MEMORANDUM

TO: Council, SSC and AP Members

FROM: Clarence G. Pautzke
Executive Director

DATE: December 1, 1997

SUBJECT: Final BSAI Groundfish Specifications for 1998

ESTIMATED TIME
12 HOURS
(for all D-1 items)

ACTION REQUIRED

(a) Review 1998 BSAI Final Stock Assessment and Fishery Evaluation (SAFE) document.

(b) Approve final BSAI groundfish specifications for 1998:

1. Acceptable Biological Catch (ABC), and Annual Total Allowable Catch (TAC);
2. Division of the pollock TAC into the January 1-April 15 ('A' Season) and September 1-December 31 ('B' Season) allowances;
3. Allocation of the pollock TAC among pelagic and non-pelagic gear;
4. Seasonal apportionment of the fixed gear Pacific cod TAC; and
5. Bycatch allowances, and seasonal apportionments of Pacific halibut, red king crab, Tanner crab, and herring to target fishery (PSC) categories.

BACKGROUND

At this meeting, the Council makes final recommendations on groundfish and bycatch specifications as listed above. These final specifications will be used for management of the 1998 groundfish fisheries.

(a) BSAI SAFE Document

The groundfish Plan Teams met in Seattle during the week of November 17-21, to prepare the final SAFE documents provided at this meeting. This SAFE forms the basis for groundfish specifications for the 1998 fishing year. Note that there are three sections to the SAFE report: a stock assessment section, a fishery evaluation section ("economic SAFE"), and an ecosystems considerations section.

(b) ABCs, TACs, and Apportionments

During the week of this Council meeting the SSC and AP recommendations will be provided to the Council. Attached as Item D-1(b)(1) are Tables 6 - 8 from the SAFE summary chapter indicating ABCs and biomass levels. The Plan Team's sum of recommended ABCs for 1998 is 2.45 million mt. Overall, the status of the stocks continues to appear relatively favorable, although in some cases biomass is expected to decline because recruitment is below average.

Adopt Seasonal Allowances for the Pollock Seasons

The FMP requires the Council to apportion pollock in the BSAI between the roe (January 1 - April 15) and non-roe (September 1 - December 31) seasons. For the 1991 and 1992 fisheries, the Council recommended a 40/60 percent split between the roe and non-roe seasons, and a 45/55 percent split for the 1993-1997 pollock fishery. Factors to be considered in recommending seasonal allowances of the pollock TAC are listed in the adjacent box; supporting information can be found in the SAFE documents.

In recommending seasonal allowances of the BSAI pollock TAC, the following factors need to be considered:

1. Estimated monthly catch and effort.
2. Expected changes in harvesting and processing capacity.
3. Current estimates of and expected changes in pollock biomass, and conditions of other fish and marine mammal stocks.
4. Potential impacts of seasonal fishing on pollock stocks, marine mammals, and other fish stocks.
5. The need to obtain fishery related data throughout the year.
6. Effects on operating costs and gross revenue.
7. The need to spread fishing effort over the year.
8. Potential allocative effects among users and indirect effects on coastal communities.
9. Other biological and socioeconomic information.

Allocate Pollock TAC among bottom and pelagic gear

The Council can set a limit on the amount of pollock that can be taken in the bottom trawl pollock fishery to control the bycatch of crab and halibut (Amendment 16a). However, for the past 7 years, the Council did not recommend a specific apportionment between pelagic and bottom gears, noting that additional pollock harvests with non-pelagic trawl gear likely would be constrained by halibut bycatch. In recommending apportionment of pollock between gears, the Council would need to consider PSC limits, projected bycatch, costs, and other factors consistent with goals of the FMP (675.24). An analysis of pollock apportionment among gear types is provided as Appendix D of the BSAI SAFE.

Adopt Seasonal Apportionments of the Pacific Cod TAC Allocated to Fixed Gear

Amendment 24 regulations allow seasonal apportionment of the Pacific cod TAC allocated to vessels using hook-and-line or pot gear. Seasonal apportionments will be divided among trimesters and established through the annual specifications process. In recommending seasonal apportionments, regulations require the Council to base its decision on factors listed in the adjacent box.

Seasonal apportionments can be based on the following information:

1. Seasonal distribution of Pacific cod relative to PSC distribution;
2. Expected variations in PSC bycatch rates in the Pacific cod fishery throughout the fishing year; and
3. Economic effects of any seasonal apportionment of Pacific cod on the hook-and-line and pot gear fisheries.

Under Amendment 46, two percent of the TAC is reserved for jig gear, 51 percent for fixed gear, and 47 percent for trawl gear. The trawl apportionment will be split between catcher vessels and catcher processors 50/50. Any unused TAC from the jig gear quota will become available to fixed gear on September 15.

For the 1997 fisheries, the Council recommended that 85,000 mt of the fixed gear's allocation be released during the first trimester (January 1 - April 30), 26,500 mt be released for the second trimester (May 1 - August 31), and 5,545 mt for the third trimester.

Adopt bycatch allowances of Pacific halibut, crab, and herring

Halibut PSCs

For the Trawl Fisheries: Amendment 21 established a 3,775 mt limit on halibut mortality for trawl gear. This limit can be apportioned to the trawl fishery categories as shown in the adjacent box. Note that under Amendment 46, the trawl halibut PSC mortality cap for Pacific cod will be no greater than 1,600 mt.

Categories used for PSC apportionment in trawl fisheries.

1. Greenland turbot, arrowtooth flounder and sablefish;
2. rock sole and "other flatfish;"
3. yellowfin sole;
4. rockfish;
5. Pacific cod; and,
6. pollock, Atka mackerel and "other species."

For Fixed Gear Fisheries: A 900 mt non-trawl gear halibut mortality can be apportioned to the fishery categories listed in the adjacent box. Note that under Amendment 46, the hook-and-line halibut PSC mortality cap for Pacific cod will be no greater than 900 mt. Item D-1(b)(2) is a table indicating this past year's PSC allocations and seasonal apportionments for the trawl and non-trawl fisheries. Item D-1(b)(3) is a current summary of PSC bycatch accounting for BSAI fisheries.

Categories used for PSC apportionment in non-trawl fisheries.

1. Pacific cod;
2. Other non-trawl (longline sablefish and rockfish, and jig gear)
3. Groundfish pot (exempt in recent years)

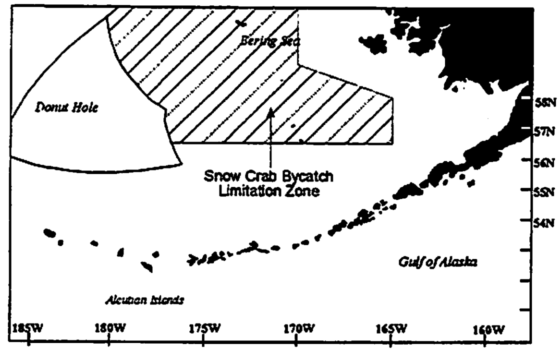
Crab PSCs

Prescribed bottom trawl fisheries in specific areas are closed when prohibited species catch (PSC) limits of C. bairdi Tanner crab, C. opilio crab, and red king crab are taken. Amendment 37 established a stairstep procedure for determining PSC limits for red king crab taken in Zone 1 trawl fisheries. PSC limits are based on abundance of Bristol Bay red king crab as shown in the adjacent table. Given NMFS and ADF&G's 1997 abundance estimate for Bristol Bay red king crab, a Zone 1 PSC limit will be established at 100,000 red king crabs for 1998. Amendment 41 established stairstep PSC limits for Tanner crab. Given current total abundance of 180 million Tanner crab, the 1998 C. bairdi PSC limits will be established at 750,000 Tanner crabs in Zone 1 and 2,100,000 Tanner crabs in Zone 2.

PSC limits for red king crab and C. bairdi Tanner crab.

Species	Zone	Crab Abundance	PSC Limit
Red King Crab	Zone 1	Below threshold or 14.5 million lbs of effective spawning biomass (ESB)	35,000
		Above threshold, but below 55 million lbs of ESB	100,000
		Above 55 million lbs of ESB	200,000
Tanner Crab	Zone 1	0-150 million crabs	0.5% of abundance
		150-270 million crabs	750,000
		270-400 million crabs	850,000
		over 400 million crabs	1,000,000
Tanner Crab	Zone 2	0-175 million crabs	1.2% of abundance
		175-290 million crabs	2,100,000
		290-400 million crabs	2,550,000
		over 400 million crabs	3,000,000

Under recently approved Amendment 40, PSC limits for snow crab (C. opilio) will be based on total abundance of opilio crab as indicated by the NMFS standard trawl survey. The snow crab PSC cap is set at 0.1133% of the Bering Sea snow crab abundance index, with a minimum PSC of 4.5 million snow crab and a maximum of 13 million snow crab. Snow crab taken within the "C. Opilio Bycatch Limitation Zone" accrue towards the PSC limits established for individual trawl fisheries. Upon attainment of a snow crab PSC limit apportioned to a particular trawl target fishery, that fishery is prohibited from fishing within the snow crab zone. The 1997 survey indicated a total population of 4.1 billion crabs. Therefore the 1998 snow crab PSC limit will be established at 4,654,000 crabs.



Location of the C. opilio bycatch limitation zone.

Bycatch data from previous fishing seasons can be useful for apportioning the snow crab PSC limit among trawl fishery targets. Bycatch of snow crab in the 1997 BSAI trawl fisheries is shown in the adjacent table. Data for other years, which were presented in the analysis for Amendment 40, show a similar distribution of snow crab bycatch among fisheries.

Bycatch of 'other' Tanner crab (primarily C. opilio) in the 1997 BSAI trawl fisheries, by category.

Fishery	1997 Bycatch	Percent
Turbot/ arrowtooth/sablefish	6,597	0.13
Rock sole/flathead/other flatfish	1,164,925	22.90
Yellowfin sole	3,190,778	62.72
Rockfish	0	0.00
Pacific cod	489,124	9.61
Pollock/mackerel/other species	147,084	2.89
Pollock (pelagic trawl)	88,860	1.75
TOTAL	5,087,368	100.0

Herring PSCs

Amendment 16a established an overall herring PSC bycatch cap of 1 percent of the EBS biomass of herring. This cap is to be apportioned to the same six PSC fishery categories listed above, plus a seventh group, mid-water pollock. The Alaska Department of Fish and Game has forecast the 1998 herring biomass at 171,450 mt. The PSC limit is set at 1 percent of the biomass in metric tons, or 1,714 mt.

Seasonal Apportionment of PSC

The Council may also seasonally apportion the bycatch allowances. Regulations require that seasonal apportionments of bycatch allowances be based on the following types of information listed in the adjacent box. Additional information on PSC limits and apportionments is presented in BSAI SAFE Appendix C.

Staff will present a worksheet with SSC and AP recommendations for ABCs, TACs, PSC and seasonal apportionments when the Council addresses this action item.

Factors to be considered for seasonal apportionment of bycatch allowances.

1. Seasonal distribution of prohibited species;
2. Seasonal distribution of target groundfish species relative to prohibited species distribution;
3. Expected prohibited species bycatch needs on a seasonal basis relevant to change in prohibited species biomass and expected catches of target groundfish species;
4. Expected variations in bycatch rates throughout the fishing year;
5. Expected changes in directed groundfish fishing seasons;
6. Expected start of fishing efforts; and
7. Economic effects of establishing seasonal prohibited species apportionments on segments of the target groundfish industry.

Table 6-- Summary of stock abundance (biomass), overfishing level (OFL), and fishing mortality rates (*F*) for the eastern Bering Sea (EBS), Aleutian Islands (AI), and Bogoslof district as projected for 1998. Biomass and OFL are in metric tons, reported to three significant digits. *F*s are reported to two significant digits.

Species	Area	Biomass[a]	OFL[b]	F_{OFL}[c]	F_{ABC}[d]
Walleye pollock	EBS	5,820,000	2,060,000	0.66	0.54[e]
	AI	106,000	31,700	0.30	0.23
	Bogoslof	280,000	8,750	0.035	0.026
Pacific cod	BSAI	1,340,000	336,000	0.42	0.25
Yellowfin sole	BSAI	3,010,000	314,000	0.16	0.11
Greenland turbot	BSAI	164,000	22,300	0.27	0.17
Arrowtooth flounder	BSAI	869,000	230,000	0.36	0.23
Rock sole	BSAI	2,360,000	449,000	0.23	0.16
Flathead sole	BSAI	824,000	190,000	0.23	0.16
Other flatfishes	BSAI	789,000	253,000	0.45[f]	0.29[f]
Sablefish	EBS	18,200	2,160	0.15	0.085
	AI	21,000	2,230	0.15	0.085
POP complex					
True POP	EBS	41,300	3,300	0.056	0.031
Other red rockfish[g]	EBS	11,600	356	0.031[h]	0.023[h]
True POP	AI	258,000	20,700	0.096	0.055
Sharp/Northern[i]	AI	94,000	5,640	0.060[h]	0.045[h]
Short/Rougheye[j]	AI	46,500	1,290	0.028[h]	0.021[h]
Other rockfish	EBS	7,030	492	0.070[k]	0.053[k]
	AI	13,000	913	0.070[k]	0.053[k]
Atka mackerel	AI	536,000	134,000	0.50	0.23
Squid	BSAI	n/a	2,620	n/a	n/a
Other species	BSAI	669,000	134,000	0.20	0.039

a/ Projected Jan. 1998 biomass for the age+ range reported in summary section.
b/ Maximum 1998 catch level allowable under overfishing definition (the "overfishing level").
c/ Maximum fishing mortality rate allowable under overfishing definition.
d/ Fishing mortality rate corresponding to acceptable biological catch.
e/ Full-selection fishing mortality rate. Expressed in terms more comparable to the "knife-edged" rates used in previous years, the value would be 0.30.
f/ Alaska plaice rate shown as an example.
g/ Sharpchin, northern, shortraker, and rougheye rockfish.
h/ Weighted average of species-specific rates.
I/ Sharpchin and northern rockfish.
j/ Shortraker and rougheye rockfish.
k/ Shortspine thornyhead rate shown as an example.

Table 7-- Total allowable catch (TAC) and acceptable biological catch (ABC) for 1997 (as established by the Council) and 1998 (as recommended by the Plan Team) for groundfish in the eastern Bering Sea (EBS), Aleutian Islands (AI), and Bogoslof district. Figures are in metric tons.

Species	Area	TAC (1997) Council	ABC(1997) Council	ABC(1998) Plan Team
Walleye pollock	EBS	1,130,000	1,130,000	1,110,000
	AI	28,000	28,000	23,800
	Bogoslof	1,000	32,100	6,410
Pacific cod		270,000	306,000	210,000
Yellowfin sole		230,000	233,000	220,000
Greenland turbot		9,000	12,350	15,000
Arrowtooth flounder		20,760	108,000	147,000
Rock sole		97,185	296,000	312,000
Flathead sole		43,500	101,000	132,000
Other flatfish		50,750	97,500	164,000
Sablefish	EBS	1,100	1,308	1,300
	AI	1,200	1,367	1,380
POP complex				
True POP	EBS	2,800	2,800	1,400
Other red rockfish	EBS	1,050	1,050	267
True POP	AI	12,800	12,800	12,100
Sharp/Northern	AI	4,360	4,360	4,230
Short/Rougheye	AI	938	938	965
Other rockfish	EBS	373	373	369
	AI	714	714	685
Atka mackerel		66,700	66,700	64,300
Squid		1,970	1,970	1,970
Other species		25,800	25,800	25,800
Groundfish complex		2,000,000	2,464,130	2,454,976

le 8-- Summary of stock biomass, harvest strategy, 1998 recommended acceptable biological catch (ABC), and stock condition for groundfish in the eastern Bering Sea (EBS), Aleutian Islands (AI), and Bogoslof district. Biomass and ABC are in metric tons, reported to three significant digits. Fishing mortality rates are reported to two significant digits.

Species	Area	Biomass[a]	Rate[b]	ABC	Relative abundance, trend[c]
Walleye pollock	EBS	5,820,000	$F_{40\%}$[d]	1,110,000	Average, declining
	AI	106,000	$F=3M/4$	23,800	Low, stable
	Bogoslof	280,000	$F_{40\%}$[d]	6,410	Low, declining
Pacific cod		1,340,000	$F_{40\%}$	210,000	Average, declining
Yellowfin sole		3,010,000	$F_{40\%}$	220,000	High, stable
Greenland turbot		164,000	$F_{40\%}$[d]	15,000	Low, declining
Arrowtooth flounder		869,000	$F_{40\%}$	147,000	High, stable
Rock sole		2,360,000	$F_{40\%}$	312,000	High, stable
Flathead sole		824,000	$F_{40\%}$	132,000	High, stable
Other flatfish		789,000	$F_{40\%}$[e]	164,000	High, stable
Sablefish	EBS	18,200	F_{sab}[f]	1,300	Low, declining
	AI	21,000	F_{sab}[f]	1,380	Low, declining
POP complex					
True POP	EBS	41,300	$F_{44\%}$[g]	1,400	Low, stable
Other red rockfish	EBS	11,600	$F=3M/4$	267	Not available
rue POP	AI	258,000	$F_{44\%}$[g]	12,100	Average, stable
harp/Northern	AI	94,000	$F=3M/4$	4,230	Not available
Short/Rougheye	AI	46,500	$F=3M/4$	965	Not available
Other rockfish	EBS	7,030	$F=3M/4$[e]	369	Not available
	AI	13,000	$F=3M/4$[e]	685	Not available
Atka mackerel	AI	536,000	F_{mac}[h]	64,300	Average, declining
Squid		n/a	$0.075F_{his}$	1,970	Not available
Other species		669,000	F_{his}[i]	25,800	Not available
Groundfish Complex Total			17,277,630		2,454,976
bove average, declining					

a/ Projected Jan. 1998 biomass for the age+ range reported in summary section.
b/ Harvest strategy used to compute ABC.
c/ Relative abundance based on long-term average, trend based on short-term projection.
d/ Adjusted on the basis of the relationship between projected biomass and $B_{40\%}$.
e/ Proxy values used for some species.
f/ Species-specific harvest strategy used only for sablefish.
g/ Adjusted on the basis of the relationship between projected biomass and $B_{44\%}$.
h/ Species-specific harvest strategy used only for Atka mackerel.
i/ Fishing mortality rate implied by setting ABC equal to historic average catch.

Recommended 1997 BSAI Trawl Fisheries PSC Apportionments and Seasonal Allowances

Fishery Group	Halibut Mortality Cap (mt)		Herring (mt)	Red King Crab (animals) Zone1	C. bairdi Zone1	C. bairdi Zone2
Yellowfin sole	930		267	10,000	276,316	1,071,000
January 20 - March 31		210				
April 1 - May 10		210				
May 11 - August 14		100				
August 15 - Dec 31		410				
Rocksole/other flatfish	795			75,000*	296,052	357,000
January 20-March 29		485				
March 30 - June 28		130				
June 29-December 31		180				
Turbot/sablefish/ Arrowtooth	0					0
Rockfish	100		7			7,000
Jan. 1 - Mar. 31		30				
May 1 - June 30		45				
July 1 - Dec. 31		25				
Pacific cod	1,600		20	7,500	133,224	195,000
Pollockmackerel/o.species	350		143	7,500	44,408	470,000
January 20-April 15		300				
April 16- December 31		50				
Pelagic Trawl Pollock			1,142			
TOTAL		3,775	1,579	100,000	750,000	2,100,000

Note: unused PSC allowances may be rolled into the following seasonal apportionment.

Red king crab PSC for the rock sole fishery is apportioned 26,250 inside the 56 - 56°10' slice, and 48,750 outside.

Recommended 1997 BSAI Non-Trawl Fisheries PSC Bycatch Allowances and fixed gear Pacific cod seasonal apportionements

Fishery Group	Halibut Mortality (mt)		Seasonal Apportion of cod ITAC (mt)
Pacific Cod	840		
Jan 1 - April 30		495	85,000
May 1 - September 15		40	26,500
Sept. 15 - Dec. 31		305	5,545
Other Non-Trawl*	60		
Groundfish Pot	Exempt		
TOTAL	900 mt		117,045

Note: unused PSC halibut from first trimester will be rolled into the third trimester.

Any unused cod TAC from first trimester will go into third trimester.

Reserves of 20,655 mt to be apportioned as above, 77% to first and third trimester, 23% to second.

* Includes hook & line fisheries for rockfish and Greenland turbot.
Sablefish hook & line fisheries will be exempted from the halibut mortality cap.
Jig gear will also be exempted from the halibut mortality cap.

NMFS/AKR
11/06/97
13:26:33

1997 BERING SEA/ALEUTIAN ISLANDS FISHERIES
PROHIBITED SPECIES BYCATCH
Week Ending: 11/01/97

TRAWL HERRING, BSAI

Fishery group	Herring (mt)	Cap (mt)	%
Midwater pollock	1,128	1,142	99%
Pacific cod	1	20	5%
Yellowfin sole	133	267	50%
Rockfish	0	7	0%
Other	51	143	36%
Total:	1,313	1,579	83%

TRAWL SALMON, BSAI

Fishery group	Chinook (#'s)	Other (#'s)	Total (#'s)
Midwater pollock	44,248	65,028	109,275
Pacific cod	5,381	283	5,665
Yellowfin sole	127	222	349
Rock sole/Other flatfish	0	146	146
Rockfish	71	0	71
Other	1,310	4,046	5,356
Seasonal Total:	51,137	69,725	120,862

TRAWL BAIRDI TANNER CRAB

	ZONE 1			ZONE 2		
Fishery group	Crabs (#'s)	Cap (#'s)	%	Crabs (#'s)	Cap (#'s)	%
Rock sole/Other flatfish	383,933	296,052	130%	131,666	357,000	37%
Pacific cod	152,104	133,224	114%	86,307	195,000	44%
Yellowfin sole	265,594	276,316	96%	705,170	1,071,000	66%
PLCK/AMCK/OTHER	10,854	44,408	24%	12,751	470,000	3%
Rockfish	0	0	0%	352	7,000	5%
GTRB/ARTH/SABL	0	0	0%	0	0	0%
Total:	812,485	750,000	108%	936,246	2,100,000	45%

TRAWL RED KING CRAB

	ZONE 1		
Fishery group	Crabs (#'s)	Cap (#'s)	%
Rock sole/Other flatfish	39,255	48,750	81%
Pacific cod	3,137	7,500	42%
Yellowfin sole	5,110	10,000	51%
PLCK/AMCK/OTHER	137	7,500	2%
Total:	47,639	73,750	65%

Draft Minutes of the Bering Sea / Aleutian Islands Groundfish Plan Team Meeting, November 17-21, 1997

The Bering Sea/Aleutian Islands (BSAI) Groundfish Plan Team met November 17-21 at the Alaska Fisheries Science Center in Seattle. The meeting was open to the public, and several industry representatives attended. Members present were Loh-lee Low (chair), Dave Ackley, Rich Ferrero, Vivian Mendenhall, Mike Sigler, Andrew Smoker, Grant Thompson, Ivan Vining, Farron Wallace, and Dave Witherell. A packet of materials was distributed prior to the meeting, and several additional documents were distributed at the meeting. The focus of the meeting was to review updated stock assessments. Research priorities, ecosystems considerations, and TAC streamlining issues were also discussed.

The plan team reviewed final assessments of groundfish for the 1998 fishery. Team recommendations are discussed in the SAFE summary chapter, and therefore not repeated here. Rather, these minutes reflect team deliberations and suggestions to assessment authors regarding future assessments.

Walleye pollock: The current assessment for Bering Sea and Aleutian Islands pollock incorporates new information from fishery age data and hydroacoustic and bottom trawl surveys. Surveys indicate that the 1996 year-class may be well above average. The bottom trawl survey found the 1996 year-class distributed throughout the shelf, which is consistent with previous observations of strong year-classes. The hydroacoustic survey also indicated that the 1995 year-class may be higher than previously observed, although these fish were distributed only in the area west of St. Matthew. However, the team noted that both of these year-classes did not appear as strong based on the statistical age-structured model. The team encouraged the hydroacoustic scientists to re-examine the 1979 survey data, which detected the strong 1978 year-class, with the expectation that it might provide insight into the 1996 year-class.

The authors used catch-age models to provide estimates of abundance and to project 1998 biomass and ABC estimates for the eastern Bering Sea and Aleutian Islands region. The results of the catch-age model employed for the Aleutian Islands pollock resulted in much ambiguity and the Team concurred with the authors's suggested use of an ABC based on the most recent survey biomass estimate adjusted for mortality. Due to insufficient data, the question of stock definition is difficult to interpret at this time. The team supports efforts to collect data to better understand pollock population dynamics in the Bering Sea, and development of a unified Bering Sea stock assessment if justified. Especially important is cooperative research and data collection from the Russian Cape Navarin fishery to improve analysis and monitor population trends in the Bering Sea.

Pacific cod: The age-structured model does a good job of representing the trawl survey biomass until about 1990, but thereafter only poorly captures trends in the survey biomass. The Team recommends that the authors explore methods to improve the trawl survey fit post-1990. The author is anticipating moving to AD model builder for the Pacific cod assessment, and the team encouraged his efforts while continuing the assessment with risk analysis for 1998 as well. The team was also interested in how selectivity estimates would change in the future when full retention is implemented in 1998. The team also discussed the possibility of splitting the ABC and TAC into Aleutian Islands and Bering Sea components.

Greenland turbot: Longline surveys provide an index of adult abundance for Greenland turbot. Only the index from the Bering Sea from 1984-93 was used in the assessment, yet an index also is available from the Aleutian Islands region and for other years. The Team recommends that the author include this information in the assessment. Killer whales often strip Greenland turbot from the longline gear during the fishery. The Team recommends the information on predation of turbot by killer whales be added to the assessment.

Shelf and slope trawl surveys and slope longline surveys provide information on the relative abundance of Greenland turbot in the Bering Sea and Aleutian Islands region. The shelf survey indexes juvenile abundance, the slope surveys adult abundance. The shelf survey indicates juvenile abundance had increased between 1986 and 1994 and remained level in recent years, though at an amount less than one-third of the levels observed in the late 1970s. The slope trawl survey shows adult abundance declining from 1978 to 1991, when the time series stops, although the 1988 and 1991 values may be underestimated. The slope longline survey indicates that adult abundance has increased since the late 1980s. The model tracks the shelf and slope trawl survey results, but is not able to track the increased longline index. The Team recommend that the authors explore model configurations with increased emphasis on the longline surveys.

Rock sole: The authors provided plots of rock sole catches from the fishery. These plots provide information on presence-absence of rock sole, but not whether catches were directed or incidental. The plots would be more informative if the data were filtered to provide only directed rock sole fishery catches or some measure of catch size. Some measures of catch size are catch per tow or catches classified by quartile. The team was also interested in the sex and length-frequencies of the catch.

Flathead sole: The authors have begun developing an age-structured model for flathead sole. The Team requests that the authors continue to develop an age or size-structured model for this species. The team requested that the author add an appendix that provides separate information for Bering Flounder and Flathead sole. Maturity information was identified as a research need for this assessment (see below).

Alaska plaice: The authors explored how the value of natural mortality affects the biomass trend estimated by the age-structured model. The Team recommends that the authors also explore how the value of survey catchability affects the biomass values estimated by the age-structured model. For example, the Team suggests that the authors fix the value of natural mortality, then estimate survey catchability. Both natural mortality and survey catchability are difficult to estimate, but maximum age provides some guidance on the value of natural mortality, whereas no direct observations are available to estimate survey catchability. The Team recommends fixing natural mortality and estimating survey catchability because information exists to fix natural mortality but not survey catchability. The two values discussed for fixing natural mortality were 0.25 as presented by the author and 0.2 as had previously been used. It was suggested that Dave Somerton's experimental work might give us a place to start in estimating survey catchability, at least for flatfish and Pacific cod.

Rex sole: Trawl survey biomass estimates were presented by region (Bering Sea, Aleutian Islands) for rex sole, but catches were aggregated. The Team requests that catches also be presented by region and that some measure of exploitation rate be computed. Aggregate catches are large enough relative to biomass that focusing more attention on assessment of this species should be considered.

Yellowfin sole: Research is currently being conducted on fecundity and maturity information for yellowfin sole, and this may be available within the next year.

Pacific Ocean Perch: The team requests that in future years, POP and other red rockfish be broken out into two separate chapters to improve clarity and understanding of these separate assessments. For POP, the team suggested that authors explore the adjustment for POP found at 800-1000 m depths. The team also discussed establishing a BSAI-wide OFL, but with ABC and TAC by area. This may alleviate some management difficulties, and the team has requested the assessment authors provide some biological analysis of this for next year's assessment. Currently, the assessment of POP in the Bering Sea consists of two elements, the EBS slope and shelf, and a portion of the western Aleutian Islands within the Bering sea statistical area 1. The remainder of the Aleutians Islands is analyzed as a sperate component. It was recommended that the areal breakdown of the assessment be investigated. The team also requested that the percent catch and biomass in the Aleutians be presented by subarea and year.

For Bering Sea other red rockfish, the team recommends the authors explore breaking out northern rockfish from this complex, like we do for the Aleutian Islands. The current assessment combines shortraker/rougheye (which are found in deeper water and command a higher ex-vessel price) together with northern rockfish, which are found in shallow water and taken as bycatch in other target fisheries (e.g., Pacific cod). Additionally, survey data suggest that northern rockfish may be much less abundant than shortraker and rougheye rockfish in the Bering Sea. The team suggested the authors explore methods to deal with the 1986 SEBS survey data, which appears to be an outlier generated by one large survey tow. As an interim measure, the team has recommended an ABC calculated by not including the value for northern rockfish from 1986 in the average.

Other rockfish: No information on species composition of the biomass or catch is provided for this group. One species, shortspine thornyhead, is an important commercial species and was the species which dominates the catch, according to the author. The Team finds it difficult to review this assessment and the reasonableness of the recommended ABC unless species-specific information is provided to evaluate the species-specific exploitation rates. Trawl biomass estimates should be provided for each species separately. Catch of each species should also be provided separately, and broken down by gear type.

Sablefish: Longline survey data from 1979-97 is the primary information used to track changes in sablefish relative abundance. Longline fishery data from the mid-1960s to early 1980s also is available and provides earlier information on sablefish relative abundance. The Team requests that the authors examine Japanese longline fishery data prior to 1979 for recruitment strength and biomass estimates.

Atka mackerel: The Team encourages development of assessments which incorporate localized depletion. The team was also interested in sex ratios from the survey catches, if possible. The team discussed the effects of changing survey tow duration this year (from 30 minute to 15 minute tows), particularly on a species with spotty distribution such as Atka mackerel. Survey scientists felt that changes in tow time would not greatly influence the trawl survey biomass estimates.

Others in attendance at the BSAI team meetings were:

Fran Bennis	*Beth Stewert*	*Lowell Fritz*
Tamra Farris	*Denise Fredette*	*Brent Paine*
Ken Stump	*Karl Haflinger*	*Dave Fraser*
John Gauvin	*Allen Kinsolving*	*John Hendershedt*
Chris Blackburn	*Mike Szymanski*	*Paul McGregor*

Research Priorities

The Bering Sea plan team concurs with the research priorities identified last year by the Scientific and Statistical Committee. However, there are several research needs that the team would like to see addressed in the short term.

1. Collect and analyze flatfish maturity data, particularly for flathead sole. The intent is to provide other information to estimate natural mortality, to calculate B40% (spawning biomass), and to improve synthesis modeling. Arrowtooth flounder and flathead sole are pointed out as species where information should be relatively easy to collect since they spawn during the winter when the fishery occurs. Alaska plaice are summer spawners and information could be collected during a summer survey.

2. Determine if there is differential growth and natural mortality for male and female Atka mackerel.

3. Otoliths of Greenland turbot have been collected but not analyzed. Aging these samples would improve the stock assessment.

4. Analyze the distribution of POP in the Bering Sea. In previous years, the fishery has occurred west of the Pribilofs, yet survey data from this area are limited. This may be a separate stock unit.

Draft

Bering Sea and Aleutian Islands
Plan Team Recommended 1998 Catch Specifications (mt)

Species	Area	1998 Biomass	1998 OFL	1998 ABC	1997 TAC	1997 Catch*
Pollock	EBS	5,820,000	2,060,000	1,110,000	1,130,000	1,033,463
	"A" season				45%	
	"B" season				55%	
	AI	106,000	31,700	23,800	28,000	24,819
	Bogoslof	280,000	8,750	6,410	1,000	162
Pacific cod	BS/AI	1,340,000	336,000	210,000	270,000	234,552
Yellowfin sole	BS/AI	3,010,000	314,000	220,000	230,000	166,684
Greenland turbot	BS/AI	164,000	22,300	15,000	9,000	7,666
	BS				67%	
	AI				33%	
Arrowtooth	BS/AI	869,000	230,000	147,000	20,760	9,651
Rock sole	BS/AI	2,360,000	449,000	312,000	97,185	67,520
Flathead sole	BS/AI	824,000	190,000	132,000	43,500	20,272
Other flatfish	BS/AI	789,000	253,000	164,000	50,750	22,131
Sablefish	EBS	18,200	2,160	1,300	1,100	547
	AI	21,000	2,230	1,380	1,200	780
POP complex						
True POP	EBS	41,300	3,300	1,400	2,800	827
Other POP	EBS	11,600	356	267	1,050	233
True POP	AI	258,000	20,700	12,100	12,800	12,648
	Eastern			3,070	3,240	2,987
	Central			3,450	3,170	2,795
	Western			5,580	6,390	6,866
Sharp/Northern	AI	94,000	5,640	4,230	4,360	1,997
Short/Rougheye	AI	46,500	1,290	965	938	1,045
Other rockfish	EBS	7,030	492	369	373	161
	AI	13,000	913	685	714	306
Atka mackerel	AI	536,000	134,000	64,300	66,700	65,840
	Eastern			14,900	15,000	16,310
	Central			22,400	19,500	19,990
	Western			27,000	32,200	29,540
Squid	BS/AI	n/a	2,620	1,970	1,970	1,769
Other species	BS/AI	669,000	134,000	25,800	25,800	22,553
BS/AI TOTAL		**17,277,630**	**4,202,451**	**2,454,976**	**2,000,000**	**1,695,626**

EBS – eastern Bering Sea
BS/AI – Bering Sea & Aleutian Islands
BS – Bering Sea
AI – Aleutian Islands

OFL – overfishing level
ABC – acceptable biological catch
TAC – total allowable catch

*catch as of 11/1/97

TONY KNO...

DEPARTMENT OF FISH AND GAME

COMMERCIAL FISHERIES MANAGEMENT AND DEVELOPMENT DIVISION

*P.O. BOX 25526
JUNEAU, ALASKA 99802-5526
PHONE: (907) 465-4210*

December 2, 1997

RECEIVED
DEC - 3 1997

Dr. Clarence Pautzke
Executive Director
North Pacific Fisheries Management Council
P.O. Box 103136
Anchorage, AK 99510

Dear Dr. Pautzke:

The Alaska Department of Fish and Game estimates that the biomass of eastern Bering Sea herring returning to spawn in the spring of 1998 between Port Moller and Norton Sound will be approximately 171,450 metric tons (Table 1). This is a modest increase from last year's estimate of 157,887 metric tons, primarily resulting from an increased biomass estimate at Norton Sound in 1997. Under Amendment 16A to the Bering Sea/Aleutian Islands groundfish fishery management plan, a herring prohibited species catch limit would be set at 1% of the estimated biomass, or 1,714 metric tons.

All major Bering Sea herring stocks are considered to be healthy and are expected to be above their thresholds for 1997. In almost all areas the age composition is dominated by the 1987 and 1988 year classes, which were aged 9 and 10 in 1997. The 1989 year class was weak everywhere. For herring spawning north of Togiak, the 1990 and 1991 year classes (aged 6 and 7) are at least moderately strong and are expected to support these populations as the 1987 and 1988 age classes approach senescence. Unless stronger than average recruitment occurs, biomass in all areas is expected to decline moderately in 1998 (Figure 1). The attached reports describe Bering Sea herring stock status in more detail.

Sincerely,

Robert C. Clasby
Director

Enclosures

cc: Dave Witherell

Table 1. Summary of preliminary 1998 forecast run biomass, and threshold levels for eastern Bering Sea herring.

Fishery	Forecast Run Biomass (metric tons)		Threshold (short tons - 2,000 lbs)
Port Moller	181 [a]	200 [a]	1,000
Bristol Bay (Togiak)	109,818	121,054	35,000
Kuskokwim Area			
Security Cove	3,644	4,017	1,200
Goodnews Bay	3,687	4,064	1,200
Cape Avinof	3,889	4,287	500
Nelson Island	6,474	7,136	3,000
Nunivak Island	3,427	3,778	1,500
Cape Romanzof	3,417	3,767	1,500
Norton Sound	36,912	40,688	7,000
Total:	**171,450**	**188,991**	
PSC Limit (at 1% of run biomass):	**1,714**		

[a] Observed biomass on limited aerial surveys. There was no fishery at Port Moller in 1997 because of poor market conditions and lack of interested processors.

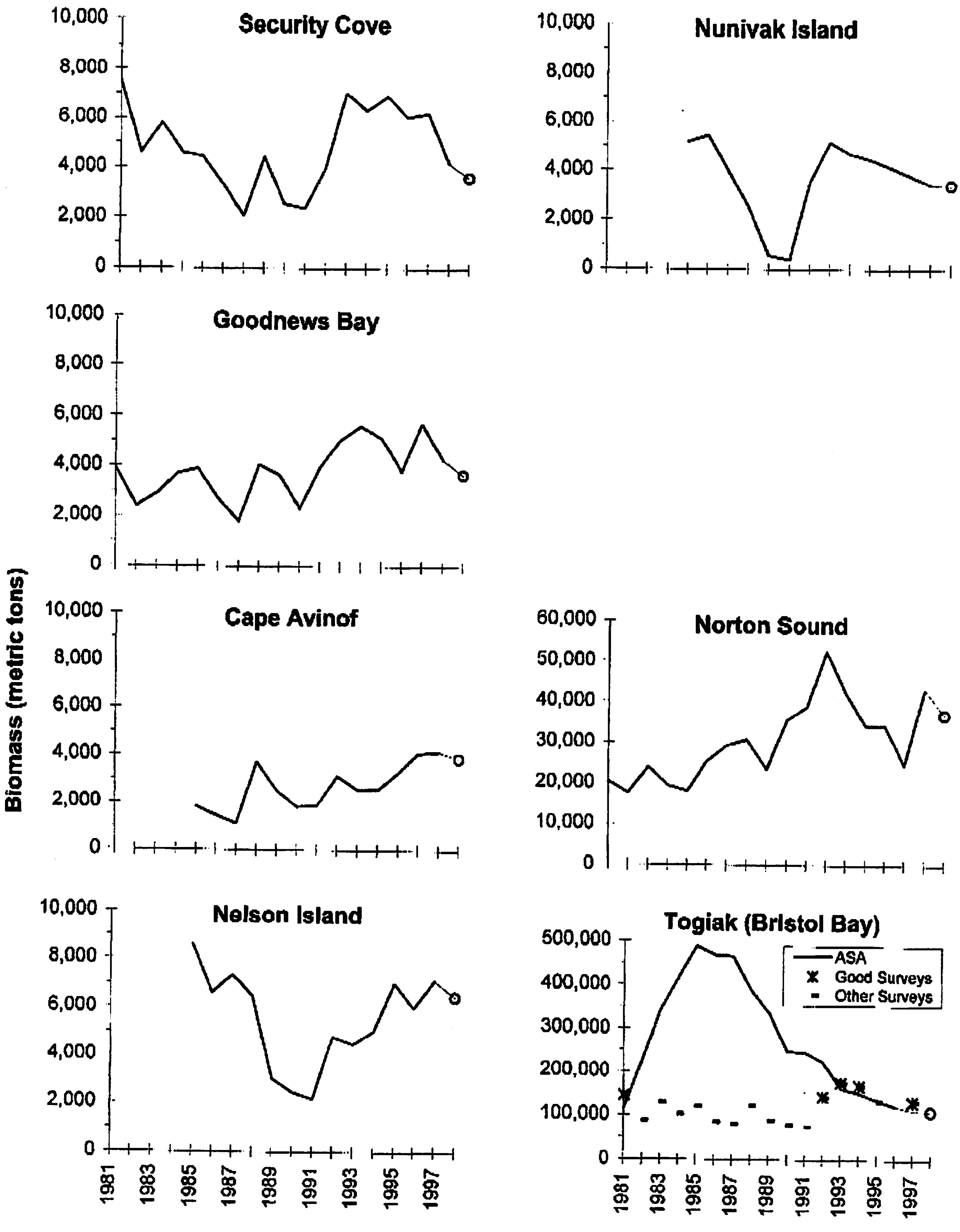


Figure 1. Estimated run biomass at major herring spawning locations in the eastern Bering Sea, 1981-97, with preliminary 1998 forecast run biomass.

Pacific Herring Stocks and Fisheries in the Arctic-Yukon-Kuskokwim Region of the Bering Sea, Alaska, 1997

A Report to the Alaska Board of Fisheries

Compiled by

Larry DuBois
and
Helen H. Hamner

Regional Information Report[1] No. 3A97-42

Alaska Department of Fish and Game
Commercial Fisheries Management and Development Division
AYK Region
333 Raspberry Road
Anchorage, Alaska 99518
November 1997

[1] The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished divisional reports. These reports frequently serve diverse and ad hoc informational purposes or archive basic uninterpreted data. To accommodate timely reporting of recently collected information, reports in this series undergo only limited internal review and may contain preliminary data; this information may be subsequently finalized and published in the formal literature. Consequently, these reports should not be cited without prior approval of the author or the Division of Commercial Fisheries Management and Development Division.

OVERVIEW OF THE TOGIAK HERRING SAC ROE AND SPAWN-ON-KELP FISHERIES BRISTOL BAY, ALASKA

REPORT TO THE ALASKA BOARD OF FISHERIES

by
Thomas E. Brookover
James B. Browning
and
Katherine A. Rowell

Regional Informational Report[1] No. 2A97-33

Alaska Department of Fish and Game
Division of Commercial Fisheries, Central Region
333 Raspberry Road
Anchorage, Alaska 99518

October, 1997

[1] The Regional Information Report Series was established in 1987 to provide an information access system for all unpublished divisional reports. These reports frequently serve diverse ad hoc informational purposes or archive basic uninterpreted data. To accommodate timely reporting of recently collected information, reports in this series undergo only limited internal review and may contain preliminary data; this information may be subsequently finalized and published in the formal literature. Consequently, these reports should not be cited without prior approval of the authors or the Division of Commercial Fisheries.

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641 West Ewing Street
Seattle, Washington 98119 USA
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RECEIVED OCT - 9 1997

October 9, 1997

Richard B. Lauber
North Pacific Fishery Management Council
Anchorage, AK 99501-2252

Fax no.: (907) 271-2817
No. of pages: 1

RE: 1998 Bering Sea Groundfish Specs

Dear Mr. Lauber:

1. Black cod: During the last few years the Bering Sea black cod that has been apportioned to trawl fisheries has largely gone unharvested.

	Year	Catch	DAP	% Taken	
Sablefish	1995	299	800	37	
Trawl	1996	141	468	30	
	1997 *	57	468	12	*through 9/27/97

Please consider this when you make the allocations for 1998. The longline fleet could put this fish to good use.

2. Greenland Turbot

The 1997 ABC for Greenland turbot was set at 12,350 metric tons, the TAC was set at 9,000 mt. I think the lower TAC was a conservative position and also the longline fleet felt that we would probably be shut down by halibut by-catch.

As you may know the longline fleet has dramatically improved the halibut by-catch mortality and could easily harvest more turbot without going over the halibut CAP.

Please consider setting the 1998 turbot TAC equal to the 1998 ABC.

Best regards,

David Little

GREENPEACE

RECEIVED DEC - 3 1997

December 3, 1997
VIA FAX

Rick Lauber, Chairman
North Pacific Fishery Management Council
605 West 4th Avenue, Suite 306
Anchorage, AK 99501-2252

Subject: 1998 BS/AI Groundfish Specifications

Dear Mr. Chairman:

Last year Greenpeace recommended a large reduction in the 1997 BS/AI pollock TAC, based on an analysis of the 1996 eastern Bering Sea (EBS) pollock survey data and model forecasts of 1998-99 yields at an F40% exploitation rate (Wespestad/Ianelli, 1996). Those data indicated that the exploitable biomass of age 3+ fish had declined by half or more since the mid-1980s, that older spawning stock from 1989 was rapidly being depleted, that projected recruitment trends continued to be weak, and that a >40% reduction in yield was anticipated in 1998 and 1999.

The 1997 triennial BS/AI pollock survey has done nothing to allay Greenpeace's concerns about the status of the stock. Despite the detection of an apparently large 1996 pollock year class throughout the EBS shelf, the stock size is expected to be in the 5.8-6.1 million t range in 1998 – comparable to last year's estimate (Wespestad et al., 1997). Meanwhile, the Bogoslof /Aleutian Basin "stock" has reached a new low according to survey results. Model projections of EBS stock abundance to the turn of the century indicate that older spawning-age groups will continue to diminish. By 1999, the largest fishery in the United States will hinge on the successful recruitment of large numbers of age 3 fish from what is believed to be a robust 1996 year class. Even if that cohort survives to age 3 in large numbers, most (70%) of those fish will be sexually immature (Wespestad et al., 1997). At current ABC/TAC levels, the risk of undermining the reproductive capability of the stock through recruitment overfishing appears increasingly high.

The decline of pollock in the central Bering Sea, Aleutian Basin and Aleutian Islands since the early 1990s, coupled with the roughly 50% estimated decline of EBS pollock, means that a larger proportion of the stock is now being taken from a smaller area concentrated in the southeastern Bering Sea. Since 1991, there has been about a 500,000 metric ton (t) increase in the catch from the southeastern Bering Sea from the Pribilofs south to Unimak Island, accounting for >90% of the total TAC. [FIGURE 1] Since the adoption of the pollock "A" and "B" seasons in 1990, the first quarter roe fishery has mushroomed to approximately 10 times its size in years prior to 1986. Furthermore, the catch is concentrated on the declining EBS spawning stock in an area which extensively overlaps the designated foraging habitat of the endangered Steller sea lion. Greenpeace believes that the intensified fishing pressure in a smaller area is likely to have negative ecosystem impacts which neither the Council nor the National Marine Fisheries Service have addressed.

The BS/AI Plan Team's recommended pollock Acceptable Biological Catch (ABC) of 1.1 million metric t for 1998, while slightly lower than the 1.13 million t quota in 1997, does not provide adequate security against the risk of overfishing in a single-species context or adverse impacts to pollock predators in an ecosystem context. Key issues which have not been adequately addressed in the Plan Team's recommended 1998 quota level include:

- **Repeated Targeting of a Few Strong Year Classes.** For much of the 1990s, the pollock fishery has been supported by one large 1989 year class, which is now rapidly dwindling. In 1998, a 1.1 million t ABC/TAC would be equal to almost 20% of the estimated exploitable (age 3+ biomass) but 50% of the estimated spawner biomass figure of 2.2 million t in the model used by Wespestad et al. (1997). Repeated targeting of a few strong year classes without subsequent strong recruitment is believed to be responsible for the demise of the Donut Hole pollock fishery (L.L. Low, 1991). Based on stock model projections at the turn of the century, the older spawning stock from the 1989, 1992 and 1995 year classes will be fished out while the bulk of the population is comprised of a single cohort of young fish from the 1996 year class. [FIGURE 2]
- **Risk of Recruitment Overfishing.** Only by assuming that the 1996 year class will recruit successfully in large numbers (as age 3 fish) can the fishery continue to sustain the 1.25 million metric ton average catch of the 1990s into 1999 and beyond. Most (70%) of those fish will not have reached sexual maturity at age 3. Based on model projections of age structure and year class strength, the risk of recruitment overfishing appears increasingly high as the Bering Sea pollock fishery becomes ever more dependent on the appearance of single large year classes of adolescent fish to sustain the current quota levels.
- **Large Uncertainties About Stock Structure and Stock Rebuilding.** For management purposes, the Bering Sea pollock stock is divided into EBS, Aleutian Basin and Aleutian Island "stocks." However, there are large questions regarding the appropriateness of defining Aleutian

Basin and Aleutian Islands pollock as separate stocks (Wespestad et al., 1997). Since strong year classes in the latter two regions have been similar to those in the EBS, it may be that a density-dependent "spillover" effect from large year-classes spawned on the EBS shelf is necessary to replenish the outlying regions. If so, the declining population on the EBS shelf and the absence of extremely large year classes in the 1990s may be the limiting factor in the recovery of pollock in the Aleutian Basin/Aleutian Islands (Wespestad et al., 1997). Based on current trends in the EBS, the likelihood of rebuilding depleted pollock populations in the Aleutian Basin and in the Aleutian Islands appears slim. Large uncertainties about stock structure and dynamics argue for a more precautionary approach to exploitation of the diminished EBS stock, in order to avoid disrupting ecosystem processes essential to the long-term health of the stock(s) as a whole.

- **Spatial Compression of the Fishery.** The Bering Sea pollock fishery of the 1990s is removing a larger proportion of the stock from a smaller area. The spatial concentration of the fishery in the southeastern Bering Sea during the 1990s has resulted in a dramatic increase in the amount of pollock removed from critical sea lion foraging habitat. Greenpeace is concerned that there is a high likelihood that pulse fishing is causing localized depletion of pollock in these designated areas. These concerns are acknowledged but not addressed anywhere in the Plan Team's recommended 1.1 million metric ton ABC.
- **Temporal Compression of the Fishery.** The division of the BS/AI pollock fishery into an "A" and "B" season in 1990 greatly increased pollock catches in the first quarter of the year compared to 1977-86. The percentage of the pollock TAC taken in the first quarter of the year has mushroomed since the mid-1980s: the 1990s roe fishery on spawning pollock removes approximately half a million metric tons of spawners that would otherwise contribute to the annual production of the age 0 fish – roughly an order of magnitude higher than first quarter removals prior to 1986. Densely schooled spawning aggregations are more susceptible to overfishing, and pollock is no exception. Episodes of intense fishing on spawning stocks in the Shelikof Strait (1981-1985) and Bogoslof/Aleutian Basin (1987-1991) have been followed by steep declines in pollock abundance in each of those areas.
- **Catches in Steller Sea Lion Critical Habitat.** Catches of pollock from areas now designated as critical foraging habitat for the endangered Steller sea lion have soared under U.S. management since 1977. [FIGURE 3] The average pollock catch in these areas has risen from 100,000-300,000 t in 1977-86 to 650,000-870,000 t by the mid-1990s, accounting for as much as 70% of the catch. The concentration of the catch in a relatively small area off the eastern Aleutian Islands between 164-170W greatly increases the risk of localized depletion of

the sea lion's prime prey in areas that have been identified as essential to the survival of the species. The Plan Team's recommended 1998 pollock ABC does not address this concern.

- **Effect(s) of Russian Fishery in the Navarin Region.** The spatial and seasonal concentration of the pollock fishery in the southeastern Bering Sea region is paralleled by a similar concentration of Russian-flagged factory trawlers in the northern (Navarin) Bering Sea region, fishing on the same stock of fish (BS/AI Plan Team, 1996). Since Russian exploitation of the stock is not factored into exploitation rates for the U.S. fishery, the actual exploitation rate on the EBS pollock stock may be significantly higher than the 18-20% estimated for the domestic fishery – perhaps as high as 30% (BS/AI Plan Team, 1996). Uncertainties about Russian fishery impacts on the subsequent recruitment of juvenile fish to the EBS shelf are acknowledged but have not been factored into the Plan Team's recommended ABC.
- **High Bycatch and Discards.** The magnitude of pollock discards in the pollock fishery are considered significant enough that they must be taken into account when estimating population size and forecasts of yield (Wespestad, 1995). Estimated discards of BS/AI pollock for 1990-96 total almost 800,000 t, an average of about 114,000 t/year. [FIGURE 4] Although the Sustainable Fisheries Act of 1996 requires the North Pacific Council to reduce the total amount of bycatch by an annual amount for four successive years, the bycatch and discards of pollock have actually increased in 1997 compared to 1996 (NMFS 1997). The factory trawl fleet's pollock discards in 1997 were 57,094 t compared to 49,894 t in 1996, accounting for the lion's share of pollock discards in the pollock fishery.
- **Violation of NEPA.** In December, 1996, Greenpeace determined that the 1997 groundfish Environmental Assessment (EA) Finding of No Significant Impact was arbitrary and capricious, based on the many years since a full-blown EIS was prepared for the GOA and the BS/AI, dramatic changes in the make-up and conduct fishery, changes in populations of key indicator species such as the Steller sea lion, and omission of other relevant information. The Fisheries Service concurred and began the process to prepare a supplemental EIS (SEIS) for both groundfish FMPs. Failure to provide that SEIS in time for the 1998 TAC-setting process deprives the Council and the broader public of needed analysis of the full range of impacts (both individual and cumulative) and management options available to address them when the BS/AI and GOA groundfish specifications are set.
- **Impact of Factory Trawlers in the Bering Sea.** Since the late 1980s, an overcapitalized, highly efficient and mobile factory trawl fleet based in Seattle has had a dramatic impact on the conduct of the fisheries, on length of fishing seasons, on the high volume of bycatch and discards, and on the shorebased catcher boat fleet. The race for

fish and waste of fish in the Bering Sea is driven by the rapid addition of so much excess factory trawler capacity in the late 1980s. In 1994, 24 of largest class of surimi factory trawlers comprised only 1.5% of the total number of groundfish vessels fishing in the BS/AI yet they accounted for 685,000 t (30%) of the entire groundfish catch (NPFMC, 1997a). The entire factory trawl fleet, comprising no more than 2-3% of the groundfish fleet every year, is also responsible for nearly three-quarters of the total reported bycatch and discards, based on 1994 data. As long as the glut of factory trawler capacity remains in the fishery, the management system appears compelled to keep quotas high in an attempt to accommodate the needs of this fleet -- at the expense of other sectors and perhaps at the expense of the sustainability of the stock itself.

SUMMARY OF GREENPEACE RECOMMENDATIONS

Given the formidable uncertainties and unresolved issues cited above, Greenpeace is once again recommending that the Council adopt a more precautionary exploitation strategy for eastern Bering Sea pollock which entails reducing the quota on the order of 35-40% from the 1996 level of 1.19 million t. While much larger than the token 20,000 t reduction (from the 1997 ABC of 1.13 million t) offered by the BS/AI Plan Team, last year's stock assessment anticipated a comparably large reduction in yield for 1998 and 1999 in the absence of any signs of strong future recruitment (Ianelli, 1996). Given the shrinking size and distribution of the pollock stock, and the concentration of the fishery in sensitive wildlife foraging habitats, there appears to be no other viable way to reduce those impacts and redistribute the catch without making a significant reduction in the EBS pollock quota.

A 35-40% reduction in the pollock TAC (from the 1996 level) would result in a catch reduction of approximately 420,000-480,000 metric tons (t), resulting in a quota ranging from 720,000-780,000 t. By targeting the reduction in sea lion foraging areas, the Council can reduce the catch in critical habitat to levels approaching those of the late 1970s and early 1980s (100,000-300,000 t). By targeting large portions of the reduction in the first quarter pollock roe fishery, the Council can reduce the risk of overfishing on the spawning stock when it is most vulnerable to overfishing, and in areas where it is deemed most critical to foraging sea lions as a rich, concentrated food source in the winter and early spring.

In targeting a 35-40% quota reduction to provide greater protection for spawning pollock and for winter foraging habitat of Steller sea lions, the Council's available options include:

- reducing the first quarter pollock roe fishery to no more than 25% of the BS/AI TAC in order to spread the fishery out seasonally and reduce the risks of pulse fishing;
- establishing the CVOA in the pollock "A" season and setting aside the offshore trawl sector portion of the CVOA catch in order to decrease first quarter catch and increase prey availability in Steller sea lion critical habitat which is extensively overlapped by the CVOA in the "B" season.

The first measure would provide a nearly 50% reduction in the first quarter catch; the second provides a means of attaining much of that first quarter reduction by establishing the CVOA in the "A" season as well as "B" season. Based on observer data, the offshore pollock fleet caught 96-100% of its first quarter pollock in the CVOA in 1991 and 1994, but only about 46% in 1996 (Fritz, 1997b). Using the 1996 offshore quota of 715,487 t as a baseline, the offshore fleet's 45% "A" season quota equals 321,969 t. Assuming the percentages of the offshore fleet's "A" season catch in the CVOA district for 1991 and 1994 (96%) and 1996 (46%), the amount of pollock removed by the offshore fleet has ranged from about 148,000-310,000 t. By removing the offshore fleet from the CVOA and setting that portion of the catch aside, much of the first quarter reduction could be achieved at the expense of a small percentage of participants in the fishery.

In addition Greenpeace is recommending the following measures:

- closing the Aleutian Island pollock fishery to directed fishing in order to allow the depleted population to rebuild as well as to safeguard available forage for endangered Steller sea lions throughout the Aleutians;
- setting the 1998 Aleutian Atka mackerel ABC at a more risk-averse level of 50,000 metric tons in order to decrease the risk of a steep decline in spawning stock and ensure the continued availability of this primary sea lion prey throughout the region;
- setting the 1998 Pacific cod ABC at the more risk-averse 210,000 t recommended by the BS/AI Plan Team in light of large uncertainties regarding to stock assessment models, low and declining spawner stock biomass, uncertain natural mortality and recruitment, and a heavy first quarter trawl fishery concentrated in or near critical sea lion foraging habitat off Unimak Island with very high discard rates of about 40%.

BS/AI POLLOCK QUOTAS IN THE 1990s: WEAKNESSES OF "MANAGEMENT BY THE NUMBERS"

Limitations of Catch Quotas As Management Tools

The Council and the Fisheries Service maintain that the EBS pollock Total Allowable Catch (TAC) is conservative and within limits of what the stock will bear. Yet total pollock catches in the BS/AI from 1990-96 were 8,786,189 metric tons, an average of 1.255 million metric tons annually not including discards (Wespestad et al., 1997). [FIGURE 4] That figure is higher than the historical average, higher than any catch total in the 1980s and higher than any recorded catch in the EBS since 1975.

Biomass estimates for eastern Bering Sea pollock have declined by more than 50% since the mid-1980s while the average 1990s TAC has remained well above the 30-year average catch of 1.1 million metric t, meaning that the pollock fishery of the 1990s is removing a larger proportion of the total pollock biomass every year. The distribution of the fishery has changed dramatically as well: pollock populations in the Bogoslof District and along the Aleutian Islands have plummeted and the fishery has shifted eastward into Districts 517 and 509. Since 1993 most of the catch has been taken from a relatively small area of the southeastern Bering Sea while the percentage of the catch taken in the first quarter of the year on roe-bearing fish has risen 10-fold over the percentage of first quarter catch prior to 1986 (NPFMC, 1990; Fritz 1993).

Although the giant pollock TAC appears "conservative" compared to computer-generated model estimates of overall stock biomass, this single-species context fails to consider the fact that fish and the fishery are not evenly distributed in space and time. In reality the BS/AI pollock fishery is a grossly overcapitalized and highly concentrated pulse fishery whose local exploitation rates may be much higher relative to the locally available fish. Evidence from survey data during 1990-1995, for instance, suggest that pollock biomass in the CVOA is already quite low in the late summer, relative to the stock as a whole, comprising as little as 10% of the total estimated stock biomass. Exploitation rates in the CVOA have reached as high as 50% of the standing biomass of pollock in the CVOA in at least one year in the time series, based on survey and fishery data (AFSC/NMFS 1995).

The use of single-species TACs is an important tool for controlling how much fish are caught, and Greenpeace supports their use; but TAC limits are based on estimates of overall stock abundance for single species: they do not take into account local and regional patterns of fish distribution and fishing effort, where the exploitation rate may be much higher relative to the exploitable biomass in local areas (P.A. Livingston, L.L. Low, R.J.

Marasco, "EBS Ecosystem Trends," unpublished manuscript). Recent work by Lowe and Fritz (1996) and Fritz (1997) on localized depletion in the Atka mackerel fishery lends legitimacy to this concern, noting that local mackerel harvest rate estimates have ranged between 55-91%, considerably large than the target harvest rates of between 10% and 15% for the managed population as a whole (Lowe and Fritz, 1996; Fritz, 1997).

In summary, catch limits by themselves tell us nothing about where, when and how fishing is conducted, merely the gross estimates of how much fish biomass is being extracted as compared to a model estimate of biomass for the managed stock as a whole. As such, TACs are crude index of fishery sustainability or ecosystem health, ignoring key factors such as time of year and spatial distribution of the fisheries.

Increasing Risk of Recruitment Overfishing

As the population of older spawning fish has been fished down throughout the 1990s, the BS/AI pollock fishery has become increasingly dependent on the appearance of single large year classes of young fish – "recruits." The Council has acknowledged the trend toward a recruitment-driven fishery: "Without consistently large year-classes, TAC specifications will become more dependent on recruitment. Available recruitment data from U.S. surveys, while uncertain, suggest that the stock may continue to decline in the foreseeable future" (NPFMC, 1997c).

Recruitment predictions for the 1990-95 year classes have proven to be overly optimistic. The 1992 and 1994 year classes were originally predicted to be the third and fourth largest since 1978 (BS/AI Plan Team, 1994), but the 1996 and 1997 Bering Sea EIT surveys indicate that the 1992 cohort is little better than average while the 1994 cohort was apparently a bust. The virtual absence of age 1-2 pollock in the 1996 survey suggest the likelihood of continued poor recruitment of three-year-olds into the fishery in 1997 and 1998.

The strong showing of age 1 pollock from the 1996 cohort in the 1997 EIT survey provides the prime justification for keeping the pollock quota above the 1 million t threshold in 1998, but it rests on the formidable assumption that they will survive in large numbers as three-year-olds to sustain the fishery in 1999 and beyond. Although the 1996 year class appears stronger than any since the 1978 cohort, similar exaggerated claims were also made for the 1992 year class. Survival to age of recruitment in the fishery is uncertain and difficult to predict. Even more disturbing, projections of pollock age class strength to the year 2000 indicate that by 1999 there will be virtually no older fish from the 1989 year class and only small numbers of 1992 and 1995-spawned fish (Wespestad et al., 1997). [FIGURE 2]

Data from the 1997 BS/AI pollock bottom trawl survey indicate that pollock abundance in the EBS is slightly lower than in 1996 and the lowest in the standard survey area since 1981 (Wespestad et al., 1997). Midwater trawl survey biomass in 1997 is slightly higher: 2.6 million metric tons compared to 2.3 million metric tons in 1996. Pollock lengths showed a major mode at 16 cm and minor modes at 27 and 40 cm, indicating a strong 1996 year class and lesser abundance of 1995 and 1992 year classes (NMFS, 1997). Total estimated biomass is expected to be in the 5.8-6.1 million t range in 1998, less than half the size of the stock in the 1980s (Wespestad et al., 1997).

Meanwhile pollock abundance in the Bogoslof region has declined to a new record low of .39 million tons. Aleutian Islands pollock appears to have increased very slightly but remains far below the abundance level of the early 1980s, when it started its long decline. Uncertainties about stock differentiation and distribution have cast serious doubt on the theory that Aleutian Islands and Bogoslof spawning aggregations are separate stocks at all. It appears more likely that both populations are replenished periodically by occasional large year classes of adult-aged fish from the EBS. The "spillover" to these outlying areas may be density dependent and related to the appearance of occasional large year classes from the larger EBS stock, in which case it is possible that the fishery is intercepting the fish before they can recruit to those other regions. Given the steady decline in EBS pollock biomass over the last decade and the absence of extremely large year classes in the 1990s, there is little prospect for rebuilding the AI or Bogoslof groups in the coming years (Wespestad et al., 1997).

Recruitment overfishing occurs when too many young fish are caught before they mature and reproduce, in effect fishing off the future to sustain short-term catch levels. By relying so heavily on incoming 1996 recruits in 1999 and beyond, the Council would be making a high-risk wager and betting the future of the fishery on a single year class of fish. Even assuming a high level of recruitment of age 3 pollock in 1999, most of those fish will be sexually immature. Taking large amounts of those incoming adolescent fish during a period when there are few older spawner cohorts greatly increases the risk of recruitment overfishing. It may also cut off the "spillover" provided by superabundant year classes in the EBS which would otherwise replenish the depleted Aleutian Basin and Aleutian Islands pollock populations.

Spatial Compression of the Fishery: Impacts on Steller Sea Lion Critical Habitat

Since 1991, the pollock fishery has become increasingly concentrated in a relatively small area of the southeastern Bering Sea shelf. This concentration of catch in the SEBS region is the result of overfishing in the central Bering Sea (Donut Hole) and Bogoslof Island/Aleutian Island regions in the mid- to late-1980s. Closure of the Donut Hole and Bogoslof Island District (518) since 1992 has further shifted fishing effort eastward onto the shelf, particularly in the "A" season. [FIGURE 5]

Since 1991, pollock catches in the northwest management areas have also declined steadily from over 500,000 t (45%) to less than 100,000 t (7%) in 1995 and 1996 as the offshore pollock fleet has taken fewer fish to the north and west of the Pribilof Islands. (Larger fish (>30 cm) have generally been concentrated to the south and east in Districts 517 and 509, which extend from the CVOA to the Pribilof Islands.) Meanwhile removals from the southeastern Bering Sea have risen from 654,000 t (55%) to over 1.1 million metric tons (93%) in 1994 and 1995 and 1 million t 1996. In effect, the southeastern Bering Sea has experienced a >40% increase in pollock removals since 1991 (Wespestad et al., 1997, Table 1.10). [FIGURE 1]

The predictable result has been steadily increasing amounts of pollock removals from critical sea lion habitat [FIGURE 3], especially in the eastern Aleutians aquatic foraging area (from Unimak Island to Islands of the Four Mountains, 164W-170W):

- Between 1977-1986, it is estimated that trawl fisheries for BS/AI pollock caught between 100,000-300,000 metric tons (t) of pollock per year in what is now designated critical sea lion habitat, representing 10-30% of the total pollock catch in those years (AFSC, 1995).
- Between 1981-1986, estimated removals from what is now Steller sea lion critical habitat in the BS/AI increased to between 250,000 to 300,000 t, equal to 20-30% of the total pollock catch (AFSC, 1995).
- Between 1987-1993, BS/AI pollock catches within sea lion critical habitat rose to between 410,000 and 680,000 t, equal to 35-53% of the total BS/AI pollock landings. Much of the increase occurred in the sea lion aquatic foraging area off the eastern Aleutians (AFSC, 1995).
- Between 1991-1995, the amount of pollock removed from eastern Aleutians critical habitat increased yet again by about 45% (Fritz, 1997).
- From 1992-96, catches in critical habitat ranged from about 650,000 t to 870,000 t, accounting for as much as 70% of the catch (NMFS, 1997).

Temporal Compression of the Fishery: Need For Protection of Sea Lion Winter Foraging Habitat and the Benefits of Creating an "A" Season CVOA

Prior to 1986, first quarter removals of BS/AI pollock never exceeded 50,000 t (AFSC, 1995). From 1971-80, the Japanese fleet took an average of only 11.3% of the annual pollock catch from January through March (NPFMC, 1990, Table 2.1). [FIGURE 6] With the advent of the large first quarter Bogoslof pollock fishery in 1987, dramatic changes in the seasonal distribution of BS/AI pollock fishing ensued:

- Catches in the first quarter of the year increased to 450,000 t in 1987 and over 200,000 in 1988, 1990 and 1992 (AFSC 1995).

- Most (70-93%) of that first quarter catch was concentrated in what is now critical sea lion habitat encompassing the eastern Aleutian Islands aquatic foraging area.

- To mitigate displacement of trawl effort for roe pollock in Bogoslof District (518), in 1992 the Fisheries Service extended the trawl exclusion zones from 10 nm to 20 nm during Jan.-April around six eastern Aleutian rookeries (Sea Lion Rock, Akun, Akutan, Seguam and Agligadak Islands in 1992, and Ugamak Island in 1993) to afford those rookeries greater buffers during the pollock "A" season. The result was a drop in first quarter pollock removals from critical habitat to 250,000 t in 1992 (AFSC 1995).

- However, creation of a pollock "A" (first quarter) and "B" (summer-fall) season in 1990 has effectively institutionalized the high volume of the pollock roe fishery at roughly 500,000 t annually in the 1990s. 500,000 t first quarter pollock removals are approximately 10 times higher than the quantities before 1986, as reported by Fritz et al. (AFSC 1995).

- In 1991 and 1994, 96-100% of the observed A-season catch came from within the CVOA by inshore and offshore sectors. That figure dropped to between 46-75% in 1996 as both sectors shifted more effort to the north and west of the CVOA (Fritz, 1997). [FIGURE 7] Nevertheless, about 70% of the pollock targeted by factory trawlers in the "A" season were taken from 517 and 509 in 1996. In 1997, areas 517 and 509 accounted for 91% of the factory trawlers' "A" season total (NPFMC, 1997c).

Both the 1991 and 1996 Section 7 Biological Opinions observe that the effects of local depletion of sea lion prey would be worse in winter, when prey resources are more scarce and nursing and/or pregnant sea lions and juveniles are especially vulnerable to nutritional stress. It is thought that spawning schools of pollock provide a rich, concentrated food source in the winter/early spring months. The heavy concentration of the pollock roe fishery in and around the CVOA in critical sea lion habitat may deplete local schools of fish and cause food-stressed females (whose energy requirements are higher) to abort fetuses or wean nursing pups before they are able to feed themselves, as noted by NMML as early as 1990:

"The February to April roe fishery for pollock occurs during a time of presumed sensitivity for pregnant females and weaned pups. This is a period of heavy storms and reduced space on land...causing sea lions to expend more energy remaining at sea longer. Also, most females are pregnant and still nursing a pup from the previous breeding season, which constitutes a high energy demand on the female. Removal of large quantities of energy-rich spawning fish, which are in compact schools and easily preyed upon, may compromise the health of these females and their fetus, or force them to wean their pups before the pup is developed sufficiently to feed on its own" (Loughlin, 1990).

Prohibiting factory trawlers from fishing in the CVOA during the 1998 pollock "A" season as well as the "B" season could move a significant amount of fishing effort and catch away from critical sea lion foraging areas which overlap the CVOA, making more sea lion prey available during the crucial late-winter months when aggregations of spawning pollock begin to gather over the southeastern Bering Sea shelf in the CVOA. It may also increase pollock availability in the CVOA during the summer and fall seasons, when biomass is very low compared to the stock abundance outside the CVOA.

Today the CVOA is only operational during the "B" season, during which time offshore factory trawlers are excluded from the CVOA. Catcher vessels caught about 84% of their B-season catch in the CVOA in 1991 and 100% in 1996 (Fritz, 1997 b). Extending from 163W-168W off the eastern Aleutian Islands, the CVOA extensively overlaps the large sea lion aquatic foraging habitat area between 164W-170W. Since the closure of the Bogoslof District (518) in 1992, fishing effort and catch has become increasingly concentrated in this area. In addition to the closure of the Bogoslof District and the decline of the Aleutian Island pollock fishery, the offshore pollock fleet has taken fewer fish to the north and west of the CVOA since the early 1990s because larger and older fish (>30 cm) have been concentrated to the south and east in Districts 517 and 509, which extend from the CVOA to the Pribilof Islands. Since the CVOA is not in effect in the pollock "A" season, the area has often been heavily exploited by factory trawlers and shorebased trawlers alike in the first quarter.

Fritz et al. (AFSC 1995) observed disproportionately high exploitation rates in the CVOA during the B season from 1990-94, ranging from 22-50%, and noted that creation of the CVOA in the pollock "B" season probably reduced harvest rates significantly during the B season by excluding the offshore sector:

"Pollock are harvested disproportionately to their areal biomass distribution. Harvest rates in the CVOA during the B-season are much higher than in areas 51 and 52 [outside the CVOA]. Furthermore, A-season pollock removals are also concentrated in the CVOA. Due to the distribution of the dominant 1989 year-class and the desire of the fleet to avoid smaller members of that cohort [and the closure of the Bogoslof District], effort shifted from areas west of 170W to the southeast in 1993-94. If the CVOA had not excluded the offshore fleet during these B-seasons, it is likely that harvest rates and removals from the CVOA would have been greater than they were." (AFSC Processed Report 95-04)

Excluding the offshore fleet from the CVOA in the first quarter would affect a small percentage of the total pollock fleet but achieve a potentially large first quarter reduction in fishery removals from critical sea lion foraging areas. The factory trawler share of the CVOA catch would NOT be reallocated to the shoreside sector but would be set aside to achieve the reduction in pollock removals from critical habitat. However, if displaced factory trawlers are allowed to shift to areas of critical sea lion habitat outside of the CVOA boundary, the benefit to sea lions will be lost. Therefore the measure must stipulate that the displaced factory trawl effort will not move into Steller critical habitat outside the CVOA.

ALEUTIAN ISLANDS POLLOCK FISHERY MORATORIUM

Aleutian pollock (age 3+ biomass) has plummeted since the early 1980s and appears to be at about 20% of its earlier abundance. [FIGURE 8] Uncertainties about the discreteness of the "stock" and its relation to the EBS stock abound. For that reason, reliable estimates of Fmsy and Bmsy do not exist for the Aleutian portion of the pollock stock (NPFMC, 1996).

If the AI pollock population is indeed a separate stock, a rebuilding program seems in order. If it is reliant on density dependent spillover from large year classes of EBS-spawned adult pollock, then there is little near-term hope that the AI or the Bogoslof region will experience a resurgence in pollock abundance (Wespestad et al., 1997). That "spillover" mechanism appears to have been shut off since the mid-1980s, when the EBS pollock stock began its long, steady decline to present levels.

A minority report from members of the BS/AI Plan Team called on the Team to recommend a moratorium on AI pollock fishing as far back as 1994. That report cited concerns over the persistent decline in pollock abundance in the AI as well as its importance as a forage resource for Steller sea lions. Last November the Plan Team recommended a moratorium on directed fishing for AI pollock (November 1996):

> "... the Plan Team believes that the Aleutian pollock fishery should be managed on a bycatch-only basis for the following reasons: 1) the trawl survey time series indicates that the Aleutian pollock biomass has declined sharply and consistently since 1983, and gives no reason to expect an upturn in the foreseeable future; 2) some fish captured in the Aleutian Islands region may be part of the Aleutian Basin stock, a stock on which fishery impacts should be minimized; and 3) pollock has been shown to be an important prey item for Steller sea lions breeding on rookeries just to the east of the Aleutian Islands management area, rookeries which recently have fared better than those for which the availability of prey consists largely of Atka mackerel" (NPFMC, 1996).

Designating AI pollock a bycatch-only fishery (no directed fishing) would promote rebuilding of a depleted stock (which is consistent with the Magnuson-Stevens Act requirement to develop a rebuilding plan for overfished stocks) and minimize the risk of depleting an important sea lion prey resource in the area. The AI pollock fishery is relatively small (28,000 t) and its closure to directed fishing will have relatively minor impact on the pollock industry. Some displacement of trawler effort can be expected and should be mitigated.

RECOMMENDATIONS FOR THE ALEUTIAN ISLANDS ATKA MACKEREL FISHERY

Until the 1990s, the Aleutian Atka mackerel catch never exceeded 38,000 t. Beginning in 1992, the Council raised the TAC to 43,000 t, increasing to 80,000 t by 1995 and 106,157 t in 1996. Since then, the estimated stock size has dropped sharply, suggesting that the record-high levels of catch in the 1990s are not sustainable within a single-species context.

In addition, there has been a dramatic shift in fishing effort by an overcapitalized factory trawler fleet to the first quarter of the year as vessels race for shares of the quota. Although the TAC has been divided into 3 subareas along the Aleutians, the increasing compression of the fishery in the first quarter of the year raises serious concerns about the impacts on Steller sea lions which rely heavily on mackerel during the breeding season on nearby rookeries. The large percentage of catch within critical sea lion foraging habitat increases the likelihood of localized depletions of unknown duration and adverse effects on abundance and/or quality of prey at a critical juncture of the year.

Below is a summary of major reasons for assuming a highly precautionary exploitation strategy for Atka mackerel:

- **Atka Mackerel Are Difficult to Assess.** Actual biomass estimates of Atka mackerel may have been overestimated in the early 1990s. The difficulty of determining stock size of Atka mackerel is compounded by the inaccessibility of trawl survey gear to rocky seabed terrain which is its prime habitat, and by the fact that this species does not possess a swim bladder and therefore cannot be located by hydroacoustic instruments. Given the difficulty of assessing Atka mackerel population size and dynamics, the record-high TACs of the 1990s represent a very high-risk strategy which attracts more vessels into the fishery at a level of exploitation which appears increasingly unsustainable.

- **Atka Mackerel Are Vulnerable to Localized Depletion.** The historical locations of the fishery and the patchy, localized distribution of schools of mackerel in the same locations every year suggest that a relative handful of areas in the western Aleutians near Buldir Island, on Petrel Bank, east and west of Kiska Island, south of Amchitka Island, in the Seguam Pass area, and near Umnak Island represent the bulk of the population. [FIGURE 9] The predictable schooling behavior of Atka mackerel in shallow waters each summer and in these same locations make them particularly susceptible to bottom trawl gear and to overfishing (Lowe and Fritz, 1997).

- **Localized Depletion Has Been Documented.** Analysis of CPUE data suggests that locally high local exploitation rates are occurring in the fishery, ranging between 55-91% -- 3-5 times higher than the target exploitation rates of between 10% and 15% estimated by the model for the managed population as a whole (Lowe and Fritz, 1996; Fritz, 1997). Recent work by Lowe and Fritz (1996) and Fritz (1997) indicate that localized depletions in the Atka mackerel fishery do indeed occur and persist for an unknown duration after the fishery has departed.

- **Impact On Steller Sea Lion Foraging and Critical Habitat.** High percentages of the fishery (between 77-99%) in most years have occurred within sea lion critical habitat along the Aleutian archipelago. [FIGURE 10] Given that Atka mackerel is the most common summer prey resource of sea lions in the region, the record-high TACs and catches of the 1990s pose a serious risk of depleting the prey availability of sea lions in and around rookeries and haulouts during the breeding season. Temporary reductions in the size and density of local Atka mackerel populations could affect Steller sea lion foraging success "during the time the fishery is operating and for a period of unknown duration after the fishery is closed" (Lowe and Fritz, 1997).

- **Uncertainties About the Life History Parameters of the Species.** Other characteristics of Atka mackerel (e.g., nest-guarding by males, low female fecundity) suggest that the population is not as resilient as gadids to high levels of exploitation. MSY is unknown and the authors of the stock assessment chapter express uncertainty about the long-term effects on the spawning stock from an F40% fishing strategy as applied to species such as pollock.

Under an F40% fishing strategy, the yield would be 97,000 t -- a 46% increase over the 1997 level (Lowe and Fritz, 1997). The authors of the stock assessment did not deem this a prudent exploitation strategy, since the female spawning biomass is projected to decline to almost 30% below B40% within 5 years if that strategy is adopted. Instead, the Plan Team accepted their recommendation for a more conservative exploitation rate approximately equivalent to F52%, yielding a 1998 ABC of 64,300 t. which the model indicates will maintain the spawning biomass within 10% of the estimated B40% threshold (Lowe and Fritz, 1997).

Under the overfishing definition, F40% is the highest exploitation rate that can be set, but there is nothing to prevent the Council from setting a lower rate. In light of the uncertainties and trends outlined above, Greenpeace recommends a still more conservative exploitation strategy identified by the authors of the stock assessment, which is approximately equivalent to an F60% strategy, yielding a 1998 ABC of 50,000 t (Lowe and Fritz, 1997). Although there is no guarantee that this exploitation level is sustainable in an ecosystem context (particularly given the high percentage of catch in critical sea lion habitat), the model indicates that this level of fishing WOULD be more prudent in a single-species context by maintaining the spawning biomass slightly above the B40% threshold within 5 years (Lowe and Fritz, 1997). Given its importance as a primary prey for sea lions and other wildlife in the Aleutians, it is critical to maintain the stock at a high level of abundance by means of such extra-precautionary exploitation strategies.

BS/AI PACIFIC COD FISHERY

1997 EBS bottom trawl survey results indicated that Pacific cod biomass is down from 890,793 t in 1996 to 604,881 t in 1997, although a size mode at 17-18 cm shows a relatively strong year class (average to above average). The spawner biomass is estimated to be the lowest since the early 1980s, and projections of spawner biomass show a continued decline to the turn of the century.

The record-high ABCs and catches of the mid-1990s appear unsustainable in the current stock assessment, with a high risk of driving the spawner stock to dangerously low levels. The risk is compounded by the multiple uncertainties in the stock model itself. The BS/AI Plan Team discussion revealed that the model only fits the available data if key parameters of natural mortality (M) and catchability (Q) are skewed so greatly as to be unbelievable to the Plan Team.

The increase in Pcod ABC/TAC to record-high levels in the mid-1990s has been accompanied by a large increase in the volume of the catch removed from sea lion critical habitat off the eastern Aleutians in the first quarter of the year. In the most recent years for which figures are available (1994-95), the catch in critical habitat has exceeded 100,000 t -- a greater than five-fold increase over the level of the late 1970s and early 1980s. [FIGURE 11]

Given the declining status of the spawning stock, the large uncertainties in basic stock parameters, the inconsistency of model results with the data, and the rising volume of the catch in critical sea lion foraging habitat, Greenpeace supports the Plan Team's recommendation to adopt a more "risk-averse" 1998 ABC of 210,000 t. This is lower than the 255,000 t ABC under an F40% fishing strategy, a procedure which is expressly allowed under the overfishing definitions adopted in Amendment 44.

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FIGURE 1

1.10. Tables

Table 1.1 Catch from the eastern Bering Sea by area, the Aleutian Islands and the Bogoslof Island area, 1979-95.

	Eastern Bering Sea			Aleutians	Donut Hole	Bogoslof I.
Year	Southeast	Northwest	Total			
1979	368,848	566,866	935,714	9,504		
1980	437,253	521,027	958,280	58,156		
1981	714,584	258,918	973,502	55,516		
1982	713,912	242,052	955,964	57,978		
1983	687,504	293,946	981,450	59,026		
1984	442,733	649,322	1,092,055	81,834	181,200	
1985	604,465	535,211	1,139,676	58,730	363,400	
1986	594,997	546,996	1,141,993	46,641	1,039,800	
1987	529,461	329,955	859,416	28,720	1,326,300	377,436
1988	931,812	296,909	1,228,721	30,000	1,395,900	87,813
1989	904,201	325,399	1,229,600	15,531	1,447,600	36,073
1990	640,511	814,682	1,455,193	79,025	917,400	151,672
1991	712,206	505,095	1,217,301	78,649	293,400	264,760
1992	663,457	500,983	1,164,440	48,745	10,000	160
1993	1,095,314	231,287	1,326,601	57,132	1,957	886
1994	1,183,360	180,098	1,363,458	58,637	NA	566
1995	1,170,828	91,939	1,262,766	64,429	trace	264
1996	1,086,840	105,938	1,192,778	29,062	trace	387
1997			1,112,810	25,478	trace	168

1979-1989 data are from Pacfin.
1990-1995 data are from NMFS Alaska Regional Office, includes discards.

FIGURE 2
11/26/97

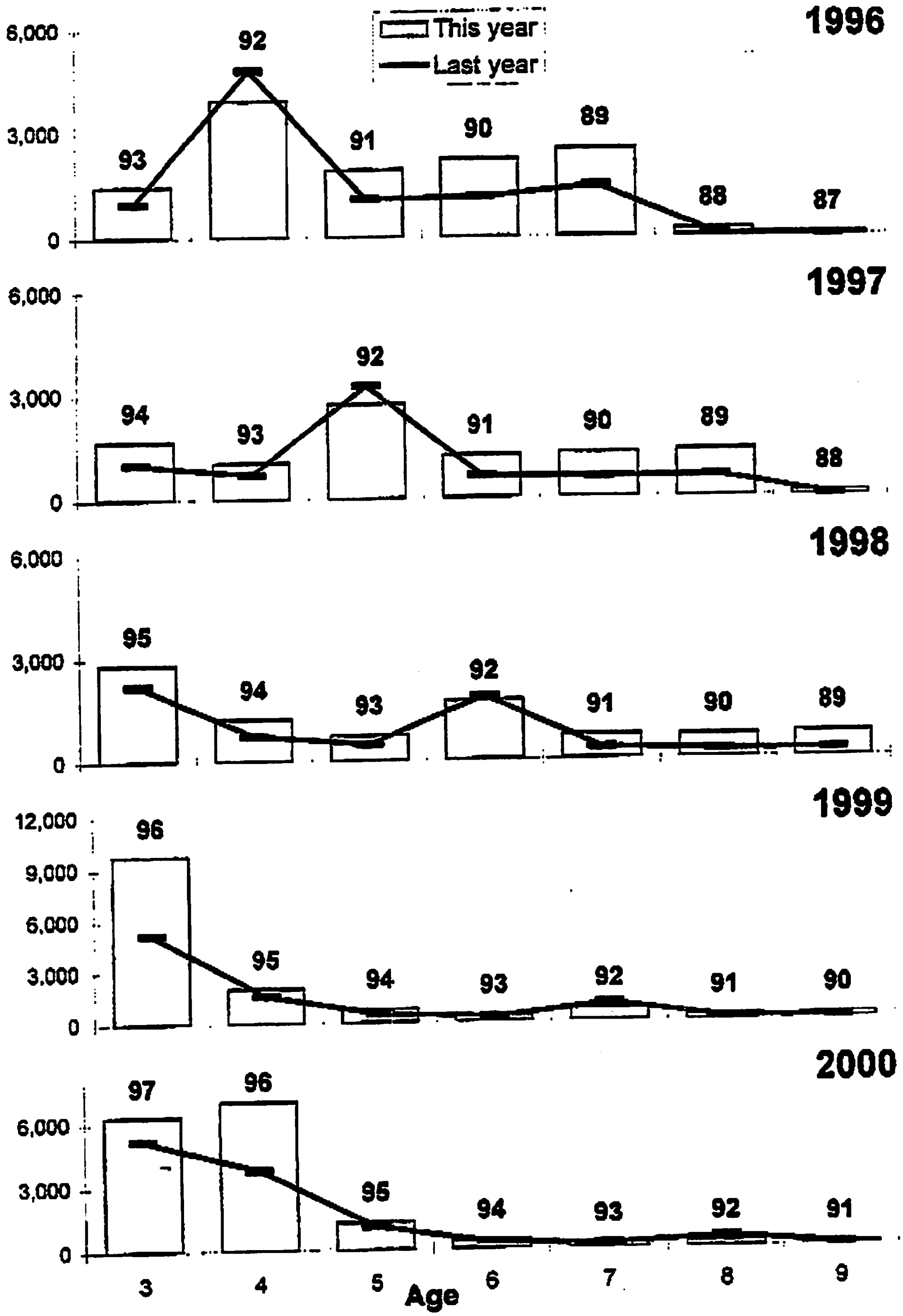


Figure 1.21. Model 4 projected population numbers at age compared with those presented in last year's appendix document (Wespestad et al. 1996).

FIGURE 3

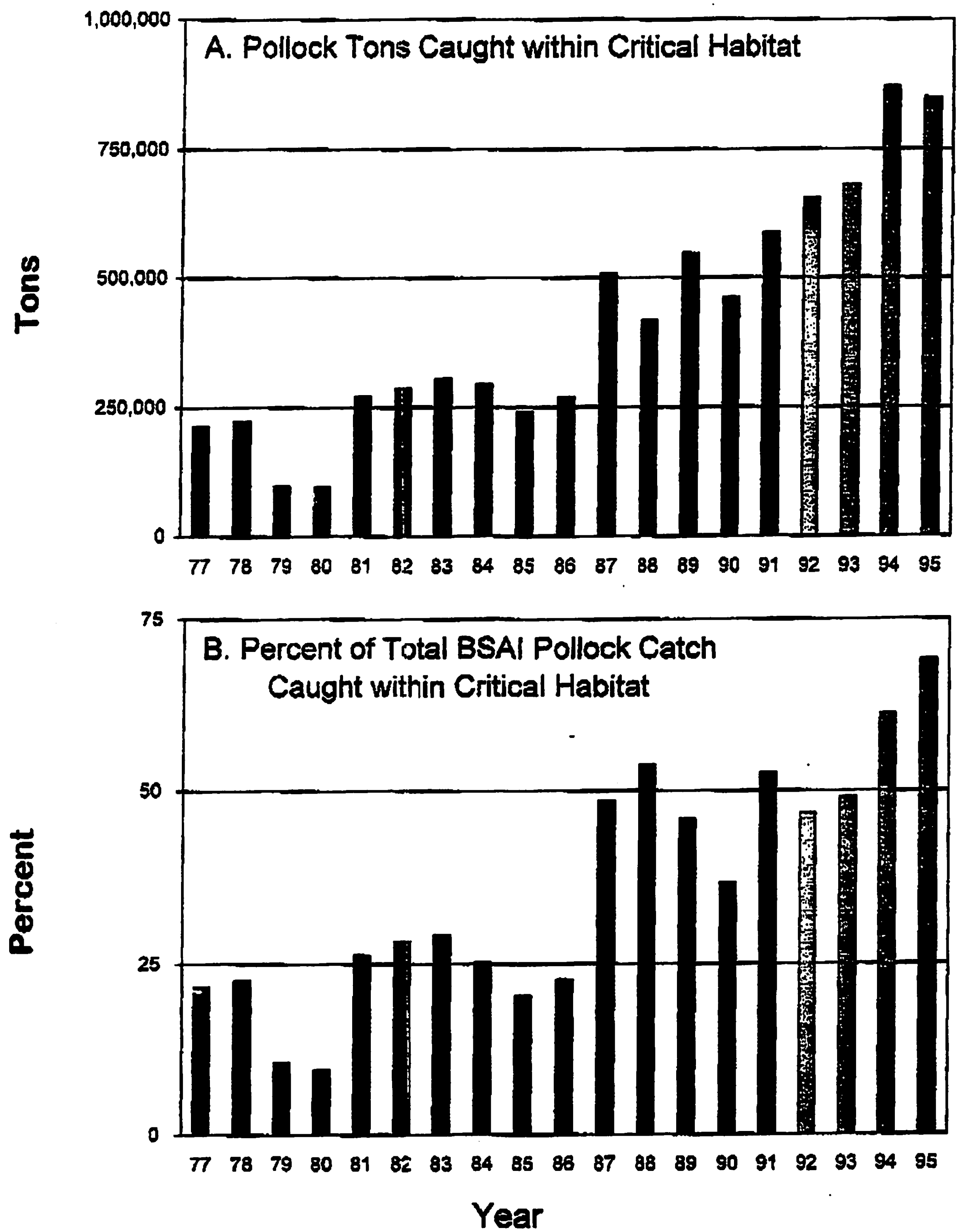
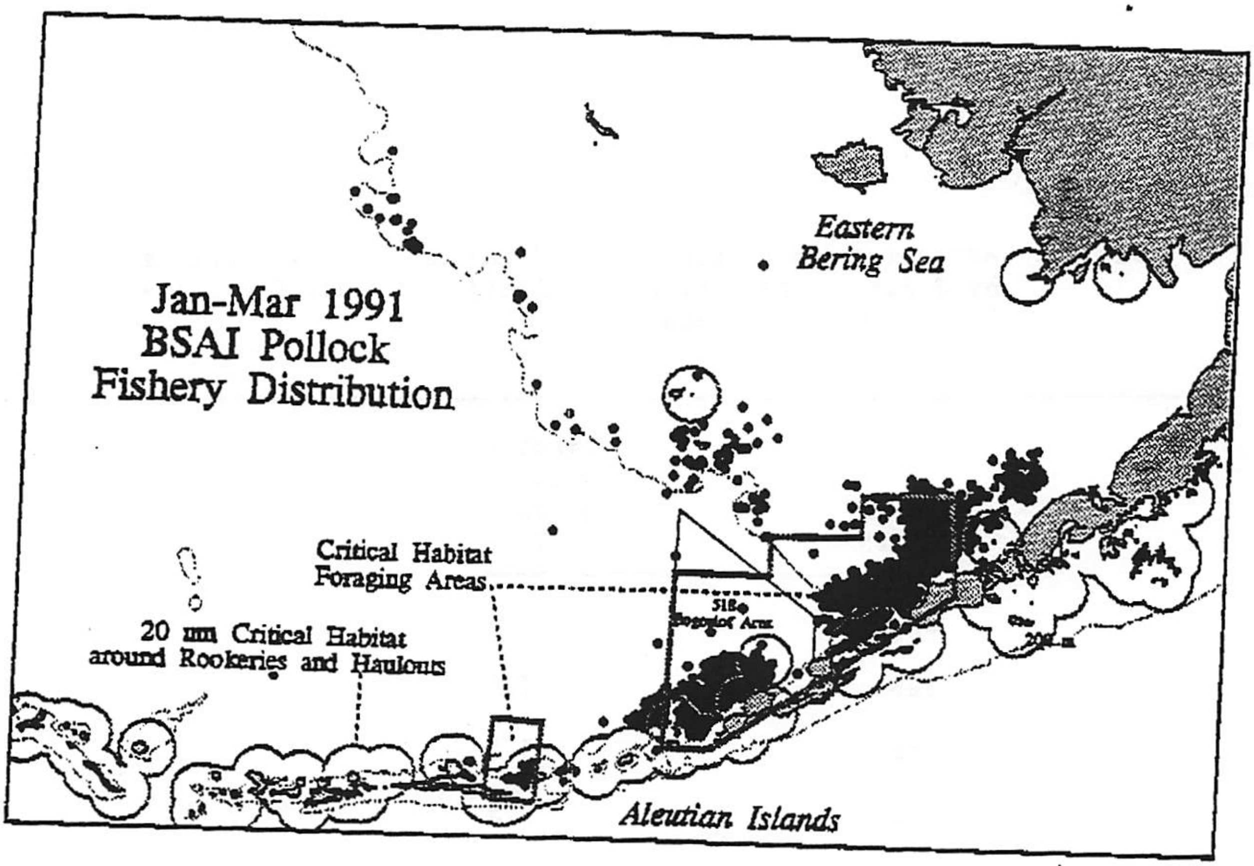

1,000,000
750,000
500,000
250,000
0
Tons
A. Pollock Tons Caught within Critical Habitat
77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95
75
50
25
0
Percent
B. Percent of Total BSAI Pollock Catch Caught within Critical Habitat
77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95
Year

FIGURE 4

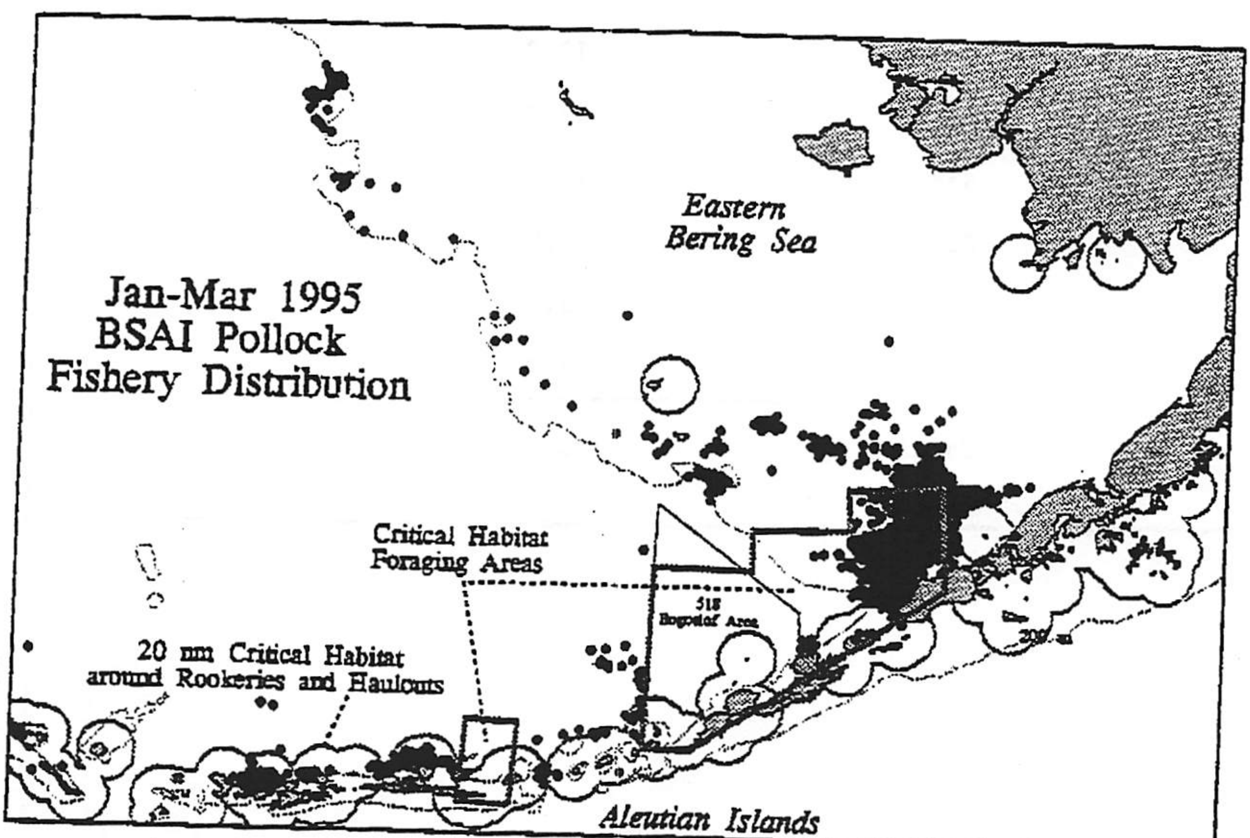
Table 1.2. Estimated retained, discarded, and percent discarded of total catch in the Aleutians, Northwest and Southeastern Bering Sea, 1990-1996.

Area / Year	Catch Retained	Discard	Total	Discard Percentage
1990				
Southeast (51)	582,660	57,851	640,511	
Northwest (52)	764,369	50,313	814,682	
Aleutians	69,682	9,343	79,025	
Total	1,416,711	117,507	1,534,218	7.7%
1991				
Southeast (51)	614,889	97,317	712,206	
Northwest (52)	458,610	46,485	505,095	
Aleutians	73,608	5,041	78,649	
Bogoslof	245,467	19,293	264,760	
Total	1,318,966	163,095	1,482,061	11.0%
1992				
Southeast (51)	600.861	62,596	663,457	
Northwest (52)	445,811	55,172	500,983	
Aleutians	45,246	3,498	48,745	
Total	1,091.919	121,266	1,213,185	10.0%
1993				
Southeast (51)	1,011,020	84,294	1,095,314	
Northwest (52)	205,495	25,792	231,287	
Aleutians	55,399	1,733	57,132	
Total	1.271.914	111819	1,383,732	8.1%
1994				
Southeast (51)	1,091,547	91,813	1,183,360	
Northwest (52)	164.020	16,078	180,098	
Aleutians	57,325	1,311	58,637	
Total	1.312.892	109,202	1,422,094	7.7%
1995				
Southeast (51)	1,083,381	87,447	1,183,360	
Northwest (52)	82,226	9,713	91,939	
Aleutians	63,047	1,382	64,429	
Total	1.228,654	98,542	1,339,728	7.4%
1996				
Southeast (51)	1,015,473	71,367	1,086,840	
Northwest (52)	101.100	4.838	105,938	
Aleutians	28,067	994	29,062	
Total	1,145,133	77,206.23	1,222,339	6.3%

FIGURE 5



Eastern Bering Sea
Jan-Mar 1991
BSAI Pollock
Fishery Distribution
Critical Habitat
Foraging Areas
518
Bogoslof Area
20 nm Critical Habitat
around Rookeries and Haulouts
200 m
Aleutian Islands



Eastern Bering Sea
Jan-Mar 1995
BSAI Pollock
Fishery Distribution
Critical Habitat
Foraging Areas
518
Bogoslof Area
20 nm Critical Habitat
around Rookeries and Haulouts
200 m
Aleutian Islands

FIGURE 6

Table 2.1 Average monthly proportion of annual pollock harvests by Japan in the Bering Sea/Aleutian Islands for 1971-1980. (Low, L., pers. comm.)

Month	Percent annual harvest (%)
Jan	2.4
Feb	3.1
Mar	5.8
Apr	7.5
May	7.8
Jun	10.7
Jul	17.2
Aug	17.7
Sep	14.9
Oct	7.0
Nov	3.8
Dec	2.2
Total	100

FIGURE 7

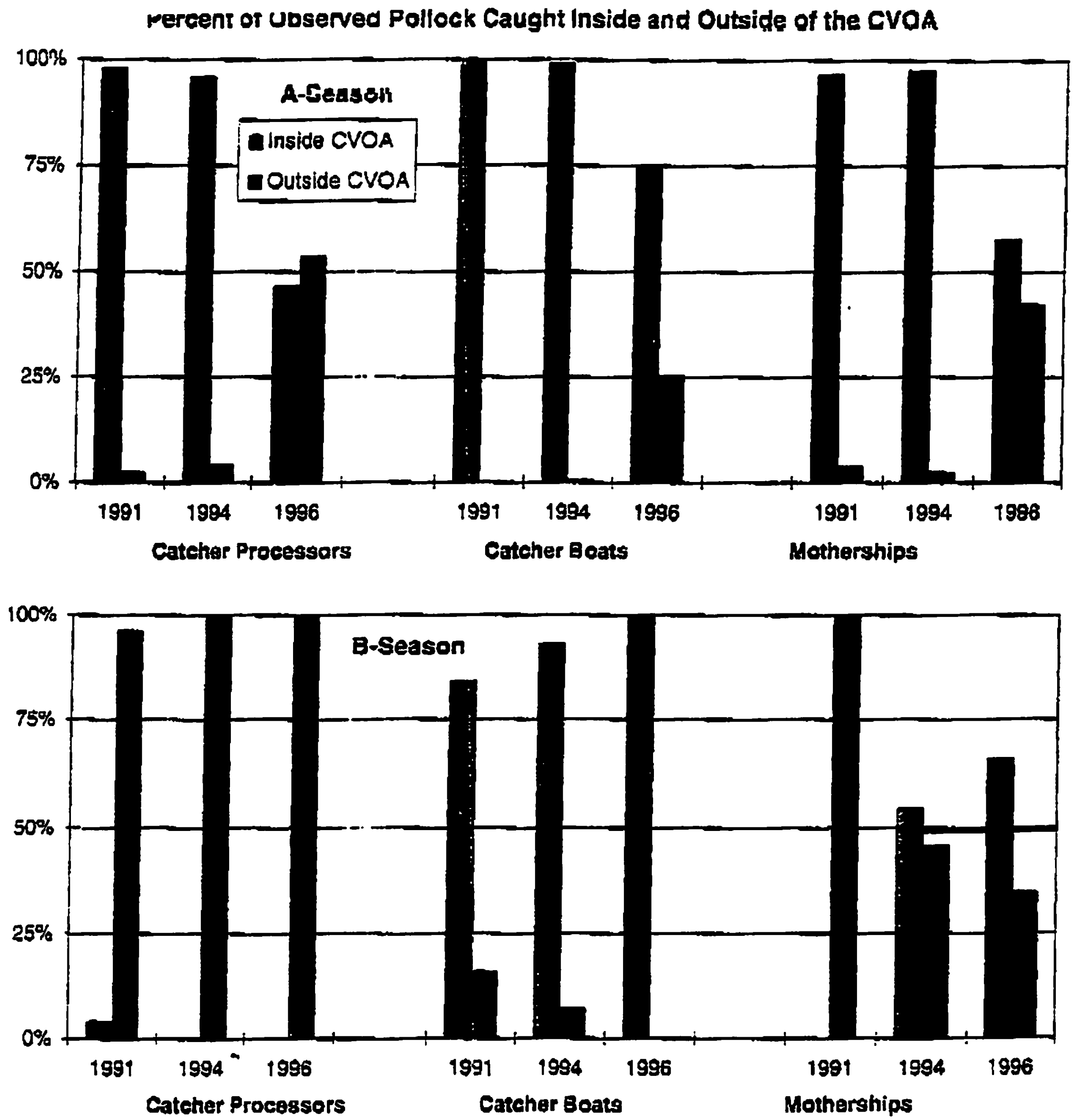


Figure 1. Observed pollock catch distribution by season, sector and area by pollock fisheries on the eastern Bering Sea shelf in 1991, 1994, and 1996. Aleutian Islands and Bogoslof data were excluded.

FIGURE 9

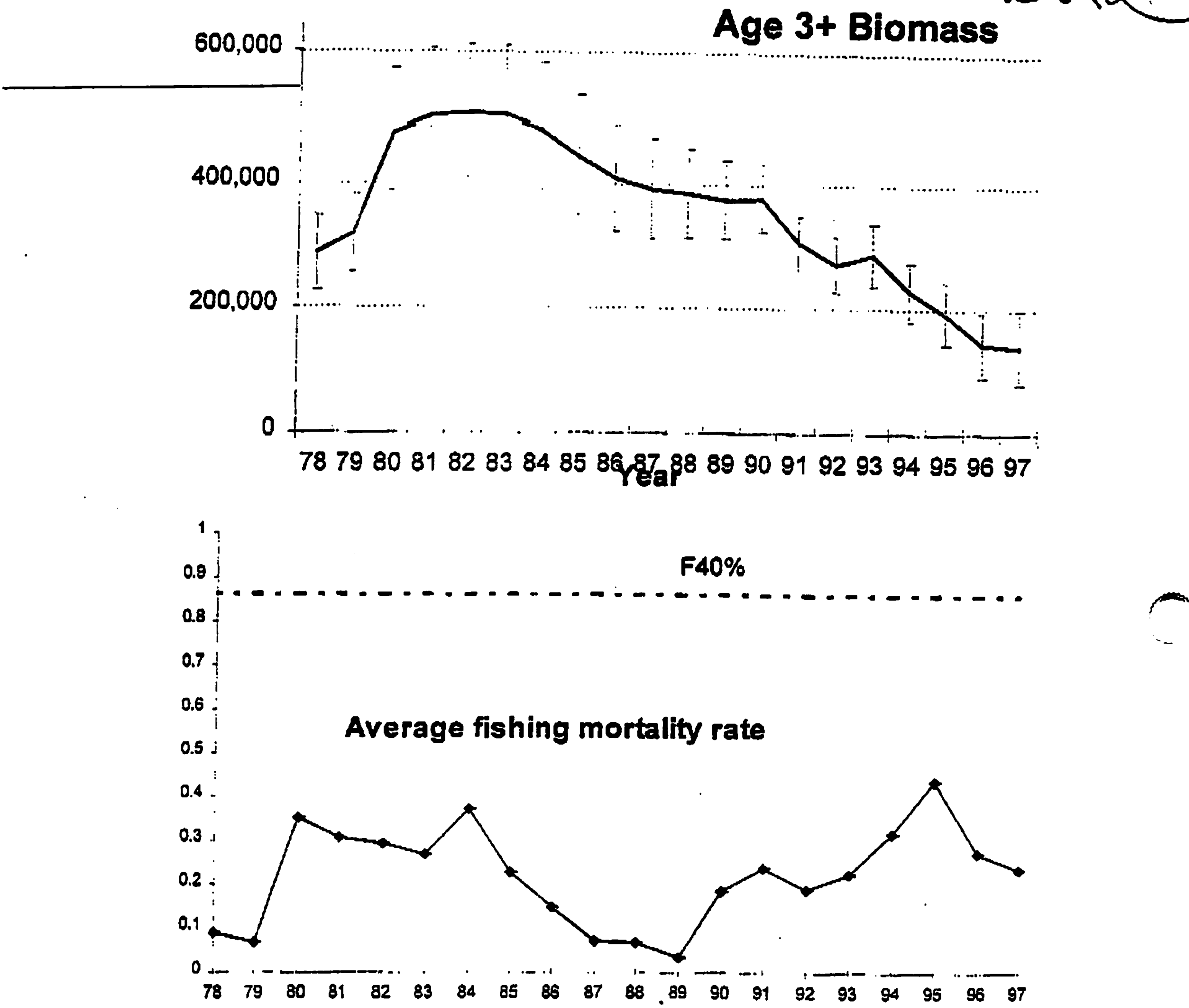
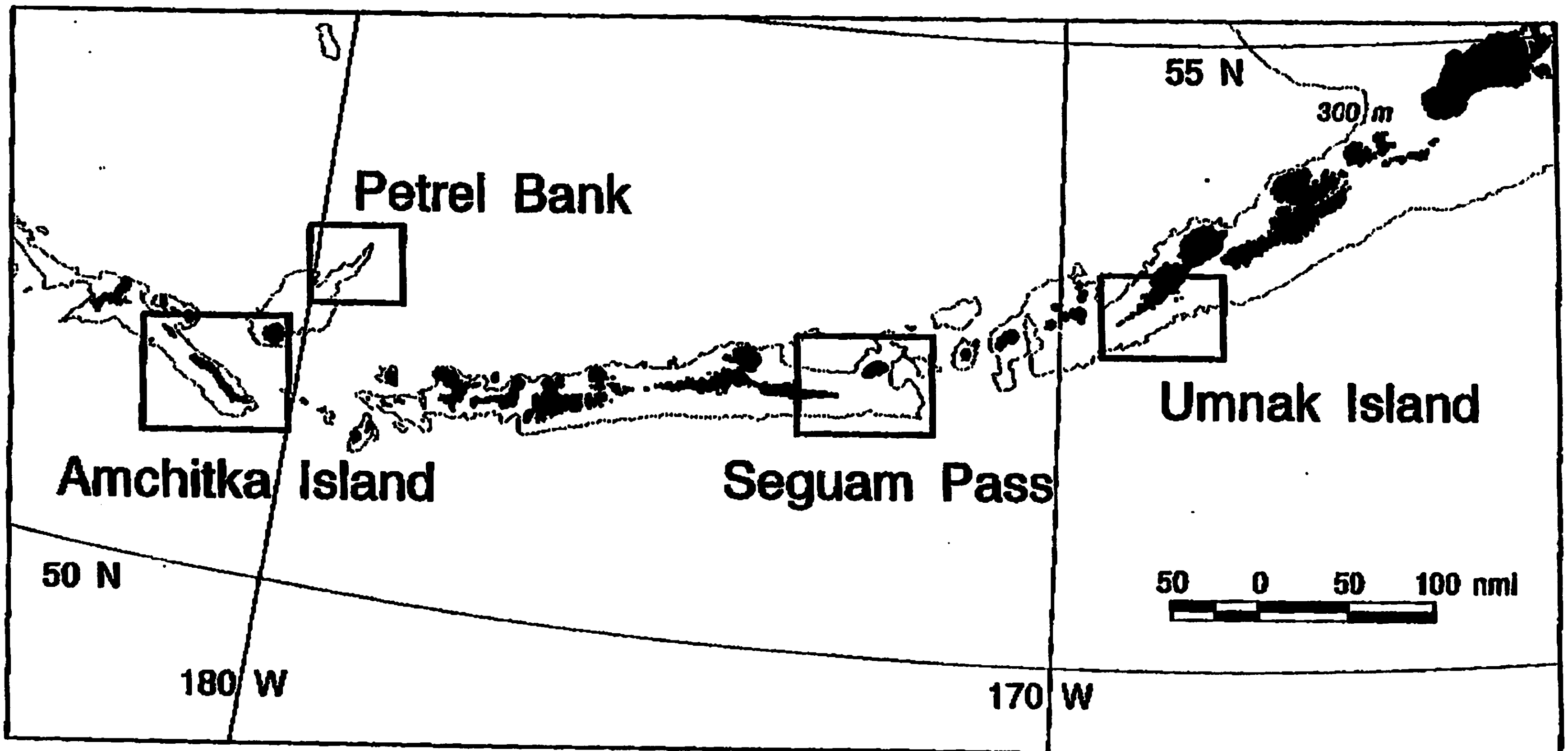


Figure 1.31. Estimated Age 3+ biomass trajectory (upper panel) and average fishing mortality (lower panel) for the Aleutian Islands SAM analysis.

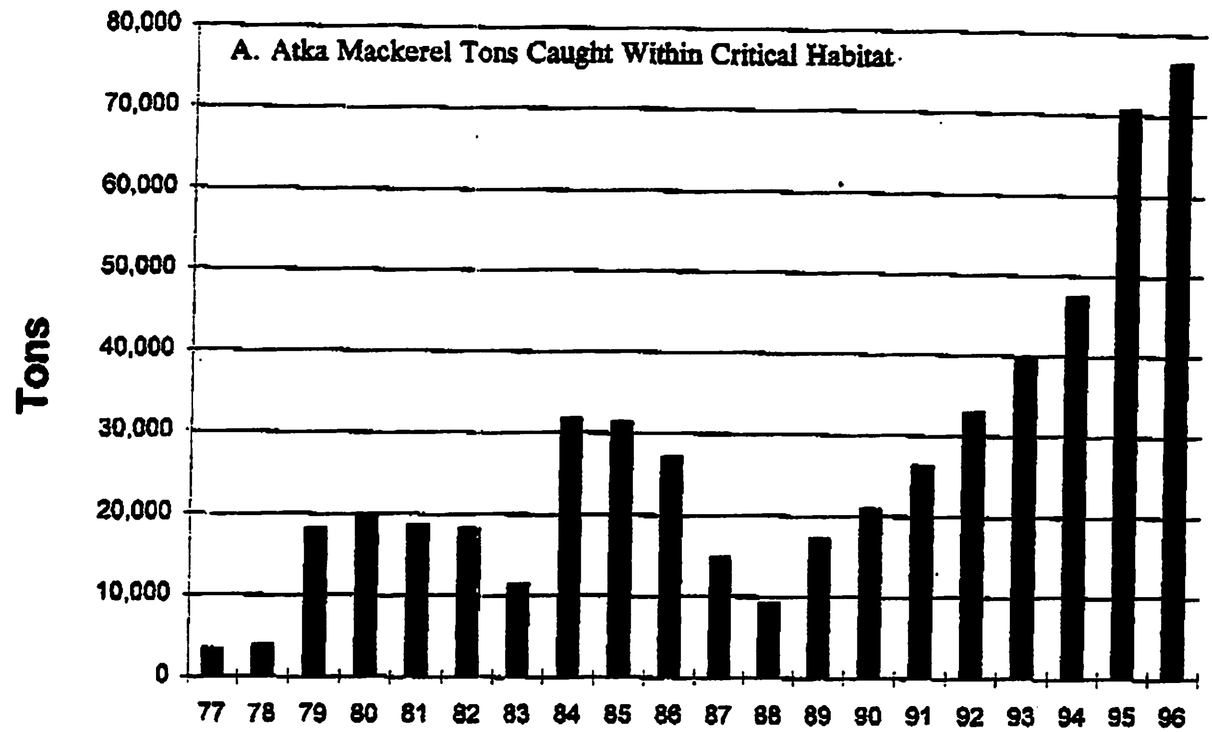
FIGURE 8

FIGURE 9



Locations of Atka Mackerel Fishery.
(From: Lowe and Fritz, unpublished)

FIGURE 10



B. Percent of Total BSAI Atka mackerel Catch Caught Within Critical Habitat

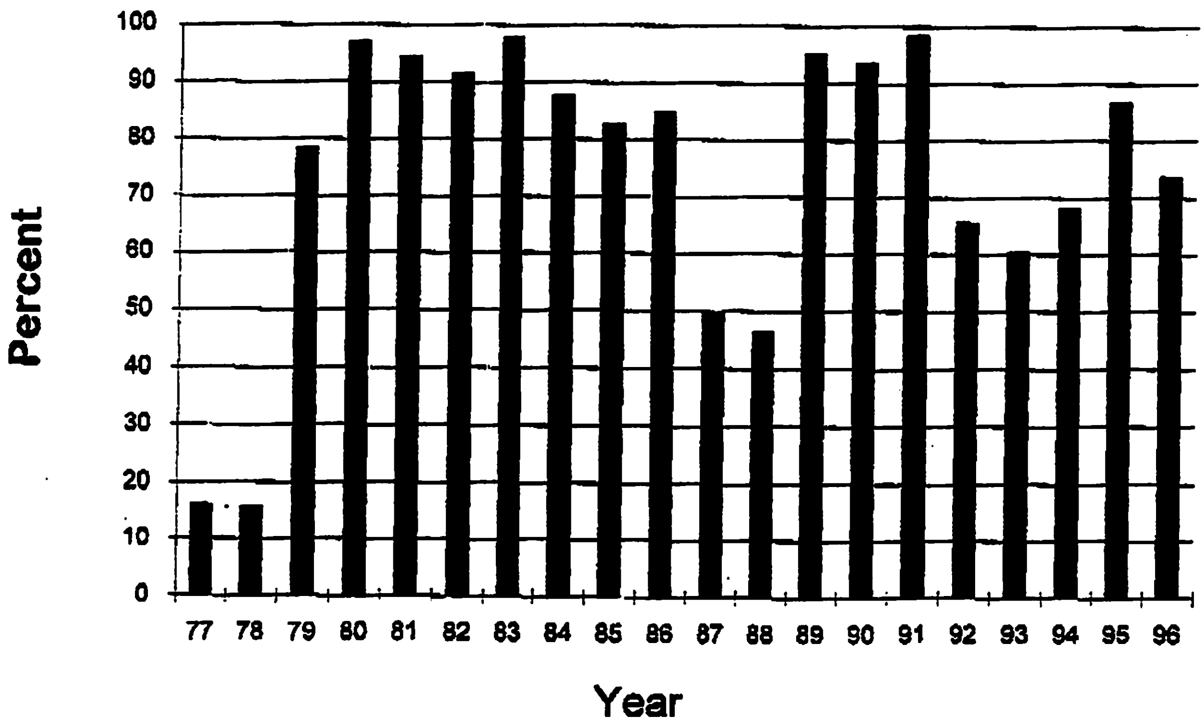
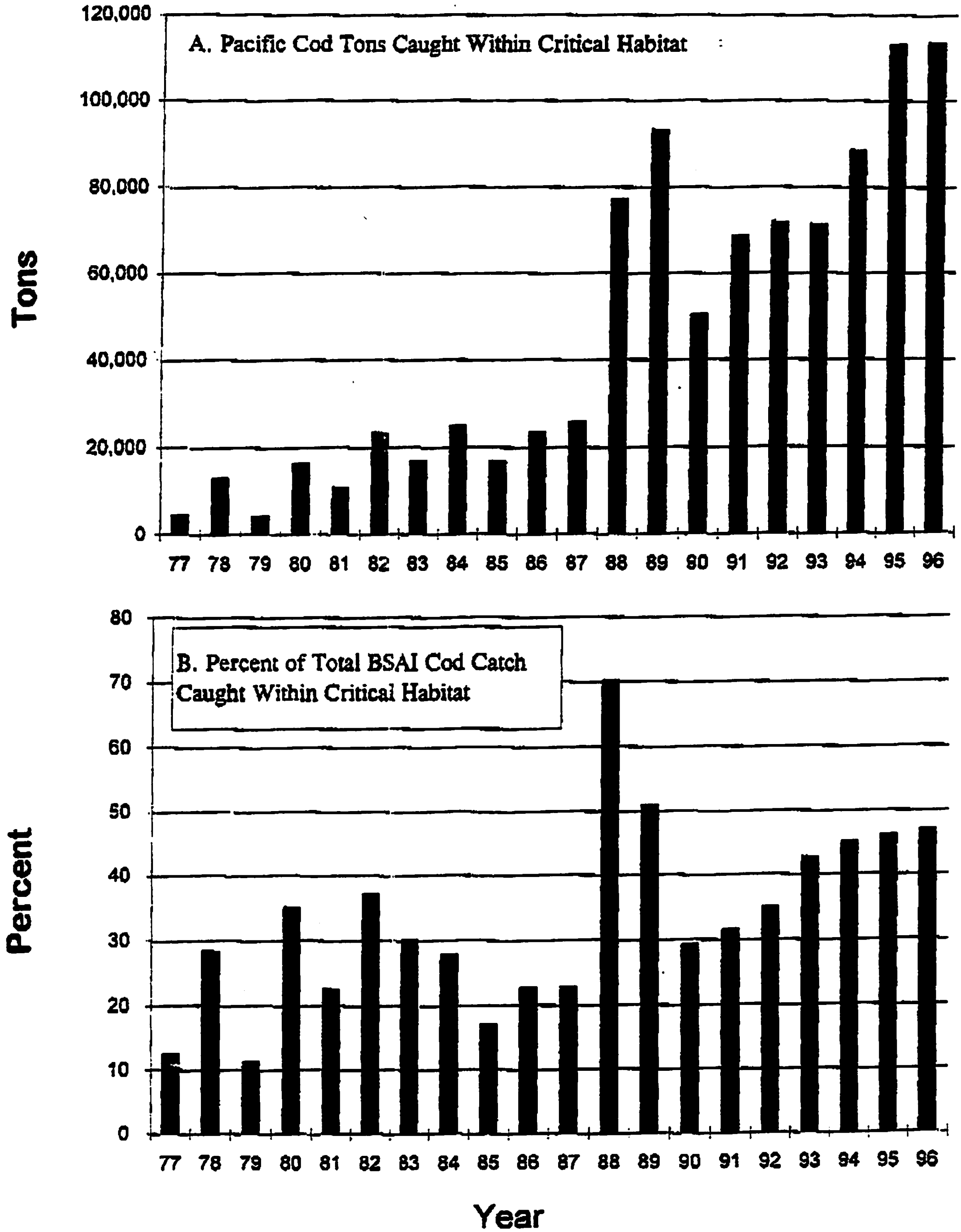


FIGURE 11


A. Pacific Cod Tons Caught Within Critical Habitat
Tons
120,000
100,000
80,000
60,000
40,000
20,000
0
77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96
B. Percent of Total BSAI Cod Catch Caught Within Critical Habitat
Percent
80
70
60
50
40
30
20
10
0
77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96
Year

Final

Draft

Bering Sea and Aleutian Islands
Council Recommended 1998 Catch Specifications (mt)

Species	Area	1998 Biomass	1998 OFL	1998 ABC	1998 TAC	1997 TAC	1997 Catch*
Pollock	EBS	5,820,000	2,060,000	1,110,000	1,110,000	1,130,000	1,033,463
	"A" season				45%	45%	
	"B" season				55%	55%	
	AI	106,000	31,700	23,800	23,800	28,000	24,819
	Bogoslof	280,000	8,750	6,410	1,000	1,000	162
Pacific cod	BS/AI	1,340,000	336,000	210,000	210,000	270,000	234,552
Yellowfin sole	BS/AI	3,010,000	314,000	220,000	220,000	230,000	166,684
Greenland turbot	BS/AI	164,000	22,300	15,000	15,000	9,000	7,666
	BS				67%	67%	
	AI				33%	33%	
Arrowtooth	BS/AI	869,000	230,000	147,000	16,000	20,760	9,651
Rock sole	BS/AI	2,360,000	449,000	312,000	100,000	97,185	67,520
Flathead sole	BS/AI	824,000	190,000	132,000	100,000	43,500	20,272
Other flatfish	BS/AI	789,000	253,000	164,000	89,434	50,750	22,131
Sablefish	EBS	18,200	2,160	1,300	1,300	1,100	547
	AI	21,000	2,230	1,380	1,380	1,200	780
POP complex							
True POP	EBS	41,300	3,300	1,400	1,400	2,800	827
Other POP	EBS	11,600	356	267	267	1,050	233
True POP	AI	258,000	20,700	12,100	12,100	12,800	12,648
	Eastern			3,070	3,070	3,240	2,987
	Central			3,450	3,450	3,170	2,795
	Western			5,580	5,580	6,390	6,866
Sharp/Northern	AI	94,000	5,640	4,230	4,230	4,360	1,997
Short/Rougheye	AI	46,500	1,290	965	965	938	1,045
Other rockfish	EBS	7,030	492	369	369	373	161
	AI	13,000	913	685	685	714	306
Atka mackerel	AI	536,000	134,000	64,300	64,300	66,700	65,840
	Eastern			14,900	14,900	15,000	16,310
	Central			22,400	22,400	19,500	19,990
	Western			27,000	27,000	32,200	29,540
Squid	BS/AI	n/a	2,620	1,970	1,970	1,970	1,769
Other species	BS/AI	669,000	134,000	25,800	25,800	25,800	22,553
BS/AI TOTAL		17,277,630	4,202,451	2,454,976	2,000,000	2,000,000	1,695,626

EBS = eastern Bering Sea
BS/AI = Bering Sea & Aleutian Islands
BS = Bering Sea
AI = Aleutian Islands

OFL = overfishing level
ABC = acceptable biological catch
TAC = total allowable catch

*catch as of 11/1/97

1998 BSAI Trawl Fisheries PSC DRAFT

Apportionments and Seasonal Allowances – Council Recommendations

Fishery Group	Halibut Mortality Cap (mt)		Herring (mt)	Red King Crab (animals) Zone1	C. bairdi Zone1	C. bairdi Zone2	C. opilio COBLZ
Yellowfin sole	1,005		268	10,000	276,316	1,071,000	
January 20 - March 31		285					
April 1 - May 10		210					
May 11 - August 14		100					
August 15 - Dec 31		410					
Rocksole/other flatfish	795		22	75,000*	296,052	357,000	
January 20 - March 29		485					
March 30 - June 30		130					
July 1 - December 31		180					
Turbot/sablefish/ Arrowtooth	0					0	
Rockfish	75		8			7,000	
July 1 - Dec 31		75					
Pacific cod		1,550	22	7,500	148,224	195,000	
Pollock/mackerel/o.species	350		155	7,500	29,408	470,000	
January 20 - April 15		300					
April 16 - December 31		50					
Pelagic Trawl Pollock			1,239				
TOTAL		3,775	1,714	100,000	750,000	2,100,000	4,654,000

Note: unused PSC allowances may be rolled into the following seasonal apportionment.

* Red king crab PSC for the rock sole fishery is apportioned 26,250 inside 56 - 56o10' (available Feb 1), and 48,750 outside.

The Council recommends that the opilio cap not be apportioned among fisheries until fishery specific bycatch data from the opilio savings area are available.

1998 BSAI Non-Trawl Fisheries PSC Bycatch Allowances and fixed gear Pacific cod seasonal apportionements

Fishery Group	Halibut Mortality (mt)		Seasonal Apportion of cod TAC (mt)
Pacific Cod	810		
Jan 1 - April 30		495	70,735
May 1 - September 14		40	15,000
Sept. 15 - Dec. 31		275	13,332
Other Non-Trawl*	90		
Groundfish Pot	Exempt		
TOTAL	900 mt		99,068

Note: unused PSC halibut from first trimester will be rolled into the third trimester.

Any halibut PSC removed from the CDQ fisheries will be replaced from PSC apportioned from the third trimester.

* Includes hook & line fisheries for rockfish and Greenland turbot.
  Sablefish hook & line fisheries will be exempted from the halibut mortality cap.
  Jig gear will also be exempted from the halibut mortality cap.

NPLA
D-1ab

INDUSTRY RECOMMENDATION FOR 1998 NON-TRAWL FISHERIES PSC BYCATCH ALLOWANCES AND FIXED GEAR PACIFIC COD AEASONAL APPROTIONMENTS

Season to open January 1, 1998. Third Trimester fishery to start on September 15, 1998.

Recommended 1998 BSAI Non Trawl Fisheries PSC Bycatch Allowances and Fixed gear Pacific Cod seasonal apportionments

Fishery Group	Halibut Mortality (mt)		Seasonal Apportionment of Pacific Cod (mt)		
Pacific Cod	840		ITAC	Reserve	Total
Jan 1 - April 30		495	65,000	5,735	70,735
May 1 - Sept. 14		40	13,792	1,208	15,000
Sept. 15 - Dec. 31		275 ~~305~~	12,243	1,089	13,332
Other Non-Trawl*	90 ~~60~~				
Groundfish Pot	Exempt				
Total	900 mt				99,068

Note: unused PSC halibut from first trimester will be rolled into the third trimester. Any unused cod TAC from first trimester will go into third trimester.

Any HALIBUT PSC removed from CDQ fisheries will be replaced from PSC apportioned from the third trimester

* Included hook & line fisheries for rockfish and Greenland turbot.
Sablefish hook & line fisheries will be exempted from the halibut mortality cap.
Jig gear will also be exempted from the halibut mortality cap.

Alaska Marine Conservation Council

P.O. Box 101145, Anchorage, Alaska 99510
Ph: 907-277-5357, fax: 907-277-5975
e-mail: amcc@alaska.net

December 9, 1997

Rick Lauber, Chairman
North Pacific Fishery Management Council
605 West 4th Avenue, Suite 306
Anchorage, Alaska 99501

RE: Bering Sea Pollock and Atka Mackerel

Bering Sea Pollock

The 1998 stock assessment for Eastern Bering Sea pollock has shown that the biomass is roughly the same as last year's assessment at about 6 million metric tons. This represents a decline from high biomass of 13 to 15 million metric tons in the mid-1980's. Our harvest levels in the EBS have been maintained at about the same level since 1990: we average between 1.1 and 1.4 million metric tons. As AMCC pointed out last year, EBS pollock harvests have been maintained despite a declining population, and despite the fact that surrounding pollock stocks have collapsed or are otherwise declining. The Aleutian Basin (Donut Hole) fishery collapsed and closed to fishing in 1991, the Bogoslof fishery thought to be associated with the Aleutian Basin pollock, closed to fishing in 1992 and is experiencing a significant decline. The Aleutian Islands pollock relationship to the EBS pollock is poorly understood, and while the 1997 survey showed a slight upturn, may be in a continued decline. Pollock stocks on the Russian side of the Bering Sea are not faring well: the Western stock is in decline. The status of the Navarin, or northern Bering Sea pollock is not well known, while harvest rate in that particular area may be as high as 60%.

The 1997 survey for the EBS pollock indicates an above average 1996-year class, but this year class so far stands alone in terms of other year class strength or overall age structure diversity for the population. As AMCC pointed out in 1996, the dependency of the fishery on a single year class belies the resiliency of that population in the face of environmental adversity. If conditions environmental conditions become unfavorable to the survival of young fish, a single strong year class could be wiped out with nothing to replace it. In addition, according to this year's assessment, the age 3+ biomass still hovers in the neighborhood of previously determined B_{msy}, or 6 million metric tons.

The assessment does not take into account the effects of pollock harvests on the Russian side of the Bering Sea. The Navarin stock of pollock is thought to be related to EBS pollock, but that relationship is poorly understood. We do know that the Navarin stock is experiencing high levels of exploitation. There may be an increased susceptibility of EBS pollock in this Russian harvest, as they are thought to be moving in a more northwesterly direction (from the Pribilof Islands) in response to warmer water temperatures.

There is growing concern about the merit of intensive harvest on spawning aggregations of a fish population in decline. Prior to 1980, most of the pollock harvested in the Bering Sea was taken by the Japanese. Their season lasted from June to September, outside the roe-bearing season (EA/RIR for Amendments 19 and 14 to GOA and BS/AI FMPs, 1990). Increased and intensive harvests of pollock in the Donut Hole in the late 1980's eventually drove that fishery into collapse. That fishery made an increasing shift in effort on the spawning aggregations of the Bogoslof area directly prior to the collapse of Aleutian Basin stock and the subsequent significant decline of Bogoslof fish in recent years. Bogoslof fish are considered to be closely related to Aleutian Basin "stock", and may contribute anywhere from 60% to 100% of mature fish to that biomass. While there is little quantitative measure of the effects of fishing heavily on spawning aggregations, intensive harvests on spawning aggregations of cod and haddock on the East Coast coincided with the collapse of those fisheries. Despite a five-year moratorium on fishing in the Donut Hole, there has been no recovery of the fishery. This may be an ominous signal of the effects of aggressive fishing during an important part of the pollock life cycle. There is further concern about the disruption of spawning by our fishing practices on the health of major pollock predators.

Looking at it from a broader perspective, one that includes marine mammals and seabirds as other pollock predators, the picture grows darker. Catches of pollock in steller sea lion critical habitat have increased multifold. According to NMFS scientists, the pollock fishery has increasingly extracted more and more of its annual quota from critical sea lion habitat. In fact, pollock catches in these areas increased from 10% of the total pollock quota in 1977 to almost 70% in 1995 (Fritz and Ferraro, 1997). In 1989, when the listing of sea lions as a threatened species under the ESA, food stress had been listed as a possible cause of the sea lion decline. Further research has shown that winter foraging for juvenile and lactating females demands high quality and diverse prey in accessible quantities. The food requirements for adult females with pups and are greater in the winter than in summer. Young of the year pups just learning how to forage could be more easily limited by changes in prey distribution (Merrick and Loughlin, 1997). Also, prey diversity and declines in sea lions have been linked in the Gulf of Alaska and Aleutian Islands: declines have been greatest where diet diversity is the least (Merrick, Chumbley, and Byrd, 1997). Food stress is now considered as a primary factor in the continuing sea lion decline.

Local observations from False Pass indicate an annual exodus of sea lions through the Pass during the "A" season fishery (pers. comm, Buck Laukitis). National Marine Fisheries Service should investigate this. Could there be behavioral displacement of sea lions from the activity of the fishery?

Along with significant impacts to the higher nutritive value of roe-bearing pollock, we have had huge localized impacts on spawning aggregations of atka mackerel in the last 5

- 7 years along the Aleutian Islands. Nearly a decade of research has suggested that there is a strong relationship between foraging behavior and prey availability (Merrick and Loughlin, 1997). Since 1989, steller sea lions have been listed as threatened, and in 1997, the sea lions in the western range in Alaska (west of 144 degrees) have been formally listed as endangered. Our harvest of their major prey in winter months has increased tremendously as the sea lions continue to decline.

AMCC wishes to remind the Council of the list of factors that "WILL be considered when setting a seasonal allowance of the pollock TAC", according to section 14.4.10 of the Bering Sea/Aleutian Islands FMP, as amended when the Council banned roe-stripping of pollock in 1990. Included in this list are the following:

- **Current estimates of and expected changes in pollock biomass and stock conditions; conditions of marine mammal stocks, and biomass and stock conditions of species taken as bycatch in directed pollock fisheries;**

- **Potential impacts of expected seasonal fishing for pollock on pollock stocks, marine mammals, and stocks of species taken as bycatch in directed pollock fisheries.**

In order to meet the imperative to address the marine system as a whole as we conduct our fisheries, the Alaska Marine Conservation Council has the following recommendations:

1. **The entire Eastern Bering Sea pollock fishery must be reconstructed to as to reduce fishing pressure during the "A", or roe-bearing pollock season. Temporal and spatial compression of the fishery has increased catches of important forage for steller sea lions. This can be addressed in the following ways:**

   - **Reduce the pollock harvest in the "A" season to no more than 10, 20, 22.5 or 30% of the total quota, combined with-**

   - **Break up the "A" season in time: The Council should consider redistributing the fishery in time through temporal closures to allow for greater prey availability for marine mammals. Options are: 1) open the fishery for one week, then close for one week, 2) 10 days on/off, 3) 14 days on/off).**

   - **Reduce levels of pollock catches in designated sea lion winter foraging grounds. Without closing out the entire 60 nm radius determined to encompass winter forage grounds, we suggest that there be a maximum tonnage of pollock allowed to be extracted from these areas. The suggested maximum for the "A" season pollock harvest in critical sea lion habitat is the percentage of total of the pollock harvest removed in 1977, 10% or roughly**

100,000 mt of pollock. The remainder of the quota could still be taken from outside of sea lion winter foraging range.

- **Extend the trawl closure zones to all rookeries to 20 nm in the winter months for both pollock and atka mackerel fisheries** (currently only 6 rookeries in the Eastern Aleutian Islands have a 20 nm buffer during the pollock season, all others are 10 nm including those near the atka mackerel fishery)

Additionally, in an effort to gain more accurate information in the fishery during the period of important winter foraging, require the following for any vessel wishing to harvest pollock inside the 60 nm radius of sea lion critical habitat previously described by NMFS (EA/RIR for trawl closures in the GOA and BS/AI, 1992):

1. two observers
2. daily reporting of catch
3. accurate weight and measure of catch

Also, the Council should begin an analysis to restrict cod end size of pollock trawl nets to less than 100 metric tons, especially during "A" season. We do not know what effects there are from extracting 200 mt or more of spawning pollock in one tow of a net. Smaller nets can make catches more manageable, create the ability to fish elsewhere in the event a codend full of fish is all juvenile pollock. Discards may be minimized in this way.

2. For atka mackerel, mitigate the intensity of the localized depletions in the following manner:

- **Break up the season in place and time by apportioning each statistical area's quota (areas 541, 542, and 543). For example, begin with a 5-day season in area 541 for 1/3 of the 1998 quota, or roughly 5,000 mt. The next 5-day opening would be in area 542, for 1/3 of that area's quota, or roughly 7,000 mt. Close this area, then open area 543 for 7 - 10 days to take 1/3 the quota, or roughly 9,000 mt. Close this area and begin the process again.**

Habitat disruption from bottom trawling remains a concern in this fishery. In the above recommendations, we need to insure that bottom-trawling effort is not displaced to a wider and perhaps currently non-impacted habitat.

We offer these recommendations to help mitigate the effects of our fisheries on marine mammals, especially sea lions. If the sea lion can be called the barometer of change in the Bering Sea from human influences, we must act decisively today and alter our fishing approaches now. We must move beyond the singular approaches of the past, which have not bode well for either fisheries or other marine life in oceans around the world.

References

Fritz, L.W, and Ferraro, R.C., 1997, Options in Steller Sea Lion Recovery and Groundfish Fishery Management

Laukitis, Buck, 1997, personal communication.

Merrick, R.L.and Loughlin, T.R., 1997, Foraging behavior of adult female and young-of-the-year Steller sea lions in Alaskan waters

Merrick, R.L., Chumbley, M.K., and Byrd, G.V., 1996, Diet diversity of Steller sea lions (*Eumetopias jubatus*) and their population decline in Alaska: a potential relationship.

North Pacific Fishery Management Council (NPFMC), 1990. Environmental Assessment and Regulatory Impact Review for Amendments 19 to the Fishery Management Plan (FMP) for the Groundfish of the Gulf of Alaska and Amendment 14 to the FMP for Groundfish of the Bering Sea/Aleutian Islands

NPFMC, 1997, Draft Stock Assessment and Fishery Evaluation document for the Bering Sea/Aleutian Islands

nt C. Paine
tive Director

Steve Hughes
Technical Director

UNITED CATCHER BOATS
UCB
Washington · Oregon · California · Alaska

MEMORANDUM

TO: NPFMC, AP and SSC

FROM: Steve Hughes and Brent Paine

DATE: December 7, 1997

SUBJECT: 1998 BE Pollock ABC/TAC

Last year at this time during the NPFMC December meeting, we testified before the Council that the SSC recommended Bering Sea pollock ABC was conservative because the pollock biomass that occurred over the North shelf/slope was excluded from the Bering Sea pollock biomass estimate. While the 1996 triannual bottom trawl survey did not include the North shelf/slope area, we noted that this area historically contained 4.7% to 27.7% of the entire Bering Sea Pollock bottom trawl assessed biomass (see Attachment 1). The Council last year agreed with our analysis.

The 1997 Bering Sea bottom trawl survey did include the North shelf area but not the slope. The pollock biomass in the North shelf area alone as measured by that survey reportedly totaled 830,000 mt. This biomass was excluded the Plan Team analysis and only the 3.03 million mt's from the standard shelf bottom trawl survey was included (see Attachment 2).

Excluding 830,000 mt (27.4% of the shelf biomass) at an exploitation rate of 15% results in a 125,000 mt reduction in ABC below the point where it should be if only the North shelf biomass was included and the slope biomass remained excluded.

Due to these factors we believe the 1998 Bering Sea pollock ABC should be set at 1.225 million MT or 1.3 million mt (the top of the Plan Team's range of 1.1 - 1.3 million mt). Secondly, the Bering Sea pollock TAC should be set conservatively at last years' level of 1.13 million mt.

Thank you for hearing and considering these comments.

cc: Industry Committee on TAC/PSC's

1711 W. Nickerson - Suite B, Fishermen's Terminal • Seattle, WA 98119 • Tel. (206) 282-2599 • Fax (206) 282-2414

ATTACHMENT 1

Date: Tuesday, November 26, 1996 6:40:36 PM
From: Vidar_Wespestad@racesmtp.afsc.noaa.gov (Vidar Wespestad)
Subj: Pass to Hughes
JAJfish@aol.com

Here's the biomass distribution from triennial surveys that I received from Gary Walters

POLLOCK BIOMASS FROM TRIENNIAL SURVEYS

1982	Standard shelf	2,989,000 mt	3,292,000
	North shelf	98,000	303,000 / 3,292,000 = 9.2%
	Slope	205,000	
1985	Standard shelf	4,650,000	6,429,000
	North shelf	1,699,000	1,779,000 / 6,429,000 = 27.7%
	Slope	80,000	
1988	Standard shelf	6,922,000	7,511,000
	North shelf	458,000	589,000 / 7,511,000 = 7.8%
	Slope	131,000	
1991	Standard shelf	5,109,000	5,363,000
	North shelf	181,000	254,000 / 5,363,000 = 4.7%
	Slope	73,000	
1994	Standard shelf	4,977,000	
	North shelf	56,000	(Western 1/3 surveyed only)
	Slope		(Not surveyed)

---------------------- Headers ------------------------------

From Vidar_Wespestad@racesmtp.afsc.noaa.gov Tue Nov 26 13:39:59 1996
Return-Path: Vidar_Wespestad@racesmtp.afsc.noaa.gov
Received: from racesmtp.afsc.noaa.gov (racesmtp.afsc.noaa.gov [161.55.96.3]) by emin20.mail.aol.com (8.6.12/8.6.12) with SMTP id NAA13009 for <JAJfish@aol.com>; Tue, 26 Nov 1996 13:39:58 -0500
Received: from RACE-Message_Server by racesmtp.afsc.noaa.gov
with Novell_GroupWise; Tue, 26 Nov 1996 10:42:58 -0800
Message-Id: <s29ac9b2.033@racesmtp.afsc.noaa.gov>
X-Mailer: Novell GroupWise 4.1
Date: Tue, 26 Nov 1996 10:39:12 -0800

ATTACHMENT 2

From: Vidar G. Wespestad
NOAA/NMFS
Alaska Fisheries Science Center
Resource Ecology and
Fishery Management Division
7600 Sandpoint Way N.E.
Bin C-15700, Bldg. 4
Seattle, WA 98115, USA
FAX: 1-206-526-6723
Telephone: 1-206-526-4249
E-mail: Vidar_Wespestad@AFSC.NOAA.GOV

DATE: ~~February 13~~ DEC 12, 1997
ADDRESSEE: Steve Hughes
ADDRESSEE'S LOCATION: NRC
ADDRESSEE'S FAX #: 283-8263

NUMBER OF PAGES TO FOLLOW: 0

REMARKS:

Steve, Here are the updated numbers.

POLLOCK BIOMASS FROM TRIENNIAL SURVEYS in tonnes

	Standard shelf	**North shelf**	**Slope**
1982	2,989,000	98,000	205,000
1983			
1984			
1985	4,650,000	1,699,000	80,000
1986			
1987			
1988	6,922,000	458,000	131,000
1989			
1990			
1991	5,109,000	181,000	73,000
1992			
1993			
1994	4,977,000	56,000	(Not surveyed)
1995		(Western 1/3 surveyed only)	
1996			
1997	3,030,000	830,000	(Not surveyed)

NPLA
D1ab

HANDOUT

EFFECT ON HOOK-AND-LINE FISHERIES OF 210,000 MT TAC

IF 1998 TAC IS SET AT 210,000 MT, FIXED GEAR SHARE IS 99067
(210000 MINUS 15700 CDQ = 194250; 51% IS 99067)
H&L CATCH REDUCED 36% FROM 1997

1996

TRIM	H&L	POT	FIXED
1ST	66346	16090	82436
2ND	2279	13287	15566
3RD	27552	3500	31052
ANNUAL	**96177**	**32877**	**129054**

1997

TRIM	H&L	POT	FIXED
1ST	70484	10853	81337
2ND	7667	8203	15870
3RD (EST)	48983	3819	52802
ANNUAL	**127134**	**22875**	**150009**

1998

TRIM	H&L	POT	FIXED	H&L RED.
1ST	63735	7000	70735	-10%
2ND	5000	10000	15000	-35%
3RD	12332	1000	13332	-81%
ANNUAL	**81067**	**18000**	**99067**	-36%

HANDOUT

FIS

EFFECT ON HOOK-AND-LINE FISHERIES OF 255,000 MT TAC

IF 1998 TAC IS SET AT 210,000 MT, FIXED GEAR SHARE IS 120296
(255000 MINUS 19125 CDQ = 235875; 51% IS 120296)
H&L CATCH REDUCED 23% FROM 1997

1996

TRIM	H&L	POT	FIXED
1ST	66346	16090	82436
2ND	2279	13287	15566
3RD	27552	3500	31052
ANNUAL	**96177**	**32877**	**129054**

1997

TRIM	H&L	POT	FIXED
1ST	70484	10853	81337
2ND	7667	8203	15870
3RD (EST)	48983	3819	52802
ANNUAL	**127134**	**22875**	**150009**

1998

TRIM	H&L	POT	FIXED	
1ST	70500	10000	80500	-0%
2ND	7000	10000	17000	-10%
3RD	20796	2000	22796	-58%
ANNUAL	**98296**	**22000**	120296	-23%

North Pacific Albatrosses

SHORT-TAILED ALBATROSS

BLACK-FOOTED ALBATROSS

D. Wechsler/VIREO

LAYSAN ALBATROSS

Match numbered photos with text on reverse.

Identification of Live Birds:

Please match numbers with photos on front.
Bill outlines are life-size for positive identification.

SHORT-TAILED ALBATROSS	BLACK-FOOTED AND LAYSAN ALBATROSS

(1) SHORT-TAILED, Juvenile — (6) BLACK-FOOTED, Juvenile

First two months at sea

Similarities

- Difficult to distinguish; completely brown body and wings, dark bill and legs

Differences

(1) Short-tailed:
- Large, light gray bill with traces of pink

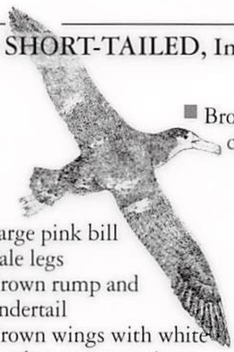
(6) Black-footed:
- Smaller dark gray bill
- White on face at base of bill

Note: Bill of young short-tailed albatross changes to pink probably within its first two months at sea. It departs from nest mid-May to early June.

(2) SHORT-TAILED, Juvenile/Immature

- Confusion with other species unlikely at this stage
- Completely brown body and wings
- Large pink bill
- Pale legs (sometimes dark)

(3) SHORT-TAILED, Immature — (7) BLACK-FOOTED, Old adult



Similarities

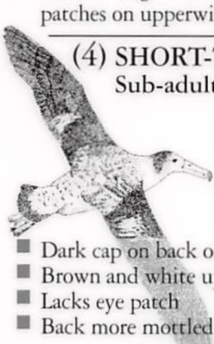
- Brown body, some white on chest and face

Differences

(3) Short-tailed:
- Large pink bill
- Pale legs
- Brown rump and undertail
- Brown wings with white patches on upperwings

(7) Black-footed:
- Smaller dark bill
- Dark legs
- White rump and undertail
- Wings all brown

(4) SHORT-TAILED, Sub-adult — (8) LAYSAN ALBATROSS, All ages



Similarities

- Pink bill (Laysan bill varies yellowish to pinkish-beige)
- White body with brown back
- Pale legs

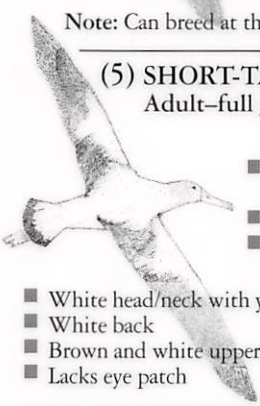
Differences

(4) Short-tailed:
- Dark cap on back of head/neck
- Brown and white upperwings
- Lacks eye patch
- Back more mottled brown

(8) Laysan:
- White head/neck
- Brown back and upperwings
- Dark gray eye patch

Note: Can breed at this stage.

(5) SHORT-TAILED, Adult–full grown — (8) LAYSAN ALBATROSS, All ages



Similarities

- Pink bill (Laysan bill varies yellowish to pinkish beige)
- White body
- Pale legs

Differences

(5) Short-tailed:
- White head/neck with yellow tinge
- White back
- Brown and white upperwings
- Lacks eye patch

(8) Laysan:
- White head/neck without yellow tinge
- Brown back and upperwings
- Dark gray eye patch

Support: U.S. Fish & Wildlife Service
National Marine Fisheries Service
International Pacific Halibut Commission
A & A Printing, Seattle

Sea Grant Alaska Washington
LIVING OCEANS National Audubon Society
North Pacific Longline Association

GENERAL DESCRIPTIONS

Short-tailed Albatross
Phoebastria albatrus

Can occur anywhere in the North Pacific Ocean during ALL months. Currently less than 200 breeding pairs. Multiple threats throughout its range require international cooperation to prevent its extinction. During various stages, can be confused with black-footed and Laysan albatrosses. Full grown chicks completely brown; dark legs; large bill grayish with pink traces (1). Not known exactly when ***bill develops distinctive pink color*** (2) but thought to occur during first two months at sea. As they mature, legs become pale; white patches replace brown plumage (3 and 4). Eventually exhibits nearly all-white body; white head and neck with yellow tinge; ***white and dark brown wings; white back*** (5).

Breeds: Japan
Estimated breeding pairs: 180

Black-footed Albatross
Phoebastria nigripes

Mostly brown throughout its life and ***always has white at base of dark bill*** (6 and 7). Dark legs. Develops a ***white rump*** and more white on the face and chest as it matures (7).

Breeds: Hawaiian Islands, Japan
Estimated breeding pairs: 71,000

Laysan Albatross
Phoebastria immutabilis

A white-bodied albatross, like the adult short-tailed albatross, but ***solid dark brown from wing tip to wing tip on upper side; dark back*** (8). Pink bill but can vary. Legs pale. Plumage colors do not change.

Breeds: Hawaiian Islands, Japan, Mexico
Estimated breeding pairs: 630,000

OTHER FACTS

Albatrosses are adult-size when they leave the nest and spend their first several years at sea. They mate for life. Both sexes of these three species raise a single chick annually, which takes 5 to 6 months. If one parent is killed, the chick also dies and the mate is not replaced for up to three years. These three species have an approximate 7-foot wingspan and range across the entire North Pacific Ocean. They can live 40 years or more.

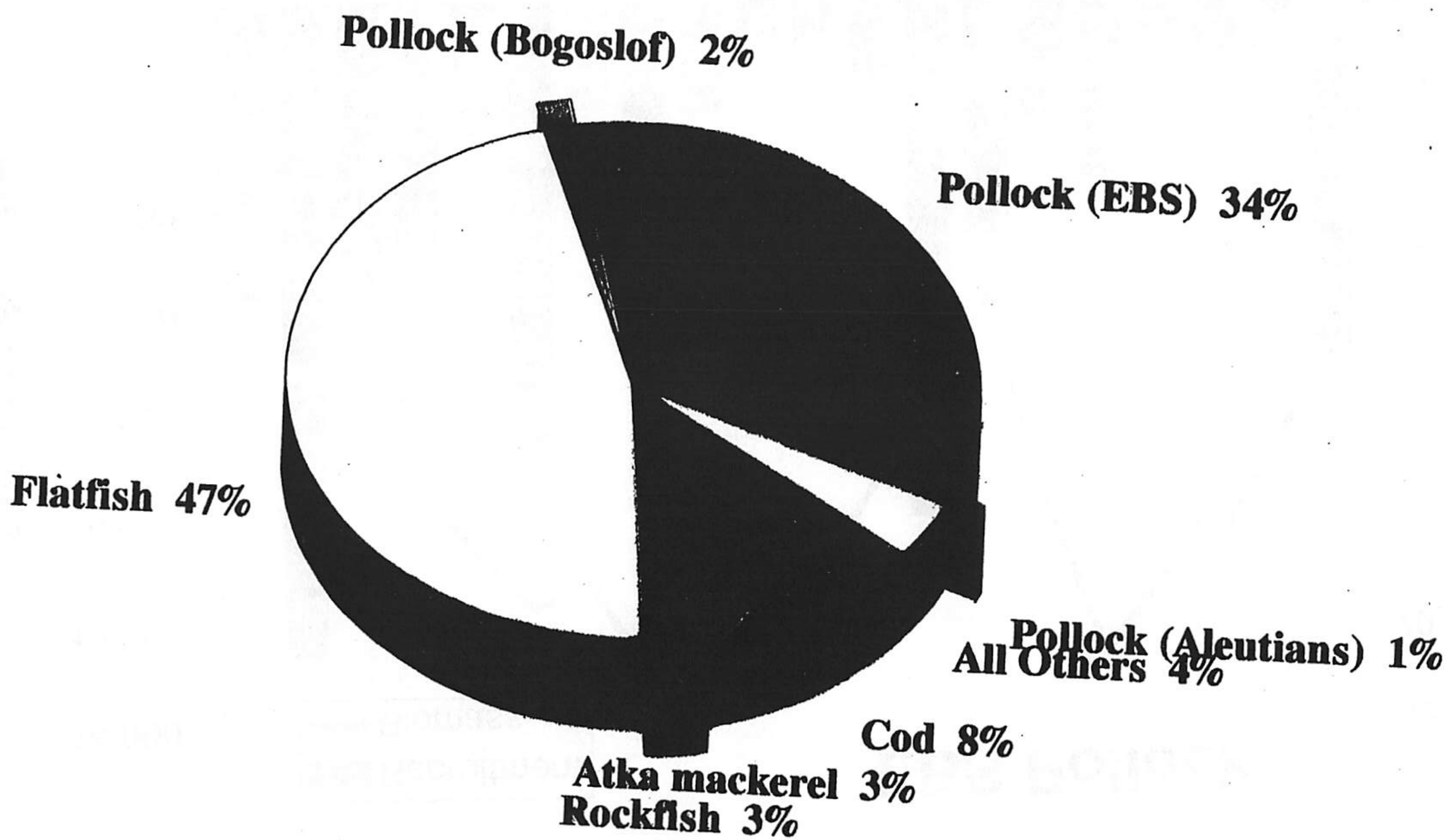
Please report sightings of short-tailed albatrosses to the U.S. Fish & Wildlife Service: 1-800-272-4174. The only way of knowing the short-tailed albatross' age is from leg bands placed on them as chicks. By reporting the following information, you are contributing to the knowledge of this endangered seabird's pelagic range: 1) Date and time 2) Vessel's position 3) Plumage characteristics 4) The leg-band color combinations (both right and left leg)

Photographs:
Hiroshi Hasegawa, Elizabeth Mitchell, VIREO
Text/Design/Art/Graphics:
Elizabeth Mitchell, Greta Tristram

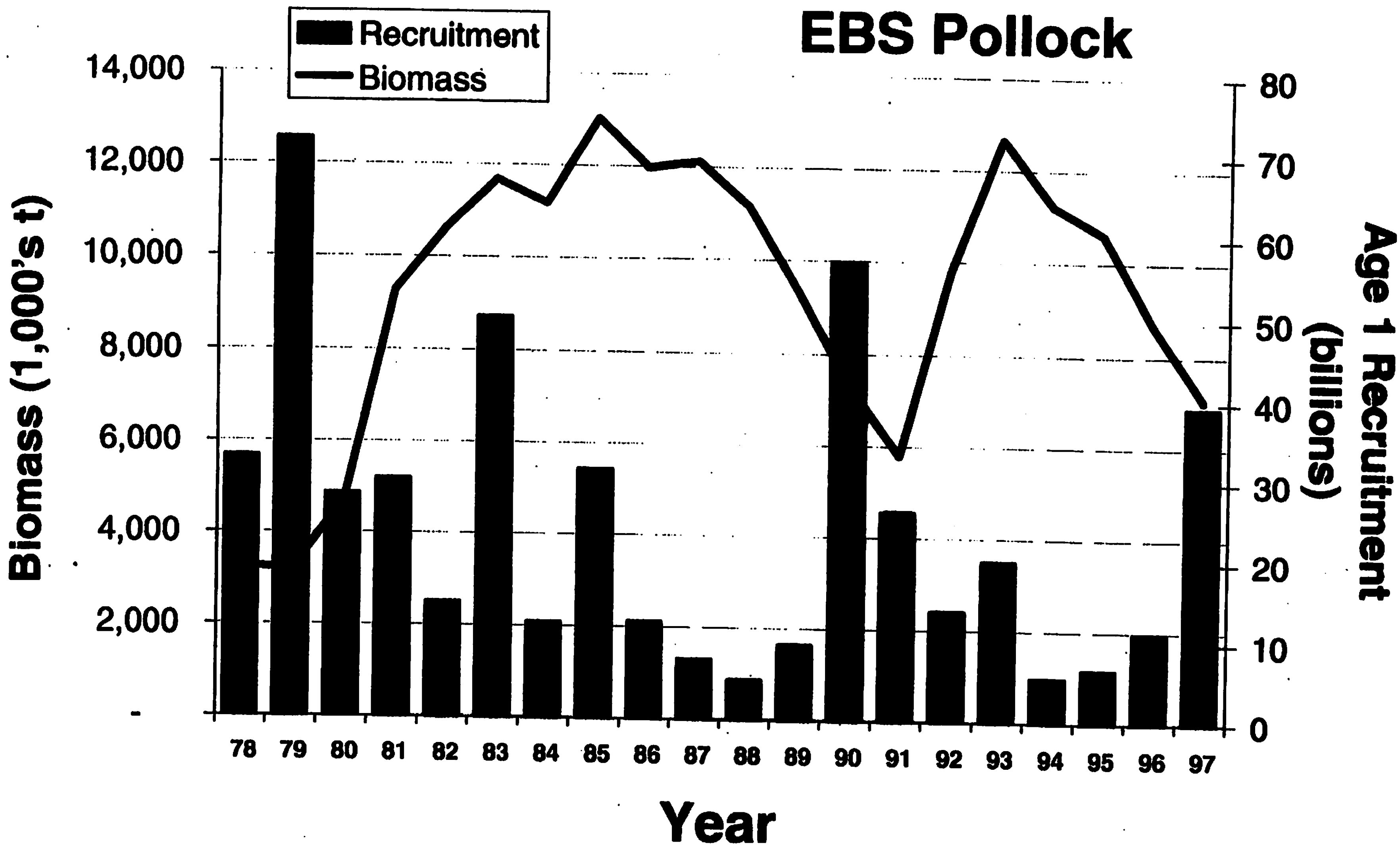
SHORT-TAILED ALBATROSS
Female
BLACK-FOOTED ALBATROSS
Male
Female
LAYSAN ALBATROSS
Male

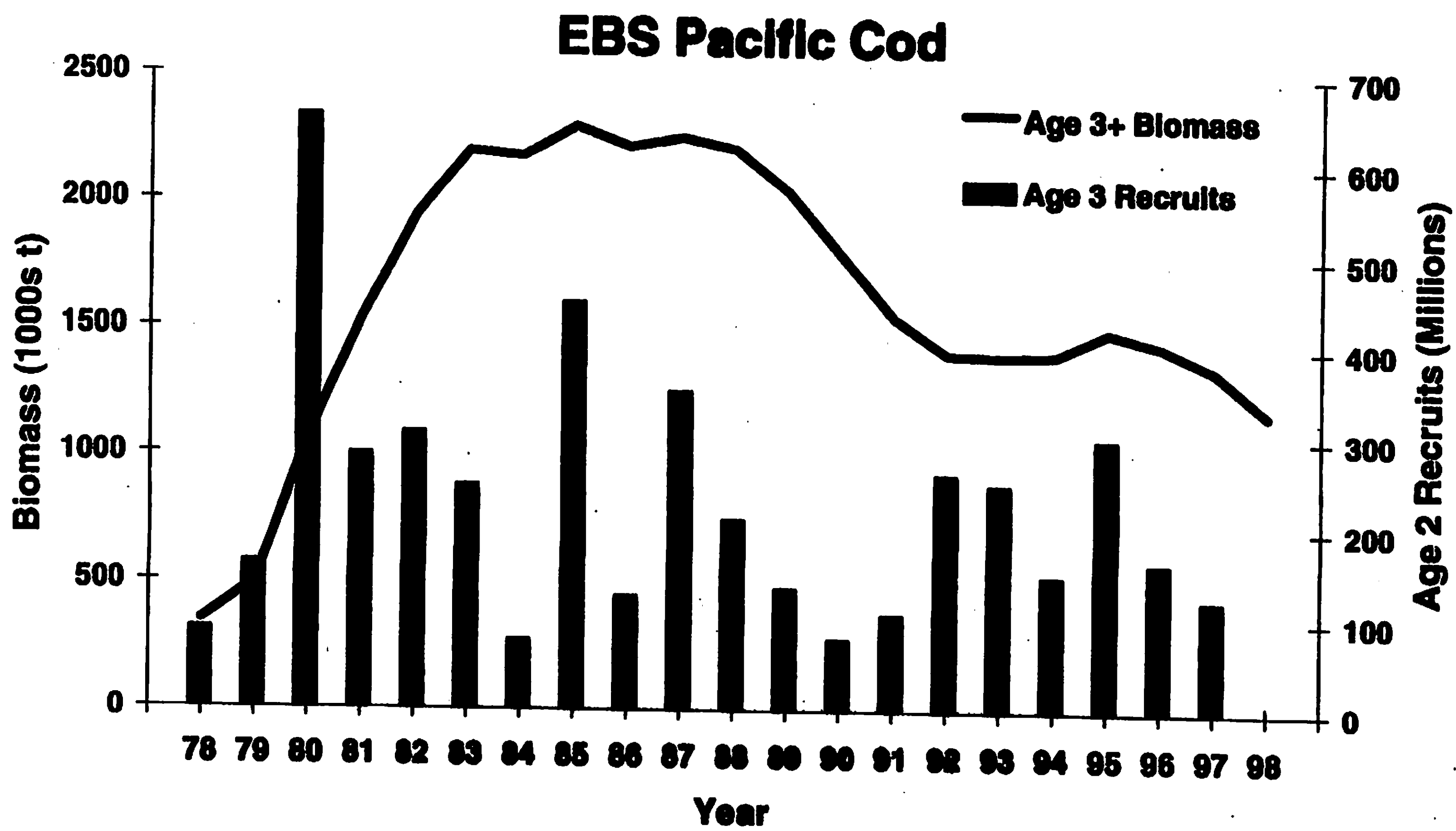
BERING SEA GROUNDFISH COMPLEX

(Projected 1998 Biomass = 17+ Million M. Tons)

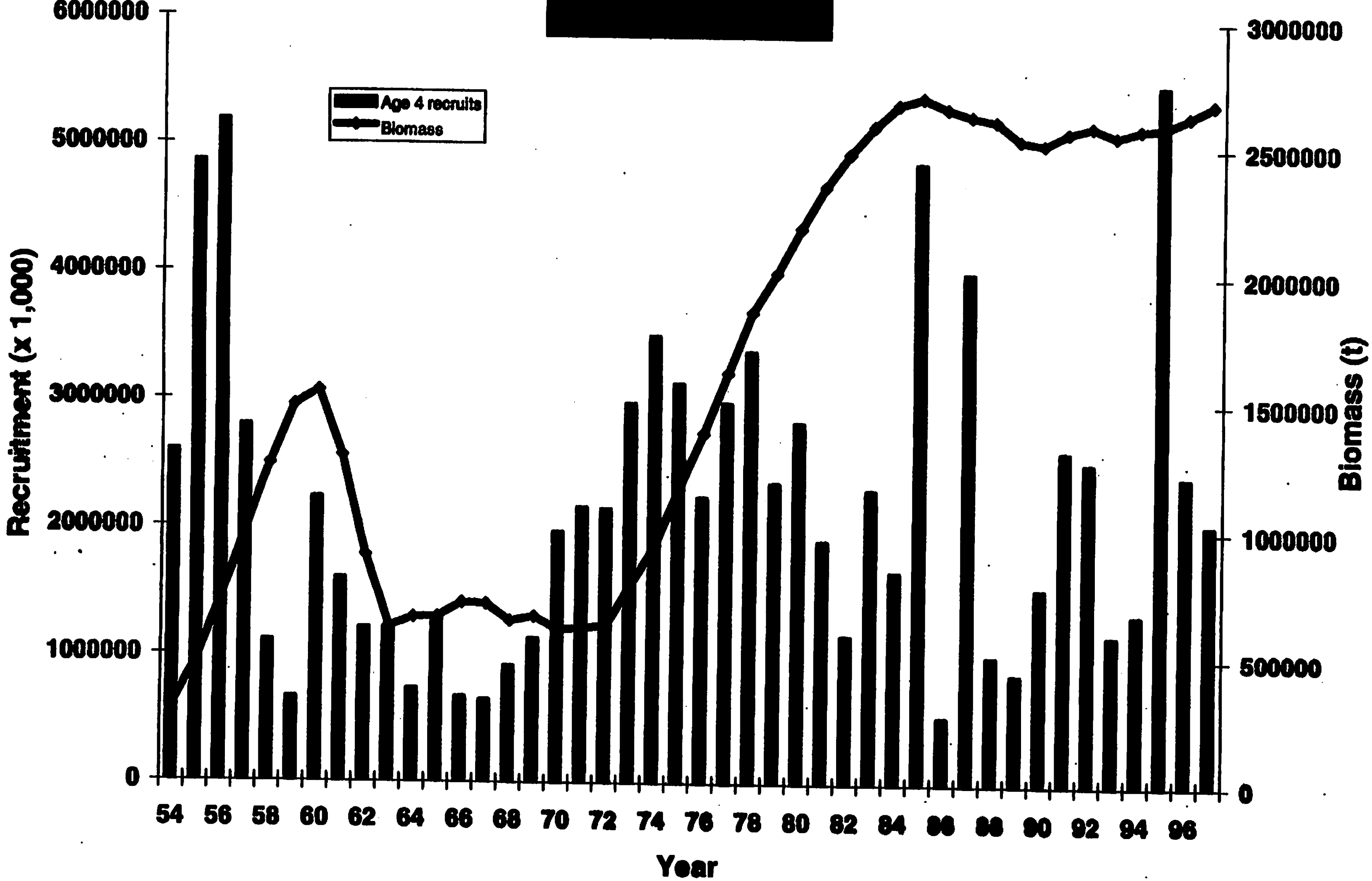


About same as 1997 Estimate


EBS Pollock
Recruitment
Biomass
Biomass (1,000's t)
14,000
12,000
10,000
8,000
6,000
4,000
2,000
-
Age 1 Recruitment (billions)
80
70
60
50
40
30
20
10
0
78
79
80
81
82
83
84
85
86
87
88
89
90
91
92
93
94
95
96
97
Year

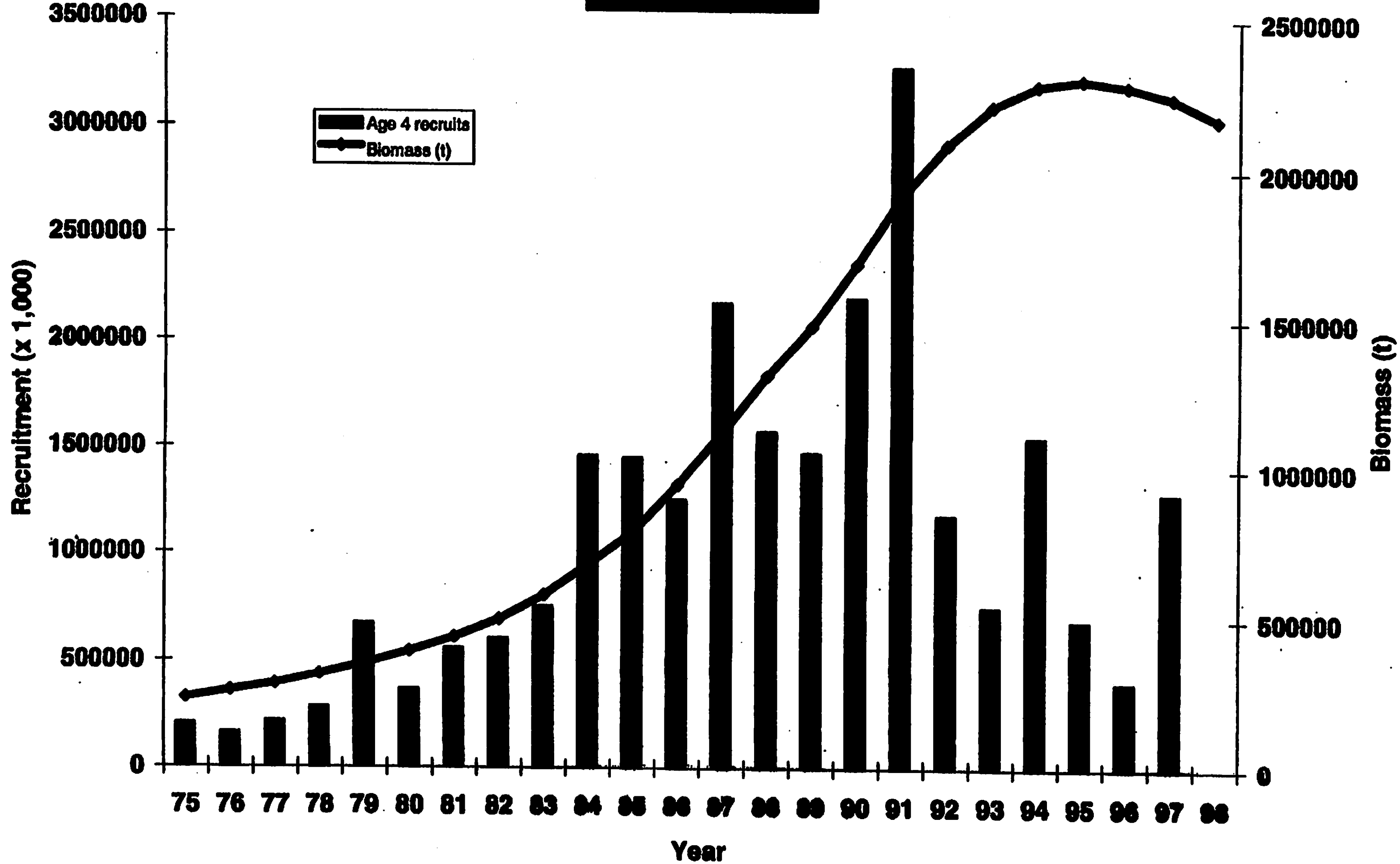

EBS Pacific Cod
Age 3+ Biomass
Age 3 Recruits
Biomass (1000s t)
2500
2000
1500
1000
500
0
Age 2 Recruits (Millions)
700
600
500
400
300
200
100
0
78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98
Year

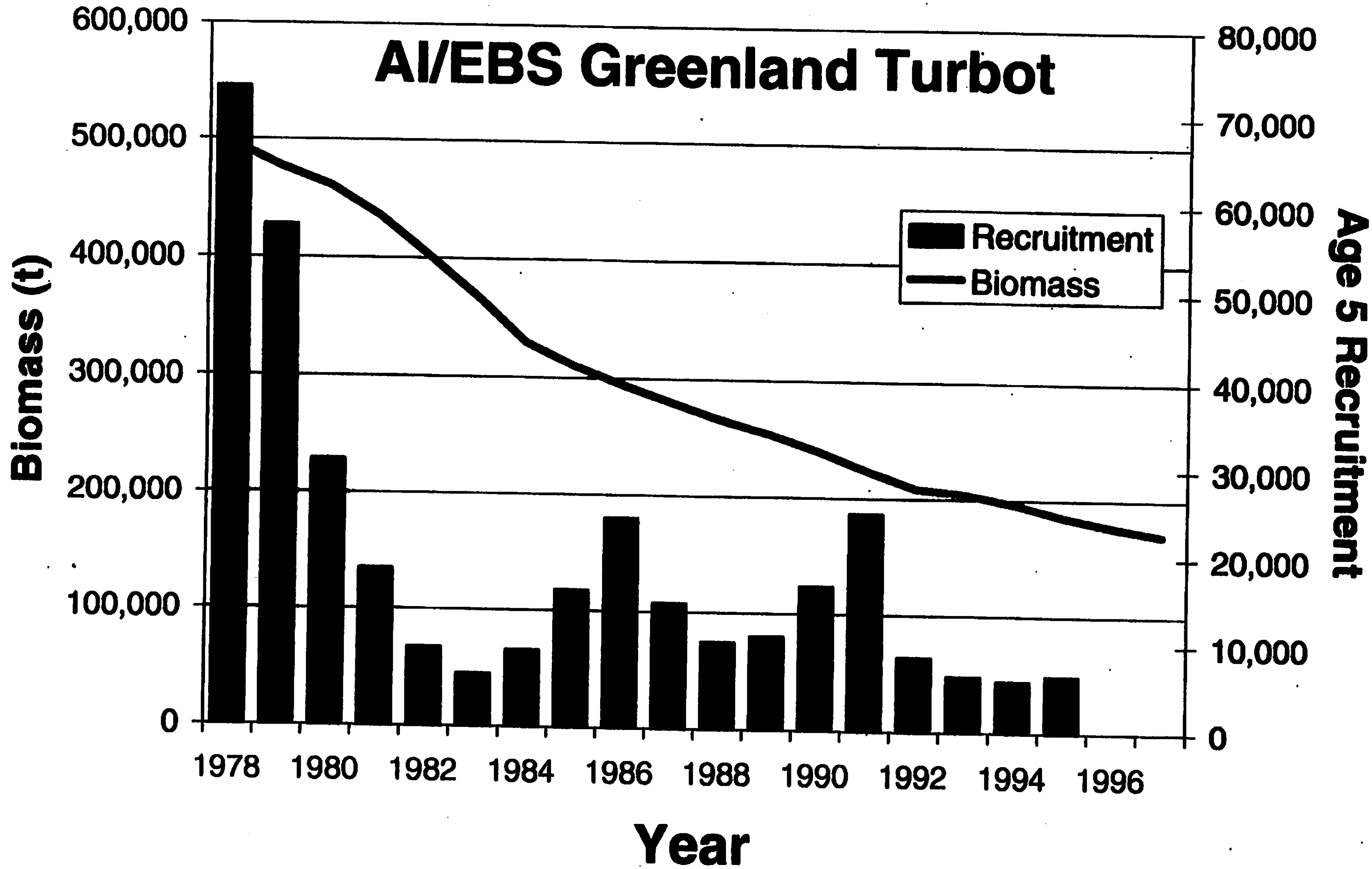
Yellowfin Sole [redacted]



Rock Sole

[redacted]

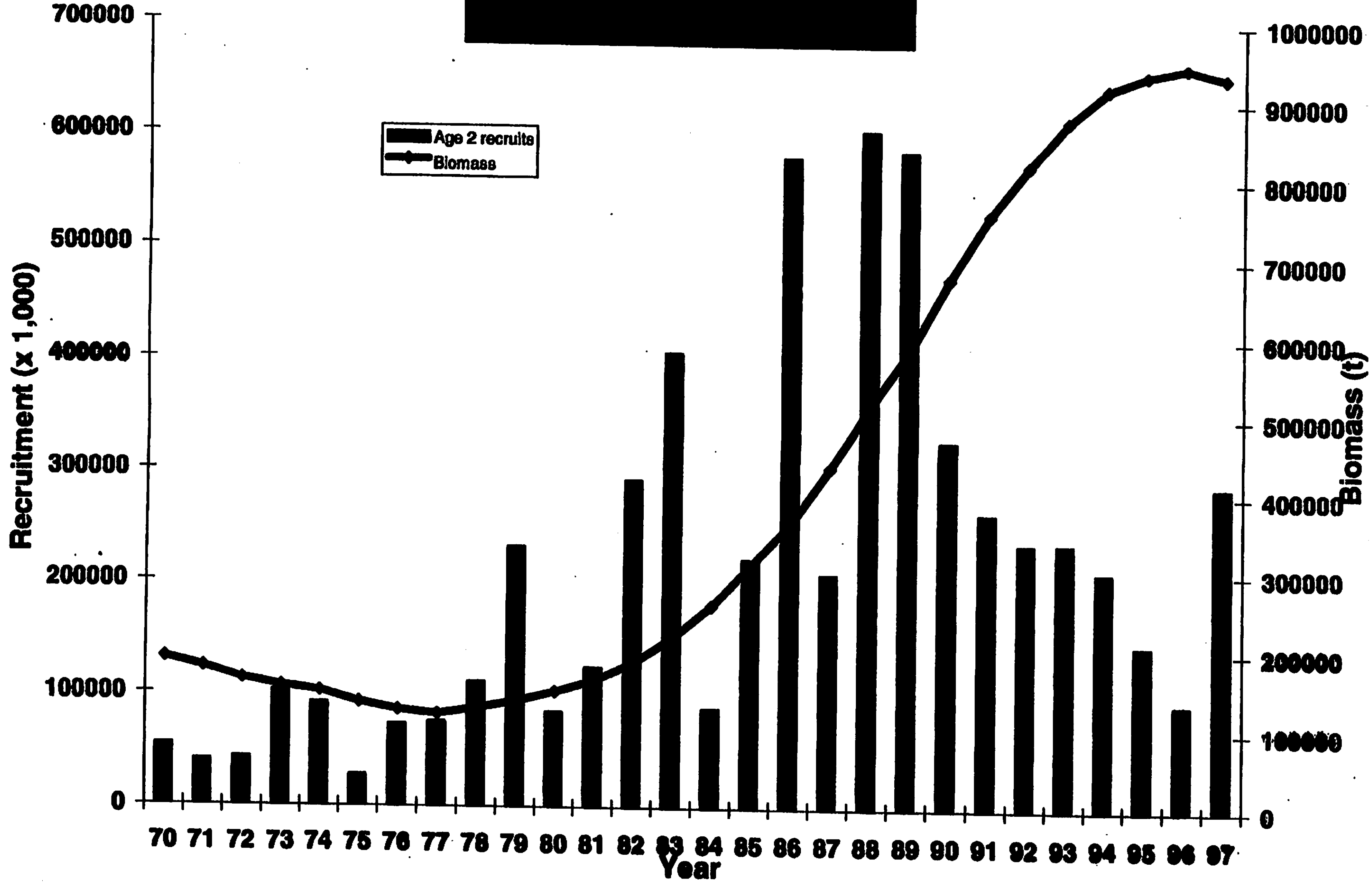




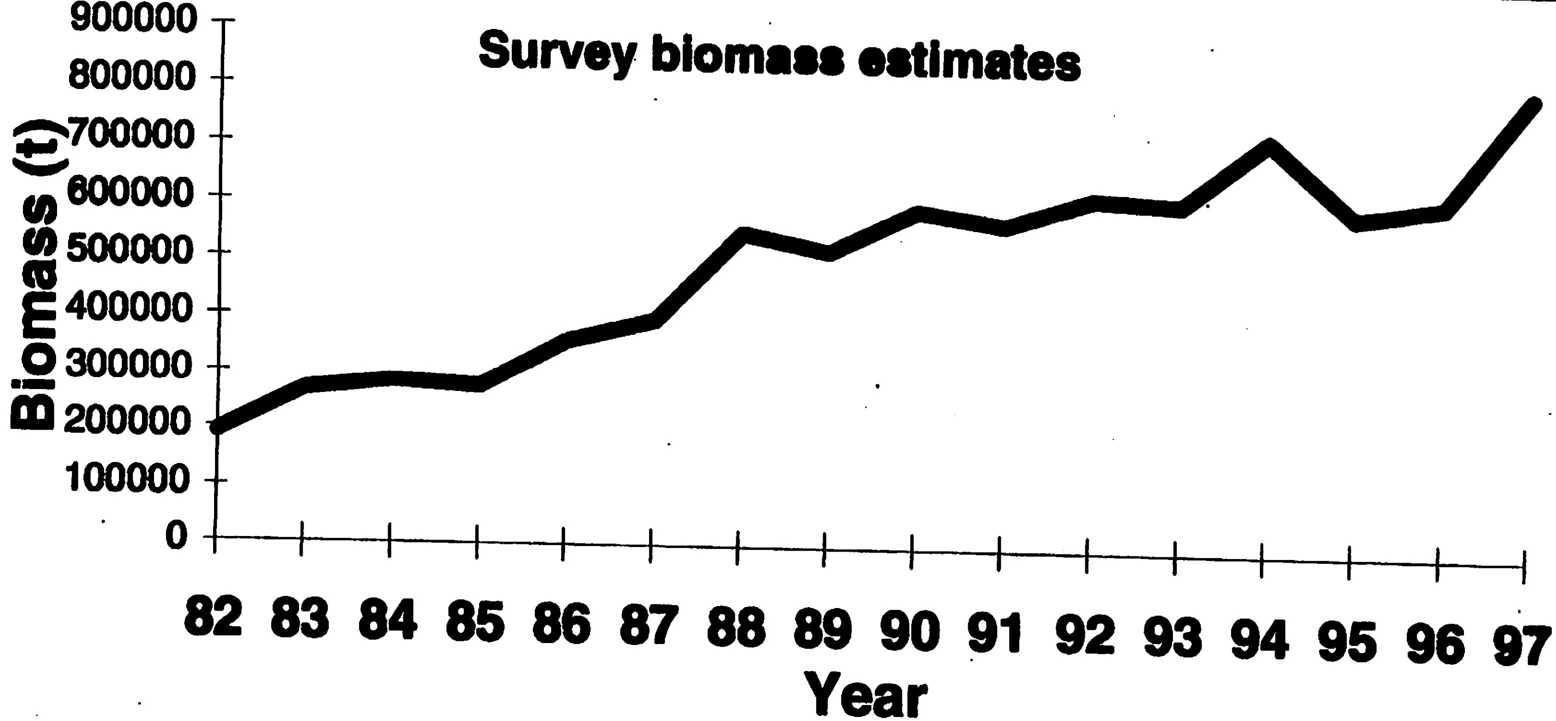
AI/EBS Greenland Turbot
Recruitment
Biomass
Biomass (t)
600,000
500,000
400,000
300,000
200,000
100,000
0
Age 5 Recruitment
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
Year

ARROWTOOTH

[redacted]

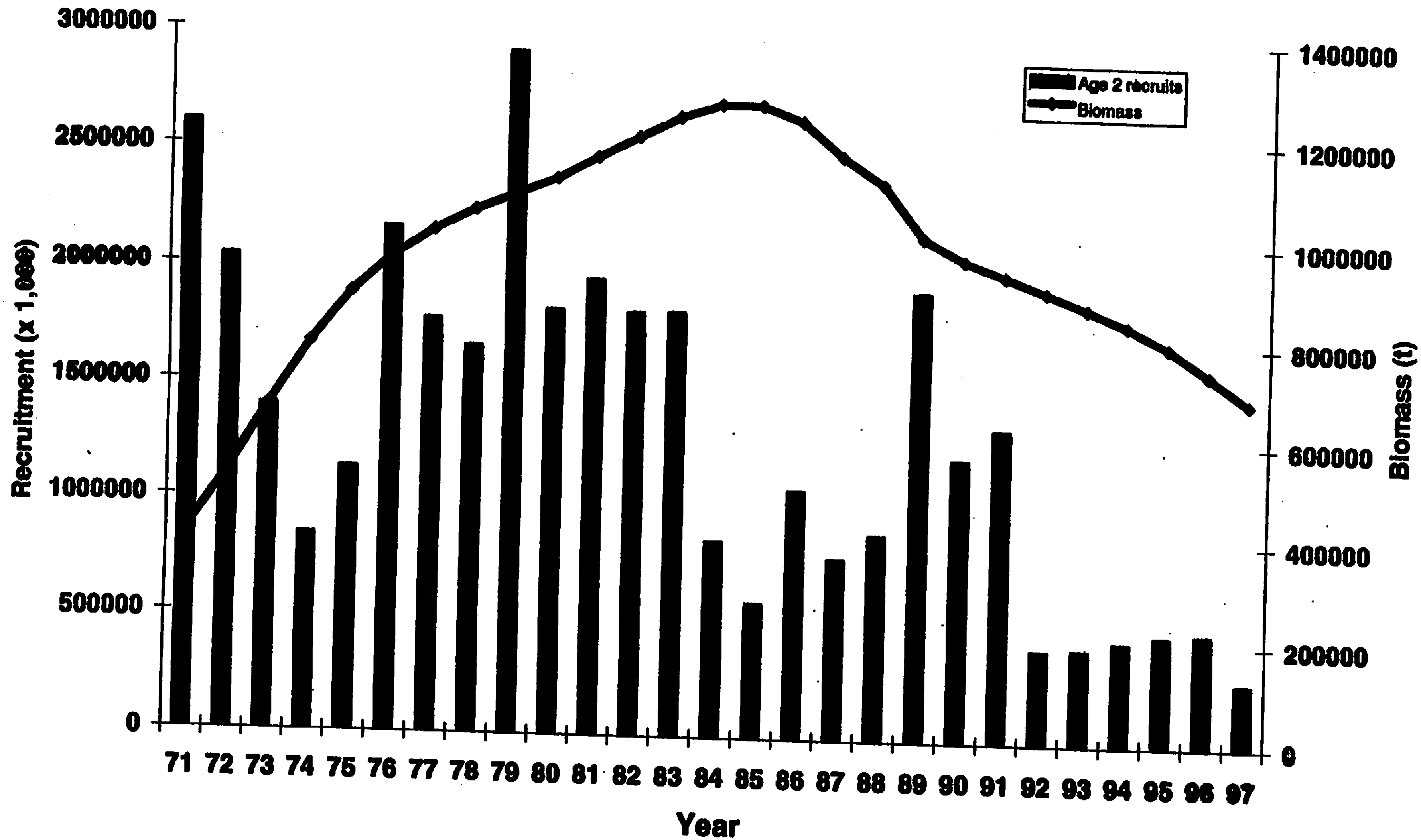


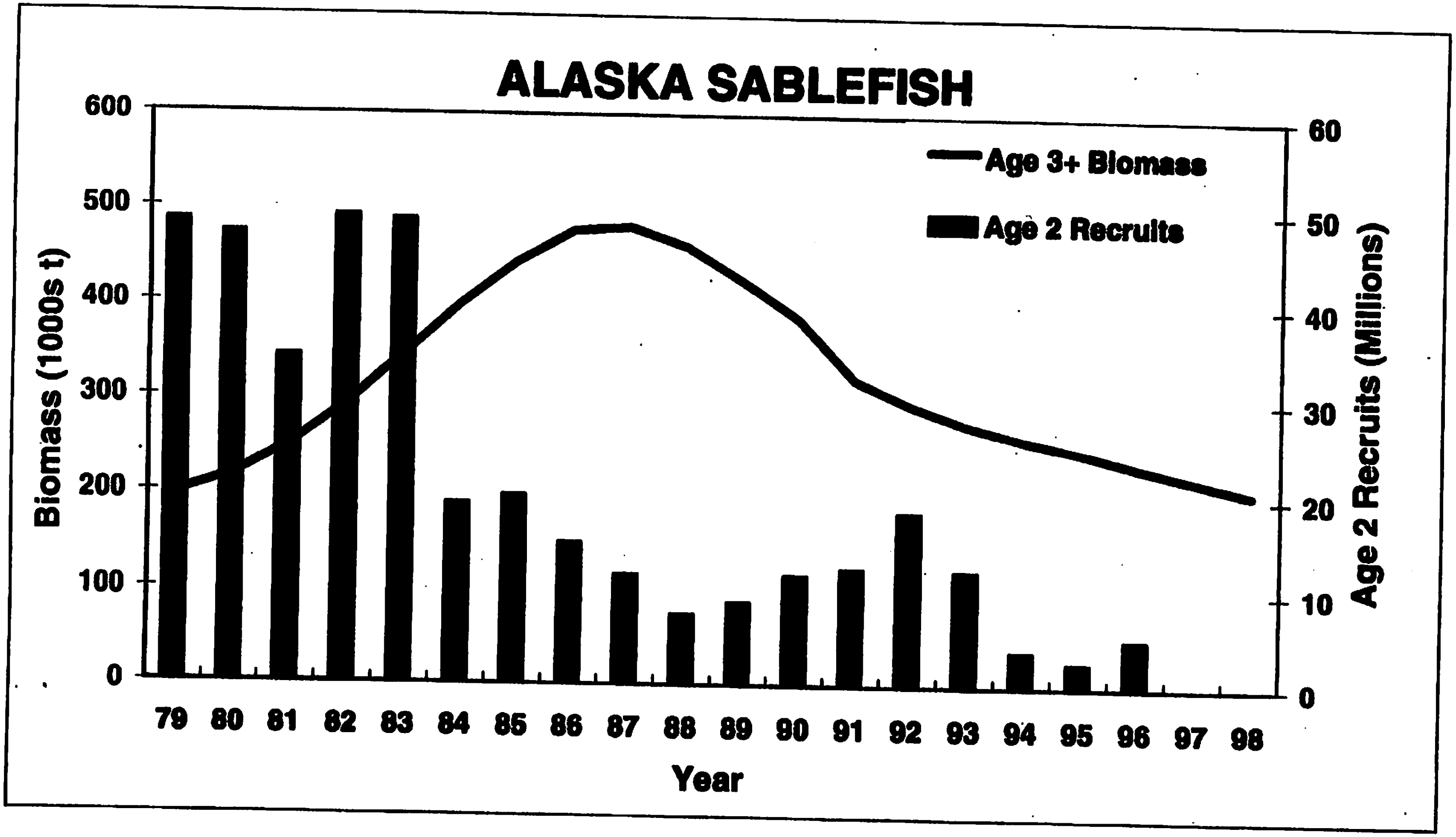
Flathead sole

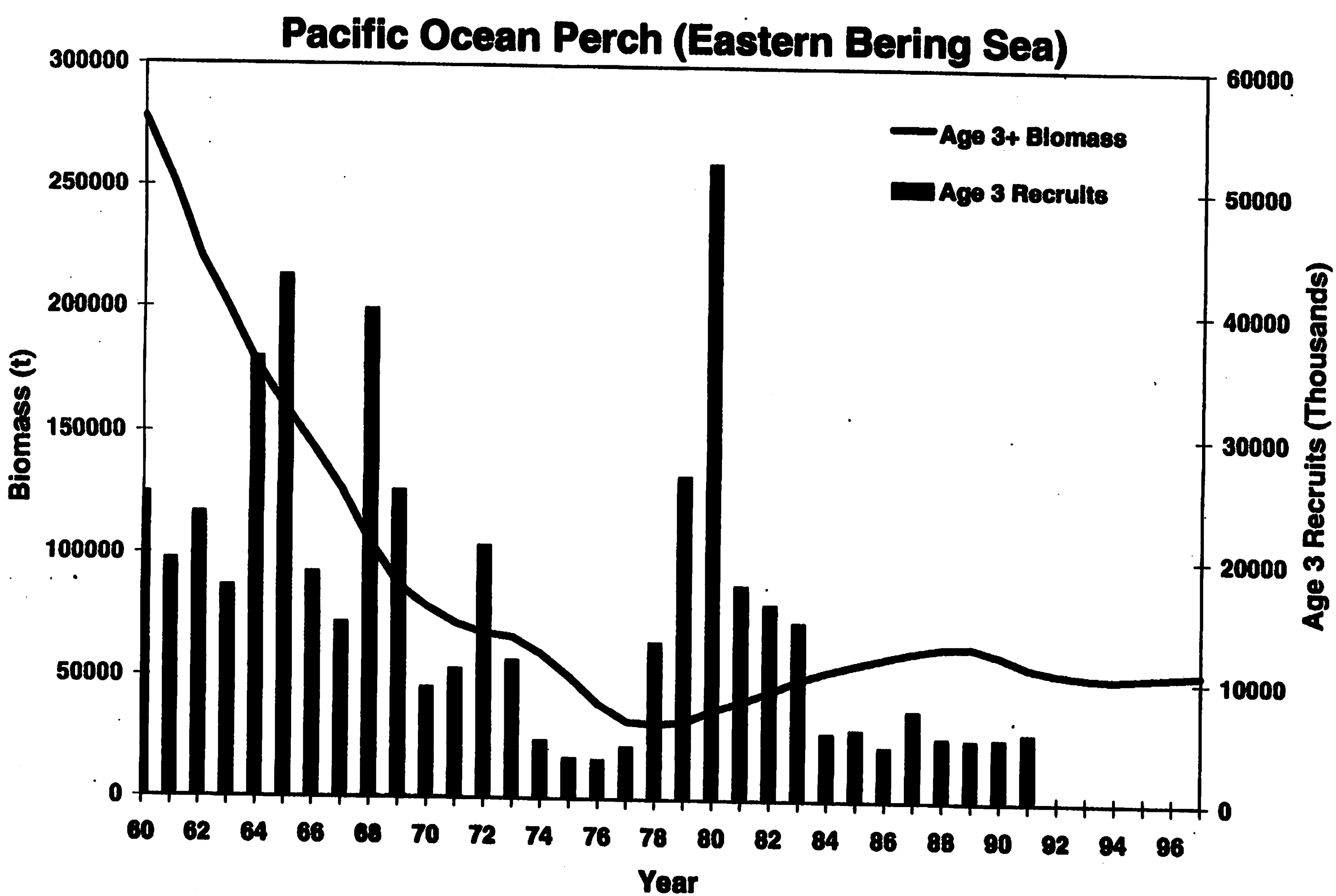


Alaska plaice

[redacted]

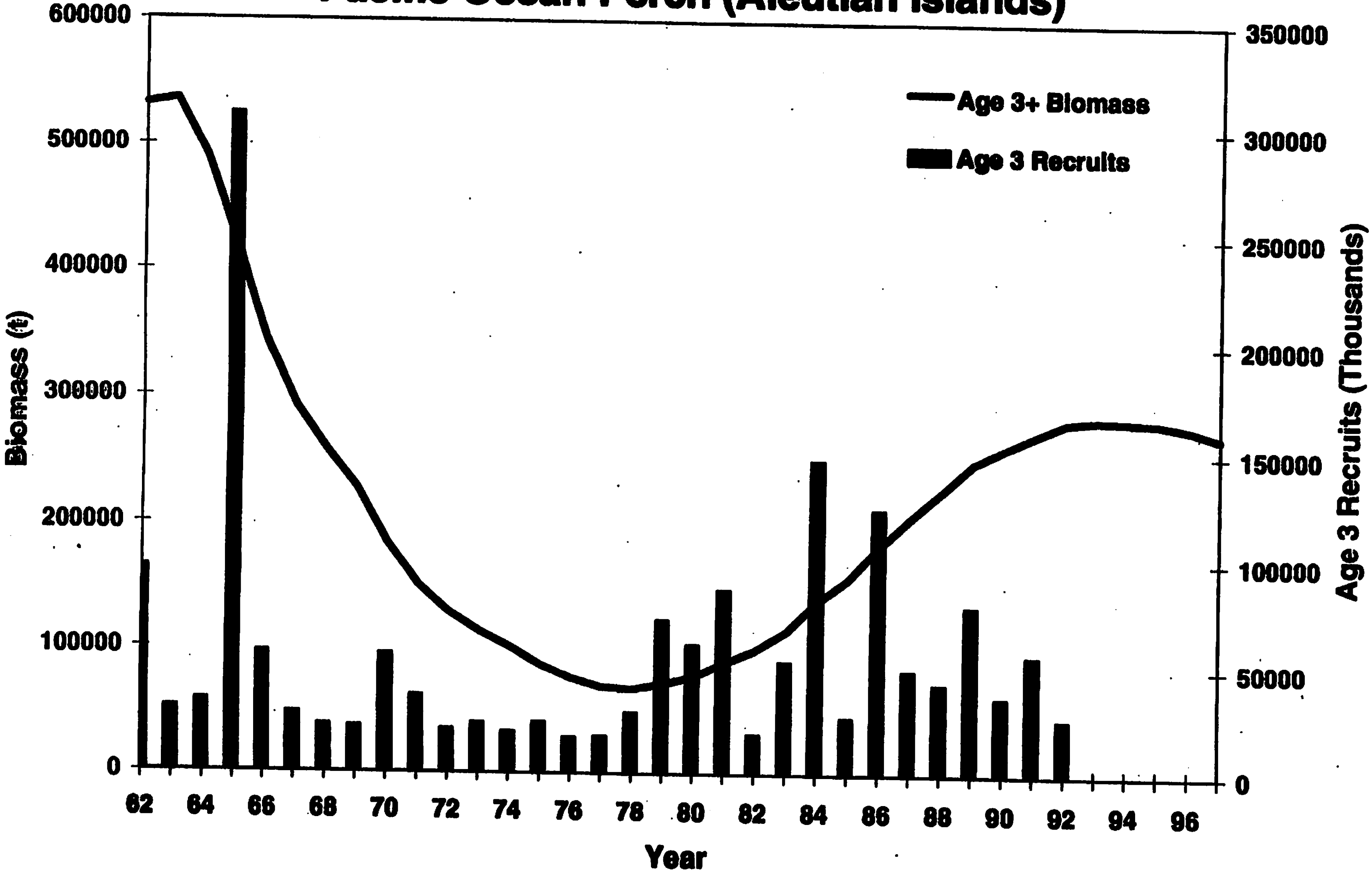


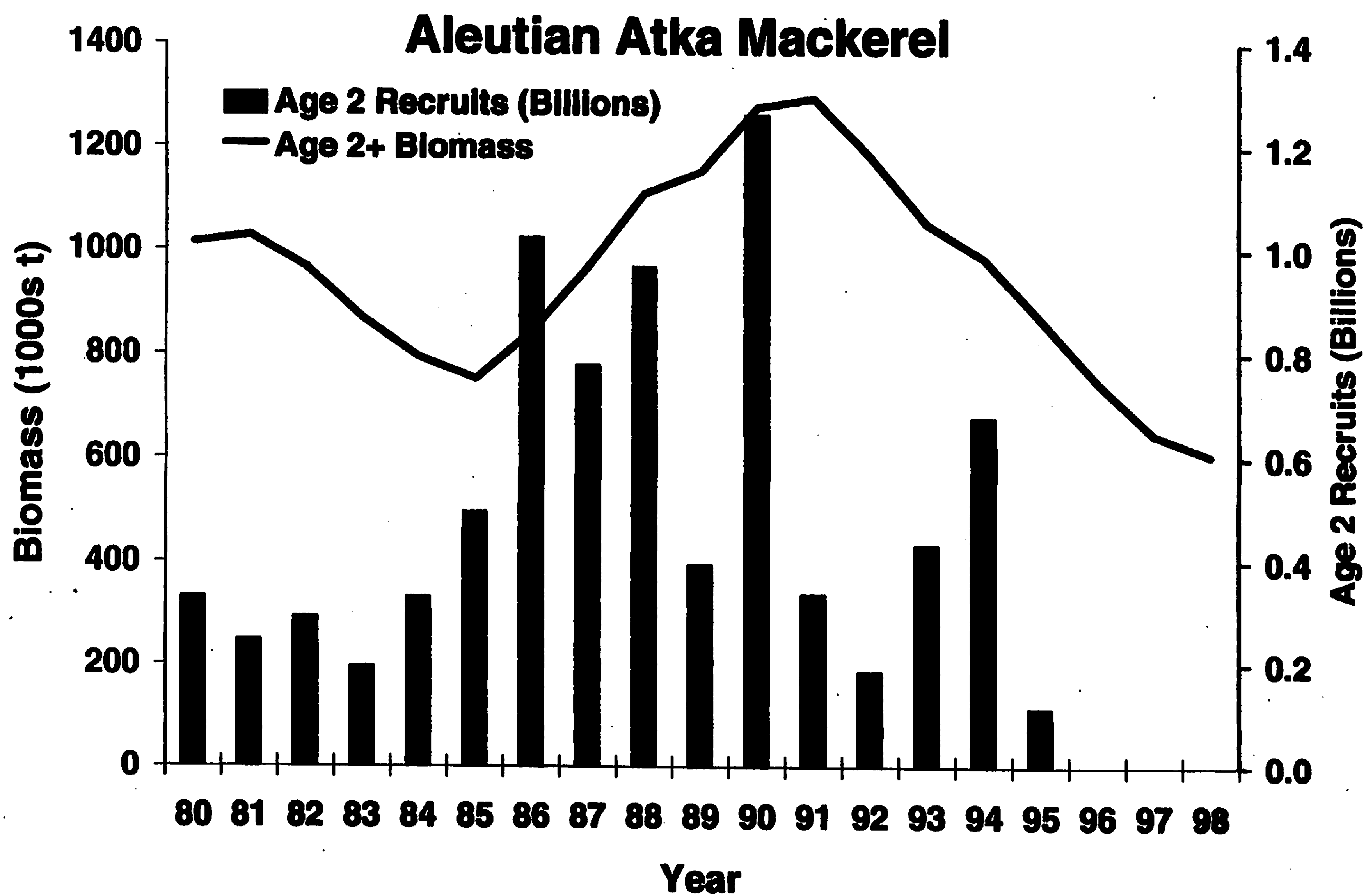

ALASKA SABLEFISH
Age 3+ Biomass
Age 2 Recruits
Biomass (1000s t)
600
500
400
300
200
100
0
Age 2 Recruits (Millions)
60
50
40
30
20
10
0
79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98
Year



Pacific Ocean Perch (Eastern Bering Sea)
Age 3+ Biomass
Age 3 Recruits
Biomass (t)
300000
250000
200000
150000
100000
50000
0
Age 3 Recruits (Thousands)
60000
50000
40000
30000
20000
10000
0
60
62
64
66
68
70
72
74
76
78
80
82
84
86
88
90
92
94
96
Year

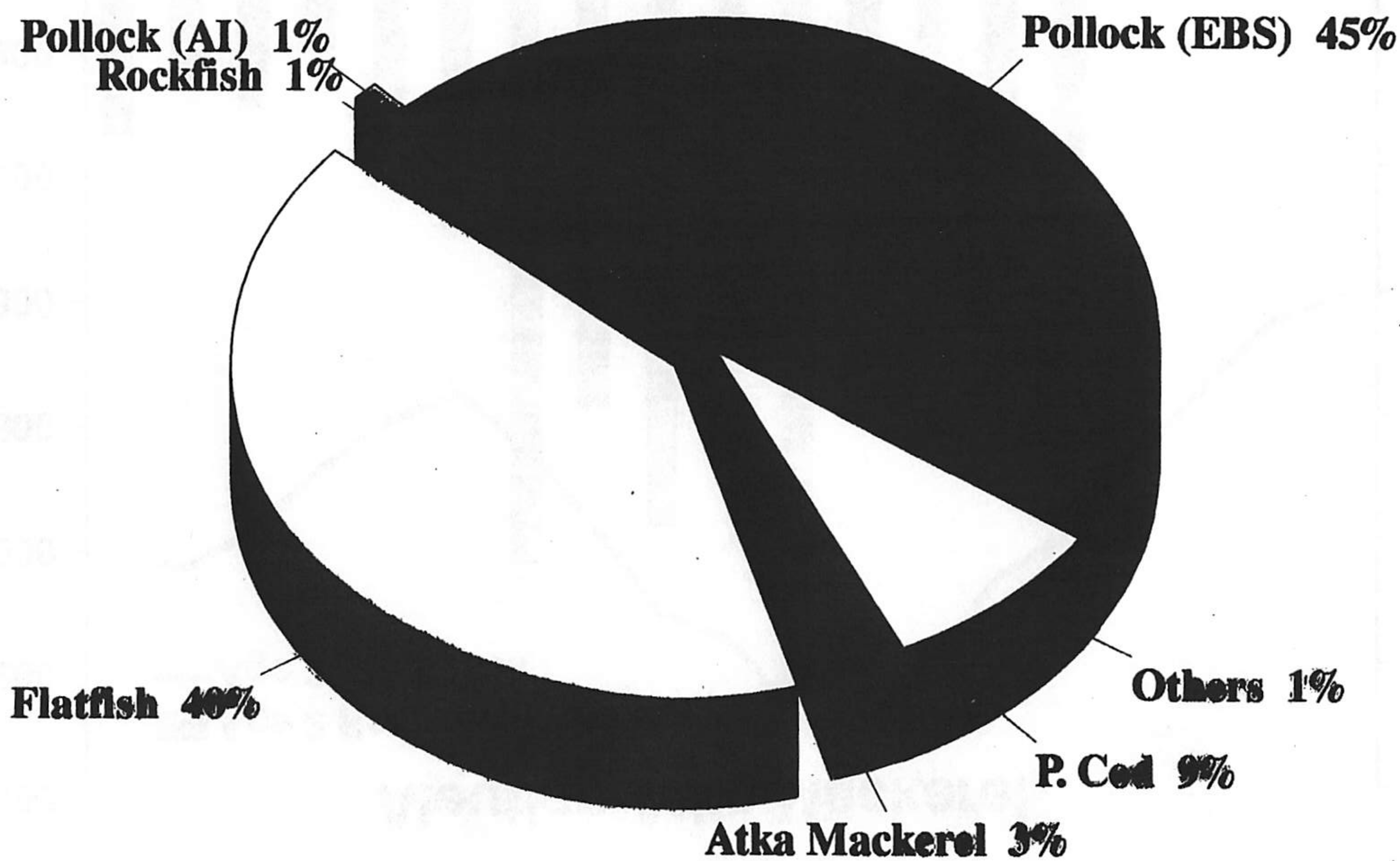
Pacific Ocean Perch (Aleutian Islands)





Aleutian Atka Mackerel
Age 2 Recruits (Billions)
Age 2+ Biomass
Biomass (1000s t)
1400
1200
1000
800
600
400
200
0
Age 2 Recruits (Billions)
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98
Year

Projected 1998 Groundfish ABCs
(Total ABC = 2,454,976 Metric Tons)



YEAR	ABC (mt)
1988	2,876,100
1989	2,700,700
1990	2,938,500
1991	2,932,485
1992	2,773,355
1993	2,476,245
1994	2,656,435
1995	2,836,985
1996	2,820,809
1997	2,464,130
1998	2,454,976