MEMORANDUM

TO: Council, SSC and AP Members

FROM: Clarence G. Pautzke
Executive Director

DATE: December 1, 1998

ESTIMATED TIME
8 HOURS
(for all D-3 items)

SUBJECT: Final BSAI Groundfish Specifications for 1999

ACTION REQUIRED

(a) Review 1999 BSAI Final Stock Assessment and Fishery Evaluation (SAFE) document.

(b) Approve final BSAI groundfish specifications for 1999:
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-November 1 ('B' Season) allowances;
3. Seasonal apportionment of the fixed gear Pacific cod TAC; and
4. Bycatch allowances, and seasonal apportionments of Pacific halibut, red king crab, Tanner crab, opilio 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 1999 groundfish fisheries.

(a) BSAI SAFE Document

The groundfish Plan Teams met in Seattle during the week of November 16-19, to prepare the final SAFE documents provided at this meeting. This SAFE forms the basis for groundfish specifications for the 1999 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-3(b)(1) are Tables 4 - 6 from the SAFE summary chapter indicating ABCs and biomass levels. The Plan Team's sum of recommended ABCs for 1999 is 2.24 million mt. Overall, the status of the stocks continues to appear relatively favorable, although in some cases biomass has declined due to below average recruitment.

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 - November 1) 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 1993-1998 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.

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 1998 fisheries, the Council recommended that 70,735 mt of the fixed gear's allocation be released during the first trimester (January 1 - April 30), 15,000 mt be released for the second trimester (May 1 - September 14), and 13,332 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 the recently adopted ban on bottom trawl gear for BSAI pollock fisheries will reduce PSC limits by 100 mt of halibut mortality. Also 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

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)

mortality cap for Pacific cod will be no greater than 900 mt. Item D-3(b)(2) is a table indicating this past year's PSC allocations and seasonal apportionments for the trawl and non-trawl fisheries. Item D-3(b)(3) is a current summary of PSC bycatch accounting for BSAI fisheries.

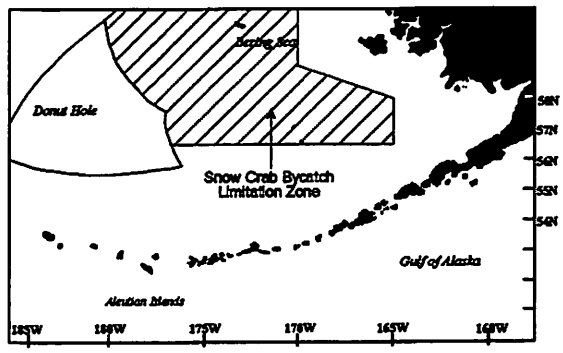
Crab PSCs

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 1998 abundance estimate for Bristol Bay red king crab, a Zone 1 PSC limit will be established at 200,000 red king crabs for 1999. Amendment 41 established stairstep PSC limits for Tanner crab. Given current total abundance of 156.5 million Tanner crab, the 1999 C. bairdi PSC limits will be established at 750,000 Tanner crabs in Zone 1 and 1,878,000 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 Amendment 40, PSC limits for snow crab (C. opilio) are 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 1998 survey indicated a total population of 3.23 billion crabs. Therefore the 1999 snow crab PSC limit will be established at 4,500,000 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 1998 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 1998 BSAI trawl fisheries, by category.

Fishery	1998 Bycatch	Percent
Turbot/ arrowtooth/sablefish	0	0.00
Rock sole/flathead/other flatfish	424,939	16.7
Yellowfin sole	2,018,429	78.4
Rockfish	0	0.00
Pacific cod	49,775	1.7
Pollock/mackerel/other species	81,958	3.2
TOTAL	2,575,102	100.0

Note that the recently adopted ban on bottom trawl gear for BSAI pollock fisheries will reduce PSC limits by 3,000 red king crab, 50,000 bairdi crab, and 150,000 opilio crab. An adjustment would be made to the specifications once the amendment is approved by the Secretary of Commerce.

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 1999 herring biomass at 168,512 mt. The PSC limit is set at 1 percent of the biomass in metric tons, or 1,685 mt.

Salmon PSCs

Currently, trawling is prohibited in the Chinook Salmon Savings Areas through April 15 upon attainment of a bycatch limit of 48,000 chinook salmon in the BSAI. The industry needs to be made aware that the Council will take final action in February on proposed changes to chinook bycatch regulations which could include a reduction in the bycatch cap, counting bycatch taken after April 15 towards the cap which could result in a "B" season closure, annually closing various hotspots, or creating separate within season caps and closures. Item D-3(b)(4) lists the specific alternatives. It is difficult to assess now whether changes to the chinook bycatch regulations will impact the 1999 fisheries or come into play initially in 2000. That will depend in part on the alternative chosen and how quickly it is processed by NMFS. There is also the "other salmon" PSC cap of 42,000 fish that may impact the trawl fisheries.

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 4-- 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 1999. Biomass and OFL are in metric tons, reported to three significant digits. Fs are reported to two significant digits.

Species	Area	Biomass[a]	OFL[b]	F_{OFL}[c]	F_{ABC}[d]
Walleye pollock	EBS	7,040,000	1,720,000	0.80	0.29
	AI	106,000	31,700	0.30	0.23
	Bogoslof	403,000	21,000	0.043	0.059
Pacific cod	BSAI	1,210,000	264,000	0.39	0.25
Yellowfin sole	BSAI	3,180,000	308,000	0.16	0.11
Greenland turbot	BSAI	177,000	29,700	0.32	0.15
Arrowtooth flounder	BSAI	819,000	219,000	0.36	0.23
Rock sole	BSAI	2,320,000	444,000	0.23	0.16
Flathead sole	BSAI	636,000	118,000	0.39	0.25
Other flatfishes	BSAI	618,000	248,000	0.47[e]	0.29[e]
Sablefish	EBS	17,000	2,090	0.17	0.11
	AI	26,000	2,890	0.17	0.11
POP complex					
True POP	EBS	45,500	3,600	0.066	0.040
Other red rockfish[f]	EBS	11,600	356	0.031[g]	0.023[g]
True POP	AI	236,000	19,100	0.095	0.068
Sharpchin/Northern[h]	AI	94,000	5,640	0.060[g]	0.045[g]
Shortraker/Rougheye[i]	AI	46,500	1,290	0.028[g]	0.021[g]
Other rockfish	EBS	7,030	492	0.070[j]	0.053[j]
	AI	13,000	913	0.070[j]	0.053[j]
Atka mackerel	AI	595,000	148,000	0.52	0.23
Squid	BSAI	n/a	2,620	n/a	n/a
Other species	BSAI	643,000	129,000	0.20	0.040

a/ Projected Jan. 1999 biomass for the age+ range reported in summary section.
b/ Maximum 1999 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/ Alaska plaice rate shown as an example.
f/ Sharpchin, northern, shortraker, and rougheye rockfish.
g/ Weighted average of species-specific rates.
h/ Sharpchin and northern rockfish.
i/ Shortraker and rougheye rockfish.
j/ Shortspine thornyhead rate shown as an example.

Table 5-- Total allowable catch (TAC) and acceptable biological catch (ABC) for 1998 (as established by the Council) and 1999 (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 (1998) Council	ABC(1998) Council	ABC(1999) Plan Team
Walleye pollock	EBS	1,110,000	1,110,000	992,000
	AI	23,800	23,800	23,800
	Bogoslof	1,000	6,410	15,300
Pacific cod		210,000	210,000	177,000
Yellowfin sole		220,000	220,000	212,000
Greenland turbot		15,000	15,000	14,200
Arrowtooth flounder		16,000	147,000	140,000
Rock sole		100,000	312,000	309,000
Flathead sole		100,000	132,000	77,300
Other flatfish		89,434	164,000	154,000
Sablefish	EBS	1,300	1,300	1,340
	AI	1,380	1,380	1,860
POP complex				
True POP	EBS	1,400	1,400	1,900
Other red rockfish	EBS	267	267	267
True POP	AI	12,100	12,100	13,500
Sharp/Northern	AI	4,230	4,230	4,230
Short/Rougheye	AI	965	965	965
Other rockfish	EBS	369	369	369
	AI	685	685	685
Atka mackerel		64,300	64,300	73,300
Squid		1,970	1,970	1,970
Other species		25,800	25,800	25,800
Groundfish complex		2,000,000	2,454,976	2,240,786

Table 6-- Summary of stock biomass, harvest strategy, 1999 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 biomass, trend[c]
Walleye pollock	EBS	7,040,000	$F_{40\%}$[d]	992,000	Average, increasing
	AI	106,000	F=0.75M	23,800	Low, stable
	Bogoslof	403,000	$F_{40\%}$[d]	15,300	Low, stable
Pacific cod		1,210,000	$F_{40\%}$[d]	177,000	Average, declining
Yellowfin sole		3,180,000	$F_{40\%}$	212,000	High, stable
Greenland turbot		177,000	$F_{40\%}$[d]	14,200	Low, declining
Arrowtooth flounder		819,000	$F_{40\%}$	140,000	High, stable
Rock sole		2,320,000	$F_{40\%}$	309,000	High, stable
Flathead sole		636,000	$F_{40\%}$	77,300	High, stable
Other flatfish		618,000	$F_{40\%}$[e]	154,000	High, declining
Sablefish	EBS	17,000	$F_{40\%}$[d]	1,340	Low, declining
	AI	26,000	$F_{40\%}$[d]	1,860	Low, declining
POP complex					
True POP	EBS	45,500	$F_{40\%}$[d]	1,900	Low, stable
Other red rock.	EBS	11,600	F=0.75M	267	Not available
True POP	AI	236,000	$F_{40\%}$	13,500	Average, stable
Sharp/Northern	AI	94,000	F=0.75M	4,230	Not available
Short/Rougheye	AI	46,500	F=0.75M	965	Not available
Other rockfish	EBS	7,030	F=0.75M[e]	369	Not available
	AI	13,000	F=0.75M[e]	685	Not available
Atka mackerel	AI	595,000	F_{mac}[f]	73,300	Average, declining
Squid		n/a	0.75F_{his}[g]	1,970	Not available
Other species		643,000	F_{his}[g]	25,800	Not available
Groundfish Complex Total		18,243,630		2,240,786	
Above average, declining					

a/ Projected Jan. 1999 biomass for the age+ range reported in summary section.
b/ Harvest strategy used to compute ABC.
c/ Relative biomass based on long-term average, trend based on short-term projection. "Average" is used in an approximate sense.
d/ Adjusted on the basis of the relationship between projected spawning biomass and $B_{40\%}$.
e/ Proxy values used for some species.
f/ Species-specific harvest strategy used only for Atka mackerel.
g/ Fishing mortality rate implied by setting ABC equal to historic average catch.

1998 BSAI Trawl Fisheries PSC

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.

NMFS/AKR
11/25/98
13:41:02

1998 BERING SEA/ALEUTIAN ISLANDS FISHERIES
PROHIBITED SPECIES BYCATCH
Week Ending: 11/21/98

TRAWL HERRING, BSAI

Fishery group	Herring (mt)	Cap (mt)	%
Midwater pollock	821	1,146	72%
Pacific cod	1	20	4%
Yellowfin sole	14	248	6%
Rockfish	0	7	0%
Other	76	143	53%
Rock sole/Other flatfish	1	20	5%
Total:	914	1,584	58%

TRAWL SALMON, BSAI

Fishery group	Chinook (#'s)	Other (#'s)	Total (#'s)
Midwater pollock	55,549	69,831	125,380
Bottom pollock	0	0	0
Pacific cod	3,091	670	3,761
Yellowfin sole	106	239	344
Rock sole/Other flatfish	403	94	497
Rockfish	0	0	0
Other	1,447	1,993	3,440
Seasonal Total:	60,596	72,827	133,423

TRAWL BAIRDI TANNER CRAB

	ZONE 1			ZONE 2		
Fishery group	Crabs (#'s)	Cap (#'s)	%	Crabs (#'s)	Cap (#'s)	%
Rock sole/Other flatfish	242,945	273,848	89%	200,614	330,225	61%
Pacific cod	65,292	123,232	53%	38,914	180,375	22%
Yellowfin sole	229,799	255,592	90%	603,968	990,675	61%
Pollock/AMCK/Other species	19,245	41,077	47%	37,064	434,750	9%
Rockfish	0	0	0%	699	6,475	11%
GTRB/ARTH/SABL	0	0	0%	2,418	0	0%
Total:	557,280	693,749	80%	883,678	1,942,500	45%

TRAWL C. OPILIO TANNER CRAB in the COBLZ AREA

Fishery group	Crabs (#'s)	Cap (#'s)	%
Rock sole/Other flatfish	424,939		
Pacific cod	49,775		
Yellowfin sole	2,018,429		
Pollock/AMCK/Other species	81,958		
Rockfish	0		
GTRB/ARTH/SABL	0		
Total:	2,575,102	4,304,950	60%

NMFS/AKR
11/25/98
13:41:26

1998 BERING SEA / ALEUTIAN ISLANDS FISHERIES
TRAWL HALIBUT BYCATCH MORTALITY (METRIC TONS)

WED	PACIFIC COD	YELLOWFIN SOLE	ROCK SOLE/ FLATHEAD SOLE/ OTHER FLATFISH	PLCK/AMCK/ OTHER	ROCKFISH	ARROWTOOTH/ SABLEFISH/ TURBOT
01/24/98	54	0	29	17	0	0
01/31/98	38	24	51	7	0	0
02/07/98	25	7	26	15	0	0
02/14/98	54	0	68	2	0	0
02/21/98	42	0	58	12	0	0
02/28/98	55	7	124	1	0	0
03/07/98	99	23	103	1	0	0
03/14/98	206	38	0	1	0	0
03/21/98	123	110	0	0	0	0
03/28/98	67	42	0	0	0	0
04/04/98	31	6	17	0	0	0
04/11/98	84	8	19	0	0	0
04/18/98	54	4	36	0	0	4
04/25/98	48	10	10	0	0	0
05/02/98	13	30	0	0	0	0
05/09/98	2	22	0	0	0	0
05/16/98	0	35	0	0	0	1
05/23/98	3	13	0	0	0	0
05/30/98	2	14	0	1	0	0
06/06/98	2	12	0	0	0	0
06/13/98	0	14	0	0	0	0
06/20/98	5	15	0	3	0	0
06/27/98	0	7	0	0	0	0
07/04/98	0	0	12	0	4	0
07/11/98	1	0	19	0	14	0
07/18/98	0	0	27	0	0	0
07/25/98	38	9	18	10	0	0
08/01/98	27	9	36	1	0	0
08/08/98	7	6	46	2	0	6
08/15/98	18	14	34	5	0	2
08/22/98	25	16	7	2	0	4
08/29/98	14	36	15	0	0	0
09/05/98	0	28	11	26	0	4
09/12/98	1	31	19	55	0	2
09/19/98	2	39	12	52	0	0
09/26/98	2	25	10	51	0	0
10/03/98	0	36	2	20	0	0
10/10/98	1	10	3	10	0	1
10/17/98	1	33	1	24	0	0
10/24/98	0	69	0	10	0	0
10/31/98	0	38	4	11	0	0
11/07/98	6	32	5	4	0	6
11/14/98	2	19	1	5	0	5
11/21/98	4	73	0	0	1	15
	1,158	966	821	347	19	53
SEASONAL CAP:	1,434	930	735	324	69	0
% OF CAP:	81%	104%	112%	107%	28%	0%
REMAINING:	276	-36	-86	-23	50	-53
ANNUAL CAP:	1,434	930	735	324	69	0
% OF CAP:	81%	104%	112%	107%	28%	0%

NMFS/AKR
11/25/98

1998 BERING SEA / ALEUTIAN ISLANDS FISHERIES
FIXED GEAR HALIBUT BYCATCH MORTALITY (METRIC TONS)

	PACIFIC COD HOOK & LINE		OTHER SPECIES HOOK & LINE, JIG		ALL GROUNDFISH POT GEAR	
WED	WEEKLY	TOTAL	WEEKLY	TOTAL	WEEKLY	TOTAL
01/03/98	14	14	0	0	0	0
01/10/98	31	45	0	0	0	0
01/17/98	14	58	0	0	0	0
01/24/98	16	74	0	0	0	0
01/31/98	13	87	0	0	0	0
02/07/98	16	103	0	0	0	0
02/14/98	13	116	0	0	0	0
02/21/98	15	131	0	0	0	0
02/28/98	13	144	0	0	0	0
03/07/98	11	155	0	0	0	0
03/14/98	15	170	0	0	0	0
03/21/98	11	181	0	0	0	1
03/28/98	7	188	0	0	0	1
04/04/98	6	194	0	0	1	2
04/11/98	13	207	0	0	1	2
04/18/98	20	227	0	0	1	4
04/25/98	26	252	0	0	1	5
05/02/98	13	266	4	4	2	7
05/09/98	14	279	8	12	4	11
05/16/98	23	302	4	16	3	14
05/23/98	0	302	11	27	2	17
05/30/98	0	302	7	34	2	19
06/06/98	0	302	5	38	3	22
06/13/98	0	302	2	41	3	25
06/20/98	0	303	7	47	5	30
06/27/98	0	303	2	49	1	31
07/04/98	0	303	2	51	1	32
07/11/98	0	303	0	51	0	33
07/18/98	0	303	1	53	0	33
07/25/98	0	303	0	53	1	33
08/01/98	0	303	1	54	0	34
08/08/98	0	303	1	55	0	34
08/15/98	0	303	1	55	0	34
08/22/98	0	303	0	55	0	34
08/29/98	0	303	1	56	0	34
09/05/98	0	303	0	57	0	34
09/12/98	0	303	1	57	0	35
09/19/98	28	331	1	58	0	35
09/26/98	33	364	0	58	0	35
10/03/98	41	405	0	59	1	36
10/10/98	40	445	0	59	3	38
10/17/98	52	498	0	59	3	41
10/24/98	29	526	0	59	1	42
10/31/98	28	554	0	59	0	42
11/07/98	32	586	0	59	0	42
11/14/98	37	623	0	59	0	42
11/21/98	36	658	0	59	0	42

PCOD SEASONAL CAP: 750
% OF SEASONAL CAP: 88%

OTHER SEASONAL CAP: 83
% OF SEASONAL CAP: 71%

Pot gear is exempt from bycatch allowances

REMAINING PCOD: 92

REMAINING OTHER: 24

1998 BSAI NON-TRAWL PACIFIC COD FISHERY HALIBUT BYCATCH ALLOWANCES

Excerpted from BSAI Amendment 58

Executive Summary

The Magnuson-Stevens Act amendments emphasized the importance of bycatch effects on achieving sustainable fisheries. National Standard 9 mandates that conservation and management measures shall, to the extent practicable: (1) minimize bycatch; and (2) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch. This Environmental Assessment/Regulatory Impact Review/Initial Regulatory Flexibility Analysis (EA/RIR/IRFA) addresses a proposal to minimize the incidental bycatch of chinook salmon in the groundfish trawl fisheries of the Bering Sea and Aleutian Islands. The following three alternatives were examined:

Alternative 1: No Action. Trawling is prohibited in the Chinook Salmon Savings Areas (CHSSA) through April 15 upon attainment of a bycatch limit of 48,000 chinook salmon in the BSAI.

Alternative 2: Include salmon taken after April 15 towards the bycatch limit of 48,000 chinook salmon. The Chinook Salmon Savings Areas would close upon attainment of the bycatch limit, whenever this would occur. Hence these areas could close, or remained closed, during the pollock 'B' season.

Alternative 3: Reduce the trigger level to 36,000 chinook salmon in the BSAI. Trawling would be prohibited in the Chinook Salmon Savings Areas through April 15 upon attainment of a bycatch limit of 36,000 chinook salmon in the BSAI.

> Option 1 (applicable to Alternatives 2 and 3): Seasonally allocate the PSC limit, such that there are separate triggers for the pollock 'A' and 'B' season.
>
> Option 2 (applicable to Alternatives 2 and 3): Begin accounting towards the PSC limit at the start of the 'B' season (currently September 1), with the amount carried over to the next pollock 'A' season.

Alternative 4: Annual closure of specific "hot spot" blocks. These specific blocks are the five contiguous blocks of the current Chinook Salmon Savings Area that in the vicinity of Unimak Island. These have been labeled in the document as 200, 201, 202, 227, 228, and 254. Block 201 has been further subdivided in half east to west and labeled as 997 (the eastern half) and 998 (the western half).

> Option 1: Consider a seasonal closure of the selected blocks.
>
> Option 2 (applicable to Alternative 4 and Option 1): The closure would only apply to the pollock fisheries although chinook salmon bycaught in all fisheries would apply toward a cap if in effect.

Alternative 5: Alternative 4 would be combined with Alternatives 1, 2, and 3. A cap would apply to closure of the "hot spot" blocks.

Draft Minutes of the
Bering Sea / Aleutian Islands Groundfish Plan Team
Meeting, November 16-19, 1998

The Bering Sea/Aleutian Islands (BSAI) Groundfish Plan Team met November 16-19 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, 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 and ecosystems considerations were also discussed.

The plan team reviewed final assessments of groundfish for the 1999 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

Age samples - Age sample size for the Aleutians pollock fishery is minimal, ranging from 45 to 308 per year and was only 163 in 1996 (Table 1.4). Changes in observer collection methods for 1999 may increase sample sizes. We recommend higher sample sizes be collected for the Aleutians pollock fishery. We also note that no ages were collected in the Northwest Bering strata in 1996.

The information on age sample sizes presented in the assessment is insufficient for us to determine if the assumed effective sample sizes of 200 for the fishery and 30 for the surveys are reasonable. The assumed values are important because they often affect abundance estimates, especially if data imply contradictory results. Age sample size is presented for the fishery but not the bottom trawl and hydroacoustic surveys. We recommend that the survey data be presented as well as the number of sampled hauls for both the fishery and surveys.

Stock-recruitment relationship - The model we used to recommend an ABC last year is equivalent to this year's constant recruitment model, model 9. The assessment authors are concerned that this model is unrealistic because recruitment is not zero when abundance is zero. We recommend that instead a Beverton-Holt stock-recruitment relationship be modeled, which would satisfy the assessment authors concern that the stock-recruitment relationship goes to zero when abundance is zero and would represent a stock-recruitment relationship where recruitment is constant over a range of stock sizes.

MSY calculations - The stock-recruitment curve implies that the population abundance is at it's most productive spot (Figure 1.24). The value of Fmsy implies that the stock would remain at this productive spot if fished harder (@1.45 mmt). We recommend that the authors address whether they believe this to be true. We also request that the authors show estimates of Fmsy and Bmsy from previous pollock assessments and describe why these estimates have changed over time.

Fishing rate calculations - We recommend that the fishing rate calculations be consistent with the timing of the fishery and spawning, to the extent practical.

Fishing spawning aggregations - The current assessment added information on gear changes and stock structure (other considerations section). We recommend that a discussion of the possible effect of fishing spawning aggregations of pollock also be added to the other concerns section of the assessment.

Temporal and spatial distribution of BSAI pollock fisheries - The current assessment added information on the temporal and spatial distribution of BSAI pollock fisheries. We recommend that more detailed information be presented. One figure presented the tons of pollock catch and percentage of pollock catch in sea lion critical habitat. We recommend that this information also be presented by season. Another figure presented the exploitation rate by area during summer. We recommend that the exploitation rate by area also be estimated for winter.

Combined Aleutian Islands, Bogoslof and eastern Bering Sea assessment - We encourage exploration of a combined Aleutian Islands, Bogoslof and eastern Bering Sea assessment in future years.

Year class strengths and population projections - The next possibly above average year class is the 1996 year class, although this year class currently is <20% selected to fishery and survey, and isn't expected to be substantially recruited (>50%) until 2001. Female spawning biomass is estimated to reach bottom in 1998 and is expected to increase slightly next year if F40% ABC set and continue to increase thereafter as the 1996 year class recruits, if year class is in fact above average. Projections with median recruitment, but recruitment is autocorrelated, so expect weak year classes after 1996 year class, if strong.

The probability distribution of projected 2003 spawning biomass is presented in this year's assessment. This is a useful plot to show the range of uncertainty of future abundance. The plot would be more usable if probability distribution for other years were added, e.g. 1999, 2000, 2001, and 2002, the 20% and 80% probabilities were marked on each distribution, and if the current biomass were indicated.

Donut-Bogoslof catches - We recommend that the authors analyze the potential effect on abundance estimates of excluding the Donut-Bogoslof catches if in fact, Donut-Bogoslof fish are "a mixture of pollock that migrate from the U.S. and Russian shelves to the Aleutian Basin at maturity", as stated in the introduction.

Recommendation and rationale - The EBS pollock population is projected to be at about 30% of unfished biomass in 1999 (Table 1.10). The population has decreased the last few years, due to a lack of strong year classes since the 1989 year class, but is projected to increase to B40% if F40% applied and the 1996 year class is above average (Figures 1.26 and 1.27). The trawl survey biomass is near it's lowest level (Table 1.5), dropping 27% from 1997 to 1998, spawning biomass is 30% of unfished level, and the strength of the 1996 year class is uncertain (Figure 1.24). We recommend that 1999 ABC of 992 tmt (model 2 ABC), a 12% drop from 1998, and warn that ABC 2000 may be less if 1999 trawl survey shows continued decline and/or 1996 year class weaker than expected. (ABC 1996 1.19, 1997 1.13, 1998 1.11 mmt).

Pacific cod

Abundance trend - Trawl survey abundance estimate decreased 11.7% from 1997 to 1998 (Table 2.15), the fourth successive decrease. Three most recent estimated recruitments, 1993 to 1995, are classified as below average, the most recent above average year class is 1992 (p. 16). Estimated biomass has been decreasing for 3 years (Figure 2.6) and is projected to continue decreasing until 2002 (Table 2.29).

Recommendation and rationale - We concur with authors' recommendation to reduce 1999 BSAI ABC to 177 tmt (Table 2.33) from 210 tmt in 1998 and 270 tmt (TAC) in 1997 (Table 2.2) based on decreasing trend in trawl survey and model abundance estimates. The ABC is projected to reach about 150 tmt by 2001.

Survey selectivity - We are concerned that the model estimate of trawl survey selectivity is sharply dome-shaped, implying significant amounts of large outside of the survey frame. Gary Walters, a Bering Sea trawl survey

scientist, says that the slope trawl survey data implies that there's not much fish outside the survey frame in deep water. The implication of this statement is that the model is overestimating biomass. We recommend that the authors examine the slope trawl survey data, as well as longline survey data, and tabulate the proportion of cod by size class outside the shelf trawl survey frame.

Data plots - We recommend that the authors also provide plots of estimated and projected exploitable and spawning biomass and estimated recruitment.

Yellowfin sole

The surveyed and modeled abundance trends are flat. We concur with the authors recommended ABC of 212 mt, a value similar to last year.

Greenland turbot

Data - Longline catches have been an increasing share of the reported Greenland turbot catches in recent years. Killer whales can remove substantial catch from longlines. We recommend that the authors analyze observer data to estimate how much unreported mortality occurs due to killer whale depredation of longlines.

Abundance - Estimated biomass is 32% of unfished biomass (p. 13) and is decreasing (Figure 4.6). Longline survey index is increasing however. This conflict may be due to an increase in killer whale depredation increasing unreported mortality and its effect of model estimates of abundance.

Discards - A substantial percentage of Greenland turbot discards are reported as occurring in the directed sablefish fishery. However we don't know if these discards are important because the amount discarded is not reported in the assessment. Therefore we recommend that the authors tabulate catch and discards by fishery to examine discard trends. If the amount of Greenland turbot discards are substantial in a fishery, we recommend that the authors analyze why the discards are high.

Arrowtooth flounder

Abundance peaked in 1996, now decreasing (Figure 5.4), due to good recruitment during 1980's (Figure 5.5). We concur with authors' recommendation of 1999 ABC at 162,400 t, compared to 1998 ABC at 147,000 t and recent catches of 10-20,000 t.

The authors analyzed the sex ratio in survey and fishery data, finding more females than males. They modeled one hypothesis that accounts for this difference, that male and female numbers in the population were equal but males were less available to the survey and fishery. The modeling software the authors use, stock synthesis, isn't flexible enough to test a reasonable alternate hypothesis, that males and females are equally available but in unequal numbers in the population. We recommend that the authors work towards adopting software, such as AD-Model Builder, which allows testing a hypothesis of unequal sex ratio in the population.

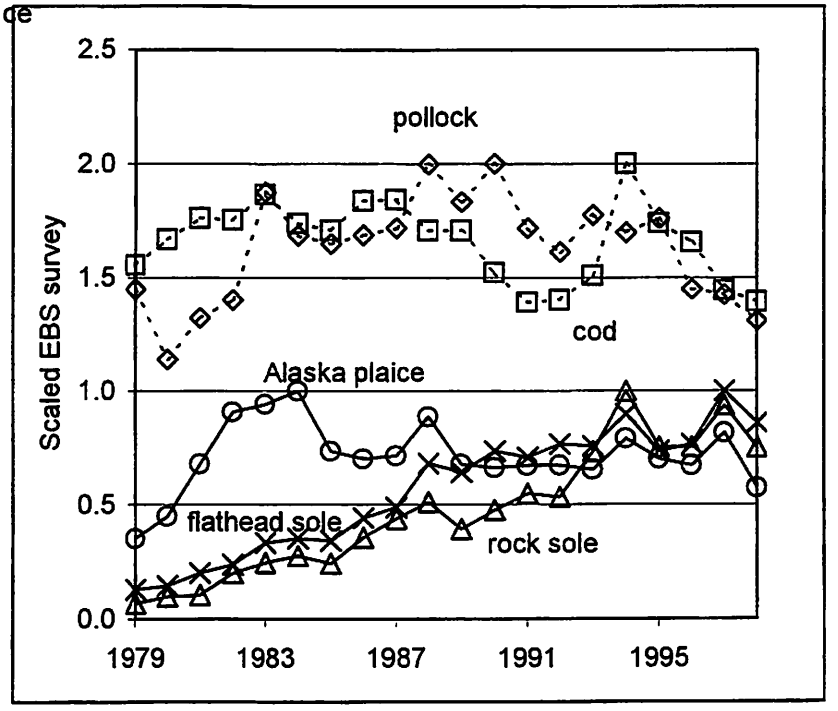
We also recommend that the authors test the data for higher natural mortality for males. Higher male mortality could cause an unequal sex ratio. One way to test for higher male mortality is to estimate sex ratio by age or size to determine if the proportion of males decreases with age.

Rock sole

Abundance peaked in 1993 or 1994, now slowly decreasing (Figure 6.3), due to good recruitment during 1980's (Figure 6.4). We concur with authors' recommendation of 1999 ABC at 308,900 t, compared to 1998 ABC at 312,190 t and recent catches averaging 60,000 t.

Flathead sole

Data - Trawl survey estimates of rock sole, flathead sole, and Alaska plaice abundance all spike in 1994 and 1997. All three also show some similarity in abundance and recruitment trends. We recommend that the authors of these assessments and trawl survey scientists analyze why these peaks coincided. Two hypotheses are a change in water temperature which concentrated fish and a change in trawl survey catchability.



Abundance - Survey and model both indicate abundance increased until about 1990, but thereafter model indicates decline due to decreased recruitment, whereas survey estimates are stable (Figure 7.2).

Recommendation and rationale - ABC recommendation based on age-structured model rather than current trawl survey estimates, which are variable. Commend authors for implementing age-structured model. The team concurs with the authors' recommendation and rationale for setting 1999 ABC at 77,300 t, compared to 1998 ABC at 131,850 t and recent catches about 20,000 t.

Alaska plaice

Survey and model abundance estimates both indicate abundance increased until about 1985, but thereafter model indicates decline due to decreased recruitment, whereas survey estimates are stable (Figure 8.2). We concur with the authors' recommendation and rationale for setting 1999 ABC at 142,500 t, compared to 1998 ABC at 151,400 t and recent catches about 15,000 t. We recommend that the authors tabulate trawl survey biomass estimates and catches back to 1980 for species listed as "common" in Table 8.1 to look for any less abundant flatfish species with significant exploitation.

Pacific Ocean perch

Data - Some available data is missing from model: 1995-1997 fishery size compositions and 1994 survey age composition. We strongly recommend that this information be included in the model.

ABC - A value of F44% was derived for GOA POP. Although no longer used for GOA POP, the F44% rate was applied in the AI by the AI POP authors to recommend ABC. We recommend that a value consistent with GOA

POP be used. We note that F44% was dropped for GOA POP after adding 1996 survey data, which changed the estimated stock-recruitment relationship and substantially increased the recommended F-rate, implying a much more productive stock which seemed unrealistic to the GOA POP authors.

Trawl survey data for northern rockfish - The highest survey biomass estimate for northern rockfish in the Aleutians Islands portion of EBS area I was measured in 1986 and is about 40 times larger than the next highest estimate. The 1986 value depends mostly on one large trawl survey haul. We recommend that the authors apply this 1986 survey biomass estimate in the assessment and ABC recommendation in a fashion which accounts for the variance of this estimate, rather than simply averaging the survey biomass estimates to estimate biomass and recommend ABC.

Chapter structure - The Team again requests that the POP and other red rockfish be broken out into two separate chapters to improve clarity and understanding of these separate assessments.

Other rockfish

Species composition from surveys and catches were not provided as requested in the last two Plan Team reviews. One or more other rockfish species may be overfished. This information was provided in the other flatfish document and indicates that rex sole should be separated analyzed because of the exploitation rate. The author and scientific reviewers can not make any evaluation of the risk of overfishing unless this basic information is provided in the other rockfish assessment. Thornyhead data also available from longline surveys and should be provided in the assessment document. ABC recommendation based on average of trawl survey biomass estimates and F = 0.75 M.

Atka mackerel

Abundance peaked in 1990, now is rapidly decreasing (Figure 12.12), due to good recruitment during 1980's (Figure 12.13). The most recent strong year class is 1992. Estimated abundance trend increased due to addition of 1998 fishery data, which implied a stronger 1992 year class, so the recommended ABC is higher. We concur with authors' recommendation of 1999 ABC at 73,000 t, compared to 1998 ABC at 64,300 t and recent catches from 60,000 to 100,000 t.

We encourage the continued testing and development of trawl survey gear specialized for Atka mackerel and rockfish. We recommend that the authors examine fishery length distributions inside and outside sea lion critical habitat to determine the potential effects on Atka mackerel age structure of regulatory changes shifting harvest outside the critical habitat.

SAFE guidelines

We recommend that the new SAFE guidelines be revised to recommend that authors also provide plots of estimated and projected exploitable and spawning biomass and estimated recruitment.

Others in attendance at the BSAI team meetings included:

Fran Bennis	*Beth Stewert*	*Brent Paine*	*John Hendershedt*
Tamra Farris	*Denise Fredette*	*Craig Cross*	*Glenn Merrill*
Ken Stump	*Karl Haflinger*	*Vidar Wespested*	*Phil Rigby*
John Gauvin	*Shane Capron*	*Sara Gaichas*	
Chris Blackburn	*Mike Szymanski*	*Dave Benson*	

Groundfish of the Bering Sea and Aleutian Islands Area:

1998 Species Profiles

by
David Witherell

North Pacific Fishery Management Council
605 West 4th Avenue, Suite 306
Anchorage, AK 99501

December 2, 1998

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Acronyms and Definitions

ABC	= acceptable biological catch
AI	= Aleutian Islands
BSAI	= Bering Sea and Aleutian Islands
BS	= Bering Sea
CDQ	= community development quota
c/p	= catcher processor
CVOA	= catcher vessel operational area
EBS	= Eastern Bering Sea
EEZ	= exclusive economic zone
F	= instantaneous fishing mortality rate
FMP	= fishery management plan
H&G	= headed and gutted fish
IFQ	= individual fishing quota
M	= instantaneous natural mortality rate
m	= meters
mt	= metric tons
OFL	= overfishing level
OY	= optimum yield
POP	= Pacific ocean perch
TAC	= total allowable catch

Walleye Pollock

Biology: Pollock (*Theragra chalcogramma*) is the most abundant groundfish species in the BSAI. Pollock begin to recruit to the fishery at age 4 and many survive 10 years or more. Females reach 50% maturity at 39 cm (about 4 years old) and produce 60,000 to 400,000 pelagic eggs. Spawning occurs in April in the Eastern Bering Sea (EBS). Annual natural mortality of adults has been estimated to be about 25% (M = 0.30). Seasonal migrations occur from overwintering areas along the outer shelf to shallow waters (90-140 m) to spawn. Pollock are found throughout the water column from the surface down to 500 m. Pollock feed on copepods, euphausiids, and fish (primarily juvenile pollock), and are in turn prey for other fish, marine mammals, and seabirds.

Stock Assessment: The current assessment involves analyses of a wide variety of data. These include hydroacoustic and bottom trawl surveys, fishery catch-at-age data, and oceanographic information. Estimates of B_{msy} and F_{msy} haverecently been re-analyzed for the EBS stock. Previous estimates were based on fishery selectivity assumptions that may no longer be valid. Beginning in 1997, OFL and ABC rates are based on tiers defined under Amendment 44. These definitions have become even more conservative with adoption of Amendment 56 in 1998.

Population Status: The overall population has remained above or near the Bmsy level. In 1998, exploitable biomass (age 3+) in the Eastern Bering Sea was projected at 5.82 million mt. Catch specifications were the following: OFL=2,060,000 mt , ABC=1,110,000 mt, TAC=1,110,000 mt. The stock has declined due to below average year-classes produced in 1993, 1994, and 1995. However, data indicate a strong 1996 year-class. Exploitable biomass is expected to increase with recruitment of the 1996 year-class.

Fishery: Pollock are targeted by trawl gear, but small numbers are also taken as bycatch by longline gear. Participants in the 1996 BSAI fishery included 92 trawl vessels delivering onshore and 81 offshore vessels. The 1996 directed pollock fishery was prosecuted by the inshore sector from January 20-March 2, and September 1-October 17. The offshore fishery occurred from January 26-February 26, September 1-October 17. Most pollock fishing has occurred in the area between Unimak Island and the Pribilofs during the A season, extending north and west of the Pribilof Islands during the B season.

Management: The BSAI Pollock fishery is regulated under the BSAI Groundfish FMP. The FMP controls the fishery through permits and limited entry, catch quotas (TACs), seasons, in-season adjustments, gear restrictions, closed waters, bycatch limits and rates, allocations, regulatory areas, record keeping and reporting requirements, and observer monitoring. Pollock TAC is allocated into a roe season ("A" season) and non-roe season ("B" season). Seven and one-half percent of the TAC is allocated to CDQ groups. The remaining TAC has been divided between inshore and offshore harvesters, with 35% to inshore processors, and 65% to offshore processors. Amendment 51, adopted in 1998, will increse the allocation to the shoreside component to 39%. A catcher vessel operational area (CVOA) is defined for the pollock B season, within which only catcher vessels may operate. Under Amendment 49, all pollock caught must be retained for processing beginning in 1998.

Economics: Two-thirds of the total ex-vessel value of groundfish in the BSAI is from pollock. In 1996, 1,192,000 mt of pollock was caught in the Eastern Bering Sea, of which about 95% was retained. Average ex-vessel price was about $0.09 per pound. Primary products produced are surimi, fillets, meal, and to a lesser extent mince, roe, and other products.

Catch History: With the decline in yellowfin sole abundance in the early 1960's, and the development of surimi processing, fishing effort in the BSAI shifted to pollock. Catches increased to over 1 million mt from 1970-1976. The fishery was prosecuted primarily by Japan (80% of the catch), and to a lesser extent the USSR. Korean vessels began participating in this fishery in 1976. Joint ventures of the early 1980's were phased out by domestic fleet by 1991. Catches have remained over one million mt since 1984.

Age 3+ biomass (mt, hindcast from 1998 Model 1 analysis), pre-season catch specifications (mt), and total catches (mt, including discards) of pollock in the EBS, 1980-1999.

Year	EBS Biomass	EBS ABC	EBS TAC	EBS Catch
1980	4,294,000	1,300,000	1,000,000	958,279
1981	8,569,000	1,300,000	1,000,000	973,505
1982	9,778,000	1,300,000	1,000,000	955,964
1983	10,705,000	1,300,000	1,000,000	982,363
1984	10,179,000	1,300,000	1,200,000	1,098,783
1985	11,919,000	1,300,000	1,200,000	1,179,759
1986	10,913,000	1,300,000	1,200,000	1,188,449
1987	11,116,000	1,300,000	1,200,000	1,237,597
1988	10,274,000	1,500,000	1,300,000	1,228,000
1989	8,546,000	1,340,000	1,340,000	1,230,000
1990	6,659,000	1,450,000	1,280,000	1,353,000
1991	5,180,000	1,676,000	1,300,000	1,268,360
1992	8,294,000	1,490,000	1,300,000	1,384,376
1993	10,279,000	1,340,000	1,300,000	1,301,574
1994	8,917,000	1,330,000	1,330,000	1,362,694
1995	8,680,000	1,250,000	1,250,000	1,264,578
1996	6,811,000	1,190,000	1,190,000	1,189,296
1997	5,307,000	1,130,000	1,130,000	1,124,593
1998	5,133,000	1,110,000	1,110,000	1,021,720
1999	7,040,000	*	*	*

Pacific Cod

Biology: Pacific cod (*Gadus macrocephalus*), also known as grey cod, are moderately fast growing and short-lived fish. Females reach 50% maturity at 67 cm (about 5.8 years old) and are highly fecund. A 67 cm cod will produce well over 1 million eggs. Spawning occurs January through April in the Bering Sea. Annual natural mortality of adults has been estimated to be about 30 (M = 0.37). Cod prey on clams, worms, crabs, shrimp, and juvenile fish. In turn, they are eaten by halibut and marine mammals. Cod are demersal and concentrate on the shelf edge and upper slope (100-250 m) in the winter, and move to shallower waters (generally <100 m) in the summer. Cod begin to recruit to trawl fisheries at age 3, but are not fully recruited to all gear types until about age 7. Maximum age has been estimated at 18 years based on otolith samples.

Stock Assessment: The current assessment is based on a length-based Synthesis model. Estimates of B_{msy} and F_{msy} are not available for this stock. Beginning in 1997, OFL and ABC rates are based on tiers defined under Amendment 44. Under this definition, 1998 OFL for Pacific cod was based on a tier 3 fishing mortality rate where $F_{OFL} = F_{30\%}$ (=0.42). ABCwas based on a tier 3 harvest strategy where $F_{ABC} = F_{40\%}$ (=0.29).

Population Status: For 1998, exploitable biomass (age 3+) was projected at 1.340 million mt. Catch specifications were the following: OFL=336,000 mt , ABC=210,000 mt , TAC=210,000 mt. The stock has declined due to poor year-classes produced in 1993, 1994, and 1995. A continued decline is expected, as the 1996 year-class looks to be about average and the1997 year class well below average.

Fishery: Cod are taken with trawl, longline, pot and jig gear. Participants in the 1996 BSAI fishery included 88 hook and line vessels, 100 pot vessels, and 146 trawl vessels. The 1996 directed Pacific cod fishery was prosecuted from approximately January 20 to May 14 by trawl vessels, January 1 through May 15 and September 1 through November 5 by fixed gear vessels. Most trawling and pot fishing occurs in the area north and west of Unimak Island, whereas most effort for Pacific cod by longline vessels occurs along the slope north and west of the Pribilof Islands.

Management: The BSAI Pacific cod fishery is regulated under the BSAI Groundfish FMP. The FMP controls the fishery through permits and limited entry, catch quotas (TACs), seasons, in-season adjustments, gear restrictions, closed waters, bycatch limits and rates, allocations, regulatory areas, record keeping and reporting requirements, and observer monitoring. Pacific cod TAC is allocated among gear types (51% to longline and pot gear, 47% to trawls, and 2% to jig gear) under Amendment 46. Under Amendment 49, all Pacific cod caught must be retained for processing beginning in 1998.

Economics: Total ex-vessel value of BSAI Pacific cod was $102 million in 1996. In 1996, 241,000 mt of BSAI Pacific cod was caught, of which about 210,000 mt was retained. Average ex-vessel price was about $0.15 per pound. Primary products produced are H&G and fillets, and to a lesser extent salted, whole fish, and other products (roe, mince, etc.).

Catch History: Pacific cod were taken by Japanese longline and trawl operations beginning in the early 1960's. By 1970, catches had reached 70.000 mt. Vessels from the USSR entered the fishery in 1971, and together these two countries harvested an average of 50.000 mt from 1971-1976. Foreign fisheries were replaced by joint ventures in the early 1980's, which were phased out by domestic fleet by 1988. Catches have fluctuated at about 170,000 mt since 1985.

Biomass (mt, fromSurvey data), pre-season catch specifications (mt), and total catches (mt, including discards) of Pacific cod in the BSAI, 1980-1998.

Year	EBS Biomass	BSAI ABC	BSAI TAC	BSAI Catch
1980	905,000	148,000	70,700	51,649
1981	1,035,000	160,000	78,700	62,458
1982	1,021,000	168,000	78,700	56,566
1983	1,176,000	298,200	120,000	93,167
1984	1,001,000	291,300	210,000	133,160
1985	961,000	347,400	220,000	145,426
1986	1,134,000	249,300	229,000	140,887
1987	1,142,000	400,000	280,000	157,746
1988	959,000	385,300	200,000	197,891
1989	960,000	370,600	230,681	168,918
1990	709,000	417,000	227,000	171,008
1991	532,000	229,000	229,000	172,158
1992	547,000	182,000	182,000	206,129
1993	690,000	164,500	164,500	167,390
1994	1,368,000	191,000	191,000	196,572
1995	1,003,000	328,000	250,000	233,029
1996	891,000	305,000	270,000	240,590
1997	605,000	306,000	270,000	234,641
1998	534,000	210,000	210,000	179,115

Yellowfin Sole

Biology: Yellowfin sole (*Limanda aspera*) are relatively slow growing and long-lived fish species. Females reach 50% maturity at 30 cm (about 10.5 years old) and are highly fecund, producing one to three million eggs. Spawning occurs in June and July in shallow waters of Bristol Bay to Nunivak Island. Annual natural mortality of adults has been estimated to be about 10% (M = 0.12). Prey includes benthic infuana and epifauna, euphausiids, and fish. Yellowfin sole concentrate on the outer shelf in the winter, and move to very shallow waters (<30 m) to spawn and feed in the summer. Yellowfin sole begin to recruit to trawl fisheries at age 6, but are not fully recruited to all gear types until about age 13. Maximum age for this species is 31 years.

Stock Assessment: The current assessment includes abundance estimates from NMFS bottom trawl surveys, cohort analysis, and Stock Synthesis model. Estimates of B_{msy} and F_{msy} are not available for this stock. Beginning in 1997, OFL and ABC rates are based on tiers defined under Amendment 44. Under this definition, OFL for yellowfin sole is based on a tier 3 fishing mortality rate where $F_{OFL} = F_{30\%}$ (=0.16). ABC is based on a tier 3 harvest strategy where $F_{ABC} = F_{40\%}$ (=0.11).

Population Status: For 1998, exploitable biomass was projected to be 3.01 million mt. Catch specifications were the following: OFL=314,000 mt , ABC=220,000 mt , TAC=220,000 mt. The stock has recently been at record high levels due to good recruitment in the early 1970's and low exploitation. Biomass is projected to decline in coming years due to smaller year-classes produced in the 1980's.

Fishery: Yellowfin sole are targeted primarily by trawl catcher-processors. The 1996 directed yellowfin sole fishery was prosecuted from approximately January 20 through May . Seasons are generally limited by seasonal apportionments of halibut and crab PSC limits. Fishing occurs throughout the shelf area.

Management: Yellowfin sole is regulated under the BSAI Groundfish FMP. The FMP controls the fishery through permits and limited entry, catch quotas (TACs), seasons, in-season adjustments, gear restrictions, closed waters, bycatch limits and rates, allocations, regulatory areas, record keeping and reporting requirements, and observer monitoring. Harvests have been constrained by halibut bycatch limits, crab bycatch limits, and the 2 million mt BSAI OY cap. Under Amendment 49, all yellowfin sole caught must be retained for processing beginning in 2003.

Economics: All BSAI flatfish species, including yellowfin sole, produced a total ex-vessel value of $48 million in 1996. In 1996, 130,000 mt of yellowfin sole was caught, of which about 100,000 mt was retained. Average ex-vessel price for flatfish was about $0.15 per pound. Primary products produced are whole fish, H&G, and kirimi.

Catch History: Yellowfin sole were overexploited by foreign fisheries in 1959-1962, when catches averaged about 400,000 mt. As a result of reduced abundance, annual catches declined to about 100,000 mt through the late 1960's to 50,000 mt in the 1970's. Abundance increased in the 1980's, resulting in increased catch by foreign and joint-venture operations. The fishery became fully domestic in 1991.

Total biomass (mt, from Survey data), pre-season catch specifications (mt), and total catches (mt, including discards) of yellowfin sole in the BSAI, 1980-1998.

Year	EBS Biomass	BSAI ABC	BSAI TAC	BSAI Catch
1980	1,842,000	169,000	117,000	87,391
1981	2,394,000	214,500	117,000	97,301
1982	3,377,000	214,500	117,000	95,712
1983	3,535,000	214,500	117,000	108,385
1984	3,141,000	310,000	230,000	159,526
1985	2,443,000	310,000	229,900	227,107
1986	1,909,000	230,000	209,500	208,597
1987	2,613,000	187,000	187,000	181,429
1988	2,402,000	254,000	254,000	223,156
1989	2,316,000	241,000	182,675	153,165
1990	2,183,000	278,900	207,650	80,584
1991	2,393,000	250,600	135,000	96,135
1992	2,172,000	372,000	235,000	146,946
1993	2,465,000	238,000	220,000	105,809
1994	2,610,000	230,000	150,325	144,544
1995	2,009,000	277,000	190,000	124,746
1996	2,298,000	278,000	200,000	130,163
1997	2,163,000	233,000	230,000	181,389
1998	2,329,000	220,000	220,000	95,036

Greenland Turbot

Biology: Greenland turbot (*Reinhardtius hippoglossoides*) are relatively fast growing species. Females reach 50% maturity at 60 cm (about 9 years old) and produce about 60,000 to 80,000 eggs. Spawning occurs in October through December. Greenland turbot feed on crustaceans, squid, and a variety of fish species. Annual natural mortality of adults has been estimated to be about 15% (M = 0.18). Greenland turbot spend their juvenile years (until age 4) on the continental shelf, then move to the slope. Yellowfin sole begin to recruit to longline fisheries at 60 cm and are fully recruited until about 90 cm. Maximum lifespan is 21 years.

Stock Assessment: The current Greenland turbot assessment is based on a Stock Synthesis model. Estimates of B_{msy} and F_{msy} are not available for this stock. Beginning in 1997, OFL and ABC rates are based on tiers defined under Amendment 44.

Population Status: In 1998, exploitable biomass in the BSAI was projected at 164,000 mt. Catch specifications were the following: OFL=22,300 mt, ABC=15,000 mt, TAC=15,000 mt. The stock biomass peaked in the early 1970s, followed by a persistent decline to current levels due to poor recruitment throughout the 1980's. Biomass is projected to remain low in the foreseeable future due to small year-classes produced in the 1980's and 1990's.

Fishery: Greenland turbot has been targeted by trawl and longline gear. The 1997 directed fishery was prosecuted longline vessels from May 1-15 in the Bering Sea. Significant amounts are also retained as bycatch in other fisheries. Most fishing occurs along the shelf edge and slope, as well as along the Aleutian Islands.

Management: The BSAI turbot fishery is regulated under the BSAI Groundfish FMP. The FMP controls the fishery through permits and limited entry, catch quotas (TACs), seasons, in-season adjustments, gear restrictions, closed waters, bycatch limits and rates, allocations, regulatory areas, record keeping and reporting requirements, and observer monitoring. In 1998, no halibut PSC was apportioned to the trawl fishery for this target, consequently no directed turbot fishing was allowed with trawl gear.

Economics: Turbot is a valuable species. In 1997, at total of 7,666 mt of Greenland turbot was caught in the BSAI, of which about 5,700 mt was retained.

Catch History: Prior to implementation of the MFCMA, Greenland turbot were targeted by the Japanese, and to a lesser extent the USSR. Annual catches of Greenland turbot averaged about 30,000 mt during the 1960s. Catches increased to 60,000 mt in 1974, and remained in the 50,000 mt range through 1983. Catch has remained at or below 10,000 mt since 1986.

Total biomass (mt, age 1+ hindcast from 1997 Synthesis model), pre-season catch specifications (mt), and total catches (mt, including discards) of Greenland turbot in the BSAI, 1980-1998.

Year	Biomass	ABC	TAC	Catch
1980	461,000	76,000	90,000	52,553
1981	436,000	59,800	90,000	57,321
1982	403,000	60,000	90,000	52,122
1983	368,000	65,000	90,000	47,558
1984	330,000	47,500	59,610	23,120
1985	310,000	44,200	37,100	14,731
1986	294,000	35,000	33,000	9,864
1987	280,000	20,000	20,000	9,599
1988	266,000	14,100	11,200	7,108
1989	254,000	20,300	8,000	8,822
1990	240,000	7,000	7,000	9,620
1991	224,000	7,000	7,000	6,878
1992	209,000	7,000	7,000	2,770
1993	204,000	7,000	7,000	8,468
1994	196,000	7,000	7,000	10,379
1995	185,000	7,000	7,000	8,193
1996	177,000	10,300	7,000	6,376
1997	169,922	12,350	9,000	7,536
1998	164,000	15,000	15,000	8,856

Arrowtooth Flounder

Biology: Arrowtooth flounder (*Atheresthes stomias*) are a relatively large flatfish that may live to 15 years. Size and age of sexual maturity are not known at this time. Spawning occurs from December through February. Annual natural mortality of adults has been estimated to be about 15% (M = 0.20). Arrowtooth flounder are distributed throughout the continental shelf through age 4, and then at older ages disperse to occupy both the shelf and the slope.

Stock Assessment: The current assessment includes abundance estimates from NMFS bottom trawl surveys, cohort analysis, and Stock Synthesis model. Estimates of B_{msy} and F_{msy} are not available for this stock. Beginning in 1997, OFL and ABC rates are based on tiers defined under Amendment 44. Under this definition, OFL for arrowtooth flounder is based on a tier 3 fishing mortality rate where $F_{OFL} = F_{30\%}$ (=0.36). ABC is based on a tier 3 harvest strategy where $F_{ABC} = F_{40\%}$ (=0.23).

Population Status: Exploitable biomass of BSAI Arrowtooth was projected to be 869,000 mt for 1998. Catch specifications were the following: OFL=230,000 mt, ABC=147,000 mt, TAC=16,000 mt. The huge increase in biomass observed over the past 15 years resulted from strong year-classes produced from 1980-89. The stock is expected to decline slightly in the future, as recent year-classes have been average (1990-1993, 95, 96), or below average (1991-92).

Fishery: Little to no effort is directed to catching arrowtooth flounder. Arrowtooth are taken as bycatch by trawl and longline gear in pursuit of other high valued species. Prior to 1996, arrowtooth may have served as "ballast" against allowable retainable bycatch of species such as Greenland turbot and sablefish.

Management: Arrowtooth is regulated under the BSAI Groundfish FMP. The FMP controls the fishery through permits and limited entry, catch quotas (TACs), seasons, in-season adjustments, gear restrictions, closed waters, bycatch limits and rates, allocations, regulatory areas, record keeping and reporting requirements, and observer monitoring. Aroowtooth was managed with Greenland turbot as a species complex until 1986. Directed fishing for arrowtooth flounder is authorized from May 1 to December 31, as long as TAC is available and other regulations are not limiting.

Economics: Arrowtooth is a very low valued species. In 1997, 9,650 mt of arrowtooth flounder was caught in the BSAI, of which all but 600 mt was discarded. Average ex-vessel price remians very low. Primary products produced from arrowtooth is meal, although a process has been developed to make surimi.

Catch History: Arrowtooth flounder and Greenland turbot were managed as a complex until 1986. Consequently, catch records for these species were combined during the 1960s and 1970s. Because the Greenland trubot fishery intensified during the 1970's, it is generally assumed that catches of arrowtooth flounder also increased. Catches of arrowtooth averaged about 15,000 mt from 1976 through 1983, and declined through the 1980's. Higher catches in more recent years are a result of higher biomass levels, and corresponding incidental catch in other target fisheries.

Total biomass (mt, from EBS trawl survey), pre-season catch specifications (mt), and total catches (mt, including discards) of Arrowtooth flounder in the BSAI, 1980-1998.

Year	EBS Biomass	BSAI ABC	BSAI TAC	BSAI Catch
1980	47,800	20,000	N/A	18,364
1981	49,500	16,500	N/A	17,113
1982	67,400	16,500	N/A	11,518
1983	149,300	20,000	N/A	13,969
1984	182,900	20,000	N/A	9,452
1985	159,900	20,000	N/A	7,375
1986	232,100	20,000	20,000	6,903
1987	290,600	30,900	9,795	4,539
1988	306,500	99,500	5,531	5,883
1989	410,700	163,700	6,000	3,222
1990	459,200	106,500	10,000	4,232
1991	329,200	116,400	20,000	13,686
1992	414,000	82,300	10,000	11,980
1993	543,600	72,000	10,000	9,298
1994	570,600	93,400	10,000	14,377
1995	480,800	113,000	10,227	9,015
1996	556,400	129,000	9,000	14.610
1997	478,600	108,000	20,760	10,054
1998	344,900	147,000	16,000	14,930

Rock Sole

Biology: Rock sole (*Lepidopsetta bilineata*) is a moderately slow growing fish. Females reach 50% maturity at about age 9. Spawning occurs March through June in the Bering Sea. Annual natural mortality of adults has been estimated to be about 15% (M = 0.20). Rock sole prey on benthic invertebrates, and are in turn prey for marine mammals. Rock sole occur throughout the shelf (<250 m), and are particularly abundant in the Bristol Bay area. Recruitment to trawl fisheries occurs at age 4, but rock sole are not fully recruited until age 11. Maximum age for rock sole is about 20 years.

Stock Assessment: The current assessment for rock sole is based on a Stock Synthesis model. Estimates of B_{msy} and F_{msy} are not available for this stock. Beginning in 1997, OFL and ABC rates are based on tiers defined under Amendment 44. Under this definition, 1998 OFL for rock sole is based on a tier 3 fishing mortality rate where $F_{OFL} = F_{30\%}$ (=0.23). ABC is based on a tier 3 harvest strategy where $F_{ABC} = F_{40\%}$ (=0.16).

Population Status: For 1998, exploitable biomass of rock sole was projected to be 2.36 million mt. Catch specifications were the following: OFL=449,000 mt, ABC=312,000 mt, TAC=100,000 mt. Biomass has greatly increased over the past 15 years due to strong year-classes produced from 1980-87 and in 1990. The stock is expected to decline slightly in the future, as recent year-classes have been average (1988, 93), or below average (1989, 91, 92, 94, 95).

Fishery: Rock sole are targeted primarily by trawl catcher-processors, and to a lesser extent shoreside and mothership operations. Participants in the 1995 BSAI rock sole fishery included 25 catcher processors, 10 catcher vessels, and 2 motherships. The rock sole fishery is directed at roe-bearing females from January 20 to about mid-March. Most fishing effort for this species occurs in outer Bristol Bay and the area north of Unimak Island.

Management: The rock sole fishery is regulated under the BSAI Groundfish FMP. The FMP controls the fishery through permits and limited entry, catch quotas (TACs), seasons, in-season adjustments, gear restrictions, closed waters, bycatch limits and rates, allocations, regulatory areas, record keeping and reporting requirements, and observer monitoring. Harvests have been constrained by halibut and crab bycatch limits. Rock sole was formerly included in the "other flatfish" complex until 1989. Under Amendment 49, all rock sole caught must be retained for processing beginning in 2003.

Economics: Rock sole have been targeted for high valued roe. Females are processed by H&G, with roe intact. Disproportionately high discards of males and juveniles have occurred. In 1995, 55,000 mt of rock sole was caught, of which about 22,000 mt was retained. Primary products produced are H&G with roe-in, and to a lesser extent kirimi.

Catch History: Rock sole were harvested by Japanese and Soviet vessels beginning in 1963. Foreign catches increased from about 7,000 mt annually from 1963-1969, and peaked at 61,000 mt in 1972. Catches were reduced until joint-venture operations participated beginning in 1980. Thereafter, catches increased to 86,000 mt in 1988. The fishery was fully domestic by 1990, and recent catches have remianed stable at about 50,000 to 60,000 mt per year.

Total biomass (mt, from survey data), pre-season catch specifications (mt), and total catches (mt, including discards) of rock sole in the BSAI, 1980-1998.

Year	EBS Biomass	BSAI ABC	BSAI TAC	BSAI Catch
1980	284,000	N/A	N/A	8,798
1981	302,000	N/A	N/A	9,021
1982	579,000	N/A	N/A	11,844
1983	713,000	N/A	N/A	13,618
1984	799,000	N/A	N/A	18,750
1985	700,000	N/A	N/A	37,678
1986	1,031,000	N/A	N/A	23,483
1987	1,270,000	N/A	N/A	40,046
1988	1,480,000	N/A	N/A	86,366
1989	1,139,000	171,000	90,762	68,912
1990	1,381,000	216,300	60,000	35,253
1991	1,588,000	246,500	90,000	46,681
1992	1,543,000	260,800	40,000	51,956
1993	2,123,000	185,000	75,000	64,260
1994	2,894,000	313,000	75,000	60,584
1995	2,175,000	347,000	60,000	55,083
1996	2,183,000	361,000	70,000	47,146
1997	2,711,000	296,000	97,185	67,564
1998	2,169,000	312,000	100,000	33,454

Flathead Sole

Biology: Flathead sole (*Hippoglossoides ellassodon*) are distributed from northern California northward throughout Alaska. Spawning occurs February through May in the Bering Sea. Annual natural mortality of adults has been estimated to be about 15% (M = 0.20). Flathead sole prey on benthic invertebrates such as crustaceans, mollusks, and brittle stars, long with fish and squid. Flathead sole overwinter along the outer shelf, and move to shallower waters (20-180 m) in the spring. Recruitment to trawl fisheries generally occurs at age 3, although some age 2 fish are taken. Flathead sole may live 16 years or more.

Stock Assessment: The current assessment for flathead sole is based on NMFS trawl survey abundance estimates. Estimates of B_{msy} and F_{msy} are not available for this stock. Beginning in 1997, OFL and ABC rates are based on tiers defined under Amendment 44. Under this definition, OFL for flathead sole is based on a tier 4 fishing mortality rate where $F_{OFL} = F_{30\%}$ (=0.23). ABC is based on a tier 4 harvest strategy where $F_{ABC} = F_{40\%}$ (=0.16).

Population Status: For 1998, exploitable biomass of flathead sole was projected at 824,000 mt. Catch specifications were the following: OFL=190,000 mt, ABC=132,000 mt, TAC=100,000 mt. The huge increase in biomass observed over the past 20 years resulted from strong year-classes produced from 1977-87. The stock is expected to decline slightly in the future, as recent year-classes have been average (1989), or below average (1988, 1990-96).

Fishery: Flathead sole are targeted primarily by trawl catcher-processors, and to a lesser extent shoreside and mothership operations. Participants in the 1995 BSAI flathead sole fishery included 37 catcher processors, 3 catcher vessels, and 2 motherships. The flathead sole fishery begins on January 20, and occurs periodically with release of halibut PSC.

Management: The flathead sole fishery is regulated under the BSAI Groundfish FMP. The FMP controls the fishery through permits and limited entry, catch quotas (TACs), seasons, in-season adjustments, gear restrictions, closed waters, bycatch limits and rates, allocations, regulatory areas, record keeping and reporting requirements, and observer monitoring. Harvests have been constrained by halibut bycatch limits. Flathead sole was formerly included in the "other flatfish" complex until 1995.

Economics: In 1997, 20,000 mt of flathead sole was caught , of which about 10,000 mt was retained. Primary products produced are H&G with roe-in, and to a lesser extent kirimi.

Catch History: Japanese and Soviet vessels bagan fishing for flathead sole, along with other flatfish in 1963, when 30,000 mt were taken. Catches fell off to only 7,000 mt in 1965, but then increased to a peak of 51,000 mt in 1971. Catches declined to 15,000 mt in 1975, and remained under 10,000 mt until 1990 when catches of flathead sole peaked at 20,000 mt. Recent catch levels are indicative of increased bycatch rates in other fisheries (corresponding to higher biomass) and developing markets.

Total biomass (mt, from EBS trawl survey), pre-season catch specifications (mt), and total catches (mt, including discards) of flathead sole in the BSAI, 1980-1998.

Year	EBS Biomass	BSAI ABC	BSAI TAC	BSAI Catch
1980	117,500	N/A	N/A	5,247
1981	162,900	N/A	N/A	5,218
1982	192,200	N/A	N/A	4,509
1983	269,000	N/A	N/A	5,240
1984	285,900	N/A	N/A	4,458
1985	276,300	N/A	N/A	5,636
1986	357,900	N/A	N/A	5,208
1987	394,800	N/A	N/A	3,595
1988	549,500	N/A	N/A	6,783
1989	519,600	N/A	N/A	3,604
1990	593,500	N/A	N/A	20,245
1991	570,300	N/A	N/A	15,602
1992	618,100	N/A	N/A	14,239
1993	610,200	N/A	N/A	13,664
1994	725,100	N/A	N/A	18,455
1995	593,400	138,000	30,000	14,452
1996	616,400	116,000	30,000	17,344
1997	807,800	101,000	43,500	20,704
1998	692,200	132,000	100,000	24,228

Other Flatfish

Biology: The current "other flatfish" category is dominated by one species, Alaska plaice (*Pleuronectes quadrituberculatus*). Less than 10% of this complex consists of miscellaneous flatfish species such as rex sole and Dover sole. Annual natural mortality of adults has been estimated to be about 15% (M = 0.20). This flatfish species is thought to live 16 years or more. Alaska plaice begin to recruit to trawl fisheries at age 4 , but are not fully recruited to all gear types until about age 7.

Stock Assessment: The current assessment for "other flatfish" is based on NMFS trawl survey abundance estimates. Estimates of B_{msy} and F_{msy} are not available for this stock complex. Beginning in 1997, OFL and ABC rates are based on tiers defined under Amendment 44. Under this definition, 1998 OFL for "other flatfish" is based on a tier 3 fishing mortality rate where $F_{OFL} = F_{30\%}$ (=0.45 for Alaska plaice and 0.23 for other species). ABC is based on a tier 3 harvest strategy where $F_{ABC} = F_{40\%}$ (=0.29 for Alaska plaice, 0.16 for other species).

Population Status: For 1998, exploitable biomass (age 4+) of "other flatfish" was projected to be 590,000 mt. Catch specifications were the following: OFL=120,000 mt, ABC=102,000 mt, TAC=35,000 mt. It is expected that the stock will decline in abundance in coming years. Aging data have indicated a series of strong year-classes increased biomas to a peak in the mid 1980's. Average, or below average year-classes have been produced since 1982, and as such the stock is projected to decline.

Fishery: Other flatfish are harvested by trawl vessels, particularly by catcher -processors. Participants in the 1995 BSAI fishery included 14 trawl catcher-processors that targeted other flatfish.

Management: The "other flatfish" complex is regulated under the BSAI Groundfish FMP. The FMP controls the fishery through permits and limited entry, catch quotas (TACs), seasons, in-season adjustments, gear restrictions, closed waters, bycatch limits and rates, allocations, regulatory areas, record keeping and reporting requirements, and observer monitoring. Harvests have been constrained by halibut bycatch limits and the 2 million mt BSAI OY cap. Rock sole were broken out from the "other flatfish" complex in 1989 and flathead sole were broken out in 1995.

Economics: All flatfish species, including other flatfish, produced a total ex-vessel value of $ 48 million in 1996. In 1997, 22,000 mt of other flatfish was caught, of which about 5,000 mt was retained. Average ex-vessel price for flatfish was about $0.16 per pound. Primary products produced are whole fish, H&G, and kirimi.

Catch History: Japanese and Soviet vessels bagan fishing for flathead sole, along with other flatfish in 1963, when 30,000 mt were taken. Catches fell off to only 7,000 mt in 1965, but then increased to a peak of 51,000 mt in 1971. Catches declined to less than 20,000 mt in the mid-1970s. Since implementation of the MFCMA in 1977, catches have been comprised primarily of Alaska plaice, and have been reported seperately. Catch of Alaska plaice and miscellaneous flatfish peaked in 1988 at 67,00 mt.

Total biomass (mt, from EBS trawl survey), pre-season catch specifications (mt), and total catches (mt, including discards) of "other flatfish" in the BSAI, 1980-1998.

Year	EBS Biomass	BSAI ABC	BSAI TAC	BSAI Catch
1980	410,500	61,000	61,000	7,558
1981	623,800	92,500	61,000	9,189
1982	819,300	92,500	61,000	7,456
1983	796,300	119,200	61,000	11,596
1984	843,600	150,200	111,490	21,078
1985	613,000	150,200	111,400	27,865
1986	592,700	137,500	124,200	47,637
1987	612,100	193,300	148,300	20,517
1988	759,700	331,900	131,369	67,425
1989	576,600	155,900	75,183	15,636
1990	559,900	188,000	60,150	11,890
1991	623,100	219,700	64,675	19,069
1992	581,900	199,600	79,000	19,963
1993	602,400	191,000	79,000	15,409
1994	677,200	225,000	56,000	13,990
1995	590,100	117,000	19,540	20,348
1996	590,000	102,000	35,000	21,440
1997	714,000	97,500	50,750	22,871
1998	789,000	164,000	89,434	15,137

Sablefish

Biology: Sablefish (*Anoplopoma fimbria*), also known as blackcod, is a long lived fish with a maximum life span of 62 years. Females reach 50% maturity at 65 cm (about 6 years old), producing up to 1 million pelagic eggs. Spawning occurs in February in the Bering Sea. Annual natural mortality of adults has been estimated to be about 10% (M = 0.10). Average age of recruitment is 5 years. Sablefish concentrate on the continental slope (100-1,000 m). Sablefish feed on benthic invertebrates, squid, and numerous fish species. In turn, they are prey for halibut, lingcod, and marine mammals such as sea lions. Killer whales have been known to take sablefish from longline gear as it is being retrieved.

Stock Assessment: A combined assessment for sablefish in the BSAI and GOA is based on an age structured model. Estimates of B_{msy} and F_{msy} are not available for this stock. Beginning in 1997, OFL and ABC rates are based on tiers defined under Amendment 44. Under this definition, 1998 OFL for sablefish is based on a tier 3 fishing mortality rate where $F_{OFL} = F_{30\%}$ (=0.15). ABC is based on a tier 3 harvest strategy where $F_{ABC} = F_{40\%}$ (=0.096).

Population Status: For 1998, exploitable biomass was projected to be 18,200 mt in the EBS and 21,000 mt in the AI. Catch specifications were the following: OFL=2,160 mt (EBS), 2,230 mt (AI); ABC=1,300 (EBS); 1,380 mt (AI), TAC=1,300 (EBS); 1,380 mt (AI). It is expected that the stock will continue to decline due to lower recruitment since 1982. The 1992-94 year-classes are the lowest observed.

Fishery: Sablefish are taken with trawl, longline, and pot gear. The 1996 directed BSAI sablefish fishery was prosecuted by 2 trawl vessels and 82 hook and line vessels. The fixed gear season begins March 15, concurrent with the halibut fishery.

Management: The BSAI sablefish fishery is regulated under the BSAI Groundfish FMP. The FMP controls the fishery through permits and limited entry, catch quotas (TACs), seasons, in-season adjustments, gear restrictions, closed waters, bycatch limits and rates, allocations, regulatory areas, record keeping and reporting requirements, and observer monitoring. The sablefish TAC is allocated among gear types (50% to fixed gear and 50% to trawl gear in the BS; 75% to fixed gear and 25% to trawl gear in the AI). The fixed gear apportionment is managed by the IFQ program. Twenty percent of the BSAI fixed gear sablefish quota is allocated to CDQ communities.

Economics: Sablefish is a high valued resource in the BSAI, worth $4.9 million ex-vessel in 1996. In 1997, 1.300 mt of BSAI sablefish was caught, of which nearly all was retained. Average ex-vessel price was about $1.89 per pound for fixed gear fisheries, and $0.89/lb for trawl fisheries. The primary product produced is H&G.

Catch History: Sablefish was targeted by Japanese freezer longliners since 1959. BSAI catches peaked in 1962 when 28,500 mt were harvested. From 1963 to 1972, an average of about 13,000 mt of sablefish were caught, with the USSR entering the fishery in 1967. Catches dropped to less than 5,000 mt in 1974. A small peak occurred in 1987 when 8,000 mt were landed. Landings have since been reduced.

Exploitable biomass (mt, hindcast from 1998 Synthesis model), pre-season catch specifications (mt), and total catches (mt, including discards) of sablefish in the BSAI, 1980-1999.

Year	BSAI+GOA Biomass	BS+AI ABC	BS+AI TAC	BS+AI Catch
1980	181,000	3,700	5,000	2,480
1981	206,000	3,700	5,000	3,137
1982	241,000	2,900	5,000	4,139
1983	286,000	2,900	5,000	3,368
1984	333,000	6,185	5,340	3,328
1985	372,000	6,080	4,500	3,796
1986	400,000	7,200	6,450	6,546
1987	404,000	7,700	7,700	8,012
1988	388,000	9,200	8,400	6,608
1989	357,000	6,200	6,200	4,500
1990	323,000	7,200	7,200	4,445
1991	265,000	6,300	6,300	3,207
1992	243,000	4,400	4,400	2,104
1993	226,000	4,100	4,100	2,747
1994	212,000	3,340	3,340	2,470
1995	185,000	3,800	3,800	1,968
1996	177,000	2,500	2,300	1,349
1997	171,000	2,675	2,300	1,657
1998	165,000	2,680	2,680	1,188

Pacific Ocean Perch and Other Red Rockfish

Biology: Pacific ocean perch (*Sebastes alutus*), often called by their acronym POP, are a slow growing and long-lived fish. Females reach 50% maturity at 29 cm (about 7 years old). Females are viviparous, meaning they retain fertilized eggs within the ovary until larval extrusion. In the BSAI, mating takes place in the late fall, and larval extrusion occurs in the early spring. Maximum life span is 90 years. Annual natural mortality of adults has been estimated to be about 5% (M = 0.05). Pacific ocean perch inhabit the outer continental shelf and upper slope regions (100-400m) and are generally found over cobble substrate. Recruitment to trawl fisheries starts at age 5, but Pacific ocean perch are not fully recruited until about age 8. The "Other Red Rockfish" complex consists of northern rockfish, rougheye rockfish, shortraker rockfish and sharpchin rockfish. Like POP, these rockfish are long lived and slow growing. Maximum age observed is 120 years for shortraker and 140 years for rougheye rockfish. As such, natural mortality is low (M= 0.06 for northerns, M=0.03 for shortraker, and M=0.025 for rougheye). Sharpchin rockfish are not common in the BSAI.

Stock Assessment: The current Pacific ocean perch assessment is based on a Stock Synthesis approach, tuned to the trawl survey abundance estimates. Estimates of B_{msy} and F_{msy} are not available for this stock complex. Beginning in 1997, OFL and ABC rates are based on tiers defined under Amendment 44. Under this definition, 1988 OFL for Pacific ocean perch in the eastern Bering Sea is based on a tier 3 fishing mortality rate where $F_{OFL} = F_{30\%}$ adjusted =0.056. ABC is based on a tier 3 harvest strategy where $F_{ABC} = F_{44\%}$adjusted =0.031. For the Aleutian Islands POP stock, $F_{OFL} = F_{30\%}$=0.096, and $F_{ABC} = F_{44\%}$=0.055. OFL and ABC for other red rockfish is based on a tier 5 fishing rate, whereby F_{OFL}= M, and F_{abc} = 0.75 x M.

Population Status: In 1998, exploitable biomass of POP was projected to be 41,300 mt in the EBS and 258,000 mt in the AI. Catch specifications for the EBS were the following: OFL=3,300 mt, ABC=1,400 mt, TAC=1,400 mt. Catch specifications for the AI POP stock were: OFL=20,700 mt, ABC=12,100 mt, TAC=12,100 mt. Several above average year-classes were produced during the 1980s in the AI area, which has rebuilt the POP stock.

Fishery: Pacific Ocean perch are taken primarily by trawl catcher-processors. Participants in 1995 BSAI rockfish fisheries included 14 c/p trawl vessels, 3 c/p longliners, and 18 catcher longliners. The 1995 directed Pacific ocean perch fishery was prosecuted from February 6 to March 15, and April 1 to April 17 in the AI area, and from October 25-31 in the Bering Sea.

Management: The fishery is regulated under the BSAI Groundfish FMP. The FMP controls the fishery through permits and limited entry, catch quotas (TACs), seasons, in-season adjustments, gear restrictions, closed waters, bycatch limits and rates, allocations, regulatory areas, record keeping and reporting requirements, and observer monitoring. Beginning in 1991, the POP complex was subdivided into separate groups to protect against overfishing of higher valued component species. For the Bering Sea, groups were 1) POP, and 2) shortraker, rougheye, sharpchin, and northern rockfish combined. For the AI region, groups were 1) POP, 2) shortraker/ rougheye, and 3) sharpchin/northern rockfish. Beginning in 1996, POP TAC was further subdivided among AI areas.

Economics: Pacific Ocean perch and other red rockfish are a relatively high-value resource. In 1997, 13,500 mt of POP was caught, of which about 11,500 mt was retained. In addition, 3,000 mt of other red rockfish was caught. Average ex-vessel price of rockfish was about $0.18 per pound. Primary products produced are H&G and whole fish.

Catch History: Pacific ocean perch supported major Japanese and Soviet trawl fisheries throughout the 1960's. In the Bering Sea, catches peaked in 1961 (47,000 mt); the Aleutian Islands catch peaked in 1965 (109,000 mt). Stocks and catches declined reaching their lowest levels in the mid-1980s. Joint-venture fisheries of the 1980's were replaced by the domestic fleet by 1990. Since then, catches have averaged 15,000 mt per year.

Exploitable biomass (mt, ages 9+, hindcast from 1998 Synthesis), pre-season catch specifications (mt), and total catches (mt, including discards) of Pacific Ocean Perch in the BSAI, 1980-1998. Specifications and catch includes POP and other red rockfish.

Year	AI Biomass	BS+AI ABC	BS+AI TAC	BS+AI Catch
1980	47,000	18,000	10,750	5,797
1981	48,000	18,000	10,750	4,844
1982	48,000	18,000	10,750	1,238
1983	51,000	11,800	10,750	501
1984	59,000	12,160	4,480	2,200
1985	80,000	12,760	4,800	1,092
1986	99,000	10,200	11,025	846
1987	128,000	14,700	11,025	1,934
1988	135,000	22,600	11,000	3,026
1989	151,000	22,600	11,000	4,723
1990	196,000	22,900	12,900	20,289
1991	192,000	21,700	21,700	7,289
1992	228,000	23,530	23,530	13,586
1993	234,000	25,520	24,630	17,138
1994	234,000	21,100	21,100	18,866
1995	247,000	20,640	19,811	15,944
1996	246,000	22,360	21,514	15,68
1997	249,000	21,948	21,948	13,4
1998	241,000	18,962	18,962	14,528

Other Rockfish

Biology: The other rockfish complex contains *Sebastolobus* and *Sebastes* species other than Pacific ocean perch. As with most rockfish, these are slow growing and long-lived species. Shortspine thornyheads (*Sebastolobus alascanus*) account for about 90% of the other rockfish complex biomass. Little is known about this species in the BSAI. In the Gulf of Alaska, females reach 50% maturity at 22 cm. Maximum life span is 60 years. Annual natural mortality of adults has been estimated to be about 5% (M = 0.07). Thornyheads are a deepwater demersal fish, inhabiting the continental shelf edge and slope. Recruitment to longline fisheries starts at age 15, and are fully recruited at age 30. Full recruitment to trawl fisheries occurs at age 22.

Stock Assessment: The current assessment for "other rockfish" is based on trawl survey abundance indices. Estimates of B_{msy} and F_{msy} are not available for this stock complex. Beginning in 1997, OFL and ABC rates are based on tiers defined under Amendment 44. Under this definition,the 1998 OFL and ABC for "other rockfish" in the eastern Bering Sea is based on a tier 5 fishing rate, whereby $F_{OFL} = M$, and $F_{abc} = 0.75 \times M$.

Population Status: For 1998, exploitable biomass of "other rockfish" was projected to be 7,030 mt in the EBS and 13,000 mt in the AI. Catch specifications for the EBS were the following: OFL=492 mt, ABC=369 mt, TAC=369 mt. Catch specifications for the AI stock were: OFL=913 mt, ABC=685 mt, TAC=685 mt.

Fishery: In recent years, thornyheads catches have been mainly incidental to other directed trawl and longline fisheries. Participants in 1995 BSAI rockfish fisheries included 14 c/p trawl vessels, 3 c/p longliners, and 18 catcher longliners. Other rockfish remained on bycatch status during 1995-98.

Management: The "other rockfish" complex is regulated under the BSAI Groundfish FMP. The FMP controls the fishery through permits and limited entry, catch quotas (TACs), seasons, in-season adjustments, gear restrictions, closed waters, bycatch limits and rates, allocations, regulatory areas, record keeping and reporting requirements, and observer monitoring. Prior to 1980, "other rockfish" were included in the Pacific Ocean Perch complex.

Economics: In 1997, about 460 mt of other rockfish was caught, of which about half was retained. Average ex-vessel price of rockfish has been about $0.19 per pound. Primary products produced are H&G and whole fish.

Catch History: The peak catch of other rockfish in the EBS occurred in 1978 with a removal of 2,600 mt. In the AI region, peak catch occurred in 1979 with a harvest of 4,500 mt. Catches in more recent years have been lower, and mainly incidental to other deepwater fisheries. In the Gulf of Alaska, thornyheads were targeted by Japanese and Soviet trawl fisheries beginning in the mid 1960's.

Exploitable biomass (mt, from AI trawl survey), pre-season catch specifications (mt), and total catches (mt, including discards) of "other rockfish" in the BSAI, 1980-1998.

Year	AI Biomass	BS+AI ABC	BS+AI TAC	BS+AI Catch
1980	19,100	7,700	7,727	879
1981		7,700	7,727	684
1982		21,300	7,727	2,390
1983	16,000	22,000	7,727	1,265
1984		14,100	7,050	232
1985		14,100	6,620	191
1986	20,300	8,910	6,625	271
1987		1,880	1,880	621
1988		1,500	1,500	619
1989		1,500	1,500	673
1990		1,600	1,600	1,248
1991	6,400	1,325	1,325	945
1992		1,325	1,325	4,364
1993		1,325	1,190	685
1994	6,400	1,135	1,135	562
1995		1,135	1,022	849
1996		1,449	1,304	642
1997	10,081	1,087	1,087	517
1998		1,054	1,054	566

Atka Mackerel

Biology: Atka mackerel (*Pleurogrammus monopterygius*) is a schooling, semi-demersal species common along the Aleutian Islands. Atka mackerel begin to recruit to the fishery at age 2 and many survive to 14 years. Annual natural mortality of adults has been estimated to be about 25% (M = 0.30). Females reach 50% maturity at 31 cm (about 3.6 years old). Atka mackerel migrate from the shelf edge to shallow coastal waters (5-30 m) to spawn. Spawning occurs in July to September along the Aleutian Islands. Eggs are adhesive and deposited in rock crevices. These nests are guarded by the males until hatching, which occurs about 40-45 days later. Atka mackerel eat copepods and euphausiids, and in turn are prey for other fish, seabirds, Steller sea lions, and other marine mammals.

Stock Assessment: The current Atka mackerel assessment is based on a stock synthesis model. Estimates of B_{msy} and F_{msy} are not available for this stock. Beginning in 1997, OFL and ABC rates are based on tiers defined under Amendment 44. Under this definition, 1998 OFL for Atka mackerel is based on a tier 3 fishing mortality rate where $F_{OFL} = F_{30\%}$ (=0.50). ABC is based on a tier 3 harvest strategy where $F_{ABC} = F_{40\%}$ adjusted more conservatively (=0.23).

Population Status: For 1998, exploitable biomass in the Aleutian Islands area was projected at 536,000 mt. Catch specifications were the following: OFL=134,000 mt, ABC=64,300 mt, TAC=64,300 mt. Biomass of Atka mackerel peaked in 1991, bolstered by strong year-classes produced in 1984-1986 and a very strong 1988 year-class. The most recent assessment indicates that this stock is on a pronounced downward trend, despite continued recruitment from strong 1988 and 1989 year-classes. Recent information suggests that the 1992 year class is above average.

Fishery: Atka mackerel are targeted by catcher processor trawlers. Participants in the 1996 fishery included 17 catcher processors. The 1995 directed fishery was prosecuted from January 20 to February 2 in the eastern AI, February 3 to April 25 in the central AI, and from April 26 to May 15 in the western AI. Fishing for Atka mackerel is concentrated on very discrete areas, such as Seguam Bank, Tanaga Pass, Oglala Pass, and Tahoma Reef.

Management: The Atka mackerel fishery is regulated under the BSAI Groundfish FMP. The FMP controls the fishery through permits and limited entry, catch quotas (TACs), seasons, in-season adjustments, gear restrictions, closed waters, bycatch limits and rates, allocations, regulatory areas, record keeping and reporting requirements, and observer monitoring. Beginning in 1994, with passage of Amendment 28, the Atka mackerel TAC was apportioned among AI subareas.

Economics: In 1996, 103,900 mt of Atka mackerel was caught in the Aleutian Islands areas, of which about 80,800 mt was retained. Average ex-vessel price was about $0.15 per pound. Primary products produced are H&G and whole fish.

Catch History: Atka mackerel were targeted by the vessels from USSR, Japan, and Korea during the 1970's. Catches peaked at 24,000 mt during this time period. Foreign fisheries were replaced by joint-ventures during the 1980's. The fishery has been fully domestic since 1990, and catches have increased in response to higher TACs in recent years.

Exploitable biomass (mt, age 3+ hindcast from 1998 Synthesis model), pre-season catch specifications (mt), and total catches (mt, including discards) of Atka mackerel in the Aleutian Islands, 1980-1998.

Year	AI Biomass	AI ABC	AI TAC	AI Catch
1980	960,000	24,800	24,800	15,533
1981	990,000	24,800	24,800	16,661
1982	924,000	24,800	24,800	19,546
1983	848,000	25,500	24,800	11,585
1984	752,000	25,500	24,130	35,998
1985	686,000	37,700	37,700	37,856
1986	693,000	30,800	30,800	31,978
1987	886,000	30,800	30,800	30,049
1988	1,011,000	21,000	21,000	21,656
1989	1,187,000	21,000	20,285	14,868
1990	1,156,000	24,000	21,000	21,725
1991	1,383,000	24,000	24,000	22,258
1992	1,304,000	43,000	43,000	46,831
1993	1,120,000	117,100	32,000	65,805
1994	1,109,000	122,500	68,000	69,401
1995	1,021,000	125,000	80,000	81,214
1996	852,000	116,000	106,157	103,867
1997	684,000	66,700	66,700	65,845
1998	628,000	64,300	64,300	55,782

Squid

Biology: Two main squid species are found in the BSAI. *Berryteuthis magister* is the principle species in the Bering Sea and *Onychoteuthis borealijaponicus* predominates catches in the Aleutian Islands area. Information on the abundance, distribution, and general biology of these squids is lacking. Squid are prey for fish and marine mammals (such as Steller sea lions, northern fur seals, harbor seals, and beaked whales).

Stock Assessment: The current assessment for squid is based on fishery catches only. B_{msy} and F_{msy} have not been estimated for the squid stock. Beginning in 1997, OFL and ABC rates are based on tiers defined under Amendment 44. Under this definition, OFL is based on a tier 6 fishing mortality rate where OFL= average catch from 1978-1995. ABC is based on a tier 6 harvest strategy where ABC= 0.75 x average catch from 1978-1995.

Population Status: Estimates of squid biomass are not available. Because squid are pelagic, the NMFS bottom trawl survey does not adequately sample this species to generate realistic biomass estimates. For 1998, catch specifications were the following: OFL=2,620 mt, ABC=1,970 mt, TAC=1,970 mt.

Fishery: Squid are not a target species in the Bering Sea, although they are taken as bycatch in the pelagic trawl fishery for pollock. They are also taken in smaller numbers in trawl fisheries for pollock, rockfish, and Greenland trubot.

Management: Squid is a defined target species that is regulated under the BSAI Groundfish FMP. The FMP controls the fishery through permits and limited entry, catch quotas (TACs), seasons, in-season adjustments, gear restrictions, closed waters, bycatch limits and rates, allocations, regulatory areas, record keeping and reporting requirements, and observer monitoring.

Economics: In 1996, 1,200 mt of squid was caught in the BSAI, of which nearly all was discarded. Discard rates in 1992-1994 fisheries ranged from 40% to 85%. Squid are generally frozen whole and used for bait or for human consumption.

Catch History: Squid were targeted by Japanese and Republic of Korea trawl fisheries during the 1960s and 1970s. Catch peaked in 1978 at 9,000 mt and steadily declined thereafter. Since 1986, less than 1,000 mt have been taken annually.

Exploitable biomass (mt), pre-season catch specifications (mt), and total catches (mt, including discards) of squid in the BSAI, 1980-1998.

Year	BSAI Biomass	BSAI ABC	BSAI TAC	BSAI Catch
1980	N/A	10,000	10,000	6,372
1981	N/A	10,000	10,000	5,945
1982	N/A	10,000	10,000	5,039
1983	N/A	10,000	10,000	3,980
1984	N/A	10,000	8,900	3,167
1985	N/A	10,000	10,000	1,620
1986	N/A	10,000	5,000	868
1987	N/A	10,000	500	131
1988	N/A	10,000	1,000	417
1989	N/A	10,000	1,000	306
1990	N/A	10,000	500	626
1991	N/A	3,800	1,000	632
1992	N/A	3,600	2,000	880
1993	N/A	3,400	2,000	683
1994	N/A	3,400	3,110	604
1995	N/A	3,110	1,000	459
1996	N/A	3,000	1,000	1,167
1997	N/A	1,970	1,970	1,474
1998	N/A	1,970	1,970	908

Other Species

Biology: The "other species" category includes species that currently have minimal commercial value such as sculpins, skates, smelts, sharks, and octopi. Skate species include Alaska skate (*Bathyraja pamifera*), big skate (*Raja binoculata*), longnose skate (*R. rhina*), starry skate (*R. stellulata*), and Aleutian skate (*B. aleutica*). The predominant shark species is spiny dogfish (*Squalus acanthias*), with sleeper sharks (*Somniousus pacificus*) occasionally taken. Smelts include capelin (*Mallotus villosus*), rainbow smelt (*Osmerus mordax*), and eulochon (*Thaleichthys pacificus*). Octopus species include *Octopus dofleini* and *Opisthoteuthis califoria*. Many species in this assemblage (smelts, in particular) are important prey for groundfish, seabirds, and marine mammals.

Stock Assessment: The current assessment is based on abundance estimates from the NMFS bottom trawl surveys. B_{msy} and F_{msy} have not been estimated for any species in this complex. Beginning in 1997, OFL and ABC rates are based on tiers defined under Amendment 44. Under this definition, OFL for other species is based on a tier 5 fishing mortality rate where $F_{OFL} = M$ (=0.20). ABC is based on a tier 6 harvest strategy where ABC=average catch from 1978-1995.

Population Status: The overall complex biomass appears to be increasing in the Eastern Bering Sea. For 1998 biomass was projected to be 669,000 mt. Catch specifications were the following: OFL=134,000 mt, ABC=25,800 mt, TAC=25,800 mt.

Fishery: Other species are taken incidentally in other target fisheries. Octopus are caught as bycatch in the pollock bottom trawl fishery and Pacific cod fisheries (using pots, trawls, and longlines). Smelts are caught primarily in the yellowfin sole fishery in northern Bristol Bay and by the pelagic trawl pollock fishery in Area 517. Capelin are also taken primarily by the yellowfin sole fishery, although smaller amounts of capelin (as well as eulochon) are taken in pelagic trawl pollock fisheries. Sharks are taken in the pelagic trawl pollock fishery and in the longline fisheries for sablefish, Greenland trubot, and Pacific cod. Skates are primarily taken in the Pacific cod longline fishery, as well as pollock and flatfish bottom trawl fisheries. Sculpins are caught as bycatch in nearly every bottom trawl fishery.

Management: Other species are regulated under the BSAI Groundfish FMP. The FMP controls the fishery through permits and limited entry, catch quotas (TACs), seasons, in-season adjustments, gear restrictions, closed waters, bycatch limits and rates, allocations, regulatory areas, record keeping and reporting requirements, and observer monitoring. The "other species" category includes species that currently have only slight economic value such as sculpins, skates, smelts, sharks, and octopus. Because sufficient data are lacking to manage each species separately, a single TAC is specified for this category as a whole. An FMP Amendment is in preparation that may regulate capelin and other forage fish separately from the "other species" category. Numerous other fish and invertebrates (such as grenadiers, eelpouts, sandfish, sea urchins, and mussels) which are not commercially harvested in the EEZ are included in a "nonspecified" category and no TAC is established.

Economics: Other species are of limited commercial value, and are generally discarded. In 1997, 22,500 mt of other species was caught, but only about 2,000 mt was retained. The primary product is meal, however, some skates have been processed into wings.

Catch History: Catches of "other species" increased during the 1960s to peak at 133,000 mt in 1972. Not surprisingly, this was also the peak year for all species of groundfish in the BSAI. Caches of "other species" remained relatively high through the mid and late 1970s (30,000-73,000 mt), but declined thereafter. Since 1990, catches have ranged from 17,000-33,000 mt, representing 2% or less of the total BSAI groundfish catches.

Biomass (mt, from NMFS trawl surveys), pre-season catch specifications (mt), and total catches (mt, including discards) of "other species" in the BSAI, 1980-1998.

Year	EBS Biomass	BSAI ABC	BSAI TAC	BSAI Catch
1980	450,900	74,200	74,249	47,661
1981	345,300	94,400	74,249	42,925
1982	533,100	94,300	74,249	23,367
1983	472,300	61,400	77,314	19,140
1984	446,500	61,000	40,000	10,178
1985	334,250	51,200	37,980	13,553
1986	573,100	35,900	27,800	11,980
1987	556,700	49,500	15,000	9,724
1988	713,900	54,000	10,000	12,643
1989	632,500	59,000	13,264	5,101
1990	827,400	55,500	5,000	20,808
1991	762,400	28,700	15,000	17,199
1992	617,505	27,200	20,000	33,075
1993	618,388	26,600	26,600	23,851
1994	691,067	27,500	26,390	24,555
1995	621,987	27,600	20,000	22,213
1996	620,997	27,600	20,125	21,437
1997	618,709	25,800	25,800	25,176
1998	669,000	25,800	25,800	23,448

AGENDA D-3(c)
DECEMBER 1998
Supplemental

Alaska Groundfish Data Bank
P.O. Box 2298 • Kodiak, Alaska 99615

TO: RICK LAUBER, CHAIRMAN
NORTH PACIFIC FISHERY MANAGEMENT COUNCIL

RE: GOA POLLOCK 1999 SPECIFICATION D-3(c)

DATE: DECEMBER 2, 1998

SENT BY FAX: 2 PP + Attachments

REQUEST FOR REVIEW OF CENTRAL/WESTERN POLLOCK ABC FOR 1999
AGENDA ITEM D-3(c)

The biomass of the Central/Western Gulf 1994 year class was adjusted downward between the assessment for 1998 and the assessment for 1999 based only on the failure of the 1994 year class to show as expected in the first and second trimester fisheries. We are concerned that conservation actions taken by the fleet may be responsible for the downward adjustment and request that the SSC review this potential.

DESCRIPTION OF THE 1ST AND SECOND TRIMESTERS

During the first half of the year the 1994 year class pollock were "cigars" too small in length to process in the machinery in the Kodiak plants. Small fish were not a significant problem in the 1st trimester because the fleet fished Shelikof and the Northern Gulf and were able to find adequate schools of large pollock. Data from the NMFS Observer program, attached, verifies the effort shift reported by the fleet.

However, the fleet had to make extraordinary efforts during the 2nd trimester to avoid undersized pollock.

1. An estimated third of the fleet used large mesh net to allow small pollock to escape.
2. Those not using large mesh net searched for schools of larger fish.
3. After the 2nd trimester pollock fishery closed in the Kodiak Area (630) the fleet moved to Chirikof (620). The 1994 year class appears to have been the prevalent fish in the Chirikof area and a majority of the fleet quite fishing voluntarily since they were unable to avoid small pollock.
4. The average catch for week in the Kodiak Area 2nd trimester was around 1,300 MT. In Chirikof the average was around 300 MT/week.
5. Processors voluntarily quite buying before the mandatory July 1 closure. About half the 2nd Trimester pollock quota was left and subsequently rolled over to the 3rd trimester which time the fish were large enough to process.

AGDB sent a letter to Steve Pennoyer describing the problems encountered during the second trimester. The first page which describes the small size at length is included as an attachment. The remainder of the letter was elegant whining about the increase in the apportionment of pollock to the second trimester as a sea lion measure – comments which you've heard.

Because the effect of large mesh was questioned by the Gulf Plan Team AGDB has also enclosed the mortality section of a report on mortality of pollock escaping large mesh net. The work was done in Kodiak by Ellen Pikitch, etal.

The 1998 Prince William Sound Science Center's 1998 found a substantial biomass of what is felt to be 1994 pollock year class in Prince William Sound. A letter discussing the survey results is included with these comments.

Chris Blackburn • Director • (907) 486-3033 • FAX (907) 486-3461 • e-mail 7353974@mcimail.com

REQUEST OF SSC

AGDB members feel that the efforts to avoid the 1994 year class 1st and 2nd trimesters changed the gear selectivity and that this change is not reflected in the model for the 1999 assessment of Central/Western Gulf pollock and the failure to reflect the change has resulted in a reduction in the estimated size of the 1994 year class.

We are aware, both from the AGDB members experience on the grounds and from the ADF&G trawl survey data from the crab survey that the 1994 year class is not as prevalent in the Kodiak Area as it appears in the Chirikof Area – the comment that the 1994 year class appears to be moving west was made by the Gulf Plan Team. However, as we understand it, the sole reason for reducing the estimated biomass of the 1994 year class was based on the catch data from the 1st and 2nd trimester.

We would appreciate the SSC's review, comments and evaluation of our concern.

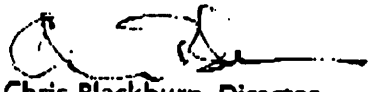
REAPPORTIONMENT OF POLLOCK AMONG CENTRAL/WESTERN GULF AREAS

The Plan Team also discussed whether any reapportionment of Central/Western Gulf pollock should be made for 1999 based on the sense that the 1994 year class was moving west. Since 1999 is a triennial survey year we feel it is more prudent to wait for the survey data than to guess based on incomplete data.

WEST YAKUTAT POLLOCK QUOTA

The Plan Team based the recommended ABC for the West Yakutat pollock quota on the summer survey. However, the West Yakutat pollock fishery is conducted only on the pollock spawning biomass, which appears much larger than the biomass estimated from the summer survey. We would appreciate review of the methods use to set the West Yakutat pollock ABC for 1999.

Thank you for your attention to our concerns.



Chris Blackburn, Director
Alaska Groundfish Data Bank

Alaska Groundfish Data Bank
P.O. Box 2298 • Kodiak, Alaska 99615

TO: STEVE PENNOYER

RE: GULF 2ND TRIMESTER POLLOCK FISHERY

DATE: JULY 14, 1998

SENT BY FAX: 6 PP

HARD COPY SENT BY MAIL

ATTACHMENT #0 GOA SPECIFICATIONS COMMENTS

Dear Steve:
The Central Gulf second trimester pollock fishery was very anomalous. The fleet had to make extraordinary efforts to find processable pollock. AGDB's Gulf members felt you should be apprised of the problems encountered. The good news is that there appears to be a pretty humongous 1994 year class of pollock.

We also request that a meeting be held in Kodiak to discuss the current and future sea lion protection measures.

1994 POLLOCK YEAR CLASS

The 1994 pollock year class appears to be huge in numbers and more numerous than the available feed can support. Usually age 4 pollock are 38 to 44 cm in length (15 to 17 inches), which is large enough to process. Much of the 1994 year class in the Central Gulf is about 12 inches long (30 cm) and shaped like cigars. The fish are too small to process and, were they processed, would have a low recovery rate.

GULF OF ALASKA POLLOCK - LENGTH AT AGE - 84, 88, 91 AND 94 YEAR CLASSES

AGE	84 YR CLASS	88 YR CLASS	91 YEAR CLASS	94 YR CLASS
2	N/A	24 cm	32 cm	21 cm
3	N/A	30 cm	35 cm	28 cm
4	38 cm	40 cm	44 cm	30 cm

Length is fork length. 1984, 88 and 94 year classes were large. The 91 year class was small. Length frequencies estimated from plots in the pollock chapter of the NPFMC SAFE document for 1998. Length for age 4 pollock in the 1994 year class estimated by processors.

As shown in the table above the 1994 year class pollock are smaller in length at age than the previous two strong year classes, 1984 and 1988, and considerably smaller than the 1991 year class which had low recruitment.

The 1994 year class's slow growth suggests that there has not been enough food for optimum or average growth. It is notable that the red salmon in the Kodiak area are also smaller than usual. Currently the red salmon weight is averaging 4.6 lbs. per fish, down from the usual 5 lbs. per fish. Both red salmon and pollock eat euphasiids. A slightly less than average run is forcasted for the Kodiak red salmon fishery.

Chris Blackburn • Director • (907) 486-3033 • FAX (907) 486-3461 • e-mail 7353974@mcimail.com

Selectivity and Mortality of Walleye Pollock Escaping from the Codend and Intermediate Section of a Pelagic Trawl: 1997 Annual Report

ATTACHMENT TO AGDB GOA SPECIFICATION COMMENTS

Submitted to:

National Marine Fisheries Service
Alaska Fisheries Science Center
7600 Sand Point Way Northeast
BIN C15700, Building 4
Seattle, WA 98115-0070

By:

The Alaska Fisheries Development Foundation

Prepared by:

Daniel Erickson[1], Ellen Pikitch[1&2], Christopher Bublitz[3], Petri Suuronen[4], and Esa Lehtonen[4]

[1]University of Washington, Fisheries Research Institute
[2]Wildlife Conservation Society, Osborn Laboratroies of Marine Sciences
[3]University of Alaska Fairbanks, Fishing Industrial Technology Center
[4]Finnish Game and Fisheries Research Institute

these tests were unnecessary. Pollock actively and repeatedly swam through or attempted to swim through the top panel of square meshes as soon as they encountered the panel (~20 m ahead of the codend pucker).

Seining as a method for catching controls: The F/V Mythos participated in this experiment 21 - 23 June to collect control specimens. This vessel used a salmon seine that fished to a depth of 11 fathoms (20 m). Meshes were 3.5" (8.9 cm) stretched measure (18 thread).

Nine attempts were made to catch pollock by seine and herd them into a collection cage (the collection cage was held inside of the seine just under the surface with one door open). The objective was to herd pollock into the cage as the bunt end of the seine was dried up. Pollock that were not herded into the cage swam free when the bunt end was released.

Pollock were successfully herded into a collection cage on two occasions. The first successful entrapment was made during the third set, when six seine-caught pollock (~45 cm fork length) were caged. Video observations were made of fish behavior while towing the cage at 1.8 to 4.0 knots by the M/V Three Bears. Pollock caught by this third set were released after the collection-cage towing tests were completed.

Forty five pollock were successfully herded into a collection cage during the ninth-seine set, which was made at 0100 on 6/23/97. Pollock were near the surface during these dark hours. The collection cage was towed from 0200 to 0330 to the staging site by the F/V Mythos at speeds of 1.4 to 2.2 knots. Pollock trapped within the cage ranged from 22 cm to 34 cm fork length (Figure 2), similar to the size distribution of pollock that escaped through trawl meshes (Figure 1). All seine-caught pollock were alive and in good condition after approximately a 64 hour holding period in the collection cage (i.e., little or no bruising, clear eyes, vigorous body movement, good color, and no injuries). Intermittent underwater video observations were recorded of these control fish. Behavior seemed normal during each observation period.

Preliminary Mortality Estimates: Methods used to determine mortality of pollock escaping through codend or intermediate meshes were tested. Fish escaping through meshes were herded into a collection cage using cover techniques (see "Effectiveness of

Treatments for Permitting Escapement", above). Following the collection of these fish, the cage was released at fishing depth, and the M/V Three Bears recovered a buoy that was attached to this collection cage. The cage was then raised to a depth of approximately 10 m where SCUBA divers inspected the contents and attached a CCD camera with umbilical so that real time observations could be made of fish behavior. The collection cage was then towed at 0.9 to 1.3 knots to the staging area (an 87 kg weight attached to a tether was lowered to the cage immediately prior this towing procedure to keep the cage below 8 m). The distance between the pick-up point and the staging area was 2 to 3 nautical miles. This towing procedure to the staging site did not appear to have adverse affects on pollock within the collection cages – they seemed to have little problem maintaining position away from the walls of the cage.

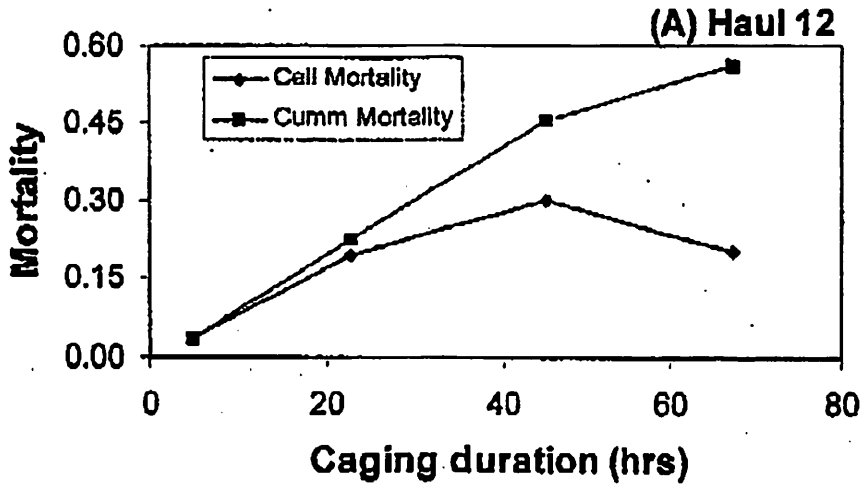
Once at the staging site, collection cages were anchored to the sea bed by divers. Final caging depths were 40 to 60 feet (12.2 to 18.3 m). Divers photographed pollock inside of the cages and collected dead specimens daily.

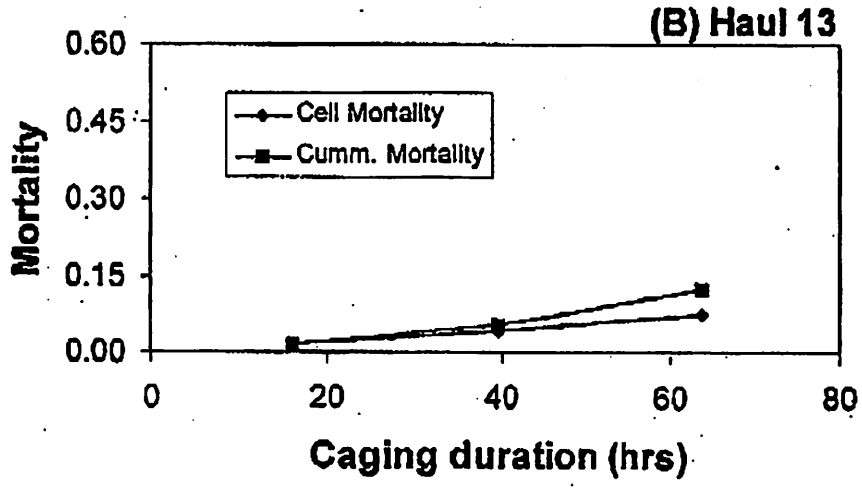
Three cages containing pollock that escaped through trawl meshes were held at the staging area for periods of 1.5 to 2.8 days. Two cages contained fish that escaped through the intermediate-top panel (93-mm square meshes) during tows 12 and 13, and one cage contained fish that escaped through the codend-top panel (77-mm square meshes) during tow 14. Most escapees displayed extensive bruising on the snout and operculum. Although some mortality was observed in each cage (Figure 3), it was very clear that more than 3 holding days are required to account for all mortality caused by the escapement process. Numerous mortalities were collected on the final day of this pilot project (Figure 3). In addition, some fish that were still alive at the end point of the study were in very poor condition. Hence, additional delayed mortality was not accounted for during the pilot study.

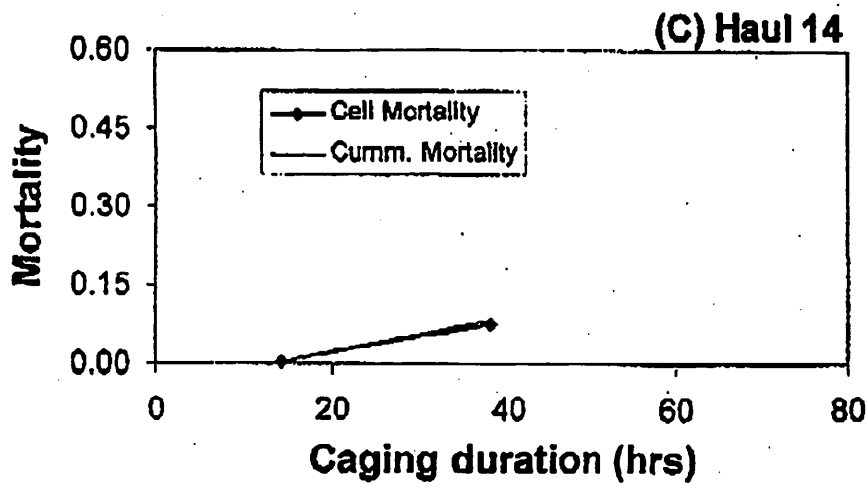
Cumulative mortality of escapees was 13% (64 hours) and 8% (38 hours) for tows 13 and 14, respectively (Figure 3 b&c). Mortality was considerably higher for tow 12 after 67-caging hours (Figure 3a) because problems were encountered for this tow that were not experienced during tows 13 and 14. Problems related to tow 12 were:

(1) The cage did not detach from the trawl at fishing depth. Instead, the cage remained connected to the trawl until the codend reached the surface during haul

Figure 3. Mortali.. proportion) of pollock that escaped th..gh (A) 93-mm square meshes of the intermediate during tow 12, (B) 93-mm square meshes of the intermediate meshes during tow 13, and (C) 77-mm square meshes of the codend during tow 14.







ATTACHMENT 1 TO AGDR COMMENTS GOA SPECIFICATIONS FOR 1999

Date: Wed Dec 02, 1998 7:02 pm EST
Source-Date: Wed, 02 Dec 1998 19:02:25 -0500
From: Bill Karp
EMS: INTERNET / MCI ID: 376-5414
MBX: Bill.Karp@noaa.gov

TO: * ALASKA GROUNDFISH DATA BANK / MCI ID: 735-3974
TO: billk
EMS: INTERNET / MCI ID: 376-5414
MBX: billk@race.afsc.noaa.gov
Subject: Re:gulf pollock catch distribution
Message-Id: 98120300023330/INTERNETGWDN2IG
Source-Msg-Id:
<02DA03665D51100F*/c=US/admd=ATTMAIL/prmd=GOV+NOAA/o=CCNMFS/s=Karp/g=Bill/@MS>
U-Alternate-recipient: Allowed
U-Content-identifier: 02DA03665D51100F
U-Content-return: allowed
U-Conversion: Allowed
U-Disclose-recipients: Prohibited

Chris

Here is the catch information from observed catcher boats targeting pollock in
the area east of 154 W, north of 57 N, and west of 140 W, by trimester for 1997
and 1998

1997	Tonnage	4707	1825
	# of tows	101	83
1998	Tonnage	6491	4847
	# of tows	80	195

As I mentioned in my voice mail message, we have prepared rough maps which show
the location of each haul by trimester and year, but they won't fax or copy well. Let me know if you would like me to FedEx them up to you. Otherwise,
I'll bring them up to Anchorage with me, arriving on Sunday evening.

See you next week

Bill
206-526-4194

Reply Separator
Subject: gulf pollock catch distribution
Author: CBLACKBURN/0007353974@MCIMAIL.COM
Date: 11/30/98 12:39 PM

Bill: Thanks for getting back to me -- I realized that the time is very short.

I think the most important information is whether there was more effort in the Northern Gulf than usual. The fleet says they fished a lot more in the Northern Gulf than usual to avoid small pollock.

I've looked at Ivan Vining's publication showing by year the catch by state stat area and little catch is shown in the Northern Gulf of area 630(Kodiak). His work is for the years 1993-6.

Ann Hallowed has the pollock catch composition for the first & second trimesters for 1998 so that data should be available. The 1997 data should
also be available.

At a minimum I would be happy if you could look at the tonnage of observed pollock taken east of 154 West and north of 57 North and west of 140 West in 1997 and 1998 for the first and second trimesters of 1997 and 1998. I want to know whether the observed catch in this area was greater in 1998 than in 1997. I hope this is possible to get before the Council meeting.

Thanks much

Chris

PRINCE WILLIAM SOUND SCIENCE CENTER
CORDOVA ALASKA

P. O. Box 705
Cordova, Alaska 99574
(907)424-5800 (ph.)/(907)424-5820 (fax)

ATTACHMENT 5 AGDB GOA SPECIFICATION COMMENTS

December 2, 1998

Ken Roemhildt
North Pacific Processors Inc.
Box 1040
Cordova, Alaska 99574

Dear Ken:

This letter is in response to your request for pollock information that I presented at the PWS user group meeting yesterday. In the winter of 1995, we measured about 37,000 mt of prespawning pollock in the Port Bainbridge and Lower Knight Island areas of PWS after the fishery had taken place. In the winter of 1996, we did not do a survey. In the winter of 1997, we worked with Bill Bechtol, ADF&G, to conduct a survey after the fishery. We measured 38,000 mt of adult pollock in the Port Bainbridge and Lower Knight Island areas. In the winter of 1998, again we worked with Bill Bechtol to conduct a survey after the fishery and found 114,000 mt of prespawning pollock. The available information suggests that the increase in biomass was due to recruitment of smaller fish. We suspect this recruitment came from the large 1994-year class.

Following protocol established for most fish stocks such as salmon, the pollock stock should be defined by its location of spawning. Thus, I refer to these pollock as the PWS stock. Insufficient information is available to determine how much of this stock feeds in the Gulf during its annual spring-fall feeding migration.

At the meeting I addressed the fact that our direct measures of pollock biomass in PWS do not support estimates of biomass and trends made by management. Given that coastal communities such as Cordova are highly dependent upon revenues generated by fishing to support their economies, and that the winter timing and magnitude of a pollock fishery can have an enormous impact, I suggest that the local community could benefit by getting more involved in the management decisions.

Five years of intensive research has established that the pelagic fish assemblage of PWS is primarily composed of pollock, herring and salmon. Managing these populations independently in the presence of this new knowledge is inefficient and in some cases impractical. I encourage the adoption of PWS as a special management area to develop new multispecies and in-season management practices. With ADF&G, PWSAC, the Science Center, and the fishing community, we have the organizations and the people that can use the tools developed from the SEA program and related projects and take management to the next level. Speaking from the Science Center, I can say that we are willing to work hand-in-hand with management and industry to make this happen but it will take major support and lobbying from the community to initiate changes of this magnitude.

Thank you for your concern.

Sincerely,

Gary Thomas, Ph.D.
President

Cc: Mayor Zeine, Chris Blackburn, Bud Perrine

Alaska Marine Conservation Council
Box 101145, Anchorage Alaska 99510
(907) 277-5357 • (fax) 277-5975
amcc@akmarine.org • www.akmarine.org

December 7, 1998

Rick Lauber, Chair
North Pacific Fishery Management Council
604 4th Ave.
Anchorage, AK 99501

RE: BSAI Specifications

Dear Chairman Lauber,

The National Marine Fisheries Service has not completed the proposed rule for the NPFMC's June 1998 decision to ban bottom trawling for Bering Sea pollock. The measure included a prohibition on bottom trawl gear, application of the performance definition for pelagic trawls year-round and a reduction in the halibut and crab PSC caps. The NPFMC voted to adopt this measure last June in order to meet the Magnuson-Stevens Act requirement to reduce bycatch by the statutory deadline of October 1998. The NPFMC's and the public's expectation was that this conservation measure would go into effect for the 1999 fishery.

This is to request that the NPFMC prohibit bottom trawling for Bering Sea pollock for the 1999 fishery through the annual specifications process. We understand the PSC cap reduction cannot take place as part of the specifications process but feel it is appropriate to get on with the prohibition on bottom trawl gear in this fishery. We expect NMFS to complete the proposed rule in 1999. Throughout the discussion leading up to the NPFMC's decision to eliminate bottom trawling for Bering Sea pollock, industry representatives expressed many times that they would support taking this action during the annual specifications process.

Thank you for considering our request.

Sincerely,

Dorothy Childers
Executive Director

4 December 1998

LATE COMMENT

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

RE: 1999 TAC specifications for the BS/AI and GOA ground fish fisheries

Dear Mr. Chairman,

The Center for Marine Conservation (CMC) submits the following comments on the Plan Team's recommended 1999 Allowable Biological Catch (ABC) levels for pollock. The recently released National Marine Fisheries Service (NMFS) Biological Opinion under Section 7 of the Endangered Species Act, 16 U.S.C. §§ 1531, et seq., has addressed the question whether the pollock fishery as currently managed jeopardizes the continued existence of endangered Steller sea lions. In light of NMFS's finding that the Bering Sea/Aleutian Islands (BSAI) and Gulf of Alaska (GOA) pollock trawl fisheries, as proposed, are "likely to 1)jeopardize the continued existence of the western population of Steller sea lions and 2) adversely modify its critical habitat" (NMFS Biological Opinion on Groundfish Fisheries in the BSAI and GOA, 114 (December 3 1998)) , regulation of the groundfish trawl fisheries, particularly for walleye pollock, requires restructuring for 1999. This restructuring must include a comprehensive set of conservation measures that incorporates more effective spatial and temporal regulation of the fisheries with the extension of no-trawl buffer zones to protect critical sea lion habitat. To successfully implement spatial and temporal restructuring and an extension of no-trawl zones, it is clear that an overall reduction in the Total Allowable Catch (TAC) is required. In addition to comprehensive time-area management measures, TAC reductions are required for declining commercial stocks and for fisheries most affecting critical sea lion habitat.

Scientists generally believe that the manner in which the pollock fishery is conducted is having an adverse impact on Steller sea lions and other marine wildlife. In studies of the Bering Sea ecosystem, from the National Research Council's report, *The Bering Sea Ecosystem*, to the proceedings of CMC's Alaska Seas Marine Conservation Biology Workshop, *Ecosystem-Based Management in the Bering Sea*, scientists have recommended that the conduct of the pollock fishery be altered to better distribute it over space and time, in order to reduce competition with Steller sea lions feeding on pollock. The current level of fishing is, quite simply, causing ecosystem effects as indicated by the decline in Steller sea lion populations and other species such as fur and

harbor seals and seabirds, as well as alterations in feeding habits of marine mammals such as orcas resulting from population declines in pinniped prey species. Accordingly, an overall reduction in TAC is necessary to reverse these trends.

We urge the Council to make the tough choices in fishery management necessary to stop the decline of the endangered Steller sea lion and other similarly-impacted marine wildlife and to begin to reverse the adverse effects of fishing on Alaska's marine ecosystems.

I look forward to meeting you and the other Council members at this week's meeting.

Sincerely,

Kris Balliet
Director
Alaska Field Office
Center for Marine Conservation
106 F Street
Anchorage, AK 99501
907-258-8935

DRAFT

Note: final specifications for AI pollock and YFS may be adjusted slightly to account for bycatch needs of pollock in other fisheries.

Bering Sea and Aleutian Islands
Council Recommended 1999 Catch Specifications (mt)

Species	Area	1999 Biomass	1999 OFL	1999 ABC	1999 TAC		1998 TAC	1998 Catch
Pollock	EBS	7,040,000	1,720,000	992,000	992,000		1,110,000	1,020,720
	"A" season				*		45%	
	"B" season				*		55%	
	AI	106,000	31,700	23,800	5,000	**	23,800	21,945
	Bogoslof	403,000	21,000	15,300	1,000		1,000	8
Pacific cod	BS/AI	1,210,000	264,000	177,000	177,000		210,000	179,115
Yellowfin sole	BS/AI	3,180,000	308,000	212,000	204,980		220,000	95,036
Greenland turbot	BS/AI	177,000	29,700	14,200	9,000		15,000	8,856
	BS			67%	67%		67%	
	AI			33%	33%		33%	
Arrowtooth	BS/AI	819,000	219,000	140,000	134,354		16,000	14,930
Rock sole	BS/AI	2,320,000	444,000	309,000	120,000		100,000	33,454
Flathead sole	BS/AI	636,000	118,000	77,300	77,300		100,000	24,228
Other flatfish	BS/AI	618,000	248,000	154,000	154,000		89,434	15,137
Sablefish	EBS	17,000	2,090	1,340	1,340		1,300	573
	AI	26,000	2,890	1,860	1,380		1,380	615
POP complex								
True POP	EBS	45,500	3,600	1,900	1,400		1,400	1,031
Other POP	EBS	11,600	356	267	267		267	107
True POP	AI	236,000	19,100	13,500	13,500		12,100	9,070
	Eastern			3,430	3,430		3,070	2,000
	Central			3,850	3,850		3,450	2,500
	Western			6,220	6,220		5,580	4,570
Sharp/Northern	AI	94,000	5,640	4,230	4,230		4,230	3,652
Short/Rougheye	AI	46,500	1,290	965	965		965	668
Other rockfish	EBS	7,030	492	369	369		369	205
	AI	13,000	913	685	685		685	361
Atka mackerel	AI	595,000	148,000	73,300	66,400		64,300	55,782
	Eastern			17,000	17,000		14,900	12,000
	Central			25,600	22,400		22,400	20,000
	Western			30,700	27,000		27,000	24,000
Squid	BS/AI	n/a	2,620	1,970	1,970		1,970	908
Other species	BS/AI	643,000	129,000	32,860	32,860		25,800	23,448
BS/AI TOTAL		**18,243,630**	**3,719,391**	**2,247,846**	**2,000,000**		**2,000,000**	**1,509,849**

*** A:B season split to harmonize with sea lion measures**
**** AI pollock TAC is for bycatch only**

EBS = eastern Bering Sea
BS/AI = Bering Sea & Aleutians
BS = Bering Sea
AI = Aleutian Islands
OFL = overfishing level
ABC = acceptable biological catch
TAC = total allowable catch

1998 catch as of 11/7/98

1999 BSAI Trawl Fisheries PSC DRAFT

Apportionments and Seasonal Allowances

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	254	21,084	274,526	1,198,906	3,248,821
January 20 - March 31	285					
April 1 - May 10	210					
May 11 - July 10	100					
July 11 - Dec 31	410					
Rocksole/other flatfish	795	22	158,133	294,134	399,635	801,080
January 20 - March 29	485					
March 30 - July 10	130					
July 11 - December 31	180					
Turbot/sablefish/ Arrowtooth		10				44,504
Rockfish	75	8			7,836	44,504
July 11 - Dec 31	75					
Pacific cod	1,550	22	15,813	147,263	218,288	133,513
Pollock/mackerel/o.species	250	152	1,970	14,077	20,335	77,578
Pelagic Trawl Pollock		1,217				
TOTAL	**3,675**	**1,685**	**197,000**	**730,000**	**1,845,000**	**4,350,000**

Note: Includes 7.5% CDQ allocation.

Unused PSC allowances may be rolled into the following seasonal apportionment.

30% of the red king crab PSC for the rock sole fishery is apportioned to the 56 - 56o10' RKCSA strip.

Accounts for the reductions in halibut and crab PSCs due to ban on pollock bottom trawling (halibut: -100 mt; RKC: -3,000; Z1 bairdi: -20,000; Z2 bairdi: -30,000; opilio: -150,000 crab)

Accounts for adjustments due to changes in biomass for herring, red king crab, Z2 bairdi, and opilio.

1999 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	60,000 first tr.
May 1 - September 14	0	8,500 second tr.
Sept. 15 - Dec. 31	315	15,000 third tr.
Other Non-Trawl*	90	
May 1 - September 14	45	
Sept. 15 - Dec. 31	45	
Groundfish Pot	Exempt	
TOTAL	900 mt	83,500

Note: unused halibut PSC or P. cod TAC 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.

4 December 1998

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

RE: 1999 TAC specifications for the BS/AI and GOA ground fish fisheries

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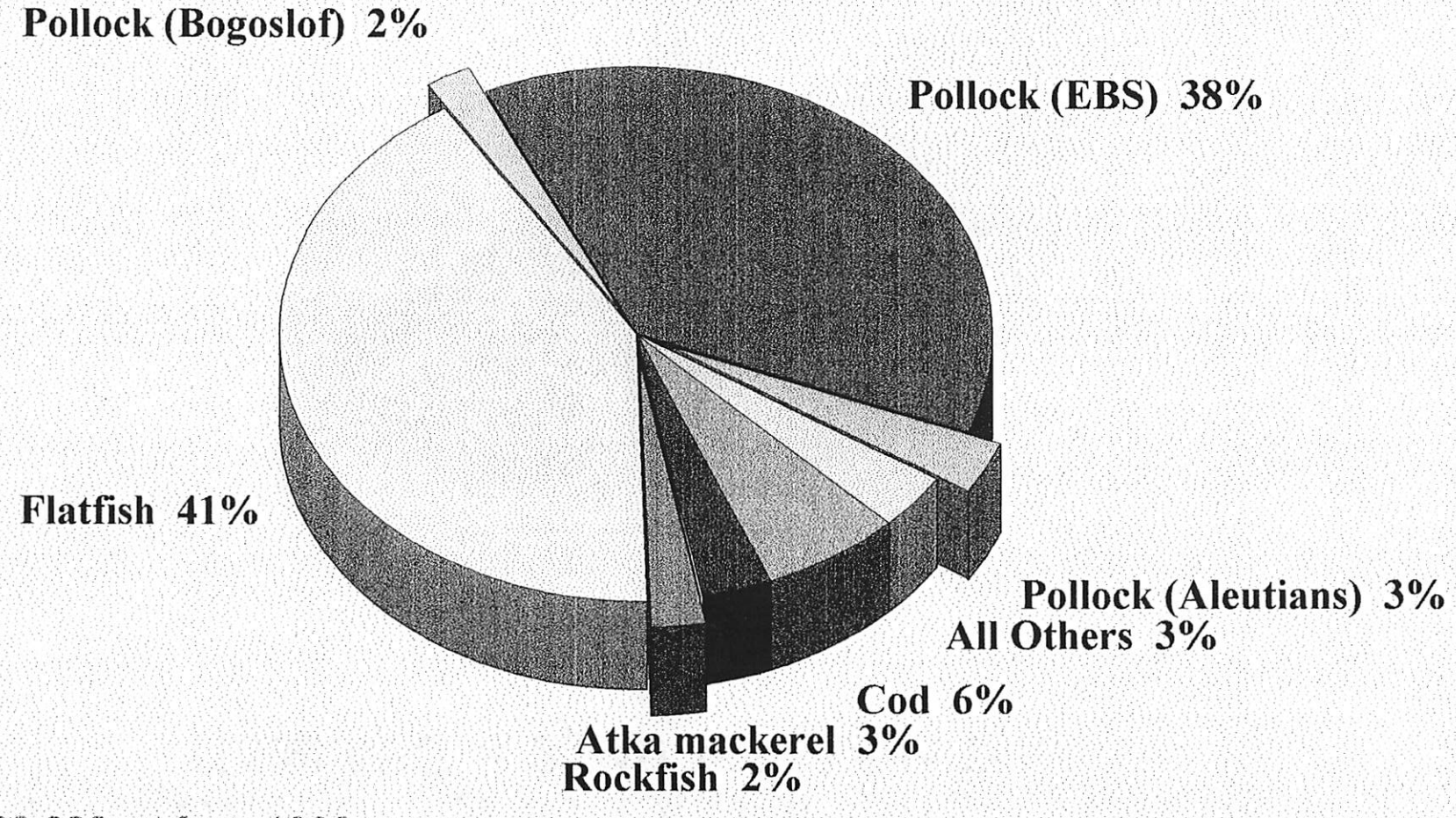
I look forward to meeting you and the other Council members at this week's meeting.

Sincerely,

Kris Balliet
Director
Alaska Field Office
Center for Marine Conservation
106 F Street
Anchorage, AK 99501
907-258-8935

BERING SEA GROUNDFISH COMPLEX

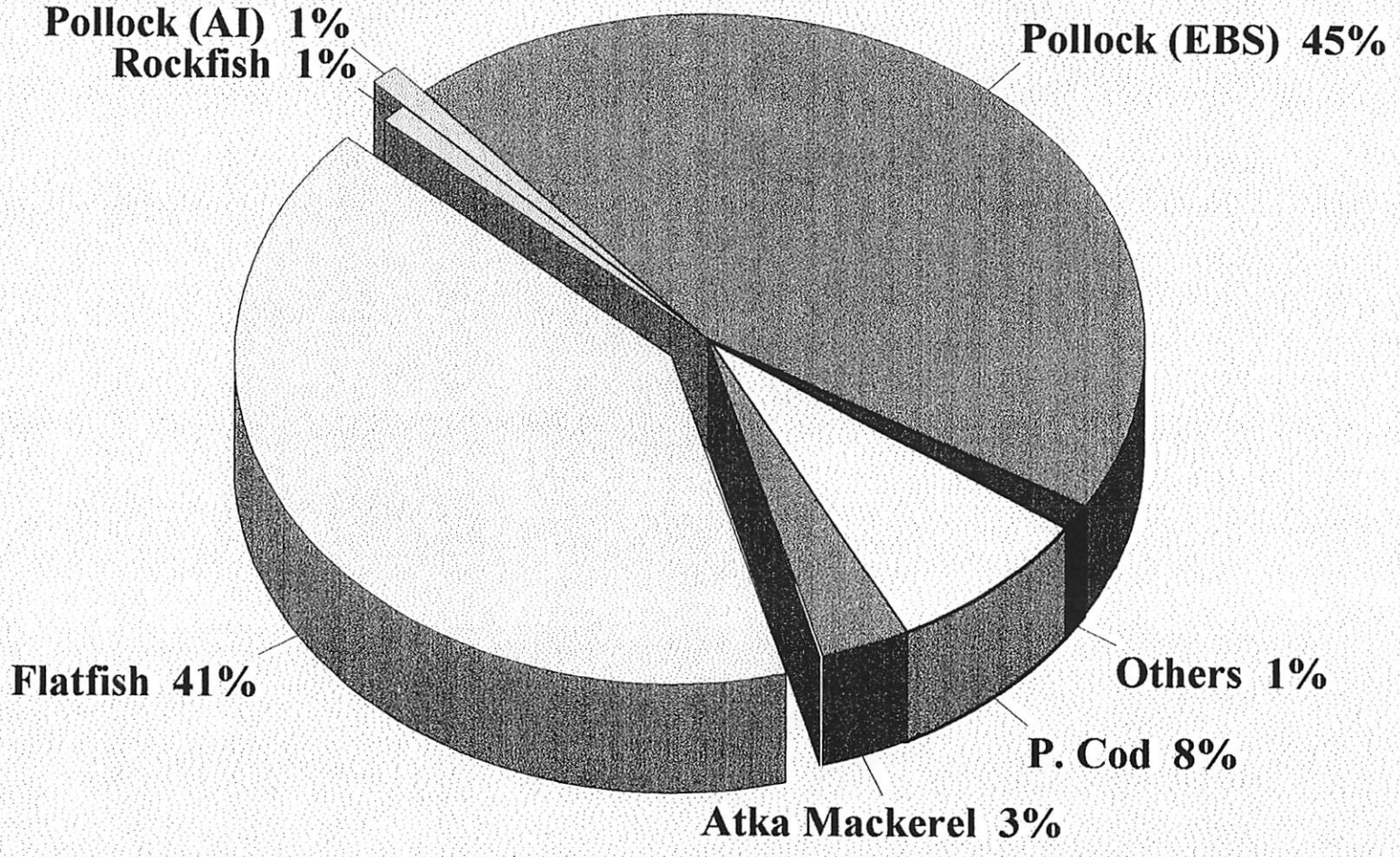
(Projected 1999 Biomass = 18.2 Million M. Tons)



Up 966,000 mt from 1998

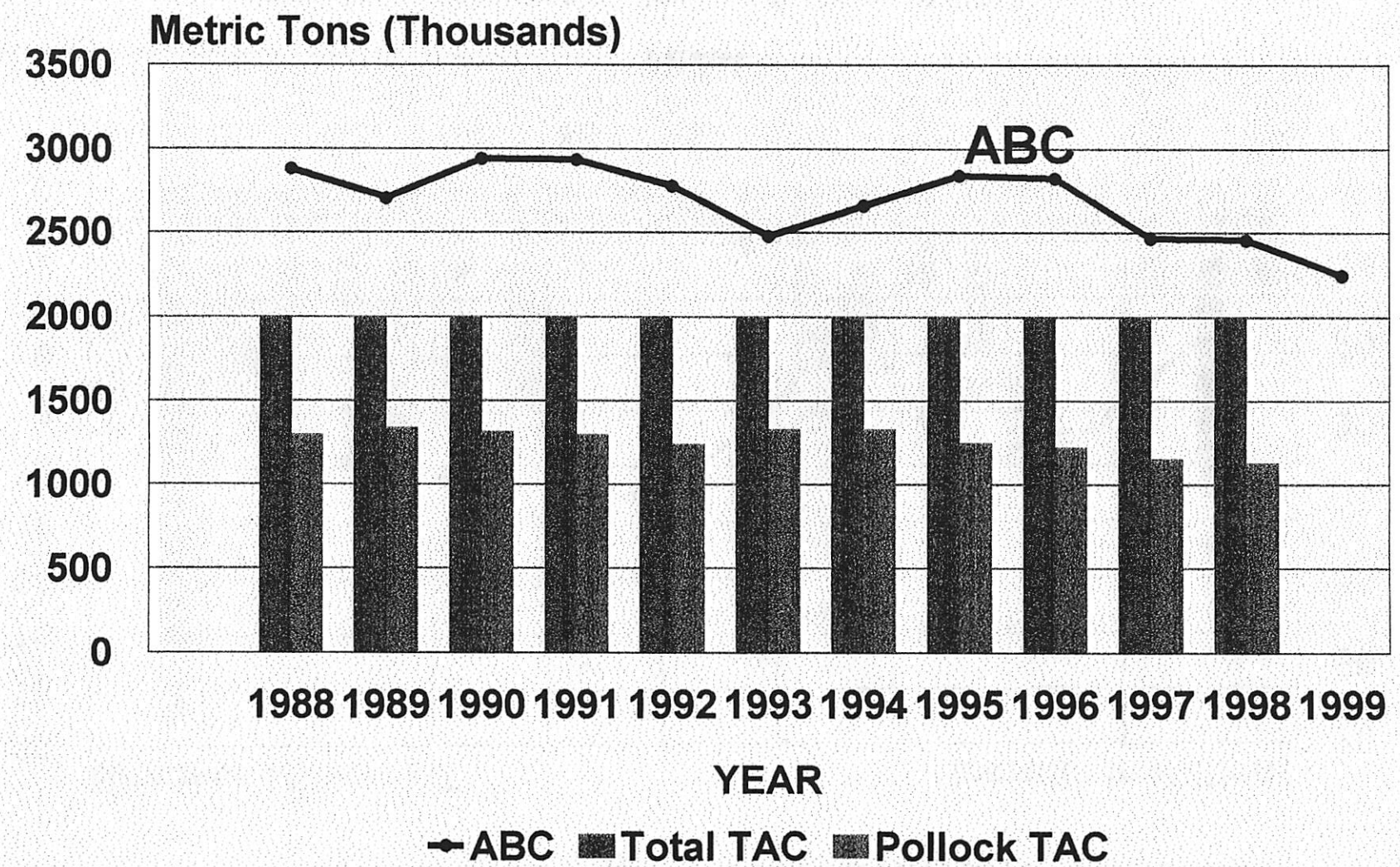
Projected 1999 Groundfish ABCs

(Total ABC = 2,240,786 Metric Tons)

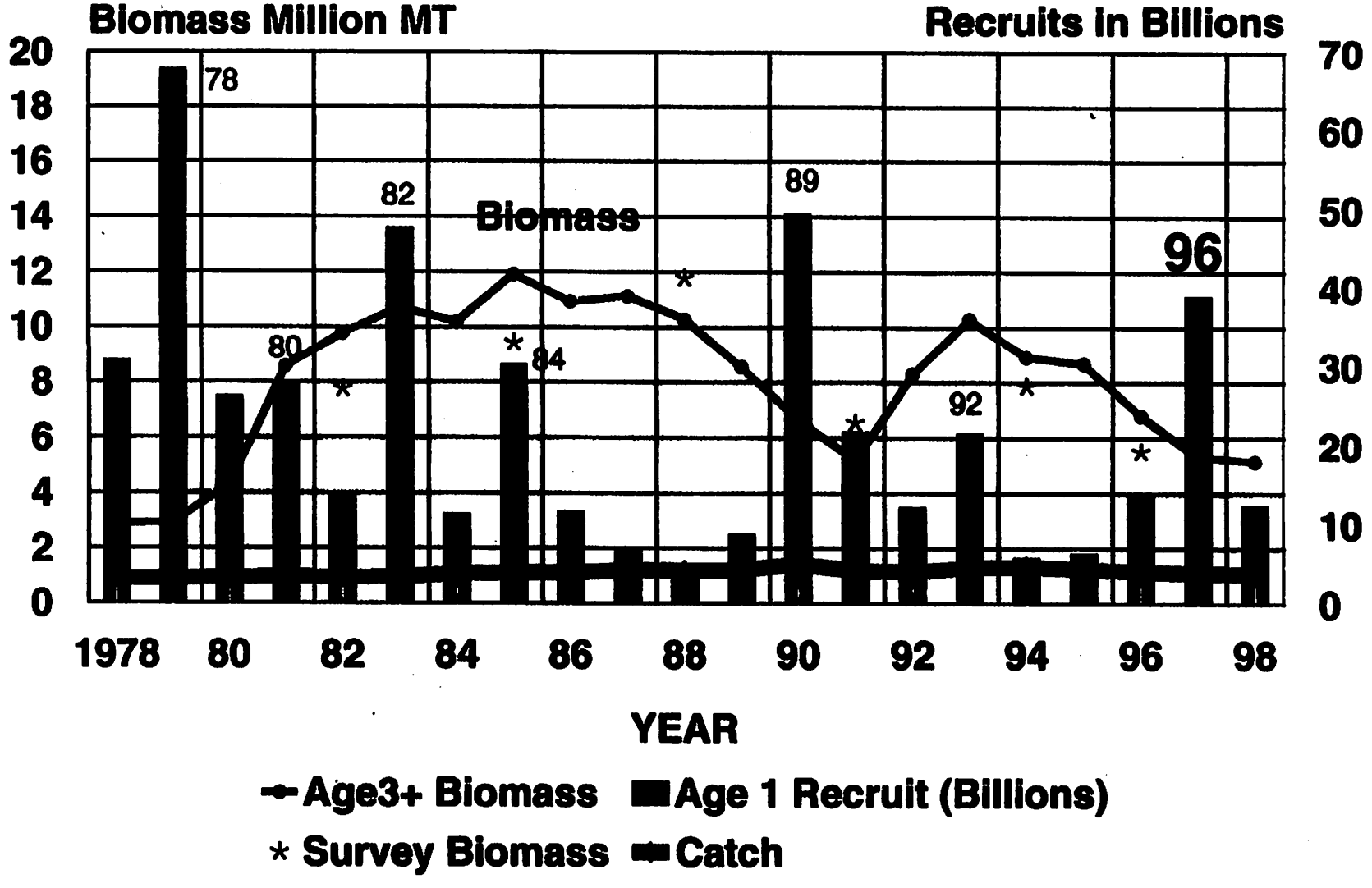


BSAI 12-Year History of ABCs and TACs

1988-1999

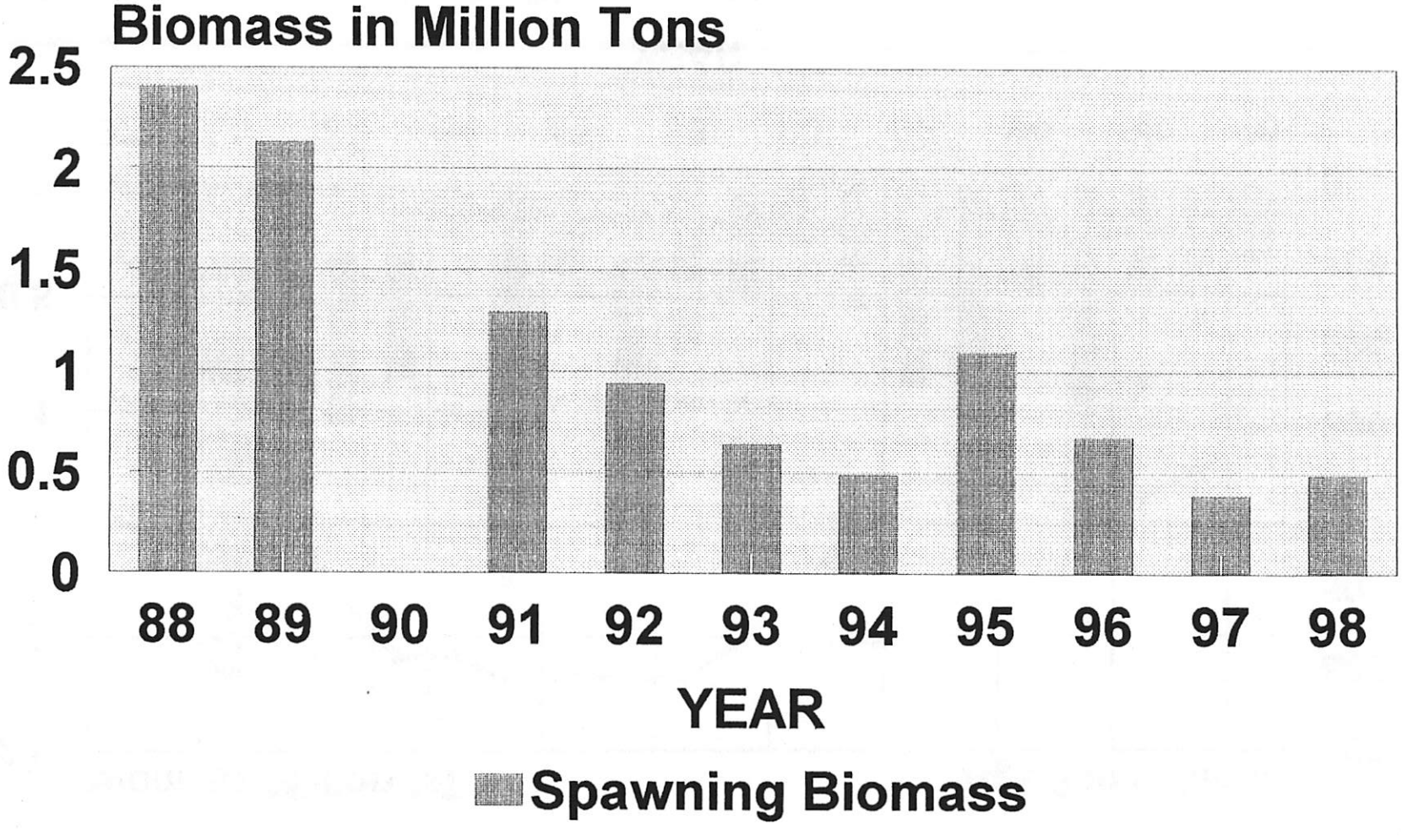


Eastern Bering Sea Pollock
Biomass and Age 1 Recruitment 1978-98



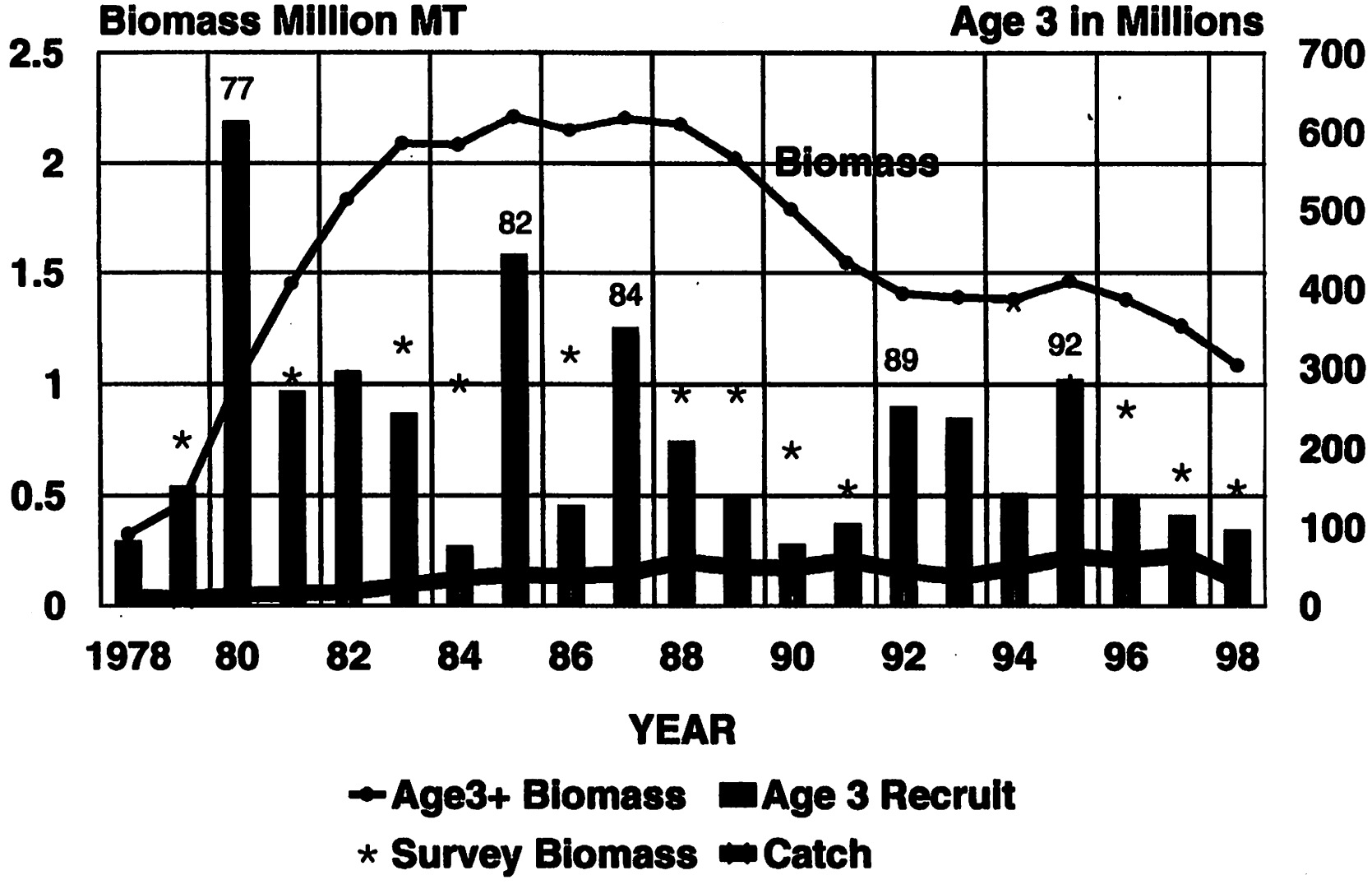
POLLOCK SPAWNING BIOMASS

BOGOSLOF AREA



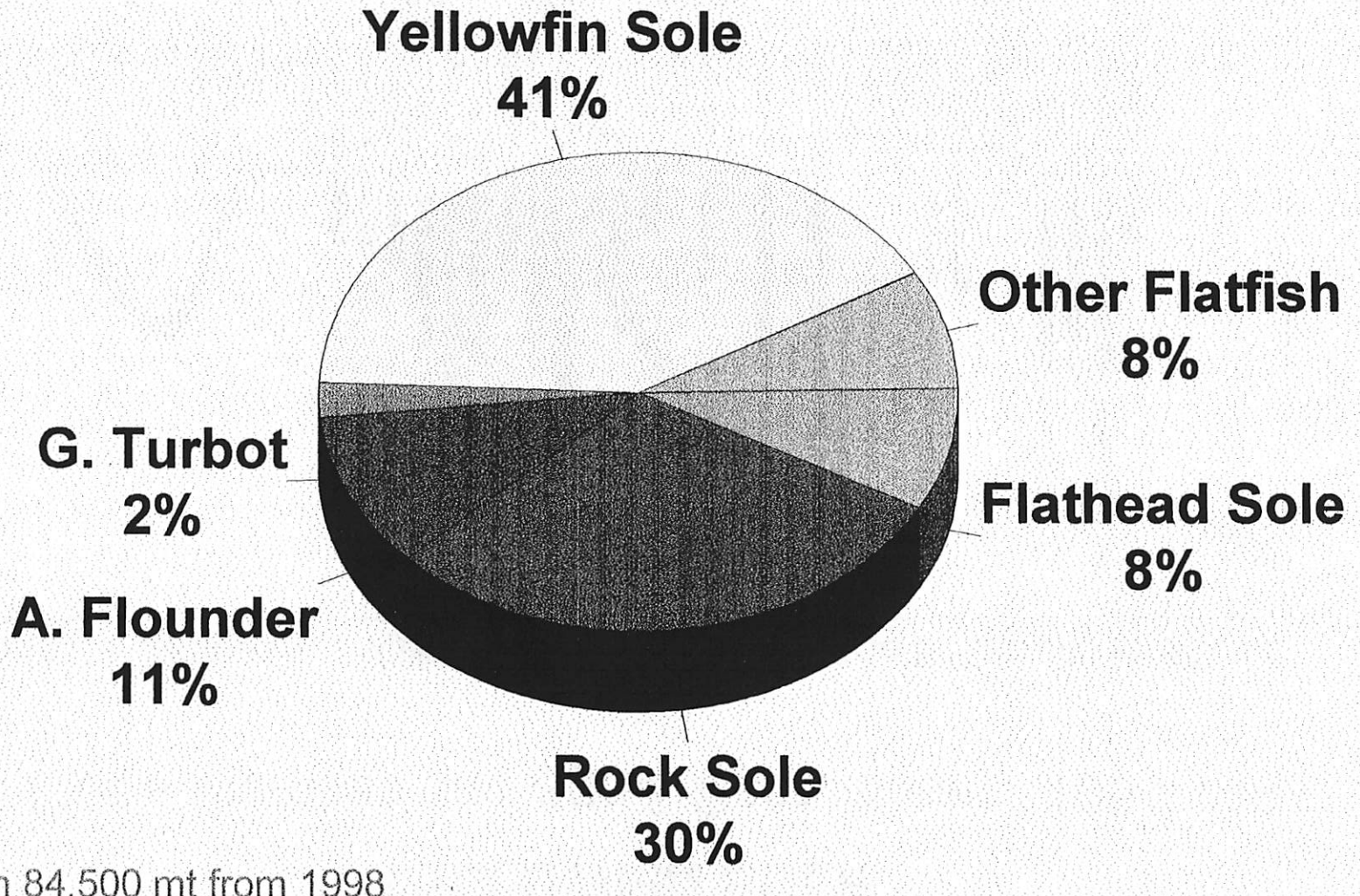
Miller Freeman Hydroacoustic Survey

Eastern Bering Sea Pacific Cod
Biomass and Recruitment 1978-98



BERING SEA FLATFISH COMPLEX

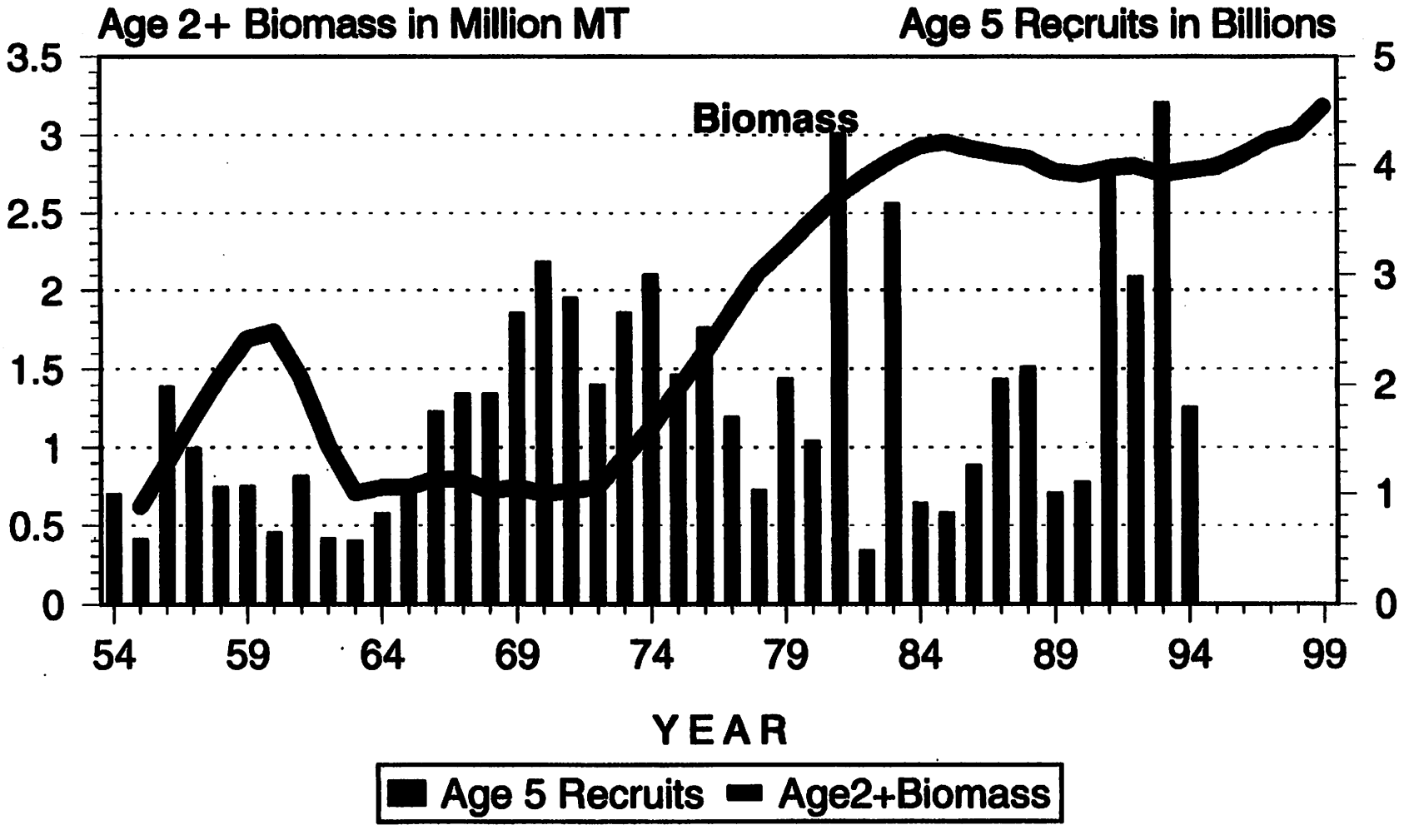
(Total 1999 Biomass = 7,750,000 Tons)



Down 84,500 mt from 1998

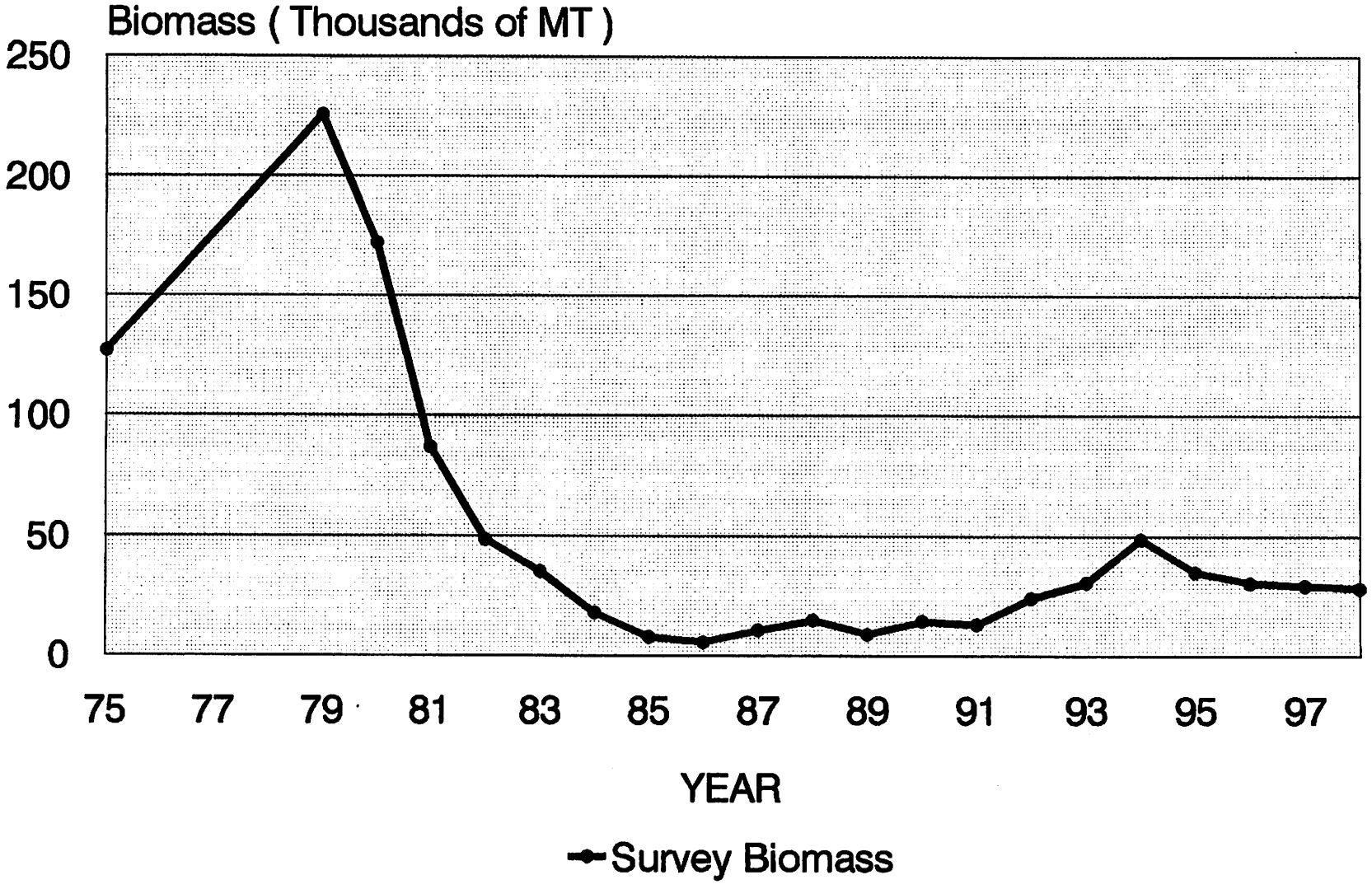
YELLOWFIN SOLE

Synthesis Biomass and Age 5 Recruitment 1954-1999



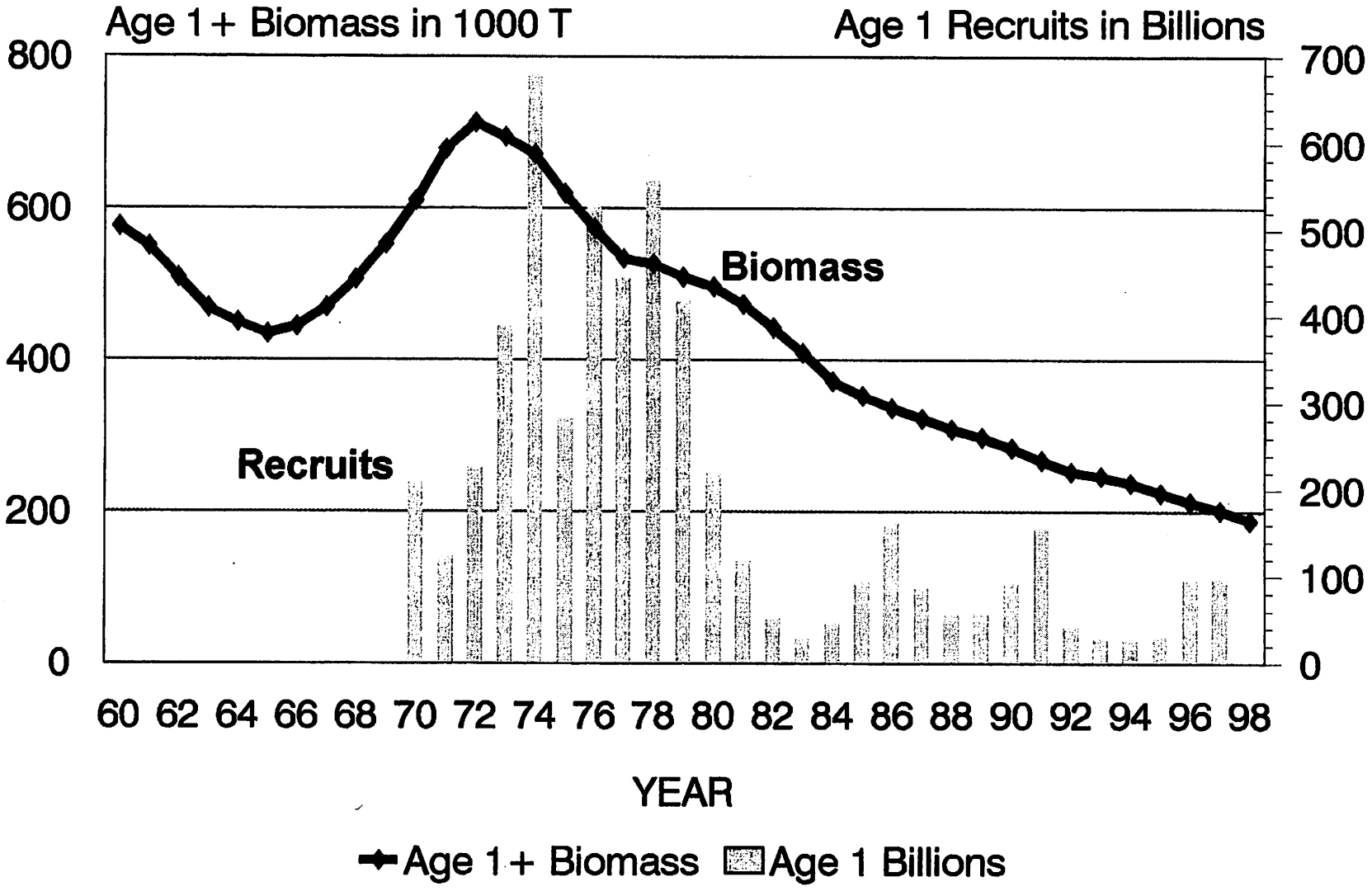
Greenland Turbot

EBS Shelf Survey Biomass 1975-98

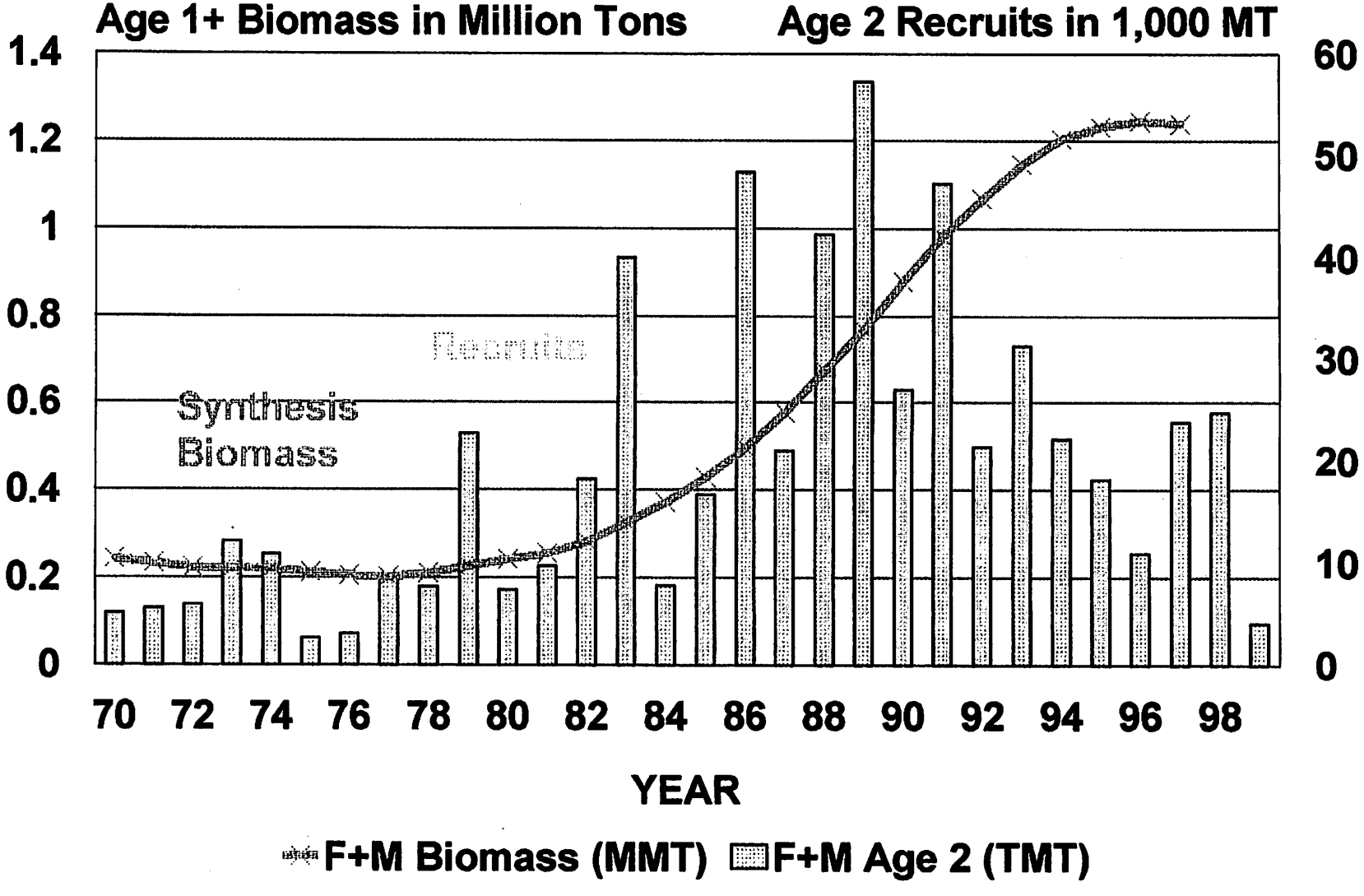


Greenland Turbot

Model 3 Synthesis Biomass and Recruitment

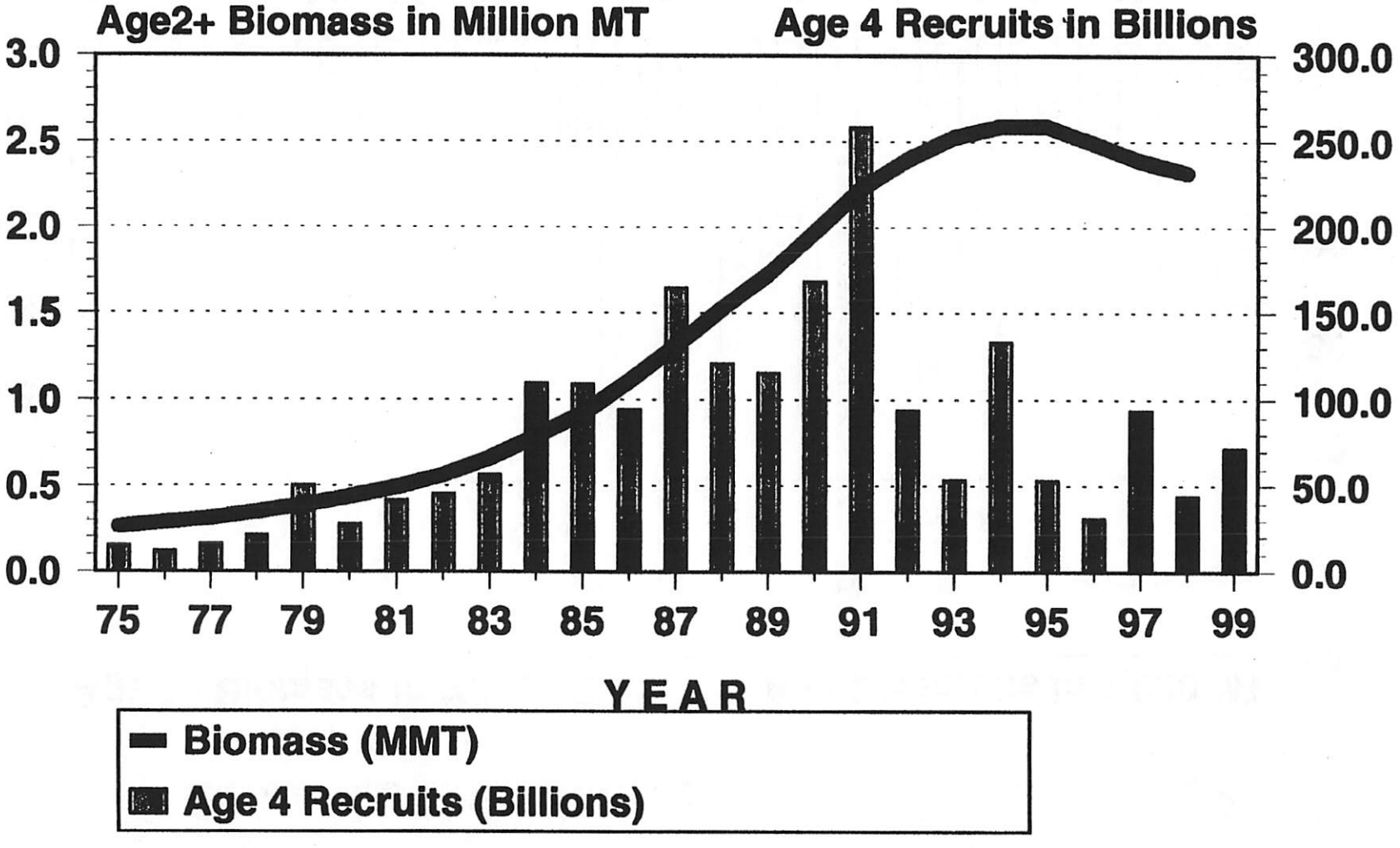


Eastern Bering Sea Arrowtooth Flounder
Biomass and Recruitment Trends 1970-99

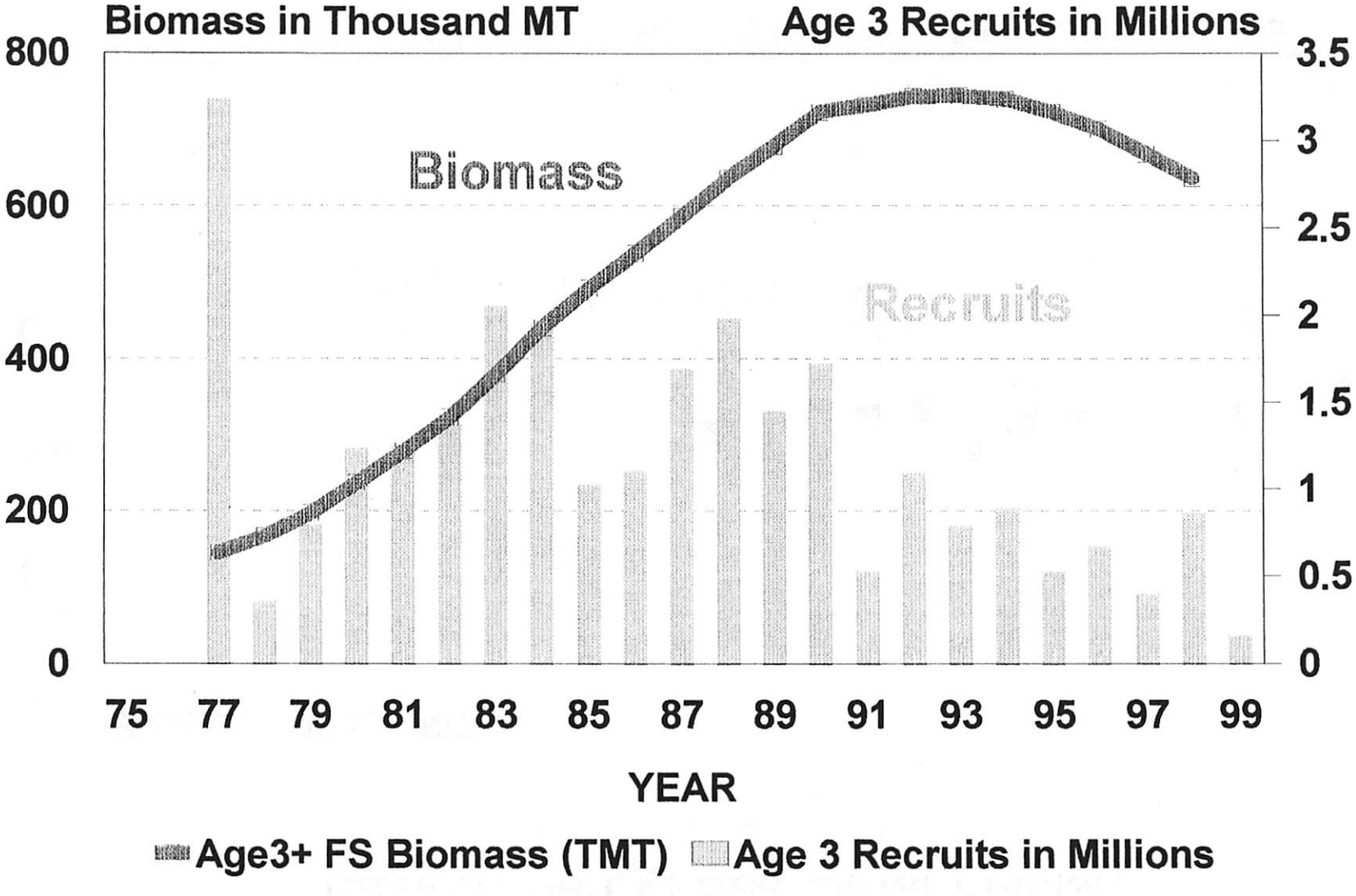


ROCK SOLE

Synthesis Biomass and Recruitment 1975-99

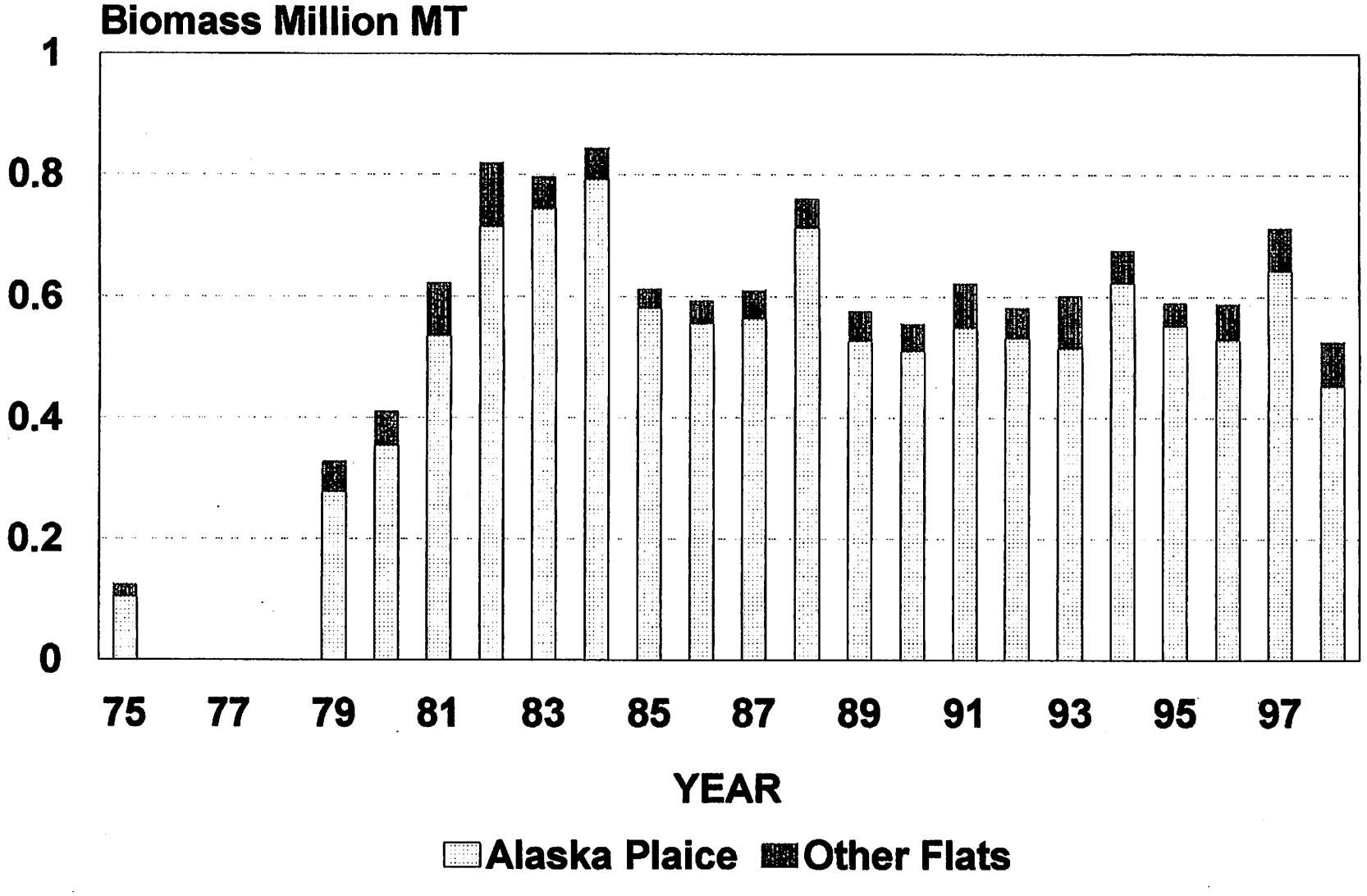


Eastern Bering Sea Flathead Sole
Model Biomass 1977-98



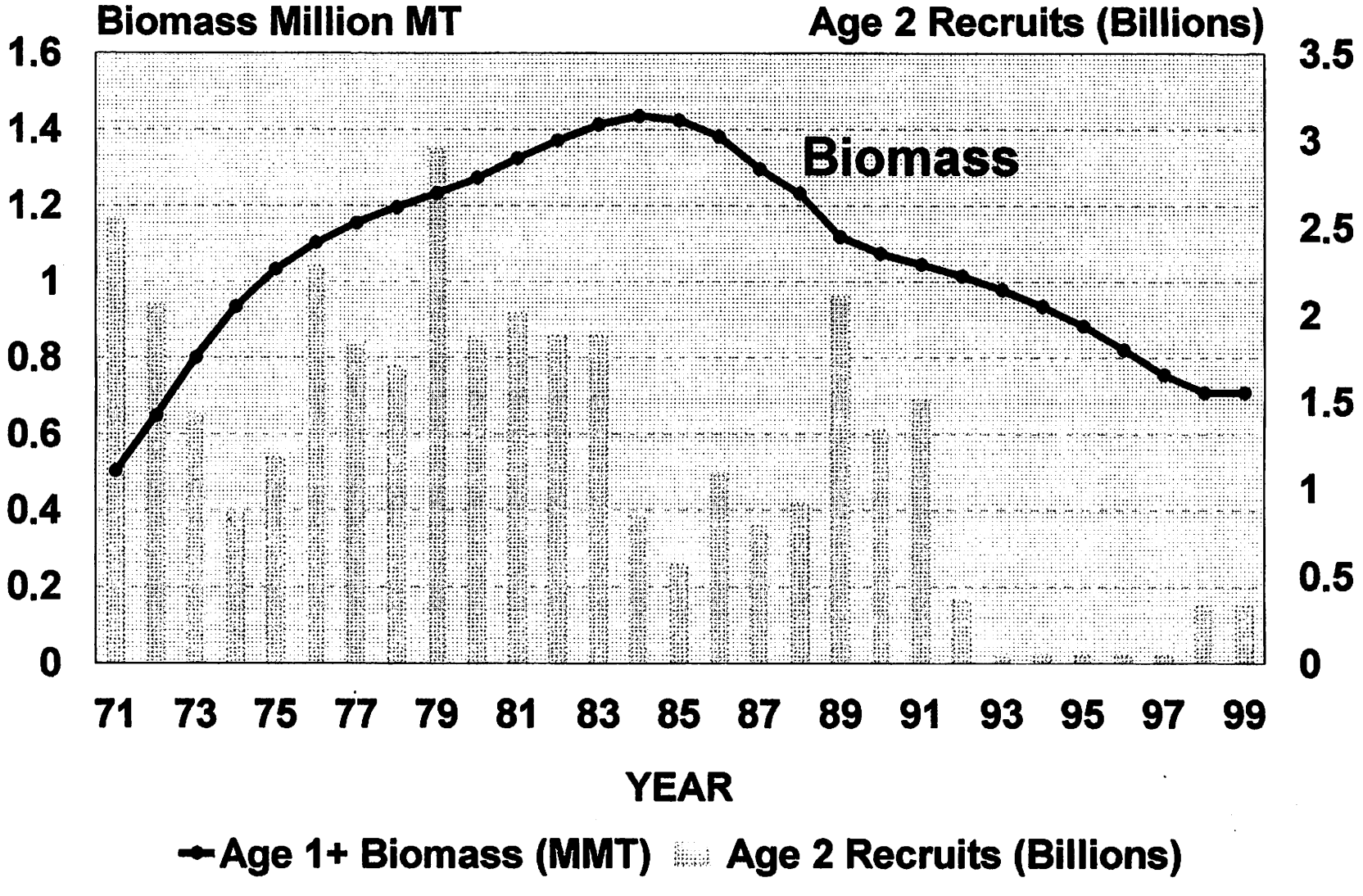
Eastern Bering Sea Other Flatfish

Survey Biomass 1975-98



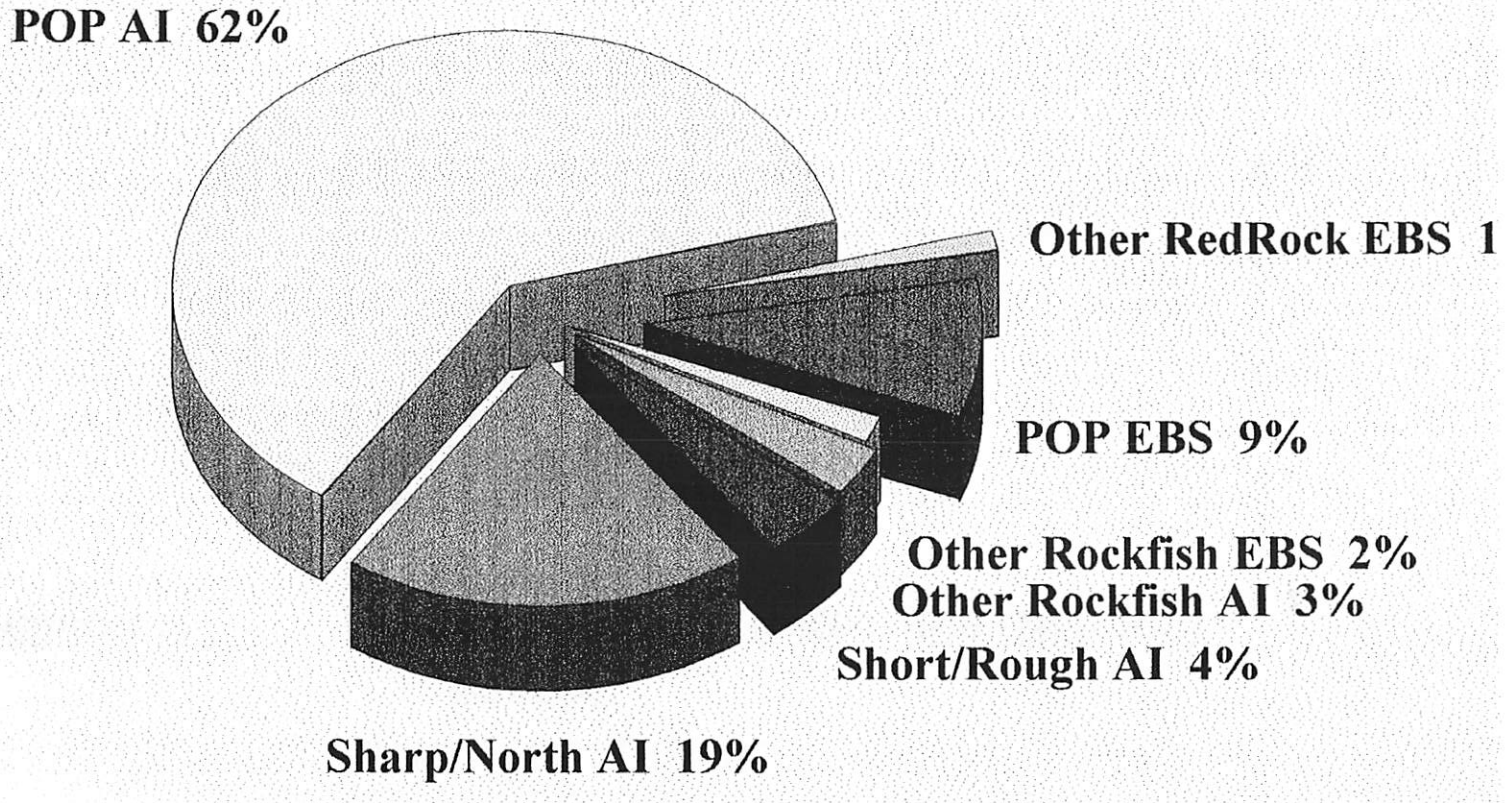
Bering Sea -- Alaska Plaice

Model Biomass and Recruitment 1971-1999



BSAI ROCKFISH COMPLEX

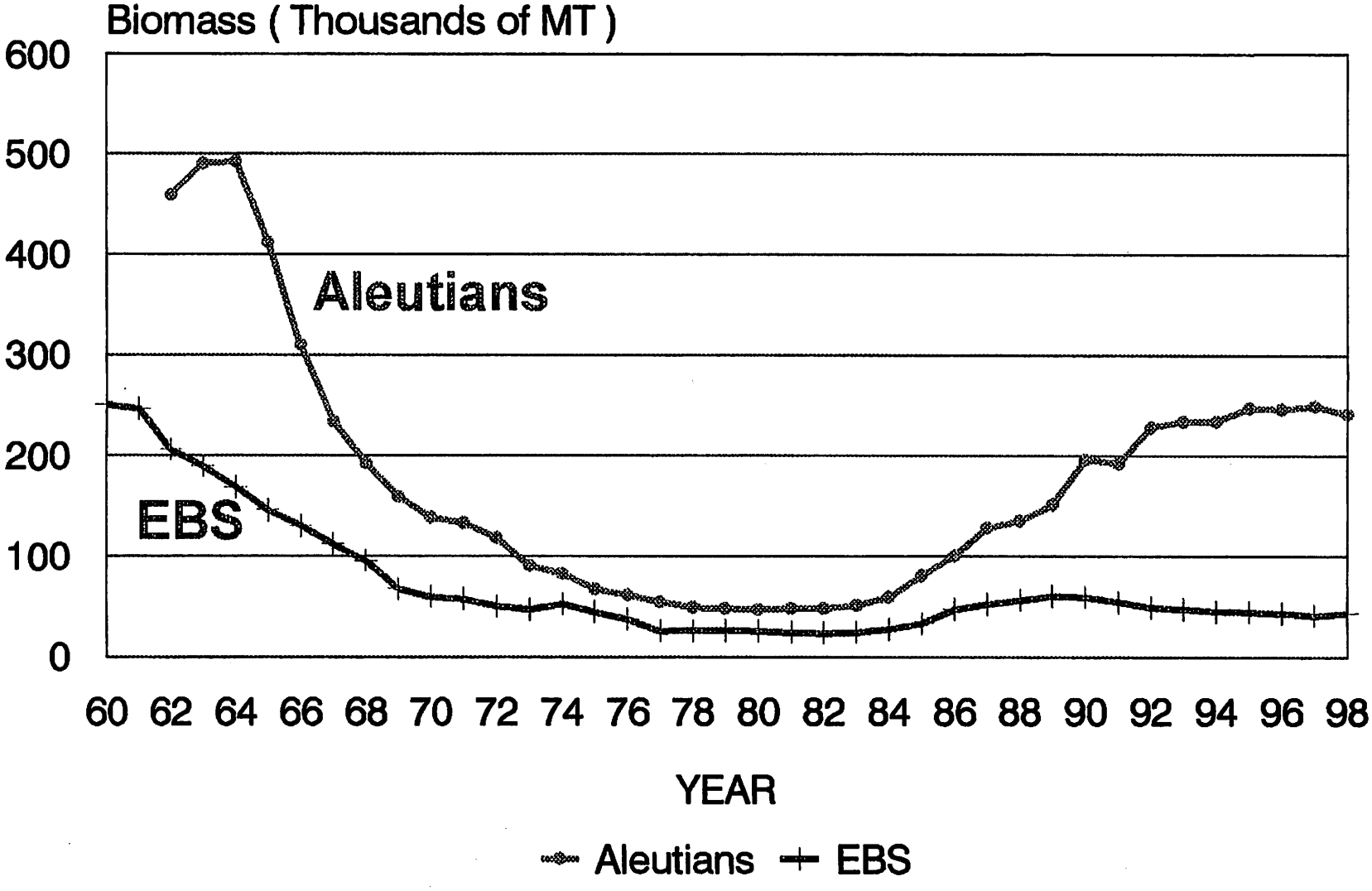
(Projected 1999 ABC = 21,916 Tons)



Down 1,900 mt from 1998

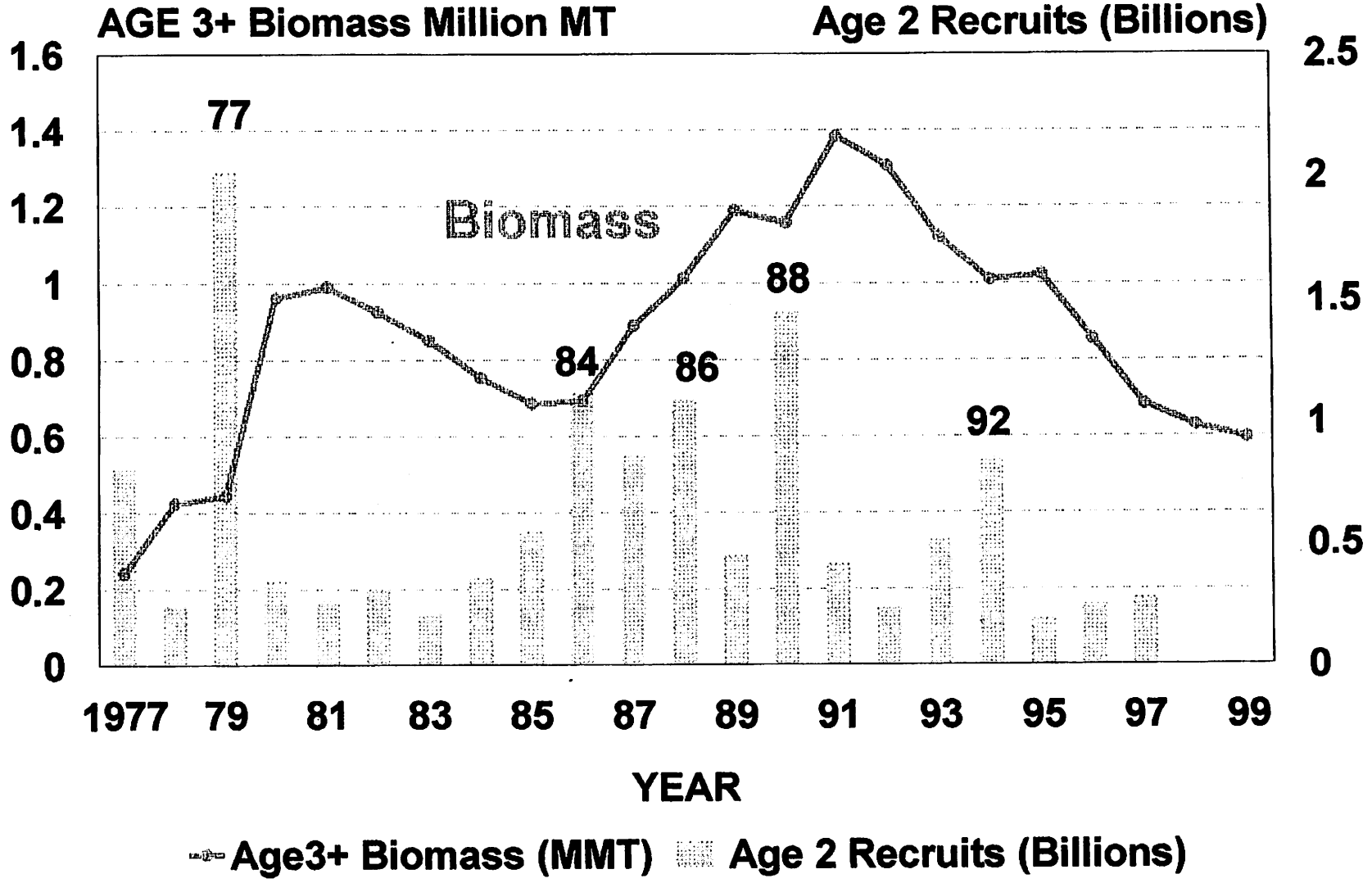
Pacific Ocean Perch

Stock Synthesis Age 9+ Biomass 1960-98



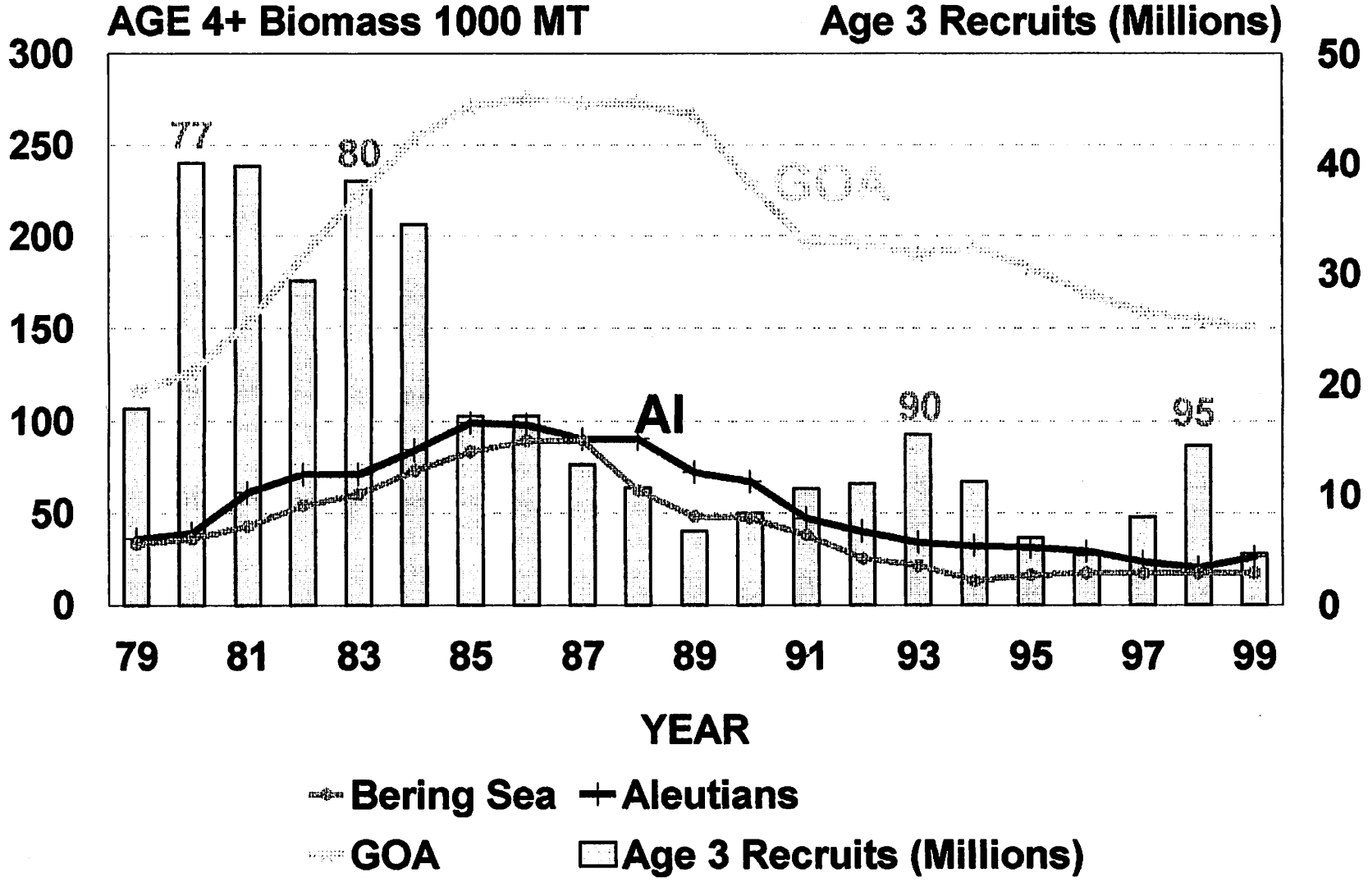
Aleutians Atka Mackerel

Biomass and Recruitment 1977-99



Sablefish off Alaska

Biomass by Region and Total Recruitment 1979-99



1999 ABCs for BSAI Groundfish

ABC Change from 1998

Species	1999 ABC	Change from 98
Pollock (EBS)	992,000	Down 118,000
(Aleutians)	23,800	No Change
(Bogoslof)	15,300	Up 8,890
Pacific Cod	177,000	Down 33,000
Flatfishes	906,500	Down 85,500
Sablefish	3,200	Up 520
Atka mackerel	73,300	Up 900
Rockfishes	21,916	Up 1,900
All Others	27,770	No Change
TOTAL	2,240,786	Down 216,190

Maximum Possible ABCs versus Plan Team ABCs

Bering Sea-Aleutians Groundfish -- 1999

Stock	Possible Tier	New Tier	Max. ABC	Team ABC	Change	Reasons
1. Pollock,EBS	(1b) F=0.58	(3b) F=0.29	1,370,000	992,000	378,000	7 reasons
2. Pacific Cod	(3b) F=0.28	(3b) F=0.25	196,000	177,000	19,000	3 reasons
3. G. Turbot	(3b) F=0.26	(3b) F=0.21	20,000	14,200	5,800	2 reasons
4. Atka Mackerel	(3a) F=0.35	(3a) F=0.23	107,000	73,300	33,700	6 reasons
5. O. Groundfish	(5) F=0.15	(6) F=0.04	96,400	25,800	70,600	Average
Sub-Total			1,789,400	1,282,300	507,100	
Rest Groundfish			958,486	958,486	0	No Changes
All Groundfish			2,747,886	2,240,786	507,100	

EBS Pollock Reasons (Page 7)

1. 1998 survey biomass is lowest since 1980 and lowest of time series.
2. Future dependent on uncertain 1996 and 1997 year classes.
3. Projected 1999 spawning biomass is only 31% of pristine biomass.
4. Pollock is most common sea-lion diet item.
5. Impact of Russian fishing is uncertain on EBS stock and can be significant.
6. Concern for short-term spawning capacity since 1990s age distribution is narrower than 1980s.
7. Question about being in Tier 1 because of questions about PDF of Fmsy.

Pacific Cod Reasons (Page 9)

1. Incorporate risk-adverse functions of M and Q.
2. Survey biomass has decreased 4 years in a row and slightly higher than series low.
3. Last 3 year classes are all below average.

Greenland Turbot Reasons (Page 10)

1. Age 1+ biomass has trended downward continually since 1972.
2. Three most recruitment are lowest in time series.

Atka Mackerel Reasons (Page 19)

1. Model biomass declined 50% since 1991.
2. 1997 Aleutian survey biomass was 50% below 1991 & 1994 estimates.
3. Female spawning biomass with $F_{40\%}$ strategy projected to decline 20% below $B_{40\%}$.
4. Uncertain effects of local depletions.
5. Uncertain effects of increasing TAC take outside of proposed critical sea-lion areas.
6. These effects would not be known for 4 years.

Other Groundfish Species Reasons (Page 20)

1. Tier 5 ABC would be too high above recent average.