


MEMORANDUM

TO: Council, AP and SSC Members

FROM: Clarence G. Pautzke 
Executive Director

DATE: November 29, 1989

SUBJECT: Bering Sea/Aleutian Islands Groundfish Fishery Management Plan

ACTION REQUIRED

Review and approve halibut and crab initial PSC apportionments within the limits established by Amendment 12a.

BACKGROUND

Amendment 12a establishes PSC caps for red king crab, C. bairdi Tanner crab and Pacific halibut in the Bering Sea for DAP and JVP fisheries. Overall PSC limits adopted by the Council under this amendment are:

<u>C. bairdi</u> :	1,000,000 crabs in Zone 1 for Zone 1 closure 3,000,000 crabs in Zone 2 for Zone 2 closure
Red king crab:	200,000 crabs in Zone 1 for Zone 1 closure
Pacific halibut:	4,400 mt catch in BSAI for Zones 1 and 2H (Area 517) closure 5,333 mt catch in BSAI for BSAI closure

These overall PSC limits will be apportioned among four fisheries: DAP and JVP flatfish fisheries (directed fishing for yellowfin sole, rock sole and other flatfish), and DAP and JVP other fisheries (directed fishing for all other groundfish species). In practice, "other fisheries" are primarily pollock and Pacific cod bottom trawl target fisheries. The apportionments to each fishery, known as PSC allowances, will be in proportion to that fishery's contribution to total bycatch. The presumed bycatch rates and the procedure for making preliminary apportionments are described in Appendix 2 of the BSAI SAFE document (attached as Item D-3(c)(1)). Based upon the preliminary groundfish TACs and apportionments approved at the September meeting, the proposed PSC apportionments for these species would be as follows:

	Zone 1	Zone 2	Zones 1 & 2H Primary	BSAI Secondary
Red King Crab				
DAP flatfish	25,190			
DAP other	11,616			
JVP flatfish	162,057			
JVP other	1,137			
<u>C. bairdi Tanner crab</u>				
DAP flatfish	56,501	169,502		
DAP other	658,513	1,975,539		
JVP flatfish	259,240	777,721		
JVP other	25,746	77,237		
Pacific halibut (mt)				
DAP flatfish			96	119
DAP other			3,768	4,567
JVP flatfish			430	521
JVP other			104	126

These pre-season estimates are based on statistical estimators. Actual observations of bycatch are superior to statistical estimates for purposes of in-season bycatch management. A Bycatch Technical Committee composed of AFSC, NOAA-Fisheries Alaska Region, ADF&G, IPHC, and NPFMC staff has been formed to provide a role of coordination, communication and advice related to technical issues associated with bycatch management. This committee will meet early in 1990, probably February, to review the statistical precision of 1990 observer data so that the group might provide recommendations as to how to integrate observed bycatch numbers with statistical estimates of unobserved bycatch. Technical issues associated with the new observer program include the percentage of coverage of various sectors of the harvesting fleet, the variance of bycatch rate estimates, and the compatibility of new and existing databases.

In summary, the following points concerning the implementation of Amendment 12a should be emphasized:

- Pre-season bycatch rates are based on statistical estimators. They are relevant only for pre-season PSC apportionments.
- It is anticipated that observed bycatch will be an important element for all in-season management measures in 1990, including any area closures.
- Apportionments of PSC limits within a specific zone may be adjusted in-season:
 - to reflect reapportionment of TAC among DAP and JVP fisheries,
 - to permit redistribution of uncaught PSC allowances among fishermen,
 - if the initial apportionments were incorrectly specified.
- The Regional Director has no authority to set aside a PSC bycatch reserve under Amendment 12a.

APPENDIX 2

BYCATCH OF FULLY-UTILIZED AND PROHIBITED SPECIES

Fully-Utilized Groundfish Species

Amendment 12 to the Bering Sea and Aleutian Islands groundfish FMP authorizes the Council to establish allowable levels of incidental catch (bycatch) of groundfish species that are fully-utilized by domestic fishermen. Previous regulations required joint venture operations to discard such species, but without any limit to the amount of discard.

A PSC framework for fully-utilized groundfish species allows for non-retainable amounts of these species to be apportioned to JVP and TALFF fisheries. Typically, these PSC amounts are to be deducted from the species ABC prior to establishing TACs, thus assuring that retainable and non-retainable catches do not exceed the ABC. However, the Council may choose to establish the sum of TACs and PSCs at a level greater than a species' ABC. In any case, when either the JVP or TALFF PSC limit for any species of groundfish is attained, any respective JVP or TALFF fishery expected to encounter more of that species would be closed.

For 1990, joint venture fisheries are expected to require some amount of sablefish, Greenland turbot, Pacific ocean perch, other rockfish and Atka mackerel, all of which are fully U.S. utilized. Pollock may also be fully-utilized by the DAP fishery. In 1988, PSC amounts were calculated and the necessary amount for JVP bycatch apportioned through an initial reserve release to JVP. A similar exercise for these species can be accomplished for 1990 by using updated estimates of bycatch rates and apportionments for groundfish species.

Table 1 gives the actual bycatch rates of fully-utilized species by the JVP fishery in 1988. Pollock bycatch rates in the flatfish and other (cod) fishery are not yet available. The 1989 rates, including those for pollock, are expected to be available for the final version of the SAFE.

Prohibited Species Bycatch

Amendment 12A establishes PSC caps for red king crab, *C. bairdi* Tanner crab, and Pacific halibut in the Bering Sea for DAP and JVP fisheries. Overall PSC limits adopted by the Council under Amendment 12A are:

<u>C. bairdi</u> Tanner crab:	1,000,000 crabs in Zone 1 for Zone 1 closure 3,000,000 crabs in Zone 2 for Zone 2 closure
Red king crab:	200,000 crabs in Zone 1 for Zone 1 closure
Pacific halibut:	4,400 mt catch in BSAI for Zones 1 and 2H (Area 517) closure 5,333 mt catch in BSAI for BSAI closure

These overall PSC limits will be apportioned among four fisheries: DAP flatfish (yellowfin sole, rock sole, and other flatfish); DAP other (all other fisheries, primarily pollock and cod bottom trawl target fisheries); JVP flatfish (same definition as for DAP); and JVP other (same definition as for DAP). The apportionments to each fishery, known as PSC allowances, will be in proportion to that fishery's contribution to total bycatch. For example, if the DAP flatfish fishery is expected to

take 25% of the red king crab bycatch in a fishery operating without bycatch controls, the DAP flatfish fishery would be assigned 25% of the 200,000 red king crab PSC limit, or 50,000 red king crab, as a PSC allowance. The two C. bairdi and halibut PSC limits would be apportioned using the same proportional rule, recognizing that different fisheries may contribute disproportionately to different species' overall bycatch.

A simulation model of the fishery is currently used to initially estimate the PSC allowances. The simulation is also used by the Council when establishing initial TACs and apportionments to DAP and JVP, as those apportionments and expected bycatch rates influence future bycatch. The bycatch predictions of the simulation are compared with each fishery's PSC allowance to gain insight on the nature of the impacts of the PSC allowances.

The simulation predicts bycatch by multiplying expected total groundfish tonnage in each of the four defined fisheries by quarter and by 3-digit statistical area by an estimated bycatch rate for that fishery in that quarter and area. Predicted bycatch therefore depends on the following assumptions:

1. The TAC, DAP, and JVP established for each species by the Council.
2. The proportion of each target fishery that is taken by bottom trawl, mid-water trawl, and longline.
3. The proportion of each target fishery that is taken in the first quarter of the year, second quarter of the year, and so forth.
4. The proportion of each target fishery that is taken in each statistical area in each quarter.
5. The expected bycatch rate for that fishery in that quarter and area (rates are numbers/mt of groundfish for red king crab and C. bairdi Tanner crab, and kg of halibut/mt of groundfish for halibut).

The distribution of the target fisheries in time and space can be determined from past fishery performance and by soliciting input from the industry on future fishery performance. Determining future bycatch rates is more problematic. Bycatch rates have high variance and are difficult to predict with any certainty. Bycatch rates for some species, for example, red king crab, are much more volatile than bycatch rates for other species, for example, halibut. Bycatch rates also vary according to the target fishery, area fished, time of year, and the skill and practices of the fishing master. Finally, even if all known factors could be accounted for, actual bycatch will differ from that predicted because of the random nature of the bycatch encounter.

In 1989, bycatch rates have been estimated for joint venture fisheries through actual observations of bycatch. Those data are provided in Table 2. DAP bycatch is not observed, thus NOAA-Fisheries has relied on statistical estimators of total bycatch. These estimators were derived from a statistical analysis of joint venture bycatch performance during the period 1986-1988 (Berger et al., in press). Bycatch rates implied by these estimates are provided in Table 3.

For 1990 the Council will apply these rates to total groundfish tonnage in each target fishery to predict bycatch. Public comment on how bycatch rates or bycatch performance may differ in 1990 from that observed or estimated in 1989 is welcome.

Table 1. 1988 JVP Bycatch Rates of Fully U.S. Utilized Species
(mt/mt)

Yellowfin Sole Fishery (Yellowfin Sole, Rock Sole, Other Flatfish)

<u>Area</u>	<u>Species</u>				
	Sablefish	Greenland turbot	Pacific Ocean Perch	Other Rockfish	Atka Mackerel
511	0.0000001	0.0001037	0.0	0.0000001	0.0000006
513	0.0	0.0000982	0.0000003	0.0000038	0.000001
514	0.0	0.0000008	0.0000002	0.0	0.0
515	0.0	0.0	0.0	0.0	0.0
521	0.0	0.0000107	0.0	0.0	0.0000064
522	0.0	0.0	0.0	0.0	0.0
All	0.0	0.0000719	0.0000002	0.0000018	0.0000007

Other Fishery (All Other Species, Primarily Pollock and Cod
Bottom Trawl)

<u>Area</u>	<u>Species</u>				
	Sablefish	Greenland turbot	Pacific Ocean Perch	Other Rockfish	Atka Mackerel
511	0.0000016	0.0001656	0.000001	0.0000023	0.0000001
513	0.0000272	0.0000341	0.0000921	0.0000189	0.0000383
514	0.0	0.0	0.0000056	0.0012305	0.0
515	0.0000025	0.0000230	0.0000436	0.0000243	0.0003318
521	0.0	0.0000473	0.0000574	0.0000272	0.0000018
522	0.0	0.0	0.0003414	0.0	0.0000809
All	0.0000106	0.0000634	0.0000579	0.0000214	0.0000521

Table 2. Joint venture bycatch rates, 1989, year-to-date, by fishery and area.

Species/Area	Flatfish	All other	All fisheries
Red king crab, Zone 1 (#/mt)	1.17	0.01	1.03
C. bairdi, Zone 1 (#/mt)	0.86	0.91	0.87
C. bairdi, Zone 2 (#/mt)	4.27	0.73	1.30
Halibut (kg/mt)	0.99	2.74	1.76

Source: NOAA-Fisheries, AFSC, through September 23, 1989.

Table 3. Implied DAP bycatch rates, 1989, year-to-date, by fishery and area.

Species/Area	Flatfish	All other	All fisheries
Red king crab, Zone 1 (#/mt)	1.21	0.26	0.52
C. bairdi, Zone 1 (#/mt)	1.18	0.96	1.02
C. bairdi, Zone 2 (#/mt)	1.15	0.61	0.62
Halibut, BSAI-wide (kg/mt)	2.56	2.91	2.89

Source: NOAA-Fisheries, AFSC, through September 16, 1989.

**APPORTIONMENT OF PROHIBITED SPECIES CATCH LIMITS
IN THE BERING SEA GROUND FISH FISHERIES
1990**

Discussion Paper 89-1
North Pacific Fishery Management Council
Anchorage, Alaska

T. P. Smith
North Pacific Fishery Management Council
December, 1989

Under Amendment 12A to the Bering Sea and Aleutian Islands groundfish fishery the Council adopted a bycatch management regime which limits the bycatch of crab and halibut in the groundfish trawl fisheries. These limits are called prohibited species catch limits or PSCs and are listed in the table below.

Species	Zone		
	1	2 or 1 & 2H	BSAI-wide
C. bairdi, #	1,000,000	3,000,000	-
Red king crab, #	200,000	-	-
Halibut, mt	-	4,400	5,333

These overall PSC limits are apportioned among four fisheries: DAP flatfish (yellowfin sole, rock sole, and other flatfish); DAP other (all other fisheries, primarily pollock and cod bottom trawl target fisheries); JVP flatfish (same definition as for DAP); and JVP other (same definition as for DAP). The apportionments to each fishery, known as PSC allowances, will be in proportion to that fishery's contribution to total bycatch. For example, if the DAP flatfish fishery is expected to take 25% of the red king crab bycatch in a fishery operating without bycatch controls, the DAP flatfish fishery would be assigned 25% of the 200,000 red king crab PSC limit, or 50,000 red king crab, as a PSC allowance. The two C. bairdi and halibut PSC limits would be apportioned using the same proportional rule, recognizing that different fisheries may contribute disproportionately to different species' overall bycatch.

A simulation model of the fishery is currently used to initially estimate the PSC allowances. The estimation procedure is simple in concept but complicated in execution. The predicted bycatch is simply the expected groundfish tonnage times the expected bycatch rate for the prohibited species. The complication is that there are four target fisheries, four quarters, seven statistical areas (511, 513, 514, 515, 517, 521, 522), and three bycatch species (red king crab, C. bairdi Tanner crab and halibut). In any case, the simulation predicts bycatch by multiplying expected total groundfish tonnage in each of the defined fisheries by quarter and statistical area by an estimated bycatch rate for that fishery in that quarter and area.

Predicted bycatch therefore depends on the following factors:

1. The TAC, DAP, and JVP established for each species by the Council. (SET BY COUNCIL)
2. The proportion of the DAP or JVP for each species that is taken in the first quarter of the year, second quarter of the year, and so forth. (BY ASSUMPTION - DAP SURVEY)
3. The proportion of the DAP or JVP for each species that is taken by bottom trawl, mid-water trawl, and longline. (BY ASSUMPTION - DAP SURVEY)
4. The proportion of the DAP or JVP groundfish tonnage for each target fishery that is taken in each statistical area in each quarter. (BY ASSUMPTION)
5. The expected bycatch rate for that fishery in that quarter and area (rates are numbers/mt of groundfish for red king crab and C. bairdi Tanner crab, and mt of halibut/mt of groundfish for halibut). (BY ASSUMPTION - OBSERVER PROGRAM ESTIMATES)

Groundfish apportionments, or item 1, are established by the Council and drive the prediction. As

tonnages change and the species mix of total groundfish changes, total bycatch estimates change.

Item 2, the proportion of the species catch in each quarter, comes from a survey of DAP conducted by NMFS. The numbers in the prediction model are based on this year's survey.

Item 3, the proportion of the species catch in each quarter by gear type, also comes from the 1989 DAP survey.

Item 4, the proportion of the species catch in each area, was derived from an informal survey of the industry in 1988, where a group of DAP and JVP trawl representatives were asked how they would fish in each quarter, if they were unconstrained by PSC limits. Their answers represent the preferred pattern of fishing for each quarter. Indications from industry are that last year's proportions will hold into 1990 (although the fisheries might take more in the 1st quarter, 2nd quarter, etc.).

Item 5, the bycatch rates, are the same as those used by the AFSC in estimating DAP and JVP bycatch this year. Specifically, for joint ventures, the rates in the model are those observed in the 1989 JVP fisheries, by 3-digit area and quarter.

A different procedure is used for estimating DAP bycatch rates. As you probably know a group of statisticians developed a way to estimate DAP bycatch without having observers. Essentially, the method uses the species tonnage in the fishery multiplied by a set of estimated coefficients to predict total bycatch. The fishery simulation model uses the same procedure and estimators.

This approach is used only for the estimation of the bycatch of C. bairdi and halibut. It has not been possible to develop reliable statistical estimators for DAP red king crab bycatch, therefore, a procedure similar to that used for estimation of JVP red king crab bycatch is used. Here, instead of observed JVP rates, "best blend" rates are used. These are a combination of rates estimated from limited DAP observer coverage, JVP rates and historical JVP rates. Again, these rates are the same as those used by the AFSC in computing DAP red king crab bycatch.

The distribution of the target fisheries in time and space can be determined from past fisheries performance and by soliciting input from the industry on future fishery performance. Determining future bycatch rates is more problematic. Bycatch rates have high variance and are difficult to predict with any certainty. Bycatch rates for some species, for example, red king crab, are much more volatile than bycatch rates for other species, for example, halibut. Bycatch rates also vary according to the target fishery, area fished, time of year, and the skill and practices of the fishing master. Finally, even if all known factors could be accounted for, actual bycatch will differ from that predicted because of the random nature of the bycatch encounter.

Provided as an attachment is a copy of the bycatch prediction model with all numbers and assumptions shown. Included are the 1989 bycatch rates estimated for joint venture fisheries through actual observations of bycatch, the estimators for DAP bycatch derived from a statistical analysis of joint venture bycatch performance during the period 1986-1988 (Berger et al., 1989), and the best blend estimators for DAP red king crab bycatch.

A SIMULATION OF THE BSAI GROUND FISH FISHERY: BYCATCH PREDICTION

T. P. Smith, North Pacific Fishery Management Council, November, 1989

Last Revision:
12/7/89 14:39

PART I. COMPUTATION OF GROUND FISH AMOUNTS

ANTICIPATED ANNUAL GROUND FISH APPORTIONMENTS

Species	Area	ABC	TAC	DAP	JVP
Pollock	BS	1,450,000	1,280,000	1,238,000	42,000
	AI	153,600	100,000	100,000	0
Pacific cod		417,000	227,000	195,000	32,000
Yellowfin sole		278,900	207,650	34,000	173,650
Greenland turbot		7,000	7,000	6,962	38
Arrowtooth flounder		242,500	10,000	5,068	4,932
Rock sole		216,300	60,000	21,181	38,819
Other flatfish		188,000	60,150	34,000	26,150
Sablefish	BS	3,800	2,700	2,800	0
	AI	9,600	4,500	3,400	0
Pacific ocean perch	BS	6,300	6,300	5,000	0
	AI	16,600	6,600	6,000	0
Other rockfish	BS	500	500	400	0
	AI	1,100	1,100	1,100	0
Atka mackerel		24,000	21,000	21,000	0
Squid		10,000	500	1,000	0
Other species		55,500	5,000	7,300	0
BSAI TOTAL		3,080,700	2,000,000	1,682,211	317,589

ASSUMPTIONS CONCERNING SPECIES CATCH, BY QUARTER

Species	Area	DAP				JVP			
		1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Pollock	BS	23%	20%	27%	30%	100%	0%	0%	0%
	AI	59%	1%	2%	38%	100%	0%	0%	0%
Pacific cod		23%	21%	24%	33%	100%	0%	0%	0%
Yellowfin sole		0%	22%	38%	34%	100%	0%	0%	0%
Greenland turbot		4%	28%	42%	26%	100%	0%	0%	0%
Rock sole		82%	4%	2%	12%	100%	0%	0%	0%
Other flatfish		20%	22%	25%	33%	100%	0%	0%	0%

ASSUMPTIONS CONCERNING SPECIES CATCH, BY GEAR AND QUARTER

Species	Area	1st Quarter			2nd Quarter			3rd Quarter			4th Quarter		
		Bottom trawl	Mid-water	Fixed Gear	Bottom trawl	Mid-water	Fixed Gear	Bottom trawl	Mid-water	Fixed Gear	Bottom trawl	Mid-water	Fixed Gear
Pollock	BS	16%	84%	0%	24%	78%	0%	26%	74%	0%	18%	82%	0%
	AI	23%	77%	0%	100%	0%	0%	100%	0%	0%	19%	81%	0%
Pacific cod		70%	17%	13%	81%	8%	12%	63%	8%	29%	69%	11%	21%
Yellowfin sole		100%	0%	0%	100%	0%	0%	100%	0%	0%	100%	0%	0%
Greenland turbot		85%	0%	15%	98%	0%	2%	81%	0%	19%	85%	0%	15%
Rock sole		100%	0%	0%	100%	0%	0%	100%	0%	0%	100%	0%	0%
Other flatfish		98%	4%	0%	100%	1%	0%	99%	1%	0%	99%	1%	0%

ASSUMPTIONS CONCERNING SPECIES CATCH, BY GEAR AND QUARTER

Species	Area	1st Quarter			2nd Quarter			3rd Quarter			4th Quarter		
		Bottom trawl	Mid-water	Fixed Gear	Bottom trawl	Mid-water	Fixed Gear	Bottom trawl	Mid-water	Fixed Gear	Bottom trawl	Mid-water	Fixed Gear
Pollock	BS	100%	0%	0%	100%	0%	0%	90%	10%	0%	90%	10%	0%
	AI	100%	0%	0%	100%	0%	0%	100%	0%	0%	100%	0%	0%
Pacific cod		100%	0%	0%	100%	0%	0%	97%	0%	3%	97%	0%	3%
Yellowfin sole		100%	0%	0%	100%	0%	0%	100%	0%	0%	100%	0%	0%
Greenland turbot		100%	0%	0%	100%	0%	0%	74%	0%	26%	74%	0%	100%
Rock sole		100%	0%	0%	100%	0%	0%	100%	0%	0%	100%	0%	0%
Other flatfish		100%	0%	0%	100%	0%	0%	100%	0%	0%	100%	0%	0%

SPECIES CATCH, BY GEAR AND QUARTER

Species	Area	Bottom Trawl				DAP Midwater Trawl				Fixed Gear (Longline and pot)			
		1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Pollock	BS	45,558	60,716	61,959	67,654	239,182	188,122	250,532	300,032	0	0	0	0
	AI	13,593	600	444	7,334	45,507	0	0	30,666	0	0	0	0
Pacific cod		31,805	32,220	31,662	43,736	7,588	3,158	3,774	6,675	6,043	4,597	13,254	13,223
Yellowfin sole		2,040	7,480	12,920	11,560	0	0	0	0	0	0	0	0
Greenland turbot		255	1,910	2,474	1,525	0	0	0	0	44	39	553	278
Rock sole		17,347	932	0	2,563	0	0	339	0	0	932	0	0
Other flatfish		7,532	8,552	0	12,828	281	0	9,718	64	0	0	0	0
		118,131	112,411	109,459	147,201	292,558	191,280	264,362	337,437	6,087	5,568	13,806	13,500

SPECIES CATCH, BY GEAR AND QUARTER

Species	Area	Bottom Trawl				JVP Midwater Trawl				Fixed Gear (Longline and pot)			
		1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Pollock	BS	42,000	0	0	0	0	0	0	0	0	0	0	0
	AI	0	0	0	0	0	0	0	0	0	0	0	0
Pacific cod		32,000	0	0	0	0	0	0	0	0	0	0	0
Yellowfin sole		173,650	0	0	0	0	0	0	0	0	0	0	0
Greenland turbot		38	0	0	0	0	0	0	0	0	0	0	0
Rock sole		38,819	0	0	0	0	0	0	0	0	0	0	0
Other flatfish		31,082	0	0	0	0	0	0	0	0	0	0	0
		317,589	0	0	0	0	0	0	0	0	0	0	0

TOTAL TONNAGES BY TARGET FISHERY

Species	Area	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter	
		DAP	JVP	DAP	JVP	DAP	JVP	DAP	JVP
Flatfish		27,175	243,589	18,874	0	15,394	0	28,476	0
Other		90,956	74,000	93,536	0	94,065	0	118,724	0

Species	Area	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter	
		Flatfish	Other	Flatfish	Other	Flatfish	Other	Flatfish	Other
Flatfish		82.0%	8.8%	82.0%	15.8%	66.1%	6.1%	78.9%	7.8%
Other		18.0%	91.2%	18.0%	83.4%	33.9%	93.9%	23.1%	92.2%

Species	Area	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter	
		Flatfish	Other	Flatfish	Other	Flatfish	Other	Flatfish	Other
Flatfish		1.2459	-0.1202	1.2754	-0.2547	1.5845	-0.1012	1.3344	-0.1125
Other		-0.2459	1.1202	-0.2754	1.2547	-0.5845	1.1012	-0.3344	1.1125

Target	Area	1st Quarter		2nd Quarter		3rd Quarter		4th Quarter	
		DAP	JVP	DAP	JVP	DAP	JVP	DAP	JVP
Flatfish		22,922	294,592	247	0	14,561	0	24,641	0
Other		95,208	0	112,163	0	94,898	0	122,560	0

PART II. AREA DISTRIBUTIONS

Area	JVP flatfish			
	Quarter 1	Quarter 2	Quarter 3	Quarter 4
511	100.0%	0.0%	0.0%	0.0%
513	0.0%	0.0%	0.0%	0.0%
514	0.0%	100.0%	100.0%	100.0%
515	0.0%	0.0%	0.0%	0.0%
517	0.0%	0.0%	0.0%	0.0%
521	0.0%	0.0%	0.0%	0.0%
522	0.0%	0.0%	0.0%	0.0%

Area	JVP other			
	Quarter 1	Quarter 2	Quarter 3	Quarter 4
511	25.0%	33.3%	20.0%	20.0%
513	15.2%	19.5%	11.8%	5.6%
514	0.0%	0.0%	0.0%	0.0%
515	0.0%	33.3%	0.0%	0.0%
517	59.8%	13.9%	28.2%	34.4%
521	0.0%	0.0%	40.0%	40.0%
522	0.0%	0.0%	0.0%	0.0%

Area	DAP flatfish			
	Quarter 1	Quarter 2	Quarter 3	Quarter 4
511	50.0%	90.0%	0.0%	0.0%
513	17.0%	0.0%	50.0%	0.0%
514	0.0%	10.0%	50.0%	100.0%
515	0.0%	0.0%	0.0%	0.0%
517	33.0%	0.0%	0.0%	0.0%
521	0.0%	0.0%	0.0%	0.0%
522	0.0%	0.0%	0.0%	0.0%

Area	DAP other			
	Quarter 1	Quarter 2	Quarter 3	Quarter 4
511	0.0%	3.0%	0.0%	0.0%
513	18.2%	50.3%	27.1%	0.0%
514	0.0%	0.0%	8.0%	100.0%
515	10.0%	12.0%	0.0%	0.0%
517	71.8%	34.7%	64.9%	0.0%
521	0.0%	0.0%	0.0%	0.0%
522	0.0%	0.0%	0.0%	0.0%

PART III. BYCATCH RATES

(Use estimated functional relationship for DAP halibut, C. bairdi; historical performance for all JVP and all red king crab)

A. Observer Data, 1989

Red king crab

Area	JVP flatfish					JVP other				
	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
511/516	1.171	-	-	-	1.171	0.008	-	0.000	0.000	0.007
513	0.182	-	0.003	0.989	0.416	0.000	-	0.000	0.279	0.060
514	-	-	0.009	0.016	0.011	-	-	0.000	-	0.000
515	0.030	-	-	-	-	-	-	0.000	-	-
517	0.030	-	0.000	0.000	0.028	0.000	-	0.000	0.000	0.000
521	0.158	-	0.000	0.363	0.351	-	-	0.000	0.000	0.000
522	-	-	-	-	0.728	-	-	0.000	0.000	0.000
BSAI-wide	1.076	-	0.019	0.672	0.917	0.002	-	0.000	0.012	0.005

Area	DAP flatfish					DAP other				
	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
511/512	1.218	0.945	-	-	1.210	0.004	0.409	0.973	0.000	0.260
All other	0.013	0.015	0.072	0.160	0.042	0.000	0.049	0.012	0.004	0.023
BSAI-wide	1.083	0.907	0.072	0.160	1.041	0.013	0.116	0.035	0.004	0.060

bairdi Tanner crab

Area	JVP flatfish					JVP other				
	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
511	0.862	-	-	-	0.862	1.128	-	0.000	0.000	0.915
513	2.695	-	5.322	11.174	7.030	0.283	-	1.197	1.392	0.952
514	-	-	7.188	9.916	8.053	-	-	0.004	-	0.004
515	-	-	-	-	-	-	-	-	-	-
517	3.466	-	0.000	0.014	3.144	0.623	-	0.522	0.006	0.394
521	0.208	-	-	5.563	5.245	-	-	1.107	0.854	0.835
522	-	-	49.594	-	49.594	-	-	0.666	0.000	0.565
BSAI-wide	1.059	-	8.845	10.516	2.541	0.686	-	0.830	0.414	0.630

Halibut

Area	JVP flatfish					JVP other				
	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Annual
511	0.0008	-	-	-	0.0008	0.0028	-	0.0000	0.0000	0.0023
513	0.0015	-	0.0010	0.0031	0.0019	0.0039	-	0.0019	0.0008	0.0023
514	-	-	0.0000	0.0000	0.0000	-	-	0.0001	-	0.0001
515	-	-	-	-	-	-	-	-	-	-
517	0.0039	-	0.0077	0.0017	0.0041	0.0041	-	0.0008	0.0002	0.0021
521	0.0000	-	-	0.0067	0.0060	-	-	0.0020	0.0014	0.0017
522	-	-	0.0183	-	0.0183	-	-	0.0003	0.0001	0.0002
BSAI-wide	0.0010	-	0.0010	0.0022	0.0011	0.0038	-	0.0014	0.0008	0.0019

B. DAP regression estimators, 1989

C. bairdi

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
b1 - pollock	0.0000	0.0000	0.5658	0.7548
b2 - cod	2.3951	9.1384	0.0000	0.0000
b3 - y. sole	0.9307	0.0000	0.0000	1.8668
b4 - o. flat.	1.2952	1.5194	2.3976	5.8105

halibut

	Quarter 1	Quarter 2	Quarter 3	Quarter 4
b1 - pollock	1.1070	2.3226	3.1192	2.2913
b2 - cod	11.2288	19.3926	8.1258	24.4234
b3 - y. sole	0.9586	0.4108	4.6134	7.2488
b4 - o. flat.	0.6760	6.3910	0.0000	0.0000

PART IV. TOTAL BYCATCH

unconstrained bycatch

Red king crab

Area	JVP flatfish					TOTAL	JVP other					TOTAL
	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Quarter 1		Quarter 2	Quarter 3	Quarter 4			
511	344,823	0	0	0	0	344,823	0	0	0	0	0	0
513	0	0	0	0	0	0	0	0	0	0	0	0
514	0	0	0	0	0	0	0	0	0	0	0	0
515	0	0	0	0	0	0	0	0	0	0	0	0
517	0	0	0	0	0	0	0	0	0	0	0	0
521	0	0	0	0	0	0	0	0	0	0	0	0
522	0	0	0	0	0	0	0	0	0	0	0	0
	344,823	0	0	0	0	344,823	0	0	0	0	0	0

Area	DAP flatfish					TOTAL	DAP other					TOTAL
	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Quarter 1		Quarter 2	Quarter 3	Quarter 4			
511	13,961	210	0	0	14,171	0	1,169	0	0	1,169		
513	49	0	525	0	574	4	2,355	300	0	2,660		
517	95	0	0	0	95	856	3,824	2,161	0	6,842		
521	0	0	0	0	0	0	0	0	0	0		
All other areas	0	0	306	1,034	1,340	0	0	0	0	0		
	14,105	211	831	1,034	16,180	860	7,349	2,462	0	10,671		

Grand total: 371,675 crabs

bairdi Tanner crab

Area	JVP flatfish					TOTAL	JVP other				
	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Quarter 1		Quarter 2	Quarter 3	Quarter 4	TOTAL	
511	253,996	0	0	0	0	253,996	0	0	0	0	0
513	0	0	0	0	0	0	0	0	0	0	0
514	0	0	0	0	0	0	0	0	0	0	0
515	0	0	0	0	0	0	0	0	0	0	0
517	0	0	0	0	0	0	0	0	0	0	0
521	0	0	0	0	0	0	0	0	0	0	0
522	0	0	0	0	0	0	0	0	0	0	0
	253,996	0	0	0	0	253,996	0	0	0	0	0

DAP (all fisheries)

Quarter 1	Quarter 2	Quarter 3	Quarter 4	TOTAL
128,835	337,707	201,171	415,283	1,082,997

DAP flatfish	JVP flatfish					TOTAL	DAP other	JVP other				
	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Quarter 1			Quarter 2	Quarter 3	Quarter 4	TOTAL	
511	12,500	668	0	0	0	13,168	511	0	10,109	0	0	10,109
513	4,250	0	13,381	0	0	17,631	513	18,898	169,493	47,265	0	216,756
517	8,250	0	0	0	0	8,250	517	74,554	116,927	113,192	0	230,119
521	0	0	0	0	0	0	521	0	0	0	0	0
522	0	0	0	0	0	0	522	0	0	0	0	0
All other areas	0	74	13,381	69,516	82,971	82,971	other areas	10,384	40,436	13,953	345,767	400,156

Grand total: 1,336,993 crabs

Halibut

Area	JVP flatfish					TOTAL	JVP other					
	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Quarter 1		Quarter 2	Quarter 3	Quarter 4	TOTAL		
511	248	0	0	0	0	248	511	0	0	0	0	0
513	0	0	0	0	0	0	513	0	0	0	0	0
514	0	0	0	0	0	0	514	0	0	0	0	0
515	0	0	0	0	0	0	515	0	0	0	0	0
517	0	0	0	0	0	0	517	0	0	0	0	0
521	0	0	0	0	0	0	521	0	0	0	0	0
522	0	0	0	0	0	0	522	0	0	0	0	0
	248	0	0	0	0	248		0	0	0	0	0

DAP (all fisheries)

Quarter 1	Quarter 2	Quarter 3	Quarter 4	TOTAL
842	1,329	1,324	2,245	5,739

DAP flatfish	JVP flatfish					TOTAL	DAP other	JVP other				
	Quarter 1	Quarter 2	Quarter 3	Quarter 4	Quarter 1			Quarter 2	Quarter 3	Quarter 4	TOTAL	
511	82	3	0	0	0	84	511	0	40	0	0	40
513	28	0	88	0	0	116	513	123	667	311	0	1,102
517	54	0	0	0	0	54	517	487	460	745	0	1,692
521	0	0	0	0	0	0	521	0	0	0	0	0
522	0	0	0	0	0	0	522	0	0	0	0	0
All other areas	0	0	88	376	464	464	other areas	68	159	92	1,869	2,188

Grand total: 5,987 mt of bycatch

PSC APPORTIONMENTS

Overall PSC Limits

Species	Zone		
	1	2 or 1 & 2H	BSAI-wide
C. bairdi, #	1,000,000	3,000,000	-
Red king crab	200,000	-	-
Halibut, mt	-	4,400	5,333

Species	Zone		
	1	2	BSAI-wide
C. bairdi (animals)	47,492	164,231	-
DAP-other	36,458	2,835,769	-
JVP-flatfish	916,050	0	-
JVP-other	0	0	-
	1,000,000	3,000,000	

Species	Zone		
	1	2	BSAI-wide
Red king crab (animals)	7,869	-	-
DAP-other	649	-	-
JVP-flatfish	191,481	-	-
JVP-other	0	-	-
	200,000		

Species	Zone		
	1 & 2H	BSAI-wide	
Halibut (metric tons)	-	528	840
DAP-other	-	3,690	4,473
JVP-flatfish	-	182	221
JVP-other	-	0	0
		4,400	5,333

Trawl Alliance Proposed
12/8/39 - 0855

BM moved to
adopt 12/8
10.14

<u>Bairdi</u>	<u>Zone 1</u>	<u>Zone 2</u>
OAP flat } " other }	600,000	2,000,000
JVP flat } " other }	400,000	1,000,000
	<u>1,000,000</u>	<u>3,000,000</u>

<u>King Crab</u>	<u>Zone 1</u>	<u>Zone 2</u>
OAP flat } " other }	150,000	
JVP flat } " other }	50,000	N/A
	<u>200,000</u>	<u>N/A</u>

<u>Harbor</u>	<u>Zones 1+2H</u>	<u>BS/AI-wide</u>
OAP flat } " other }	3,740	4,533
JVP flat } " other }	660	800
	<u>4,400</u>	<u>5,333</u>