


MEMORANDUM

TO: Council, SSC and AP Members

FROM: Clarence G. Pautzke 
Executive Director

DATE: June 18, 1990

SUBJECT: Regulatory amendments to delay the yellowfin sole/other flatfish fishery and allow for increased retention of yellowfin sole and other flatfish in directed rock sole fisheries.

ACTION REQUIRED

Provide guidance to NMFS on the development of regulatory amendments.

BACKGROUND

During its consideration of crab and halibut bycatch management measures at the April meeting, the Council requested NMFS to develop two regulatory amendments. The first amendment would postpone the start of the yellowfin sole/other flatfish fishery until sometime between May 15 and June 15. The second amendment would increase the amount of yellowfin sole and other flatfish which could be retained as bycatch in a directed rock sole fishery. Delay of the yellowfin sole/other flatfish fishery is expected to result in reduced red king crab and halibut bycatch rates because the target species would have largely moved out of Zone 1 by that time. Increased retention of yellowfin sole and other flatfish in a rock sole fishery would minimize discard waste.

NMFS will present draft regulatory amendment analyses at the meeting. The Council should provide guidance concerning the specific date to open the yellowfin sole/other flatfish fishery and the proportion of yellowfin sole and other flatfish which may be retained as bycatch in a rock sole fishery. Only 20% is allowed now.

A comment from the Midwater Trawlers Cooperative supporting the postponement of the yellowfin sole/other flatfish fishery until May 15 is enclosed as item D-3(b)(1).

Midwater Trawlers Cooperative

4055 21st Avenue West • Seattle, Washington 98199

Al Geiser
President
2099 Criteser Loop
Toledo, Oregon 97391
Telephone: (503)336-2722

Steven E. Hughes
Technical Advisor
4055 21st Avenue West
Seattle, Washington 98199
Telephone: (206)285-3480
Telefax: (206)283-8263

June 15, 1990

MEMBER VESSELS

AJ
ANNIHILATOR
BAY ISLANDER
CAPE KIWANDA
CARAVELLE
COHO
ENDURANCE
EXCALIBUR
EXCALIBUR II
GOLDEN PISCES
HAZEL LORRAINE
IRENE'S WAY
JEANETTE MARRIE
LESLIE LEE
LISA MELINDA
MARATHON
MISS LEONA
MUIR MILACH
NEW JANET ANN
NEW LIFE
PACIFIC CHALLENGER
PATIENCE
PEGASUS
PIONEER
QUEEN VICTORIA
RAVEN
ROSELLA
SEEKER
SLEEP ROBBER
SONNY BOY
VEGA
WESTERN DAWN

Mr. Clarence G. Pautzke
Executive Director
North Pacific Fishery Management Council
P.O. Box 103136
Anchorage, Alaska 99510

Dear Clarence:


RE: Delay 1991 Yellowfin Sole/Other Flatfish Opening

MTC vessels have played a pioneering role in developing yellowfin sole and other flatfish fisheries in the Bering Sea. MTC vessel owners, with about 10 years experience in this fishery, strongly support a 1991 and future years yellowfin sole/other flatfish opening date during the period of May 15-June 15, with most members preferring May 15. January 1 (status quo) opening dates have resulted (and will continue to result) in unavoidably high halibut bycatch rates, early fishery closures due to achievement of halibut bycatch caps, and millions of dollars of economic loss due to un-caught quotas. A May 15-June 15 opening date will allow fishermen to minimize halibut bycatch and maximize target species catch by working in ice-free waters away from known regions of halibut concentrations.

MTC urges approval of the 1991 and future year yellowfin sole/other flatfish opening date of May 15-June 15.

Sincerely,

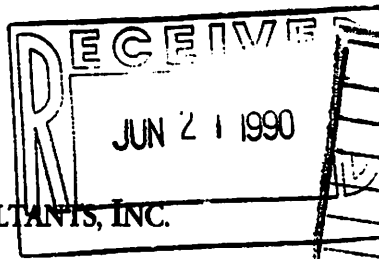
MIDWATER TRAWLERS COOPERATIVE


Steven E. Hughes
Technical Advisor



NATURAL RESOURCES CONSULTANTS, INC.

4055 21ST AVENUE WEST
SEATTLE, WASHINGTON 98199, U.S.A.
TELEPHONE: (206) 285-3480
TELEFAX: (206) 283-8263



ACTION	ROUTE TO	INITIAL
	Exec. Dir.	
	Deputy Dir.	✓
	Admin. Off.	
	Exec. Sec.	
	Staff Asst. 1	
	Staff Asst. 2	
	Staff Asst. 3	
	Economist	
	Sec./Bkkr.	
	Sec./Typist	

June 18, 1990

Mr. Clarence G. Pautzke
Executive Director
North Pacific Fishery Management Council
P. O. Box 103136
Anchorage, Alaska 99510

RE: Common sense bycatch management

Dear Clarence:

At the April Council meeting, Ron Hegge correctly made the point that the fishing industry could go a long way toward maximizing its target species catch and minimizing bycatch through following a few simple fishing principles. Ron asked if I could pull together these concepts and provide them to the Council; hence, the intent of this letter.

Deepwater groundfish assemblage

Slope rockfish (rougheye, short raker, Pacific Ocean perch, and yellow eye being the primary species), idiot rockfish, dover sole, rex sole and Greenland turbot are deepwater species which share the distributional feature of remaining on the continental slope in the 150-400 fm. zone year around. The primary PSC associated with target slope complex fisheries is halibut. Halibut display strong seasonal variations in depth distributions--deepwater in winter, inshore migration during the spring, shallow during the summer, migrate offshore during the autumn. Halibut (primarily adults) share slope habitat with deepwater groundfish assemblages to a maximum extent during the winter. Based upon these distributional differences, halibut bycatch in slope fisheries can be minimized by conducting slope fisheries during the late spring, summer and early autumn and by avoiding winter fisheries.

Sablefish is also a slope species, but displays stronger deep to shallow water migrations than most species of the deepwater community. Sablefish migrations to shallow water are much less than halibut. Halibut bycatch in sablefish fisheries can be minimized by regulating sablefish openings in late spring and summer and by restricting sablefish fisheries to depths of 150 fms and greater.

Bering Sea Flounder

Bering Sea flounders are comprised primarily of yellowfin sole, other flatfish (flathead, plaice) and rocksole. All are shallow-water shelf species whose spring/summer/fall preferred habitats are largely covered with ice during winter. Bering Sea flounder migrate west to east toward Bristol Bay as the winter ice pack recedes. Fisheries are only conducted by bottom trawling and bycatches consist of red king crab, Tanner crab (primarily bairdi), and halibut.

Except for rock sole where a strong economic incentive exists for a winter "roe season" fishery, halibut bycatch in the flounder fishery can best be minimized by implementing winter closures and opening the season between May 15-June 15. This opening date allows the fishery to be conducted in ice-free water and east of regions where high halibut catches occur.

In both research and commercial operations, it has been dramatically proven that Tanner crab bycatch rates (number of animals per ton of flounder) can be reduced 5-6 times by eliminating night towing (you see there is in fact truth to the story that crabs are out and about at night). The need for dark-hour towing to meet 24-hour production requirements is also greatly lessened in the spring/summer period relative to winter given Alaska's long hours of winter darkness and short hours of late spring/summer darkness.

Gulf of Alaska and Bering Sea/Aleutians Cod

Pacific cod inhabit the upper slope and shelf, ranging from 25-150 fms. Cod mix with halibut much of the year, most extensively during the non-winter months. Halibut bycatch in cod fisheries is likely unavoidable but can be minimized from the present situation by eliminating night fishing. Cod typically rise in the water column from their near seabed daylight habitat as darkness falls and return at daylight. Night fishing produces low cod catch rates and halibut catches at a rate about consistent with daylight hours. The result is substantially more halibut per ton of cod during hours of darkness.

Gulf of Alaska and Bering Sea/Aleutians Pollock

Alaska pollock have and will likely continue to comprise more than 60% of Alaska's total groundfish harvest. Pollock display what is

referred to as a semi-demersal distribution, being either off bottom in pelagic schools, near the seabed but still available to midwater trawl gear, or in close association with the seabed where bottom trawling is most effective. Like cod, pollock also move higher in the water column at night.

Midwater pollock fisheries are obviously very free of halibut and crab bycatches. Some have suggested that pollock be a midwater trawl only fishery. Others have suggested midwater trawling should be the only legal gear in the horseshoe area of the southern Bering Sea (south of 55° N latitude, for example), where halibut bycatches are high via bottom trawls.

Summary

The common sense regulatory measures which might be considered to reduce bycatches are summarized as:

1. Deepwater assemblages.--Slope rockfish, idiot rockfish, dover sole, rex sole and Greenland turbot: Open season late spring through fall to minimize halibut bycatches. Crab bycatches are not a problem.
2. Sablefish.--Open late spring-summer after halibut have moved inshore of sablefish grounds. Restrict fishing to 150 fms. and deeper.
3. Bering Sea flounder.--Open season no sooner than May 15. Restrict dark hour fishing.
4. Gulf of Alaska and Bering Sea/Aleutian cod.--Restrict dark hours fishing.
5. Gulf of Alaska, Bering Sea/Aleutian pollock.--Midwater trawling is the obvious way to go but may not be feasible year around. This one needs some help as midwater catches produce typically smaller fish (good for surimi) than bottom trawl catches (good for fillets).
6. Other items.--In addition to the above fishery distribution/behaviorable aspects, I believe the industry could be well served by the Council's regulating bycatch at the vessel level. A few vessels simply cannot be allowed to close seasons for entire fleet components. If individual vessels are held accountable, they will take actions to reduce bycatch and be responsible. These actions will include gear modifications and fishing practices which would be difficult to implement by regulation and probably more difficult to enforce.

Mr. Clarence G. Pautzke
Page 4

I hope this serves as a starting point and that these concepts stimulate further ideas and eventual regulations which will provide for a healthier industry. Some bad mistakes have been made, both in terms of what has and has not been done.

Sincerely,

NATURAL RESOURCES CONSULTANTS, INC.



Steven E. Hughes
Vice President

cc: Ron Hegge
Steve Pennoyer, NMFS/Alaska Region
AFTA
PSPA
NPFVOA
AHSF
MTC
HLA

DRAFT ENVIRONMENTAL ASSESSMENT
and
REGULATORY IMPACT REVIEW/INITIAL REGULATORY FLEXIBILITY ANALYSIS
OF A REGULATORY AMENDMENT APPLICABLE TO
THE GROUND FISH FISHERIES OFF ALASKA
[Delay of the flatfish season in the Bering Sea/Aleutian Islands]
and
[Amend the directed fishing standard for yellowfin sole]

ABSTRACT

This EA/RIR/IRFA analyzes impacts on the domestic fishery for flatfish species other than rock sole, in the Bering Sea and Aleutians Islands area, and effects on bycatches of red king crab, Tanner crab, halibut, herring, and salmon that might result from a new starting date of May 15, rather than January 1. Impacts of a June 15 starting date are also considered.

A May 15 starting date (mid-second quarter) is superior to January 1 with respect to reducing bycatch rates of red king crab and Tanner crab, and possibly salmon, assuming fishing effort concentrates in area 514 where high flatfish catch rates would occur. If the starting date remains January 1, fishermen would likely begin flatfish fishing in Zone 1 (areas 511 and 516) where high catches of flatfish would occur, but where high bycatch rates of red king crab are likely. This might cause premature closure to flatfish fishing there. High bycatch rates of red king crab (1.890-4.069 crab) experienced in 1990 caused early closure of the JV flatfish fishery in Zone 1 on January 25. JV fishermen then moved into westward areas where high halibut bycatch rates (0.012 mt of halibut) were experienced, resulting in closure of Zone 2H to flatfish fishing and then the entire Bering Sea to JV flatfish fishing. About 126,000 mt of flatfish with a value of \$19 million was foregone.

A May 15 starting date would allow fishing in area 514 north of Zone 1 where high flatfish catch rates would occur. Red king crab bycatch rates could be 0.085 in area 514 compared to 1.890-4.069 in Zone 1 at the same time of year. Tanner crab bycatch rates could be 0.100 in area 514 compared to 1.703 in area 511. A halibut bycatch rate could be 0.002 in area 514 as well as other areas. But this rate is six times smaller than the 0.012 rate in area 517 rate during the first quarter when flatfish fishing commenced there after being closed in Zone 1. With respect to salmon bycatches, data from the domestic observer program show some first quarter salmon bycatch in the DAP flatfish fishery (primarily rock sole). However, 1984-1986 foreign data for the third and fourth quarter show no salmon bycatch in the foreign flatfish fishery in areas 511, 513, 514, 516 and 521, even though many thousands of tons of flatfish were harvested. A May 15 or June 15 could be superior to a January 1 starting date if salmon catches are reduced.

A May 15 starting date is superior to a January 1 starting date in terms of better and safer working conditions with the advent of better weather and longer daylight. Better working conditions would increase overall working efficiency and reduce operating costs.

A May 15 starting date is superior to a June 15 starting date with respect to higher flatfish catch rates and, therefore, lower operating costs. Flatfish catch rates of 7.5 mt/hour during the second quarter have been experienced in area 514 compared to 3.7 in this area during the third quarter. Bycatch rates of red king crab, Tanner crab, and halibut would be lower, assuming flatfish fishing effort concentrates in area 514. With respect to herring, however, a higher herring bycatch rate could occur during a May 15 starting date rather than a June 15 starting date. Herring bycatch rates of 0.2 and 0.3 percent were observed during second quarter 1986 and 1987 JV harvests of roughly 94,000 and 137,000 mt of groundfish, most of which was yellowfin sole. By June 15, herring would have migrated from area 514 and bycatch would be negligible.

INTRODUCTION

The domestic and foreign groundfish fisheries in the EEZ of the Bering Sea and Aleutian Islands area (BSAI) are managed by the Secretary of Commerce (Secretary) under the Fishery Management Plan (FMP) for the Groundfish Fishery of the Bering Sea and Aleutian Islands Area. The FMP was prepared by the North Pacific Fishery Management Council (Council) under the Magnuson Fishery Conservation and Management Act (Magnuson Act) and is implemented by regulations for the foreign fishery at 50 CFR Part 611 and for the U.S. fishery at 50 CFR Part 675.

At times, amendments to the management measures contained in the FMP and regulations are necessary to respond to new information or changing conditions in the groundfish fisheries. Some of the more important management measures have addressed incidental catches of fish species, which are important to U.S. fishermen in other fisheries. These fish species include halibut, king crab, Tanner crab, salmon, and herring. Incidental catches of these species are referred to as "bycatch".

Various measures to minimize bycatches, especially of halibut and red king crab as well as Tanner crab (Chionoecetes bairdi), in the BSAI groundfish fisheries have been authorized by the FMP during past years. From March 15, 1989 through September 2, 1989, bycatch controls were implemented by emergency rule (54 FR 11376, March 20, 1989). These consisted of (1) closures of areas north of the Alaska Peninsula to trawling except in compliance with a data collection plan and (2) provision for gear

modifications and additional closed areas if excessive waste or biological harm to prohibited species occurred. Bycatch measures since September 3, 1989 are currently authorized by Amendment 12a to the FMP. These measures are intended to control the bycatch of halibut, Tanner crab, and red king crab in the BSAI bottom trawl fisheries. Because Amendment 12a expires on December 31, 1990, the Council is reviewing options for future bycatch management during the current 1989-1990 amendment cycle.

Amendment 12a notwithstanding, bycatches of red king crab in the bottom trawl flatfish fishery have occurred at rates higher than expected. A regulatory amendment has been proposed to address the problem of excessive bycatches in the flatfish fishery. The regulatory amendment proposes two actions. First, the starting date for the flatfish season, except for rock sole, would be delayed until May 15 or June 15. Second, the directed fishing standard for yellowfin sole would be amended. This Environmental Assessment/Regulatory Impact Review/Initial Regulatory Flexibility Analysis (EA/RIR/IRFA) is prepared to address impacts of these actions.

A description of, and reasons for, these actions are as follows:

Delay the start of the flatfish fishing season

The current season in the BSAI for the flatfish fishery is January 1 through December 31, subject to other closures. U.S. fishermen in both domestic annual processing (DAP) or joint venture processing (JVP) operations participate in the flatfish fishery. This fishery is done mostly with bottom trawls. Some fishing for Greenland turbot is also done with hook-and-line gear. The flatfish trawl fishery with bottom trawls results in bycatches of halibut, red king crab, and Tanner crab, which are controlled by measures contained in Amendment 12a.

Amendment 12a established a series of prohibited species catch (PSC) limits for halibut, Tanner crab, and red king crab within zones in the BSAI defined at 50 CFR Part 675 and listed as follows:

Zone 1 - Statistical Areas 511, 512, and 516.

Zone 2 - Statistical Areas 513, 517, and 521.

Zone 2H - Statistical Area 517,

The PSC limits are apportioned into bycatch allowances to the (1) DAP and JVP "flatfish" fisheries (yellowfin sole, rock sole, and "other flatfish") and (2) the DAP and JVP "other"

fisheries". The "other fisheries" are those which would not qualify as an "other flatfish" fishery. For example, Greenland turbot and arrowtooth flounder are included in the "other fisheries". Further descriptions of the PSC limits are as follows:

Red king crab - An overall PSC limit of 200,000 animals is established in Zone 1.

Tanner crab - Overall PSC limits of 1,000,000 and 3,000,000 animals are established in Zone 1 and in Zone 2, respectively.

Halibut - An overall PRIMARY PSC limit of 4,400 metric tons (mt) is established in Zones 1 and 2H, combined. An overall SECONDARY PSC limit of 5,333 mt is established for the BSAI. The PRIMARY PSC limit is a subset of the SECONDARY PSC limit.

The 1990 DAP and JVP flatfish fisheries in the above management zones were conducted with unexpectedly high bycatch rates of halibut and red king crab. Weekly reporting requirements were inadequate to monitor the fishery relative to these high rates. By the time information received indicated that the fishery should be closed, some PSC bycatch allowances had been grossly exceeded. The Council had intended that DAP and JVP fishermen would be encouraged to actively avoid prohibited species when it established the PSC allowances, and thus DAP and JVP fishermen would be able to harvest as much flatfish as possible. Instead of changing fishing practices to avoid prohibited species, however, the fishing fleets accelerated their flatfish harvest to maximize catch before attainment of a PSC allowance triggered closures to bottom trawling. As a result, they experienced high bycatch rates of halibut and crab.

For example, JVP fishermen experienced high bycatch rates of red king crab in Zone 1 in 1990 while fishing for flatfish in early January 1990. The bycatch of red king crab in Zone 1 was 161,816 crabs, which exceeded the JVP bycatch allowance of 50,000 crabs by 224 percent. In early January, bycatch rates of red king crab experienced by JVP fishermen were 4.4 crabs per ton of groundfish, which increased to 7.5 crabs later in January. These rates are high compared to rates experienced by JVP fishermen during the first and second quarters of 1987 and 1988. In 1987, the first and second quarter rates in Zone 1 (~ statistical area 511) were 0.17 and 3.48 crabs (Appendix 3). In 1988, the first and second quarter rates in Zone 1 in this statistical area were 0.78 and 0.28.

Although the abundance of red king crab stocks appeared to have increased between 1989 and 1990, the high rates of red king

crab bycatch are believed to have occurred as a result of fishing practices directed at catching as much of the JVP flatfish specifications as possible before the red king crab PSC was reached, rather than fishing in a manner to avoid red king crab.

When JVP flatfish fishing effort shifted west of Zone 1, halibut PSC became constraining, causing the JVP flatfish fishery to close in Zone 2H (statistical area 517) on February 27 when the primary (1°) halibut PSC allowance was reached, and the BSAI to close on March 5 when most of the secondary (2°) PSC allowance was reached. Amounts of JVP harvests of yellowfin sole, rock sole, and "other flatfish" that might have occurred in Zone 1 and the BSAI were foregone. About 98,000 mt of yellowfin sole, 22,100 mt of "other flatfish", and 5,900 mt of rocksole were left unharvested. At \$152 per mt, roughly \$19 million of exvessel gross revenue was foregone as a result.

Likewise, the 1990 domestic annual processing (DAP) fishery for flatfish (primarily rock sole) was closed prematurely when the halibut PSC allowance allocated to the DAP flatfish fishery was reached. Zone 2H was closed on March 14. The BSAI was closed on March 19.

Large amounts of the specified total allowable catch (TAC) for yellowfin sole and "other flatfish" have gone unharvested due to these closures. This has resulted in substantial losses in gross exvessel revenue for U.S. fishermen.

The Council reviewed the circumstances underlying these closures during its April 24-27, 1990 meeting. It noted that much of the flatfish harvest has occurred in the early winter months in Zone 1 just north of the Alaska Peninsula in areas where seasonal concentrations of yellowfin sole occur. Fishing for yellowfin sole in Zone 1 occurs in early winter, because yellowfin sole are concentrated in this area at that time, and also because the southern edge of the ice pack during early winter prohibits fishing farther north. The Council also noted that foreign and JV fisheries have profitably operated north of Zone 1 from mid-May through June once the yellowfin sole have migrated into this area.

Because distribution of red king crab occurs mostly in Zone 1, a closure of just that area would address the problem of high red king crab bycatches. The Council recognized, however, that fishing effort would then shift into westward areas, e.g. statistical areas 513, 515, and 517 where halibut bycatch problems could be exasperated. The Council's Ad Hoc Bycatch Committee, after considering information received from NMFS that closure of Zone 1 until later in the year would reduce the bycatch rate of red king crab in the flatfish fishery, recommended that the entire BSAI be closed to flatfish fishing until later in the year.

At the Council's April meeting, some U.S. fishermen requested that the delay in the flatfish season be imposed on JVP only, because most DAP effort for flatfish had occurred in the highly lucrative rocksole roe fishery. They explained that bycatch of yellowfin sole in the rock sole fishery sometimes occurs at high rate. Because the current definition of directed fishing for yellowfin sole constrains bycatches of yellowfin sole to less than 20 percent, fishermen must discard amounts of yellowfin sole that they catch as bycatch while fishing for rock sole. Because a DAP market for yellowfin sole is increasing, being forced by regulations to discard bycatch amounts of yellowfin sole is an unacceptable waste to these fishermen.

To address the problem of bycatches in the flatfish fishery, the Council recommended two regulatory changes be analyzed for its consideration at its June 1990 meeting. One, the start of the season for flatfish, other than for rock sole, throughout the BSAI would be delayed until such time as the ice edge would have receded to allow flatfish fishing in northern areas and, thus, reduce potential red king crab bycatches in Zone 1. The Council requested that starting dates between May 15 and June 15 be analyzed. And, two, the bycatch percentage of yellowfin sole in a rock sole fishery would be increased to avoid having to discard bycatch amounts of yellowfin sole caught as bycatch in the rock sole fishery. These regulatory changes, if adopted by the Council, would be submitted to the Secretary as a regulatory amendment to initiate proposed and final rulemaking. The regulatory amendment would become effective on January 1, 1991.

The regulatory amendment would not apply to the directed fishery for rock sole, which is a roe fishery conducted by DAP fishermen. Significant amounts of red king crab bycatch also occurs in this fishery. Through March 17, 1990, the DAP rock sole fishery caught 79,000 red king crab as bycatch, while catching about 18,000 mt of rock sole. The rock sole roe fishery starts in late December and ends in March of the following fishing year. The potential exvessel value of this fishery is about \$70 million a year, even though it lasts only a few months. U.S. fishermen could lose gross revenue equal to this amount, if the rock sole roe fishery was preempted due to a mid-year season starting date.

This proposal to delay the yellowfin sole and "other flatfish" fishery in the BSAI is necessary to reduce economic waste in the groundfish fisheries that is likely to occur if these fisheries continue to be closed prematurely. It is intended to further the opportunity to harvest available flatfish while affording continued protection for red king crab.

ALTERNATIVES

Delay the start of the flatfish fishing season.

Alternatives include:

(1) Maintain the regulatory status quo. Under this alternative, the start of the flatfish fishing season would remain January 1. High bycatches of red king crab that have been experienced by fishermen in Zone 1 and subsequent high halibut outside of Zone 1 would likely occur again. Premature closures of the flatfish fisheries would be expected, resulting in substantial amounts of flatfish not being harvested.

(2) Delay the start of the fishing season for flatfish, other than rock sole, throughout the BSAI management unit (preferred action). Under this alternative, no directed fishing for flatfish, except for rock sole, would be authorized until later in the year. Two options for season starting dates are considered - May 15 and June 15.

(3) Delay the start of the fishing season for flatfish, other than rock sole, in Zone 1 only. Under this alternative, only Zone 1 would be closed to flatfish fishing. Other areas would remain open, which could exasperate halibut bycatch problems in those areas as a result of displaced flatfish fishing effort during the Zone 1 closure to flatfish fishing.

Change the directed fishing definition for yellowfin sole.

Alternatives include:

(1) Maintain the regulatory status quo. Under this alternative, the directed fishing standard for yellowfin sole would remain 20 percent of all other fish and fish products on board a fishing vessel during a trip.

(2) Change the directed fishing standard for yellowfin sole from 20 percent to a higher percentage, e.g. 40 percent as measured in a rock sole fishery. Under this alternative, an amount of yellowfin sole up to a higher percentage, e.g. 40 percent, of rock sole and rock sole products could be retained on board a vessel, plus 20 percent of all other fish and fish products on board a vessel during a trip.

ANALYSIS OF THE ALTERNATIVES

Delay the start of the flatfish fishing season

Socioeconomic impacts of the alternatives

The DAP flatfish fishery to date targets largely on rock sole, the season for which would remain unchanged. Much of the analyses contained herein, therefore, uses the JV fishery to demonstrate effects of the alternatives.

Alternative 1 (status quo). Impacts on the fishery -- Certain bycatch rates (Table 1) of halibut, red king crab, and Tanner crab in a flatfish fishery are assumed to represent the status quo for purposes of this analysis. For the first calendar quarter, the rates were reported by observers in the JVP flatfish fishery through January 25, 1990 and in the DAP flatfish (rocksole) fishery through March 19, 1990. For the second, third, and fourth quarters, they were reported by observers on JV vessels during 1986 -1988 or on foreign vessels. These rates are shown for each statistical area where fishing occurred, in the table below. For the status quo during the first quarter, 1990 JVP rates from the first quarter are used.

Table 1. Assumed bycatch rates of halibut, red king crab, and Tanner crab observed in the BSAI flatfish fisheries. First quarter rates are from the 1990 JVP and DAP observer databases. Second, third, and fourth quarter rates are from the 1986-1988 JVP observer database.

	1st Quarter					
	Halibut (mt/mt)		Red king crab (no.s/mt)		Tanner crab (no.s/mt)	
	JVP	DAP	JVP	DAP	JVP	DAP
511	0.001	0.015	2.327	1.162	8.034	11.048
513	0.007	0.003	0.051	0.292	9.462	2.234
514	-----	-----	-----	-----	-----	-----
515	0.017	-----	0.000	-----	0.000	-----
516	0.001	0.009	4.069	4.410	3.931	16.032
517	0.012	0.021	0.005	-----	11.438	4.773
521	-----	-----	-----	0.582	-----	23.950
	2nd Quarter					
	Halibut (mt/mt)		Red king crab (no.s/mt)		Tanner crab (no.s/mt)	
511	0.002		1.748		1.703	
513	0.002		0.035		1.602	
514	0.002		0.085		0.100	
515	-----		0.005		-----	
516	-----		-----		-----	
517	-----		-----		-----	
521	-----		-----		-----	
	3rd Quarter					
	Halibut (mt/mt)		Red king crab (no.s/mt)		Tanner crab (no.s/mt)	
511	0.002		1.605		1.117	
513	0.002		0.020		1.850	
514	0.004		0.048		0.121	

515	-----	-----	-----
516!		0.072	.050
517!!	0.008	-----	-----
521	-----	-----	-----

4th Quarter

	Halibut (mt/mt)	Red king crab (no.s/mt)	Tanner crab (no.s/mt)
511	-----	-----	-----
513	0.001	0.100	0.770
514	0.008	0.080	0.220
515	-----	-----	-----
516!		0.260	0.330
517!!	0.002	-----	0.014
521	-----	-----	-----

! Foreign data
!! 1989 JV data

Effects on the flatfish harvest

When JVP fishermen were prohibited from further flatfish fishing in Zone 1 on January 25, 1990, they had harvested 39,200 mt of yellowfin sole, 1,856 mt of "other flatfish", and 3,013 mt of rocksole. Although fishing for flatfish resumed outside of Zone 1, substantial amounts of flatfish might have been harvested in Zone 1 if the red king crab PSC allowance had not been reached.

Flatfish are distributed seasonally, migrating into Zone 1 at the beginning of the year. Zone 1 has been a major fishing area early in the year. During January, yellowfin sole and "other flatfish" reside on the outer continental shelf at 50-100 fathoms. During February, yellowfin sole may be found just north of the Alaska Peninsula in Zone 1, perhaps attracted to somewhat warmer water that moves northeastward onto the shelf. Much of the flatfish fishing grounds are confined to Zone 1, where red king crab also reside. High bycatches of red king crab in Zone 1 are likely during any year. Starting in April and continuing through June, yellowfin sole migrate eastward from the outer shelf from north and south of the Pribilof Islands and concentrate on the upper continental shelf north of Zone 1.

Eventually all JV flatfish fishing was closed as a result of reaching the 1st and 2nd JVP halibut allowances. The actual 1990 amounts of yellowfin sole, "other flatfish", and rock sole harvested in the BSAI by JV fishermen were about 65,000 mt, 18,800 mt, and 10,400 mt, respectively. Quotas remaining were: yellowfin sole - 98,800 mt; "other flatfish" - 22,100 mt; and rocksole - 5,900 mt. Using an exvessel value for JVP groundfish of \$152/mt, the JVP exvessel value for these three categories of flatfish was about \$19 million. Had the red king crab and

halibut allowances not been reached prematurely, JVP fishermen would have harvested more flatfish and accrued additional revenue up to this amount.

Under the status quo, opportunities for larger flatfish harvests are likely to be curtailed, because high rates of red king crab bycatches in Zone 1 and halibut bycatches to the west of Zone 1, would cause early attainment of the PSC limit for red king crab. If flatfish fishing effort remains high in Zone 1, substantial bycatches of red king crab, and subsequent displacement of effort into areas of high halibut bycatch, would continue. The actual 1990 amount of flatfish harvested in the BSAI by JV fishermen was about 125,600 mt, distributed among areas, as follows:

Zone	Flatfish mt
511	12,700
513	31,800
516	62,600
517	<u>18,500</u>
	125,600

Under the status quo, flatfish fishermen risk being closed early, resulting in (1) foregone harvest and revenue, or (2) additional operating costs as a result of stopping and then recommencing fishing activity. Also, fishing early in the year likely causes additional costs in terms of decreased operating efficiency from inclement winter weather. With respect to effects on the flatfish harvest, the status quo is inferior to either Alternatives 1 or 2, because opportunities to more fully achieve the quotas for yellowfin sole and "other flatfish" will be reduced.

Effects on king crab bycatch

Under the status quo, the start of the flatfish fishery would remain January 1. Because good flatfish fishing occurs in Zone 1, including areas 511 and 516, substantial fishing effort would be occur there. Bycatch rates, however, of red king crab per ton of flatfish experienced by JVP fishermen, in early January 1990 were 2.327 crabs in area 511 and 4.069 crabs in area 516. As stated in the introduction, the rate was even as high as 7.5 crabs.

Area	Flatfish mt	1st quarter Red king crab bycatch rate
511	12,700	2.327
513	31,800	0.051
516	62,600	4.069
517	<u>18,500</u>	0.005
	125,600	

The actual number of red king crabs that were caught in Zone 1 before the fishery was closed was about 150,000 crab. Management tools, e.g. daily reporting requirements of individual vessels, to manage the king crab PSC limit were not available to constrain the red king crab bycatch to the 50,000-crab JVP allowance. Management tools are being pursued which may be available in time for the 1991 first quarter fishery. Because fishing effort in the flatfish fishery would be substantial, daily reporting may not be enough to prevent the PSC allowance from being grossly exceeded again.

Fishing for yellowfin sole and "other flatfish" could occur outside of Zone 1. Until the ice edge recedes far enough north to allow fishing north of 58° N. latitude, however, fishing could only take place to the west of Zone 1. More effort to harvest the same amount of flatfish would be required, which would likely cause higher catches of prohibited species. With respect to king crab bycatches, however, potential bycatch rates could be significantly reduced from those in Zone 1. As listed above, rates experienced by JVP fishermen in Areas 513 and 517 were 0.051 and 0.005 crabs, respectively.

Using the red king crab PSC allowance of 50,000 crab, JV flatfish fishing in either area 511 or 516 would be constrained. Only about 26,455 mt of flatfish could be caught in area 511 or 12,288 mt in area 516 at the high rates, assuming that monitoring the fishery resulted in its being closed when the PSC allowance was reached. In either area 513 or 517, however, JV flatfish fishing would not be constrained due to small red king crab bycatch, because (1) small amounts of red king crab occur in these areas, and (2) red king crab PSC allowances do not apply outside of Zone 1.

With respect to effects on red king crab, the status quo is inferior to either Alternatives 1 or 2, because flatfish fishing would occur mostly in Zone 1, and red king crab bycatches could occur at such a high rate that the PSC mortality limit would be achieved prematurely. Opportunities to more fully achieve the quotas for yellowfin sole and "other flatfish" would be reduced.

Effects on halibut bycatch

Under the status quo, if fishermen are prohibited from fishing for flatfish in Zone 1 as a result of reaching the red king crab PSC allowance in Zone 1, they may pursue flatfish fishing in areas to the west of Zone 1. JVP fishermen did just that in 1990. Fishing for flatfish in westward areas, however, would likely exasperate the bycatch of halibut. These areas might include Statistical Areas 513 and 517. Halibut bycatch rates (Table 1) in area 517 are typically high, relative to the other areas.

Area	Flatfish mt	1st quarter halibut bycatch rate
511	12,700	0.001
513	31,800	0.007
516	62,600	0.001
517	<u>18,500</u>	0.012
	125,600	

Closure of Statistical Area 517 (Zone 2H), which is currently required by regulations once the 1° halibut PSC allowance is reached, would become more likely depending on where flatfish fishing occurred. In 1990, Zone 2H closed to JVP fishing for flatfish on February 27 as a result of reaching the 1° halibut 660 mt PSC allowance.

Using the 2° halibut PSC allowance of 800 mt, JV flatfish fishing in either area 511 or 516 would not be constrained. Numerically, about 800,000 mt of flatfish could be caught in either area 511 or 516, which is an amount in excess of the flatfish TAC. In either area 513 or 517, however, JV flatfish fishing would be constrained. About 114,000 mt or 67,000 mt of flatfish in areas 513 or 517, respectively could be supported by the allowance, which are amounts short of the current flatfish TAC. With respect to halibut bycatch, the status quo is inferior to either alternative 2 or 3, because early attainment of the red king crab PSC allowance in Zone 1 during the first quarter would cause greater effort west of that Zone where higher halibut bycatches would occur.

Effects on Tanner crab bycatch

Under the status quo, JVP rates during the first quarter in areas 511 and 516 were 8.034 and 3.931 crabs/ mt flatfish (Table 1). If these areas were closed prematurely in Zone 1 as a result of reaching the red king crab PSC, then fishing could shift to westward areas during the first quarter. JVP rates in areas 513 and 517 were 9.462 and 11.438, respectively.

Area	Flatfish mt	1st quarter Tanner crab bycatch rate
511	12,700	8.034
513	31,800	9.462
516	62,600	3.931
517	<u>18,500</u>	11.438
	125,600	

Using the Tanner crab PSC allowance of 400,000 crab in Zone 1, JV flatfish fishing in area 511 would be constrained. Only about 50,000 mt of flatfish could be caught. In area 516, JV

fishing would be only somewhat constrained. About 102,000 mt could be caught. Reaching the Zone 1 red king crab allowance, however, would occur before the Tanner crab was reached. Using the Tanner crab PSC allowance of 1,000,000 crab, JV flatfish fishing would be somewhat constrained in area 513 where about 106,000 mt of flatfish could be caught. In area 517, JV flatfish fishing would be severely constrained. About 87,000 mt of flatfish could be caught.

Effects on herring bycatch

Under the status quo, few herring would be caught. The flatfish fishery would be conducted in Zone 1 and adjacent areas during the early winter months. Few herring, if any, are in these areas at that time of year. During January and February, herring are found in areas northwest of the Pribilof Islands. In March, herring begin shoreward migrations to coastal spawning sites, e.g. Togiak, where they arrive in May. Vessels are not able to fish the grounds where herring occur as a result of the southern edge of the sea ice, making fishing difficult or impossible. Through most of April, the ice edge remains far south, extending along a line from northwest of the Pribilof Islands southeastward to about the latitude of Port Moller. Not until late April or early May does the edge sufficiently north to allow fishing. A small segment of the spawning population arrives at Port Moller in May. No fishing would be occurring in this area due to the closed status of area 512.

Effects on salmon bycatch

Under this alternative, flatfish fishing could continue in Zone 1, until it was closed upon reaching the red king crab PSC allowance. Few data are available from the 1990 JV fishery. Some data can be obtained from the DAP flatfish fishery (primarily rock sole), however, through the domestic observer program. During the first quarter of 1990, the observers reported 77 salmon caught as bycatch in 2,184 mt of groundfish samples in Zone 1. They reported 28 salmon caught as bycatch in 684 mt of groundfish samples. Bycatch rates were 0.04 in both cases. Compared to either alternates 2 or 3 in which few salmon if any are expected to be caught as bycatch, the status quo alternative may be inferior with respect to salmon bycatch.

Administrative and enforcement costs -- Under the status quo, no changes in administrative or enforcement costs would occur, even though agency management of the fisheries would continue to be labor intensive. Because the need for more adequate management tools remains, e.g. better reporting requirements, efforts would continue to develop them. Better reporting requirements would require more labor to collect, analyze, and disseminate the

information, which would necessitate at least two more data managers in the NMFS Regional office. The need to increase personnel will occur, however, under the status quo as well as under alternatives 2 or 3.

Alternative 2 - Delay the starting date of the flatfish season, other than for rock sole, in the BSAI. Two options for season starting dates, May 15, and June 15, are considered.

Effects on the flatfish harvest

Option 1 -- Fishermen could not conduct a directed flatfish fishery until May 15. At that time of year, the southern edge of the ice pack would have receded far enough north to allow fishing in statistical area 514 north of 58° N. latitude, as well as in statistical areas south of that latitude. Fishermen would have 7.5 months to harvest whatever TACs for yellowfin sole and "other flatfish" are available. In 1990, initial TACs for yellowfin sole and "other flatfish" were 207,650 mt and 60,150 mt, respectively. Good fishing for yellowfin sole in area 514 is expected. Historical JVP catch information indicates that 7.5 metric tons of flatfish have been harvested per hour in area 514 during the second quarter. Flatfish are abundant in this area in the vicinity of Togiak and the Walrus Islands during the period around May 15, apparently because they congregate to feed on herring eggs. The peak spawning period of herring stocks in this area is May 15.

Under this option, fishermen would have 4.5 fewer months to harvest available flatfish. Amounts of yellowfin sole and "other flatfish" that could be harvested during the remaining months available are estimated from foreign and JVP catch reports. For example, in 1985 the total foreign yellowfin sole harvest during June through December in the BSAI was 77,057 mt. The total JVP yellowfin sole harvest during the same time period was 91,912 mt. Total yellowfin sole harvests for seven months, therefore, have been at least 168,969 mt. This amount equals 81 percent of the 1990 yellowfin sole TAC. On the basis of this information, a season delay might constrain the full potential of the yellowfin sole harvest. Market opportunities, however, might stimulate even greater effort, resulting in the entire TAC being reached in the 7.5 months available.

Option 2 -- Fishermen could not conduct a directed flatfish fishery until June 15. Fishermen would have 6.5 months to harvest the yellowfin sole and "other flatfish" TACs. JVP catch information indicates that 3.7 metric tons of flatfish have been harvested per hour in area 514 during the third quarter. Compared

to option 1, opportunities would be lost to harvest yellowfin sole in statistical area 514 at a time when they are more concentrated.

Because yellowfin sole and "other flatfish" disperse soon after herring have spawned, fishermen must expend more effort to catch them. By June 15, fishermen would necessarily spend several hours trawling to catch the same amount of yellowfin sole and "other flatfish" as they would catch if allowed to start on May 15. Because additional trawling time increases the amount of bycatch of other species, a June 15 starting date for the flatfish fishery is less favorable than May 15. As under option 1, a season delay might constrain the full potential of the yellowfin sole harvest, but market opportunities might stimulate effort, resulting in the entire TAC being reached in the 6.5 months available.

Under either option, however, the JV flatfish fishery should be productive, even if they do not return to Zone 1 to fish. For example, total JV catches of yellowfin sole and "other flatfish" during 1986 in area 514 during the third quarter was 43,860 mt and 8,191 mt, respectively (Appendix 1). Also, under either option, the risk of being closed as a result of early attainment of bycatch is reduced compared to the status quo. Thus, operating costs would be reduced as they fish to obtain the quota. Fishing later in the year reduces operating costs, because operating efficiency would be increased as a result of being able to operate in better seasonal weather and longer daylight.

Effects On red king crab bycatch

Under either option of this alternative, bycatch rates of red king crab would be reduced compared to the status quo. A large percentage of the yellowfin sole and "other flatfish" harvest is likely to occur in area 514 north of Zone 1, thereby avoiding until midyear areas that are sensitive to bycatches of red king crab. This will occur even though flatfish fishing could resume throughout the BSAI, because good flatfish fishing will be available in area 514. As a result, fewer red king crab will be taken as bycatch. For example, joint venture fisheries experienced bycatch rates (numbers of red king crab/mt of yellowfin sole) in area 514 that ranged between 0.048 and 0.080 during the 2nd, 3rd and 4th quarters during 1986 and 1987. These are significantly lower than the 1990 rates in Zone 1 of 2.327 to 4.069 red king crabs per ton (Table 1).

Area	Flatfish mt	2nd, 3rd, & 4th quarter red king crab bycatch rates
511	12,700	1.748 1.605 ----

513	31,800	0.035	0.020	0.100
514		0.085	0.048	0.080
516	62,600	0.005	0.072	0.260
517	<u>18,500</u>			
	125,600			

If the same amount of flatfish, 125,600 mt, that was caught in 1990 by JV fisheries, was caught in area 514, these rates would result in a red king crab bycatch of between 6,028 and 10,048 crab. In Zone 1, however, the bycatch rates of 2.327 for area 511 and 4.069 for area 516 might result in a red king crab bycatch of 160,000 if the 1990 joint venture experience was repeated.

Based on the historical rates, either Option 1 or 2 of Alternative 2 are superior to the status quo with respect to reducing red king crab bycatches.

Effects on halibut bycatch

Under option 1 or option 2, flatfish fishing would not start until May 15 or June 15. As discussed above, high flatfish catch rates are expected by May 15, resulting in lower halibut bycatch rates. By June 15, flatfish catch rates would be lower, resulting in higher halibut bycatch rates. For purposes of this analysis, halibut bycatch rates under these two respective options are represented by information from second quarter and from third and fourth quarter information. For the second quarter, flatfish catches have been 7.5 mt/hour. Halibut bycatch rates have been 0.002 mt of halibut/mt groundfish. For the third quarter and fourth quarters, flatfish catches have been 3.7 and 3.3 mt/hour. Halibut bycatch rates have been 0.002 and 0.008.

Area	Flatfish mt	2nd, 3rd, & 4th quarter halibut bycatch rates		
511	12,700	0.002	0.002	----
513	31,800	0.002	0.002	0.001
514		0.002	0.004	0.008
516	62,600	-----	-----	-----
517	<u>18,500</u>		0.008	0.002
	125,600			

Under option 1 (May 15 opening), if 125,600 mt of flatfish was all harvested during the second quarter in area 514, 251 mt of halibut could be caught, using a bycatch rate of 0.002. Under option 2 (June 15 opening), if all of the flatfish were caught in area 514 during the third or fourth quarters, the halibut catch could be 502 or 1,004 mt. With respect to the JVP halibut allowance of 800 mt, option 1 is superior to option 2.

Zone 1 would open also on May 15 or June 15. Halibut bycatch rates may be the same, e.g. 0.002 under either option in area 511 as in area 514. If all 125,600 mt of flatfish was harvested in Zone 1, the same amount of halibut bycatch may result as if the harvest occurred in area 514. Assuming same bycatch rates, no difference exists between option 1 or option 2.

Effects on Tanner crab bycatch

Under either option of this alternative, bycatch rates of Tanner crab would be reduced compared to the status quo if fishing occurs mostly in area 514. As discussed above, a large percentage of the yellowfin sole and "other flatfish" harvest will occur in area 514, thereby avoiding high Tanner crab concentrations in Zone 1. As a result, fewer Tanner crab will be taken as bycatch. For example, joint venture fisheries experienced bycatch rates (numbers of Tanner crab/mt of yellowfin sole) in area 514 that ranged between 0.100 and 0.22 during the 2nd, 3rd and 4th quarters during 1986 and 1987. These are significantly lower than the 1990 rates in Zone 1 of between 3.931 and 8.034 Tanner crabs per ton (Table 1).

Area	Flatfish mt	2nd, 3rd, & 4th quarter Tanner crab bycatch rates		
		1.703	1.117	----
511	12,700	1.602	1.850	0.770
513	31,800	0.100	0.121	0.220
514		-----	0.050	0.330
516	62,600	-----	-----	0.014
517	<u>18,500</u>			
	125,600			

If the same amount of flatfish, 125,600 mt, that was caught in 1990 by JV fisheries, was caught in area 514, these rates would result in a Tanner crab bycatch of between 12,500 and 27,632 crab. In Zone 1, however, the bycatch rates of 3.931 for area 511 and 8.034 for area 516 might result in a Tanner crab bycatch of between 493,733 and 1,009,070 crab if the 1990 joint venture experience were repeated.

Effects on herring bycatch

If the starting date for the flatfish fishing is May 15 under option 1, much of the fishing effort could occur in statistical area 514 north of 58° N. latitude in the vicinity of Togiak, where good fishing for yellowfin sole occurs. As discussed above under the section, Effects on the flatfish harvest, herring occur in this area during their spawning period, which peaks in mid-May. Herring would be caught, especially if

the effort on flatfish is substantial. During 1986 and 1987, herring bycatch rates experienced by joint venture fisheries in this area at this time of year were 0.2 and 0.3 percent of the yellowfin sole catch. For example, 105 mt of herring were caught in 1986 while harvesting 94,505 mt of groundfish, including 47,211 mt of yellowfin sole. In 1987, 380 mt of herring were caught while harvesting 137,094 mt of groundfish, including 118,044 mt of yellowfin sole. These rates in area 514 were somewhat higher than the respective 1986 and 1987 rates of 0.08 percent and < 0.1 percent observed in other BSAI areas.

When the flatfish fishery opens in Zone 1 on May 15, trawling in Zone 1 may resume. Bycatches of Pacific herring in Zone 1 at this time of year are expected to occur at low rates, using the 1986 and 1987 fishing years as examples. After spawning in the area of Togiak north of 58° N. latitude during mid-May, some stocks of herring are thought to migrate clockwise in southern Bristol Bay. By July 1, these herring stocks are expected to have moved west of 165° W. longitude into statistical area 517 and beyond. As of May 15, however, herring would not yet have migrated out of northern Bristol Bay and are not expected to be caught even if fishing effort moves into Zone 1 at that time.

Effects on salmon bycatch

Under this alternative, flatfish fishing would be delayed until either May 15 or June 15. Data are available from the foreign fisheries that targeted on flatfish in areas 511 through 522. No salmon were ever reported by observers, even though flatfish catches amounted to tens of thousands of metric tons. Under this alternative, any effects on any of the species of salmon would be insignificant.

Administrative and enforcement costs -- Under alternative 2, no changes in administrative or enforcement costs are expected. Even though management of the flatfish fishery would not begin until May 15 or June 15, other fisheries would still be managed, consuming agency resources as a result of other intense fisheries.

Alternative 3. Delay the fishing season for flatfish, other than rock sole, in Zone 1 only.

Under this alternative, only Zone 1 would be closed to flatfish fishing until a later date. For purposes of analysis, only a May 15 starting date is considered.

Effects on the flatfish harvest

Under this alternative, flatfish would be limited to the west of Zone 1 in areas 513, 515, and 517 until the southern edge of the sea ice had retreated sufficiently to allow fishing north of Zone 1. Nonetheless, substantial amounts of flatfish could be harvested. For example, in 1990, JVP fishermen harvested 31,800 mt of flatfish in area 513 and 18,500 mt in area 517, or about 29 percent of the 125,600 mt JV flatfish harvest.

Area	1st quarter Flatfish mt
513	31,800
517	<u>18,500</u>
	50,300

Likewise, JV fishermen have demonstrated substantial flatfish catches during the first quarter outside Zone 1 during 1986-1988. For example, the respective catches for yellowfin sole and "other flatfish" during the first quarter of 1988 were 35,800 mt and 17,100 mt (Appendix 1). Once the season starts on May 15, good flatfish catches could be expected north of Zone 1 as discussed under Alternative 2.

If fishing were delayed until May 15, fishermen could still target on flatfish outside Zone 1 until the season in Zone 1 opened. Fishermen may decide to remain outside of Zone 1 as long as good fishing for flatfish continued.

Effects On red king crab bycatch

The rate of red king crab bycatch would be reduced under this alternative. The high bycatch rates discussed under the status quo alternative of 2.327 and 4.069 in areas 511 and 516, respectively, would not be expected, because these areas would be closed until May 15. Flatfish fishing would occur, however, in areas to the west of zone 1. In 1990, JV fishermen experienced red king crab bycatch rates in these areas much lower than in Zone 1. For example, while catching 50,300 mt of flatfish, JV vessels experienced bycatch rates of red king crab of 0.051 in area 513 and 0.005 in area 517.

Area	Flatfish mt	1st quarter Red king crab bycatch rate
513	31,800	0.051
517	<u>18,500</u>	0.005
	50,300	

In previous years, JV fishermen also experienced low bycatch rates of red king crab in areas west of Zone 1 compared to within Zone 1 while fishing for yellowfin sole during the first quarter. For example, during 1986-1988, the first quarter bycatch rates varied from 0.01 to 0.03 in area 513 (Appendix 2). First quarter rates in Zone 1 were as high as 12.63.

On the basis of the above information, red king crab bycatch would be reduced if fishing for yellowfin sole were limited to statistical areas 513 and 514. If fishing resumed in statistical area 511 after May 15, the red king crab bycatch would remain relatively high.

Effects On Tanner Crab bycatch

Under this alternative, fishermen might commence fishing in area 513 during the first quarter. In this area, observed Tanner crab bycatch rates were 2.23 crab during the first quarter compare to 7.72 in Zone 1 (Appendix 3). During the third and fourth quarters, rates are only available for area 513 and 514. Respective third and fourth quarter rates were 3.27 and 1.16 in area 513 and 0.16 and 0.41 in area 514.

On the basis of the above information, the amount of Tanner crab bycatch would likely be reduced if fishing for yellowfin sole were limited to statistical area 514. If fishing occurred in statistical area 513 or resumed in statistical area 511 after May 15, the Tanner crab bycatch would increase.

Effects On halibut bycatch

Under this alternative, flatfish fishermen could begin fishing in either or both areas 513 or 517 during the first quarter, because Zone 1 would be closed. Bycatch rates in these two areas could be 0.007 and 0.012, respectively.

Area	1st quarter	
	Flatfish mt	halibut bycatch rate
513	31,800	0.007
517	<u>18,500</u>	0.012
	50,300	

Both rates are high compared to 0.001 in Zone 1 (areas 511 and 516). The Area 517 rate, in fact, is twelve times the Zone 1 rate. Thus, if Zone 1 is closed under this alternative and all JV flatfish fishing effort concentrated in Area 517, a harvest of only about 67,000 mt of flatfish would be possible before the JV

halibut PSC allowance of 800 mt would be reached. This amount is only 53 percent of the 1990 flatfish harvest of 125,600 mt.

On the other hand, 1986-1988 data on the JVP yellowfin sole fisheries suggest that first quarter observed halibut bycatch rates are variable between areas 511 and 513. In area 511, they ranged from 0.57 to 1.21 halibut per metric ton of yellowfin sole. In statistical area 513, they ranged from .60 to 2.43. This information is summarized from Appendix 4, below:

<u>Year</u>	<u>Area</u>	<u>Halibut first quarter bycatch rates</u>
1986	511	1.21
	513	2.43
1987	511	1.16
	513	0.60
1988	511	0.57
	513	0.89

On the basis of the above information, effects on halibut bycatch rates of a season delay of the flatfish fishery in Zone 1 are difficult to determine between areas 511 and 513. Except for area 517, where high halibut bycatch rates appear to always occur, bycatch rates would likely be independent of the statistical area where flatfish fishing would occur.

Because flatfish fishing could concentrate in area 517, however, this alternative is inferior to the status quo, because lower bycatch rates could be experienced in Zone 1 than in area 517. If it weren't for the high bycatch rate of red king crab in Zone 1, being able to fish in Zone 1 at the start of the year would have been preferable to Alternative 2.

Effects On herring bycatch

Prior to Zone 1 opening to flatfish fishing on May 15, much of the fishing effort could occur in statistical area 514 north of 58° N. latitude in the vicinity of Togiak. Herring occur in this area during their spawning period, which peaks in mid-May. Some herring bycatches have occurred in the large JVP flatfish fisheries. For example, 105 mt of herring were caught in 1986 while harvesting 94,505 mt of groundfish, including 47,211 mt of yellowfin sole. In 1987, 380 mt of herring were caught while harvesting 137,094 mt of groundfish, including 118,044 mt of yellowfin sole. These herring bycatches in 1986 and 1987

represented 0.2 percent and 0.3 percent of the yellowfin sole catch. These rates in statistical area 514 were somewhat higher than the respective 1986 and 1987 rates of 0.08 percent and < 0.1 percent observed in other BSAI areas.

When the flatfish fishery opens in Zone 1 on May 15, trawling in Zone 1 may resume. Bycatches of Pacific herring in Zone 1 at this time of year are expected to be minimal. After spawning in the area of Togiak north of 58° N. latitude during mid-May, some stocks of herring are thought to migrate clockwise in southern Bristol Bay and may become more susceptible to Zone 1 trawl operations. By July 1, however, these herring stocks are expected to have moved west of 165° W. longitude into statistical area 517 and beyond. As of May 15, however, herring would not yet have migrated out of northern Bristol Bay and are not expected to be caught even if fishing effort moves into Zone 1 at that time. Some herring are believed to migrate to the area of Port Moller east of the flatfish fishing grounds in Zone 1. By the time Zone 1 opens on May 15, some of these herring could be susceptible to trawl operations along with those from the Togiak area. Depending on fishing effort, however, bycatch could be insignificant. Other trawl operations also occur in this area. Through mid-May 1990, trawling for Pacific cod resulted in 0.2 mt bycatch of herring.

Administrative and enforcement costs -- Under alternative 3, no changes in administrative or enforcement costs would occur. Although Zone 1 would be closed, fishing effort in the adjacent areas to the west would still require labor intensive management.

Change the directed fishing definition for yellowfin sole.

Socioeconomic impacts of the alternatives

Alternative 1 (status quo) -- Under this alternative, the directed fishing standard for yellowfin sole would remain at 20 percent. When directed fishing for yellowfin sole is closed, only amounts of yellowfin sole up to 20 percent of all other fish and fish products can be retained on board a vessel. Amounts that are equal to or greater than 20 percent would be considered to be the result of directed fishing. If fishermen catch amounts of yellowfin sole in excess of the directed fishing standard, they must discard them at sea to avoid being in violation of a closure to directed fishing for this species.

If the directed flatfish fishery, other than for rock sole, is delayed until later in the year, e.g. May 15 or June 15, amounts of yellowfin sole up to 20 percent of rock sole could be retained until the flatfish fishing season starts. In 1990, the

initial rock sole TAC was set at 67,359 mt. If all of the rock sole TAC was harvested prior to the start of the general flatfish fishing season, an amount of yellowfin sole up to 20 percent of rock sole TAC, or 13,471 mt could be harvested as bycatch.

Amounts of yellowfin sole, as well as "other flatfish", in rock sole landings during the 1990 rock sole fishery in the Bering Sea were examined, using the Alaska Department of Fish and Game fish ticket database. Any landings when rock sole were 50 percent of the total tonnage landed (by fish ticket landing record) were defined to be the result of a rock sole fishery. In 46 records, 31 showed no bycatch of yellowfin sole. The remaining 15 records showed an average bycatch rate (proportion of yellowfin sole to rock sole) of 9.8 percent.

Because the ADF&G fish tickets are landing records only, they do not indicate amounts of yellowfin sole discarded. Industry sources were queried to determine rates (proportions) of yellowfin sole in the rock sole fishery. Rates varied from about 1 percent in the western side of statistical area 511 to as high as 45.7 in the eastern side. Fishermen move west to east as they harvest rock sole. The unweighted average of the proportions was 19.9 percent.

Although some yellowfin sole fin bycatch rates are low, high rates of yellowfin sole can occur in a rock sole fishery. Because yellowfin sole stocks are not in need of conservation, allowing a higher percentage would eliminate waste during times when actual bycatches are large in a rock sole fishery.

No additional administrative or enforcement costs would occur as a result of retaining the status quo.

Alternative 2. Change the directed fishing standard for yellowfin sole from 20 percent to a higher percentage, e.g. 40 percent as measured in a rock sole fishery. Under this alternative, the directed fishing standard for yellowfin sole would be increased to a higher percentage in a rock sole fishery. Forty percent is used as an example. When directed fishing for yellowfin sole is closed, amounts of yellowfin sole up to 20 percent of all other fish and fish products PLUS 40 percent of the amount of rock sole and rock sole products can be retained on board a vessel. Amounts that are equal to or greater than the sum of 20 percent of amounts of fish, other than rock sole, and 40 percent of the amount of rock sole on board a vessel would be the result of directed fishing.

If the fishing season for flatfish is delayed, but a TAC for rock sole equal to that established initially in 1990 is harvested prior to the start of the flatfish fishing season, an amount of yellowfin sole equal to 40 percent of the rock sole TAC of 67,359 mt, or 26,943 mt could be harvested as bycatch. To the

extent that U.S. fishermen had a market for yellowfin sole caught incidental to a rock sole fishery, the potential gross revenue that could be generated from this amount of bycatch could approach \$21 million, based on a DAP exvessel value of \$774 per metric ton. If the directed fishing definition is changed to allow a higher proportion of yellowfin sole in a rock sole fishery, fishermen could accrue more revenue.

Environmental impacts of the alternatives

The types of environmental impacts that are associated with fishery management actions are generally categorized as (1) changes in predator-prey relationships among invertebrates and vertebrates, including, fish, marine mammals, and birds, (2) physical changes as a direct result of fishing practices, e.g. bottom trawling, and (3) nutrient changes due to fish processing and discarding fish wastes into the sea. Any groundfish harvests result in removing numbers of fish from the environment where they had been predators or prey. Bottom trawling can disrupt the ocean bottom. Examples of such disruptions include: increased turbidity that could reduce feeding efficiency of various animals; uprooting benthos (attached animals and plants), and damaging various marine life. Environmental impacts of the proposed measures and their alternatives are discussed as follows:

Delay the start of the flatfish fishing season.

Alternative 1, maintain the status quo. Under the status quo alternative, smaller amounts of flatfish might be harvested as a result of reaching the PSC allowances established for red king crab in Zone 1 and halibut in Zone 1 and 2H. For example, in 1990 the total amount of flatfish left unharvested by JV operations was 126,000 mt. Unharvested flatfish would remain as predators and prey within the ecosystem. Premature closure of the flatfish fishery under the status quo would result in curtailed fishing activity, which would reduce disturbance associated with bottom trawling. Because bottom fishing activity for other species would still be ongoing, the overall effect of the status quo would likely not be measurable. Smaller harvests of flatfish as a result of potential closures of Zones 1 and 2H would cause reduced processing of flatfish and smaller amounts of nutrients being discharged into the sea.

Each of the prohibited species also have roles as predators and prey in the ecosystem. Under the status quo alternative, or any of the other alternatives, bycatches of red king crab, Tanner crab, and halibut will be controlled by PSC limits. Thus, no changes in environmental impacts should occur under any alternative. Because high bycatch rates of red king crab and

halibut would likely recur under the status quo, however, the PSC allowances of red king crab in Zone 1 and the 1 and 2 PSC halibut allowances might be exceeded again as they were in 1990. Nonetheless, any environmental impacts as a result of exceeding these PSC limits are believed to be insignificant. Bycatches of herring would be less under this alternative than those occurring under Alternative 2 as discussed below. Environment impacts of amounts saved are believed to be insignificant, given natural perturbations in the environment. Information on salmon bycatch rates is not yet well understood. Possibly more salmon would be caught under this alternative than under Alternatives 2 or 3. Overall catches, however, compared to sizes of salmon stocks, would be insignificant.

Alternative 2 -Delay the starting date of the flatfish season, other than for rock sole, in the BSAI.

Under the two options under this alternative, larger harvests of flatfish are expected, because bycatch rates of red king crab and halibut would be reduced markedly if fishing occurs in area 514 under a May 15 or June 15 starting date. More flatfish would be removed from the ecosystem, ending their predator/prey roles. More physical disturbance to the ocean bottom would occur as a result of increased bottom trawling activity. More nutrients would be introduced into the ecosystem as a result of larger amounts of processing of flatfish. Because no more than the specified flatfish quotas are intended for harvest, however, no net changes in impacts should occur other than those already anticipated under the FMP.

As discussed under Alternative 1, the PSCs established for red king crab, Tanner crab, and halibut are controlling. Unless management fails to limit mortality to amounts intended by the PSCs, no net changes in environmental impacts are expected. Additional bycatches of herring might result from a May 15 opening rather than a June 15 opening. However, bycatches in previous years have been small, e.g. 105 mt in 1986 and 380 mt in 1987, which occurred as bycatches in groundfish harvests of 94,505 mt and 137,094 mt of groundfish, respectively. No measurable impacts over those occurring in the natural environment are expected.

Change the directed fishing definition for yellowfin sole.

Alternative 1 (status quo) - Under this alternative, the amount of yellowfin sole that could be retained while fishing for rock sole would remain less than 20 percent of amounts of rock sole retained on board. More yellowfin sole, therefore, would remain in the ecosystem where they would continue their predator/prey roles. No physical impacts on the ocean bottom

would occur beyond those caused by the directed rock sole fishery. If yellowfin sole are caught in a higher proportion than that allowed by the directed fishing definition, additional amounts of nutrients would be disposed of at sea in terms of round weight fish.

Alternative 2. Change the directed fishing standard for yellowfin sole from 20 percent to a higher percentage, e.g. 40 percent as measured in a rock sole fishery -- Under this alternative, a larger percentage of yellowfin sole could be retained in a rock sole fishery. If the amount of yellowfin sole that is retained is the result of true bycatch and not the result of topping off a vessel's catch of rock sole with amounts of yellowfin sole up to a higher allowed percentage, then less round weight fish would be discarded at sea. No differences in physical changes to the ocean bottom from trawling or additions of nutrients would be expected, unless additional trawling is done to top off rock sole catches with additional yellowfin sole. Because no more than the intended harvest amount of yellowfin sole as bycatch in addition to a directed yellowfin sole catch would be allowed, no net changes in the ecosystem would occur beyond those anticipated by the FMP.

FINDINGS OF NO SIGNIFICANT ENVIRONMENTAL IMPACT

For the reasons discussed above, neither implementation of the proposed action nor any of the alternatives to that action would significantly affect the quality of the human environment, and the preparation of an environmental impact statement on the preferred action is not required by Section 102(2)(C) of the National Environmental Policy Act or its implementing regulations.

DATE

COORDINATION WITH OTHERS

North Pacific Fishery Management Council
P.O. Box 103136
Anchorage, Alaska 99510

LIST OF PREPARERS

Ronald J. Berg
Fishery Management Division
NMFS, Alaska Region
P.O. Box 21668
Juneau, Alaska 99802

Appendix 1. Joint venture catches (mt) of yellowfin sole (YFS) and other flatfish (Oflat) species in statistical areas 511, 513, and 514 during 1986-1988 (data summarized from NOAA Technical Memorandum NMFS F/NWC-155, Bycatch Rates in the Bering Sea and Aleutian Islands Joint Venture Groundfish Fishery, 1986-88, Jerald D. Berger, November 1988.

Statistical area:		511		513		514	
Year	Quarter	YFS	Oflat	YFS	Oflat	YFS	Oflat
1986	1	390	165	1,888	1,009	---	---
	2	46,309	11,688	25,506	8,770	3,569	1,678
	3	102	25	6,605	1,891	43,860	8,191
	4	---	---	3,411	1,207	3,133	887
	Subtotal	46,801	11,878	37,430	12,877	50,562	10,756
1987	1	31,292	5,709	3,979	421	---	---
	2	15,919	2,200	5,689	1,746	114,194	7,921
	3	---	---	---	---	3,850	616
	4	---	---	---	---	---	---
	Subtotal	47,211	7,909	9,668	2,167	118,044	8,537
1988	1	54,677	10,815	35,845	17,112	---	---
	2	501	28	3,671	2,216	70,175	6,482
	3	---	---	---	---	---	---
	4	---	---	---	---	---	---
	Subtotal	55,178	10,843	39,516	19,328	70,175	6,482
TOTAL		149,190	30,630	86,614	34,372	238,781	25,775

Appendix 2. Joint venture bycatches (numbers/mt) of red king crab (RKC) in the yellowfin sole (YFS) target fishery in statistical areas 511, 513, and 514 during 1986-1988 (data summarized from NOAA Technical Memorandum NMFS F/NWC-155, Bycatch Rates in the Bering Sea and Aleutian Islands Joint Venture Groundfish Fishery, 1986-88, Jerald D. Berger, November 1988.

Statistical area:		511	513	514
Quarter				
1986	1	12.63	0.00	---
	2	2.12	0.06	0.02
	3	2.55	0.03	0.06
	4	---	0.21	0.16
	AVERAGE	2.21	0.06	0.07
1987	1	0.17	0.03	---
	2	3.48	0.08	0.08
	3	---	---	0.17
	4	---	---	0.00
	AVERAGE	1.29	0.06	0.08
1988	1	0.78	0.01	---
	2	0.28	0.08	0.13
	3	---	---	---
	4	---	---	---
	AVERAGE	0.78	0.02	0.13

Appendix 3. Joint venture bycatches (numbers/mt) of Tanner crab in the yellowfin sole (YFS) target fishery in statistical areas 511, 513, and 514 during 1986-1988 (data summarized from NOAA Technical Memorandum NMFS F/NWC-155, Bycatch Rates in the Bering Sea and Aleutian Islands Joint Venture Groundfish Fishery, 1986-88, Jerald D. Berger, November 1988.

Statistical area:		511	513	514
Quarter				
1986	1	7.27	2.23	
	2	2.08	2.38	1.41
	3	1.77	3.27	0.16
	4	0	1.61	0.41
	AVERAGE	2.12	2.46	0.21
1987	1	1.31	2.62	
	2	3.38	4.96	0.14
	3	0	0	0.38
	4	0	0	
	AVERAGE	2.01	3.99	0.15
1988	1	1.17	2.30	
	2	0.28	2.57	0.04
	3	N/A		
	4	N/A		
	AVERAGE	1.16	2.33	0.04

Appendix 4. Joint venture bycatches (numbers/mt) of halibut in the yellowfin sole (YFS) target fishery in statistical areas 511, 513, and 514 during 1986-1988 (data summarized from NOAA Technical Memorandum NMFS F/NWC-155, Bycatch Rates in the Bering Sea and Aleutian Islands Joint Venture Groundfish Fishery, 1986-88, Jerald D. Berger, November 1988.

Statistical area:		511	513	514
Quarter				
1986	1	1.21	2.43	---
	2	1.40	0.89	0.11
	3	1.01	0.47	1.43
	4	---	0.53	2.67
	AVERAGE	1.40	0.86	1.62
1987	1	1.16	0.60	---
	2	1.19	1.92	0.98
	3	---	---	2.40
	4	---	---	0.00
	AVERAGE	1.17	1.37	1.03
1988	1	0.57	0.89	---
	2	0.30	3.24	0.27
	3	---	---	---
	4	---	---	---
	AVERAGE	0.57	1.10	0.27