition)

The FMP recognizes single species and species complex management strategies. Single species management is recommended for stocks which are easily targeted by the harvesting sector, and for which minimal mixing of other species occurs in the targeted catch. In the Gulf of Alaska, Pacific cod, pollock, sablefish, Pacific ocean perch, flathead sole and arrowtooth flounder have been managed as single species. Other groundfish species that are usually caught in groups have been managed as complex assemblages. For example, shortraker and rougheye rockfish, other slope rockfish, pelagic shelf rockfish, demersal shelf rockfish, thornyhead rockfish, deepwater flatfish, shallow water flatfish, and other groundfish have been managed as complexes. The FMP, however, authorizes splitting species, or groups of species, from the complexes for purposes of promoting the goals and objectives of the FMP. Acceptable biological catches (ABCs) for a species complex represent potential total yields for the species comprising that complex.

Fishermen do not always catch species in a complex in proportion to the species composition, i.e., certain segments of the complex may be more easily harvested than others, or they may be more valuable. Consequently, the implicit risk in species complex management is that one or more of the species in the complex may be over or underharvested. Recognition of this risk is important. Alternative management strategies can be imposed to limit the risk including removing a species from a complex and managing as a single species, or reducing the quota of the complex to protect the more vulnerable species. The Plan Team gave close scrutiny to the species composition of the catch from the species complex management units and made recommendations for adjustments as required.

NEW INFORMATION

Since the 1991 Stock Assessment and Fishery Evaluation Report (SAFE) was issued (NPFMC 1990), the following new information has become available:

1. Data from the 1991 hydroacoustic survey in Shelikof Strait conducted by the Alaska Fisheries Science Center.

2. Data from the NMFS Observer Program Office for 1991.

3. Revised estimates of biomass from the 1990 bottom trawl survey in the Gulf of Alaska.

MARINE MAMMAL CONSIDERATIONS

NORTHERN SEA LIONS

Declines in Alaskan northern sea lion numbers as determined from surveys conducted through 1990 were sufficient to lead to a final listing on 26 November 1990 of the species as threatened throughout its range under the Endangered Species Act (ESA). Regulatory measures instituted as part of this listing included the designation of 3 nm no-entry zones around all major Alaskan sea lion rookeries west of 150°W longitude. Subsequent emergency regulations prohibited trawling within 10 nm of rookeries in the Gulf of Alaska and eastern Aleutian Islands. In addition, the Gulf

of Alaska walleye pollock TAC was split in half between the western and central Gulf of Alaska management areas (at 154°W longitude) to minimize potential localized depletion of walleye pollock stocks.

The northern sea lion recovery team submitted a draft recovery plan for public comment in February 1991. Comments were incorporated into a draft final revision by August 1991, with a final draft currently in preparation.

1991 Surveys

Aerial surveys of adult and juvenile northern sea lions were conducted during June 1991 at all rookeries and most haul-outs in southeast Alaska, Gulf of Alaska, and Aleutian Islands. Preliminary results indicate that since 1990, may numbers have remained stable in southeast Alaska, decreased in the Gulf of Alaska and Prince William Sound, remained stable in the eastern Aleutian Islands, and decreased in the central and western Aleutian Islands (Merrick, Calkins, and McAllister in press).

Counts of pups were made at 13 rookeries in the same area during July 1991. Pup numbers generally followed the trends in adult numbers, except at Seal Rocks (Prince William Sound) where pup numbers were constant but adult numbers appeared to have declined (Merrick, Calkins, and McAllister in press).

Juvenile Survival at Marmot Island

During 1987-88 a total of 800 northern sea lion pups were marked at Marmot Island in a long term study of northern sea lion dispersal, survival, and reproduction. Calkins and Pitcher (1982) found that most of the pups surviving from the cohorts marked in the mid 1970's returned to their island of birth by the time they were four years old. Life tables they had constructed from mid 1970's collections indicated that 41% of females and 22% of males survived to age four. As a result, around 100 survivors of the 400 animals tagged in 1987, plus some animals from the 1987 cohort were expected to return to Marmot Island in the summer of 1991. A field team was placed on the island during June-July 1991 to count returnees. A maximum of seven tagged animals (of 800) were resighted during the month of observations. These low returns point towards either increased dispersal or some change in life history characteristics (e.g., declining juvenile survival or delayed age of first reproduction). Field teams will return to the island in subsequent field seasons to evaluate these hypotheses.

1990-91 Foraging Studies

Satellite linked radio tags were attached to adult female sea lions (with pups) at rookeries and haul-outs in the Gulf of Alaska and Aleutian Islands during 1990-91. In summer, animals studied remained close to the rookeries (< 30 km), made brief trips (<= 2 days), and made shallow dives ($\bar{x}$ < 30 m). Deepest dive was 120 m. This seems to be characteristic of animals at all of the five sites studied (Chirikof, Ugamak, Ulak, Seguam, and Kiska islands). The short trip durations recorded (and as a result short trip lengths) are confirmed by previous on-land observations of females with pups at Ugamak and Marmot Islands (Merrick 1987; NMFS unpub. data). However, these on-land observations also noted that females without

pups stayed at-sea longer, and as a result, probably forage further away from the rookeries.

Results from the fall and winter studies (again using females with pups at Marmot and Chirikof Islands) indicated that winter trips are much longer in time (up to 4 months) and distance (up to 450 km offshore), and animals dives deeper ($\bar{x}$ up to 84 m with deepest dives at least 273 m).

Aside from the areas immediately around rookeries, areas identified where Gulf of Alaska animals appear to forage in winter include:

- o Marmot Island (1 animal tagged) - Portlock Bank and Marmot Bay
- o Chirikof Island (3 animals tagged) - Albatross Bank/Barnabus Gully (2 animals), Marmot Gully (1 animal) and Gilbert/Patton Seamounts (3 animals).

Two animals tagged at Puale Bay, Shelikof Strait in winter 1991 foraged within the strait during the one to two weeks they were tracked--one stayed at the southern end and the other foraged on the west side of Kodiak Island. An animal tagged at Marmot Island in January 1990 also visited the northern end of the strait on one trip.

Physiological Studies

One element of the summer 1991 fieldwork was measurement of the physiological condition of 1-2 month old pups. Blood was drawn from 58 pups at 9 sites in the area from southeastern Alaska through the Aleutian Islands to study pup condition. Pups were also weighed at two sites--Ugamak and Atkins Island. Ugamak Island pups were heavier than pups weighed in 1990. While there were no 1990 data for Atkins Island, pups weighed there in 1991 were similar in size to the 1991 Ugamak Island pups. These preliminary results indicate pups in all areas generally appeared healthy without signs of anemia or malnourishment.

Genetic Studies

Stock differentiation studies using MtDNA analysis were begun during summer 1991. Blood (white blood cells) was collected from adults and pups at sites from southeastern Alaska, the Gulf of Alaska, the Aleutian Islands, and the Pribilof Islands. Analysis of these samples is presently underway.

NORTHERN FUR SEALS

A new population estimate of northern fur seals is not available for 1991. In 1990 fur seal numbers on St. Paul Island were stable while those on St. George Island were declining (York 1990, Kajimura and Sinclair in press). The overall Bering Sea population is considered to be depleted but stable.

PACIFIC HARBOR SEALS

NMFS began a comprehensive population assessment of harbor seals in Alaska during 1991. Surveys will continue through the late summer; however, preliminary results are available from 1991 breeding season surveys conducted in the Bristol Bay area (NMFS unpub.

data). These data indicate numbers there have not changed significantly since 1990; however, numbers in the area are still less than half of that observed in 1976. The generally low abundance recorded in recent surveys in the Bristol Bay and Kodiak areas had led NMFS to begin a status review of the Alaskan population of harbor seals. Results of this review should be available in early winter.

KILLER WHALE

Since 1986, NMFS has been conducting investigations of the nature and magnitude of killer whale interactions with sablefish fisheries. Depredation by killer whales on longline catches of sablefish has been documented in the southeastern Bering Sea and Prince William Sound areas (Dahlheim, 1988). Results of dockside interviews conducted in the winter of 1988 with domestic Bering Sea longline fishermen suggested that depredation occurred on 20% of the sets. In Prince William Sound, a 25% predation rate was reported based on interviews conducted with fishermen. Data collected from the Japan/U.S. cooperative longline research surveys operating in the Aleutian Islands and Bering Sea indicate that interactions may be increasing (Yano and Dahlheim, 1991). Probably as a consequence of these interactions, there have been numerous reports of fishermen shooting at whales. Photographs of Alaskan killer whales show evidence of bullet wounds. Reports have also been received of fishermen using high-powered explosives to frighten whales away from their boats during fishing operations.

Various methods have been tried to reduce or eliminate whale depredation on commercially valuable fish. A Salstonstall-Kennedy grant to Hubb's Research Institute has been used to investigate possible methods to reduce interactions. No consistently effective technique has been developed to date.

Population estimates of killer whales are not available for most Alaskan waters. Prince William Sound is an exception. Based on photo-identification studies that have been ongoing there since 1984, 233 individuals have been identified representing 9 resident pods and 8 transient pods. The pod responsible for most of the fishery interactions in Prince William Sound (AB pod) has experienced a high level of mortality (Matkin et al., 1987). Since 1986, 20 whales (out of a pod of 37 individuals) are missing and considered dead. Prior to being listed as missing, many of these whales showed evidenced of bullet wounds.

Photographs collected from fisheries observers working in the Bering Sea have been submitted to NMFS since 1986. These photographs have also documented bullet wounds on killer whales. In 1991, in addition to the numerous sightings and photographs, NMFS was notified (by domestic observers) of at least four separate records of dead Bering Sea killer whales.

The number of dead Bering Sea killer whales observed in 1991 could result from the increase in observer coverage. However, the high number of reported deaths may be indicative of an increasing level of take from this region (previously under-reported). A significant level of take has been documented for the Prince William Sound region. Had it not been for the baseline information on pod identification and abundance, NMFS would not be able to determine the level of whale mortality on the killer whale pods in

Prince William Sound. Corresponding baseline information on population numbers and structure is not available for the Bering Sea region, thus the level of impact on killer whales from this region cannot be determined at this time.
In 1991, NMFS received numerous reports from angry fishermen about problems they are having once again with killer whales in the Bering Sea. The whales are becoming increasingly tolerant of fishing vessels and will follow vessels at extremely close range feeding off discard for days at a time. The close proximity of killer whales to vessels, continued fishery interaction problems, and the suggestion of associated mortality of whales in Alaska make it necessary to obtain Bering Sea/Aleutian Island population estimates of killer whales. As a result, NMFS proposes to assess the population of killer whales in coastal Alaskan waters westward from Kodiak Island. Subject to funding, this project will begin ion 1992.

HARBOR PORPOISE

NMFS began a three year assessment of the Alaskan harbor porpoise population during 1991. Vessel surveys were conducted in Southeast Alaska in spring, summer, and fall of 1991, and aerial surveys of Cook Inlet and Bristol Bay during late summer 1991. Initial results indicate high densities of harbor porpoise exist in southeastern Alaska, with low numbers in Bristol Bay and Cook Inlet. Additional surveys will be conducted during 1992-93 in Southeast Alaska, Prince William Sound, Kodiak, and the southside of the Alaska Peninsula.

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PART A: CURRENT STATUS OF STOCKS AND ACCEPTABLE BIOLOGICAL CATCHES

Tables 1 and 2 provide a summary of the current status of the groundfish stocks, including estimated maximum sustainable yields, catch statistics, the 1990 and 1991 TACs, final ABCs for 1991, and preliminary recommendations for ABCs for 1992. Catch statistics, 1991 TACs, and ABCs are divided among the Gulf of Alaska regulatory areas. These areas are illustrated in Figure 1.

The abundances of Pacific cod, deep-water flatfish, shallow-water flatfish (except rock sole), flathead sole, arrowtooth flounder, and sablefish are high. The abundance of pollock is medium. The abundances of slope rockfish, demersal shelf rockfish, and thornyheads are low.

The sum of the 1992 ABCs is 669,972 mt, which is within the FMP-approved optimum yield (OY) of 116,000-800,000 mt for the Gulf of Alaska. The team notes that because of halibut bycatch mortality considerations in the high-biomass flatfish fisheries, an overall OY for 1991 will be considerably under this upper limit. For perspective, the sum of the TACs was 301,089 mt in 1991.

Table 1. Groundfish maximum sustainable yields (MSYs), 1991 and 1992 ABCs, 1990 and 1991 TACs, 1990 catches and 1991 catches through August 18, 1991.

Species	MSY		ABC (mt) 1991	ABC (mt) 1992	1990 Catch	1990 TAC	1991 Catch	1991 TAC
Pollock	176,000	W/C	100,000	93,000	80,309	70,000	69,776	100,000
		Shelikof*	(part of W/C)		-----	-----	-----	-----
		E	3,400	3,400	277	3,400	3,542	3,400
		Total	103,400	96,400	80,586	73,400	73,318	103,400
Pacific cod	39,100	W	30,000	22,400	30,347	29,500	28,654	30,000
		C	45,000	42,100	40,141	59,500	39,674	45,000
		E	2,900	3,400	337	1,000	182	2,900
		Total	77,900	67,900	70,825	90,000	68,510	77,900
Flatfish** (deep water)	13,692 (includes flathead sole)	W	2,000	3,287	350	3,650	1,072	2,000
		C	38,900	38,219	6,991	15,300	6,401	10,000
		E	9,600	4,913	506	3,050	123	3,000
		Total	50,500	46,419	7,847	22,000	7,596	15,000
Flatfish*** (shallow water)	28,254	W	48,800	27,481	1,585	3,570	1,391	3,000
		C	22,200	21,262	6,119	6,180	2,253	7,000
		E	3,000	1,741	225	250	3	2,000
		Total	74,000	50,484	7,930	10,000	3,647	12,000
Flathead sole	16,589	W	12,600	12,584			99	2,000
		C	32,700	31,988			400	5,000
		E	5,000	3,710			1	3,000
		Total	50,300	48,282			500	10,000
Arrowtooth flounder	110,042	W	40,800	38,881	1,804	4,450	1,583	5,000
		C	272,100	253,325	15,553	23,170	8,935	10,000
		E	27,200	11,683	1,557	4,380	289	5,000
		Total	340,100	303,889	18,913	32,000	10,807	20,000

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Table 1 (cont.) Groundfish maximum sustainable yields (MSYs), 1991 and 1992 ABCs, 1990 and 1991 TACs, 1990 catches and 1991 catches through August 18, 1990.

Species	MSY (mt)		ABC (mt) 1991	ABC (mt) 1992	1990 Catch	1990 TAC	1991 Catch	1991 TAC
Sablefish	26,900	W	2,925	2,925	1,991	3,770	1,690	2,925
		C	10,575	10,575	12,066	11,700	10,100	10,575
		WYK	4,050	4,050	5,181	4,550	3,481	4,050
		SE/EYK	4,950	4,950	6,526	5,980	4,725	4,950
		Total	22,500	22,500	25,765	26,000	19,996	22,500
Slope rockfish (other) (MSY for all species)	15,000-27,700	W	1,212	1,212			322	1,212
		C	5,454	5,454			3,976	5,454
		E	3,434	3,434			409	3,434
		Total	10,100	10,100			4,707	10,100
Pacific Ocean Perch		W	1,624	3,248			993	1,624
		C	1,798	3,596			2,533	1,798
		E	2,378	4,756			1,846	2,378
		Total	5,800	11,600			5,372	5,800
Shortraker/Rougheye		W	100	100			68	100
		C	1,320	1,320			836	1,320
		E	580	580			402	580
		Total	2,000	2,000			1,306	2,000
Pelagic shelf rockfish	Unknown	W	800	1,500	165	1,400	26	800
		C	3,100	5,500	956	5,800	810	3,100
		E	900	1,600	527	1,000	214	900
		Total	4,800	8,600	1,647	8,200	1,050	4,800
Demersal shelf rockfish (SE Outside District)	Unknown		Unknown	Unknown	357	470	330	425

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Table 1 (cont.) Groundfish maximum sustainable yields (MSYs), 1991 and 1992 ABCs, 1990 and 1991 TACs, 1990 catches and 1991 catches through August 18, 1990.

Species	MSY (mt)		ABC (mt) 1991	ABC (mt) 1992	1990 Catch	1990 TAC	1991 Catch	1991 TAC
Thornyhead rockfish	3,750	GW	1,798	1,798	1,575	3,800	851	1,398
Other species	NA	GW	NA	NA	7,784	14,179	1,434	15,766
Totals			743,198	669,972	223,229	280,049	199,424	301,089

* Shelikof Strait pollock is included within the W/C ABC range.
** "Deep water flatfish" means rex sole, Dover sole, and Greenland turbot.
*** "Shallow water flatfish" means rock sole, yellowfin sole, butter sole, starry flounder, and other flatfish not specifically defined.
GW means Gulfwide

Table 2. Exploitable biomasses, 1992 ABCs, and estimated trends and abundances of groundfish.

Species	Exploitable Biomass (mt)		1992 ABC	Abundance, trend
Pollock	927,000	W/C	93,000	Medium, decreasing
		Shelikof	6,250	
		E	3,400	
		Total	96,400	
Pacific cod	369,565	W	22,400	High, decreasing
		C	42,100	
		E	3,400	
		Total	67,900	
Flatfish (deep water)	169,132	W	3,287	High, stable
		C	38,219	
		E	4,913	
		Total	46,419	
Flatfish (shallow water)	257,338	W	27,481	High, stable
		C	21,262	
		E	1,741	
		Total	50,484	
Flathead sole	240,615	W	12,584	High, stable
		C	31,988	
		E	3,710	
		Total	48,282	
Arrowtooth flounder	1,787,583	W	38,881	High, stable
		C	253,325	
		E	11,683	
		Total	303,889	
Sablefish	194,000	W	2,925	High, decreasing
		C	10,575	
		WYK	4,050	
		SE/EYK	4,950	
		Total	22,500	

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Table 2. (cont.) Exploitable biomasses, 1992 ABCs, and estimated trend and abundances of groundfish.

Species	Biomass (mt)		1992 ABC	Abundance, trend
Slope rockfish (Other)	160,152	W	1,212	Low, decreasing
		C	5,454	
		E	3,434	
		Total	10,100	
Pacific Ocean Perch	129,734	W	3,248	Low, decreasing
		C	3,596	
		E	4,756	
		Total	11,600	
Shortraker/ Rougheye	46,243	W	100	Low, decreasing
		C	1,320	
		E	580	
		Total	2,000	
Pelagic shelf rockfish	95,284	W	1,500	Relatve abundance unknown
		C	5,500	
		E	1,600	
		Total	8,600	
Demersal shelf rockfish (SE Outside district)	Unknown		Unknown	Depressed, stable
Thornyhead	25,700	Gulfwide rockfish	1,798	Depressed, decreasin
Other species	NA	Gulfwide	NA	TAC = 5% of the su of TACs
Total			669,972	

Pollock

	ABC	EXPLOITABLE BIOMASS	CATCH
1990	73,400	1,050,000	84,695
1991	103,400	1,088,000	61,536
1992	93,000	927,000	

The exploitable biomass estimates for 1990 and 1991 are from the stock synthesis (SS) model. The estimated 1992 biomass is 927,000 mt which is based on a projection from the 1991 biomass estimated from stock synthesis.

The current assessment incorporates two changes into the SS model. First, the 1984, 1987 and 1990 gulf-wide bottom trawl survey biomass estimates were revised. This was due to changes in the fishing power correction factors applied to bottom trawl data. Second, historical estimates of discard from the domestic fishery (1986-present) were accounted for in the SS model. The current stock assessment presents two configurations: 1 in which a low emphasis was placed on hydroacoustic data and a new one described below. The new configuration of the SS model incorporates hydroacoustic data as indices, and the 1990 bottom trawl biomass as an absolute estimate. Recent hydroacoustic survey biomass estimates from Shelikof Strait have been much lower than the gulf-wide bottom trawl estimates. One explanation for the observed discrepancies is that the abundance of pollock in the demersal habitat remains relatively constant while the pelagic fraction of the stock may vary considerably, depending on year class strength. The new configuration of the model is an attempt to reconcile these differences. The old configuration of the SS model which placed a low emphasis on the bottom trawl data was no longer presented.

The Team utilized results from the new configuration of the model. The SS results show a declining trend in biomass since 1982. The 1988 year class continued to appear in large numbers in Shelikof Strait confirming previous indications that this year class will be above average. The 1989 and 1990 year classes appear to be less abundant than the 1988 year class, although the hydroacoustic survey is not designed to sample juvenile pollock.

The preliminary 1992 recommended ABC was derived by applying last year's 10% rate to the estimated 1992 exploitable biomass. Last year's rate was used in this preliminary recommendation, since the Team anticipates receiving an updated final assessment which would provide several more years of stock recruitment data, and an analysis of several methods for deriving optimum levels of fishing mortality. In addition, the $F_{0.1}$ value derived from a yield-per-recruit analysis with the current stock recruitment relationship is approximately 10% (.098). The preliminary recommended 1992 ABC is therefore 93,000 mt for the Western/Central areas. The Team again recommends that a portion of the TAC in the amount of 6,250 mt be allocated to the Shelikof Strait District to provide for a fishery for the collection of data. Lacking new information for the eastern Gulf population and noting that effort is low in this area, the Team again set ABC for the Eastern area at 3,400 mt.

There is sufficient concern with the stock-recruitment relationship, that the estimates of fishing mortality associated with sustainable yields may not be appropriate. Therefore, overfishing for pollock is the fishing mortality rate that results

in the biomass-per-recruit ratio falling below 30% of the pristine level. This fishing mortality rate is 0.416. With a 10% rate (yield/biomass) in 1992, the fishing mortality rate will be approximately 0.10, well below the overfishing level.

Pacific cod

	ABC	EXPLOITABLE BIOMASS	CATCH
1990	90,000	467,100	74,647
1991	77,900	418,000	78,314*
1992	67,900	369,600	

* (PacFIN as of 8/20/91)

The 1990 bottom trawl survey of the Gulf of Alaska provided data for estimation of biomass of Pacific cod by management area. Incorporating the bottom trawl results from 1984, 1987 and 1990, the SRA model estimated exploitable biomass for 1992 at 369,565 mt. This is a decline in biomass from previous years and the projection model estimates that the decline may continue.

The $F_{0.1}$ rate (0.184) applied to the projected 1992 exploitable biomass of 369,565 t provides an estimate of ABC of 67,900 t. This should be distributed by management area approximately as the biomass is distributed: 33% (22,400 t) in the western area; 62% (42,100 t) in the central area; and 5% (3,400 t) in the eastern area.

The fishing mortality rate that would constitute overfishing would be 0.254. This is the fishing mortality rate that would result in the equilibrium biomass-per-recruit ratio falling below 30% of its pristine value. Hence, the recommended ABC, with an associated fishing mortality rate of 0.184, does not violate the Council's overfishing policy.

Flatfish

		ABC	EXPLOITABLE BIOMASS	CATCH
1990	Deep Water	108,400	541,618	6,696
	Shallow Water	84,500	424,856	4,584
	Arrowtooth	194,600	1,144,242	4,132
	TOTAL	87,500	2,110,716	15,412
1991	Deep Water	50,500	169,132	
	Shallow Water	74,000	257,338	
	Arrowtooth	340,100	1,787,583	
	Flathead sole	50,400	240,615	
	TOTAL	515,000	2,454,668	21,784*
1992	Deep Water	46,419	169,132	
	Shallow Water	50,484	257,338	
	Arrowtooth	303,889	1,787,583	
	Flathead sole	48,282	240,615	
	TOTAL	449,074	2,454,668	

* Catch through 11 August

The 1992 exploitable biomass for each category is the same as the absolute abundance estimated from the 1990 triennial trawl survey. These estimates have changed from the values presented in the 1991 SAFE document as the result of new analyses based on improved Fishing Power Corrections (FPC). The table above includes these changes for 1991 and 1992. The large decrease in biomass of the deep water group between 1990 and 1991 is due almost entirely to the removal of flathead sole from that category beginning in 1991. The decrease in shallow water flatfish between 1990 and 1991 is due mainly to decreasing abundance of rock sole.

The ABCs for the four flatfish categories were determined by applying the $F_{0.1}$ fishing mortality rates determined from yield-per-recruit analysis, to the exploitable biomass estimates. The 1992 ABCs were calculated using the same fishing mortality rates as 1991; however, the 1992 ABCs differ from 1991 because the estimates of exploitable biomass have changed and are now lower than the biomass values presented in the 1991 SAFE document.

The plan team recommends that ABCs for each group be apportioned among the three regulatory areas in proportion to biomass distributions in the 1990 trawl survey. The resulting distributions are:

	WEST	CENTRAL	EAST	TOTAL
Deep Water	3,287	38,219	4,913	46,419
Shallow Water	27,481	21,262	1,741	50,484
Arrowtooth	38,881	253,325	11,683	303,889
Flathead sole	12,584	31,988	3,710	48,282
TOTAL	82,233	344,794	22,047	449,074

Gulf of Alaska flatfish are not considered overfished so long as the fishing mortality rate remains below the level that would result in the spawning biomass-per-recruit ratio falling to 30% of its pristine value. These fishing mortality rates are 0.239 for arrowtooth flounder, 0.262 for flathead sole, 0.263 for rock sole, and 0.296 for yellowfin sole. The $F_{0.1}$ values for these species are at or below 0.20, therefore flatfish are not considered overfished.

Sablefish

	ABC	EXPLOITABLE BIOMASS	CATCH
1990	26,200	226,000	25,570
1991	22,500	194,000	19,580
1992	22,500	194,000	

The method of calculating exploitable biomass from longline survey RPW indices in the Gulf of Alaska, Bering Sea, and the Aleutians was changed last year to a new scaling factor to provide consistency between regions. The cooperative longline survey and the domestic longline survey provided conflicting results as to whether the exploitable biomass of sablefish increased or decreased in the Gulf of Alaska in 1990. Utilizing the new scaling factor

and assuming no change in the Gulf from 1989 to 1990, but zero recruitment for 1991, the exploitable biomass projected to 1991 was 194,000 mt. The $F_{0.1}$ exploitation rate of .116 was used to calculate an ABC for 1991 of 22,500 mt. The exploitation rate used in the past has been approximately equal to the $F_{0.1}$ level.

Results from the Center's 1991 sablefish longline surveys, which are still in progress, will be used to update the projection of exploitable biomass at the beginning of 1992. It is recommended that the preliminary 1992 ABC be specified equal to the 1991 ABC of 22,500 mt.

The 1988 to 1990 TACs were distributed in proportion to distribution of biomass in the 401-1000m slope and gully areas as estimated from the 1987 longline survey. The biomass distribution as obtained from the 1990 longline survey compares to the 1988-90 TAC apportionment as follows:

	1990 RPW	1988-90 TAC
Western	.13	.145
Central	.47	.45
W. Yakutat	.18	.175
Southeast Outside/ East Yakutat	.22	.23

The Team feels apportioning the ABC by either scheme or moderate variations of them would be satisfactory. The 1991 ABC was divided in proportion to the 1990 RPW: 2,925 mt to the Western, 10,575 mt to the Central, 4,050 mt to West Yakutat, and 4,950 mt to East Yakutat/Southeast Outside.

The $F_{0.1}$ fishing rate is below the estimated F_{msy} level of 0.27, as well as the fishing rate, F=0.18, that would drive biomass per recruit to 30% of its unexploited value. Therefore, the recommended ABC does not exceed that allowed by the overfishing definition.

Slope rockfish

	ABC	EXPLOITABLE BIOMASS	CATCH
1990	17,600	729,000	21,114
1991	17,900	533,000	9,710
1992	23,700	533,000	

The 1990 trawl survey indicated a large decrease in exploitable biomass of slope rockfish from 1987 estimates (729,000 mt to 336,000 mt). Because fitting these data points would not be significant, the mean of the two surveys are used to estimate exploitable biomass rather than using model projections.

Because an appropriate recruitment scenario could not be determined, fishing rates equal to natural mortality rates are applied to the exploitable biomass to obtain ABC. The ABC for Pacific ocean perch is 11,600 mt, shortraker/rougheye, 2,000 mt, and other slope rockfish, 10,100 mt.

The rate of overfishing for Pacific ocean perch and rougheye rockfish is considered to be the fishing rate that would drive the

biomass:recruit ratio to 30% of its unexploited state, which is computed to be F=0.105, for Pacific ocean perch, and 0.046 for rougheye rockfish. For other species, the rate of overfishing would be equal to natural mortality rate.

The magnitude of the decrease observed from the 1987 to the 1990 trawl survey casts some doubt as to the validity of at least one or both of the survey results, or the fishing mortality reported during the period between the surveys. The Team points out that, while the only available data indicates a dramatic decrease and the stock should be watched carefully, they are not comfortable with the capability of the present survey and its methods to accurately assess the abundance of rockfish. They recommend that innovative new techniques and approaches be attempted to better determine the distribution and abundance of slope rockfish. A survey approach that can utilize the capabilities of successful rockfish operations should be considered. The AFSC has developed a rockfish assessment working plan which contains plans to evaluate new survey approaches and experimental management schemes.

Pelagic shelf rockfish

	ABC	EXPLOITABLE BIOMASS	CATCH
1990	8,200	164,000	1,647
1991	4,800	95,284	950
1992	8,600	95,284	

The 1990 trawl survey estimate for pelagic shelf rockfish was 26,217 mt compared to the estimate 164,400 mt in 1987. Because the validity of the large difference in the surveys is questionable, the mean of the two estimates is used as exploitable biomass for computing ABC.

An exploitation rate equal to an estimated natural mortality rate of 0.09 was used to compute an ABC of 8,600 mt. The distribution of the ABC, which is based on an average of the 1987 and 1990 biomass estimate distributions is: 1,500 mt in the Western area, 5,500 mt in the Central area, and 1,600 mt in the Eastern area.

There is doubt as to the validity of trawl surveys' ability to assess pelagic species, especially considering the magnitude of the observed contrasts in the pelagic rockfish results.

Demersal shelf rockfish

Harvest of demersal shelf rockfish through mid-August 1991 totalled 273 mt, well below the annual TAC of 425 mt. It should be noted, however, that for the second year the harvest of DSR has been constrained by halibut PSC closures to all hook and line gear in the GoA and this year was further constrained by the trawl closure in the Eastern Gulf. Some additional harvest is expected as bycatch in the September halibut opening.

There is no new information to calculate MSY or ABC for DSR using conventional analytical methods. For 1991 the Council adopted the default overfishing definition which establishes the threshold at the average harvest over the previous five years when biological data is lacking. The resulting overfishing threshold level of 445 mt was presumed to be equal to ABC for 1991. Using this same

method results in a preliminary ABC of 512 mt for 1992. This is based on the average landings of DSR in the Southeast Outside District between 1986 and 1990 as listed in table 7.2 of the SAFE document.

Thornyhead rockfish

	ABC	EXPLOITABLE BIOMASS	CATCH
1990	3800	98,670	1646
1991	980	25,697	769*
1992	980	25,697	

* Catches through July

Based on results of the 1990 trawl survey the best estimate of current exploitable biomass for 1992 is 25,697 t. The 1992 estimate had been adjusted upward to account for the lack of survey stations in 1990 at depths greater than 500 m. To adjust the 1990 estimate for the unsampled depths, the average proportion of the total biomass found deeper than 500 m in 1987 and 1984 (33 %) was assumed to be the same proportion of the total that would have been found in 1990.

Best estimates of current exploitable biomass derived from surveys in 1987 and 1990 indicate an apparent 74 % decline in thornyhead biomass over three years. The apparent decline has occurred despite the fact that thornyhead catches in 1989 and 1990 were 81 % and 61 % of the respective TACs. For 1991, the Team did not adopt the Fmsy estimates because assumptions needed to arrive at the estimates did not seem to be supported by the subsequent yield estimates. The 1991 ABC was determined by applying an exploitation rate of 3.8 %, the same rate used for 1990. The SSC differed with the Team's estimate of ABC and chose to apply the natural mortality rate to exploitable biomass. The recommended ABC for thornyheads for 1992 is again 980 t (0.038 X 25,697) as the Team is anticipating an updated assessment for November. This may be sufficient only for bycatch needs.

No stock recruitment relationship has been defined for thornyheads. Therefore the maximum allowable fishing mortality rate for judging whether overfishing of thornyheads may occur was calculated as the value that results in the biomass-per-recruit ratio falling to 30 % of its pristine level. That value is F = 0.07, equivalent to an exploitation rate of 6.5 %. Therefore, the recommended ABC does not exceed that allowed under the overfishing definition.

OTHER SPECIES - No recommendations were made by the Plan Team for this group. FMP procedures define the reasonable quota for this category to be set at 5 percent of the sum of the TACs yestablished for the other species category.

PART B. PROHIBITED SPECIES CATCH SUMMARY FOR HALIBUT

The GOA Plan Team recommends continued evaluation of both bycatch rates and mortality estimates for incidentally caught and released halibut from all Gulf of Alaska groundfish fisheries. The Team has reviewed bycatch rates and mortality estimates gathered from the 1991 Domestic Observer Program. Actual bycatch rates from the Domestic Observer Program should be used by the Council and NMFS to monitor cumulative halibut mortality during 1992. The Team notes further that the bycatch information in this SAFE report may be helpful to the Council in examining possible halibut mortality implications when setting final groundfish TAC's for 1992.

The team recommends that halibut bycatch in 1991 should be managed using actual observed bycatch rates. In addition, the team recommends that observers in the 1991 Domestic Observer Program collect information concurrently on the condition factors and size of halibut caught as bycatch in all fisheries. The timing of observations relative to the return of fish to the ocean should also be recorded.

In 1991, Gulf of Alaska fisheries were managed with the following discard mortality rates by gear group: Trawl - 50%; Longline - 16%; Pot - 12%. The Plan Team recommends the following discard mortality rates for the 1992 fishery: Trawl - 50%; Longline - 16%; Pot - 12%. These rates are unchanged from 1991, though information from the IPHC may be available by November to update these mortality assumptions. Last year the Team reviewed and discussed a report from the International Pacific Halibut Commission which analyzed condition data collected during 1989 and the first half of 1990. Results indicated that discard mortality in the longline fisheries is higher than previously believed. This report estimated discard mortality to be from 17-20%. Because these data represent a similar number of observations (when compared to the data which generated the previous estimate of 13%), the Team recommends adopting the midpoint of the 2 surveys which is calculated at 16%. Discard mortality rates observed in this IPHC report were similar to earlier estimates for the bottom trawl gear fisheries, so the Team recommend no change. New data were unavailable for the pot fisheries so the Team has no basis to recommend a change for 1992.

For purposes of evaluating existing PSC cap levels, estimates of the halibut mortality associated with anticipated groundfish TACs were made for longline and trawl gear (pot gear was exempted from PSC cap closures in 1991 and was not included in this analysis). Results are detailed in the halibut PSC chapter (Part B) of this SAFE document. Part B also contains additional information to assist the Council in its framework process for establishing PSC limits for the coming year. This includes bycatch rates by fishery (species), gear type, management zone, week, and processing mode. A review of the 1991 fishery is included with a description of bycatch related closures and effects on other directed groundfish fisheries. Seasonal distributions of both halibut and target groundfish species are discussed with guidelines for seasonal distribution of the halibut PSC caps.

PART C: ECONOMIC OVERVIEW

Economic developments in the Gulf of Alaska (GOA) groundfish fishery

Landings data presented in the economic section was extracted from PacFIN on August 23, 1991. This data may differ from catch data presented elsewhere in the SAFE, due to lags in processing fishtickets and the presence of discards. Caution should be used in judging reductions in harvest during 1991 because of the incomplete data. No joint-venture or foreign harvest has occurred in the GOA since 1988. Domestic landings of all groundfish increased from 143,800 mt in 1988 to 219,800 mt in 1990. Year-to-date GOA landings for 1991 are 180,000 mt. Longline landings have held relatively stable since 1988, at just over 30,000 mt. Longline sablefish landings fell by about 1,800 mt (7%) between 1988 and 1990, while Pacific cod rose by 2,600 mt (67%). Year-to date Pacific cod landings have increased the 1990 total by another 1,300 mt. GOA trawl landings increased from 144,000 mt in 1980 to 220,000 mt in 1990. Over this period trawl landings of Pacific cod increased from 26,000 mt to 61,000 mt (135%), and pollock landings increased from 56,000 mt to 78,000 mt (39%). Trawl landings of flatfish also rose by 8,400 mt (122%).

The ex-vessel value of domestic landings (excluding the value added by at-sea processing) fell slightly during both 1989 and 1990, primarily because of lower sablefish revenue. For all gears, sablefish revenue fell from $65.4 million in 1988 to $42 million in 1990. This drop in revenue resulted from a substantial drop in sablefish prices. Between 1988 and 1990, the round-weight equivalent, ex-vessel price of longline-caught sablefish in the GOA fell from an annual high of $0.98/lb to $0.70/lb. The drop in trawl price was somewhat less, from $0.82/lb to $0.67/lb. Because of the relatively small relative take of sablefish, the trawl fleet experienced an overall increase in earnings over this period, from $37 million to $49 million. With its heavier dependence on sablefish, longline earnings fell from $61 million to $42 million. With longline prices for sablefish back above $0.90/lb in 1991, year-to-date revenue from that species has eclipsed the 1990 total. The only other noteworthy change in earnings for the longline fleet occurred in the Pacific cod fishery, where revenue rose from $1.9 million in 1988 to $3 million in 1990, with the 1991 total currently near $5 million. Pacific cod has also figured prominently in the trawl fishery, rising from $8.3 million in 1988 to $20.2 million in 1990, and continuing to nearly $29 million thus far in 1991. Although earnings in the trawl rockfish fishery increased by roughly 50% between 1988 and 1989, 1990 saw them fall back below the 1988 level.

GOA prices for Pacific cod changed little between 1988 and 1990 for either gear, but 1991 prices are 33% higher in the longline fishery and 50% higher for trawlers. Trawl flatfish price also increased by more than 50% between 1990 and 1991, with pollock price up roughly 70%. On the other hand, trawl rockfish prices fell to $0.18/lb, a 40% drop since the annual high in 1989, and the lowest value since 1986. Rockfish prices in the longline fishery have also been on the decline since 1988.

GULF OF ALASKA GROUNDFISH

1992 Plan Team, SSC, and AP recommendations and apportionments (metric tons)

22-Sep-91

		1991			Plan Team	SSC	Advisory Panel	
Species	Area	ABC	TAC	Catch**	ABC - 1992	ABC - 1992	TAC	DAP
Pollock	W/C	100,000	100,000	69,776	93,000			
	Shelikof *	0	0	n/a	0			
	E	3,400	3,400	3,542	3,400			
	Total	103,400	103,400	73,318	96,400			
Pacific Cod	W	30,000	30,000	28,654	22,400			
	C	45,000	45,000	39,674	42,100			
	E	2,900	2,900	182	3,400			
	Total	77,900	77,900	68,510	67,900			
Flatfish, Deep	W	2,000	2,000	1,072	3,287			
	C	38,900	10,000	6,401	38,219			
	E	9,600	3,000	123	4,913			
	Total	50,500	15,000	7,596	46,419			
Flathead sole	W	12600	2000	99	12,584			
	C	32,700	5,000	400	31,988			
	E	5,000	3,000	1	3,710			
	Total	50,300	10,000	500	48,282			
Flatfish, Shallow	W	48,800	3,000	1,391	27,481			
	C	22,200	7,000	2,253	21,262			
	E	3,000	2,000	3	1,741			
	Total	74,000	12,000	3,647	50,484			
Arrowtooth	W	40,800	5,000	1,583	38,881			
	C	272,100	10,000	8,935	253,325			
	E	27,200	5,000	289	11,683			
	Total	340,100	20,000	10,807	303,889			
Sablefish	W	2,925	2,925	1,690	2,925			
	C	10,575	10,575	10,100	10,575			
	W. Yakutat	4,050	4,050	3,481	4,050			
	E. Yak./S.E. Out.	4,950	4,950	4,725	4,950			
	Total	22,500	22,500	19,996	22,500			
Pacific Ocean Perch	W	1,624	1,624	993	3,248			
	C	1,798	1,798	2,533	3,598			
	E	2,378	2,378	1,846	4,756			
	Total	5,800	5,800	5,372	11,600			
Shortraker/Rougheye	W	100	100	68	100			
	C	1,320	1,320	836	1,320			
	E	580	580	402	580			
	Total	2,000	2,000	1,306	2,000			
Other Slope	W	1,212	1,212	322	1,212			
	C	5,454	5,454	3,976	5,454			
	E	3,434	3,434	409	3,434			
	Total	10,100	10,100	4,707	10,100			
Rockfish (Pelagic Shelf)	W	800	800	26	1,500			
	C	3,100	3,100	810	5,500			
	E	900	900	214	1,600			
	Total	4,800	4,800	1,050	8,600			
Rockfish (Demersal Shelf)	S.E. Out.	0	425	330	0			
Thornyhead	G W	1,798	1,398	851	1,798			
Other Species	G W	0	15,766	1,434	0			
GULF OF ALASKA TOTAL		743,198	301,089	199,424	669,972			

* W/C Pollock includes 6,250 mt from Shelikof

** Catch through August 18, 1991

1992 Council Recommendations for ABC, TAC, and Apportionments

22-Sep-91

Species	Area	Council ABC	Council TAC	Council DAP	Council JVP
Pollock	W/C				
	Shelikof				
	E				
	Total				
Pacific Cod	W				
	C				
	E				
	Total				
Flatfish, Deep	W				
	C				
	E				
	Total				
Flathead sole	W				
	C				
	E				
	Total				
Flatfish, Shallow	W				
	C				
	E				
	Total				
Arrowtooth	W				
	C				
	E				
	Total				
Sablefish	W				
	C				
	W. Yakutat				
	E. Yak./S.E. Out.				
	Total				
Pacific Ocean Perch	W				
	C				
	E				
	Total				
Shortraker/Rougheye	W				
	C				
	E				
	Total				
Other Slope	W				
	C				
	E				
	Total				
Rockfish (Pelagic Shelf)	W				
	C				
	E				
	Total				
Rockfish (Demersal Shelf)	S.E. Out.				
Thornyhead	G W				
Other Species	G W				
GULF OF ALASKA TOTAL					